Saskatchewan Prairie Conservation Action Plan

Guide to Managing for Optimal Habitat Attributes:

Loggerhead Shrike

(Lanius ludovicianus excubitorides)

April, 2018

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ABOUT THIS GUIDE

A New Approach To Managing For Species At Risk

The intent of this guide is to determine local and landscape-scale habitat features that are optimal for species at risk at different life stages, as well as important non-habitat related beneficial management practices. As habitat for species at risk declines and threats to populations increase in jurisdictions outside Canada, it becomes critical to provide optimal conditions on what remains if we are to conserve or recover a species.

This First Approximation of the guide for Loggerhead Shrike should be considered a living or dynamic document that will continually evolve. As our knowledge of prairie species at risk improves with research and monitoring, this guide will need to be periodically revisited and updated.

Who Should Use This Guide?

Most grassland species at risk in Saskatchewan exist on working agricultural lands that most often support grazing livestock and sometimes support annual or perennial crops. This guide provides habitat targets and non-habitat related beneficial management practices (BMPs) for land managers who may have the opportunity to aid in the conservation of species at risk on the land under their control. Additionally, the habitat targets and BMPs may be used by conservation organizations in designing results-based agreements with land managers.

The Environmental Benefit Index (EBI) is designed to be used by any stakeholder to prioritize sites and/or projects for conservation and recovery programs, or by land managers to evaluate the value of their property for a particular species.

How To Use This Guide

This guide is presented in two parts. The first part summarizes the important spatial and temporal needs of the species and presents habitat targets and non-habitat related BMPs. Habitat targets are presented at two major spatial scales. Landscape-scale habitat targets are those attributes that an individual opts for when choosing a breeding location or home range. These targets are often land cover or topography-related, but may also include such factors as whether or not there are other individuals of the same species already in the area. Site-scale targets are those attributes that the individual prefers at a certain time (e.g., breeding, brood rearing, hunting or foraging) or in a certain portion of their home range. Site habitat targets are most commonly physical vegetation and/or soil parameters, but may also include such attributes as configuration of vegetation communities or land cover, density of perches, presence/absence of human infrastructure, etc. The rationale for each

target or BMP is also provided so land managers can readily understand the relationship between the target and use of habitat by the species.

Guides have been prepared for individual species. Habitat targets for individual species give the land manager the choice of species they wish to benefit. Managing for a single species may result in habitat that is undesirable for another species. Conflicts between species are addressed in the EBI.

The second part of the guide presents an index that places values on the habitat targets and BMPs in combination with other considerations. An Environmental Benefit Index is a compound index that considers multiple environmental factors when determining an ecosystem outcome. EBIs can be used to evaluate and prioritize opportunities for conservation programs. An EBI is of considerable importance in determining priority sites to invest in, particularly when funds are limited.

The overall goal of the EBIs for species at risk habitat is to ensure maximum environmental value for an investment in results-based conservation programming. The EBI has several potential uses including:

- To geographically target the most important locations,
- To evaluate and rank candidate properties or projects for their environmental benefit,
- To rank the environmental benefit of candidate properties or projects by cost (or bid), and
- To evaluate projects over time to determine if environmental values are being improved or maintained, or to evaluate the efficiency of the investment over time.

EBIs were identified as a method to target programming and prioritize participation in the design of the Prairie Beef & Biodiversity program (Commission for Environmental Cooperation, 2013). EBIs were subsequently developed for the Greater Sage-Grouse (Ranchers Stewardship Alliance Inc., 2014), Piping Plover (SK PCAP, 2017), and Burrowing Owl (unpublished, 2017).

Loggerhead Shrike Identification

Loggerhead Shrike are small to medium-sized birds, of gray, white and black coloration and have a conspicuous black face mask. Shrikes are often referred to as "butcher birds" because of their habit of impaling prey on thorns or barbed wire to hold it in place for dismembering and consumption.

COSEWIC status: Threatened

S-Rank for Saskatchewan: S2B, S2M (Imperiled/Very rare)

Size - Length: 9" (23 cm), Wingspan: 12" (30 cm)

