A Stewardship Guide to Grasslands in Southern Ontario:

An Introduction for Farmers and Rural Landowners

Ontario Barn Owl Recovery Project

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The **Ontario Barn Owl Recovery Project** is recognized by the national Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and by Ontario's Committee on the Status of Species-at-Risk in Ontario (COSSARO) as the official recovery team for the eastern population of the Barn Owl in Canada. Our goals are:

To foster community volunteerism and partnerships by involving individuals and groups in Barn Owl nest box building, installation and monitoring programs;

To identify, enhance, and protect grassland and wetland fringe habitat along the north shore of Lake Erie through conservation agreements and creation of grassland reserves. With the support of farmers and rural landowners, we are exploring innovative approaches to revert marginal and inactive farmland, public lands, and corporate-owned lands along the north shore of Lake Erie back into productive grasslands. New and expanded grasslands are expected to benefit a wide variety of wildlife, including other species-at-risk, such as the Karner Blue Butterfly, Henslow's Sparrow, Eastern Bob White, Short-Eared Owl and American Badger;

To develop public awareness, appreciation and grassroots support for Barn Owls, other grassland species, and grassland habitat through public seminars and workshops, and development and distribution of educational materials to schools, parks, conservation organizations and interested members of the public.

For more information on the Ontario Barn Owl Recovery Project visit our website at
http://www.bsc-eoc.org/regional/barnowl.html

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Introduction

Southern Ontario is a mosaic of farmland, woods, wetlands, roadways, rural dwellings, urban centres, and industrial land. Scattered throughout this landscape are grasslands – native, naturalized and agricultural. Grasslands are defined as habitats that consist predominately of grasses, forbs (herbaceous vegetation) and sedges. They represent unstable ecosystems that are in a "succession" stage towards a more stable ecosystem (e.g. forest). Succession depends on local, neighbouring seed sources, soil quality, type of original disturbance, topography etc. Prior to European settlement grasslands were maintained by fire, either from lightning strikes on dry vegetation or intentionally set by native peoples. Today controlled burns are used to maintain native prairie habitat, while agricultural grasslands are maintained by haying and by livestock grazing.

Grasslands are ecologically important as they support a tremendous diversity of plants and animals, protect valuable soil resources from wind and water erosion, filter out toxins before they reach the groundwater, sequester carbon from the air, are used for grazing and winter feed for livestock and horses, can be converted into bio-fuels, provide seed stock for additional grassland plantings, provide shelter, food, and nesting opportunities for wildlife (including various species-at-risk), and offer recreational and tourism opportunities for humans.

This publication is intended as an introduction to grasslands and their stewardship in Southern Ontario. It is geared towards farmers and rural landowners, and provides insight into the value of grassland habitat in terms of environmental benefits, economic viability, and social wellbeing for rural landscapes and rural communities.

A Brief History of Grasslands in Southern Ontario

When most people think of grasslands they think of the Prairies, bison, tumbleweed, and prairie dogs. Few people realize that, despite being dominated by deciduous/mixed forest prior to European settlement, up to 10 % of Southern Ontario was once covered in tall grass prairie, oak and pine savannah, grassy wetland fringe habitat and meadows.

Two hundred and fifty years ago the landscape of southern Ontario began a massive transformation as forests were cleared by pioneers, eager to plant crops in the rich, fertile soils created by centuries of organic build-up from layers of dead vegetation on top of ancient glacial deposits. By the mid-1800's the early European explorers that first trekked and mapped southern Ontario would have been amazed at the transformation of the landscape…one of small, highly diversified farms, scattered woodlots, roads, hamlets, villages and towns. In rural areas much of the native forest and tallgrass prairie had been replaced with pastureland and hayfields, hedgerows and grassy ditch banks. A habitat conducive to very different species than those that roamed the great deciduous forests of the Great Lakes basin – species like Eastern meadowlark, bobolink, upland sandpiper, red-tailed hawk, great horned owl, meadow vole, cottontail rabbit, and great flocks of grackles and red-winged blackbirds. Wooden barns, found on every farm, provided shelter and homes for barn owls, rock pigeons, barn swallows, mice, raccoons and other opportunistic species that adapted well to the changing landscape.

Over the last 75 years the Southern Ontario countryside continued to change as farming became more mechanized and global market demands for food crops began to intensify. Smaller, diversified farms were swallowed up by larger, corporate farms, large tracts of land were planted to field corn and soybeans, sturdy steel farm buildings replaced old wooden barns, corn silos were abandoned for central storage depots. At the same time ongoing drainage of wetlands, urban sprawl and road construction associated with development began to accelerate. Many of our grassland species of plants and animals, especially those that have very specific needs as to grassland size, vegetation type/mix, and species composition, continue to decline as their habitat gradually shrinks and disappears.

Many species of wildlife, like this white-tailed deer, benefit from grassland habitat (A. Woodliffe)

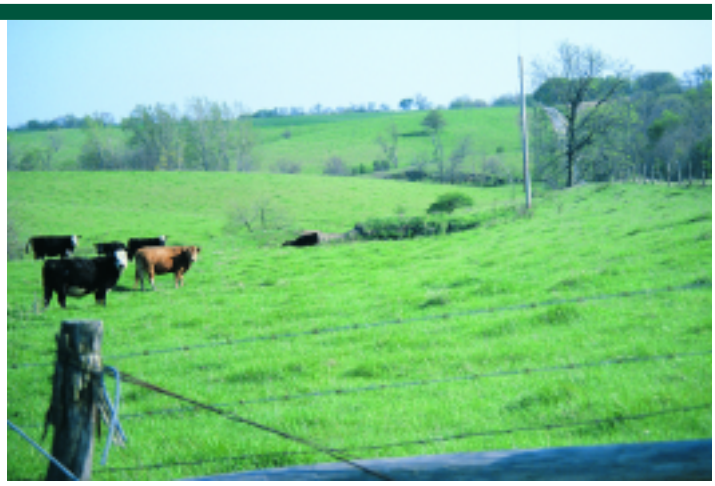
The network of roads that criss-cross southern Ontario have negatively impacted species like American badger, black rat snake, Eastern fox snake, many turtle species and other wildlife. Older pesticides, like organophosphates and organochlorines, along with rodenticides used around farm buildings and orchards, have impacted many wildlife species. Adaptive and opportunistic predators, like raccoons, opossums and feral cats, have had a significant negative impact on grassland bird species.

Today, native grasslands (tallgrass prairie, oak savanna, wetland edges, etc.) are confined to small, isolated pockets across Southern Ontario. Some of these are on private lands or protected government lands, but most are on public land including old railroad lines and ditch banks. These small, isolated ecosystems are vulnerable to disturbance and pressure from invasive species. Many grassland species require a certain acreage of grassland for survival. All species require enough gene flow to keep their population viable. Isolated populations can face the risk of extinction and sustaining diversity is vital to saving these remnants.

The Altiman Prairie on Walpole Island, a remnant of a once larger tallgrass prairie habitat (A. Woodliffe)

Benefits of Grasslands

- Grasslands provide wildlife habitat and increase biodiversity. Grasslands provide wildlife with shelter, nesting opportunities, hunting and grazing habitat, migration stopover areas for birds, and winter cover.
- Grasslands can be low maintenance alternatives to mowing on private properties, cemeteries, roadsides, hydro corridors, industrial lots, and retired farmland
- Grasslands promote healthy soils and diversity in soil life, conserve soil moisture and prevent erosion.
- Grasslands fix (take-up and store) carbon, helping reduce build-up of greenhouse gases in the atmosphere.
- Healthy grasslands can increase economic returns on your investment in time, labour and land (e.g. better quality feed for livestock).
- For the beef farmer sustainable grazing systems can produce heavier calves and for the dairy farmer more productive cows.
- Grasslands can add an extra source of income through hay and honey production, hunting, farm vacations, and eco-tourism opportunities (e.g. bird watching tours)
- Property values can increase with healthy grassland cover.
- Grasslands have educational value (e.g. farm demonstration site, schoolyard naturalization, etc.).
- Grasslands are aesthetically pleasing.



Farmers maintain pastures and hayfields for their livestock (D. Reid)

Grassed buffer along the James Berry Drain in Norfolk County (NLSC)

Grasslands provide a diverse habitat for plants and animals (M. Gartshore)

Wildflower meadows add aesthetic appeal to rural lands (B. Solymár)

Tallgrass communities, like this prairie on Walpole Island, support the highest biodiversity of flora and fauna of any grassland (A. Woodliffe)

Types of Grassland

Southern Ontario's remaining grasslands are much more than land covered with grass. They are a network of interacting habitats, including open deciduous forest stands, tallgrass prairie and savannah, pastures and hayfields, old farm fields, stream corridors, scrub land, wetlands, roadsides, windbreaks, and fencerows. The following describe the main grassland types in our part of the province:

Meadow

Native meadows are warm, sunny clearings in forests, which consist of mixes of grasses and wildflowers. This type of meadow was usually formed due to some natural disturbance, like fire, flooding by beavers or by wind, resulting in the clearing of woody species and allowing colonization of herbaceous plants and grasses. Meadows of this type are usually short-lived or transitional, and through years of succession will gradually convert back to forest. These native meadows can either be drier, upland meadows or wet meadows, occurring in floodplain areas.

