Components of a Biodiversity Enhancement Plan: A Discussion of Best Management Practices (BMPs) for Pasture Operations with a Focus on Species at Risk

3.0 Source materials

There are a number of recently published manuals on BMPs for Species at Risk on hay fields and pasture in Ontario and Central and Eastern US (McCracken 2005, Vickery, NPWRC 2014, AWCC 2010, Solymar 2005, CC, Mussell, 2013). Most quoted material in this text is drawn from Mussell, 2013, because it is Ontario based, recent and relatively comprehensive. There is also a quantity of material relating to the phenology for specific grassland species (see URL list in Bibliography). The most comprehensive of these are the series available on the Northern Prairie Wildlife Research Center (NPWRC) website.

3.1 Discussion of Best Management Practices for Grassland Birds Arranged by Order of Importance:

3.1.1 BMPs #1: Continue the present farm operations.

Many Ontario farm operations already support significant numbers of species at risk during the breeding season. Although high population densities do not necessarily correlate with high reproductive success – and we do not yet have detailed breeding season observations to confirm levels of reproductive success on specific properties – there can be little doubt that these birds are present on these farms because of the habitat created by the presence of cattle (and other ruminants) and the accompanying management protocols (Diemer, 2014). A look at the breeding distribution maps for our target species (Cadman, 2007) confirms the strong correlation between the preferred habitat of these species and beef cattle and sheep production in Ontario. Ruminants are the key, not only because they create and maintain suitable grassland habitat, but because they also increase invertebrate populations by up to five times over farm operations that do not house animals (Ambrosini, 2002). Therefore, BMPs which encourage a continuation of the current pasture operation are to be promoted, while those that discourage continuance should be adjusted or dropped.

3.1.2: BMP#2 Data collection and analysis

The task of developing BMPs for grassland species in Ontario is a relatively new undertaking and a critical need for more observation and study is apparent on two levels: At the Provincial/regional level, there are still major knowledge gaps that prevent the development of 'general' BMP guidelines. For example, we do not have a full understanding of the connection between stocking rates and nest destruction (trampling) in pastures in Ontario (see discussion below under BMP #3). At the farm and

field level, detailed breeding season observations can provide important inputs into daily decision making. For example, the general BMP for Ontario is to minimize disturbance on breeding grounds until July 15th. However, farm and field level observations of fledgling activity may allow paddock entry days or even weeks before that date. Each day of delayed entry reduces both the quality and quantity of forage available for the cattle (see Mussell, 2013, Section 5), so fine-tuning BMPs to the farm level is potentially the most important cost mitigation strategy available for protecting species at risk. Consequently, one major focus of this management plan going forward is to upgrade the observational skills of the farm manager. As seen in the Action Plan below, a number of components designed to increase the SAR biology data input into daily decision making have been purchased or developed, including mapping tools, observation protocol charts, breeding factsheets and timelines, inventory checklists and reference books. Ongoing assistance from experienced observers for data collection, analysis and interpretation is strongly recommended for the 2015 breeding season.

3.1.3 BMP#3 Minimize disturbance during breeding season

Certainly the most effective strategy in promoting reproductive success in our ground-nesting target species is to delay grazing and hay mowing of breeding habitat until after juveniles have fully fledged (are strong fliers, capable of escaping the disturbance) – a date generally reached by July 15th in Southern Ontario. Studies show that reproductive success is reduced to near zero on fields mowed between June 1 and July 1 (MacDonald, 2014, Mussell, 2013). Grazing, at least at high stock density rates, has similar consequences. Recent Ontario studies (MacDonald, 2014, Mussell, 2013) reject reducing stocking rates as either ineffective (small reductions) or cost prohibitive (large reductions), thus leaving delayed pasture entry as the best management practice of choice. Mussell estimates the costs of such delays at approximately $200/acre, based on full exclusion until July 15th. This would amount to hundreds of millions of dollars in lost income across Ontario (Mussell, 2013, Section 5). On the other hand, fine tuning delayed entry practices at the farm level could significantly decrease the delay, and thereby mitigate these costs. Below, two fine tuning opportunities are discussed.

