Garry Oak Ecosystems Recovery Team

WESTERN MEADOWLARK STEWARDSHIP ACCOUNT

For the Garry Oak Ecosystems of Southwestern British Columbia

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Executive Summary

Western Meadowlarks are widespread and abundant across western North American grasslands although populations currently appear to be in decline. Western Meadowlarks are now presumed extirpated as a breeding species in the Georgia Depression. The last breeding records were from 1986 in the lower Fraser River valley and 1977 on Vancouver Island. A few birds do, however, still occur annually outside of the breeding season both on Vancouver Island and in the lower Fraser Valley.

Large grassland areas are the preferred breeding habitat, although pastures, agricultural lands and open woodlands are also used as this species will accept a range of vegetation heights and structure. Throughout their range, habitat loss caused by urban sprawl, intensive agricultural practices, and tree encroachment into grasslands is thought to be the greatest threat to the species continued survival.

The amount of suitable Western Meadowlark habitat that is currently protected within the region is unknown but thought to be small. Most suitable habitat is currently privately owned. Protection of existing habitat and the restoration of additional habitat are necessary to allow for possible re-colonization of historic sites in the Georgia Depression. Efforts should be concentrated on larger rather than smaller habitat areas. Inventory of non-breeding birds as well as potential breeding habitat would be beneficial to determine location of possible breeding sites. The potential habitat should also be catalogued and mapped.

Artificial relocation to re-colonize Western Meadowlarks in the region is probably not necessary. If suitable nesting habitat is maintained, they may naturally re-colonize available nesting habitat on their own as some birds do occur in the region, outside of the breeding season.

Stewardship of private land with appropriate habitat should be encouraged. Specific management recommendations in areas with suitable habitat include: avoid intensive agricultural practices during the breeding season; control encroaching tree and shrubs; and minimize habitat fragmentation.

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1. Introduction

The Garry Oak Ecosystem Recovery Team (GOERT) has established a list of plant, invertebrate and vertebrate species that are a priority for future research and recovery efforts in the Georgia Depression Ecoprovince of southwestern British Columbia. The species selected rely on the Garry oak (*Quercus garryana*) or associated ecosystems (e.g., coastal bluffs, sparsely vegetated areas) for the majority or an important part of their lifecycle and are either in decline or are currently extirpated from the region.

The Western Meadowlark (*Sturnella neglecta*), a priority vertebrate species as identified by GOERT, has been extirpated from the Garry oak ecosystems of southwestern British Columbia. This stewardship account has been prepared for GOERT to summarize what is known about this species and to make management recommendations as an initial step towards guiding the development of a recovery plan, with the long-term objective of restoring this species to its former range in the Garry Oak ecosystems of British Columbia.

a) Taxonomy

The Western Meadowlark is not a true lark but instead is a member of the blackbird family Icteridae. The Western Meadowlark was considered a subspecies of the Eastern Meadowlark (*S. magna*) until 1908 when it was given separate species status. The two species are almost indistinguishable visibly, but have different, distinctive song repertoires (Lanyon 1994).

Two subspecies of Western Meadowlark are recognized (*S. n. neglecta and S. n. confluenta*: AOU 1957). The breeding range and distinguishing characteristics of the two subspecies are poorly understood and described (Lanyon 1994). Both subspecies breed in British Columbia and it is assumed that *S. n. confluenta* is the subspecies found in the Georgia Depression (Cannings 1998). The British Columbia Conservation Data Centre (BC CDC) recognizes two populations of Western Meadowlark, the “interior” population and the “Georgia Depression” population (BC CDC 2002).

2. Range and Known Distribution

a) Global range

The Western Meadowlark is an abundant and widespread grassland species, breeding across southern Canada from British Columbia to the Great Lakes, and throughout most of the western United States east of the Mississippi, south to north-central Mexico (AOU 1957; Lanyon 1994).

