9 APPLYING LANDSCAPE ECOLOGY AND CONSERVATION BIOLOGY PRINCIPLES TO PRIORITY HABITAT DESIGNATION IN STRATHCONA COUNTY

Recently, there have been calls for the study of landscape diversity for conservation purposes. The emerging science of landscape ecology provides numerous concepts that can be applied to practical problems in managing natural areas of any size, and may be especially useful in solving preservation problems in fragmented landscapes. Because conservation of species diversity depends on conservation of the habitats and landscapes in which species live, greater attention must be given to understanding and examining diversity at the broader ecosystem and landscape level (Rowe 1992).

Landscape ecology has emerged as the trans-disciplinary science which integrates other fields such as conservation biology, population biology, ecology, and geography in an attempt to explain spatial patterns: what they are; how they develop; how they change over time; and how they affect and are affected by biological and ecological processes. A landscape is comprised of a mosaic of habitat elements (i.e., patches, corridors, and the intervening matrix). An understanding of all of these elements and processes is integral if the ***right*** habitat fragments and remnants are to be conserved in Strathcona County's conservation plan.

9.1 The Effects of Habitat Fragmentation

The issue central to conserving wildlife populations in Strathcona County, as with in all other highly developed landscapes, is the fragmentation of habitats. Habitat fragmentation, involving both a reduction in total landscape area and a division of the remaining area into isolated pieces, has long been implicated as a major factor in the decline of certain species (Saxena 1994). As early as 1855, the French ecologist de Candolle observed, *"The breakup of a large landmass into smaller units would necessarily lead to the extinction or local extermination of one or more species and the differential preservation of others"* (Browne 1983). Today, most conservation biologists agree with Wilcox and Murphy (1985) that *"habitat fragmentation is the most serious threat to biological diversity and is the primary cause of the present extinction crisis."*

The end result of fragmentation is often a patchwork of small, isolated "natural" areas in a sea of development; these areas are the land units designated as priority ***Wildlife Habitat Units*** in this study. The ecological similarities between such isolated WHUs (or other legally protected areas) and natural oceanic islands have spawned the application of island biogeography theory (*sensu* MacArthur and Wilson 1967) to public land management. The emerging scientific disciplines of landscape ecology (Forman and Godron 1986), biodiversity conservation (Wilson and Peter 1988), and conservation biology (Soule 1986) can also be applied to the effective management of remnant wildlife habitats and habitat refuges, particularly to determine the effects of refuge size, shape, and isolation on biodiversity and on individual species conservation potential.

Based on current knowledge, the direct consequences of habitat fragmentation on biodiversity may be assigned to one of the following four categories (Harris 1988, Harris and Atkins 1991, Saunders et al. 1991):

1. *Loss of large, wide-ranging species, especially top carnivores or otherwise threatening forms* (e.g., bears). Cursorial forms, which are vulnerable to automobile collisions, and aquatic migratory forms (e.g. fish), which are vulnerable to obstacles to migration, are particularly sensitive.

2. *Loss of area-sensitive or interior species* that only reproduce in the interior of large tracts of habitat and are therefore vulnerable to reduction in size of the individual component habitat units as well as to reduction in total available habitat area.

3. *Loss of genetic integrity from within species or populations* that inhabit areas too small for a viable population of individuals. This is especially important for large, wide-ranging carnivores or raptors that are territorial and require areas proportional to population number (i.e., they are not amenable to population packing).

4. *Increase in abundance of habitat generalists which are characteristic of disturbed environments*. Often these species serve as competitors (e.g., European starlings), predators (e.g., crows), or parasites (e.g., brown-headed cowbirds) on native species and accelerate their demise.

The ultimate result of these four classes of impacts is that each region loses its unique and distinguishing biological characteristics and acquires the generalist species that are already common throughout the human-dominated landscape. Therefore, activities that may increase the number of species and biological diversity of individual component subsystems may in fact cause the demise of some species and homogenize regional differences, thereby greatly reducing the biodiversity of the compound or regional system.

9.2 Effective Size of Wildlife Habitat Units

Where wildlife habitat is concerned, refuge or reserve size is a fundamental issue raised by conservation biologists and land managers and similar questions are applicable to the Prioritized Wildlife Habitat Inventory for Strathcona County when phrased as, ***"How big must a priority Wildlife Habitat Unit be in order to adequately protect and/or provide life requisites for its significant element(s)?"*** Considerable debate has historically cantered on both the size and spatial arrangement of such refugia.

