

# GRASSHOPPER SPARROW

*Ammodramus savannarum*

Original<sup>1</sup> prepared by Susan Paczek

## Species Information

### Taxonomy

Four subspecies of Grasshopper Sparrow are recognized in North America. Only *Ammodramus savannarum perpallidus* occurs British Columbia (Vickery 1996; Campbell et al. 2001).

### Description

The Grasshopper Sparrow is small (11–13 cm, mass 14.5–20 g), flat-headed, and inconspicuous. The head has a dark, blackish crown that is narrowly streaked with buff and divided by a pale buffy-white crown stripe. Lores are orange-yellow, sometimes extending thinly over and behind the eyes. The bill is deep. Nape is greyish, with fine chestnut or reddish brown streaks. The back is streaked with chestnut-rust and black, with yellow wing edges that are brightest at the carpal joint. Tail is short and sharp, with rectrices pointed with bare shaft at tip (as is typical of *Ammodramus*). Breast is buffy and unstreaked, with a whitish lower breast. Juvenile Grasshopper Sparrows have a band of streaks across their breasts (Vickery 1996; Cannings 1995). Eggs are creamy white, speckled or spotted with reddish brown, and sometimes have greyish markings (Vickery 1996).

### Distribution

#### Global

The breeding range of *A. savannarum perpallidus* extends from northwestern California, eastern Washington State, northeast and southwestern Oregon, southern British Columbia, Alberta, Saskatchewan, western Ontario and Minnesota, south to southwestern California, central Nevada, northern Utah, central Colorado western Oklahoma,

and central Texas, and possibly east to Illinois and Indiana. Winter range extends from western Oregon, central California, west and southeast Arizona, central Oklahoma, southern Louisiana, southern Mississippi, and southwest Georgia, south to southern Baja California, Mexico, and El Salvador (Vickery 1996).

#### British Columbia

In British Columbia, the Grasshopper Sparrow is largely restricted to the Okanagan and lower Similkameen valleys, occurring mainly between Osoyoos Lake in the south, and Goose Lake north of Vernon, and west through Richter Pass to Chopaka in the southern Similkameen Valley (Campbell et al. 2001). A small breeding population has been recorded in the Nicola Valley near Chapperon Lake (Cannings 1995). Grasshopper Sparrows have occurred as a vagrant on the coast in the Fraser Lowland, and on Vancouver Island near Victoria. In the Interior, they have occurred as a vagrant at Becher's Prairie, west of Williams Lake (Campbell et al. 2001). Grasshopper Sparrows may also occur in the extreme southern Rocky Mountain Trench (Fraser et al. 1999).