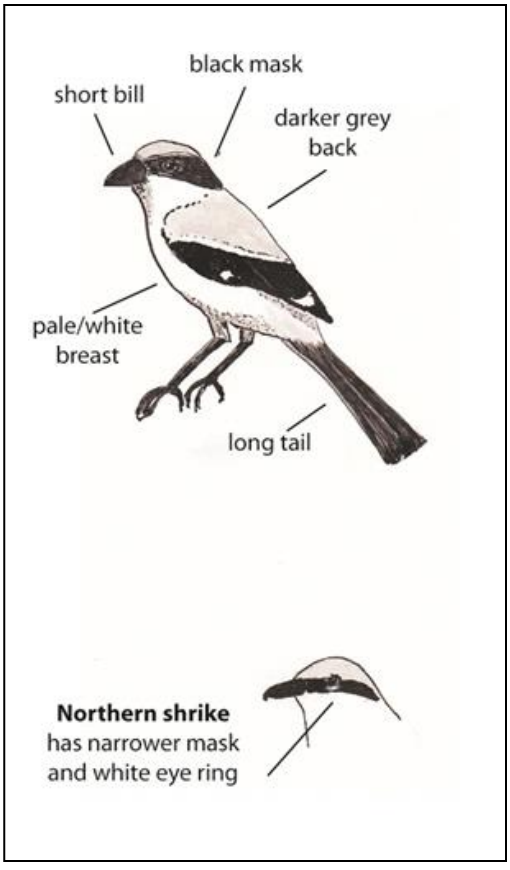
Features - Distinctive black facial mask; bill is heavy and hooked; grey head and back; white belly; black wings with white wing patches; black tail with white outer tail feathers. **Male and female are similar.** Juveniles have light grayish-brown bars on the breast and sides and they have less prominent facial mask.

Song - Loggerhead Shrike sings quiet songs composed of short trills, rasps, and buzzes mixed with clear, often descending notes. They also have a harsh scream used as an alarm call.

Nest – Shaped like a thick cup and is built using grass, bark strips, and sticks, lined with feathers, animal hair, plant fibres, etc. The nest usually contains 4-6 eggs, grayish white to pale buff, with spots of brown and gray often concentrated on the larger end. Nests are most often located 2 – 4 m above the ground.

Habitat - This summer resident (Most often May through September) prefers open areas such as native or tame pasture for feeding with nearby thorny shrubs or trees such as Thorny Buffaloberry and hawthorns for nesting. It is also found in farmyards, golf courses, cemeteries, and other sites with tall shrubs.

Similar species - Northern Shrike has a narrower mask, white marking under eye, and a longer, more hooked bill than the Loggerhead Shrike. Northern Shrikes occur only on migration and wintering areas of the Prairie Loggerhead Shrike.



Where Do Loggerhead Shrikes Live?

Historically, Loggerhead Shrikes used the Aspen Parkland and prairie regions for breeding. In Saskatchewan the breeding range appears to have contracted southward and shrikes may no longer breed in parts of the Aspen Parkland. Prior to European settlement, the Loggerhead Shrike was likely uncommon on the Canadian prairies due to the amount of available shrubs which would have been limited by periodic fires. Figure 1 shows the known and potential occurrences of Loggerhead Shrikes in Saskatchewan. Occurrences of shrikes in the potential occurrence zone are likely quite rare.