The central question that must be answered in order to determine the adequate size of a priority WHU lies in first determining the nature of the species or elements of significance. Areal requirements of priority WHUs will differ between those with a focus on small, sedentary species to those with a focus on large, wide-ranging species, to those with a focus on ecological processes and integrity. Pickett and Thompson (1978) introduced the concept of a ***minimum dynamic area***, defined as *"the smallest area with a natural disturbance regime, which contains internal recolonization sources, and hence minimizes extinction. The size would be furthermore defined by the most extinction-prone taxon [such as a large carnivore]."* Unfortunately, this concept is impractical in application, as few priority WHUs (and, in the case of Strathcona County, few undisturbed land parcels at all) are anticipated to be large enough to constitute minimum dynamic areas.

Recent debates have focused on the relative value of a Single Large Or Several Small (SLOSS) refuges (Soule and Simberloff 1986). The controversy surrounding this issue is rooted in the importance of small reserves and, in particular, whether two or more reserves equal in total area to a single large reserve will support more or fewer species. The history of this debate has been reviewed by numerous authors (Margules et al. 1982, Simberloff 1982, Blake and Karr 1984, Soule and Simberloff 1986, and others) and, while all arguments are not presented here, most researchers agree that a set of small reserves frequently support more species than does a single large reserve. However, this assertion is fraught with stipulations and assumptions which render it largely inapplicable to on-the-ground conservation efforts (for examples, see Soule and Simberloff 1986, Askins et al. 1987).

Many of the species in small habitat units are characteristic of disturbed habitats and the species in most need of management may be absent. Thus, while it is true that several small refuges can contain at least as many species as a single large refuge at the time of designation, a major point of concern lies in the population dynamics of critical species after the WHU has been recognized, set aside, and surrounded by anthropogenic activity. Total species richness at the time of designation may not be the best measure of the effectiveness of a priority WHU for maintaining either sensitive species or regional biodiversity. In this light, larger wildlife habitat refuges are almost always more valuable for conservation purposes than are smaller refuges. Both Soule and Simberloff (1986) and Noss (1987) make a case for "bigness" of protected areas because larger reserves tend to house a greater diversity of habitats and, subsequently, support more species and larger populations than smaller reserves, thus reducing the probability of species extinction.

Where specific species have been targeted, the size of potential Environmentally Significant Areas and, ultimately, protected areas is extremely critical for the conservation of large, wide-ranging species of concern. Within Strathcona County, such species include moose, white-tailed deer, mule deer, and coyote (*Canis latrans*). The preservation of genetic variability to allow for long-term evolutionary development of these species includes the need to maintain large effective populations and the need to provide linkages between populations to allow for dispersal and avoid general inbreeding depression. The optimal size of a priority WHU designated to acknowledge significant ungulate habitat in the Astotin Creek sand dune area, for example, must be large enough to provide enough within population variation to slow the rate of genetic drift. The effective population, or ***minimum viable population*** (MVP), has been described by Shaffer (1981) as:

> *the smallest isolated population having a 99% chance of remaining extant for 1,000 years despite the foreseeable effects of demographic, environmental, and genetic stochasticity, and natural catastrophes.*

Unfortunately, estimates of MVPs are largely subjective because empirical data on which to base such estimates are relatively difficult to acquire. Consequently, estimates of MVPs have been fairly variable, ranging from 50 (Berry 1971) to 500 (Franklin 1980) individuals for most species. In reality, however, an overall population much larger than this is required in order to avert inbreeding depression. The extinction of species, as an evolutionary mechanism, is an inevitable process (Raup and Sepkoski 1984). For small populations, the expected time to extinction is shorter than that for larger populations and, at some extremely low population level (i.e., below MVP), the time to extinction becomes very short. The establishment of reserves and refuges will be ill-fated if they are based on priority WHUs that, even in combination, are too small to allow a population to reach or exceed its MVP. Therefore, populations whose habitat requirements are satisfactorily met within a given WHU may, nonetheless, be highly susceptible to extinction if the WHU is too small for them to maintain an MVP (Soule and Simberloff 1986).