#### Forest regions and districts

Southern Interior: Kamloops, Okanagan Shuswap

#### Ecoprovinces and ecosections

SOI: GUU, NIB, NOB, OKR, SOB, STU, THB

#### Biogeoclimatic units

BG: xh1, xh2, xw, xw1

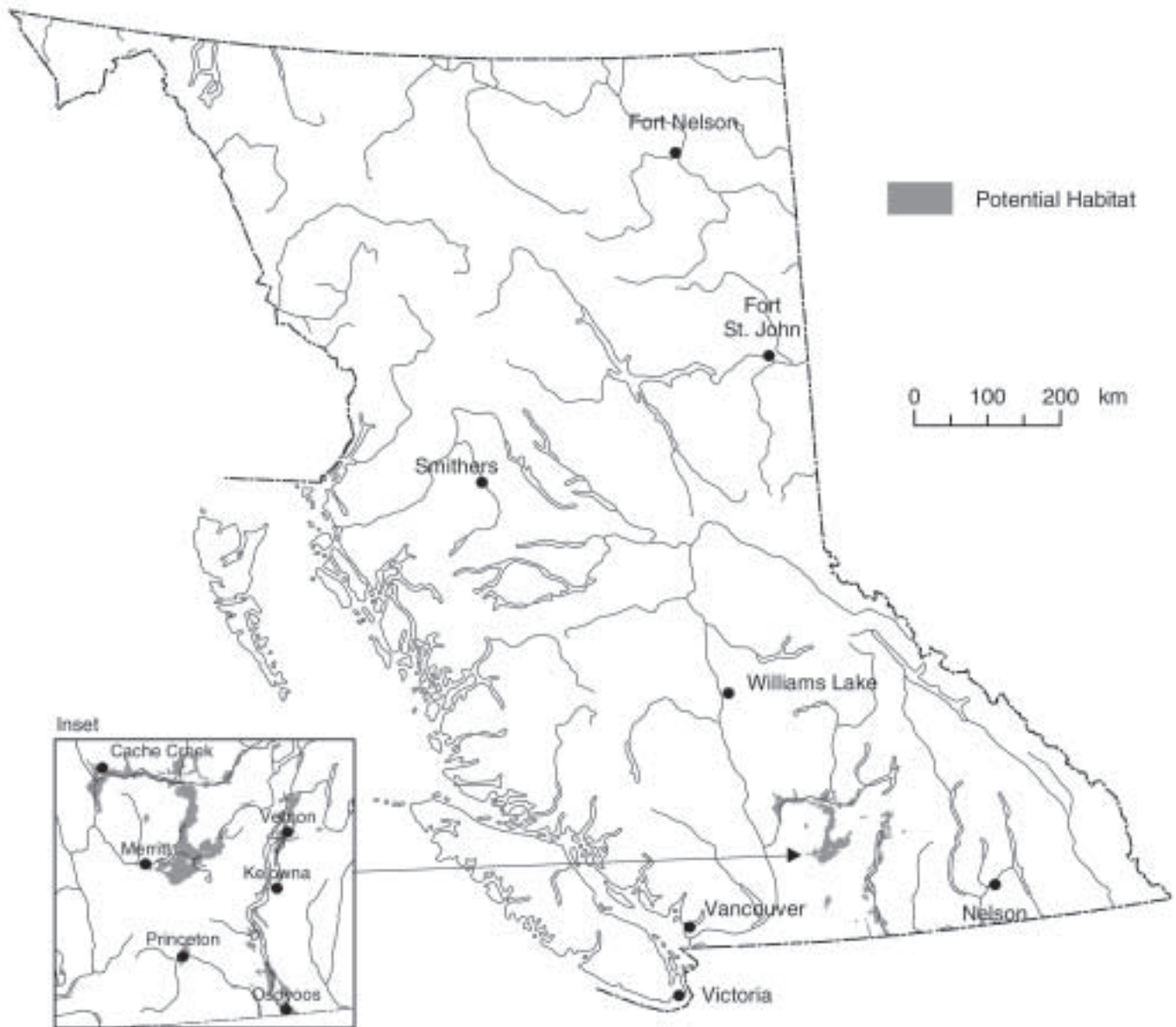
IDF: dk1a, xh1, xh1a, xh2, xh2a

PP: xh1

<sup>1</sup> Volume 1 account prepared by S. Cannings.

# Grasshopper Sparrow

(*Ammodramus savannarum*)



Note: This map represents a broad view of the distribution of potential habitat used by this species. The map is based on several ecosystem classifications (Ecoregion, Biogeoclimatic and Broad Ecosystem Inventory) as well as current knowledge of the species' habitat preferences. This species may or may not occur in all areas indicated. More detailed maps are available for this species from the Ministry of Sustainable Resource Management.

### **Broad ecosystem units**

BS, SS

### **Elevation**

Breeding activity in British Columbia occurs mainly between 300 and 500 m, although nests have been found between 1000 and 1160 m (Campbell et al. 2001).

### **Life History**

This species has not been studied in British Columbia, therefore life history characteristics are inferred from studies of *A. savannarum perpallidus* in North America or other subspecies.

