COSEWIC
Assessment and Status Report

on the

Coastal Vesper Sparrow
Pooecetes gramineus affinis

in Canada

ENDANGERED
2018

COSEWIC
Committee on the Status
of Endangered Wildlife
in Canada

COSEPAC
Comité sur la situation
des espèces en péril
au Canada

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Coastal Vesper Sparrow — Photo by Rod Gilbert.

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COSEWIC
Assessment Summary

Assessment Summary – April 2018

Common name
Coastal Vesper Sparrow

Scientific name
Pooecetes gramineus affinis

Status
Endangered

Reason for designation
This songbird is a distinct subspecies limited to the Pacific coastal plains of western North America, breeding in sparsely vegetated grasslands with scattered trees or shrubs and patches of bare soil. Its numbers are declining throughout its range, due to loss and degradation of breeding and wintering habitat. Despite targetted surveys, no breeding attempts have been confirmed in Canada since 2014, and the current Canadian population is near zero. Remaining patches of suitable nesting habitat are scarce on southeastern Vancouver Island and the Lower Mainland of British Columbia, and continue to decline in extent and quality

Occurrence
British Columbia

Status history
Designated Endangered in April 2006. Status re-examined and confirmed in April 2018.

COSEWIC
Executive Summary

Coastal Vesper Sparrow
Pooecetes gramineus affinis

Wildlife Species Description and Significance

The Vesper Sparrow *affinis* subspecies (*Pooecetes gramineus affinis*) is more commonly known as Coastal Vesper Sparrow, or as Oregon Vesper Sparrow in the United States. It is the rarest of the three subspecies of Vesper Sparrow that breed in Canada, with a disjunct population and a restricted range. It is a medium-sized sparrow with distinctive chestnut wing coverts, white outer tail feathers and a white eye ring. It is one of several taxa restricted to the coastal savannahs and grasslands of the west coast of North America.

Distribution

Historically, Coastal Vesper Sparrow has been restricted to the coastal plains of southern British Columbia, Washington, Oregon, and extreme northern California. In British Columbia it formerly bred in the lower Fraser River valley and southeastern Vancouver Island, but more recently was restricted to only the Nanaimo Airport and immediately adjacent land on Vancouver Island. Breeding activity was last recorded there in 2014.

Habitat

Coastal Vesper Sparrow nests on the ground in structurally diverse and sparsely vegetated grasslands that include scattered trees or shrubs and patches of bare, gravelly soil. Structural diversity is important because these sparrows use the taller perches for singing while open areas are used for foraging.

Biology

The breeding season of Coastal Vesper Sparrow in British Columbia is approximately late April to mid-July. Breeding site fidelity is likely strong. During the breeding season, the diet consists primarily of insects, although seeds are also taken. The northernmost breeding Coastal Vesper Sparrows move south to winter, with birds from Vancouver Island thought to winter in California. Coastal Vesper Sparrows can adapt to modified habitats. However, there is potentially a greater risk of nest failure at such sites as they are often mowed or have other human-induced disturbance issues.

Population Sizes and Trends

Coastal Vesper Sparrow is not known to have bred in Canada since 2014, when a pair of birds was observed carrying food late in the nesting period at the one known breeding site. Since that date, nesting season observations within its Canadian breeding range have been of single individuals. Although never considered to be common in British Columbia, the subspecies was historically recorded during the breeding season at sites on southeastern Vancouver Island from the Parksville vicinity south to the area around Mill Bay, and was also known to nest in the Fraser Valley lowlands on the mainland. Numbers have also declined in Washington and Oregon, and the taxon is likely extirpated in its former breeding range in northern California.

Threats and Limiting Factors

Loss or degradation of habitat (e.g., encroachment by native and non-native trees, shrubs, and grasses; urban development) in both breeding and wintering ranges, deleterious effects of land use and land management (e.g., mowing regimes at odds with the species' breeding cycle or habitat requirements), and demographic factors affecting small and declining subpopulations are the primary threats to Coastal Vesper Sparrows throughout the range. Adequately sized patches of Vesper Sparrow habitat with low disturbance levels are currently very scarce on southeastern Vancouver Island and the Lower Mainland. Land use practices at the only known Canadian breeding site reduced suitability for Coastal Vesper Sparrow. Other threats include predation by cats, which occur in higher densities in urbanized and rural areas, including the Nanaimo Airport and vicinity. Considering subpopulation declines in adjacent Washington State, it is increasingly unlikely that there will be a source of dispersing birds from the south to rescue the population on Vancouver Island.

Protection, Status and Ranks

Coastal Vesper Sparrow is listed as Endangered under the federal *Species at Risk Act* and is on the Red List in British Columbia. In the US, the subspecies is a candidate for Endangered status in Washington, in Oregon it is considered 'Sensitive-Critical', and it has recently been petitioned to be listed under the US *Endangered Species Act*.

TECHNICAL SUMMARY

Pooecetes gramineus affinis

Coastal Vesper Sparrow

Bruant vespéral de la sous-espèce *affinis*

Range of occurrence in Canada (province/territory/ocean): British Columbia

Demographic Information

Generation time (usually average age of parents in the population; indicate if another method of estimating generation time indicated in the IUCN guidelines (2011) is being used)	Assumed to be 2-3 years, as for many passerines.
Is there an [observed, inferred, or projected] continuing decline in number of mature individuals?	Yes
Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations]	Unknown, but population already near zero
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations].	>85% reduction observed (20 in 2009, 1-3 males in 2012-2013, 2-3 adults in 2014, <3 individuals annually in subsequent years)
[Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations].	Unknown, but likely small, given that population is currently near zero
[Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over any [10 years, or 3 generations] period, over a time period including both the past and the future.	Observed >85% reduction
Are the causes of the decline a.clearly reversible and b.understood and c. ceased?	a. Unknown b. Yes c. No
Are there extreme fluctuations in number of mature individuals?	No

Extent and Occupancy Information

Estimated extent of occurrence	4 km² in 2014, 0 km² in 2015 and subsequently
Index of area of occupancy (IAO) (Always report 2x2 grid value).	4 km² in 2014, 0 km² in 2015 and subsequently
Is the population “severely fragmented” i.e. is >50% of its total area of occupancy is in habitat patches that are (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	a. n/a (IAO of 0 km²) b. No, within dispersing distance of US population

Number of “locations” (use plausible range to reflect uncertainty if appropriate)	1 in 2014, 0 known in 2015 and subsequently
Is there an [observed, inferred, or projected] decline in extent of occurrence?	Yes, observed
Is there an [observed, inferred, or projected] decline in index of area of occupancy?	Yes, observed
Is there an [observed, inferred, or projected] decline in number of subpopulations?	Yes, observed
Is there an [observed, inferred, or projected] decline in number of “locations”*?	Yes, observed
Is there an [observed, inferred, or projected] decline in [area, extent and/or quality] of habitat?	Yes, observed
Are there extreme fluctuations in number of subpopulations?	No
Are there extreme fluctuations in number of “locations”?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of Mature Individuals (in each subpopulation)

Subpopulations (give plausible ranges)	**N Mature Individuals**
Total	2-3 adults observed at known breeding site in 2014, <3 sightings annually at various other locations in 2015-2017, without evidence of breeding

Quantitative Analysis

Probability of extinction in the wild is at least [20% within 20 years or 5 generations, or 10% within 100 years].	Not done, but population already likely at 0 breeding birds in Canada.