Meadowlarks winter from southern British Columbia, south to central Mexico (Lanyon 1994).

b) Canadian range

In Canada, the Western Meadowlark breeds in southern and central British Columbia, north-central and southern Alberta, central and southern Saskatchewan, southern Manitoba, western and southern Ontario, and rarely in southwestern Quebec (Godfrey 1986).

c) Provincial range

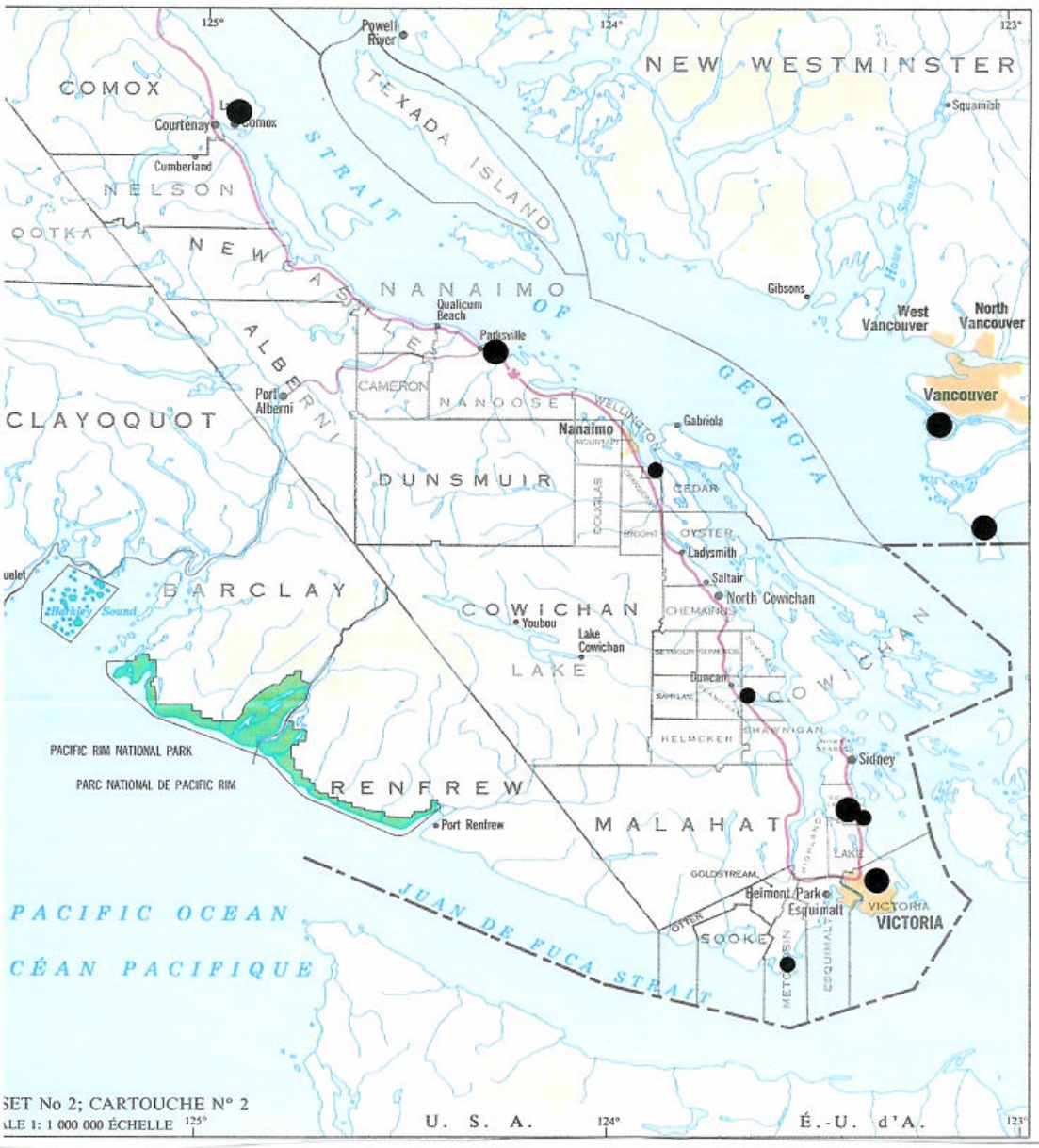
British Columbia is at the northern limit of the Western Meadowlark's range. In southern British Columbia, the Western Meadowlark has a widespread breeding distribution east of the Coast Mountains, particularly along dry river valleys, from Princeton north to Williams Lake, east to Invermere and south to Cranbrook. A disjunct population breeds locally in the Peace Lowland in northeastern British Columbia. Western Meadowlarks formerly bred, but are now presumed extirpated as a breeding species, in the Georgia Depression (Campbell et al. 2001: Fig. 1).