### **Diet and foraging behaviour**

The diet of breeding Grasshopper Sparrows in Nebraska consisted of 33% seeds and 67% arthropods, although nestlings were fed entirely on arthropods (Kaspari and Joern 1993). Adults in Nebraska selected acridid grasshoppers (Orthoptera) and adult Coleoptera above all else, followed by Hemiptera species, although Homoptera species were more widely available (Kaspari and Joern 1993). In other locations including Oklahoma and South Dakota, grasshoppers (Orthoptera species) and Lepidopteran larvae made up a large proportion of the adult diet, although seeds still accounted for 14–39% of breeding season diet (Wiens 1973; Vickery 1996). In Wisconsin, nestlings were fed primarily Lepidoptera larvae, with other items including Odonata, Orthoptera, Hemiptera, Diptera larvae, Arachnida, and Oligochaete (Wiens 1969).

Concurrent measures of prey availability revealed that adult Grasshopper Sparrows are not opportunistic foragers as suggested by Wiens and Rotenberry (1979) but rather select prey based on size and profitability (Kaspari and Joern 1993). They avoid small prey, and prey with high chitin ratios, and will strip insects of their chitinous exoskeletons to maximize food value for effort (Kaspari and Joern 1993).

### **Reproduction**

Only five clutches have been recorded in British Columbia, and dates for these ranges from 2 June to 11 July (Campbell et al. 2001). Three nests had four eggs, one nest had six eggs, and one nest had one egg (Campbell et al. 2001). Information about reproduction is inferred from studies in other areas.

Males begin territory establishment upon arrival at breeding grounds (Smith 1968). Pairs form immediately after arrival of females at breeding ground, usually 3–5 days after males. Nest building may be initiated immediately, and the female alone builds the nest over 2–3 days. Nests are typically 11–14 cm in diameter, and 5–7 cm in height. Grasshopper Sparrows commonly produce two or more broods in a year, when conditions are favourable. Nests are not reused in subsequent nesting attempts. Clutch size varies from three to six, with second clutches generally smaller, often with two eggs.

The female alone incubates the clutch for 11–13 days (Smith 1968). If a female is flushed while incubating, she is likely to feign injury to distract predators (Smith 1963). There is a record of a Grasshopper Sparrow dumping two eggs into a Savannah Sparrow nest (Wiens 1971). The eggs were incubated and hatched although the nestlings were subsequently predated (Wiens 1971).

Both males and females feed nestlings (Vickery 1996). Non-parental attendants helped to feed nestlings at 4 of 23 nests in Nebraska between 1981 and 1984, although it did not affect nestling survival (Kaspari and O’Leary 1988). This was most likely misdirected parental care and not kin-based altruism since there was no evidence of site fidelity (Kaspari and O’Leary 1988).

Juveniles are well feathered by 9 days when they leave the nest, and plumage is complete by 10–12 days (Smith 1968). Nestlings in Nebraska departed nests at 6–8 days (Kaspari and O’Leary 1988). Both sexes give approximately 4–19 days of post-fledging parental care before females initiate nest construction for the second clutch. Fledglings disperse immediately from the vicinity of the nest,

and young of first brood are dispersed by the time second brood is being fed (Vickery 1996).

Grasshopper Sparrows breed the first spring after hatching, and presumably every year after (Vickery 1996). Nesting success rates in Missouri Conservation Reserve Program (CRP) fields were 32–63% (McCoy et al. 1999), 30% in Iowa CRP fields (Patterson and Best 1996), and 20% in Minnesota (Johnson and Temple 1990).

Grasshopper Sparrows are thought to experience a low level of brood parasitism by Brown-headed Cowbirds (*Molothrus ater*) (Smith 1968), although parasitism levels vary throughout their range (2–50%) (Vickery 1996). One of the five nests recorded in British Columbia had a cowbird egg (Cannings et al. 1987). However, in Ontario, only 8% of nests were parasitized by cowbirds ( $n = 74$ ) (Peck and James 1987). It is possible that the structure and placement of nests keeps them well hidden from cowbirds (Burger et al. 1994).