Threats (actual or imminent, to populations or habitats, from highest impact to least)

No threats calculator call was completed, because there is currently no known population on which threats could act. However, threats historically and theoretically relevant to the species include:

i. Residential and commercial development (IUCN Category 1), threatening remaining savannah habitat.
ii. Agriculture and agriculture (IUCN Category 2), primarily through disturbance or destruction of nests by tilling and livestock trampling.
iii. Human intrusions and disturbance (IUCN Category 6), both from recreational activities and maintenance regimes at airports.
iv. Invasive and other problematic species and genes (IUCN Category 8), in particular Scotch Broom and other invasive plants colonizing open habitats, and increasing predation pressure from feral cats.
v. Natural system modifications (IUCN Category 7), specifically infilling of coastal grasslands with shrubs and trees.

Rescue Effect (immigration from outside Canada)

Status of outside population(s) most likely to provide immigrants to Canada.	Declining; S1B (critically imperilled) in Washington and S2B (imperilled) in Oregon
Is immigration known or possible?	Yes
Would immigrants be adapted to survive in Canada?	Yes
Is there sufficient habitat for immigrants in Canada?	Unknown
Are conditions deteriorating in Canada?	Yes
Are conditions for the source population deteriorating?	Yes
Is the Canadian population considered to be a sink?	Unknown
Is rescue from outside populations likely?	No

Data Sensitive Species

Is this a data sensitive species? No

Status History

COSEWIC: Designated Endangered in April 2006. Status re-examined and confirmed in April 2018.

Status and Reasons for Designation:

Status:	**Alpha-numeric codes:**
Endangered	A2ac; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C2a(i); D1
Reasons for designation: This songbird is a distinct subspecies limited to the Pacific coastal plains of western North America, breeding in sparsely vegetated grasslands with scattered trees or shrubs and patches of bare soil. Its numbers are declining throughout its range, due to loss and degradation of breeding and wintering habitat. Despite targetted surveys, no breeding attempts have been confirmed in Canada since 2014, and the current Canadian population is near zero. Remaining patches of suitable nesting habitat are scarce on southeastern Vancouver Island and the Lower Mainland of British Columbia, and continue to decline in extent and quality	

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals): Meets criteria for Endangered, A2ac, based on observed >85% reduction in total number of mature individuals over the past ten years and an observed decline in extent of occurrence, area of occupancy, and quality of habitat
Criterion B (Small Distribution Range and Decline or Fluctuation): Meets criteria for Endangered, B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v), as the EOO and IAO are well below thresholds, there are fewer than 5 locations, and there is a continued inferred decline in EOO, IAO, extent and quality of habitat; number of locations, number of locations and subpopulations, and number of mature individuals.
Criterion C (Small and Declining Number of Mature Individuals): Meets criteria for Endangered C2a(i), as there has been a continuing decline in number of mature individuals, and no subpopulation is estimated to contain more than 250 mature individuals.

Criterion D (Very Small or Restricted Population): Meets criteria for Endangered D1, as the population of near zero mature individuals is well below the threshold.
Criterion E (Quantitative Analysis): Analysis not conducted.

PREFACE

Since the last status report on Coastal Vesper Sparrow was published in 2006, the species has declined to an estimated 0 pairs nesting in Canada. The Nanaimo Airport was the country's only known breeding site, and nesting activity (one singing male; adults carrying food) was last documented there in 2014. Although annual surveys at this site ceased in that year, the growth in popularity of eBird and the presence of many expert birders within the historical range of this species (now with several urban centres and numerous expert birders) suggest a strong likelihood of rare species such as this being detected when occupying a site, or during migratory stopovers. Additional regional surveys for the species have also been carried out since the previous status report, with no new breeding subpopulations being detected. However, the possibility remains that there are one or more unidentified breeding sites for Coastal Vesper Sparrow in Canada, or that individuals may immigrate from US subpopulations.

Critical habitat (at the Nanaimo Airport) was identified in the federal Recovery Strategy for Coastal Vesper Sparrow in 2014 (Environment and Climate Change Canada 2016). Considerable work has also been conducted on this species over the last decade throughout its US range, with results being summarized in the recent Conservation Assessment for Oregon Vesper Sparrow (Altman 2017).

COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS (2018)

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.

** Formerly described as "Not In Any Category", or "No Designation Required."

*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

Environment and Climate Change Canada
Canadian Wildlife Service
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Canada

The Canadian Wildlife Service, Environment and Climate Change Canada, provides full administrative and financial support to the COSEWIC Secretariat.

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Pooecetes gramineus affinis

in Canada

2018

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WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE

Name and Classification

Vesper Sparrow, *Pooecetes gramineus*, is one of 49 species of emberizine sparrows that breed in North America (Sibley 2014). Four subspecies are recognized; Coastal Vesper Sparrow (*P. g. affinis*) was described in 1888 by G.S. Miller based on a type specimen from Salem, Oregon (American Ornithologists' Union 1957), and is typically referred to as Oregon Vesper Sparrow in the United States (Rising 1996; Rogers 2000; Beauchesne 2002a; Altman 2017). Coastal Vesper Sparrow, Western Vesper Sparrow (*P. g. confinis*), and Eastern Vesper Sparrow (*P. g. gramineus*) breed in Canada, while the fourth subspecies, *P. g. altus*, breeds in the southwestern United States (Jones and Cornely 2002).

Morphological Description

Vesper Sparrow is a medium-sized sparrow (length approximately 16 cm) with a chestnut shoulder patch (lesser coverts), white outer tail feathers, a whitish eye-ring and dark brown auricular spot (Figure 1; Sibley 2014). Sexes are similar. Juveniles are similar to adults but duller, and usually lack chestnut lesser coverts (Pyle 1997).

Figure 1: Coastal Vesper Sparrow (Suzanne Beauchesne).

The four subspecies are similar in appearance and cannot reliably be separated in the field. Differences between the subspecies are limited to shading and variation in measurements. Coastal Vesper Sparrow has medium greyish-brown upperparts and white underparts with a buff tinge. In comparison, Western Vesper Sparrow, the nearest subspecies geographically, has pale grayish-brown upperparts and creamy underparts, a longer tail, and is larger overall (Pyle 1997; Jones and Cornely 2002).

Population Spatial Structure and Variability

There has been no genetics work to assess differences among Vesper Sparrow subspecies; analysis was initiated on birds breeding in coastal British Columbia but was not completed due to inadequate sample size (Altman 2017; Toews pers. comm. 2017).

Designatable Units

While the physical differences between Coastal Vesper Sparrow and Western Vesper Sparrow are slight, their breeding ranges are separated by broad chains of high mountains lacking suitable habitat (see **Distribution**, below). They also breed in different National Ecological Areas (EAs), Coastal Vesper Sparrow in Pacific EA, versus Western Vesper Sparrow in the Southern Mountain and Prairie EAs. Coastal Vesper Sparrow is well-accepted as a taxonomically distinct unit (American Ornithologists' Union 1957; Rising 1996; Cannings 1998; Rogers 2000; Jones and Cornely 2002).

