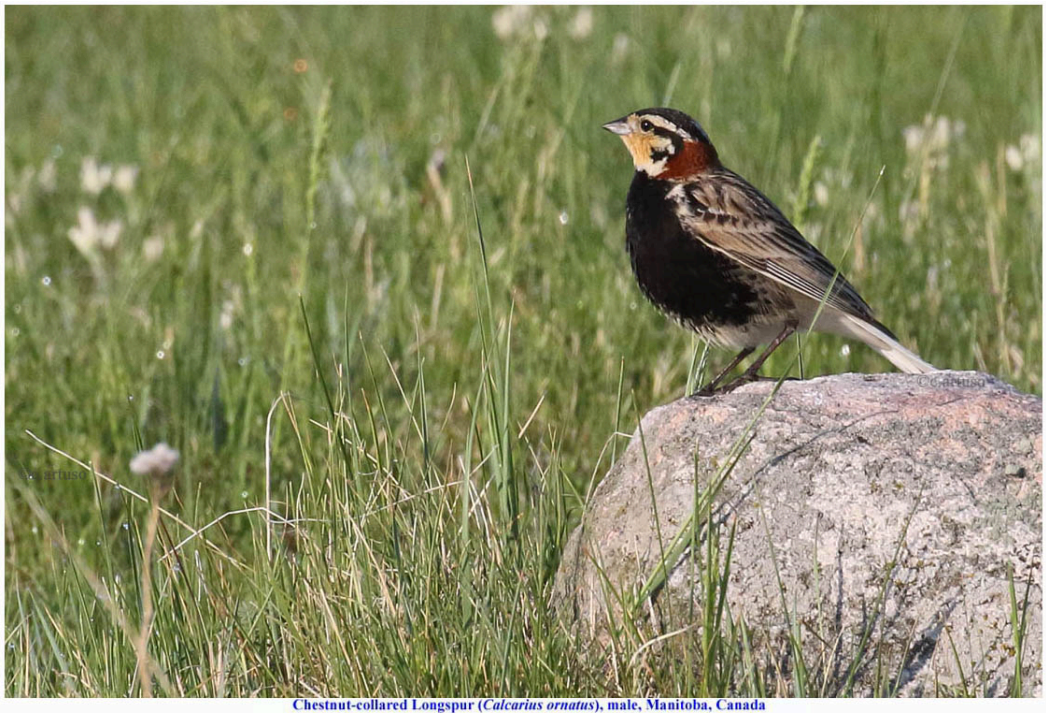
# COSEWIC
# Assessment and Status Report

on the

# Chestnut-collared Longspur
*Calcarius ornatus*

**in Canada**



Chestnut-collared Longspur (*Calcarius ornatus*), male, Manitoba, Canada

**ENDANGERED**
**2019**

**COSEWIC**
Committee on the Status
of Endangered Wildlife
in Canada

**COSEPAC**
Comité sur la situation
des espèces en péril
au Canada

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

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Previous report(s):

COSEWIC. 2009. COSEWIC assessment and status report on the Chestnut-collared Longspur *Calcarius ornatus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 36 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Production note:
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For additional copies contact:

COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment and Climate Change Canada
Ottawa, ON
K1A 0H3

Tel.: 819-938-4125
Fax: 819-938-3984
E-mail: ec.cosepac-cosewic.ec@canada.ca
www.cosewic.ca

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Chestnut-collared Longspur — Photo provided by author.


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# COSEWIC
# Assessment Summary

**Assessment Summary – November 2019**

**Common name**
Chestnut-collared Longspur

**Scientific name**
*Calcarius ornatus*

**Status**
Endangered

**Reason for designation**
This striking grassland songbird is only found on North America's Great Plains. It has experienced a population decline of more than 50% over the past decade, and about 95% since 1970. The Canadian breeding range has contracted to the south and west since the 1970s. The primary threat is degradation and fragmentation of native grasslands, especially through conversion to agriculture. Ongoing loss of habitat in the core wintering region of northern Mexico is currently believed to be of greatest concern, but declines in habitat extent and quality are also an issue in Canada, where grassland parcels of at least 40 hectares are generally required for breeding.

**Occurrence**
Alberta, Saskatchewan, Manitoba

**Status history**
Designated Threatened in November 2009. Status re-examined and designated Endangered in November 2019.

# COSEWIC
# Executive Summary

## Chestnut-collared Longspur
*Calcarius ornatus*

### Wildlife Species Description and Significance

Chestnut-collared Longspur is a medium-sized songbird. It is one of two longspurs (family Calcariidae) that nest in grassland. Breeding males are boldly marked, with a black breast, belly, crown, and eye-line contrasting with a buffy-yellow throat, whitish supercilium, and chestnut patch on the nape; in winter the pattern is heavily muted and more similar to the year-round overall buffy, streaked appearance of females. In all plumages, Chestnut-collared Longspur has an inverted dark triangle at the tip of its tail which distinguishes it from all other longspurs. Chestnut-collared Longspur is one of six passerine species endemic to the Great Plains of North America; five of them occur in Canada, and all have been assessed as at risk.

### Distribution

Chestnut-collared Longspur breeds in the short- and mixed-grass prairie of the northern Great Plains of Canada and the United States. It overwinters in the short-grass and desert grassland of the southern United States and northern Mexico.

### Habitat

Chestnut-collared Longspur is a grassland specialist, preferring short (<30 cm) vegetation structure, low levels of litter accumulation, and minimal cover from woody vegetation. It is area-sensitive, requiring a minimum patch size of 39 ha for breeding. Chestnut-collared Longspur does not commonly occur in cropland during the breeding season. Preferred wintering habitat includes areas with dense grass cover or tall grass, but Chestnut-collared Longspur avoids areas with tall shrubs (>1.2 m) or forbs (>30 cm), or where shrub cover exceeds 10%. The amount of native grassland on both the breeding and wintering grounds has declined due to ongoing conversion of the habitat to annual cropland.

### Biology

Chestnut-collared Longspur is socially monogamous. Males establish breeding territories, which are often clumped together. Females excavate and build a nest on the ground and lay 3-5 eggs which are then incubated for 11-13 days. The chicks fledge after 11 days (range 7-15 days). Pairs will attempt multiple clutches in one season, with a new

nest built for each clutch. Generation time is likely two to three years. Predation is the primary cause of egg and nestling mortality.

## Population Sizes and Trends

The Chestnut-collared Longspur population in Canada is estimated at 680,000 mature individuals (range 360,000 to 1.2 million). Analysis of Breeding Bird Survey trends indicate that the Canadian Chestnut-collared Longspur population declined by an average of -6.6% per year (95% CL -8.0% to -5.3%; n = 99 routes) between 1970 and 2017, amounting to a cumulative change of -96% (95% CL -98% to -92%). This is similar to the sustained long-term decline of -92% (95% CI -94% to -89%) across the Great Plains between 1967 and 2014 (Wilson *et al.* 2018). The short-term trend (2007-2017) in Canada is similarly steep, at an average of -7.3% per year (95% CL -10.5% to -4.6%; n = 84 routes), and a cumulative total of -53% (95% CL -67% to -37%; Smith *et al.* 2019).