### Site fidelity

Return rates of Grasshopper Sparrows to former breeding sites differ markedly between populations and probably between years (Vickery 1996). There is no evidence of site fidelity of this species in Nebraska (Kaspari and O’Leary 1988), although a 20% return rate was recorded in California (Collier 1994, cited by Vickery 1996). Site fidelity of migrants may be more evident in the eastern United States, including a 50% return rate of birds in Connecticut ( $n = 10$ ) and 35% at Kennebunk Maine ( $n = 42$ ), although site fidelity was not recorded at other sites in Maine (Vickery 1996).

Banding studies show an average longevity of 2.9 years in Florida with an annual survival rate of 0.6 (Delany et al. 1993 in Vickery 1996), and a longevity record of 6.6 years (Dean et al. 1998). Longevity data for migrant subspecies are unreliable due to low return rates, and survival rates have not been determined, but the longevity record for a migrant Grasshopper Sparrow is 3 years and 1 month, in Nebraska (Klimkiewicz and Futcher 1987).

### Home range

There are no data on breeding territory size or home ranges within British Columbia. *Ammodramus savannarum perpallidus* territories in California were unusually small, averaging  $0.37 \pm 0.16$  ha (Collier 1994, cited by Vickery 1996). Elsewhere in the United States, Grasshopper Sparrow territory size ranges from 0.66 to 1.4 ha (Vickery 1996), with the Florida subspecies (*A. savannarum floridanus*) averaging 1.8 ha/territory (Delany et al. 1995). Breeding densities range between 0.55 and 1.3 territories/ha (Vickery 1996) throughout the midwest and eastern United States, with lower densities reported in Florida: 0.037–0.061 territories/ha (Delany et al. 1995).

Grasshopper Sparrows tend to be semi-colonial, breeding in small groups of 3–12 pairs, while nearby apparently suitable habitat is left unoccupied (Smith 1968). In grassland/shrub-steppe habitat of the lower south Okanagan and Similkameen valleys in 1998, this species was present at five separate locations in groups of 2–5 singing males (Paczek, unpubl. data). Between 8 June and 30 July, 2001, this species was detected during 34 ten-minute point count station surveys in five separate locations, including White Lake Basin, Willowbrook, Haynes Lease Ecological Reserve, Kilpoola Provincial Park (Order In Council), and Chopaka East Provincial Park (Order In Council) (A.M. Bezener, pers. comm.). Small groups of singing males have been recorded elsewhere in British Columbia (Cannings 1995).

### Movements and dispersal

The Grasshopper Sparrow arrives in British Columbia as early as 1 May, with build up of numbers occurring by mid-May (Campbell et al. 2001). Autumn departure probably occurs from September through the first half of October, with the latest sighting in the Okanagan recorded at 19 October (Cannings et al. 1987).



## Habitat

### Structural stage

2: herb

3a: low shrub

### Important habitats and habitat features

Grasshopper Sparrows exhibit variable responses to habitats throughout its range. *Ammodramus savannarum pratensis* is most commonly found on cultivated grasslands, while *A. savannarum perpallidus* prefers native prairie habitats (Smith 1968).

### Nesting

Grass cover is important for concealing nests (Vickery 1996). Grasshopper Sparrow nests are extremely difficult to find, usually hidden at the base of clumps of grass, clover, dead vegetation, alfalfa, or other cover (Smith 1968). In Florida, *A. savannarum floridanus* often places nests beneath dwarfed live oak (*Quercus minima*) instead of grass clumps (Delany and Linda 1998). Nests are sunk into depressions, with the rim flush with the ground. Nests are made of dried grass and lined with fine materials including grasses, sedges, and sometimes hair (Vickery 1996). The top is usually arched or domed at the back, giving it an oven-like appearance (Smith 1968).