Meadow in autumn, Haldimand County (B. Solymár)

Meadows provide sunny warm areas within forests and woods for various species of butterflies (satyrs, checkerspots, swallowtails, blues) to forage on wildflowers, and feeding areas for many forest birds (including wild turkey), small mammals, and deer. Wetter meadows consist of a variety of sedges, grasses and flower species and provide habitat for insects, toads, frogs, snakes, waterfowl and mammals

Most meadows found today in Southern Ontario are usually a result of either overgrown or abandoned farmland, or active efforts by farmers and rural landowners to create this kind of habitat. If left undisturbed, the old-field meadow, common on abandoned agricultural land and along roadside ditches, will generally progress through several stages of succession, and will eventually fill in with shrubs and trees. Old-field meadows provide important habitat for many species, including grassland birds (like Eastern meadowlark, bobolink, mallards and ring-necked pheasant), rabbits, groundhogs, weasel and fox.

The rare wild lupine is only found in oak savanna habitats.

Prairie and savanna

Prairies are native ecological communities made up of grasses, sedges and wildflowers (forbs). In Southern Ontario tallgrass prairie, which consists of warm-season grasses (e.g. big bluestem, indiangrass, and switchgrass) and wildflowers (e.g. coneflower, tall sunflower and prairie dock), is the major type of prairie. Savannas are similar to prairies in that they are grass and forb dominated communities, but they are scattered with 10% to 35% tree cover. Oak and hickory are the commonly associated tree species with savannahs in Southern Ontario.

Pre-European settlement, there were an estimated 830 square kilometres of tallgrass prairie and oak-hickory and oak-pine savanna spread throughout the Ontario landscape from Windsor to Peterborough. Their floral diversity makes prairies and savannahs favourable habitat to a wide variety of insects, herptiles, birds and mammals, including some species-at-risk (e.g. American badger, Karner blue butterfly, Northern bobwhite). Native peoples used prairies and savannas for hunting and actively "managed" these sites by setting fires to drive game and to attract wildlife to the new, green growth that resulted from burning the vegetation. Regular fires play an important ecological role in prairies and savannas by suppressing non-native plants, adding nutrients to the soil from the rich ash, and naturally blackening the soil, which favours the growth of warm season plants. Fire management of prairies should occur at least every 3 years on established sites, or as needed for newly planted sites.

Today, only small, scattered remnants of tallgrass prairie and oak-hickory-pine savanna exist in Southern Ontario and active

efforts to preserve and protect these remnants are underway. Other efforts are aimed at creating or restoring additional patches of this unique habitat. Tallgrass prairies and savannas are recognized as the most endangered ecosystems in North America, but are among the most diverse, supporting hundreds of associated species of plants and animals where they still exist.

Agricultural grassland

Presently, pastures and hayfields are the predominant types of grassland in Southern Ontario. In early colonial times, when every settler had at least some livestock, they were even more common than today. With the industrialization of agriculture much of our agricultural landscape has been converted to row crop production (e.g. corn, soybeans) and horticultural crop production (fruit and vegetables). However, livestock producers still maintain significant acreages of pasture and hayfields and hobby horse farms are also characterised by having these types of grasslands.
Pastures and hayfields used by Ontario farmers are classed as either unimproved or improved, and annual (forage) or perennial. Good management practices are the key to producing high quality graze for livestock. This means establishing a diversity of cool-season grasses (e.g. orchardgrass, meadow bromegrass, timothy, tall fescue) and legumes (e.g. alfalfa, clovers, birdsfoot trefoil), application of fertilizers, and rotational grazing practices.
Pastures and hayfields are important to many species of grassland birds that build their nests, feed, and seek shelter in pastures and hayfields. Some species nest along weedy borders, shrubby edges of fields and adjacent woodlots and use open fields to forage for seeds and insects. Predatory insects (dragonflies, praying mantids), raptors (hawks, kestrels and owls) and mammalian predators (badger, coyote, fox, weasel) also use agricultural fields for hunting. Pastures can also be important nectar sources for butterflies, honeybees and other bee species.

Old Fields

Abandoned agricultural field, if not maintained, will go through a succession of stages beginning with mostly annual broad-leaf plants in the first year or two, and then gradually replaced by grasses in successive years. Goldenrod and asters will begin to increase in density over time and, eventually shrubs, like hawthorn and sumac, will become established. Brambles, wild rose and dogwood gradually add to the diversity.

These types of fields, especially in areas, where they are adjacent to other types of grassland, are extremely valuable for many species of wildlife, including insects, snakes, birds and mammals.

Hayfields offer habitat for many grassland and edge species (B. Solymár)

Abandoned farms will slowly revert back to scrubland and woodland (B. Solymár)

Cool Season Grasses vs. Warm Season Grasses

	Cool Season Grasses	Warm Season Grasses
Description	• Develop rapidly in spring and early summer when cool nights follow warm days • Tend to go dormant in hot summer weather (> 28ºC) • Growth resumes in late summer and early fall	• Develop most rapidly in summer when warm nights follow hot days • Often referred to as "bunch grasses" because they grow in clumps • Deep root systems allow prolonged drought tolerance
Examples	Timothy, perennial rye, orchard grass, Canada wild rye, fescues, bromes	Switch grass, big bluestem, little bluestem, Indian grass
Companion species	Pastures and hayfields: Red clover, white clover, ladino clover, aslike clover, alfalfa Meadows: Native wildflowers, ox-eye daisy, poppies, cosmos	Bergamot, coreopsis, native asters, blazing stars, black-eyed susan, tall sunflower, butterfly milkweed, coneflowers, sunflowers, wild lupine
Wildlife Value	Pastures and hayfields: Intensively managed pastures and hayfields cut more than twice per season do not provide much habitat for wildlife. However, low maintenance pastures and those used on a rotational basis provide good habitat. Meadows: Provide excellent food and cover for a wide variety of species including American goldfinch, bobolinks, meadowlarks, red-winged blackbirds, pheasants, cottontails, meadow voles, red fox, garter snakes, and insects.	Native tallgrass prairie and oak savanna support the highest diversity of wildlife of any grassland type. Species include Karner blue butterfly, great spangled fritillary, Northern true katydid, Eastern fox snake, grasshopper sparrow, savanna sparrow, Northern bobwhite, American badger, prairie deermouse, and short-tailed weasel. In addition to their importance for green vegetation and seeds, warm season grasses offer excellent winter cover for game birds and small mammals.
Cost to Establish	Relatively inexpensive	Expensive
Establishment Time	Rapid establishment (1 growing season)	Slow establishment (2 to 3 years)

There are a number of key steps in developing and managing your grassland planting. These steps ensure that the design and uses for your grassland are well planned prior to making any financial, labour or time commitments and that you are well informed about the type of grassland planting best suited to your needs.

Identify your goals for establishing grassland habitat. There are many reasons for planting grassland, which include:

- Creating wildlife habitat for recreational (e.g. hunting, birding, etc.) or economic reasons (e.g. educational farm tours, wildflower honey or native seed production, etc.).
- Livestock feed production or pasturing.
- Maintaining a hobby horse farm
- Restoring a natural plant community such as tallgrass prairie.
- Using plants for erosion control or buffer strips around water bodies.
- Creating a low-maintenance landscape to reduce mowing costs/time.
- Providing educational opportunities for school children
- Plantings to be used for ecological research or demonstration sites.
- Establishing a wildflower/prairie planting for purely aesthetic reasons.

Often the goals are multi-fold and several of the above will apply to your reasons for establishing grassland.

Grassland plantings may be large (left, B. Solymár) or may simply provide a buffer between agricultural fields (right, MNR)

Develop a site plan

A site plan provides you with a blueprint for your grassland planting project. It aids in making decisions on the cost and labour involved, the type of plants you select, how you will prepare the land for planting, the equipment required, and how you will maintain the grassland planting.

Steps in developing a site plan:

Step 1. Determine any limiting factors that may affect type, diversity and size of your planting, i.e. soil type (e.g. sandy, sandy loam, clay), moisture/drainage, past and existing uses (Note: some herbicides used in row crop production, i.e. atrazine and Pursuit, can adversely impact germination of grasses and forbs planted in subsequent years.
Step 2. Determine the size of your proposed planting – this will help you determine the amount of planting material (seeds, transplants) needed, the equipment required and the cost and labour involved.

Step 3. Draw a map of your site which shows existing natural features (adjacent woodlots, water courses, drainage patterns, roads, buildings, hydro lines, and neighbouring land uses – these are all considerations to take into account when planning your planting.

Step 4. Develop a planting plan – this may be as simple as deciding on a standard grass/legume mix for a hayfield or pasture based on your soil type, geographic area and the livestock the grassland is intended for. Alternately, if planting a tallgrass prairie or a diversified planting of different grass/forb species, the planning becomes more complex. When planting a prairie try to use native seed stocks (preferably locally sourced), ensure specialized planting equipment is available, and consider the site in terms of the potential for future burns to maintain the integrity of the prairie.

When planting grasslands with wildlife habitat in mind, remember that planting more than one kind of grass will provide a variety of grass heights and density, which creates good nesting habitat for waterfowl, game birds, and song birds. Mixing in legumes in cool season plantings and wildflowers in warm season (tallgrass prairie) stands will encourage insects, which, in turn, will provide food for wildlife. Stiff-stemmed legumes and wildflowers provide perching sites for meadowlarks, sparrows and other birds, as well as foraging opportunities for downy woodpeckers and other insect-eating birds. The wildflowers also offer a source of nectar for hummingbirds, butterflies and bees.
The species of grasses, legumes and wildflowers that you establish depends on soil type, texture, depth, and fertility. Certain grasses and legumes grow better on dry, sandy sites, while others thrive on wetter sites. Warm season grasses, for example, tend to grow best on sandy, well-drained sites, while most cool season grasses perform better on well-drained sandy loams. Many warm-season prairie species are very low nutrient and drought tolerant, so may be a good choice for stabilizing and amending unproductive soils.