Area-sensitive species such as pileated woodpecker, ovenbird, and flying squirrel (*Glaucomys sabrinus*) are particularly affected by refuge size. These species are forest interior inhabitants and are intolerant of ecotonal zones, also called "edge" habitat. Area-sensitive species require large tracts of undisturbed, canopied forest, therefore WHUs in forested areas represent rare, largely undisturbed habitat patches of varying sizes which allow forest interior species to maintain viable populations. Physical changes such as increased solar insolation, increased wind speeds, higher diurnal temperature fluctuations, and decreased soil moisture have been documented at forest edges (Laurance and Yensen 1991). In addition, the penetration of climatic factors has been shown by some authors (Franklin and Forman 1987, Temple and Cary 1988) to extend many hundreds of metres into a forested patch. Thus, patches of mature and old forest which are less than 10 ha in size are essentially all edge and do not retain characteristics of mature forest required by forest-interior species. Forest interior species that are sensitive to edge effects or that require large contiguous areas to maintain populations are unlikely to persist in fragmented or small habitat units.

The insulation of high priority Wildlife Habitat Units from extraneous forces, both anthropogenic and naturally occurring, is a critical management concern for habitats which are intended to serve a roll as refuges. Researchers such as Schonewald-Cox and Bayless (1986) have hypothesized that the effectiveness of refuge habitats are more dependent upon what crosses the refuge boundary than upon any internal processes alone. Therefore, designating WHUs with an appropriate buffer zone conveys advantages to the inhabitants by increasing available habitat and decreasing potential exposure to adverse impacts. In addition, the realization that both ecological and social factors will eventually affect the Wildlife Habitat Units and the effectiveness of a refuge has prompted Harris (1984), Noss and Harris (1986), and Noss (1987) to advocate a multiple-use-module, consisting of an inviolate core preserve surrounded by a gradation of multiple-use buffer zones (Figure 4). The inclusion of such buffer and multiple-use zones has obvious implications on the required size of the designated habitats.

The shape of a land unit designated as a priority WHU is not of significance until the refuge or reserve itself is established. At that time, refuge shape is a greater concern with smaller areas than with larger areas. Patches of habitat which are either small or elongated have a much higher edge:area ratio than larger, circular or square patches (Williams and Marcot 1991).

The above factors have been cited in support of larger WHUs, acknowledging significant amounts of habitat which are capable of supporting vast populations. However, the political and economic constraints of such a concept are numerous and, as a result, it is logistically more feasible to designate a multiple series of core natural areas connected by corridors of suitable habitat.

9.3 Connectivity Between Wildlife Habitat Units

Many of the species causing conservation concerns in today’s world are top carnivores and it is widely accepted that animals higher in the trophic pyramid tend to be less habitat-specific. The principle of the inverse pyramid of habitats suggests that species at higher trophic levels are generally more rare than primary consumers, yet they also range over greater distances and derive their life requirements from a greater number of habitats. Therefore, their active management requires the conservation of a network of habitat components. For these species, designating small, isolated Priority Wildlife Habitat Units within a larger ecological complex has implications fundamentally similar to habitats that have been fragmented and separated by sub-optimal