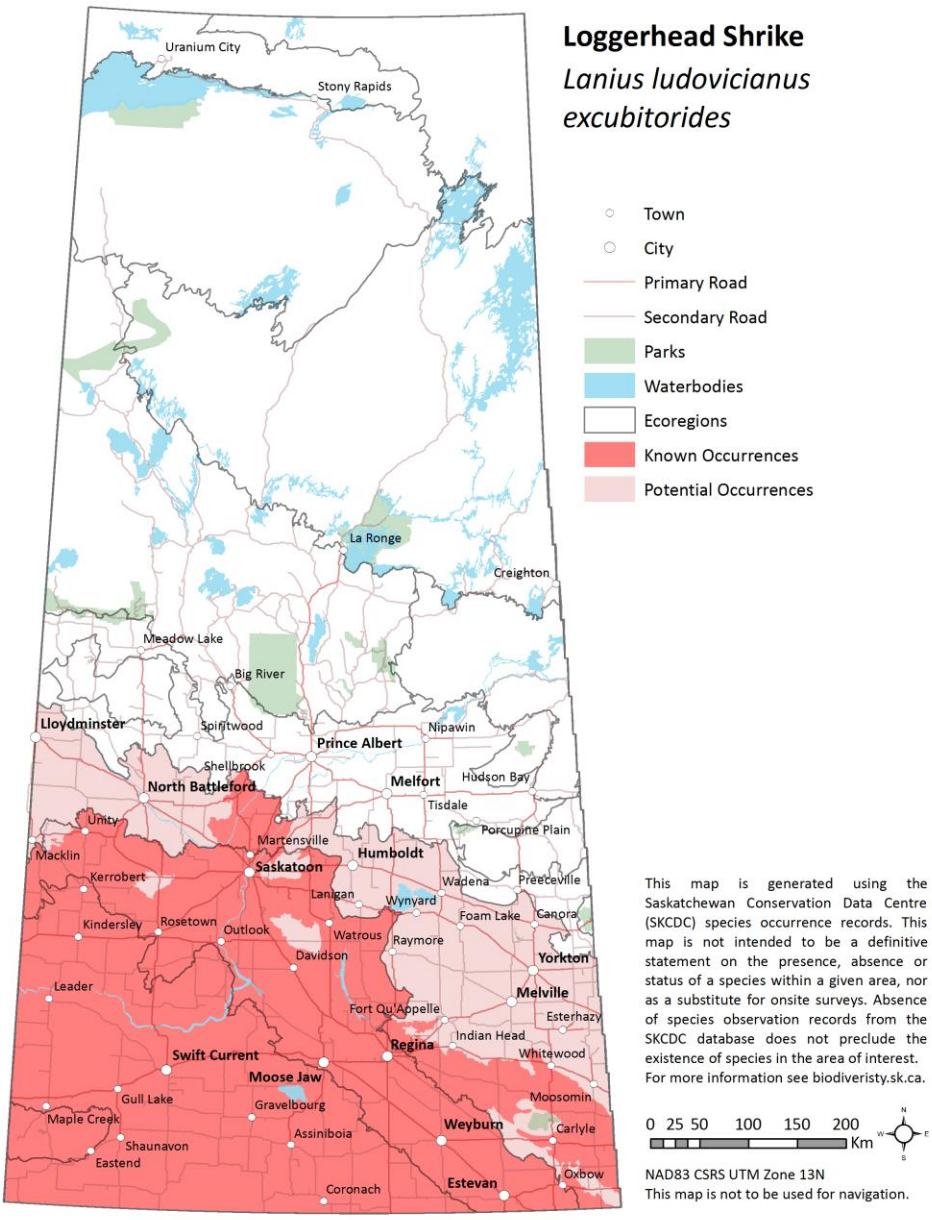


Figure 1. Range map of known and potential occurrences of Loggerhead Shrike (Saskatchewan Conservation Data Centre, 2017).

Behavior And Habitat Use In Canada

Loggerhead Shrikes can be found in their Canadian breeding grounds from as early as late April through the fall migration in August to September. In Canada, the prairie subspecies is found in the Aspen Parkland, Moist Mixed Grassland, and Mixed Grassland.

Loggerhead Shrikes prefer open country with short vegetation, including pastures with fences, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, and open woodlands. They will often choose to be near sparse trees or large shrubs for nesting. Loggerhead Shrikes are associated with two different types of landscapes: tall shrubs in large areas of natural grassland, and tall shrubs in farmland areas.

Shrikes most commonly build their nests in trees and shrubs, thickets, or hedgerows that have thorns or dense interior structure. Dense foliage is necessary to protect the nest and nestlings from wind, rain and detection from predators. Shrikes rarely construct nests in tall shrubs under 2 m in height. Figure 2 illustrates some of the main habitat preferences and avoidances for Loggerhead Shrikes.