Wildflowers provide nectar and pollen for insects and hummingbirds (B. Solymár)

Warm season grasses provide winter cover for many species of wildlife (M. Patrikeev)

The Northern Bobwhite prefers grassland habitat with a diverse mix of taller and shorter species (Cornell)

Some Common Plant Species for Grassland Plantings

Cool Season Grasses
Canada wild rye (native)
Redtop (native)
Timothy
Orchard grass
Meadow foxtail
Tall fescue
Perennial ryegrass

Native Warm Season Grasses & Sedges
Big bluestem
Little bluestem
Switchgrass
Indiangrass
Fox sedge
Bristly sedge
Sand dropseed

Legumes
Round-headed bush-clover (native)
Showy tick-trefoil (native)
White clover
Red clover
Sweet clover
Alsike clover
Ladino clover
Alfalfa
Birdsfoot trefoil

Native Wildflowers
Black-eyed susan
Wild strawberry
New England aster
Dense blazing star
Butterfly milkweed
Wild bergamot
Gray goldenrod
Tall sunflower
Evening primrose

Besides soil considerations, other site conditions to consider are drainage and erosion concerns and potential weed problems. For farmers, weed seed movement into cropped fields adjacent to meadows may be of concern if meadow grasses are allowed to seed on a regular basis. Nuisance wildlife may also be a concern in this type of situation. Seed cost may be a consideration. Warm-season grass and wildflower seed are more expensive than cool-season grass seed.

Soil amendments are recommended prior to planting hayfields or pastures for use in commercial livestock operations and for hobby farms (e.g. horse, sheep). The use of well-composted manure or green manure (plow-down) crops adds organic matter and nutrients to the soil. A balanced chemical fertilizer mix can also be applied based on soil test results. For additional information on preparing fields for pasture and hay production see the Ontario Ministry of Agriculture and Food's publications, *Pasture Production* (Publication 19) and *Forage Production* (Publication 30).

To increase the value of grasslands for wildlife, especially smaller sites of 5 to 20 acres, locate them near other grassland habitat, such as hayfields, pastures, wetlands, or grassed corridors (e.g. ditch banks, stream buffers). The larger the grassland the better – 10 acres in better than 5 acres, 20 acres is better than 10 acres, etc. If a larger grassland is not an option then try to minimize attracting edge-loving predators like raccoons, opossums, hawks and skunks, and from bird nest parasitism by brown-headed cowbirds by placing the grassland at least 20 metres from hedgerows, woodlots and large trees.

If planting for recreation or aesthetic purposes, choosing a species list for planting a prairie or meadow can be a fun and rewarding exercise. The more diverse (use of multiple species of grasses, sedges and wildflowers) the chosen mixture, the more species of animals the planting will attract and the better the planting can respond to droughts, water logging and harsh winters. A general recommendation for ratios of grasses to wildflowers is 50:50 for tallgrass prairie and a minimum 30% grasses and sedges for meadows.

Preparing the Land

Site preparation is an important prerequisite to any grassland planting – be it agricultural/hobby farm (hayfield, pasture) or conservation/recreation (meadow or prairie). Eliminating undesirable vegetation prior to planting your grassland reduces competition from aggressive introduced plants like quackgrass, Kentucky bluegrass and crabgrass. As a general rule of thumb work on field preparation should be at least one year before any planting is to be done. Only repeated tillage and/or herbicide application will help destroy the seed bank in the soil.

Burn-down herbicides (like Round-up) are the easiest and often cheapest way to remove unwanted vegetation from your field. However, they do tend to have environmental impacts (especially soil and water), which is not acceptable to some people. Glyphosate-based herbicides, such as Roundup, are broad spectrum (kill grasses and broadleaf plants) and are generally considered the most benign, with little harmful impacts on the environment.

Non-chemical methods to remove unwanted vegetation include repeated tillage of the land over a growing season. This technique also has environmental impacts as ground can become compacted and soil may lose its structure with repeated use of heavy machinery.

Seed for establishing native tallgrass prairie should be locally sourced (A. Woodliffe)

Drill seeders are used for planting tallgrass prairie (RLSN)

Emerging warm season grass seedlings (RLSN)

Seeding

What species of grasses, legumes and/or wildflowers you decide on depends on what the use of your grassland is intended for, as well as site conditions. Some general guidelines are provided below:

Planting Type	General Seeding Rate	Comments
Tallgrass Prairie	13 kg/Ha (9 Kg grass, 4 kg of wildflowers)	This guideline refers to drilled seeding. For broadcasting, double the rate.
Meadows	13 kg/Ha (7 Kg grass, 6 kg of wildflowers)	Adjustment of the grass:wildflower ratio accommodates for various desired purposes (e.g. wildflower meadow, grassland bird habitat, attracting butterflies, honey production, etc.)
Pastures	8-21 kg/Ha, depending on soil drainage and intended use?	Soil drainage (well drained, moderate drainage, fair to poor drainage) has a major influence on pasture seed mixture selection. Intended use of the pasture (e.g. close grazing, rotational grazing, horse paddock, hay production) also impacts the decision on what grass and legume mix to use. For recommendations on pasture mixes and seeding rates refer to the OMAF publications, Publication 19 - *Pasture Production*; Publication 30 – *Forage Production* and Publication 811 – *Agronomy Guide for Field Crops*.

Managing Grasslands

Grasslands, once established, must be managed to ensure the integrity of the grassland and prevent it from growing into scrubland or forest over time. Depending on the type and the use of your grassland, there are 3 practices to keep grasslands habitats healthy and productive: mowing/haying, burning, and grazing.

Several techniques are available to minimize negative impacts of haying operations on nesting birds

Mowing

Mowing is an effective means of reducing woody plant growth, but the cut vegetation will cover much of the bare ground. Generally, residual vegetation is undesirable as it leads to an excess of nitrogen that will encourage weed growth. Removing thatch will also leave bare spots that will allow the sun to heat the soil, encouraging seed germination of desirable species. If your goal is conservation and wildlife habitat (i.e. to encourage ground nesting of ducks and songbirds) residual cover in spring is considered beneficial; however, too much residual vegetation can make it difficult for chick of some species, like the Northern bobwhite, to move about.

A rotational system is important to ensure that varying grass heights and densities exist so that all species have the habitat they desire at all times. It is best if mowing is combined with an occasional prescribed burn, as the burn will rid the site of unwanted ground cover.

The timing of mowing is quite important and depends on grassland bird nesting times, which occur from May 1 through late July, and grassland types. If the purpose of mowing is to safeguard bird populations, mowing times should be regulated to occur after fledging time. If possible, avoid mowing before late July, or early August, as mid-season cutting decreases fledgling and nesting success. However, do not leave mowing until too late in the growing season as this will have a negative impact on plant species composition and growth as they are storing and preparing for winter. Grassland areas that are mowed in mid-summer will usually have time to recover and produce valuable seed sources and cover for over-wintering wildlife.However, if weeds are not a problem, or if springtime conditions, such as wet ground, inhibit mowing, management can be postponed until late in the fall, after plants have set seed. Unfortunately, this can pose a problem to wildlife searching for seed sources and leaves a less attractive (low cover) field over the winter season. Again, plant litter should be removed to so that the growth of desirable species is not inhibited by thatch.

If the intent of the grassland is for hay production it may be necessary for farmers to harvest high quality forage before nesting activities are completed. In these situations, you can take a few precautions to reduce negative impacts. Fields can be mown in a spiral pattern, starting in the centre of the field and working outwards. This allows adult and fledged birds to escape to the edge of the field. Rotating mowing of different areas throughout the season will allow habitat to be available at all times. Night mowing should be avoided, as nesting birds will be less likely to move from their cover. Harvesting equipment can be equipped with flushing bars so that nesting adult birds can escape harm. No spring or summer mowing should be practised in strip cover areas, if those sites may represent the only nearby opportunity for grassland nesting birds.

Roadsides should be left relatively undisturbed. If weed problem becomes a concern, spot mowing and herbicide use is recommended. Periodic mowing may be necessary to prevent growth and encroachment of woody shrubs and seedlings, but grass may be cut at 10-12 inches height to reduce disturbance to desirable plants. If extensive mowing is required, it is best to wait until after August 1.

Mowing is similar in tallgrass prairie plantings, but should occur in late fall, once grasses and forbs have set seed and the birds have finished nesting. If possible, cut stems should be removed. A rotational system should be implemented to ensure some

unmowed habitat is available at all times. Native species, such as warm season grasses, are particularly valuable to wildlife as they provide winter cover that stands up better to wind and snow than cool season species.

Burning

Burning has long been a traditional method of controlling and maintaining grasslands. There is evidence to indicate that the First Nations people intentionally set fires to rejuvenate the prairie ecosystem, and that drought conditions and lightning strikes were also conducive to the natural fire cycle that was essential to keep grasslands open and thriving.. Burning is beneficial to prairie plants, as blackening of the soil allows more rapid warming. The occasional disturbance can also help develop a "seed bed", as well as induce flowering and seed production.

Tallgrass prairie benefits from burns every 2 to 5 years (A. Woodliffe)

As with mowing, the timing of burning is very important. Spring and Fall burning have proven to be the most beneficial in southern Ontario – particularly March thru late April or September to first snow cover.