Figure 4: Multiple-Use Module

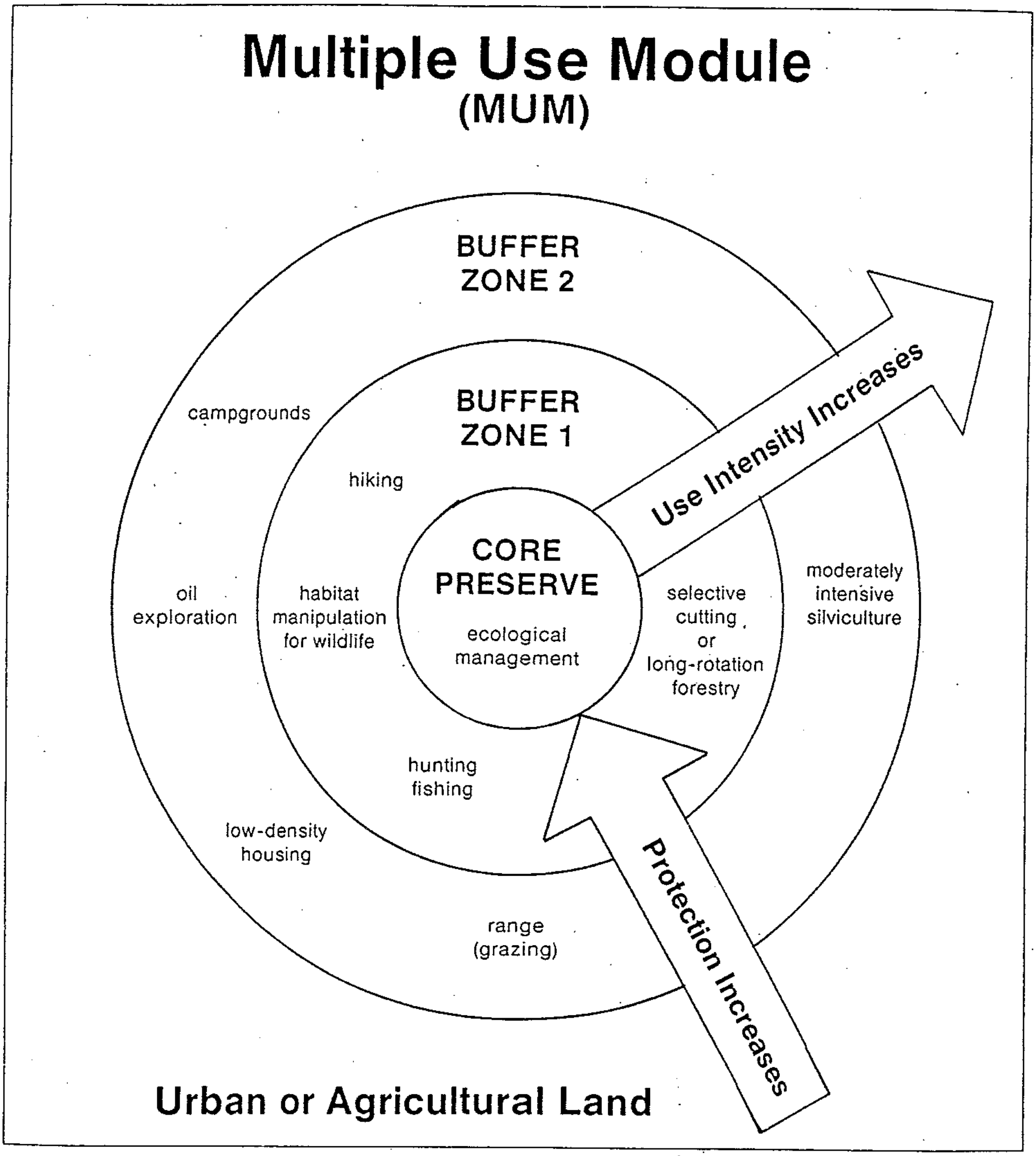


Figure 4: **Multiple Use Module (from Noss 1987)**

environments. Between these disjunct patches of amenable habitat (high priority WHUs, for example), the extent and nature of the habitat which separates the WHUs combine to create variable degrees of isolation and restriction for some wildlife populations, particularly far-ranging species.

The forces that govern the evolution of natural communities in isolated systems can be arbitrarily classified as either extrinsic or intrinsic (Soule 1983). Extrinsic forces include deleterious interactions with other species, such as increases in predation, competition, parasitism, and disease as well as deleterious changes in habitat or the physical environment. However, intrinsic factors are particularly critical because their effects are not always as evident as are the results of extrinsic forces. Intrinsic factors include random variation in the genetically-based traits of the species and interactions of these traits with the environment. These include: demographic stochasticity (random variation in sex ratio and recruitment rate); social dysfunction or behaviours that become maladaptive at small population sizes; and genetic deterioration as a result of inbreeding, genetic drift, and other factors (Soule and Simberloff 1986).

Over evolutionary time, declines to small population sizes, whether they be predictable or stochastic declines, can eliminate all of the individuals of a certain species from a small habitat patch. A patch that experiences such an extirpation may be recolonized if it is not completely isolated by inhospitable habitat. If isolation prevents recolonization of the habitat unit, local extinctions may accumulate to form landscape, regional or even larger extinctions. When interchange of individuals is possible within and among these core wildlife habitat units, however, a habitat patch may be recolonized after a local extirpation, thus preventing extinction of the species from an entire region or set of WHUs.

Levins (1970) introduced the concept of ***metapopulation*** to describe wildlife communities which are linked demographically to function as a whole. This concept is integral to the conservation of natural ecosystems and functioning ecosystem components, particularly in relation to these Wildlife Habitat Units and potential refuge areas designed to conserve populations of migratory, nomadic, or largely vagile species, such as ungulates or waterfowl. Metapopulation models have replaced island biogeography theories regarding terrestrial habitat islands due to some fundamental differences between the two theories (Merriam 1991). The metapopulation model:

1. considers populations and their demographic and genetic processes, rather than changes in number of species;

2. does not assume a single (mainland) source of colonists;

3. does not assume limiting rarity of recolonization; and,

4. incorporates the effects of heterogeneity both within and among habitat patches, or WHUs.