In the winter, Western Meadowlarks may be found in the Georgia Depression and in the south Okanagan. Occasional wintering birds are, however, recorded as far north as Williams Lake (Campbell et al. 2001). Christmas Bird Counts suggest wintering populations in the Okanagan are declining (Cannings et al. 1987). In the Georgia Depression, wintering birds may be found in the lower mainland (e.g., Iona and Sea Islands: M. McNicholl pers. comm.), and on southeastern Vancouver Island (G. Monty pers. comm.; D. Allinson pers. comm.; SMB unpublished notes: see Table 1). The breeding range of these wintering birds is not known, however, it is speculated that they breed further north, as they appear to have left the area by late spring (Campbell et al. 2001; M. McNicholl pers. comm.; G. Monty pers. comm.).

Table 1: Recent records of Western Meadowlark on Southeastern Vancouver Island, British Columbia

Season	**Year**	**Location**	**Comments**	**Observer**
Late spring	2002	Koksilah River Estuary	Two birds observed	JMC
Late spring, and again late summer	Up to and including 2002	Nanaimo River Estuary	During peak breeding, searches conducted, but no birds nor nests found	GM
Fall	Up to and including 2002	Martindale farmland, Saanich Peninsula	Small flocks regularly observed	DEA, SMB
Fall	Up to and including 2002	Rocky Point Bird Observatory	Typically one or two birds seen in late fall (in 2002, 1 bird was seen in mid October)	DEA
Sept.	1977	Englishman River Estuary	Last breeding record	ND

Fig. 1. Historic breeding sites and recent non-breeding records for Western Meadowlark in the Georgia Depression, British Columbia. Base map from the Gazetteer of Canada, Vol. British Columbia, 1985.



Former breeding localities ●

Recent (2002) records of non-breeding birds ●

d) Range changes

In general, the range of the Western Meadowlark has been expanding into northern British Columbia and contracting in the Georgia Depression (Campbell et al. 2001).

In the early 1900s, Western Meadowlarks bred regularly in the Georgia Depression, but by the early 1940s, it had become less common and more local as its habitat was lost to urbanization (Campbell et al. 2001). Declining trends continued and breeding has not been documented on southeastern Vancouver Island since 1977 (Campbell et al. 2001). The last breeding record for the lower mainland is from 1986 (Butler and Campbell 1987).

Western Meadowlarks still occur in small numbers outside of the breeding season (i.e., early fall through to late spring) on southeastern Vancouver Island and in suitable areas of the lower mainland. The species is presumed extirpated as a breeding species in the region (BC CDC 2002; N. Dawe pers. comm.). Historically, it bred on eastern of Vancouver Island from the Saanich Peninsula north to the Comox River valley (Campbell et al. 2001).

3. Status of Species

a) Population size

The range-wide population size is unknown. It remains common throughout most of its range, particularly at the centre of its distribution, on the Great Plains of the United States (Lanyon 1994). Breeding Bird Survey data suggests that summer densities in the interior of British Columbia are generally lower than those in the core of its North American range (Sauer et al. 1997).