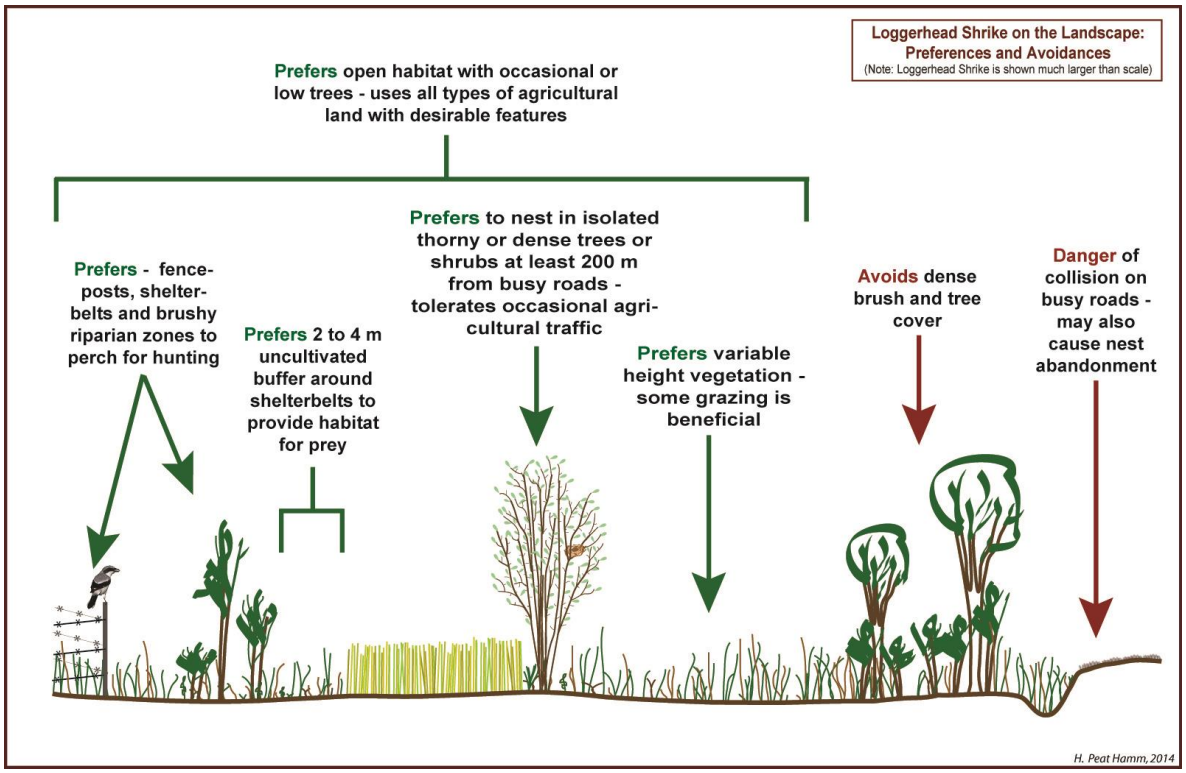


Figure 2. Habitat Diagram for Loggerhead Shrike.

A pair will raise 4 to 6 young per season. If a nest is destroyed, a second nesting attempt will sometimes be made, although the likelihood of success is diminished by the short breeding season.

Adults will most often return to within 4.7 km of their nest site from the previous year. Juveniles are less likely to return to their fledging location and have been recaptured an average of 12.4 km from their natal site in Alberta.

Loggerhead Shrikes are opportunistic predators and hunt from perches. They feed on a wide variety of small prey including insects, mammals, birds, reptiles, amphibians, and occasionally scavenge dead animals.

Threats To Loggerhead Shrikes In Canada

Impacts to Loggerhead Shrikes during migration and on wintering range are likely primarily responsible for the decline of shrike populations. In the breeding range, habitat loss is likely the primary threat to the prairie population. Loggerhead Shrikes will forage from shelterbelts, hedgerows, and fences, which are often near roads. This creates the potential for high mortality due to collision with vehicles. Predators of Loggerhead Shrike are not well documented but include corvid species such as Crows and Black-billed Magpies, Raccoons, Coyotes, snakes, feral cats, and weasels. Avian nest predators are mobbed, attacked, or chased away.

HABITAT LOSS

Native grassland is an important feature of productive breeding territories, and therefore the loss of natural habitat is a threat to Loggerhead Shrike foraging success. The contraction of native prairie in Canada continues to occur. Loss of riparian areas due to drainage or cultivation reduces the available nesting habitat. Although shrikes have adapted to nest in cultivated farmland habitat because of planted shrubs and shelterbelts, it is not known if reproductive success in this habitat is the same or lower than in areas of natural grassland.

Additionally, winter habitat loss in Texas has shown that migrating populations must compete with year-round inhabitants for the dwindling amounts of habitat. Winter migrants may be forced into more marginal territories as the residents defend their territories. This implies that winter migrants might be in poorer condition as they return to breeding territories in Canada.

WOODY VEGETATION

The invasion of trees and shrubs into Aspen Parkland is considered a possible threat to Loggerhead Shrike. When tree or shrub cover exceeds 30%, areas become inhabitable for Loggerhead Shrike.

Conversely, grazing cattle and other livestock, given access, can damage trees to the point of decline and death. In the Aspen Parkland and Moist Mixed Grassland, this can reduce habitat available for Loggerhead Shrikes. Removal of shelterbelts and cultivation of wetland areas for agriculture during dry years can also have similar negative effects as shrubs/trees are removed.

ROADS AND TRAFFIC

Loggerhead Shrikes use many features adjacent to roadways (powerlines, fences and windbreaks) and thus are susceptible to road collisions. They are also low fliers and when roadside vegetation is

mowed, they fly even lower over roads, making them more likely to be killed by vehicle traffic. Increased road traffic and road improvements (increasing traffic speed) lead to increased chances of Loggerhead Shrike mortality while foraging. However, the impact of road mortality on the prairie shrike population is not known.

PREDATORS

Increases in Loggerhead Shrike predators that are influenced by humans may be a threat. For example, Raccoons and corvid species which benefit from human habitation increase the potential for predation of Loggerhead Shrike nests. This is accentuated by the fact that some trees and shrubs which are suitable for Loggerhead Shrikes are also near human habitation and roadways. The impact of predation on the prairie shrike population is unknown.

PESTICIDES AND HERBICIDES

Pesticides have been implicated in Loggerhead Shrike declines. In some instances, they have been shown to cause thinning of eggs shells (and in some cases did not) and exposure has been demonstrated to result in slower prey capture by shrikes. Indirect effects of pesticides may also affect shrikes as they can negatively affect shrike prey. While pesticides and herbicides are less likely to be used on their preferred habitat of native pastures, it may become more critical as they are forced to use more marginal habitats, such as intensively farmed land. However, potential impacts to Loggerhead Shrike may be associated with pesticides no longer in use in Canada.