3.1.3.1 Reduced stocking rate:

Mussell quotes several studies which note that “High population densities are not always synonymous with high reproductive output. Therefore habitats with high Bobolink and Eastern Meadowlark densities could be functioning as ecological traps.” (2013, p65) As the large majority of our target species habitat is hay fields and pastures, and very few of these are left undisturbed until July 15th, one is led to question whether most of Ontario’s grassland habitat is acting as an ecological trap? And if so, how are high population densities being sustained? MacDonald (2014, personal comm.) notes that in her study in Renfrew County, population density was observed to be much higher, overall, on hay fields, than on pastures (this is supported by Peck, 1987). She suggests that the bulk of reproductive success is occurring in hay fields that were not cut until after July 15th, if at all. In areas where the stocking rate is very low, the opposite has been observed: the bulk of the reproductive success is occurring on pastures,

with hayfields making a significant contribution only in years when haying is delayed past July 1st (Ron Reid, Personal Comm.) Mussell reports that 98 % of Ontario farmers enrolled in a forage insurance program expected to harvest hay prior to July 1st (2014, p39, and Table 3.12, p40).

On the other hand, there are many studies (Bleho, 2014) from Central and Western North America that note that nest destruction due to trampling is insignificant (1/30 of predation rate). Obviously then, at some point, a lower stocking rate does reduce nest destruction. This suggests that we may be able to harvest a portion of the available forage by earlier paddock entry with a reduced stocking rate without heavily impacting reproductive success. Unfortunately, for Ontario we have no answers to such questions as: At what stocking rate does nest destruction begin to fall? At what stocking rate does nest destruction become an insignificant factor in reproductive success? And how do those stocking rates compare to average, and regional, Ontario stocking rates?

Clearly more research into the connection between stocking rate and reproductive success in Ontario is needed. This is probably Ontario's most important knowledge gap in terms of preparing best management practices for grasslands birds! It may also impede farm operator uptake of funded SAR protective measures. There are similar gaps at the farm level for our target property: What is the current reproductive success rate for ground nesting birds already on the property? If it is near zero, as some of the Ontario based literature suggests may be the case, can it be improved by adjustments to the stocking rate, or is it necessary to implement delayed entry strategies to boost the success rate?

3.1.3.2 Delayed entry

When stocking rates are high enough to result in near total nest destruction by trampling, delayed entry to the breeding grounds becomes the preferred best management practice. Until we know the reproductive success rate on a specific farms, we cannot tell whether the current rotation system is acceptable, whether or not reproductive success can be improved by moderate adjustments to current practices, or whether the current rotation system needs to be revamped to accommodate delayed entry dates in some of the paddocks.

If, as much of the literature from Ontario indicates, we do need to delay entry to some paddocks to improve reproductive success, then the current system of paddocks (number, size and shape) may need to be reviewed and adjusted. For example, paddocks could be reorganized so that most of the preferred interior habitat is contained in one or two smaller paddocks, thus reducing the cost of delayed entry into the most productive breeding habitat on the farm. As well, variations in the quality and quantity of forage available in various paddock configurations will need to be factored in when calculating how to sustain stocking rates while delaying access to significant portions of the available forage.

It is worth repeating that stocking rates and pasture entry dates can be fine-tuned for each farm operation. For example, entry dates may be advanced by several weeks in fields where the breeding cycle is completed earlier, or pastures may be partially utilized earlier by using a reduced stocking rate.

Such fine tuning requires significant skills and commitments from the operators, but may potentially result in significant reductions in the costs of such BMPs.

3.1.4 BMP #4 Maintain a variety of forage cover and a well-developed litter layer

A considerable number of variables come together to determine the quantity and quality of forage cover at a given place at a given time, including plant mix, soil type, microclimate, seasonal weather, and the number, timing and intensity of grazing events. Paddock rotation can be used to ensure a variety of forage heights and growth stages, through three seasons. The 5 paddocks rotation, for example, would typically host three or four different stages of first growth and/or recovery, with forage heights ranging between 10 and 50 cm. Typically, all the paddocks would be grazed more than once before July 15. As well, other grassed areas (vacant land, fence beds, ditches, etc.) can form a significant refuge in which forage heights can range up to 120 cm.

The mix of forage plants present – grasses, legumes, forbs – will varies considerably across large pasture areas. By and large, grasses will dominate, tending to highest concentrations in areas where the soil is best. In most pastures, there will also be significant bare areas – in trampled areas, where paths form, in wet spots and where bedrock is exposed. As well, there will be areas where legumes or forbs dominate.

Most pastures will support a variety of forbs, many occurring in scattered patches. Spotted knapweed is very common in drier areas in Grey Bruce pastures, while forbs like smartweed and heal-all occur in wetter areas. A common legume is birdsfoot trefoil – it is suited to wet soils and is often part of ongoing overseeding programs used to sustain forage production.