The Western Meadowlark is considered an extirpated breeding species in the Georgia Depression, with no known breeding pairs remaining (Campbell et al. 2001).

b) Population trends

Breeding Bird Survey data show a slight population decline (0.6% annually) between 1966-1996 across North America (Sauer et al. 1997). For coastal British Columbia, Washington and Oregon (i.e., Partners in Flight Bird Conservation Region 5), population declines were rated as significant between 1968 and 2000. In the Georgia Depression of British Columbia, Breeding Bird Surveys from 1968-1993 contained insufficient data for analysis (Campbell et al. 2001).

Western Meadowlarks were probably never common in the Georgia Depression. The availability of suitable breeding habitat such as Garry oak (*Quercus garryana*) meadows, open wetland complexes, river estuaries and deltas would likely have been a limiting factor. The early settlement of the Georgia Depression and the clearing of forests and increased agricultural lands probably contributed to an increase in breeding habitat in the early 1900s (Campbell et al. 2001). By the 1940s, breeding populations were already beginning to decline (Munro and Cowan 1947). On Vancouver Island, the maximum count of birds on Breeding Bird Surveys was 8 in June 1975 along the Nanaimo River (Campbell et al. 2001). In recent years, small numbers of birds found in this area have not

been located in the breeding season, so it is assumed that they were non-breeders (G. Monty pers. comm.).

Christmas Bird Count (CBC) data show a steady decline of wintering populations in the Georgia Depression from the late 1950s. Rapid urban expansion in the 1960s probably contributed to the decline in meadowlark numbers on Christmas Bird Counts between 1960-1964. After the mid 1960s, populations continued a steady decline. (Campbell et al. 2001).

In western Washington State, Western Meadowlarks populations have also decreased in size and distribution. They are now absent from many areas where they formerly nested (Rogers 2000). The species was formerly common in suitable prairie and agricultural habitat, much of which has been lost to urban development or the encroachment of trees and shrubs as a result of fire suppression (Smith et al. 1997).

In Oregon's oak ecosystems, Western Meadowlarks have declined (B. Altman pers. comm.).

c) Global, Canadian, and provincial rank

Range-wide, the Western Meadowlark is considered globally secure (G5) by the BC CDC (2002). The "interior" population is provincially "Yellow-listed" (considered not at risk) because it is "apparently secure" (S4S5B, SZN provincial rank). The "Georgia Depression" population, (i.e., lower mainland and southeastern Vancouver Island) is provincially "Red-listed" (threatened or endangered) and is "presumed extirpated" (SXB, SZN).

Table 1. Status of the Western Meadowlark (Rogers 2000; NatureServe 2002; BC CDC 2002; COSEWIC 2002).

Jurisdiction	**Rank**	**Qualifier**
British Columbia Interior population	Yellow List	Considered "Not at Risk"
British Columbia Georgia Depression population	Red List	Presumed "Extirpated"
Washington	Not listed	
Oregon	State Sensitive Species	
COSEWIC	Not assessed	
US ESA	Not listed	

d) Related forms threatened

S. n. confluenta is considered common to abundant across its North American range (Lanyon 1994).

e) Special scientific interest

The Western Meadowlark is one of several grassland and open woodland bird species that formerly bred in the Georgia Depression, but is currently considered extirpated (Fuchs 2001; BC CDC 2002; GOERT 2002). Sustainable, breeding populations of these species indicate healthy grasslands and woodlands ecosystems and help to maintain the avifauna diversity of the region. Restoring an extirpated species presents a great challenge to wildlife and land managers.

4. Life History

a) General

Very little is known about the ecology of Western Meadowlark in the Georgia Depression, therefore most of the following is inferred from studies in other regions.

b) Diet and foraging behaviour

The Western Meadowlark diet consists largely of invertebrates, including beetles, weevils, wireworms, cutworms, grasshoppers and crickets, as well as seeds of forbs and grasses (Lanyon 1994). Occasionally this species will depredate eggs and young of other grassland songbirds or scavenge on roadkills during severe winter conditions (Schaeff and Picman 1988). Seasonal differences in diet occur with grain primarily consumed in the winter and early spring, invertebrates in late spring and summer, and other seeds in fall (Lanyon 1994).