If managing grassland that is greater than 100 acres, 20-30% should be burned annually in rotation. If managing smaller, isolated grasslands, a larger percentage of the area, not exceeding 50-60%, should be put on rotation. If there are a few small neighbouring grasslands, a burning regime should be set up that rotates between them.

Generally, prescribed burns should take place every 5-10 years. However, if the purpose of the prescribed burn is to keep exotic species at bay, burns may be held more frequently (2-5 years). Additionally, if a particular problem occurs, for example a highly invasive plant, then additional burning may be practical.

Potential risks of relying too heavily on prescribed burning (annually) can break down the soil, reduce availability of some soil nutrients to plants and can increase weed growth. Burning with the purpose of getting rid of old growth can also lead to problems. Weeds may grow more vigorously. Erosion may become more pronounced if there are too many bare patches, leading to higher frost, resulting in more runoff with the spring melt. If bare patches of ground predominate, leave spring burning until the following year. Mowing would be a good option here.

Natural firebreaks (e.g. roads, streams, frequently mowed areas) are ideal. If there are no natural firebreaks, a 1.5 to 2-metre border should be mowed short or tilled to bare soil. This strip should be clean of plant litter, and should be well soaked. A professional should be contacted before conducting a prescribed burn. Remember that local fire laws must be obeyed. Be sure to be safe – watch the weather, contact local authorities and a burn specialist.

Burning Tips

Contact a professional for sound advice and safety procedures
Contact municipal authorities for applicable permits and neighbours to inform them of the time and location of the prescribed burn
Prepare area well
Ensure that firebreaks are well established. If natural firebreaks do not exist (i.e. roads, streams), they should be established
Mow a 1.5-2 metre strip, remove all leaf litter and wet area down well
Ensure a larger strip around buildings
Shrubs and the trunks of those trees that you wish to save can be wrapped in aluminium foil or siding (shiny side out)
Smaller plants may be protected by a thorough soaking, or by placing clay pots over them
Burns should be conducted early in the morning to avoid high winds (less than 2 kilometres/hour), but after dew on vegetation has dried. The direction of the wind is important to note as well. A quickly moving fire with a relatively low temperature will generally result from burning with the wind, whereas burning against the wind will result in a slower, higher temperature fire. These slower fires can more dangerous to desirable plants, but are much more effective at ridding an area of unwanted woody material. Regardless, it is imperative to ensure that a reliable water source is within reach and that there are enough people there to assist in maintaining the fire if necessary.

Grazing

The timing of grazing depends on the type of grassland that you have planted. For example, grazing can begin in late May for mixed grassland, but should begin in early June in fescue prairie. Grazing too early will be detrimental to plant communities, as plants will not have had the opportunity to become well established before losing significant biomass, and will therefore have a lower chance of recovery.

Rotation of grazing areas should be carefully considered. Rest periods allow grazed areas to re-establish and become healthy and lush. This in turn reduces weed growth, erosion, compaction and groundhogs, which are impacts resulting from overgrazing. Rest periods also encourage wildlife to use the habitats created by the grassland pasture.
You must consider the carrying capacity of your grassland and the grazing capacity differs with each site depending on plant species and soil type. Try to evenly distribute grazing pressure by moving mineral sources, water sources and by herding. Continuous close cropping, especially in spring and fall should be avoided.

"Carrying capacity" is an important consideration for healthy pastures (B. Solymár)

The Use of Warm Season Grasses for Livestock Grazing

(Excerpted from *Agro-Economic Applications of Tallgrass Prairie Species in Southern Ontario: A Literature Review and Critique*, http://www.tallgrassontario.org/publications/agroeconomicreview.pdf
Used with permission from Tallgrass Ontario)

Interest in warm-season grasses has increased in recent years for summer grazing and hay production because in summer, high temperatures and in some cases, low soil moisture limit forage production by cool-season grasses. Warm-season grasses are also characterized by high optimal temperatures for photosynthesis, creating forage potential in northern temperate regions during the critical months of July and August, as part of a complementary grazing system. Studies in the US have identified various cultivars of switchgrass as having potential for highest yields, while there has also been some research on indiangrass, sideoats grama, big bluestem, and little bluestem.

Warm season grasses provide excellent nutrient quality for late-season livestock grazing (DU)

Factors that influence animal performance include the management system utilized (i.e. rotational grazing is preferred to continuous grazing), stage of growth at which grazing is initiated, leaf to stem ratio, stocking rate, and fertilization. However, it is difficult to extrapolate the results of these studies to southern Ontario, as most are from the Midwest, Great Plains and southern US, with significantly different climate and livestock management systems. In the US, research found that development of compatible, persistent, native warm-season grass and native legume mixtures could increase forage yield and quality during summer months.

Notably, the influence of various grazing systems and stocking rates on native tallgrass prairie grass pastures has been studied in the US. Researchers found that continuous and rotation grazing had similar affects on herbage composition over time in that standing crop of all major herbage components, including forbs, declined as stocking rate increased, but higher standing crop at the end of the grazing season was observed in the rotation units.

In terms of forage quality, cattle are well adapted to the utilization of perennial warm-season grasses, based in digestibility studies. Although warm-season grasses have a high fibre and low crude protein content, and low dry matter digestibility, they have relatively high intake and support reasonable rates of average daily gain in cattle when they are grazed. Generally, warm-season grasses appear more suited to animals with lower nutrient requirements such as beef cattle versus high performing dairy animals. However it is possible to increase the crude protein value of some grasses (i.e. switchgrass, indiangrass and big bluestem) via nitrogen fertilization and burning. Nutritive value of warm season grasses (i.e. digestibility and intake) has been reported to decrease from spring to summer, closely following morphological development of the plant.

Big bluestream has high nutritional value as a livestock graze (M. Gartshore)

Potential benefits of warm season grasses for producers include:

- Extension of the grazing season through the hot summer months.
- Reduced requirements for fertilization, which cuts down production costs.
- Safeguarding against drought.
- The opportunity to turn less productive (marginal) lands into useable pasture.
- The opportunity to increase stocking rates.

Potential drawbacks of warm season grasses that limit their use to producers include:

- Slow establishment as compared to cool season grasses

(i.e. it may be difficult for producers to set ground aside for an entire year just to get the crop established).

- The need for active and unconventional management, especially during the establishment year

(i.e. invading cool season grasses have to be controlled; overgrazing must be changed).

- The need for adequate cool season pasture acreage in order to give the warm seasons

the rest they require (i.e. rotational grazing is a must for these grasses to be used properly).

Potential applications for Southern Ontario are promising, although there do appear to be some constraints related to climate. Studies conducted on switchgrass and big bluestem to approximate forage yield and quality, and guide management strategies, suggest there is potential for warm-season grass production in southwestern Quebec. In general, cultivars from more northern areas had higher ground cover ratings, flowered and matured earlier than those from more southerly regions. Difficult stand establishment in spring and limited overall production because of low spring and fall temperatures are the main disadvantages of warm-season grasses in areas such as Ontario. However, slow and inconsistent establishment has been overcome in some areas of the US using conservation tillage and early planting, and seed treatments (including stratification, bleach, acid, hydrogen peroxide, and mechanical scarification) have been investigated to improve germination and emergence. Clearly, more research is needed to determine the forage potential and optimal management systems of native warm-season grasses in southern Ontario.

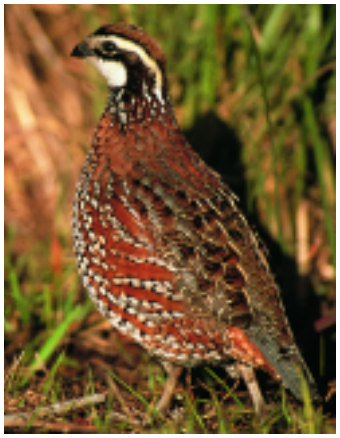
Given that there are a greater number of tallgrass species with forage/grazing potential and that this activity, if properly managed, does appear to be workable for natural tallgrass communities, there is the possibility of contributing significantly to tallgrass recovery by planting a number of these species on marginal agricultural lands.

Conserving Grassland Birds on Farms

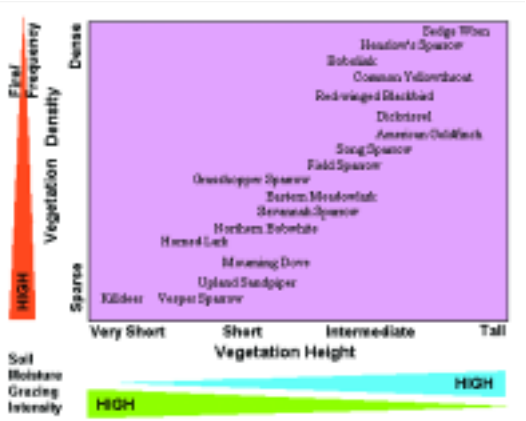
(*Excerpted from* Conserving Grassland Birds, by Andrea Jones and Peter Vickery, *Grassland Conservation Program, Center for Biological Conservation, Massachusetts Audubon Society, http://www.massaudubon.org/Birds_&_Beyond/Grassland_Birds/. Used with permission*.)

Many grassland birds use hayfields, meadows, and pastures for breeding, while many other birds nest nearby and use crop fields and open areas for hunting and foraging. Some species nest along weedy borders and shrubby edges of fields and rely on open fields for feeding on seeds and insects.