Efforts to increase the quantity and quality of forage available through overseeding and fertilization (both pasture wide and in selected spots) are important management tools going forward. With no increase in the stocking rate, any increases in forage production can be used to offset some of the forage losses incurred through practices like delayed entry into areas where nest concentration is highest.

Cow pats (dung) also contribute to the variety of forage cover. Cattle avoid eating plants near cow pats for over a year after deposition (Pasture Production, 2000, p28). This results in uneven grazing and variation in forage heights and quality across the paddock. Some studies comment that many nests were found near cow pats – perhaps the cows prefer not to step in it as well!

The litter layer is also determined by many variables. The plant mix is important because it determines the texture of the litter. Fall weather is also important because it determines the amount of regrowth and decomposition after the last grazing event. (Generally, first grazing events occur between May 15 and June 15, last grazing events between Sept 1 and Sept 30).

Increasingly, native tall grass species are being included in grazing regimes. Once established, they complement traditional production of cool season grasses with high quality summer forage. These

native species are deep rooted which allows them to outperform cool season grasses in hot, dry conditions. In Ontario, most on farm experience with these species has been on deep, dry soils (Bryan Gilroy, personal comm. 2014). As well, they are harder to establish, with thorough seed bed preparation recommended. Many Grey Bruce pastures offers wet soils over shallow bedrock with no ability for thorough cultivation.

3.1.5 BMP #5 Keep woody growth out

Openness is an important breeding habitat feature at the landscape scale, especially for bobolinks. Studies show that bobolinks, and to a lesser extent eastern meadowlarks, avoid nesting near woody or shrubby edges (at least 50m), undoubtedly because they provide corridors and perches for predators.

For the most part, on farm grazing rotation will control woody growth on the pastures themselves. Late season clipping can be performed to stimulate forage growth and control invasive species like spotted knapweed (see discussion below in BMP #6) and can be deployed as needed for control of woody growth. Fence beds and road allowances should be kept largely clear of woody growth.

3.1.6 BMPS#6 Control invasive species

There are two common troublesome invasive species in many pastures in Grey Bruce: spotted knapweed and common buckthorn. Both are the subject of ongoing actions designed to reduce, or at least control, their populations.

Buckthorn is generally not a problem on pastures themselves, but can have a significant presence in fencebeds, particularly those that border wooded areas.

Knapweed is can be widely distributed over the entire pasture area, with the greatest concentrations usually occurring on the higher ground. Late season clipping (after July 15) with a mower can be used to prevent the knapweed from going to seed, although because of the late start, this is often not completely effective. As well, the cattle will browse on the regrowing knapweed, although they tend to find the mature plant unpalatable.

Overseeding (see above, 3.1.4) and spot fertilization can also be used, in part, in an attempt to crowd out the knapweed, although full results may not be apparent for several years, hence the ongoing effectiveness of overseeding and fertilization will need to be monitored.

As well, there may be significant refuges outside the pasture fenceline, where knapweed can grow unmolested. These areas can represents a large seed bank for this plant. This will be of less significance if high concentrations of knapweed already infest the pasture. However, if ongoing efforts to reduce

knapweed populations in the pasture are successful, the impact of this seed bank refuge will increase and control measures may need to be introduced.

Overall, the knapweed infestation of pasture in Grey and Bruce is very worrisome. It has spread very quickly since its introduction approximately twenty years ago and, as it reduces both the quality and quantity of forage available, it is a threat to both the cattle operation and the SAR on the property. Most of the methods of control developed for knapweed are not well suited to most extensive pasture operations (see http://www.co.lincoln.wa.us/weedboard). Biological controls, at this point, require importing control insects into Canada and mechanical tillage is not advisable given the soils on the farm. Pesticides can be effective, but they are expensive and difficult to apply. Clipping and crowd out strategies appear to be have some effect, and these practices need to be continued, and perhaps augmented going forward as ongoing monitoring of the infestation may indicate.

3.1.7 BMP #7: Maintain and Develop Built Infrastructure

There are barn swallow colonies nesting in farm structures on many pasture properties in Grey and Bruce. These buildings are often of rudimentary construction and can be quite old, raising some concerns about their durability. Maintaining the structural integrity of these buildings, as well as accessibility for the birds, is of ongoing concern.