## Threats and Limiting Factors

Threats to Chestnut-collared Longspur include habitat loss and fragmentation as a result of conversion of grassland for annual crops, energy production and mining, transportation and service corridors, natural system modifications, invasive species, agricultural effluents, fire suppression, and extreme weather events. The greatest threat currently is likely the conversion of native grasslands to annual agriculture in the Chihuahuan Desert grasslands of northern Mexico, a particularly important wintering area for Chestnut-collared Longspur.

A key limiting factor for Chestnut-collared Longspur is that it is an area-sensitive, grassland specialist, which means that the persistence of the species is dependent on large remaining tracts of native grassland habitat. The most limiting stage of the life cycle to population growth of Chestnut-collared Longspur is first-year survival, followed by first-year reproduction, particularly by yearling females.

## Protection, Status and Ranks

COSEWIC designated Chestnut-collared Longspur as Threatened in November 2009. Its COSEWIC status was re-examined and designated Endangered in November 2019. The species is listed as Threatened on Schedule 1 of the *Species at Risk Act* and is protected under the *Migratory Birds Convention Act, 1994*. Provincially, the species is only protected in Manitoba where it is listed as Endangered under *The Endangered Species and Ecosystems Act.* NatureServe lists Chestnut-collared Longspur as ‘Secure’ globally (G5) and in the US (N5B, N5N), but ‘Vulnerable’ (N3B, N3M) in Canada. In Canada, the species is ranked as ‘Vulnerable to Apparently Secure’ (S3S4B) in Alberta, ‘Vulnerable’ (S3B) in Saskatchewan, and ‘Imperiled to Critically Imperiled’ (S1S2B) in Manitoba. Chestnut-collared Longspur is listed as Vulnerable by the IUCN and is a “D” Yellow Watch List species with Partners in Flight.

# TECHNICAL SUMMARY

*Calcarius ornatus*

Chestnut-collared Longspur

Plectrophane à ventre noir

Range of occurrence in Canada: Alberta, Saskatchewan, Manitoba

**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) | 2-3 years, based on mark-recapture studies in Canadian prairies |
| Is there an [observed, inferred, or projected] continuing decline in number of mature individuals? | Yes, observed |
| Estimated percent of continuing decline in total number of mature individuals within [5 years or 2 generations] | Estimated 31% decline over 5 years, interpolated from the average annual rate of decline from 2007-2017, based on Canadian Breeding Bird Survey data |
| [Observed, estimated, inferred, or suspected] percent [reduction or increase] in total number of mature individuals over the last [10 years, or 3 generations]. | Estimated 53% decline over the 10-year period of 2007-2017, based on Canadian Breeding Bird Survey data |
| [Projected or suspected] percent [reduction or increase] in total number of mature individuals over the next [10 years, or 3 generations]. | Unknown, but projected to continue declining based on high to very high overall threat impact |
| [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. | Unknown, but likely to exceed 50% decline based on recent trends and high to very high overall threat impact |
| Are the causes of the decline a. clearly reversible and b. understood and c. ceased? | a. No<br>b. Yes, generally<br>c. No |
| Are there extreme fluctuations in number of mature individuals? | No |

**Extent and Occupancy Information**

| | |
|---|---|
| Estimated extent of occurrence (EOO) | 365,621 km² |
| Index of area of occupancy (IAO)<br>(Always report 2x2 grid value). | > 2,000 km² |
| Is the population “severely fragmented” i.e., is >50% of its total area of occupancy 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. No<br>b. No |

| | |
|---|---|
| Number of “locations” (use plausible range to reflect uncertainty if appropriate) | Unknown, but > 10 |
| Is there an [observed, inferred, or projected] decline in extent of occurrence? | Yes, observed southward and westward contraction of range |
| Is there an [observed, inferred, or projected] decline in index of area of occupancy? | Yes, inferred decline based on habitat loss and southward constriction of range |
| Is there an [observed, inferred, or projected] decline in number of subpopulations? | N/A – no subpopulations identified for this species |
| Is there an [observed, inferred, or projected] decline in number of “locations”? | Yes, inferred based on reduction of extent of occurrence |
| Is there an [observed, inferred, or projected] decline in [area, extent and/or quality] of habitat? | Yes, observed decline in extent and quality of native grassland on both breeding and wintering grounds |
| Are there extreme fluctuations in number of subpopulations? | Not applicable. |
| 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 | Approximately 680,000 (360,000 – 1.2 million) |

**Quantitative Analysis**

| | |
|---|---|
| Is the probability of extinction in the wild at least [20% within 20 years or 5 generations, or 10% within 100 years]? | Unknown; analysis not conducted |

**Threats (direct, from highest impact to least, as per IUCN Threats Calculator)**

Was a threats calculator completed for this species? Yes; overall threat impact of high to very high, with key threats identified as:

i. Agriculture and aquaculture (2.1 – annual and perennial non-timber crops) – High threat impact
ii. Natural system modifications (7.1 – fire and fire suppression; 7.3 - other ecosystem modifications) – Medium-low threat impact
iii. Pollution (9.3 – agricultural and forestry effluents; 9.6 – excess energy) – Medium-low threat impact
iv. Energy production and mining (3.1 – oil & gas drilling; 3.2 – mining and quarrying; 3.3 – renewable energy) – Low threat impact
v. Transportation and service corridors (4.1 – roads and railroads; 4.2 – utility and service lines) – Low threat impact
vi. Invasive and other problematic species and genes (8.1 – Invasive non-native / alien species / diseases) – Low threat impact
vii. Climate change and severe weather (11.4 – storms and flooding) – Low threat impact

What additional limiting factors are relevant?
Chestnut-collared Longspur is an area-sensitive, grassland specialist and first year survival is the most limiting stage of the species' life cycle to population growth.

**Rescue Effect (immigration from outside Canada)**

| | |
|---|---|
| Status of outside population(s) most likely to provide immigrants to Canada. | Annual trend of -2.3% in the United States (2005-2015), including -1.9% in Montana and -3.4% in North Dakota |
| Is immigration known or possible? | Yes |
| Would immigrants be adapted to survive in Canada? | Yes |
| Is there sufficient habitat for immigrants in Canada? | Yes, but declining and may be of reduced quality |
| Are conditions deteriorating in Canada?[+] | Yes, habitat being lost, degraded or fragmented in parts of Canadian range |
| Are conditions for the source (i.e., outside) population deteriorating?[+] | Yes, habitat is being lost and fragmented in parts of U.S. range |
| Is the Canadian population considered to be a sink?[+] | No |
| Is rescue from outside populations likely? | Possible, but limited by declines in U.S. portion of breeding range |

**Data Sensitive Species**

| | |
|---|---|
| Is this a data sensitive species? | No |

**Status History**

Designated Threatened in November 2009. Status re-examined and designated Endangered in November 2019.