HABITAT REQUIREMENTS OF LOGGERHEAD SHRIKES IN CANADA

Critical dates for breeding season of Loggerhead Shrike in Canada are listed in Table 1.

Table 1. Critical dates for Loggerhead Shrike in Saskatchewan.

Life Stage	Critical dates for SK
Breeding	Arrive late April, early May
Nesting	Nest building commonly occurs in late May. Incubation 5-17 days – early June to early July; 16-20 days to fledging – mid July to early August.
Brood-rearing	Fledglings fed for another 30 days by parents. Dispersal occurs mid-late August. Migration occurs early September.

Landscape Scale Features Important To Loggerhead Shrikes

Loggerhead Shrikes use native prairie, tame pasture, riparian areas, shelterbelts, summer fallow, and cropland. Natural grassland is the optimal habitat for shrikes, particularly grasslands that support tall, sparse shrub communities and upland habitat. They also appear to prefer structural variability in the vegetation within their home territory. Territories are usually 6–9 ha (15–22 ac) in size. However, shrikes commonly forage up to 400 m from the nest and territories can reach 50 ha (124 ac).

Preferred habitat features on the landscape scale are:

- Slope - flat to gently rolling.
- Prefer heterogeneous landscape, with two or more cover types.
- Require landscape that has both foraging habitat (open) and nesting trees/shrubs.
- Riparian corridors; these are of particular importance in drier zones where there are fewer trees/shrubs.

Site Characteristics Of Loggerhead Shrike Habitat

Loggerhead Shrikes prefer open habitat characterized by grassland with occasional or sparse shrubs or trees. In Canada, Loggerhead Shrikes breed in pastures with sparse trees and shrubs, thickets, or shelterbelts and hedgerows, and in thorny bushes along railroad rights-of-way. Shrikes prefer shrubs greater than 2 m high for both nesting and perching, but are also known to nest in very tall trees and in lower shrubs such as sagebrush when preferred woody vegetation is unavailable.

Shrikes forage in native prairie and will use the higher herbaceous or woody vegetation as perches. Some of the largest populations of Loggerhead Shrikes occur in natural riparian corridors, especially in those that support Thorny Buffaloberry shrubs. In modified agricultural landscapes such as tame pasture and cropland, fence posts and shelterbelts provide perches for hunting.

Thorny Buffaloberry is the ideal woody species for Loggerhead Shrikes. Other trees and shrubs that also provide nesting opportunities for Loggerhead Shrike include Manitoba Maple, Trembling Aspen, Caragana, Chokecherry, Hawthorn, Wolf Willow, Common Lilac and willow species with the appropriate branchy structure.

In natural grassland habitat, Loggerhead Shrike territories generally have a 400 m radius from the nest, however, they have been observed foraging up to 600 m from the nest site.

Loggerhead Shrike prefers variable vegetation height. Areas of tall herbaceous vegetation are required as habitat for small mammals and other prey species to thrive. However, areas of uniform tall grasses obscure sight-lines for hunting. Pastures with no grazing, or other periodic disturbance, would therefore likely be unattractive to shrikes because the vegetation height would be more uniform than a grazed site. On the other end of the spectrum, pastures that are grazed uniformly at a high intensity would likely be used for foraging to a certain extent, but since shrike territories are so small, the vegetation variability that enhances prey availability would not be present. Grazing intensities, durations, and frequencies, or other disturbances such as fire, that enhance patchiness of vegetation structure within a pasture may attract Loggerhead Shrikes to an area.

Preferred habitat features on the site scale are:

- Sparse shrub cover – less than 30%; less than 5% shrub cover is preferred when density distribution is class 6 (a single patch plus several sporadically occurring individuals) or lower.
- Shrubs or trees, sparsely distributed, over 2m in height for nesting; shrubs with dense foliage for nesting. Tall shrub types – preferred is Thorny Buffaloberry, Chokecherry, willow species with branchy structure and Caragana.
- Hunting perches with little visual obstruction (posts, dead trees or shrubs).
- Vegetation height in foraging area: 10 cm to 45cm.

Undesirable habitat features include:

- Dense, tall grass is avoided. Loggerhead Shrikes prefer a mosaic of short vegetation with some taller vegetation providing habitat for prey and some low vegetation for improved hunting access.
- Areas with low shrubs of high density, such as snowberry/buckbrush, are less likely to be occupied. Snowberry/buckbrush is too short for nesting preferences and impedes foraging.

Optimal habitat targets are listed in Table 1. Many of these habitat targets may be created through management of disturbance (i.e., grazing, prescribed fire or water level manipulation) on the land.

Table 1. Optimal habitat targets for Loggerhead Shrikes.