Grasshopper Sparrows typically select moderately open grasslands and prairies with patchy bare ground (Vickery 1996). Grasshopper Sparrows in Wisconsin occurred at the highest densities in habitats with relatively short vegetation (Ribic and Sample 2001). In eastern Washington, Grasshopper Sparrows were positively associated with perennial grasses, which are indicative of native grassland (Vander Haegan et al. 2000). Soil type (loamy, shallow, or sandy) and range condition (good, fair, or poor) had a significant interaction when used to describe abundance of this species. Grasshopper Sparrows were most abundant in sites that had loamy soil with fair range, or shallow soil with poor range (Vander Haegan et al. 2000).

In British Columbia, Grasshopper Sparrows are generally found in bluebunch wheatgrass habitats,

including bunchgrass-sagebrush associations (Cannings 1995). In a survey of sagebrush (*Artemisia tridentata*) habitat in the south Okanagan–lower Similkameen valleys, Grasshopper Sparrows occurred in sites with relatively sparse sagebrush cover, and an abundance of cheatgrass and pasture sage (*Artemisia frigida*) (Paczek 2001). Needle-and-thread grass (*Stipa comata*) was the dominant perennial grass. Grasshopper Sparrows elsewhere have been noted as avoiding dense shrub cover (Vickery 1996; Madden et al. 1999), although they were not negatively associated with shrub cover in Washington (Vander Haegan et al. 2000). Grasshopper Sparrows in North Dakota have been described as a species that occurs mainly in areas that are in transition between shrub-steppe and grassland (Kantrud and Kologiski 1983). In Arizona, the Grasshopper Sparrow is clearly a grassland species, but scattered shrubs are an important component of its habitat (Bock and Bock 1992).

The positive association of Grasshopper Sparrow with cheatgrass, a weedy annual grass, and pasture sage indicates that this species tolerates some level of disturbance, and habitat selection may not be affected by invasion of exotic species (Paczek 2001). Grasshopper Sparrows may respond more to plant structure than floristics, as they were more abundant in areas with abundant Eurasian weeds, relative to native plants in Manitoba, Illinois, and Colorado (Wilson and Belcher 1989; Haire et al. 2000; Walk and Warner 2000). Presence of weeds could indicate habitats that are rich in prey. For example, in Arizona, grasshoppers (Orthoptera) prefer rangelands dominated by weedy herbs rather than well-grassed ranges (Nerney 1958); in Oklahoma, Orthoptera, particularly acridids, increased in moderate to heavily grazed grassland (Smith 1940). Grasshopper Sparrow abundance was equal between lightly grazed introduced crested wheatgrass (*Agropyron cristatum*) stands and lightly grazed native mixed-grass prairie in Saskatchewan (Sutter and Brigham 1998). In British Columbia, this species is found in crested wheatgrass areas at the West Bench site, but not in crested wheatgrass areas on Mount Middleton (Cannings 1995). In the lower south Okanagan and Similkameen valleys,

Grasshopper Sparrows had a slight negative correlation with crested wheatgrass (Paczek, unpubl. data).

Song perches in general are important for Grasshopper Sparrows, which sing most often from fixed perches such as shrubs, flower stems, and fence posts, and occasionally from the ground, usually in the periphery of their territories (Vickery 1996).

### Foraging

Grasshopper Sparrows forage exclusively on the ground, and require some amount of bare ground for foraging (Whitmore 1981; Vickery 1996).

### Wintering

Little is known about the winter habitat requirements of this species. *Ammodramus savannarum pratensis* has been recorded as wintering in grass-dominated fields and native prairie (Vickery 1996).

## Conservation and Management

### Status

The Grasshopper Sparrow is on the provincial *Red List* in British Columbia. Its status in Canada has not been evaluated (COSEWIC 2002).