[+] See Table 3 ( Guidelines for modifying status assessment based on rescue effect)

**Status and Reasons for Designation:**

| **Status:** | **Alpha-numeric codes:** |
|---|---|
| Endangered | A2bc+4bc |

**Reasons for designation:**
This striking grassland songbird is only found on North America's Great Plains. It has experienced a population decline of more than 50% over the past decade, and about 95% since 1970. The Canadian breeding range has contracted to the south and west since the 1970s. The primary threat is degradation and fragmentation of native grasslands, especially through conversion to agriculture. Ongoing loss of habitat in the core wintering region of northern Mexico is currently believed to be of greatest concern, but declines in habitat extent and quality are also an issue in Canada, where grassland parcels of at least 40 hectares are generally required for breeding.

**Applicability of Criteria**

| |
|---|
| Criterion A (Decline in Total Number of Mature Individuals):<br>Meets Endangered, A2bc+4bc. Observed 53% decline in number of mature individuals over the past ten years, based on Canadian Breeding Bird Survey data. Projected ongoing decline of >50% over ten years spanning past and future, based on past trends and further declines anticipated from a high to very high overall threat impact, influenced primarily by substantial ongoing habitat loss. |
| Criterion B (Small Distribution Range and Decline or Fluctuation):<br>Not applicable. EOO of 365,621 $km^2$ and IAO of >2000 $km^2$ exceed thresholds. |
| Criterion C (Small and Declining Number of Mature Individuals):<br>Not applicable. Number of mature individuals greatly exceeds thresholds. |
| Criterion D (Very Small or Restricted Population):<br>Not applicable. Population estimate greatly exceeds thresholds for D1, and population is not highly restricted. |
| Criterion E (Quantitative Analysis):<br>Not applicable. Analysis not conducted. |

## PREFACE

Chestnut-collared Longspur was assessed by COSEWIC as Threatened in November 2009. Since then, the taxonomy of Chestnut-collared Longspur has been revised, with the species moving to the family Calcariidae. New data related to Chestnut-collared Longspur occurrence and abundance have become available through projects such as the Manitoba and Saskatchewan Breeding Bird Atlases, continued monitoring of North American Breeding Bird Survey routes and Christmas Bird Count circles, and increased research into the effects of anthropogenic activity (particularly energy development) on the species (e.g., Kalyn Board and Davis 2014; Shaffer and Buhl 2015; Thompson *et al.* 2015; Bernath-Plaisted and Koper 2016; Davis *et al.* 2016; Rodgers and Koper 2017; Yoo and Koper 2017; Ng *et al.* 2019). A recovery strategy has been developed for Chestnut-collared Longspur (Environment and Climate Change Canada 2018) and was updated in February 2018 to identify the National Wildlife Area in which critical habitat of the species is found (Prairie National Wildlife Area Unit No. 11). In 2017, the status of the species was uplisted to Vulnerable on the IUCN Red List of Threatened Species.

## 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 (2019)

| | |
|---|---|
| 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
Environnement et Changement climatique Canada
Service canadien de la faune
Canada

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

# COSEWIC Status Report

on the

# Chestnut-collared Longspur

*Calcarius ornatus*

**in Canada**

2019

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# WILDLIFE SPECIES DESCRIPTION AND SIGNIFICANCE

## Name and Classification

Scientific name: *Calcarius ornatus*
English name: Chestnut-collared Longspur
French name: Plectrophane à ventre noir
Classification: Class Aves, Order Passeriformes, Family Calcariidae

Chestnut-collared Longspur is one of three species in the genus *Calcarius* (Chesser *et al.* 2018); the other two are Lapland (*C. lapponicus*) and Smith's (*C. pictus*) longspurs. Both Lapland and Smith's Longspurs breed in the Arctic, whereas Chestnut-collared Longspur breeds at more southern latitudes. In 2010, Chestnut-collared Longspur was one of six species moved from the family Emberizidae to the newly created family Calcariidae (Chesser *et al*. 2018).

## Morphological Description

Chestnut-collared Longspur is a medium-sized songbird (length: 13-16.5 cm, mass: 17-23 g; Bleho *et al.* 2015). In the breeding season, males can be distinguished from females by their black breast, belly, crown, and eye-line, chestnut patch on the nape, and buffy yellow throat. Females and males in basic plumage are largely grayish to buff-coloured overall with dusky streaks. Both sexes have white outer tail feathers and dark inner tail feathers that form a triangle, which distinguishes them from other longspur species in all plumages.

## Population Spatial Structure and Variability

No geographic variation or subspecies have been described for Chestnut-collared Longspur (Bleho *et al*. 2015). No information is available on the population structure of Chestnut-collared Longspur in Canada.

## Designatable Units

No discrete or evolutionarily significant populations have been identified for Chestnut-collared Longspur, and it is therefore assessed as a single designatable unit.

## Special Significance

Chestnut-collared Longspur is one of six passerine birds endemic to the grasslands of the North American Great Plains (Knopf 1994). Four of the other five species also occur in Canada: Sprague's Pipit (*Anthus spragueii*), Baird's Sparrow (*Ammodramus bairdii*), Lark Bunting (*Calamospiza melanocorys*), and McCown's Longspur (*Rhynchophanes mccownii)*, all of which are assessed as at risk in Canada. The sixth species is Cassin's Sparrow (*Peicaea cassinii*), which occurs in the southern Great Plains and is currently not of conservation concern. No Aboriginal Traditional Knowledge is currently available for Chestnut-collared Longspur.

# DISTRIBUTION

## Global Range

Chestnut-collared Longspur is endemic to the short- and mixed-grass prairie regions of the northern Great Plains in Canada and the United States (Bleho *et al*. 2015). In the United States, the breeding range includes eastern Montana, North Dakota, and northern South Dakota. Relict breeding populations exist in southeastern Wyoming, northeastern Colorado, northwestern Nebraska, and western Minnesota (Figure 1). Range contractions have occurred within the eastern and northern portions of the species' Canadian range, as well as within the United States range (e.g., Minnesota, western Kansas). Specifically, the distribution centroid of Chestnut-collared Longspur shifted south by 117 km and east by 30 km between 1967 and 2014 (Wilson *et al.* 2018).

Chestnut-collared Longspur winters from central Kansas and west-central Oklahoma to southeastern Arizona and northern Mexico (Figure 1).