HABITAT	SPATIAL SCALE	HABITAT TARGET
Landscape	Landscape	Aeolian dunes supporting shrub savannah; glacial outwash plain supporting linear riparian shrubland

HABITAT	SPATIAL SCALE	HABITAT TARGET
		Sparse, patchy or linear shrubland with shrubs > 2 m high
		Woody vegetation <30% cover
		At least 2 vegetation cover types, one of which must be dispersed shrubs >2 m high
Site - Nesting Habitat	10 m radius of nest; 200 m radius of nest for sight lines	No obstruction of sight lines for at least 200 m from the nest on at least 3 sides
		Nesting shrub >2 m high with dense foliage and/or thorny branches
		Woody vegetation within 10 m of the nest on average <2 m high
		Minimum of 5 perches higher than the surrounding vegetation within 10 m of the nest
		Understory index (vegetation % cover X herbaceous vegetation height in cm) of <10 within 10 m of the nest
Site - Foraging Habitat	Territory (6 to 50 ha); 400 m radius of nest	Dispersed native or introduced shrubs with a large, contiguous area of native grassland within 400 m of the nest
		Cover of shrubs > 2 m high within 400 m (linear or dispersed) of the nest 1-5%, if the density distribution consists of classes 4-6; or less than 30% if the density distribution consists of classes 7-10.
		Herbaceous vegetation with a heterogeneous structure ranging from 10 – 45 cm high within 400 m of the nest
		If foraging habitat is primarily cropland, a small buffer of permanent cover adjacent to nesting habitat: 2 – 4 m or more for shelterbelts; 10 m or more for linear riparian shrubland.

OTHER BENEFICIAL MANAGEMENT PRACTICES FOR LOGGERHEAD SHRIKES

There are a few management issues unrelated to the characteristic of the landscape or site that should be taken into consideration when managing to benefit Loggerhead Shrikes. It is thought that there is adequate habitat, and much suitable unoccupied habitat for Loggerhead Shrikes. Therefore, creating new habitat by planting shrubs on grassland or shelterbelts on cropland or permanent cover is unnecessary and may negatively impact endemic grassland wildlife.

Reducing the number of features near the nesting site that attract predators or competitors (e.g., corvids, Raccoons, Merlin, Great Horned Owl etc.) of Loggerhead Shrikes would reduce mortality at all life stages:

- Remove old buildings in active or abandoned farmyards.
- Fix leaking granaries and ensure there is no access for larger birds and mammals.
- Clean up spilled grain.

ENVIRONMENTAL BENEFIT INDEX (EBI) FOR LOGGERHEAD SHRIKE HABITAT

Criteria And Scoring

The EBI was developed by compiling comprehensive categories of criteria based on available knowledge, such as Loggerhead Shrike population and habitat research, as well as species recovery strategy documents.

The EBI begins with four screening criteria. These criteria are either met, in which case the user continues to the next criterion, or not met, in which case the property or potential project is eliminated from further consideration. The remaining criteria are grouped into either landscape-level criteria (criteria 5), or site-level criteria (criteria 6 and 7).

A scoring system was devised for the EBI. Each criterion is weighted out of 200, 100, 50, or 30 based on relative importance to the species.

The total scores are calculated based on the following formula:

EBI= (1)(2)(3)(4)+5+*(6*.1+6.2+6.3+6.4*)*+7

The EBI result may then be divided by the costs of the proposed project or the bid for the project to determine cost effectiveness. The cost to achieve the habitat requirements could include added management, added infrastructure or inputs, or lost opportunities.

The range of possible scores for candidates that pass the screening criteria is quite wide. The lowest possible total score is 100 and the highest possible score is 700. When evaluating candidate properties for a project or program, it may be possible to divide the scores into more general High, Moderate and Low priorities. There are many uses for a general ranking. For example, a more general ranking could be used to determine the total cost of implementing results-based programming on all High priority sites.

SCREENING CRITERIA

1. The area of consideration supports a current presence of Loggerhead Shrikes, or is within 1 km of an active Loggerhead Shrike nest. Loggerhead shrikes exhibit little site fidelity, and it is thought there is a substantial amount of unoccupied habitat. However, they tend to avoid being isolated from other shrikes, so expansion of populations will occur in close proximity to source populations.
   Yes=1, No=0.

2. The area of consideration supports a diversity of land cover types within an area of 160 acres (64 ha) or less. Land cover types must include sparse or patchy shrubland and at least one of the following cover types: grassland (native grassland or tame forages), cropland or wetlands.
   Yes=1, No=0.

3. The area of consideration is free of highways and high traffic volume gravel roads within 500 m of nests. Loggerhead Shrikes often hunt in roadside ditches and use perches adjacent to roads, and are subject to mortality from collision with vehicles as a result.
   Yes=1, No=0.