Western Meadowlarks feed almost exclusively on the ground. They forage in low forbs and grasses while walking or running along the ground, but may also glean insects while perched in low shrubs. Typically Western Meadowlarks forage above the soil layer, but they will also probe beneath the ground and search under dirt clods and vegetation (Lanyon 1994).

c) Reproduction

Western Meadowlarks are often polygamous. Males usually have two concurrent mates, rarely three. The nesting cycles of females may be staggered so that chick rearing only briefly overlaps for the male (Lanyon 1994).

Across its range, breeding occurs from late March to August (Lanyon 1994). In the Georgia Depression of British Columbia, breeding has been recorded between the 31st of March and the 25th of July (Campbell et al. 2001). Males arrive on breeding grounds two to four weeks before females. Shortly after her arrival, the female selects a territory held by a male with whom she will mate, provided that male continues to maintain the territory. The pair bond is maintained until parental care is completed or the nest fails (Lanyon 1994).

The female alone builds the nest (Lanyon 1994). Nests are well concealed on the ground, often in a shallow depression and usually obscured by dense vegetation. In British Columbia, all located nests (n=104) have been found on the ground beneath vegetation (Campbell et al. 2001). Most nests (80%) were constructed of coarse, dried grasses and lined with finer grasses. Nests are often partially arched or roofed with runways or tunnels (Campbell et al 2001; Lanyon 1994).

In British Columbia, clutches usually contain five eggs, with a range of one to seven (Campbell et al. 2001). The female alone incubates for 13 to 15 days (Baicich and Harrison 1997). The female also broods the nestlings and assumes a greater role in feeding (Lanyon 1994). The amount that the male assists with feeding varies depending on his responsibilities with other females. Nestlings are almost exclusively fed insects. Nestlings fledge after 10 to 12 days and are dependent on parents for another two weeks (Baicich and Harrison 1997).

In British Columbia, dates for nests with young ranged from April 15 to July 25, with 51% between May 30 and June 30 (Campbell et al. 2001). Western Meadowlarks usually attempt to raise two broods per breeding season and may, rarely, raise three broods (Lanyon 1994).

d) Site fidelity

Elsewhere, adults of both sexes show very strong breeding site fidelity but juveniles show weak fidelity to natal site (Lanyon 1994). Site fidelity is unknown for British Columbia (Campbell et al. 2001).

e) Territory size

Territory size ranges from 1.2-13.0 ha (Lanyon 1994). Territories change size and shape throughout the breeding season, resulting in changes in population densities, habitat suitability and the relocations of female activity centres (Lanyon 1994).

f) Causes of mortality

Nest failure can result from predation, accidental destruction by livestock and machinery, and human disturbance. Adults may succumb to predation, poisoning, and exposure to bad weather (Lanyon 1994).

Potential predators of eggs, nestlings and adults include birds of prey (e.g., Cooper's Hawk *Accipiter cooperii* and Merlin *Falco columbarius*), corvids (e.g., Northwestern Crow *Corvus caurinus* and Common Raven *C. corax*) and medium-sized mammals (e.g., coyotes *Canis latrans*, foxes *Vulpes vulpes*, raccoons *Procyon lotor*, skunks *Mephitis mephitis*, domestic dogs *Canis familiaris*) or snakes (e.g., Common Garter Snake *Thamnophis sirtalis* and Western Terrestrial Garter Snake *T. elegans*; Bent 1958). Domestic cats *Felis catus*, however, probably represent the greatest predation threat to ground-nesting birds in the Georgia Depression. Cats are known to be competent

predators of small to medium sized birds (George 1974; Coleman and Temple 1993; Cooper 1993; Coleman et al. 2002). On southeastern Vancouver Island domestic cats were frequently observed at each of 35 grassland sites surveyed in 2002, a result of close proximity to human habitation (Beauchesne in prep.).

In agricultural areas, mowing and harvesting probably cause the greatest incidence of nest failure (Dechant et al. 2001). Farming machinery can either directly destroy nests or create enough disturbances to cause adult abandonment. Western Meadowlarks are reportedly highly sensitive to human disturbance on breeding territories; females flushed during incubation invariably abort that nesting (Lanyon 1994).