Songbirds, such as bobolinks and Eastern meadowlarks, build nests on the ground, raise young, and forage exclusively within hayfields, meadows, and pastures during the summer. In the fall, fields provide food for migrating sparrows, larks, and warblers. Some songbirds that breed farther north (e.g. snow buntings) visit farm fields in winter to search for food. Many hawks and owls, including as American kestrels, northern harriers, and short-eared owls, rely on grasslands of all sizes for hunting small mammals. Waterfowl and shorebirds frequently feed in flooded portions of crop fields during spring and fall migration.



Three grassland bird species associated with farms are the Eastern meadowlark, Northern bobwhite and Northern harrier (Cornell)



Grassland bird species vegetation height and density preferences (IDNR)

Grassland bird species forb abundance and low growing (less than 1 metre) woody stem density preferences (IDNR)

(Editors note: The following recommendations from the Massachusetts Audubon Society for managing hayfields, pastures and crop fields sustainably will help in conserving grassland birds while having minimal to no impact on farm gate returns. Long-term agricultural benefits of the described practices, including reduced soil erosion, decreased pollution of fresh water, decreased energy costs from fewer tillage operations, and increased soil fertility, provide long-term return benefits to the farmer or rural landowner.)

Management of Hayfields

Keep alert for grassland birds nesting in fields. Mowing around areas where birds are frequently seen or leaving small patches unmowed can easily protect many nesting birds. Small, unmowed patches will provide cover and feeding areas for birds for the remainder of the summer.

Rotating sizable fields (greater than ten acres) that are mowed early with those that are mowed late (hay used for bedding straw, etc.) each season can provide some fields for nesting birds while minimizing an impact on high-quality hay.

If possible, defer mowing until near the end of the grassland bird breeding season (i.e., after July 15) on fields not used for intensive hay production (e.g. bedding hay). This includes areas such as fallow fields, edge habitats, marginal farmlands, and weedy areas.

Choose fields that are not used for hay production for wildlife habitat. Mowing high-quality hayfields in early June will discourage birds from nesting in those areas. Nests that are attempted in these fields will probably fail due to mowing activities. In time, birds are not likely to return to fields where their nests were destroyed. However, if adjacent unmowed fields are available, birds can shift from high-production hayfields to those areas and re-nest.

Use conservative mowing practices where possible. These may include practices such as raising mower blades to six inches or more (may prevent the destruction of some nests and young in early mowing); avoiding night mowing because this often kills or injures roosting birds and young; using flushing bars on haying equipment to move birds hiding in the grass.

Manage multiple contiguous fields for conservation. Four adjacent fields are better than four isolated fields. Multiple adjacent small fields can provide the "look" of a large grassland, especially if hedgerows are removed and planted in grasses. This continuous landscape is necessary for some rarer grassland birds, such as the grasshopper sparrow and upland sandpiper, which require large grasslands. Multiple contiguous fields can be managed through rotational mowing and/or burning to provide a mosaic of grassland types and, therefore, can attract a greater diversity and abundance of grassland birds.

Rotating horses, cattle and other livestock between pastures, reduces plant stress and helps grasses regenerate (B. Solymár)

Management of Pastures

In grazed pastures with nesting birds, keep approximately 40 percent of the vegetation cover at a minimum height of 8 to 12 inches or at "knee height," with scattered forbs until August 1. This can be achieved by rotating grazing animals through several fields during the growing season. Keeping some areas ungrazed during the nesting season usually improves nest success.

Avoid overgrazing fields. Overgrazing creates excessive bare ground, which can cause erosion, reduce plant and invertebrate diversity, encourage invasive, non-palatable weeds, and lead to trampling of bird nests.

Experiment with different grazing regimes in your fields to determine the intensity of grazing and rotation that works best to provide wildlife habitat. This will vary from site to site, depending on the type of vegetation and the soil and moisture conditions.

Livestock rotation between forage fields planted in warm- and cool-season grasses prevents overgrazing and provides high-quality nutritious grass for a greater portion of the year. Manipulating the intensity, frequency, and duration of grazing in fields preserves upland or wetland vegetation, protects stream banks from erosion, minimizes soil compaction, and benefits nesting grassland birds.

Spring burning of pastures, particularly on poor soil, releases nutrients into the soil and encourages growth of nutritious, palatable grasses for livestock (make sure you have secure a burn permit from your municipality before proceeding).

Creating a mosaic by leaving some areas ungrazed and unburned each season, and allowing grass to grow (8 to 12 inches) creates ideal habitat for growth of wildflowers, butterflies, and breeding areas for grassland birds. Maintaining adequate vegetation cover prevents soil erosion from wind and water.

Grassed buffers bordering agricultural fields provide natural wildlife corridors and filter out excess fertilizers (NLSC)

Cover crops, like winter wheat (on right) and no-till corn (on right) adds to soil fertility and provides shelter and food (corn residue) for wildlife in winter and early spring (NLSC)

Management of Crop Fields

Field edge conservation: Uncultivated shrubby or grassy edges, particularly along wetlands and streams, protect soils, control erosion, improve water quality, and provide wildlife habitat for a variety of birds, such as Eastern towhees and song sparrows, nesting along edge habitats, as well as for foxes and other mammals.

Brush row removal: Field borders, particularly those dividing fields, which are not needed for wind or erosion control or to protect wetlands, can be removed to control invasive woody plants. This results in the creation of larger grassland habitats that are attractive to more species of grassland birds. Removal of woody vegetation can be achieved by a variety of means: mechanically, with herbicides, or by burning. Repeat treatments will be required.

Cover cropping: Planting a cover of grasses, grains, or legumes in unused fields decreases soil erosion, increases organic matter and soil fertility, and provides cover and feeding areas for wildlife throughout the year.

Strip cropping: In large fields, alternating strips of grass or close-growing crops with cultivated crops, particularly on the edge of a field or along a drainage area, provides cover and nesting habitat for birds and other wildlife. Leaving these areas unplowed and ungrazed during the breeding season helps prevent runoff and erosion while providing areas for birds to successfully raise young.

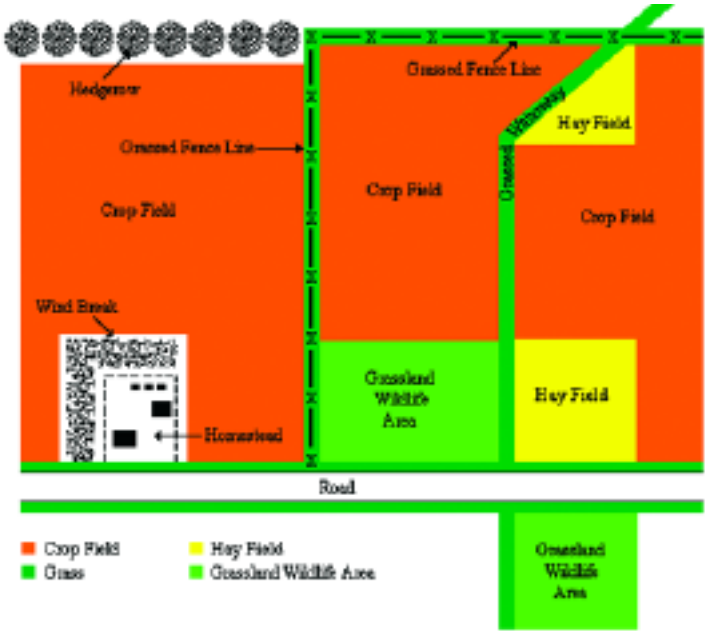
Wetlands protection: Wetlands adjacent to crop fields are especially important for wildlife habitat, and surrounding buffers of natural vegetation aid in the breakdown of pollutants from agricultural runoff. Pollutants in runoff include nutrients in fertilizers and harmful bacteria and viruses in manure. The wider the buffer, the greater will be the reduction of pollutants that can find their way into surface water. In fields that are in agricultural use, and where cultivation already occurs close to a wetland, a buffer zone of at least 6 metres (20 feet) will provide some water quality benefits.

Conservation tillage: Frequent tillage destroys bird's nests and decreases the amount of shelter and food available for wildlife. In addition, tillage buries roughly 75 percent of crop residues, including waste grains and weed seeds that provide food in the fall for migrating and grassland birds and waterfowl. Conservation tillage is defined as a tillage or planting system that maintains at least 30 percent of the soil covered by plants or plant residue. Decreasing tillage reduces soil erosion, saves fuel and time, conserves soil moisture, and improves wildlife habitat, but is associated with more frequent herbicide use.

Crop rotation: Rotating crops grown in each field helps maintain or improve soil productivity and fertility. This reduces soil erosion from wind and water, helps control weeds, manages plant pests by breaking the pest cycle, and improves or maintains the condition of the soil. Crops planted in recurring sequence may include cover crops that provide habitat for wildlife.

Grassed buffers filter pollutants, such as pesticides and fertilizers, before they reach groundwater (NLCS)

Landscaping Farmland for Wildlife



Example of placement of grassland areas on a farm. Note that grassland wildlife plantings are connected to other grassed areas (IDNR).

In addition to agricultural pastures and hayfields, meadows, native tallgrass prairie, and other grassland types, there are many other features, which add to the diversity of wildlife on your farm. The following are features of farmland habitat that make rural living more enjoyable from an aesthetic, recreational, ecological and inspirational viewpoint.