4. The area of consideration has woody vegetation cover less than 30%. While Loggerhead Shrikes require tall shrubs for nesting and perching, too much cover obstructs views and makes hunting difficult. Therefore, Loggerhead Shrikes will tend to avoid areas with too much woody vegetation cover.
   Yes=1, No=0.

5. A diversity of land cover types is preferred by Loggerhead Shrike. Shrub savannah on Aeolian dunes with lots of relief is ideal habitat. Glacial outwash plains with linear, but meandering shrubby riparian areas adjacent to grassland or cropland is also ideal. High relief morainal landforms with a mix of wetlands, sparse or patchy shrubland and grassland or cropland is also used but are not considered ideal. **(Max 200 points)**

Land Cover Configuration

200	Sparse, patchy or linear natural shrubland intermixed or adjacent to native grassland or tame forage; some shrubs or trees >2m high
150	Sparse, patchy or linear natural shrubland intermixed or adjacent to cropland or wetlands; some shrubs or trees >2m high
100	Introduced shrubs in farmyards, graveyards or shelterbelts intermixed or adjacent to native or tame grasslands or cropland; at least some shrubs or trees >2m high

6. Criteria 6.1, 6.2, 6.3 and 6.4 all relate to habitat quality of a site for Loggerhead Shrikes. Habitat quality for Loggerhead Shrikes has different requirements between the nest site and foraging sites, and between natural habitat and anthropogenic habitat.

6.1. Nesting habitat quality: Line of sight is of critical importance for nesting habitat for predator evasion. The ability to camouflage or protect the nest from avian predators and weather is also an important attribute of nesting habitat. Therefore, foliage must be thick or dense, and ground vegetation must be short and sparse. Thorny Buffaloberry and Chokecherry leaf out sooner than other shrubs, and tend to be preferred by Loggerhead Shrikes. Caragana and willows that have an appropriate branching structure are also used preferentially. **(Max points = 200)**

Habitat Quality – Nesting Habitat

200	Nesting shrub is a native species >2m high with dense foliage and/or thorny branches; no obstruction of sight lines for 200 m from the nest on at least three sides; woody vegetation is on average <2m high within 10 m of the nest; a minimum of 5 shrubs or other perches higher than surrounding vegetation within 10 m of the nest; the understory index (vegetation % cover X herbaceous vegetation height in cm) within 10 m of the nest is <10
100	Nesting tree or shrub (native or introduced) is >2m high with dense foliage and/or thorny branches; no obstruction of sight lines for 200 m from the nest on at least three sides; woody vegetation is on average <2m high within 10 m of the nest; 2 - 5 shrubs or other perches higher than surrounding vegetation within 10 m of the nest; the understory index (vegetation % cover X herbaceous vegetation height in cm) within 10 m of the nest is between 10 and 30
50	Nesting tree or shrub (native or introduced) is <2 m high with dense foliage and/or thorny branches, or >2 m high without dense foliage or thorny branches; OR sight lines are obstructed within 200 m from the nest on 2 or more sides; OR woody vegetation is on average >2m high within 10 m of the nest; OR <2 shrubs or other perches higher than surrounding vegetation within 10 m of the nest; OR an understory index (vegetation % cover X herbaceous vegetation height in cm) within 10 m of the nest of > 30
0	2 or more of the features in the previous score category.

6.2. Foraging habitat quality – cover type: The home range must support habitat capable of producing prey (taller vegetation) but also have short, sparse vegetation so shrikes can see prey and perches for them to sit while they search for prey. Permanent cover (i.e., perennial grasses and forbs) is the optimal cover type to produce prey and also allow hunting opportunities. Variability in vegetation cover types is preferred by Loggerhead Shrikes as it provides all of these features. **(Maximum 100 points)**

Foraging Habitat Quality – Cover Type

100	Large contiguous areas of natural grassland within 400 m of the nest (nesting area may support native shrubs or introduced shrubs in an anthropogenic habitat)
50	A minimum of 2 – 4 m of permanent cover beside shelterbelts if adjacent cover is cropland; AND Shelterbelts with periodic breaks of several m; OR a minimum of 10 m of permanent cover adjacent to linear riparian shrubland if adjacent cover is cropland
0	No permanent cover adjacent to nesting areas

6.3. Foraging habitat quality – herbaceous vegetation: Enough variation in vegetation structure is required to both produce prey (i.e., taller vegetation) and allow for visual detection of prey (shorter vegetation). **(Max points = 50)**

Foraging Habitat Quality – Herbaceous Vegetation

50	Herbaceous vegetation with a heterogeneous structure ranging from 10 to 45 cm in height within 400 m of the nest
25	Herbaceous vegetation with a homogenous structure ranging from 10 to 45 cm in height within 400 m of the nest
0	Herbaceous vegetation on average <10 cm or >45 cm in height

6.4. Foraging habitat quality – perches: Loggerhead Shrikes tend to hunt from perches which need to be distributed throughout the foraging area. **(Maximum points = 100)**

Foraging Habitat Quality – Perches

100	Cover of shrubs >2 m high within 400 m of the nest 1 to 5% if the density distribution class is between 4 and 6; OR cover of shrubs >2 m high less than 30% if the density distribution class is between 7 and 10, using density distribution classes from Saskatchewan's Range Health protocols.
75	Cover of shrubs >2 m high within 300 m of the nest 1 to 5% if the density distribution class is between 4 and 6; OR cover of shrubs >2 m high less than 30% if the density distribution class is between 7 and 10, using density distribution classes from Saskatchewan's Range Health protocols.