Summary of ABI status in BC and adjacent jurisdictions (NatureServe Explorer 2002)

| BC  | AB  | WA          | ID          | MT          | Canada | Global |
|-----|-----|-------------|-------------|-------------|--------|--------|
| S2B | S4B | S3B,<br>S2N | S3B,<br>S2N | S4B,<br>S2N | N4B    | G5     |

### Trends

#### Population trends

Breeding Bird Survey (BBS) data for Grasshopper Sparrows across North America have indicated a significant, consistent decline in population from 1966 to 2000 at about -3.71%/yr (Peterjohn and Sauer 1999; Sauer et al. 2001). In a regional comparison of BBS surveys, this species has one of the greatest estimated rates of decline among grassland

birds of the midwestern United States, at -5.5%/yr (Herkert 1995). Grasshopper Sparrows occur only on 4 of 73 BBS routes in the British Columbia interior (Campbell et al. 2001), but in Canada, this species has a rate of decline of -4.83%/yr between 1966 and 2000, with a rate of -6.33%/yr between 1980 and 2000 (Sauer et al. 2001).

While trends in British Columbia are difficult to establish, the Grasshopper Sparrow appears to have become regular in the province in recent years, despite habitat loss and fragmentation (Campbell et al. 2001). Since 1958, this species has been recorded in British Columbia nearly every year. Since 1898, when the species was first recorded in British Columbia, there have been 66 years where Grasshopper Sparrows were not recorded, with periods of absence being as long as 19 years (Campbell et al. 2001). The British Columbian population appears to be stable but small, with an estimated 50 pairs or less (Cannings 1995). In Washington, this species appears to be declining as a result of overgrazing and conversion of native grassland to agriculture (Smith et al. 1997, cited by Campbell et al. 2001).

### Habitat trends

Much of Grasshopper Sparrow habitat in British Columbia has already been lost or altered by conversion to agricultural and residential developments (Cannings 1995). Currently, only 5% (724 ha) of potential habitat occurs on lands managed with conservation objectives. An additional 23% is Crown land. The majority of potential habitat is located on private land (40%) or Indian reserves (32%) (MELP 1998).

Over half of the native shrub-steppe in Washington has been converted to agricultural lands (Vander Haegen et al. 2000).

### Threats

#### Population threats

There has been little documentation on predation in British Columbia. It is possible that Grasshopper Sparrow nests are less vulnerable to predation due to their closed roof construction (Burger et al. 1994).

In a study of *A. savannarum pratensis* in Iowa, 89% of predation was attributed to mammals including Red Fox (*Vulpes vulpes*), Raccoon (*Procyon lotor*), and Striped Skunk (*Mephitis mephitis*) (Patterson and Best 1996). Other recorded predators include hawks, Loggerhead Shrikes (*Lanius ludovicianus*), weasels (*Mustela* spp.), ground squirrels (*Spermophilus* spp.), cats (*Felis catus*), and snakes (Smith 1968; Vickery 1996). As nests are well concealed, and the birds stay close to the grass, predation by raptors is probably rare (Smith 1968). Grasshopper Sparrows are commonly impaled by Loggerhead Shrikes in Oklahoma (Vickery 1996) although Loggerhead Shrikes are infrequent visitors to the Okanagan (Cannings et al. 1987). Information is lacking on the impact of predators on survival, but high nest failure rates (80%) have been recorded in agricultural land in Iowa due to nest predation (Vickery 1996).

Trampling of nests by cattle is a concern (Campbell et al. 2001), and in areas where Grasshopper Sparrows use cultivated fields, nests may be crushed during mowing (Smith 1968). Application of insecticides in Grasshopper Sparrow territories would adversely affect this species because the chemicals both reduce food supply and are highly toxic to birds (Cannings 1995). Herbicide spraying on Grasshopper Sparrow habitat may pose other potential threats.