Special Significance

Coastal Vesper Sparrow is one of a suite of taxa restricted to coastal savannahs and grasslands in southern British Columbia, Washington and Oregon; many of these (e.g., Streaked Horned Lark, *Eremophila alpestris strigata*) are listed under the federal *Species at Risk Act*.

DISTRIBUTION

Global Range

Coastal Vesper Sparrow has a disjunct population in the Pacific Northwest, separated from other subspecies by the densely forested Coast Range and Cascade Mountains. Historically, this subspecies bred locally on southeastern Vancouver Island, and in the lower Fraser River valley south through western Washington and Oregon to extreme northwestern California (Figure 2). It is accepted by most authorities that Coastal Vesper Sparrow is the only subspecies found west of the Cascades (American Ornithologists' Union 1957; Pyle 1997; Cannings 1998; Rogers 2000; Campbell *et al*. 2001; Jones and Cornely 2002; Altman 2003).

Coastal Vesper Sparrow historically wintered from central California west of the Sierra Nevada to northwestern Baja California, Mexico (American Ornithologists' Union 1957), though there are no recent wintering records from Baja California or parts of the coast of southern California (Patten *et al.* 2003; Erickson 2008; Altman 2017).

Canadian Range

Vesper Sparrow breeds in grassland habitats from British Columbia east to Nova Scotia. The birds breeding in coastal British Columbia are considered to be Coastal Vesper Sparrow based on the known distribution of that subspecies in Washington and Oregon (Fraser *et al*. 1999; Campbell *et al*. 2001). Coastal Vesper Sparrow breeds on San Juan Island, Washington, less than 20 km from southern Vancouver Island (Rogers 2000), while the nearest Western Vesper Sparrow population breeds several hundred kilometres to the east, on the other side of the Cascade Range and Coast Mountains (Campbell *et al*. 2001; Jones and Cornely 2002). Within Canada, Coastal Vesper Sparrow has been found only on southeastern Vancouver Island and in the lower Fraser River valley. Historically, Vesper Sparrows have been reported during the breeding season on Vancouver Island from the Englishman River estuary in the north to Cobble Meadows and Mill Bay in the south, and locally in the Fraser Lowlands on the southwest mainland coast (Campbell *et al*. 2001; Beauchesne 2002a; Figure 2). Historical records of this species were sporadic, with breeding season observations on Vancouver Island from 1890 to 1892; nesting in New Westminster in 1938; breeding season observations in the Chilliwack region in 1944, 1961, 1962, and 1968; nesting on Iona Island (Fraser Delta) in 1968; and more recent breeding season observations on Vancouver Island in 1957 and from 1971 to 2014 (Campbell *et al*. 2001; Beauchesne 2014). Sporadic records from the Fraser Valley from the 1970s to 2001 (Campbell *et al*. 2001; Beauchesne 2002a) may involve vagrants from the interior subspecies, given that no evidence of territoriality has been reported in these instances. The only known recent breeding site is located on Vancouver Island about 20 km south of Nanaimo at the Nanaimo Airport (Beauchesne 2002b, 2003, 2004, 2010a,b, 2012).

As of 2015, the eBird database included 40,881 breeding season (April – July, all species) checklists from areas of British Columbia traditionally occupied by Coastal Vesper Sparrow (24,694 from the Metro Vancouver and lower Fraser Valley areas and 16,187 from southern Vancouver Island; eBird 2015); these were all searched for records of Vesper Sparrow, and potential evidence of breeding. Though not all checklists came from sites with suitable habitat, as a whole they provide data on the distribution and relative abundance of Vesper Sparrows in those regions. While this database does include some older data, it consists primarily of submissions post-2005, so it provides a reasonable picture of distribution over the last decade but is not as useful for historical comparisons. These observations are subject to an unknown degree of error given the wide range of experience of the birders submitting to eBird, although data are monitored by knowledgeable regional reviewers, with particular scrutiny on reports of rare species. Nonetheless, data from eBird support the idea that Vesper Sparrows are rare spring migrants in the lower Fraser Valley. In reviewing all available records for the months of April, May, June and July through to 2015, there were only 53 reports involving 34 individual birds from that area (n=24,694 checklists; eBird 2015), and no evidence of breeding. The latest spring dates (3 records) came from the first week of June; there were no summer (late June through July) records. Most records of multiple birds came from sites that are characteristic of migrant traps and unsuitable for breeding (e.g., Harrison Hot Springs beach).