Foraging Habitat Quality – Perches

50	Cover of shrubs >2 m high within 200 m of the nest 1 to 5% if the density distribution class is between 4 and 6; OR cover of shrubs >2 m high less than 30% if the density distribution class is between 7 and 10, using density distribution classes from Saskatchewan's Range Health protocols.

7. **Other Criteria:** Interaction with other species at risk (SAR): Other SAR may exist in the area. The presence of optimal Loggerhead Shrike habitat may have a positive, negative or neutral effect on the other SAR found in the area of consideration. Loggerhead Shrikes may negatively impact Burrowing Owls, Northern Leopard Frogs, Short-horned Lizards, and many grassland nesting songbirds by using them as food sources locally, and as competitors in winter habitat. Managing habitat to encourage tall, woody vegetation may negatively impact grassland species at risk which have a low tolerance for woody vegetation. Loggerhead Shrike presence may positively impact Bull snake which preys on shrikes**. (Max points 50)**

Interaction with other Species at Risk

50	Loggerhead Shrike habitat contributes positively to other area SAR.
0	Loggerhead Shrike habitat has no impact on other area SAR.
-50	Loggerhead Shrike habitat has a negative impact on other area SAR

EBI= (1)(2)(3)(4)+5+(6.1+6.2+6.3+6.4)+7

REFERENCES

CEC. 2013. Prairie Beef and Biodiversity: A Payment for Ecosystem Services Program Design for Ranches on Natural Grasslands in Canada. Montreal, Canada. Commission for Environmental Cooperation. 29 pp.

Collister, D.M. and D. De Smet. 1997. Breeding and natal dispersal in the Loggerhead Shrike. Journal of Field Ornithology 68: 273-282.

COSEWIC. 2014. COSEWIC assessment and status report on the Loggerhead Shrike Eastern subspecies *Lanius ludovicianus* ssp. and the Prairie subspecies *Lanius ludovicianus excubitorides* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 51 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

Environment Canada. 2015. Recovery Strategy for the Loggerhead Shrike Prairie subspecies (Lanius ludovicianus excubitorides) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. iv + 23 pp.

Haas, C.A. 1997. What characteristics of shelterbelts are important to breeding success and return rate of birds? American Midland Naturalist 137: 225-238.

Hellman, S. L. 1994. Breeding habitat for the Loggerhead Shrike (Lanius ludovicianus) in southwestern Manitoba. Thesis. University of Manitoba, Winnipeg, Canada.

Michalsky, S. and H. Peat Hamm. 2009. Prairie Species at Risk Beneficial Agricultural Practices Pilot Project – A State of Knowledge. Report, Fact Sheets and Databases. Manitoba Habitat Heritage Corporation: Winnipeg.

PCAP SK. 2017. Guide to managing for optimal habitat attributes: Piping Plover (*Charadrius melodus circumcinctus) 24pp.*

Peat Hamm, Heather. 2017. Saskatchewan Species at Risk Farm Program Workbook. Simply Agricultural Solutions: Saskatoon. 179 + v pp.

Prescott, D.R.C. and D.M. Collister. 1993. Characteristics of occupied and unoccupied Loggerhead Shrike territories in southeastern Alberta. The Journal of Wildlife Management 57: 346-352. As cited in SODCAP, 2015.

Ranchers Stewardship Alliance Inc. 2014. Prairie Beef & Biodiversity Program: Results-based Module for Greater Sage Grouse. 19pp.

Saskatchewan Prairie Conservation Action Plan (PCAP). 2008. Native Grassland and Forest Rangeland Health Assessment Workbook. ISBN: 978-0-9809462-0-8.

Shen, L., Y. He, and X. Guo. 2013. Exploration of Loggerhead Shrike habitats in Grasslands National Park of Canada based on in situ measurements and satellite-derived adjusted transformed soil-adjusted vegetation index (ATSAVI). Remote Sensing 5:432-453. As cited in SODCAP, 2015.

South of the Divide Conservation Action Program (SODCAP) Inc. 2015. Prairie Loggerhead Shrike (*Lanius ludovicianus excubitorides*) habitat requirements at multiple selection scales and indicators: Final Report Prepared By: Leah Kovatch.16pp.