A comprehensive approach to prioritizing Wildlife Habitat Units in Strathcona County must also consider the genetic properties of small, insular populations. Movement of individuals between populations is required in order to effectively counter the extirpation of local populations. Provincial policies and federal acts abound with examples of mandates for managing wildlife movement. Fisheries, waterfowl, and other migrant species management strategies have hinged on the need for many wildlife species to migrate and for others to roam and disperse. For example, a highway underpass system in Banff National Park, Alberta has been designed to allow deer, elk, wolves, and other species unhindered movement between habitats on either side of the Trans-Canada Highway (Bertch 1991).

The recognition of some species' need to move over great distances is a reality that must be incorporated into both regional and provincial land use strategies from the very initial phases of the planning process, including the Prioritized Landscape Ecology Assessment being completed here. Due to the relatively large areas required for species such as white-tailed deer, it is fair to assume that between-population movements cannot be facilitated within any single Priority 1 WHU and even within-population movements will be restricted for such species in most, if not all, WHUs. Simply put, individual WHUs in Strathcona County cannot be made large enough in and of themselves to support viable populations of these species. Therefore, an interconnected system of landscape linkages remains the most practical method of providing for the needs of wildlife in the County. For example, Suckling (1982) observes, *"The size of [habitat units] is not relevant, provided they are linked by corridors of suitable habitat, as gene flow and dispersal can occur freely throughout. Within intensively managed or developed areas, a system of linked [habitat units] is desirable."*

The need for vertebrates to move derives from many basic biological functions, including the need to access resources such as food, water, and shelter, the need for sexual organisms to mate and outbreed, and the need to colonize new environments (Chepko-Sade and Halpin 1987). It is very difficult for any small, isolated population of vertebrates to maintain its genetic and demographic integrity indefinitely in the face of habitat fragmentation, genetic isolation and inbreeding. Frankel and Soule (1981) have commented that modifications to the environment that preclude movement between component WHUs may be as devastating to nomadic species as are the forces that directly destroy habitats and species; this phenomenon is especially critical to higher trophic level genera in the Strathcona County study area, such as mustelids and large carnivores, including lynx, coyote, and black bear. The dynamics of fragmented and isolated populations mimic those of isolated islands of small populations where intrinsic and extrinsic factors such as localized catastrophes, disease vectors, sex and age imbalances, and inbreeding can severely threaten population viability. These factors have led ecologists to the theory that a self-amplifying cycle, termed an “extinction vortex” (Gilpin and Soile 1986), results in smaller populations exhibiting a rate of extinction that is higher than would be predicted from population size alone (Figure 5).