### **Habitat threats**

The largest threat to Grasshopper Sparrow habitat is probably the continued loss and fragmentation of grasslands due to development. Across the United States and Canada, declines in native prairie since European settlement vary, but are as high as 99.9% in Manitoba and some mid-western states (Samson and Knopf 1994). Over 90% of the land in the Okanagan and lower Similkameen valleys has already been altered from its original state (Redpath 1990, cited by Cannings 1995). Two sites at the northern end of the Okanagan Valley where this species has occurred regularly; Mount Middleton and Goose Lake, are now adjoined by residential development and may soon become unsuitable habitat (Campbell et al. 2001). Grasshopper

Sparrows are known to be area sensitive in much of their range, preferring large tracts of grassland habitat (Herkert 1994; Vickery et al. 1994; Haire et al. 2000; Johnson and Igl 2001). Grasshopper Sparrows in the lower south Okanagan and Similkameen valleys occurred in areas surrounded by shrub-steppe, and were generally absent from areas with agriculture or forest within a 500 m radius (Paczek 2001). Occupation of sites by this species was highly correlated with the amount of shrub-steppe within a 2 km radius (Paczek 2001). Development of land therefore not only results in habitat loss, but fragmentation may cause the remaining habitat to become less suitable.

This species has shown to respond positively to fire throughout its range. Short-term studies typically show an immediate negative response to fire, with birds preferring areas >1 year after burning (Vickery 1996). In a long-term study of effects of fire in North Dakota, Grasshopper Sparrows were absent from native prairie that had been unburned for >15 years (Madden et al. 1999). This species preferred a short burn period of 2–4 years (Madden et al. 1999), and in Florida, some areas with Grasshopper Sparrows are burned in winter at 2–3 year intervals for management purposes (Delany et al. 1985). Although these burn intervals approximate the natural pre-settlement burn cycle for these particular areas, the grasslands and shrub-steppe of British Columbia likely have a different pre-settlement burn interval. The effect of fire in British Columbia is unknown, although burning would probably benefit this species by reducing shrub cover (Madden et al. 1999). Unfortunately, invasion by cheatgrass in the lower south Okanagan and Similkameen valleys may have already changed the fuel properties of some areas, making restoration to native species difficult (Knick and Rotenberry 2000). Restoration burns in areas that have had fire suppression are often hotter (Madden et al. 1999), so the further spread of cheatgrass is a management concern.

Mowing hayfields during breeding season is a threat to habitat in the eastern range of this species (Smith 1968; Frawley and Best 1991). However, this practice does not generally take place in the native grasslands

used by the western race in British Columbia (Cannings 1995).

Much of the Grasshopper Sparrow habitat in British Columbia is subject to grazing, and specific effects in this province are unclear, as the open areas where this species occurs have often been disturbed by grazing (Paczek 2001). Effects of grazing on this species vary in the literature. Generally, light to moderate grazing is beneficial in lush habitats, and heavy grazing in shorter, drier habitats is detrimental (Saab et al. 1995). Grasshopper Sparrows in Illinois responded positively to light, late season grazing (Walk and Warner 2000), while in Arizona this species occurred only on ungrazed sites (Bock and Webb 1984). Overgrazing can lead to increased sagebrush density and reduce suitable land for Grasshopper Sparrows (Campbell et al. 2001). However, grazing is also correlated with increased grasshopper abundance (Smith 1940, Nerney 1958).

## Legal Protection and Habitat Conservation

The Grasshopper Sparrow, its nests, and its eggs are protected in Canada by the *Migratory Birds Convention Act*. In British Columbia, the same are protected from direct persecution by the provincial *Wildlife Act*.

The Nature Trust of British Columbia and the province currently protect Grasshopper Sparrow habitat at White Lake Basin, Vaseux-Bighorn National Wildlife Area, and Haynes Lease ecological reserve. New provincial parks proposed at White Lake Basin (White Lake Provincial Park, Order In Council) and International Grasslands (Chopaka East, Chopaka West, and Kilpoola Provincial Parks, Orders In Council) through the Okanagan-Shuswap Land and Resource Management plan would also include important Grasshopper Sparrow habitat.

Under the results based code, range use plans may be used to meet the requirements of this species. In some cases, current grazing practices may be adequate to maintain habitats for this species and therefore it may not be necessary to establish a WHA. This assessment must be made case by case.