Direct morality has been reported from eating grain poisoned for rodent and insect control (Griffin 1959 cited in Lanyon 1994). In the western United States, nest failure and territory abandonment occurred 10-21 days after grasshopper pesticides were applied, probably due to the reduction in insect prey (Lanyon 1994).

Mortality in Western Meadowlark populations may also be caused by severe winter conditions during periods with unusually deep snow or ice storms (Lanyon 1994).

Brood parasitism by Brown-headed Cowbirds (*Molothrus ater*) occurs throughout its range with up to 46% of nests parasitized in some areas (Lanyon 1994). In British Columbia, only 2 of 139 nests were parasitized by cowbirds, neither of which was in the Georgia Depression (Campbell et al. 2001). In Minnesota, both brood parasitism and nest depredation were lower on large (130-486 ha) than on small (16-32 ha) grassland areas (Lanyon 1994).

g) Migration

Western Meadowlarks are partial migrants. Although resident throughout much of their range, birds in northern and central breeding areas migrate south in winter, particularly when snow restricts foraging. Band recoveries suggest that some individuals migrate over 1000 km and winter in areas that do not have local breeding populations (Lanyon 1994).

Western Meadowlarks are amongst the earliest spring arrivals in many areas. Individuals will begin arriving on breeding grounds before snow packs are fully melted (Lanyon 1994). In the southern interior of British Columbia, Western Meadowlarks arrive in late February and early March with numbers peaking in early May. The fall movement begins at the end of August with most birds departed by mid-October. Some individuals do winter in the southern Okanagan. In the Georgia Depression, the departure of overwintering birds occurs between March and early June. It is assumed that the winter population leaves for other, unknown breeding locations as no birds have been detected during the breeding season in recent years (Campbell et al. 2001).

Timing of migration is probably related mainly to weather and food supply. Movement is mostly during daylight hours, usually in small to large flocks (Lanyon 1994).

5. Habitat Description

a) General habitat requirements

Western Meadowlark nesting habitat is variable across its range. The most common habitat type used is native grasslands and pasture, but they will also nest in hay fields, roadsides, orchards, field edges, riparian areas, meadows, windbreaks, and other open areas. In general, Western Meadowlarks prefer open areas with few trees. Scattered trees, shrubs, fence posts, buildings or farm machinery are required for song perches (Lanyon 1994; Dechant et al. 2001).

Across their range, Western Meadowlarks use grasslands with a wide range of vegetation heights and densities. However, they tend to avoid extremely sparse or very tall cover (Rogers 2000). Generally, they prefer high forb and grass cover, low to moderate litter cover and little or no woody cover (Dechant et al. 2001).

In British Columbia, reported nesting habitat usually consisted of open spaces including natural grasslands, agricultural grasslands, pastures, alfalfa fields, and abandoned fields with forb and grass cover. They are also known to nest in open forest and parkland areas with grass understories, wetland complexes and grassy shrubland habitats (Campbell et al. 2001).

In the Georgia Depression, few data are available for nesting habitat. It is assumed that prior to European settlement, Garry oak meadows, open wetland complexes, river estuaries and deltas would have been used for nesting. Post-settlement, agricultural lands, fields and pastures were important nesting habitats in the Georgia Depression (Campbell et al. 2001).

b) Habitat availability and net trends in habitat change

Historically, in the Georgia Depression, suitable habitat would have been available in open Garry Oak woodland and associated ecosystems (Fuchs 2001; GOERT 2002), as well as open wetland complexes, deltas and river estuaries (Campbell et al. 2001). These are currently very scarce due to urbanization, agricultural development and fire suppression (Fuchs 2001; GOERT 2002). Agricultural practices early in the 20th century may have provided more potential nesting habitat as forested areas were cleared for farming and open pastureland. However, recent agricultural practices increasingly promote large-scale monoculture crops, greenhouse complexes, and side-by-side small industry, all of which reduce available nesting habitat. Human population growth for the Georgia Depression is projected to climb steadily, creating even greater pressures on remaining habitat (Campbell et al. 2001).