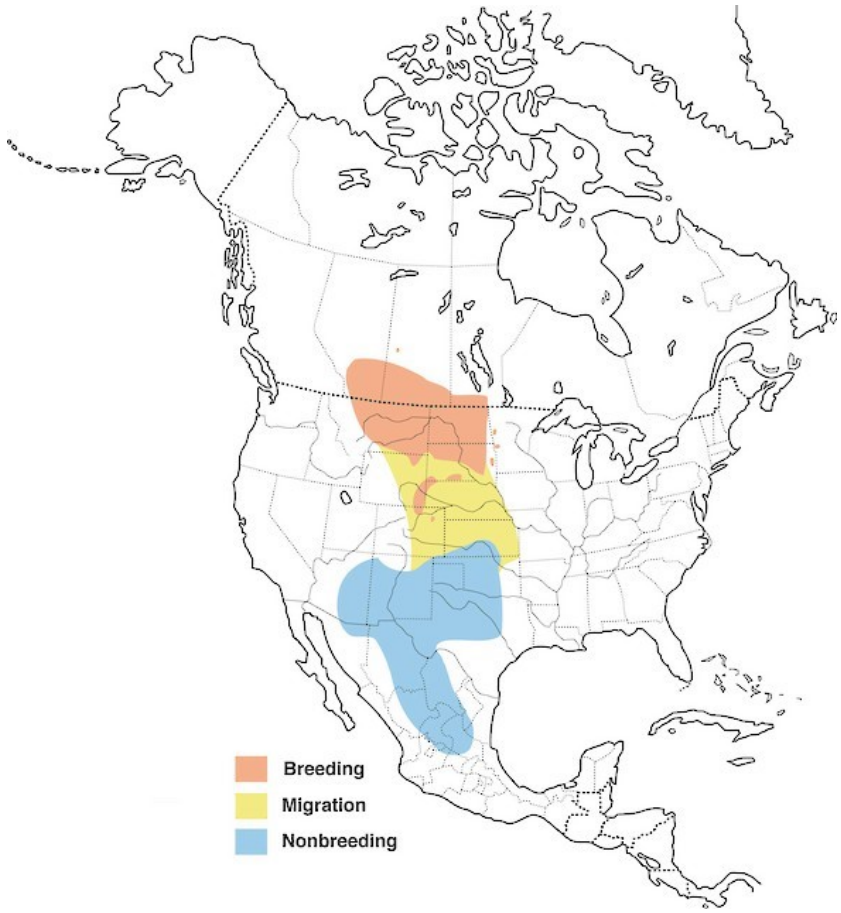


Figure 1. Distribution of Chestnut-collared Longspur during breeding (summer), migration (spring and fall) and non-breeding (winter) (Bleho *et al*. 2015).

## Canadian Range

In Canada, the current breeding range of Chestnut-collared Longspur stretches across southeastern Alberta, southern Saskatchewan, and southwestern Manitoba (Figures 1 and 2).

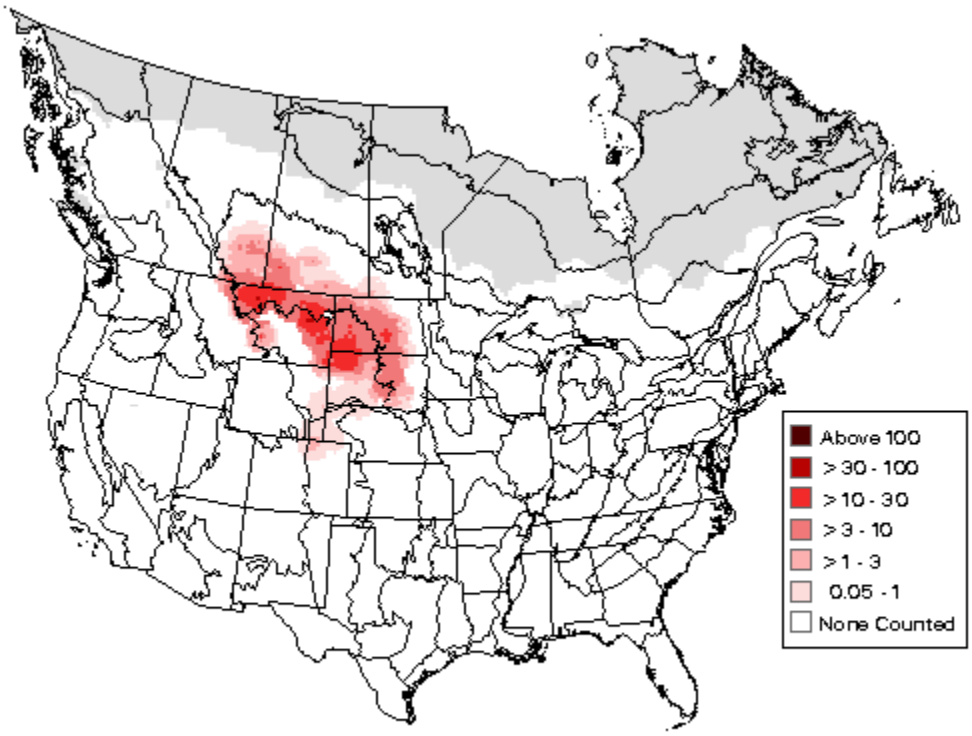


Figure 2. Summer distribution of Chestnut-collared Longspur based on the relative abundance of birds documented on the North American Breeding Bird Survey 2011-2015 (Sauer *et al*. 2017).

### Alberta

Previously, the species occurred north to Camrose and Beaverhill Lake (Semenchuk 1992), but it has experienced a southward range contraction to the southeast corner of Alberta (Federation of Alberta Naturalists 2008), with the most northerly recent occurrences near Provost, Metiskow, and Pearl Lake (eBird 2018; S.K. Davis unpubl. data).

Saskatchewan

As in Alberta, Chestnut-collared Longspur has experienced a southward range contraction in Saskatchewan in recent decades. Previously, it occurred as far north as Grill Lake and the Quill Lakes (Smith 1996), but more recent observations (eBird 2018; Smith *et al.* 2018; S.K. Davis unpubl. data) reach a northern limit near Kerrobert and Central Butte, and some additional records from the Last Mountain Lake National Wildlife Area, and near Saskatoon.

Manitoba

Formerly abundant in Manitoba, Chestnut-collared Longspur has experienced a substantial westward and southward range contraction and now occurs only in the extreme southwest corner of the province, restricted to vestiges of remnant prairie south and west of Carberry, extending north along the Assiniboine River to St. Lazare. Important strongholds for the species identified in the most recent Manitoba Breeding Bird Atlas include prairies and pastures in the Shilo Plains, pastureland associated with the Assiniboine River north to St. Lazare (in particular the Ellice-Archie and Spy Hill-Ellice community pastures), and remnant prairies in the Lyleton-Pierson area, the Souris and Blind Souris valleys south of Melita, and the Poverty Plains from Pierson to Broomhill (De Smet 2018).

## Extent of Occurrence and Area of Occupancy

The extent of occurrence (EOO) of Chestnut-collared Longspur over the period 2008-2018 is approximately 365,621 $km^2$, based on a minimum convex polygon around observation data. This is larger than the EOO previously calculated for this species (292,000 $km^2$; COSEWIC 2009). The previous EOO was calculated from the NatureServe range map, which represented the core range but did not include some peripheral sites. The current EOO may also reflect more extensive and intensive sampling efforts in recent years, but likely is not representative of a range expansion of the species; on the contrary, evidence suggests that the range has continued to contract. The index of area of occupancy (IAO) based on a 2 km x 2 km grid is unknown, as specific sites used by the species within the breeding and wintering ranges are not sufficiently documented. However, considering the population size and extent of occurrence, the IAO is very likely greater than 2,000 $km^2$.

## Search Effort

Information on the abundance and distribution of Chestnut-collared Longspur in Canada comes from roadside surveys on its breeding and wintering grounds (see **Sampling Effort and Methods**), as well as provincial conservation data centres, breeding bird atlases, eBird, and academic or government researchers.