## Identified Wildlife Provisions

### Sustainable resource management and planning recommendations

- ❖ Maintain large areas (>100 ha) of suitable shrub-steppe habitat within the range of the species.
- ❖ Maintain and maximize connectivity of suitable habitats.
- ❖ Where prescribed burning is practised as a habitat enhancement strategy, consider rotational burning that creates a mosaic of burned and unburned areas. Madden et al. (1999) recommend burning 20–30% in rotation so that birds always have access to unburned land. This mosaic approach can be used to encompass habitat requirements of other grassland species. The same approach could be applied to livestock grazing.

### Wildlife habitat area

#### Goal

Provide suitable nesting habitat as described previously under “Important habitats and habitat features.”

#### Feature

Establish WHAs at locations where two or more singing males have been recorded regularly (i.e., consecutively over several years).

#### Size

A minimum of 10–15 ha to allow occupation by multiple pairs and accommodate semi-colonial breeding territories.

#### Design

Include open native grassland and shrub-steppe habitats with sparse shrub cover (<15%) and moderate amounts of bare ground and grass cover. Ideally, WHAs should be surrounded by native grassland habitat and preferably located 500 m or more from forest, development or agricultural edges.



## General wildlife measures

### Goals

1. Prevent destruction and abandonment of nests by minimizing disturbance during critical breeding times.
2. Maintain dense clumps of grass used for nesting and cover.
3. Promote natural disturbance regimes such as fire to control shrub density and enhance grass growth.

### Measures

#### Access

- Do not construct roads, trails, or other access routes.

#### Pesticides

- Do not use pesticides.

#### Range

- Do not concentrate livestock use between 1 May and 1 August.
- Plan livestock grazing to maintain desired structure of plant community, desired stubble height, and browse utilization. If there is no other practicable option to avoid incompatible livestock grazing, the statutory decision maker may recommend fencing.

## Additional Management Considerations

Consider prescribed burning to decrease shrub cover, and promotes the growth of grasses (Madden et al. 1999). Prescribed burning in late autumn or winter, or other methods of shrub control could be used to maintain open grasslands with relatively sparse sagebrush cover.

Maintenance of large tracts of grassland appears to be important for this species (Vickery 1996), although the minimum patch size for Grasshopper Sparrows varies among studies and regions. In Nebraska where this species is common, a patch area of 5 ha (square) or 3.9 ha (circular) was recommended (Helzer and Jelinski 1999). This is considerably lower than a minimum patch size of 30 ha

recommended by Herkert (1994) and 100 ha in Maine (Vickery et al. 1994). Vickery et al. (1994) suggested that the large area requirement they estimated for Grasshopper Sparrow could be attributed to increased habitat selectivity because of low population numbers of this species. Patch shape had more influence on Grasshopper Sparrow presence than did patch area in a habitat fragmentation study in Nebraska (Helzer and Jelinski 1999). Grasshopper Sparrows were among several species that were negatively correlated with perimeter-area ratio, which reflects both the area and shape of a patch (Helzer and Jelinski 1999).

Since much of the suitable Grasshopper Sparrow habitat in the province has already been lost or degraded (Cannings 1995), efforts should be made to reduce further habitat fragmentation and loss, and restore degraded habitat where possible.

## Information Needs

1. Basic life history and habitat information in British Columbia (i.e., predator information, site fidelity, foraging habitat requirements, preferred food sources, territory establishment and maintenance, breeding success).
2. Reproductive success in native versus weedy habitats to determine success in weedy habitats.
3. Response of this species to grazing and prescription or other burns in British Columbia. Regular burns enhance Grasshopper Sparrow habitat elsewhere in North America (Delany et al. 1985; Madden et al. 1999).

## Cross References

“Great Basin” Gopher Snake, Long-billed Curlew, Racer

Management strategies for other red-listed songbird species—Sagebrush Brewer’s Sparrow and Sage Thrasher—may conflict with Grasshopper Sparrow needs. Sagebrush Brewer’s Sparrow and Sage Thrasher require abundant sagebrush for nesting, unlike Grasshopper Sparrows that occur in sparse shrub cover.

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