In western Washington, suitable habitat is also in decline. Grassland habitat and agricultural lands have been lost to urbanization and successional encroachment by trees as a result of fire suppression (Smith et al. 1997; Rogers 2000).

6. Threats to the Species

Loss or alteration of suitable breeding habitat is probably the primary threat to Western Meadowlarks (Rogers et al. 1997; Rogers 2000). Urbanization, intensive agricultural practices, and fire suppression, and encroachment by native and introduced woody plant species have the greatest impact on habitat availability.

Urbanization permanently removes habitat from the land base in the footprint required for buildings, roads and other infrastructure (Jones and Bock 2002). Otherwise suitable habitat that occurs adjacent to urban areas are also generally not used by Western Meadowlarks (Bock et al. 1999), likely due to this species low tolerance to human disturbance (Lanyon 1994). Urban areas also tend to have high densities of domestic pets including cats, which can be a major predator for both adults and young (George 1974; Coleman and Temple 1993; Cooper 1993; Coleman et al. 2002).

Intensive agricultural practices that involve mechanical tilling and mowing during the breeding season can cause mortality and nest abandonment (Rodenhouse et al. 1993). Crops that require frequent tilling, mowing or pesticide applications have the most adverse impact on Western Meadowlark populations (Dechant et al. 2001). Limited livestock grazing can improve tall grass areas by reducing the amount of cover, however overgrazing in shorter grass is detrimental and increased the risk of trampling (Bock et al. 1993; Lanyon 1994). Commercial agricultural structures (e.g., greenhouses) that are becoming increasingly common in the lower Fraser Valley, provide little, if any, Western Meadowlark habitat (Campbell et al. 2001; Dechant et al. 2001). Large-scale monoculture crops typically require the expansion of field sizes and the subsequent conversion of marginal lands and the removal of shrubby fencerows eliminate important habitat features (Rodenhouse et al. 1993; Lanyon 1994).

Brown-headed Cowbirds tend to be more common around agricultural areas (Rodenhouse et al. 1993). Although this species has not been recorded as a parasite in the Georgia Depression meadowlark population, parasitism records elsewhere suggest there is potential for cowbirds to have an impact should breeding meadowlarks return to the area (Campbell et al. 2001; Lanyon 1994).

Historically, wild fire was a regular, naturally occurring event in the Georgia Depression that maintained natural openings and killed encroaching trees (Fuchs 2001). In some areas, First Nations used controlled burning to improve growing conditions for Common Camas (*Camassia quamash)*, an important food staple (Pojar and MacKinnon 1994). These controlled burns would have created clearings that provided suitable Western Meadowlark habitat. Currently, because the Georgia Depression is well settled, fire suppression is practised for the safety of the human population and to protect property. As a result, trees and shrubs including introduced, invasive species (e.g., Scotch broom *Cytisus scoparius*, gorse *Ulex europaeus* and Himalayan blackberry *Rubus discolor*), are encroaching into many grassland and open areas (Campbell et al. 2001; Fuchs 2001).

7. Management Recommendations

a) Habitat ownership and protection

In the Georgia Depression, some suitable habitat occurs within regional and provincial parks and federal crown lands in the lower Fraser River valley, the east coast of Vancouver Island, and the Gulf Islands. However, the quality of habitat and size of protected areas are currently unknown. The amount of habitat that is protected is thought to be small.

Most potential suitable nesting habitat is probably on private agricultural land. Management and stewardship of these lands are at the discretion of individual landowners.