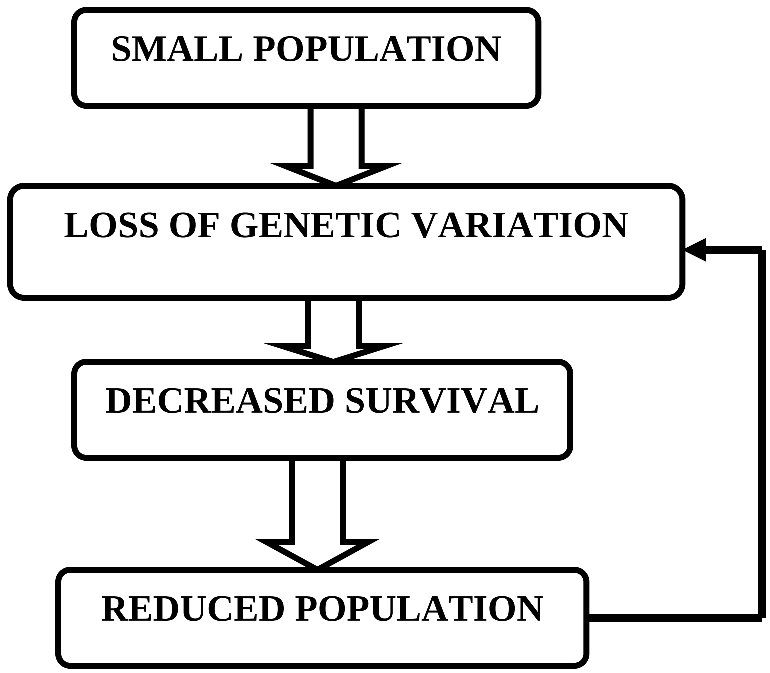
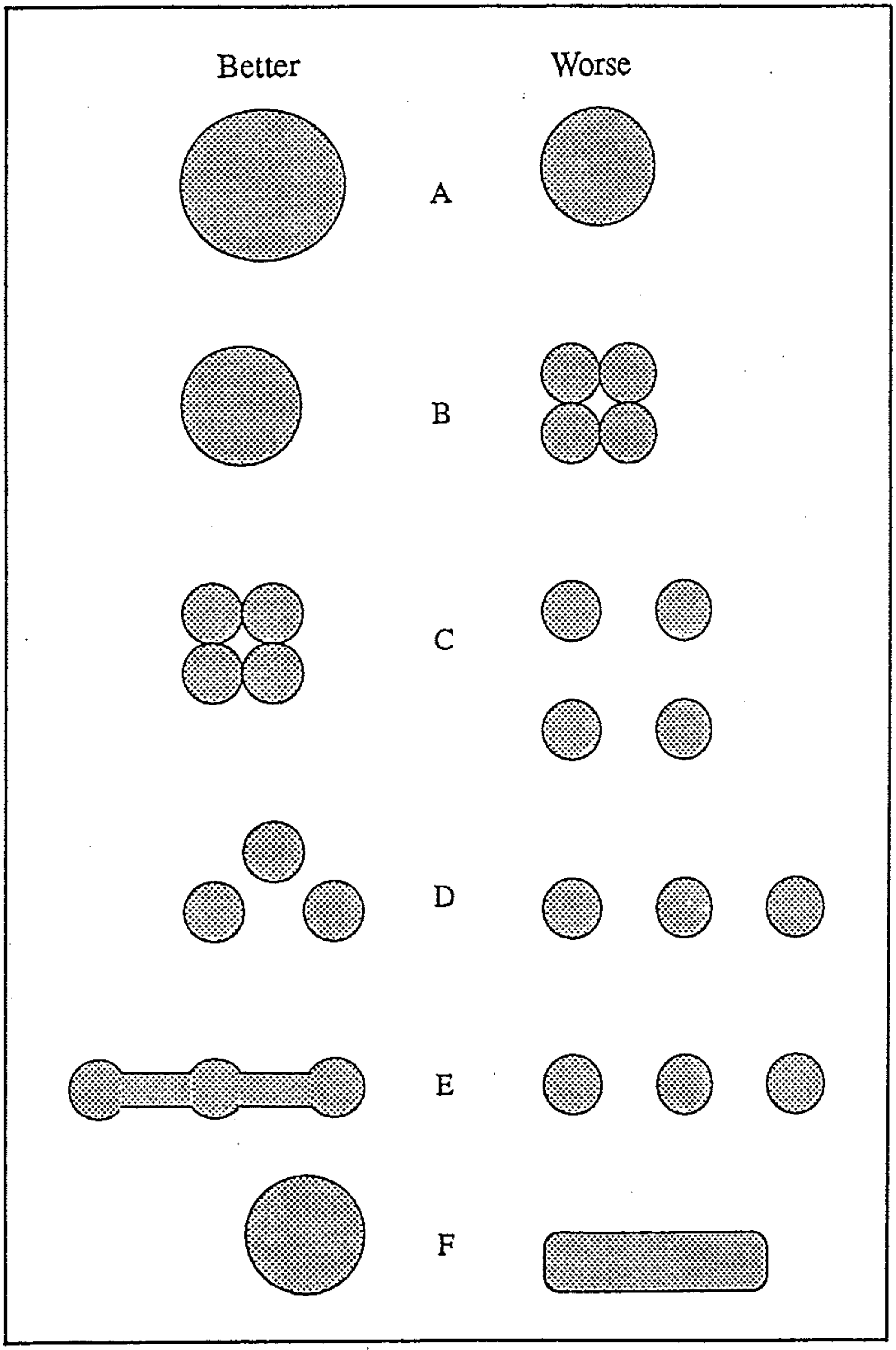


Figure 5: Extinction Vortex For Small Wildlife Populations

Soule and Simberloff (1986), Noss (1987), and Merriam (1991) as well as a wealth of additional researchers maintain that a system of multiple core habitat refuges connected by corridors are necessary in order to capture the full spectrum of biological diversity in a region, to include all centres of endemism and unique habitats, to maintain genetically distinct populations, and to guard against episodic extinctions. Based on the aforementioned theories of conservation biology, insular island biogeography, landscape ecology, and metapopulation models, the parameters of high to moderate priority Wildlife Habitat Units presented in Figure 6 are anticipated to provide the most effective means of conserving biodiversity and representative habitats and landscapes in Strathcona County.