Marginal farmland is best put in permanent pasture or retired to grassland (OSCIA)

Abandoned and Marginal Farm Land

When entire farms or even the odd corner here and there on an active farm, this type of site, are left to revert back to natural habitat, this creates habitat that is extremely valuable to wildlife and for biodiversity. Natural succession will result in different species occupying that niche over successive years. Even old barns and other farm buildings, when left standing can attract and shelter a range of wildlife including barn swallows, American kestrels and barn owls.

Roadsides and Ditch Banks

In many rural areas, roadsides and ditch banks are the only remaining grassland wildlife habitat. Over 40 species of wildlife, including mallards, meadowlarks, vesper sparrows, goldfinch, cottontail, shrew, vole, and woodchuck, use roadsides to forage or live. Although, the acreage of roadside along a 1 kilometre stretch of road may seem negligible, when calculating the total length of rural roads in southern Ontario that acreage becomes significant.

Unfortunately disturbance from mowing, burning and spraying of roadsides and ditch banks has a negative impact on those species. Leaving roadsides undisturbed, where it is not a safety hazard, saves money, protects wildlife and reduces levels of pollen from ragweed, an opportunistic weed that only grows where grass cover has been cut or removed. Improving roadside habitat with native prairie seeding or wildflowers adds aesthetic qualities for motorists and rural residents.

Floodplains are best protected by retiring to permanent grass cover (B. Solymár)

Fencerows

Fencerows can provide grassy nesting cover, winter roosts, wildlife corridors and perch sites for songbirds and raptors. Fencerows may consist of herbaceous cover only, herbaceous cover with scattered trees and shrubs, or solid trees/shrubs. Fence rows can be enhanced by planting grassy strips on either side of established tree lines, adding rock piles and installation of nest boxes for species like Eastern bluebirds and tree swallows.

Fencerows provide perch sites for birds and cover for many species of wildlife (left, OSCIA)

Wetlands and Farm Ponds

Wetlands (marshes, ponds, bogs) are one of the most valuable natural assets on a farm. If properly managed, they can harbour more wildlife then any other habitat and serve as a nutrient trap that filters out fertilizers and herbicides that leach or run-off from adjacent crop lands. Wetlands trap rainwater and allow settling of sediments, thereby reducing the potential for downstream flooding and water pollution. Grassed buffers, with optional plantings of shrubs and trees will enhance a farm pond and provide extra wildlife habitat. Fencing should be used to exclude livestock.

Farm ponds add diversity to the agricultural landscape and provide an important resource for wildlife (OSCIA)

Grassed Waterways/Municipal Drains

Waterways and municipal drains contain water in spring and fall but may be dry during summer months. In addition to acting as wildlife corridors, this habitat provides cover, food and water sources for wildlife. Grassy watercourses prevent soil erosion and can trap pesticides and fertilizers from leaching into water.

Farmstead Shelterbelts/Windbreaks

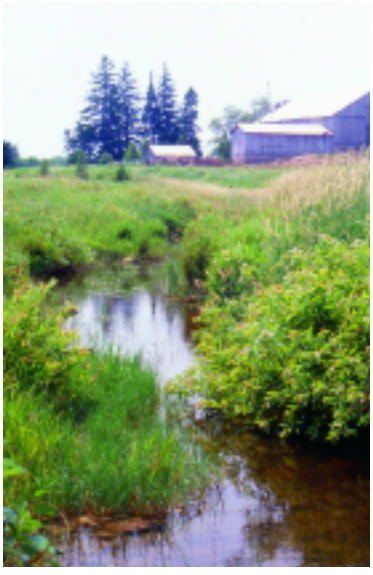
Planting lines of trees or shrubs around farm buildings not only enhances wildlife habitat but strategic placement (especially along north and west sides of farm houses and livestock barns to buffer from prevailing winds), can significantly cut energy and fuel bills during winter months, as well as provide snow drift control. General recommendations are to have multiple rows of trees/shrubs with the tallest furthest away from farm structures.

Food Plots

Planting food plots is an excellent way to enhance the survival of wildlife in winter, especially during long, cold snaps. Food plots can include soybeans, corn, sunflowers, buckwheat, sorghum, or combinations of some or all.

Food plots can also help reduce wildlife damage to adjacent agricultural crops by offering alternate food. Deer, woodchucks and rabbits are attracted to commercial mixes of alfalfa, clover, rape, turnip, millet, and ryegrasses.

Shelterbelts provide food, cover and a natural corridor for wildlife (B. Solymár)



A grassed buffer straddles this stream (OSCIA)

Bird Nest Boxes

Some species of grassland birds benefit from landowners erecting artificial nest boxes along fence posts, trees, barns or other structures. Bluebird nest boxes are always popular, and will also attract tree swallows. American kestrel boxes can be installed on high poles or on trees. Along the shore of Lake Erie nest boxes for the rare and elusive Barn owl can be installed in or on barns facing grassland. Landowners that have Barn owl nest boxes find that American kestrels and screech owls (along with less desirable species like pigeons and starlings) will also use the boxes to nest or roost.

Bluebird populations are increasing in southern Ontario thanks to landowners installing bluebird nest box trails on their land (M. Patrikeev, B. Solymár)

Rock Piles and Brush Piles

The value of brush piles and rock piles for wildlife includes shelter, escape cover, and nesting, basking and den sites. They are particularly important habitat for species like Eastern fox snake and black rat snake, which are both non-venomous and help to control area rodent populations. Rock piles can be placed anywhere and various arrangements add aesthetic appeal Brush piles are best placed at the edge of meadows or fields, adjacent to woodlands or scrubland. Rural brush piles should be a minimum of 3 to 5 metres (12 to 15 feet) in diameter, with a foundation of larger logs or rocks and smaller branches criss-crossed on top.

Bobolink (*Dolichonyx oryzivorus*)

Bobolink (Cornell)

(This article is from the booklet, *Birds on the Farm*, and is used with permission from Ontario Nature).

The bobolink's striking black and white markings, long, clear burbling song, and aerial displays make it an easily recognizable bird in rural Ontario. This member of the blackbird family is a long-distance traveler, making its way from northern Argentina to breed in Canada and the United States. During migration, bobolinks can be found in large groups in wet meadows.

Bobolinks prefer habitats of medium-height grasslands and favour hayfields and lightly grazed pastures. Bobolinks once benefited from increased agriculture in Ontario, with hay production providing ready habitat. In fact, range maps show a clear link between agricultural areas and bobolink abundance, and where there is no hay production, there are generally no bobolinks.

Female bobolinks are drably coloured with brown and buff streaks. They lay four to seven eggs that are spotted with red-brown and lavender, and which they incubate for 11-13 days. Bobolink nests are a cup of grass, stems and rootlets on the ground. To help protect the nest site, females behave in a cryptic manner, rarely carrying nesting materials and food directly to the nests. Similarly, they travel some distance from the nest before flushing.

Recent reports show that the bobolink numbers are declining, a phenomenon which may be related to the widespread use of alfalfa as a hay crop, the harvesting of hay earlier in the season, and the declining acreage of pastures and hayfields in Ontario.

American Badger (*Taxidea taxus* jacksoni)

American badger (MNR)

Often described as "nature's excavators", the badger is armed with specialized claws, paddle-like rear legs and a wedge-shaped body that allows them to penetrate dens of small mammals that they prey on with amazing speed. Observers describe badgers as appearing to "swim" through the sandy soils in a breaststroke fashion in search of prey, which include rabbits, groundhogs and small rodents. Badgers also live and give birth to their young underground in burrows called "setts". They are nocturnal, meaning they are primarily active at night, and solitary in nature. They prefer open grassy areas, like abandoned farmland and tallgrass prairie, and lightly wooded ravines. Sandy and sandy loam soils facilitate digging activities – hard, clay soils are generally avoided.

There are estimated to be less than 200 badgers of the tallgrass prairie and savanna subspecies, *Taxidea taxus jacksoni*, remaining in the province. These badgers are native to Southwestern Ontario and many neighbouring Great Lakes states. Badgers are listed as federally *endangered* by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and by COSSARO in Ontario.

Badger populations have declined in this province due to ongoing habitat loss and fragmentation, vehicle fatalities while crossing roads, genetic depression from population isolation, agricultural practices resulting in the disturbance or destruction of den sites, persecution by concerned landowners that see them as a threat to their pets or livestock, and to incidental trapping. A Recovery Team was recently formed to attempt to conserve and protect remaining badger populations in Ontario.

Monarch Butterfly (*Danaus plexippus*)

The monarch is a familiar butterfly, which can be found in Ontario wherever there are milkweed plants for its caterpillars to feed on and wildflowers for a nectar source, including abandoned farmland and roadsides, meadows and tallgrass prairie remnants. The eastern North American population migrates to Mexico each fall to overwinter at 12 sites in the central mountains. Many

Monarch butterfly

Ontarians flock to Pt. Pelee, Long Point Provincial Park, Pres'quile Provincial Park, and other spots along the north shore of Lake Erie and Lake Ontario to observe the large migrations of monarchs every fall – an awe-inspiring sight.

Declines in the Ontario populations of monarchs are due to logging and disturbance of the overwintering sites in Mexico, and the widespread use of pesticides and herbicides in Ontario. This has resulted in the monarch being listed as a species of "Special Concern", both provincially and nationally.

There is no formal protection for this species in Ontario. Three key management strategies have been identified to protect the monarch butterfly. Milkweeds, the larval food plant, should be taken off the noxious weed act in Ontario and by municipalities; native and old field grassland and wildflower habitat should be protected and encouraged; and migration stopover sites should be protected from disturbance.