# HABITAT

## Habitat Requirements

Breeding Grounds

Chestnut-collared Longspur is a grassland specialist that nests on the ground in short or mixed-grass prairie. Preferred breeding habitat has short vegetation structure (<30 cm), low levels of litter accumulation, and minimal woody cover (Owens and Myres 1973; Johnson and Schwartz 1993; Dieni and Jones 2003; Grant *et al*. 2004; Davis *et al.* 2014). Level to rolling topography is preferred in mixed-grass and short-grass prairies as well as drier areas within moist lowlands (Owens and Myres 1973; Kantrud and Kologiski 1983).

Chestnut-collared Longspur also nests in planted grassland (Davis *et al*. 1999, McMaster and Davis 2001, Davis *et al*. 2016), but only if management such as grazing or mowing maintains suitable vegetation structure. Furthermore, pastures dominated by exotic plant species, such as Crested Wheatgrass (*Agropyron cristatum*), represent poorer quality habitat for Chestnut-collared Longspur than native prairie. Specifically, Chestnut-collared Longspur nests located in planted grassland had lower nest survival, fledging success, nestling growth rate, and smaller mass of chicks at fledging than nests located in native grassland (Lloyd and Martin 2005; Davis *et al*. 2016).

Chestnut-collared Longspur is area sensitive, with a minimum requirement of 39 ha, and probability of occurrence increasing with pasture size (Davis 2004). In Alberta, Chestnut-collared Longspur avoided crop edges by up to 1.9 km and wetland edges by up to 1 km, and abundance was higher farther away from cropland and wetlands (Sliwinski and Koper 2012).

Migration Habitat

Little information is available on the habitat preferences of Chestnut-collared Longspur during spring and fall migration, although native grasslands are preferred in central Kansas (Bleho *et al*. 2015) and Black-tailed Prairie Dog (*Cynomys ludovicianus*) towns are preferred over open rangeland without prairie dogs, Conservation Reserve Program grasslands dominated by Yellow Bluestem (*Bothriochloa ischaemum*), scrub habitat, and fallow crop fields in Oklahoma (Smith and Lomolino 2004). Chestnut-collared Longspur flocks were frequently observed on crop fields during spring migration in North Dakota (Lokemoen and Beiser 1997).

Wintering Grounds

Chestnut-collared Longspur is also a grassland specialist on the wintering grounds. The occurrence of Chestnut-collared Longspur on grasslands in the Chihuahuan Desert of northern Mexico is positively correlated with rainfall (Macías-Duarte *et al*. 2009). Preferred wintering habitat in the grasslands of the Chihuahuan Desert includes areas with dense grass cover or tall grass (Macías-Duarte *et al*. 2009), but the species avoids areas with high

shrub cover (≥10%) and tall shrubs (>1.2 m) and forbs (>30 cm; Pool *et al*. 2012). Chestnut-collared Longspur distribution patterns shifted among moderate to heavily grazed grasslands in west Texas and Oklahoma, likely due to variability in the distribution of seed resources (Grzybowski 1983). The species has also been observed using cultivated fields in Texas (Sedgewick 2004).

### Habitat Trends

Prior to European settlement, approximately 162 million ha of native grassland blanketed the Great Plains of North America, including 29.2 million ha across the Canadian Prairies, but by 1994 only 23% remained intact in Canada (Sampson and Knopf 1994). Between 2003 and 2014, the amount of grassland (native and seeded tame) in the Prairie Ecozone of Canada declined by 36% (Gauthier and Wiken 2003; Roch and Jaeger 2014). The last several years have seen continued conversion of grassland to cropland across the northern Great Plains (Gage *et al*. 2016) and it is likely that less than 15% of intact native grassland remains on the Canadian Prairies.

## BIOLOGY

Unless otherwise indicated, information on the biology of Chestnut-collared Longspur has been summarized from Bleho *et al*. (2015).

### Life Cycle and Reproduction

Research on longevity, site fidelity, and adult survivorship of Chestnut-collared Longspur is scarce, and more study is needed. Mark-recapture studies of Chestnut-collared Longspur in southeast Alberta and southwest Saskatchewan suggest males were more likely to return to the same breeding site in subsequent years than females, suggesting either lower site fidelity or adult survivorship in females compared to males. Two birds banded as adults returned for three subsequent breeding seasons after initial capture, yielding the oldest recorded age for Chestnut-collared Longspur, of at least 4 years. Average life span is unknown, but likely 2-3 years, based on mark-recapture studies conducted over multiple years in Saskatchewan and Alberta (Bleho *et al*. 2015); generation length is therefore 2-3 years at most. Individuals are sexually mature and likely capable of reproducing the first breeding season after hatching.

Chestnut-collared Longspur is socially monogamous and pair bonds form after the males have established territories. Males establish and defend individual territories averaging about 1 ha in size (range 0.25 – 4 ha), though territories tend to be clumped together. Females construct nests, making a new one for each clutch. The nest is an open cup lined with grasses and located on the ground in small depressions either excavated by the female, or naturally occurring (e.g., hoof prints).

Incubation is done solely by the female, beginning after clutch completion, and lasting 11-13 days. Males provide food to the female during incubation, allowing her to spend more time on the nest (Kirkham and Davis 2013; Ng 2017). Typical clutch size is four eggs, although clutches of 3 or 5 eggs are not uncommon. The young are fed by both parents and leave the nest after about 11 days (range 7-15 days). After fledging, the young are fed by the male for two weeks. Flocks of immature birds begin to form later in the breeding season. Pairs will attempt multiple clutches within a breeding season and female annual reproductive success increases with the number of broods (Hill 1997).

Apparent nest success (percent of nests that fledged at least one young) of Chestnut-collared Longspur varies from 30-53% across the species range (Table 1). Productivity of Chestnut-collared Longspur varies from 2.2 to 3.6 young fledged per successful nest across the species range (Table 2). Predation is the primary cause of nest failure (Davis 2003; Jones *et al*. 2010) and predation rates are higher on nestlings than on eggs (Davis 2003; Jones *et al.* 2010). Chestnut-collared Longspur nests are depredated by a wide variety of opportunistic, generalist species (Vickery *et al*. 1992; Pietz and Ganfors 2000; Jones *et al*. 2010). See **Interspecific Interactions** for more details on predators.

**Table 1. Apparent nest success (percent of nests that fledge at least one young) of Chestnut-collared Longspur at study sites in Canada.**

| Apparent Nest Success (%) | # Nests | Location | Study |
|---|---|---|---|
| 30 | 474 | southern Saskatchewan | Davis (2003) |
| 30 | 30 | southern Saskatchewan | Gaudet (2013) |
| 35 | 30 | tame pastures in south central Saskatchewan | Davis *et al*. (2016) |
| 37 | 46 | native pastures in south central Saskatchewan | Davis *et al*. (2016) |
| 41 | 133 | southern Saskatchewan | Pipher (2011) |
| 44 | 770 | north-central Montana | Jones *et al*. (2010) |
| 44 | 155 | southeast Alberta | Yoo (2014) |
| 44 | 3 | hayfields in south central Saskatchewan | Davis *et al.* (2016) |
| 45 | 57 | southwest Manitoba | Davis (1994) |
| 45 | 301 | Montana | Lloyd and Martin (2005) |
| 50 | 20 | southeast Alberta | Ng (2017) |
| 50 | 78 | southeast Alberta | Bernath-Plaisted (2016) |
| 53 | 269 | southeast Alberta | Hill (1997) |