Development and urbanization pressures in the Georgia Depression are projected to increase in the future (Campbell et al. 2001). Several private conservation organizations (e.g., The Nature Trust of British Columbia, The Nature Conservancy, The Land Conservancy and Habitat Acquisition Trust) are currently involved in purchasing habitat areas that might provide suitable nesting habitat for Western Meadowlarks. The federal government is also planning to create a National Park within the Gulf Islands, and this may protect suitable Meadowlark habitat.

b) Current management policies and actions

Currently, there no known management policies directed towards restoration of Western Meadowlark in the Georgia Depression. Current management practices designed to protect Garry oak and associated ecosystems are generally compatible with this species, however these management practices are only just coming to the attention of a range of jurisdictions and are not yet widely practiced.

c) Recommended prescriptions

The management, maintenance and enhancement of potential nesting habitat are critical. These efforts should be concentrated in those areas that historically had the highest population densities and have the highest possibility of future re-colonization (e.g., Saanich Peninsula, Nanaimo River estuary, Iona Island). Efforts should be concentrated in permanently protected areas. In addition, private landowners should be encouraged to adopt stewardship plans for grassland habitat. Road and utility right-of-ways may also provide potential habitat and should be managed as such (Manning et al. 2001; King and Byers 2002).

Suitable Western Meadowlark habitat areas should be secured towards the goal of establishing a network of protected areas that represent the full diversity of woodland ecosystems and grassland habitats with essential ecosystem characteristics maintained (Fuchs 2001). Protected areas should be of sufficient size to maintain ecological integrity (Bock et al. 1999). Enhancement efforts should be concentrated on the largest habitat

areas available because of the lower likelihood of nest depredation, human disturbance, and brood parasitism by Brown-headed Cowbirds (Lanyon 1994). In areas with important habitat, adoption of stewardship plans by private landowners as well as the managers of public utility right-of-ways.

Artificial relocation to re-colonize breeding populations of Western Meadowlarks on Vancouver Island is probably not necessary, because dispersing or migratory birds may naturally relocate (Campbell et al. 2001). If appropriate nesting habitats are protected and enhanced, the Western Meadowlark may again attempt to breed in the Georgia Depression.

In areas with suitable Western Meadowlark nesting habitat, the following prescriptions should be adopted by land managers:

- Avoid mechanical disturbance (mowing, tilling) and other wide scale disturbances (burning, intensive grazing and chemical spraying) during the breeding season (early April to the end of July).

- Pesticide and herbicide applications should also be restricted to the non-breeding season. Furthermore, applications should be conducted on a spot-by-spot basis and all chemicals used should be rapidly degrading, low toxicity products that are applied at the lowest rates possible.

- Control the encroachment of woody vegetation such as tree seedlings and invasive exotic shrubs. Treatment may include controlled burning, mowing and grazing and should be applied on a rotational schedule to provide a mosaic of successional stages. Treatment should not occur during the breeding season.

- Development of trails, roads or access points should be restricted to forest or grassland edges to minimize habitat loss, edge creation and disturbances.

- A feral cat control should be adopted in nesting areas, possibly in conjunction with animal welfare agencies such as the SPCA.

d) Potential to stabilise or reverse decline

If the appropriate conservation efforts are taken, the re-colonization of Western Meadowlarks in the Georgia Depression is possible. Western Meadowlarks occur in small numbers during the fall, winter and occasionally into the late spring (Campbell et al. 2001). These seasonal stragglers may be attempting to establish territories on Vancouver Island. Limiting factors, such as lack of mates, poor quality food and nesting habitat or excess human disturbance may be deterring re-establishment of breeding populations. Management, maintenance and enhancement of potential nesting habitat in the most likely areas for re-establishment, may address some of the limiting factors. However, if the overall population of Western Meadowlarks continues to decline throughout North America, the permanent extirpation of this species from the Georgia

Depression may be a consequence of a contraction of the extralimital range of this species (Campbell 2001; Lanyon 1994).

e) Recommended further work

Potential nesting areas in the Georgia Depression should be visited, described, catalogued and mapped to develop a permanent record of quality potential nesting habitat. Areas where Western Meadowlarks are known to frequent in the spring and early summer should be visited annually. Where meadowlarks are located, efforts should be made to monitor activity, breeding status and habitat use. These areas should be the focal point for restoration efforts.

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