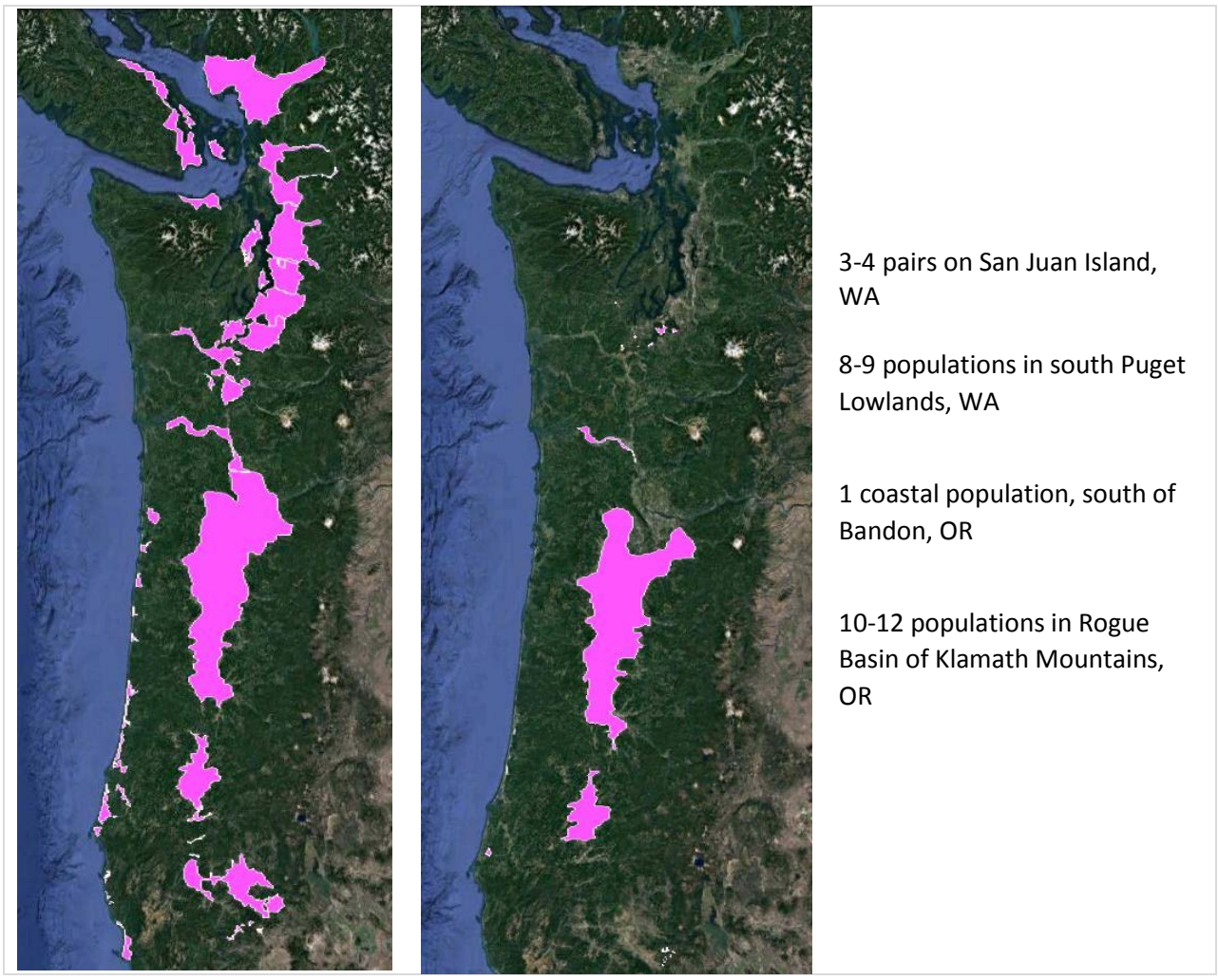

Figure 2: Historical (left) and current (right) breeding range of Coastal Vesper Sparrow. All current known breeding sites are in Washington and Oregon. Text boxes indicate populations in the current range not easily visible due to scale of map. Map reproduced courtesy of Bob Altman, American Bird Conservancy.

Outside of the breeding season, Vesper Sparrow has been recorded on Vancouver Island and the Gulf Islands from Cortes Island south to Victoria including Rocky Point and the Victoria Airport area (Fraser *et al*. 1999; Beauchesne 2002a). The subspecific identity of these birds is unknown.

Extent of Occurrence and Area of Occupancy

In recent years, Coastal Vesper Sparrow is known to have bred at only one site in Canada, the area of which is less than 1 km^2 (about 10 ha). Using the 2 km x 2 km grid method of COSEWIC, its extent of occurrence and area of occupancy are thus reported as 4 km^2, although since 2015 they appear to both be 0 km^2.

Search Effort

Search effort has been high for this subspecies in Canada, at least in recent years. Sites on southeast Vancouver Island deemed suitable based on current knowledge of habitat have been surveyed in recent targeted breeding season searches over 7 years, and its local range was covered by the British Columbia Breeding Bird Atlas (see **Sampling Effort and Methods,** below). As a regional rarity, it is sought by birders and sightings tend to be recorded in eBird and BCVIBird Yahoo Group (which functions as a rare bird alert on Vancouver Island and the Lower Mainland); such local observations are generally credible for this taxon because to be publicly posted in eBird, rare bird sightings must be documented and verified. Nonetheless, the bird's low numbers and relatively secretive nesting behaviour make it challenging to assess its presence and abundance. Christmas tree farms, a "high use" habitat type in Oregon's Willamette Valley (Alman 2017; see **Habitat**, below) were not searched in Vancouver Island surveys. Outside of the breeding season, information is not available on the subspecific status of birds wintering in the range of Coastal Vesper Sparrow, as subspecies are not readily distinguishable. The Breeding Bird Survey (BBS) and Christmas Bird Count (CBC) provide coverage of this taxon in the US portion of its range.

HABITAT

Habitat Requirements

Vesper Sparrow is a grassland species, preferring dry, open areas with short, sparse grass or herbaceous cover (Reed 1986; Campbell *et al.* 2001; Dechant *et al*. 2001). Structural diversity is important; scattered shrubs or trees at the edge of or within grasslands are used for cover and as singing perches while areas with shorter vegetation or bare ground are used for foraging (Davis and Duncan 1999). Fence posts, wire fences and other anthropogenic structures are also used as singing perches (Beauchesne 2002a). In western Washington, Rogers (2000) determined that foraging Vesper Sparrows used sites with a mean cover of 32% bare ground, with the remaining cover being grasses and forbs. In the Willamette Valley, Oregon, most detections (49%) occurred in pastures despite these representing only 9.5% of the cover types sampled. Interestingly, Christmas tree farms (though not highly manicured ones, and primarily in years 2-5 of an 8-year harvest rotation) accounted for 44% of detections but only 5% of land use type sampled in this area (Altman 2017). A complete description of the habitat types occupied by nesting Coastal Vesper Sparrow in Washington, Oregon and California is provided by Altman (2017).

Several studies indicate that Vesper Sparrow avoids permanent pasture and hayfields (Kantrud 1981; Prescott *et al*. 1995; Campbell *et al*. 2001). This finding is consistent with results from inventory work on southeastern Vancouver Island, where breeding territories were adjacent to, but not within, hayfields (Beauchesne 2002b, 2003, 2004); however, "grazed pasture" was described as a habitat type for earlier detections in the range of Coastal Vesper Sparrow (Fraser *et al*. 1999). Vesper Sparrow appears to prefer grassland away from urban edges (Bock *et al*. 1999; Jones and Bock 2002). Size of habitat patch

may also be important (Kershner and Bollinger 1996; Rogers 2000). For example, in Washington, Coastal Vesper Sparrow is currently found in large prairie areas, but not in small patches (i.e., <8 ha) of similar habitat (Washington Department of Fish and Wildlife 2013; Altman 2017). In the Willamette Valley, Oregon, they have been recorded breeding in patches of about 8 ha, though they are also absent from similarly sized patches of suitable habitat there (Altman 2017). On Vancouver Island, the recently extant population occurred in a habitat patch of approximately 10 ha (Beauchesne 2002b), which is considered small compared to more ideal habitat patches in Washington and Oregon (Altman 2017).

On Vancouver Island, the plant community at the recently known breeding site includes both native and non-native flora. Birds were frequently seen using smaller clumps of Scotch Broom (*Cytisus scoparius*) as singing perches and escape cover. They foraged and nested on the ground in the adjacent open areas with gravelly soil and sparse forb and grass cover (Beauchesne 2002b, 2003, 2004).

Habitat Trends

Across the range of Vesper Sparrow, grassland habitats have been altered since the arrival of Europeans. In many areas, Vesper Sparrow habitat has declined in quality and quantity with development (urban and industrial) and modified farm practices such as earlier and more frequent mowing, and larger crop fields with subsequent reduction of hedgerows (Jones and Cornely 2002; Altman 2003).

Before European colonization, habitat for Coastal Vesper Sparrow in British Columbia was likely restricted to xeric, sparsely vegetated areas within coastal grassland and Garry Oak (*Quercus garryana*) ecosystems, especially those recently burned by First Nations peoples. A theoretical map of the habitat types in existence prior to European colonization (1859) in the lower Fraser River valley shows “grassland” habitat along the edges of the Fraser River, Sumas Lake, and on the Fraser River delta (Brierly *et al.* 2002). That grassland was extensive in places, as described by Lt. Charles Wilson, during the 49th Parallel Survey, 1858-1862. "The prairie runs down to the bank of the Chilukweyuk [Chilliwack] from which we are about 2 miles distant, the view from the camp is superb, the prairie in front with its beautiful waving grass and belts of poplar, willow, ash and maple in the foreground” (Chilliwack Museum 2002). Although that particular grassland type was not further specified, it has been thought possible that some of the coastal grassland was short-grass prairie, which could have provided habitat for Vesper Sparrows (Cannings 2015); in the lower Fraser River area in the latter half of the 1800s, “red top prairie” (likely comprised of Tufted Hairgrass *Deschampsia caespitosa*) was reported on Sea and Lulu islands and by the Serpentine and Nicomekl river lowlands (North and Teversham 1984). However, much of the reported grassland habitat further upstream on the Fraser, for example in the Chilliwack and Sumas region, would have been wet meadow prior to being drained to produce cropland, and thus unsuitable for Vesper Sparrows (Fairbarns pers. comm. 2017).