**Table 2. Mean number of young fledged per nest, and per successful nest, of Chestnut-collared Longspur at study sites in Canada.**

| Mean # Fledged / Successful Nest (n) | Mean # Fledged / Nest (n) | Location | Study |
|---|---|---|---|
| 2.2 (80) | 1.6 (167) | native fields in Montana | Lloyd and Martin (2005) |
| 2.4 (55) | 1.0 (134) | crested wheatgrass fields in Montana | Lloyd and Martin (2005) |
| 2.5 (2) | 1.7 (3) | hay fields in southern Saskatchewan | Davis *et al*. (2016) |
| 3 (141) | 0.9 (474) | southern Saskatchewan | Davis (2003) |
| 3.1 (14) | 1.5 (29) | tame pastures in southern Saskatchewan | Davis *et al*. (2016) |
| 3.2 (64) | 1.0 (212) | southwest Saskatchewan | Gaudet (2013) |
| 3.4 (142) | -* (269) | southeast Alberta | Hill (1997) |
| 3.4 (342) | 3.6 (627) | northern Montana | Jones *et al*. (2010) |
| 3.5 (26) | 1.6 (57) | southwest Manitoba | Davis (1994) |
| 3.6 (26) | 2.1 (45) | native pastures in southern Saskatchewan | Davis *et al*. (2016) |
| *information not provided in cited source | | | |

## Physiology and Adaptability

It is unclear how well Chestnut-collared Longspur is able to adapt to human disturbance and anthropogenic modifications to the landscape. Results from multiple studies suggest Chestnut-collared Longspur may be sensitive to anthropogenic disturbance and infrastructure. For example, Chestnut-collared Longspur abundance, density, parental care at nests, and fledging success are reduced near roads (Sutter *et al*. 2000; Ng *et al*. 2019) and oil and natural gas wells (Linnen 2008; Gaudet 2013; Kalyn Bogard and Davis 2014; Thomson *et al.* 2015; Unruh 2015; Ng *et al*. 2019) and the species was displaced beyond one year following construction of a wind farm (Shaffer and Buhl 2015). However, there are also several studies reporting that Chestnut-collared Longspur abundance and nest success are not related to the presence of oil and gas infrastructure (Bernath-Plaisted and Koper 2016; Rodgers and Koper 2017) or well density (Hamilton *et al*. 2011; Yoo and Koper 2017) and that fledging success was higher closer to wells (Gaudet 2013). The inconsistency in responses of Chestnut-collared Longspur to anthropogenic disturbance and infrastructure may be due to various factors, including differences in study design or analysis, regional variation in behavioural response, differences in vegetation structure (Kalyn Bogard and Davis 2014), variation in the size or footprint of the infrastructure itself (Rodgers and Koper 2017), or variability in the amount of noise and traffic associated with each site. See the **Threats** section for a more detailed discussion of the response of Chestnut-collared Longspur to anthropogenic disturbance and infrastructure.

It is generally expected that species ranges will shift toward the poles as temperatures continue to warm with climate change (Root *et al*. 2003; La Sorte and Jetz 2012). However, analysis of long-term changes in the abundance and distribution of Chestnut-collared Longspur on the Great Plains show a southward shift in the range of this species and that the spatial dynamics of Chestnut-collared Longspur were not related to environmental variability (Wilson *et al*. 2018).

## Dispersal and Migration

Chestnut-collared Longspurs that breed in Canada are medium-distance migrants, traveling to overwintering sites in the southwest U.S. and northern Mexico. The migration path typically follows the Central Flyway (Bleho *et al.* 2015). The species is gregarious on migration and over winter. Birds begin flocking in mid-July to mid-August; juveniles flock first, followed by adults (Harris 1944). Using light-level geolocators, Ellison *et al.* (2017) found that individuals from southwestern Saskatchewan commenced migration in late September or early October, and arrived at wintering areas on average 41 days later; the duration of spring migration was nearly identical (average 42 days), typically beginning around mid-March, with arrival on the breeding grounds between mid-April and early May. Males were documented leaving their wintering grounds in Oklahoma earlier than females (Bleho *et al.* 2015) and arriving sooner on the breeding grounds in Alberta (Hill 1997) and Montana (Lloyd and Martin 2005). Based on two mark-recapture studies done in Alberta and Saskatchewan, adult birds tend to return to the same breeding site each year (Bleho *et al.* 2015). Little information is available on juvenile dispersal patterns, but natal philopatry is low (Hill 1997).

## Interspecific Interactions

### Nest and Adult Predation

Documented predators of adult and fledgling Chestnut-collared Longspur include Thirteen-lined Ground Squirrels (*Ictidomys tridecemlineatus*; Pietz and Granfors 2000), Burrowing Owls (*Athene cunicularia*; Haug 1985), and Swift Fox (*Vulpes velox*; Uresk and Sharps 1986). Documented predators of Chestnut-collared Longspur nests include Plains Garter Snake (*Thamnophis radix*; Yoo 2014), Richardson's Ground Squirrel (*Urocitellus richardsoni*; Kirkham and Davis 2013), Thirteen-lined Ground Squirrel, American Badger (*Taxidea taxus*), Northern Harrier (*Circus cyaneus*), and Swainson's Hawk (*Buteo swainsoni*) (Pietz *et al*. 2012; Bleho *et al.* 2015). However, predators of grassland songbird nests are widely varied (Pietz *et al.* 2012) and opportunistic (Vickery *et al*. 1992). For example, Pietz *et al*. (2012) documented predation of grassland songbird nests by over 30 different species of mammals, birds, and snakes across the northern prairies and Midwest U.S.A.

Chestnut-collared Longspur nests are parasitized by Brown-headed Cowbirds (*Molothrus ater*), but the rate is considered to be low to moderate (10-30%; Shaffer *et al*. 2019).

Non-predatory Interspecific Interactions

Chestnut-collared Longspur evolved with American Bison (*Bison bison*) and other native herbivores on their breeding grounds, and subsequently require grazing to maintain suitable habitat (see **Habitat Requirements**).

Chestnut-collared Longspurs have been observed chasing and being chased by Baird's Sparrow, McCown's Longspur, Western Meadowlark (*Sturnella neglecta*), and Horned Lark (*Eremophila alpestris*; Bleho *et al.* 2015). Other species observed chasing Chestnut-collared Longspurs include Savannah Sparrow (*Passerculus sandwichensis*), Brown-headed Cowbird, and Gray Partridge (*Perdix perdix*; Bleho *et al.* 2015). Chestnut-collared Longspurs (individuals and pairs) have been observed mobbing Northern Harriers, Loggerhead Shrikes (*Lanius ludovicianus*), and Burrowing Owls near their nests (COSEWIC 2009).

# POPULATION SIZES AND TRENDS

## Sampling Effort and Methods

There are currently two main survey methods used to collect population size and trend information for Chestnut-collared Longspur – the North American Breeding Bird Survey (BBS) and the Christmas Bird Count (CBC). Each of these methods is described below, with a brief discussion of its limitations in monitoring Chestnut-collared Longspur populations. The Grassland Bird Monitoring (GBM) program was a survey method that incorporated surveys within habitat patches (i.e., surveys were not roadside) to account for some species being less abundant near roads. The GBM program was highlighted in the previous version of this report (COSEWIC 2009), but has since then been fully incorporated into the BBS and is therefore no longer interpreted separately.