Black Rat Snake (*Elaphe obsoleta obsoleta*)

The black rat snake is Ontario's largest snake, reaching lengths of 1.3 metres or more. Adults are usually shiny black, with a white chin and throat, although they may resemble the Eastern fox snake in patterning. Young snakes are grey with dark blotching on the body and tail. The species ranges across much of eastern North America, from New England south to Georgia, and west to Texas. In Canada, it occurs in two separate regions of Ontario -- north of Lake Erie, and in a region of eastern Ontario that includes Frontenac, Leeds and Grenville Counties.

Black rat snake (G. Blouin-Demers)

Black rat snakes prefer edge habitats, particularly old fields next to deciduous forest, where they may live at densities of about four snakes per hectare. Rural landowners sometimes encounter these snakes in old, wooden barns, which provide shelter and food (mice, rats). They are also excellent climbers, and will often hunt for bird's eggs or nestlings in trees.

The black rat snake overwinters in communal hibernacula. Hibernacula are located in underground chambers on warmer, south-facing slopes and may contain many snakes belonging to several species. This behaviour is considered an important method of surveying and calculating abundance of the species in the wild. Identification and protection of the hibernacula, which are used year after year, is considered an important conservation strategy.

Natural predators of the snake include raccoons (which eat eggs) and hawks (which prey especially on young snakes). Like other snakes, the black rat snake is persecuted by humans and subject to road kills. Education is paramount in changing people's perceptions about these significant animals.

Considered threatened, nationally (COSEWIC) and provincially (COSSARO), numbers of black rat snake have been declining and their distribution in southern Ontario shrinking. The species is protected under Ontario's *Fish and Wildlife Conservation Act*.

Ontario Species-at-Risk (Fauna) Associated with Grasslands

Species	Ontario Status[1]	National Status[2]
INSECTS		
Frosted Elfin	END-R	E
Karner Blue Butterfly	END-R	XT
Monarch	SC	SC
HERPTILES		
Northern Cricket Frog	END-R	E
Blue Racer	END-R	E
Butler's Gartersnake	THR	T
Eastern Foxsnake	THR	T
Black Ratsnake	THR	T
Eastern Hog-nosed Snake	THR	T
Milksnake	SC	SC
Common Five-Lined Skink	SC	SC
Eastern Ribbonsnake	SC	SC
BIRDS		
Henslow's Sparrow	END-R	E
King Rail	END-R	E
Loggerhead Shrike	END-R	E
Barn Owl	END	E
Northern Bobwhite	END	E
Least Bittern	THR	T
Short-eared Owl	SC	SC
MAMMALS		
American Badger	END	E
Gray Fox	THR	T
Eastern Mole	SC	SC

[1]**Status Categories and Definitions for Ontario Species-at-Risk**
OMNR STATUS DEFINITION (April 2004):

Endangered - Regulated (END-R) - A species facing imminent extinction or extirpation in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
Endangered - Not Regulated (END) - A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's ESA.
Threatened (THR) - A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
Special Concern (SC) – A species with characteristics that make it sensitive to human activities or natural events.

[2]**Status Categories and Definitions for National Species-at-Risk**
COSEWIC STATUS DEFINITION (May 2004):

Extirpated (XT) - A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E) - A wildlife species facing imminent extirpation or extinction.
Threatened (T) - A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC) - A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Getting Help - Sources of Information and Assistance

(This section is taken from the booklet, McGauley, E. 2004. *Birds on the Farm: A Stewardship Guide*, and used with permission from Ontario Nature – Federation of Ontario Naturalists).

This section is designed to put landowners in touch with organizations that act as information clearinghouses for conservation and environmental farming techniques, as well as networking resources. Many of the organizations listed may offer financial programs to assist individual farmers and other rural landowners in the implementation of the techniques noted in the book. Funding programs and project eligibility vary from year to year. It is recommended that contact be made prior to planning a project for which financial assistance is required.

Bird Studies Canada
Bird Studies Canada (BSC) is recognized as a leading conservation organization dedicated to advancing the understanding, appreciation and conservation of wild birds and their habitats in Canada and elsewhere. BSC coordinates programs on regional, national and international scales, including many of the bird monitoring programs mentioned in this guidebook. BSC is also one of the Canadian BirdLife International co-partners and is involved in a global effort to protect essential bird habitat through the delivery of the Canadian Important Bird Areas Program. Contact BSC to find out more about Project Feeder Watch, the Ontario Nest Record Scheme and the Christmas Bird Count, or to find out more about birds and bird conservation in your area.

Bird Studies Canada
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N0E 1M0
1-888-448-BIRD
E-mail: generalinfo@bsc-eoc.org
Website: www.bsc-eoc.org

Canadian Nature Federation
The Canadian Nature Federation's (CNF) mission is to protect nature, its diversity and the processes that sustain it, and is fulfilled through the implementation of four national conservation programs: Community Education; Bird Conservation; Wildlands and Seas; and Endangered Species. As one of the Canadian BirdLife International co-partners, CNF is involved in the delivery of the Canadian Important Bird Areas Program which is designed to identify and protect some of Canada's most critical bird habitat. CNF is also involved in Project Feeder Watch and other national volunteer monitoring programs including Frog Watch, Plant Watch, and Ice Watch. Contact CNF to find out the location of your nearest Important Bird Area.

Canadian Nature Federation
Suite 606, 1 Nicholas Street
Ottawa, ON
K1N 7B7
(613) 562-3447
1-800-267-4088
Website: www.cnf.ca
www.ibacanada.ca

Canadian Wildlife Service
The Canadian Wildlife Service (CWS) is Canada's national wildlife agency, handling wildlife issues that are the responsibility of the federal government. CWS is involved in the protection of migratory birds, wildlife habitat, endangered species, and research on nationally important wildlife issues, among other program areas.

Canadian Wildlife Service - Environment Canada
351 St. Joseph Boulevard
Hull, Quebec
K1A 0H3
(819) 997-1095
www.cws-scf.ec.gc.ca

Conservation Ontario

Local Conservation Authority Programs

Members of Ontario's 36 Conservation Authorities are working individually to ensure clean water, prevent flooding, reduce erosion, preserve wildlife, and provide local conservation and recreational spaces in the province. Through the development and delivery of programs to restore and manage Ontario's water resources, Conservation Authorities are closely linked to local stewardship activities. Some of the projects likely to be supported by a local Conservation Authority include restricting livestock from waterways, buffer strips and strip habitat plantings. Conservation Authorities serve individual landowners, providing stewardship advice and, in some cases, funds related to waterway protection and restoration.

Individual Conservation Authorities develop programs to protect the urban and rural lands that form part of the watershed under their jurisdiction. To find out if there is a funding program related to an ecological farm management technique noted in this book, contact Conservation Ontario and have them put you in touch with your local Conservation Authority.

Conservation Ontario
P.O. Box 11
120 Bayview Parkway
Newmarket, ON
L3Y 4W3
E-mail: info@conservation-ontario.on.ca
Website: www.conservation-ontario.on.ca

Ducks Unlimited Canada

Ducks Unlimited Canada conserves, restores and manages wetlands and associated habitats for North America's waterfowl. As a result, this organization is active in rural Ontario and, in the past, has offered funding programs such as Ontario Land Care and the Rural Conservation Club Program. These funding initiatives featured partnerships with local farmers and community pasture managers to implement ecological agricultural management techniques. Their past experience in ecological farming techniques makes Ducks Unlimited staff a valuable resource for advice and help with conservation initiatives on farms, as are the organization's wetland related publications and profiles of past projects. Ducks Unlimited does provide some financial assistance for agricultural projects, particularly those involved in wetland management.

Ducks Unlimited Canada
566 Welham Road
Barrie, ON
L4N 8Z2
(705) 721-4444
Website: www.ducks.ca

Environmental Farm Plan Incentive Fund

The Environmental Farm Plan is a voluntary educational program for farmers and their families. Currently, over 26,000 farm families have been engaged in the EFP program, which is delivered locally by the Ontario Soil Crop and Improvement Association on behalf of the Ontario Farm Environmental Coalition. The EFP program involves workshops to help participants work through the process of conducting an environmental risk assessment and developing an EFP. Once a plan has been prepared, the program offers financial incentives to assist farmers making positive environmental changes and implementing new management practices. For complete program details, contact:

Ontario Soil and Crop Improvement Association
1 Stone Road W.
Guelph, ON
N1G 4Y2
1-800-265-9751
E-mail: oscia@ontariosoilcrop.org
Website: www.ontariosoilcrop.org

Ontario Federation of Anglers and Hunters
Local Habitat Restoration Programs
Individual Ontario Federation of Anglers and Hunters (OFAH) club members participate in any number of local and provincially significant habitat restoration projects. Members of the OFAH have been planting trees, creating stream buffers, installing wood duck nesting boxes and protecting wetlands and woodlands to provide better habitat for wildlife. Locally based clubs sometimes have funds to disperse for habitat enhancement. For more information about current funding opportunities, contact:

Ontario Federation of Anglers and Hunters
P.O. Box 2800
Peterborough, ON
K9J 8L5
(705) 748-6324
Website: www.ofah.org

Ontario Ministry of Agriculture (OMAF) and Food/Agriculture and Agri-Food Canada (AAFC)
These government departments maintain exhaustive information databases on their websites, and it is well worth a browse through for additional information, specialist contact information and ideas about ecological farm management techniques. While the majority of funding from these organizations is administered through other programs like the EFP, funding may be available for individual farmland enhancement projects.