On Vancouver Island, Governor Douglas wrote of “walking across open prairie for 6 miles behind Fort Victoria”, an indication that there were large areas of open grassland in the region. Historical maps of open plant communities in the Victoria region show that grassland and Garry Oak savannahs were extensive (Brierly *et al.* 2002). However, much of the information was compiled from surveys conducted 30 or more years after Governor Douglas banned grassland burning by First Nations, so considerable in-growth by Garry Oak and Douglas-fir (*Pseudotsuga menziesii)* would have already begun (Lutz 1995; Turner 1999). Remnants of the large expanse of open prairie can be found at various localities on southeastern Vancouver Island and its adjacent small islands. Although some parts of these areas appear to be suitable for Vesper Sparrows, these habitat patches are currently very small (<8 ha) or disturbed. For example, despite having remnant habitat, Victoria’s Beacon Hill Park is heavily used and disturbance is likely too great for some ground-nesting birds, like Vesper Sparrows.

European settlers initially may have increased available terrestrial habitat in southwestern British Columbia through clearing of forests and draining of wetlands for agricultural purposes. However, those habitat areas have subsequently declined in size and quality through urbanization and intensification of agriculture. Agricultural land in the region continues to be converted to housing, golf courses, commercial developments, or industrial greenhouses that preclude use by the Vesper Sparrow (Dawe *et al*. 2001). Concurrently, almost all the natural habitat options have also been lost or drastically altered, so that naturally occurring suitable habitat exists only as tiny remnants.

The reduction of naturally occurring terrestrial habitat in these ecosystems over the past 150 years, due to human modifications, has been estimated at 80% (Ward *et al*. 1998). Fuchs (2001) estimated that Garry Oak and associated ecosystems in British Columbia had declined in area by 95%. Over 100 years of fire suppression have led to infilling of grassland and oak meadow habitat and have prevented the creation of new open areas. Most of the Garry Oak savannah and grassland ecosystems on southern Vancouver Island and the Gulf Islands have also been modified for residential or agricultural purposes, with dramatic changes to topsoil and water regimes and subsequent alteration to vegetation structure. In addition, alien species invasion is further altering vegetation structure in the remaining habitat (e.g., ingrowth by Scotch Broom and invasion by exotic tall grasses is replacing the open areas of native short grasses and forbs required by nesting Coastal Vesper Sparrow).

The Nanaimo Airport is one of the few sites in the region providing a relatively large area of suitable habitat (Beauchesne 2002b, 2003). Topsoil removal for runway development has mimicked a natural erosion event, leaving behind a gravel base that has limited plant growth. Elsewhere, it has been noted that airports represent some of the largest remaining open grasslands and, if well managed, may provide critical refuges for many grassland species (Kershner and Bollinger 1996). However, at least one Vesper Sparrow territory at the Nanaimo Airport was lost due to creation of a truck parking lot in 2012, and scarification to remove Scotch Broom thickets in an attempt to control feral rabbits affected additional habitat by also removing the smaller patches of broom used by Vesper Sparrows (Beauchesne 2013; Cooper pers. comm. 2017).

Elsewhere, some (but not all) population declines in Washington and Oregon are linked with habitat loss or changes (Rogers 2000; Altman 2003, 2017). Prairie habitat in western Washington has declined by an estimated 98% since the arrival of European settlers, with prairies being converted to urban areas or unsuitable agricultural habitats, returning to forest because of fire suppression, or being invaded by exotic plants (Crawford and Hall 1997; Smith *et al*. 1997; Rogers 2000). The Willamette Valley in western Oregon still supports a remnant subpopulation of Coastal Vesper Sparrows, but has undergone dramatic habitat changes since the arrival of Europeans (Altman 2003, 2017).

BIOLOGY

Vesper Sparrows are ground-nesting birds of sparsely vegetated grassland habitats. Very little is known about the breeding ecology of Coastal Vesper Sparrow in Canada; therefore most of the following information is inferred from data available for other regions or other subspecies of Vesper Sparrow.

Life Cycle and Reproduction

Vesper Sparrows are seasonally monogamous (Jones and Cornely 2002). Males typically arrive on the breeding grounds first with females following shortly after (Best and Rodenhouse 1984). The female alone builds the nest, on level ground or in a slight depression. Nests are usually placed beside a tuft of vegetation to help conceal the location from potential predators (Jones and Cornely 2002) as well as to help maintain an optimal microclimate in the nest (Nelson and Martin 1999). There is very little life history information available for this subspecies; however, recent (2017) fieldwork in Oregon's Willamette Valley showed high survival of overwintering adults, and of hatch-year juveniles in the first weeks post-fledging (colour-banding of 80 adults and 50 hatch-year birds), but "average to low…nest success and productivity, in particular low hatchability of eggs" (nesting data at 21 nests; Altman pers. comm. 2017).

Physiology and Adaptability

In British Columbia, Coastal Vesper Sparrow inhabits sites that have been modified by humans, but avoids areas with intensive agricultural practices (e.g., hayfields; Beauchesne 2002a). Researchers elsewhere have suggested that Vesper Sparrows prefer to avoid areas with high human population concentrations and associated disturbance (Bock *et al*. 1999).

Dispersal and Migration

Vesper Sparrows are partial migrants. The northernmost breeding Coastal Vesper Sparrows move south to winter, with birds from Vancouver Island thought to winter in California (Cannings 2015). Breeding birds begin to arrive on Vancouver Island in early April and most depart by mid-October (Fraser *et al*. 1999; Campbell *et al*. 2001).

Migration is probably opportunistic, timed with seasonal changes in vegetation. Vesper Sparrows primarily migrate at night and move in small groups (Jones and Cornely 2002).

Banding studies have shown breeding site fidelity in this species (Best and Rodenhouse 1984). A 2017 colour-banding study (80 adults and 50 hatch-year birds at 21 nests) of an Oregon metapopulation showed only two dispersing birds within the metapopulation, to a distance of about 16 km (Altman pers. comm. 2017). Return rates for banded adults (~5 pairs present each year during banding studies, variable annual banding rates) at the Nanaimo airport varied between 29% and 100% over six years (Beauchesne 2013).

Interspecific Interactions

Vesper Sparrow diet consists of insects and the seeds of native and introduced grasses and forbs. During the breeding season, insects, particularly grasshoppers, were found to form the bulk of the diet in southeastern Washington, Montana, and North Dakota (Adams *et al*. 1994; Jones and Cornely 2002).

This ground-dwelling sparrow primarily forages in low vegetation while walking or hopping. It will also hop and hover to glean insects from higher vegetation (Jones and Cornely 2002). On Vancouver Island, Vesper Sparrows were observed gleaning insects from low forbs and eating dandelion (*Taraxacum officinale*) seeds. Adults were observed carrying insects, presumably to feed to nestlings (Beauchesne 2002b, 2014).