3.1.8 BMPS #8 Watering system

Access to water can significantly impact when, where and how often cattle move about a paddock. Observations on the pattern of cattle movement, particularly in areas of heavy nest activity, may suggest adjustments that will reduce the impact of trampling and grazing. As well, the adequacy of the current water systems may need to be revisited should the paddocks need to be rearranged to accommodate delayed entry to some areas,

3.1.9 BMPS #9 Managing for other SARs

As Action Plans are developed for more and more farms, the inventory of identified fauna and flora on these properties will grow considerably. There is a potential that a number of other SAR will be identified as well (See SAR lists below) . As their presence on the farm is confirmed, the BMPs for these species will need to be added to the Biodiversity Enhancement Plans.

3.1.9.1. Monarch butterflies

Monarch butterflies are seen yearly on many properties in Grey and Bruce. At present small patches of common milkweed pastures can be left undisturbed, as this species is the host plant for monarch

butterflies. Seed can collected and and distributed in suitable areas. It is not anticipated that these small patches of common milkweed will have a significant impact on farm operations.

List of confirmed or potential SAR on the pasture properties in Grey Bruce

- Bobolink,
- Eastern Meadowlark,
- Barn Swallow,
- Butternut,
- Milk Snake,
- Snapping Turtle,
- Ribbon Snake,
- Common Nighthawk,
- Whippoorwill,
- Henslow's Sparrow,
- Monarch Butterfly

2.2.3 List of species of interest:

Bitternut Hickory , Wood Frog, Spring Peeper, Chorus Frog, Grey Tree Frog, Red-bellied Snake, Smooth Green Snake, Garter Snake, Painted Turtle, Cliff Swallow, Tree Swallow, Bluebird, Savannah Sparrow , Field Sparrow, Vespers Sparrow, Grasshopper Sparrow, Northern Harrier, Upland Sandpiper, Bats spp,

2.2.4 Invasive species of concern on the Property:

Spotted Knapweed, Common Buckthorn, Phragmites, Garlic Mustard.

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Mass Audubon, "Managing Small Grasslands for Grassland Birds", http://www.massaudubon.org/our-conservation-work/wildlife-research-conservation/grassland-birds/grassland-birds-manual/small-grasslands

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Pasture Production, Publication 19, 2000, OMAFRA, Guelph

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Vickery, Peter, et.al., "Grassland Birds: An Overview of Threats and Recommended Management Strategies", Cornell, Ithaca, New York.
http://www.birds.cornell.edu/pifcapemay/vickery

Solymar, Bernt, 2005, "A Stewardship Guide to Grasslands in Southern Ontario", Ontario Barn Owl Recovery Project.

Best management practices URLs for:

Bobolinks:

http://www.npwrc.usgs.gov/resource/literatr/grasbird/bobo/bobo.htm

http://www.bobolinkproject.com/docs/NRCS_Grassland_leaflet.pdf

http://www.dec.ny.gov/pubs/86582.html

http://www.bsc-eoc.org/download/grasslandbirdsmccracken.pdf

http://www.audubonmagazine.org/articles/birds/buying-time

http://www.holdenarb.org/resources/Bobolink.asp

Eastern Meadowlarks

http://www.ace-eco.org/vol5/iss2/art11/Eastern meadowlark:

http://www.npwrc.usgs.gov/resource/literatr/grasbird/eame/eame.htm

http://www.npwrc.usgs.gov/resource/birds/wiscbird/

http://www.ontariobeef.com/uploads/userfiles/files/2012_10_30_comments%20on%20bobolink.pdf

http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_ghd_est_mdwlrk_en.pdf

Invasive species:

http://www.colorado.gov/cs/Satellite?c=Page&childpagename=ag_Conservation%2FCBONLayout&cid=1251618711680&pagename=CBONWrapper

http://www.integratedweedcontrol.com/pricing.html

http://www.omafra.gov.on.ca/english/crops/facts/info_knapweed.htm

http://www.bio-control.com/pricing.php

http://www.co.lincoln.wa.us/weedboard

Eastern Milk Snake

http://www.gbbr.ca/our-environment/species-at-risk/reptiles/eastern-milksnake/

http://brucetrail.org/system/downloads/0000/0469/Milksnake_for_Archives.pdf

Butternut Tree

http://www.ontwoodlotassoc.org/pdf/A%20Landowners%20Resource%20Guide%20To%20Butternut.pd
http://www.rom.on.ca/ontario/risk.php?doc_type=fact&id=298

Monarch Butterfly

http://www.rom.on.ca/ontario/risk.php?doc_type=fact&id=149

http://dnr.wi.gov/org/caer/ce/eek/teacher/milkweedmonitoring/monarchfacts.pdf