OMAF Info Line: 1-877-424-1300
www.omaf.gov.on.ca

www.agr.gc.ca

Ontario Ministry of Natural Resources (OMNR)
If a farm woodlot is four hectares (10 acres) or more in size, significant tax savings can be gained by enrolling that land in the Managed Forest Tax Incentive Program, administered by the Ministry of Natural Resources. Other funding programs may be available through the MNR for fish and wildlife habitat enhancement. The LandOwner Resource Center is a unique extension service of the MNR and provides a suite of publications relating to restoration and land management, many of which are directly applicable to farmland.

MNR Southcentral Regional Office
300 Water Street,
4th Floor, South Tower,
P.O. Box 7000
Peterborough, ON
K9J 8M5
(705) 755-2000
Website: www.mnr.gov.on.ca

LandOwner Resource Centre
P.O. Box 599, 5524 Dickinson Street
Mantiock, ON
K4M1A5
1-800-387-5304
E-mail: info@lrconline.com
Website: www.lrconline.com

Ontario Natural Heritage Information Centre
The Natural Heritage Information Centre (NHIC) compiles, maintains and provides information on rare, threatened and endangered species and spaces in Ontario. This information is stored in a central repository containing a computerized database, map files and an information library, which are accessible for conservation applications, land use planning, park management, etc. The new NHIC website makes this information available through the world wide web.

http://www.mnr.gov.on.ca/MNR/nhic/nhic.cfm

Ontario Nature
Ontario Nature – Federation of Ontario Naturalists protects and restores nature through research, education and conservation action. Ontario Nature champions woodlands, wetlands and wildlife, and preserves essential habitat through its own system of nature reserves. It is a charitable organization representing 25,000 members and over 135 member groups across the province, connecting individuals and communities to nature.

Contact Ontario Nature to network with local naturalist groups, to find out more about protecting bird habitat through conservation easements and land donations, or to inquire about bird monitoring programs including the current (2001-2005) Ontario Breeding Bird Atlas.

Ontario Nature
355 Lesmill Road
Toronto, ON
M3B 2W8
1-800-440-2366 or (416) 444-8419
E-mail: info@ontarionature.org
Website: www.ontarionature.org

Ontario Soil and Crop Association
The Ontario Soil and Crop Improvement Association (OSCIA) is a non-profit farm organization whose membership represents virtually all commodity groups across the province and is a credible, active, grassroots voice on agricultural issues. The OSCIA delivers Environmental Farm Plans, develops resource publications on farm issues like nuisance wildlife, and partners with farm organizations, conservation clubs and others to implement soil and water stewardship projects across Ontario. OSCIA has 55 local county/district branches across the province and is a significant presence in all the major agricultural areas of Ontario.

Ontario Soil and Crop Improvement Association
1 Stone Road W.
Guelph, ON
N1G 4Y2
1-800-265-9751
E-mail: oscia@ontariosoilcrop.org
Website: www.ontariosoilcrop.org

Ontario Stewardship
Local Stewardship Councils
Ontario Stewardship links private landowners with funding, information and expertise to ensure environmental stewardship across Ontario. The 40 community stewardship councils that comprise Ontario Stewardship have project and operational funding that acts as the catalyst to ensure that good ideas, generated by local citizens on the council, are translated into great projects. Local stewardship councils may have funds to contribute towards ecological farm management, and can also link farmers to other information sources for help with farm enhancement initiatives. Ontario Stewardship, the administrative body for local Stewardship Councils can help you determine your local Stewardship Council Coordinator's contact information.

Steve Wilkins, Provincial Stewardship Coordinator
c/o Ministry of Natural Resources
300 Water Street, Box 7000
Peterborough, ON
K9J 8M5
(705) 755-3278
Email: steve.wilkins@mnr.gov.on.ca
Website: www.ontariostewardship.org

Society for Ecological Restoration
Up to date information about invasive exotic species is available from the Society for Ecological Restoration, by mail or through their website.

SER Ontario Chapter
c/o Center for Environmental Training
Niagara College, Glendale Campus
135 Taylor Road, R.R.#4
Niagara-on-the-Lake, ON
L0S 1J0
(905) 641-2252 ext. 6494
Website: www.serontario.org

Tallgrass Ontario
This organization's strength lies in its focus on native tallgrass prairies in Ontario rather than funding. If you are interested in finding out more about warm season native grasses, or would like to find out whether restoring an old field on your property to a prairie ecosystem is suitable for your land, contact Tallgrass Ontario.

Tallgrass Ontario
659 Exeter Road
London, ON
N5Y 2R7
(519) 873-4631
E-mail: info@tallgrassontario.org
Website: www.tallgrassontario.org

Wildlife Habitat Canada
Wetland Habitat Fund
Water quality and erosion projects, including buffer strips, native vegetation planting and restricted livestock access may be funded by the Wetland Habitat Fund (WHF). This fund provides private landowners with financial assistance for projects that improve the ecological integrity of wetland habitats. The WHF is directly supported by Wildlife Habitat Canada. The fund program favours projects that address local wetland and wildlife habitat issues, such as those initiated by farmers. Habitat projects that conform to WHF's criteria may be eligible for funds up to a maximum of 50% of the project cost or $5,000 (whichever is less). To apply, contact the Program Manager to determine the WHF representative in your area, or visit http://www.wetlandfund.com/whfcontacts.htm.

Mark Stabb, Program Manager
Wetland Habitat Fund
c/o Wildlife Habitat Canada
7 Hinton Avenue North, Suite 200
Ottawa, Ontario
K1Y 4P1
(613) 722-2090 ext. 252
E-mail: mstabb@wetlandfund.com
Website: www.wetlandfund.com

Selected Resource Materials

Anonymous. ----. *Management Options for Abandoned Farm Fields*. Government of Ontario. (Available from the LandOwner Resource Centre at 1-888-571-4636 or lrc@sympatico.ca).

Baute, T. et al. (editors). 2002. *Agronomy Guide for Field Crops*, Publication 811. Ontario Ministry of Agriculture, Food and Rural Affairs. (Available at OMAF offices and at http://www.gov.on.ca/OMAFRA/english/products/product.html

Daigle, J-M. & D.J.Havinga. 1996. *Restoring Nature's Place. A Guide to Naturalizing Ontario Parks and Greenspace*. Ontario Parks Association. (Available from the ESRC at 905-939-8498; eoutlook@ican.net)

Delaney, K. *et al*. 2000. *Planting the Seed: A Guide to Establishing Prairie and Meadow Communities in Southern Ontario*. Environmant Canada. (Available from Tallgrass Ontario at 519-873-4631 or info@tallgrassontario.org).

Hilts, S. and P. Mitchell. 1998. *Caring for Your Land: A Stewardship Handbook for Carolinian Canada Landowners*. Centre for Land and Water Stewardship, University of Guelph. (Available at the University of Guelph bookstore).

Kanter, M. *et al*. 2004. *Species @ Risk in Carolinian Canada and How to Help*. Carolinian Canada, London, ON (Copies available from Carolinian Canada, 519-433-7077 or info@carolinian.org).

Lane, Alison (Ed.). 2004. *Best Management Practices: Buffer Strips*. Ontario Ministry of Agriculture and Food (Available at OMAF offices and at http://www.gov.on.ca/OMAFRA/english/products/product.html)

Lane, Alison (Ed.). 1996. *Best Management Practices: Fish and Wildlife Habitat Enhancement*. Ontario Ministry of Agriculture and Food (Available at OMAF offices and at http://www.gov.on.ca/OMAFRA/english/products/product.html)

McGauley, E. 2004. *Birds on the Farm: A Stewardship Guide*. Ontario Nature – Federation of Ontario Naturalists. (For copies contact Ontario Nature at 1-800-440-2366 or info@ontarionature.org

Ontario Soil and Crop Improvement Association. 2002. *Wildlife Wise*. OSCIA and Ministry of Natural Resources. (Copies available from OSCIA, 1-800-265-9751 or oscia@ontariosoilcrop.org)

Upfold, R.A. and H.C. Wright. 1994. *Forage Production*. Publication 30. Ontario Ministry of Agriculture and Food Queens Printer, Toronto. (Available at OMAF offices and at http://www.gov.on.ca/OMAFRA/english/products/product.html).

Web Resources

Effects of Management Practices on Grassland Birds, Northern Prairie Wildlife Research Center, North Dakota.
http://www.npwrc.usgs.gov/resource/literatr/grasbird/grasbird.htm

Grassland Birds: An Overview of Threats and Recommended Management Strategies, Cornell University, New York.
http://birds.cornell.edu/pifcapemay/vickery.htm

Grassland Birds: Grassland Conservation Program Introduction, MassachusettsAudubon Society, Massachusetts.
http://www.massaudubon.org/Birds_&_Beyond/grassland/index.php

Planting the Seed: A Guide to Establishing Prairie and Meadow Communities in Southern Ontario. Environment Canada.
http://www.on.ec.gc.ca/wildlife/docs/doc-planting-prairie-e.html

Cats and Wildlife: A Conservation Dilemma, Cooperative Extension Services, Wisconsin.
http://wildlife.wisc.edu/extension/catfly3.htm

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Homepage.
http://www.cosewic.gc.ca/index.htm

Ontario's Species-at-Risk, Royal Ontario Museum, Toronto, ON.
http://www.rom.on.ca/ontario/risk.php

Species-at-Risk, Ontario Ministry of Natural Resources.
http://www.ontarioparks.com/english/sar.html