Figure 6: Optimal Refuge Parameters Required to Conserve Wildlife Habitats in Strathcona County

***Figure 6:* Optimal Refuge Parameters Required to Conserve Wildlife Habitats in Strathcona County**



Within the scope of sociological, political, and economic constraints of any given region, conserving landscape units with a certain degree of ecological integrity is more likely accomplished through the acknowledgement of an array of core priority or critical wildlife habitats and the interconnection of these habitat patches.

9.4 Biological Characteristics and Functions of Wildlife Corridors

We have already come to the understanding that many animals found within Strathcona County make daily and seasonal movements to meet their life requisites and that they depend upon "stepping stones" of appropriate habitats to do so. In addition, many wildlife populations also have the need to disperse, or to move away from their place of origin. It is critical that avenues for dispersal and other movement be maintained within fragmented habitats if local extinction is to be prevented or compensated. Despite the great diversity of reasons why animals move, the distance moved by terrestrial organisms is roughly proportional to the time frame being considered (Table 12).

Table 12: REASONS FOR MOVEMENT OF TERRESTRIAL VERTEBRATES

(adapted from Harris and Scheck 1991)

Reason for Movement	Time Interval	Distance
To forage for resources that are patchy in space	daily	< km to 10's km
To exploit resources that are sporadic in time	daily / monthly	meters to 100's km
To exploit seasonal environments	seasonal migration	up to 100's km
To accommodate different life stages	seasonal	100's km to 1,000's km
To return to birth place	annually	up to 1,000's km
To colonize new environments	n/a	up to 100's km
To extend range distribution	n/a	up to 100's km
To accommodate climate change	decades	up to 100's km
To colonize new islands or continents	decades	100's km to 1,000's km

We have used the term ***"wildlife corridor"*** in this project to define such transitional habitats that allow wildlife species to move between natural areas in the regional landscape. The retention of natural movement corridors for wildlife species, particularly large game animals, has been recognized worldwide as a practical conservation strategy for species such as tigers (*Panthera tigris*: Seidensticker 1989), Asian elephants (*Elephas maximus*: Rudran et al. 1980), giant pandas (*Ailuropoda melanoleuca*: Schaller et al. 1985), black bears (Pelton 1986); grizzly bears (*U. arctos*: Picton 1988), and Florida panthers (*Felis concolor coryi*: Maehr 1990).

Comprehensive reviews of the literature on wildlife corridors have been conducted by Forman and Godron (1986), Adams and Dove (1989), and Harris and Gallagher (1989). For purposes of this project, we have differentiated between ***dispersal corridors*** or ***landscape linkages*** and other ***linear habitats***. Linear habitats such as fencerows, hedgerows, or streamside buffers are valued primarily or solely as habitat. Although corridors also may have intrinsic habitat value, their salient wildlife value is that they connect more substantive patches of habitat.

The potential utility of wildlife corridors in maintaining species diversity within habitat refuges has been recognized for some time (Wilson and Willis 1975) and has a theoretical basis in the equilibrium theory of island biogeography (MacArthur and Wilson 1967). This theory roughly states that the number of species in a habitat patch represents a dynamic equilibrium between rates of immigration to the habitat patch and rates of extinction within the habitat patch. In the context of this island biogeography theory, corridors should increase the rate of immigration and thus increase species number within the habitat patch by permitting species that have become extirpated to re-colonize the patch. Furthermore, wildlife corridors can increase the effective size of a habitat patch and thus lower the probability of extinction of individual populations by providing additional feeding, breeding, and cover habitat.

From the variety of functions that a corridor can serve, most species using corridors can be categorized into one of two types, as described by Beier and Loe (1992). “Passage species” require corridors to allow individuals to pass directly between two areas in discrete events of brief duration, e.g., dispersal of a juvenile, seasonal migration, or moving between parts of a large home range. Large herbivores and medium to large carnivores are typically passage species as are many migratory animals. Although these species do not have to meet all of their life requirements within the corridor, the corridor must provide suitable conditions that motivate the animal to enter and use the corridor.

In contrast to passage species, “corridor dwellers” need several days to several generations to pass through the corridor. Most plants, reptiles, amphibians, insects, small mammals, and birds with poor dispersal abilities often are corridor dwellers. Members of these species must be able to live in the corridor for extended periods, perhaps entire lifespans. Thus, the corridor must provide most or all of the species’ life requisites.