POPULATION SIZES AND TRENDS

Sampling Effort and Methods

For an overview, see **Search Effort***,* above. Beauchesne (2002b, 2003) searched for breeding Vesper Sparrows in suitable habitat throughout southeastern Vancouver Island for 30 days in both 2002 and 2003. The same author also surveyed 246 sites throughout southeastern Vancouver Island and the Gulf Islands in 2009 (Beauchesne 2010a), and conducted another regional survey in 2014 (Beauchesne 2014). In addition, Beauchesne (2010b, 2012, 2013) surveyed the Nanaimo airport area for Vesper Sparrows during the nesting season for 16, 11 and 22 days, respectively. Cannings (2014) conducted 57 5-min point counts over four non-consecutive days throughout much of the subspecies' historical Canadian range (24 on Vancouver Island, 18 at Vancouver airport, 8 at Abbotsford airport, 1 at the Chilliwack airport and 6 at the Hope airport). He also conducted area searches at six sites on Vancouver Island (between 30 and 160 minutes at each site; Cannings 2014). Additional *ad hoc* searches were made by birders employed by the Vancouver Airport, who watched for species of interest while carrying out daily wildlife control operations there throughout 2014, but they saw no Vesper Sparrows (Gotz pers. comm. 2014; Levesque pers. comm. 2014). The range of this species was also well-covered by the British Columbia Breeding Bird Atlas effort (2008-2012). As a rare bird in the region, Coastal Vesper Sparrow occurrences are sought and recorded by birders, including those contributing their observations to the eBird database.

In the United States, Altman (2015, 2017) has conducted extensive searches for Vesper Sparrows in coastal Washington, Oregon and California. These included 665 roadside point counts, 41 off-road point counts at 9 sites, 12 off-road transects, 26 off-road area searches, and 150 territories mapped at 13 locations in 3 ecoregions. These efforts have covered at least 7203 ha of habitat. Incidental data collection includes surveys by other researchers for Streaked Horned Lark (2006-2016) on islands in the Columbia River; these surveys also recorded Coastal Vesper Sparrows (reported in Altman 2017).

Abundance

The global population of Vesper Sparrow (all subspecies) is estimated at 28 million birds, including 10 million in Canada (Partners in Flight Science Committee 2013).

In Washington and Oregon, Altman (2011) estimated the Coastal Vesper Sparrow subpopulation to be 1540-2770 birds, most of them in the Rogue and Umpqua valleys of Oregon. A more recent range-wide inventory plus additional incidental sightings recorded during surveys for Streaked Horned Lark (**Sampling Effort,** above) indicates the current US population is similar (1,825-2,575 birds; Altman 2017). However, Altman (2013) reported finding only 185 males on extensive, targeted searches throughout the range of the sparrow in coastal Washington and Oregon, and the range of the subspecies is contracting from both north and south, including the likely recent extirpation of the northern California subpopulation (Altman 2017).

The Nanaimo Airport remains the only known recent breeding locality for this subspecies in Canada (Beauchesne 2013, 2014; Environment and Climate Change Canada 2016). In the late 1990s, local experts estimated that the Canadian population of Coastal Vesper Sparrow was five to ten breeding pairs at this site, with the taxon recorded there since at least 1990 (Fraser *et al*. 1999; Campbell *et al*. 2001). Survey efforts at the Nanaimo Airport over the next few years (Table 1) confirmed that this population was fairly stable, albeit at a low level, until about 2011 (Beauchesne 2013), after which it dropped to an observed low of a single territorial male in 2014 (Cannings 2014) and a pair seen carrying food that same year (Beauchesne 2014; Environment and Climate Change Canada 2016). Breeding birds have not subsequently been observed at this site, and although it is not presently monitored by the researchers who studied this subspecies for over a decade, it is periodically visited by experienced local birders (Cooper pers. comm. 2017; eBird 2018). Searches conducted in potential breeding habitat in the region — between Mill Bay and Nanaimo (Vancouver Island) and on Gabriola and Saltspring islands in May and June, 2002 (Beauchesne 2002b); between Cassidy and Campbell River and adjacent Gulf Islands from April to June, 2003 (Beauchesne 2003); and throughout southeastern Vancouver Island and the Lower Mainland in 2014 (Beauchesne 2014; Cannings 2014) — failed to detect additional breeding localities, nor have any breeding Vesper Sparrows been found recently by the many keen birdwatchers who are quick to report any sighting of this rare species (eBird 2015, 2017); thus, the current Canadian population of Coastal Vesper Sparrow is likely near zero.

Nonetheless, it is possible that breeding birds still occur in Canada, at least in some years. The British Columbia Breeding Bird Atlas recorded one observation of “possible” breeding (Code H, “species observed in its breeding season in suitable nesting habitat”) in a square between Chemainus and Crofton (square 10DV41; Davidson *et al*. 2015), 20 or more kilometres from the Nanaimo Airport site. Elsewhere in the vicinity of the historical Canadian breeding range of Coastal Vesper Sparrow, there have been about 15 eBird reports of single birds during the nesting season over the past decade (April through July; 2007 - 2017; multiple observer accounts at a given location considered as one observation). Several of these were by experienced birders. Moreover, six observations were photo-documented and include one in the Victoria area and a series of reports from 15 April to 6 May 2017 at Iona Island, one of the historical nesting sites for Coastal Vesper Sparrow (eBird 2017). In April 2014 another bird was photographed at Iona Island, and in April 2016 one was photographed at nearby Point Roberts in the US (eBird 2017). However, no observations of breeding behaviour were reported with any of these records. Two birds were also photographed at Cowichan Bay on 28 August 2016 (eBird 2017).

Table 1. Vesper Sparrow population surveys at the Nanaimo airport since 2002 (as reported in Beauchesne 2013, 2014; Cannings 2014; Environment and Climate Change Canada 2016; Altman 2017). No birds have been observed at this site since 2014.

Year	Birds observed	Productivity
2002	6 males	3 broods
2003	6 males	5 broods
2004	8 or 9 males	6 broods
2005	7 to 10 pairs	At least 4 broods
2006	7 pairs	All 7 pairs successful
2007	6 males	1 late brood
2008	6 to 8 males, 4 females	3 broods
2009	9 or 10 pairs	At least 7 broods
2010	7 pairs, 1 floater male	8 broods from 6 pairs (2 pairs double clutched)
2011	6 males, only 1 female	1 brood; no evidence of others
2012	3 males	No broods
2013	1 male	No broods
2014	2 males, 1 female	No broods observed; one inferred from presence of pair of adults carrying food

Fluctuations and Trends

For Coastal Vesper Sparrow as a whole (i.e., including its United States range), BBS data from the Northern Pacific Rainforest region are applicable, where the long-term trend (1966-2012) is -5.37% per year (Table 2; Sauer *et al*. 2014). For Coastal Vesper Sparrow in the US, there are statistically significant range-wide declines of -3.67% per year over the latest 10-year period (2003-2013). Long-term (1968-2013) annual trends for Washington and Oregon are -4.07% and -17.25%, respectively (Sauer *et al*. 2014).