Breeding Bird Survey

The Breeding Bird Survey is a roadside survey conducted throughout Canada and the United States. Experienced observers survey fixed, randomly-selected routes once per year between late May and early July. At each of 50 stops approximately 800 m apart, observers note all birds seen or heard (Sauer *et al*. 2017). Although the BBS covers the range of Chestnut-collared Longspur in Canada, detection rates are relatively low because the species tends to avoid roads (Sutter *et al*. 2000), and cultivated landscapes tend to have more road access than grassland areas. Despite these limitations, the sample size of routes with Chestnut-collared Longspur detections is fairly large, enabling fair confidence in the resulting trend estimates for the portion of the population breeding near roadsides.

Christmas Bird Count

The Christmas Bird Count is an annual survey conducted by volunteers across the Americas, with most of the effort focused in Canada and the United States. Each survey is run on a predetermined day between December 14 and January 5 and involves volunteers counting all the birds they see or hear within a 24 km diameter circle. Data from the CBC provide information on the portion of the Chestnut-collared Longspur population that winters in the United States, but limited insight into the core wintering range in northern Mexico, where only one or two count circles are sampled annually within the wintering range of the species.

## Abundance

Partners in Flight (2019) estimated the global population of Chestnut-collared Longspur to be 3.1 million mature individuals (95% limits 2.1 million, 4.3 million), including 1.3 million (95% limits 690,000, 2.3 million) in Canada, representing 42% of the total. Provincial estimates from Partners in Flight (2019) reflect considerable uncertainty, i.e., 520,000 in Alberta (95% limits 230,000, 1 million); 770,000 in Saskatchewan (95% limits 280,000, 1.6 million); 16,000 in Manitoba (95% limits 0, 44,000). The new estimate for Canada is more than double the previous estimate of 600,000 mature individuals in Canada, which represented 21% of the global population (Partners in Flight 2013). The distribution and relative abundance of Chestnut-collared Longspur within its breeding range in Canada and the U.S., based on BBS data (Figure 2) suggests that the proportion of the population in Canada is likely closer to 21% than 42%.

The earlier Partners in Flight estimate was derived primarily from BBS data from Canada and the U.S. from 1998 to 2007 (Blancher *et al*. 2013); the more recent estimate used BBS results from 2006 to 2015, and extrapolated them to unsurveyed parts of the breeding range (Will *et al.* 2019). This could underestimate the count in that density is greater away from roads where the source data were collected. Conversely, extrapolations were based on distribution maps from 2005 (Ridgely *et al.* 2005), and therefore did not take into account the ongoing retraction of the Canadian range, nor the declining availability of intact grassland habitat within those limits (see **Habitat Trends**).

Despite the uncertainties described above, the approach to population estimation by Partners in Flight (2019) is the best available currently. However, considering that it was based on a midpoint of 2010 or 2011 for BBS data and that the average rate of decline in Canada over the past decade has been -7.3% per year (see **Fluctuations and Trends**), an adjusted population estimate for 2019 would be approximately 680,000 mature individuals (with a range of uncertainty of roughly 360,000 to 1.2 million).

## Fluctuations and Trends

Breeding Bird Survey

Analyses of BBS data for Canada by the Canadian Wildlife Service (CWS) indicate widespread and long-term population declines (Table 3; Figure 3; Smith *et al.* 2019). The national population trend was -6.6% per year (95% CL -8.0% to -5.3%; n = 99 routes) between 1970 and 2017, amounting to a cumulative change of -96% (95% CL -98% to -92%), and considered by BBS to be of high reliability. At a provincial scale, the annual trends during this period were -8.5% in Alberta (CL -10.1% to -6.9%; n = 46 routes), -4.4% in Saskatchewan (CL -6.3% to -2.6%; n = 41 routes), and -8.0% in Manitoba (CL -11.0% to -5.1%; n = 12 routes). The U.S. analysis of BBS data shows a -3.5% annual trend from 1966 to 2015 (CL -4.4% to -2.5%; n = 123 routes) for the U.S. portion of the range (Sauer *et al.* 2017).

**Table 3. Long-term (1970-2017 for Canada; 1966-2015 for US, North America, and BCR-11) and short-term (2007-2017 for Canada; 2005-2015 for US, North America, and BCR-11) population trends for Chestnut-collared Longspur based on Breeding Bird Survey data, with 95% lower and upper confidence limits (LCL and UCL, respectively); annual rates in bold are considered statistically significant. Sources: Canada (Smith *et al.* 2019) and all other regions (Sauer *et al.* 2017).**

| Region | Long-term | | | Short-term | | |
|---|---|---|---|---|---|---|
| | Annual % Change (LCL, UCL) | Cumulative % Change (LCL, UCL) | # Routes | Annual % Change (LCL, UCL) | Cumulative % Change (LCL, UCL) | # Routes |
| Continental | **-4.2 (-5.0, -3.4)** | -88.3 (-106.7, -69.9) | 220 | **-2.9 (-4.6, -0.9)** | -27.7 (-38.0, -17.4) | 220 |
| All BCR-11 (Canada and US) | **-4.3 (-5.4, -3.3)** | -88.9 (-107.4, -70.4) | 155 | **-3.5 (-5.3, -1.3)** | -32.4 (-43.6, -21.2) | 58 |
| Canada | **-6.6 (-8.0, -5.3)** | -95.9 (-98.0, -92.1) | 99 | **-7.3 (-10.5, -4.6)** | -52.9 (-67.2, -37.4) | 84 |
| Alberta | **-8.5 (-10.1, -6.9)** | -98.4 (-99.3, -96.5) | 46 | **-11.8 (-16.6, -6.9)** | -71.4 (-83.7, -51.3) | 41 |
| Saskatchewan | **-4.4 (-6.3, -2.6)** | -87.9 (-95.2, -71.0) | 41 | **-4.6 (-8.3, -1.7)** | -37.2 (-57.8, -15.7) | 32 |
| Manitoba | **-8.0 (-11.0, -5.1)** | -98.0 (-99.6, -91.3) | 12 | **-8.3 (-14.4, -3.5)** | -57.9 (-78.8, -29.8) | 11 |
| US | **-3.5 (-4.4, -2.5)** | -83.1 (-101.0, -65.2) | 123 | **-2.3 (-4.4, -0.2)** | -22.6 (-31.9, -13.3) | 123 |
| Montana | **-2.3 (-3.6, -0.9)** | -68.8 (-85.1, -52.5) | 32 | -1.9 (-4.3, 1.2) | -19.0 (-27.5, -10.5) | 32 |
| North Dakota | **-4.2 (-5.7, -2.8)** | -88.3 (-106.7, -69.9) | 39 | -3.4 (-7.2, 1.3) | -31.6 (-42.6, -20.6) | 39 |
| South Dakota | **-4.9 (-6.5, -3.2)** | -91.9 (-110.7, -73.1) | 36 | **-1.0 (-7.2, -6.5)** | -10.5 (-16.8, -4.2) | 36 |