The effectiveness of a wildlife corridor can only be judged in relation to its objective. For purposes of this study, we have assumed that the objective of wildlife corridors are to promote the survivorship of wildlife species within Priority Wildlife Habitat Units. If such corridors are to be effective in this role, they must be designed for the most extinction prone species in the area. At greatest risk are species with small populations, species with fluctuating population levels, and species with slow rates of population growth. Specifically, the following groups of organisms are particularly susceptible to fragmentation and extinction (Terborgh 1974, Pimm et al. 1988, Reid and Miller 1989, Orians and Kunin 1990):

Table 13: ORGANISMS THAT ARE SUSCEPTIBLE TO LOCAL EXTINCTION PROCESSES

Group of Organism	Description
Species at higher trophic levels	Species high in the food chain tend to be large, rare animals with slow rates of population growth.
Local endemics	Species with restricted ranges are often threatened by habitat loss, as exemplified by the high rates of island species extinction.
Species with chronically small populations	This category overlaps the first. Since many species at higher trophic levels have sparsely distributed populations, habitat restriction or fragmentation may reduce their populations to extremely low levels. However, the population sizes of species at lower trophic levels may also be low in a given habitat or region.
Largest members of a guild	Physically large species have high metabolic demands, require large areas of habitat, and tend to occur in low densities. Thus, the largest members within a guild tend to be at higher risk than smaller species.
Species with poor dispersal and colonization ability	As with local endemics, species with narrow habitat requirements and species which cannot disperse easily to new habitats are at risk even if their populations are widespread.
Species with colonial nesting habitats	Colonial nesting species are particularly susceptible to over-exploitation or potential losses of breeding habitat.
Migratory or nomadic species	Migratory species are dependent upon suitable habitat in both their summer and winter ranges and along their migration routes. Nomadic, or far-ranging, species require large tracts of habitat and the potential for adverse effects of habitat changes on these populations is high.
Species dependent on unreliable or cyclic resources	These species' populations fluctuate greatly and they face increased threats when their populations are low.

For some species which may be considered area-sensitive (such as pileated woodpecker, *Dryocopus pileatus*), the ratio of edge habitat to interior habitat is a primary factor which will determine species use of a corridor. This has led to the long-held assumption that corridor width is a critical determining factor of the success and utility of wildlife corridors. Wildlife corridor identification and management has, thus, been historically based on a number of generalities and wider corridors have been assumed to be more effective since they have an "interior" component free of edge effects. In actuality, however, there is no straightforward and simple formula from which to derive a minimum corridor width for which one should strive.

The critical features of a wildlife corridor are not physical traits such as its length or width or vegetation composition, but rather how well a particular piece of land identified as a corridor fulfills several functions. In particular, corridors provide avenues along which (Beier and Loe 1992):

1. Wide-ranging animals can travel, migrate, and meet mates;
2. Plants can propogate;
3. Genetic interchange can occur;
4. Populations can move in response to environmental changes and natural disasters; and
5. Individuals can recolonize habitats from which populations have been locally extirpated.

Ideally, it is these functions, rather than some minimum width, that should be used to evaluate the suitability of a land unit as a wildlife corridor. However, in the absence of hard data from which to quantify these functions, corridor width is often used as an indicator of potential ecological integrity because ideal corridor width is determined by many factors such as its length, the topography and vegetation of the corridor, the species of interest, and adjacent human land uses. The most important of these determinants is the species of interest. For example, a corridor that allows movement of deer mice (*Peromyscus maniculatus*) may be inadequate for white-tailed deer. The corridor is considered “wide enough” when it meets the functions for each species of interest.

In considering the design of wildlife corridors, most researchers (e.g., Soule and Gilpin 1991, Paquet et al. 1994) agree that the following general principles apply to most landscapes:

✐Optimum corridor width depends upon the strength of the edge effect. But very wide corridors are sub-optimal because animals tend to spend time wandering around inside the corridor (which is often comprised of habitat of lower quality than those which it connects). It should be noted, however, that a corridor that is too wide is one which generally reaches magnitudes of over hundreds of kilometers and corridors of such size do not exist in the fragmented landscape of Strathcona County.

✐Any departure from linearity may be deleterious. A straight corridor is generally superior because animals spend less time in edge habitats.

✐Corridors are most effective with straight sides and a constant width. Funnel shaped (gradually narrowing) or horn-shaped (gradually widening) corridors are less effective than those with straight sides and a constant width.

✐There should be no impediments to movement. Novel structures should not be placed within corridors, particularly if they are proven to be traditional movement corridors.

✐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).