Table 2. Population trends (average annual percent change) from Breeding Bird Survey data for the Vesper Sparrow; note that data for British Columbia include *P. g. affinis* but are dominated by records of *P. g. confinis* from the interior of the province. The interval given after the trend estimate indicates that there is a 95% probability that the average annual trend lies between those figures. N refers to the number of survey routes that contributed to the trend calculation. Canada data from Environment and Climate Change Canada (2017); US data from Sauer *et al.* (2014).

Long-term Trends	Time Period	Annual Trend	N
British Columbia	1970-2012	-1.91 (-3.98 to -0.123)	56
Northern Pacific Rainforest (US)	1968-2012	-5.37 (-9.63 to -2.52)	23
Short-term trends	**Time Period**	**Annual Trend**	**N**
British Columbia	2002-2012	-0.236 (-3.68 to 4.54)	51
Northern Pacific Rainforest (US)	2002-2012	-4.66 (-11.89 to 2.18)	23

Coastal Vesper Sparrow is considered a casual (Cannings 1998) or occasional local breeder in British Columbia (Campbell *et al*. 2001). The species has never been recorded on BBSs or CBCs on the coast (Campbell *et al*. 2001), though BBS routes are not designed to look for rare birds and the species is only very rarely present in Canada in winter, with subspecific status of coastally wintering birds unknown.

This subspecies may never have been common in British Columbia. Field reports have been inadequate to estimate a historical population size, but the maximum count of birds at one location during the breeding season is 13 birds in the Cobble Meadows/Cobble Hill region on Vancouver Island in 1978 (Campbell *et al*. 2001). Because formal surveys of Vesper Sparrow populations were not conducted historically, trends are difficult to determine. However, as the species has disappeared from some historical breeding locations (e.g., Cobble Meadows, Iona Island and the Fraser River valley), the population has clearly declined in number and extent (Fraser *et al*. 1999).

In Oregon, a study at 544 point count stations throughout the Willamette Valley reported a 79% decline in Coastal Vesper Sparrow detections between surveys conducted in 1996 and repeated in 2008 (Myers and Kreager 2010). A survey for Streaked Horned Lark on islands in the Columbia River detected Vesper Sparrows on seven islands (2006-2010) but subsequent surveys (2010-2016) provided only a single detection on one island (Altman 2017).

Rescue Effect

Because of very small and declining populations in adjacent Washington State, and declining habitat availability there and in British Columbia, rescue of the Canadian population from adjacent populations seems unlikely. However, the birds occasionally observed in British Columbia during the nesting season (see **Abundance** section, above; eBird 2017) are presumably derived from the US population.

THREATS AND LIMITING FACTORS

It is assumed that, prior to European settlement, suitable sites within sparsely vegetated Garry Oak and associated ecosystems would have been the key habitat used by this species. Clearing of land for farming and other human uses may have increased the amount of suitable habitat along the coast in the early 20th century. During the last few decades, significant amounts of farmland and other open areas, including Garry Oak ecosystems, have been converted to industrial, commercial and residential developments, or more intensive forms of agriculture (Campbell *et al*. 2001). Continued loss of suitably sized patches of undisturbed breeding habitat is the primary threat for Coastal Vesper Sparrow range-wide, although not all population declines are linked to habitat changes. Altman (2017) documented 10 subpopulations (sites) throughout the taxon's range that have likely been extirpated, or nearly so, as a result of habitat degradation. However, a further five sites no longer support viable populations of Coastal Vesper Sparrow despite experiencing no discernible habitat alteration (Altman 2017). The major cause of habitat loss for this species at present is intensification of agricultural practices and urbanization, and, at the Nanaimo Airport, runway expansion and airport management practices.

A formal threats assessment was not done, given the lack of evidence for a current population in Canada, but the threats below reflect factors that have likely contributed to the disappearance of the population. They follow the IUCN-CMP (International Union for the Conservation of Nature – Conservation Measures Partnership) unified threats classification system (based on Salafsky *et al*. 2008), and are listed in order of severity (greatest to least).

<u>Category 1: Residential and commercial development</u>

Urbanization permanently removes parts of the land base in the footprint required for buildings, roads and other infrastructure. Most of the remaining area (e.g., backyards or city gardens) is also dramatically altered such that it has little to no value as habitat for ground-

nesters such as Vesper Sparrows (Jones and Bock 2002). At the Nanaimo Airport and vicinity, habitat recently used by Coastal Vesper Sparrow is vulnerable to potential future activities, such as airport expansion (new or longer runways), construction of new airport infrastructure (airport buildings, aircraft hangars, parking areas for vehicles and equipment), and expansion of ancillary commercial operations (expanded recreational vehicle sales or other new businesses; Environment and Climate Change Canada 2016). At least one Vesper Sparrow territory at the Nanaimo Airport was lost due to the construction of a truck parking lot in 2012, and other land management practices at this site (e.g., scarification to remove Scotch Broom in order to displace introduced rabbits, removal of other vegetation used as singing perches) degraded or destroyed habitat used by nesting birds (Beauchesne 2013; Cooper pers. comm. 2017). Given the high land values on southeast Vancouver Island and the Lower Fraser Valley, urban development undoubtedly threatens any of the remaining patches of Coastal Vesper Sparrow habitat.

Category 2: Agriculture and aquaculture

Agricultural practices that involve mechanical procedures (e.g., tilling, mowing) during the nesting season can destroy nests of Vesper Sparrows. Modern crop 'improvements' of more rapid growth with earlier and more frequent harvest exacerbates the risk to ground-nesting birds. When greater industrialization of agriculture involves the expansion of field size, the subsequent 'clean farming' practices of removal of shrubby fencerows eliminates important structural features, reducing the quality of habitat for nesting birds (Rodenhouse *et al*. 1993; Sauer *et al*. 2014). Intensive grazing, where animals are concentrated in small enclosures, reduces habitat quality as a result of increased nest trampling risk (Bock *et al*. 1993).

Category 6: Human intrusions and disturbance

Although some habitat within or adjacent to urban areas may appear suitable, Vesper Sparrows tend to occur in lower density in these areas than further away from the urban edges. This indicates that there are factors such as increased disturbance or increased predation that reduce habitat quality (Bock *et al*. 1999). On southeastern Vancouver Island, regional parks with potential habitat are often heavily frequented by visitors, which may be detrimental to this species. At the Nanaimo airport, Vesper Sparrows established territories and oriented their foraging in habitats away from buildings and human activity (Environment and Climate Change Canada 2016).

Category 8: Invasive and other problematic species and genes

Widespread ingrowth of savannah and grassland habitats by native and non-native trees, shrubs, and grasses (e.g., Douglas-fir, Scotch Broom) is a primary threat to Coastal Vesper Sparrows, as it eliminates the open complex of vegetation and bare soil required by nesting birds (Environment and Climate Change Canada 2016; Altman 2017). Within urban and rural areas, the high concentration of domestic and feral cats also poses a threat to this species (George 1974; Cooper 1993; Coleman and Temple 1993); domestic or feral cats have been observed at the Nanaimo Airport (Environment and Climate Change Canada

2016; Blight, pers. comm. 2017). Habitat changes in this region have also led to encroachment by Brown-headed Cowbirds (*Molothrus ater*), which heavily parasitize other sparrow species in rural-urban areas (parasitism rates of 30% or higher for Song Sparrows (*Melospiza melodia)*; Arcese pers. comm. 2015), though Campbell *et al*. (2001) showed that nest parasitism rates were low for Vesper Sparrows.

Category 7: Natural system modifications

Historical burning by First Nations and European farmers likely maintained some of the open microhabitat used by Coastal Vesper Sparrows. Suppression of this burning has contributed to infilling of coastal grasslands and savannah with native and non-native trees, shrubs and grasses (Lutz 1995; Turner 1999), perhaps resulting in the loss of otherwise suitable habitat patches currently distant from urban areas on Vancouver Island. Given the recent downward trend in breeding numbers at the Nanaimo Airport, it is clear that a larger local population spread over a number of sites would provide more stability to the Vesper Sparrow population on Vancouver Island. There are grassland patches of suitable size within 20 km of Nanaimo Airport, but none are adjacent to the airport, and many are not managed in a manner that creates habitat for Vesper sparrows (Beauchesne 2003, 2004, 2010a; Hill 2009).

Limiting Factors

Given the historically low numbers of Coastal Vesper Sparrow range-wide, this taxon is vulnerable to several factors affecting small and isolated populations. These include stochastic events, limited recruitment and dispersal, and low genetic variability or inbreeding depression. Evidence for these factors likely affecting Coastal Vesper Sparrow include ongoing local extinctions, and recent data showing low egg hatchability (i.e., potential infertility due to inbreeding) in Oregon (Altman 2017; pers. comm. 2017).

Number of Locations

There is only one extant or recent breeding location known for Coastal Vesper Sparrow in Canada: the Nanaimo Airport, where only one breeding pair (in 2014) has been detected since 2012.

PROTECTION, STATUS AND RANKS

Legal Protection and Status

Coastal Vesper Sparrow is protected by the federal *Migratory Birds Convention Act* of 1994, which makes it illegal to possess migratory birds or their nests. It is also protected under the British Columbia *Wildlife Act*, which prohibits shooting, trapping, poisoning or any other measure of killing of wildlife, or the disturbance or destruction of eggs or active nests. It is listed as Endangered under the federal *Species at Risk Act*.

In December 2016, the American Bird Conservancy petitioned the US Fish & Wildlife Service to list Coastal Vesper Sparrow as a Threatened or Endangered species under the US *Endangered Species Act* (American Bird Conservancy 2016); it is currently listed as a Species of Concern (NatureServe 2017).

Non-Legal Status and Ranks

Coastal Vesper Sparrow is ranked as G5T3? globally (i.e., the species as a whole is secure, but the subspecies is likely vulnerable but may range from imperilled to apparently secure), S1B (critically imperilled breeder) in both British Columbia and Washington; S2B, S2N (imperilled as a breeder and non-breeder) in Oregon; and S3? (likely vulnerable) in California (NatureServe 2017), although recent data indicating that the California population has been extirpated suggests that this status should be revised to SX, and that the global rank may warrant adjusting to G5T2.

Coastal Vesper Sparrow is on the British Columbia Red List, as a candidate for designation as a threatened or endangered species (BC Ministry of Environment 2015). It is a candidate species for listing in Washington (Washington Department of Fish and Wildlife 2012) and a “critical sensitive” species in Oregon (Oregon Biodiversity Information Center 2013).

Habitat Protection and Ownership

The only recently known breeding site for Coastal Vesper Sparrow in Canada is on the grounds of the Nanaimo Airport, which is independently owned and managed by the Nanaimo Airport Commission. The primary consideration for vegetation management at the site is stated to be compliance with Federal Aviation Authority regulations (Environment and Climate Change Canada 2016).

Recognizing the importance of the Nanaimo Airport to the survival of the Coastal Vesper Sparrow in Canada, the Vertebrates Recovery Implementation Group (RIG) of the Garry Oak Ecosystems Recovery Team (GOERT) adopted a formal Stewardship Agreement with the Nanaimo Airport (Beauchesne 2002c). The agreement, covering issues such as the timing of mowing, timing and location of pesticide applications, control of invasive species and other vegetation management issues, was replaced in 2010 by a Management Plan (Radcliffe 2010).

In 2016, the federal Recovery Strategy identified Critical Habitat for Coastal Vesper Sparrow at the Nanaimo Airport site, as this is the only recently known nesting site for this taxon in Canada. Critical Habitat here is characterized by the open areas with short, sparse grass or herbaceous cover and intermittent bare ground that are needed for nesting and foraging (Environment and Climate Change Canada 2016), and is protected under SARA.

Other historical breeding sites on Vancouver Island are on private agricultural land, management of which is typically at the discretion of the individual landowner. It is possible that there is also some suitable habitat within regional parks and other protected areas, but

the amount available has not been assessed. Given the development pressures on southeastern Vancouver Island and the Lower Mainland, it is unlikely that additional habitat will be created in the future (Dawe *et al*. 2001). Therefore, stewardship of existing habitat is very important.

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BIOGRAPHICAL SUMMARY OF REPORT WRITERS

Richard Cannings was born and raised in the Okanagan Valley in a family keenly interested in natural history. This early involvement in birds, bugs and plants led him to a university education in zoology, including a BSc degree from the University of British Columbia and an MSc from Memorial University of Newfoundland. He worked for 15 years as the Curator of the Cowan Vertebrate Museum in the Department of Zoology at the University of British Columbia. He left UBC in 1995 to return to his Okanagan roots, working half-time for Bird Studies Canada, coordinating Canadian Christmas Bird Counts, the eBird program, the Great Backyard Bird Count and the British Columbia-Yukon Owl Survey. He also undertook consulting work primarily centred on endangered species, particular those in southern British Columbia. He was co-chair of the Birds Specialist Subcommitee (SSC) on the Committee on the Status of Endangered Wildlife in Canada for eight years and has served on both the BC Environmental Appeal Board and the BC Forest Appeals Commission. He has written a number of books, including *Birds of the BC Interior and Rockies*, *Birds of Southwestern British Columbia, The Rockies: a Natural History*, and *An Enchantment of Birds*; *The Birds of the Okanagan Valley* and *British Columbia* with brothers Sydney and Robert Cannings; *British Columbia: A Natural History* and *The New BC Roadside Naturalist* with Sydney Cannings; and *Birdfinding in British Columbia* with Russell Cannings. Since 2015, he has been the elected member of Parliament for Okanagan-Similkameen.

Louise Blight is a conservation biologist who has been working on seabirds, marine and island ecosystems, and species at risk for over 20 years. Her MSc, PhD, and consulting work have included primary research on BC seabirds, at-sea surveys in the Pacific Ocean, and field studies of penguins, larids, and procellariiforms in the Antarctic and Southern Ocean. She has also worked extensively on at-risk taxa in BC's Garry oak ecosystems, including working for several years on conservation strategies for birds in these coastal savannah systems. Her travels have also led to extended forays into coastal and marine habitats in Latin America and Australia. One of her research interests is the use of historical data and information sources in conservation science and planning, which led to her co-editing the multi-author book *Marine Historical Ecology in Conservation: Using the Past to Manage for the Future* (UC Press). She is currently a member of the COSEWIC Birds SSC, and a daily contributor to eBird.

COLLECTIONS EXAMINED

None examined.