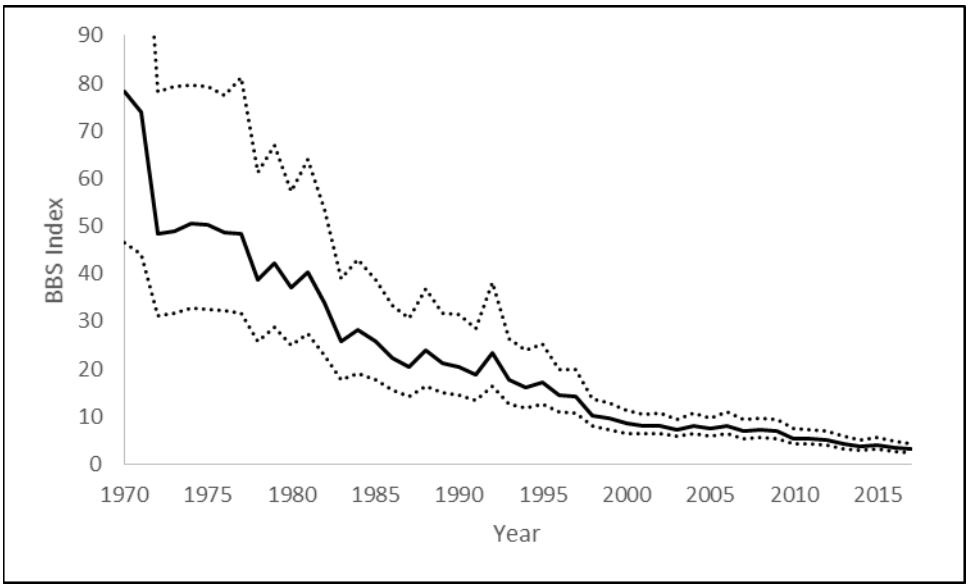


Figure 3. Population trend of Chestnut-collared Longspur based on the analysis done by Environment and Climate Change Canada of North American Breeding Bird Survey (BBS) data, 1970-2017 (Smith *et al.* 2019). The solid line represents the population trend and the dashed lines represent 95% credible intervals.

Independent analyses of BBS data by Wilson *et al.* (2018) estimated an average annual decline of -5.2% per year (95% CI -5.7% to -4.6%) between 1967 and 2014 across the northern Great Plains, equating to a cumulative decline of 92% (95% CI -94% to -89%); the strongest declines were in the northern half of the species range (i.e., in Canada and just south of the U.S. border).

Short-term trends in Canada show accelerating declines (Smith *et al.* 2019). The annual trend in the national population was -7.3% per year (95% CL -10.5% to -4.6%; n = 84 routes; Figure 4) between 2007 and 2017 with medium reliability, amounting to a cumulative decrease of 53% (95% CL -67% to -37%), with a 65% probability of exceeding a 50% decline. At a provincial scale, the annual trends during this period were -11.8% in Alberta (CL -16.6% to -6.9%; n = 41 routes), -4.6% in Saskatchewan (CL -8.3% to -1.7%; n = 32 routes), and -8.3% in Manitoba (CL -14.4% to -3.5%; n = 11 routes). In the U.S., the rate of decline slowed somewhat, with an annual trend of -2.3% from 2005 to 2015 (CL -4.4% to -0.2%; n = 123 routes; Sauer *et al.* 2017).

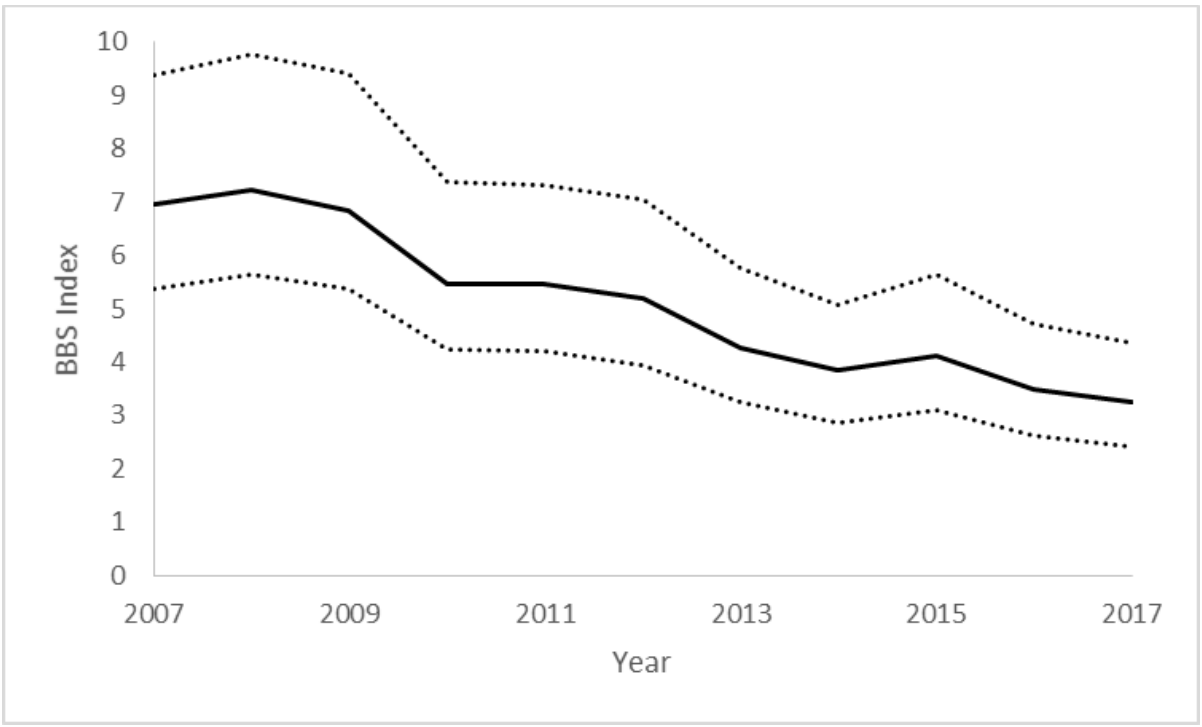


Figure 4. Population trend of Chestnut-collared Longspur based on the analysis done by Environment and Climate Change Canada of North American Breeding Bird Survey (BBS) data, 2007-2017 (Smith *et al*. 2019). The solid line represents the population trend and the dashed lines represent 95% credible intervals.

Traditional reporting of BBS trends uses the percent/year geometric mean rate of change between the start and end years (e.g., 1980 and 2017), which can be misleading as estimates may vary greatly from year to year. An alternate approach to account for variation between years is to examine rolling 10-year trends, in which each year is plotted as a data point, representing the average annual percent change over the previous decade (see Figure 5). The rolling 10-year trend highlights the overall pattern over time, as well as the large fluctuations that occur. For Chestnut-collared Longspur, rolling 10-year trends for 1980-2017 show that estimated trends are around or below -30% for all years, and below 50% in three of the past four years (Figure 5). Despite fairly broad 95% credible intervals, the Canadian Chestnut-collared Longspur population has likely declined by more than 50% in the past decade (Figure 5).

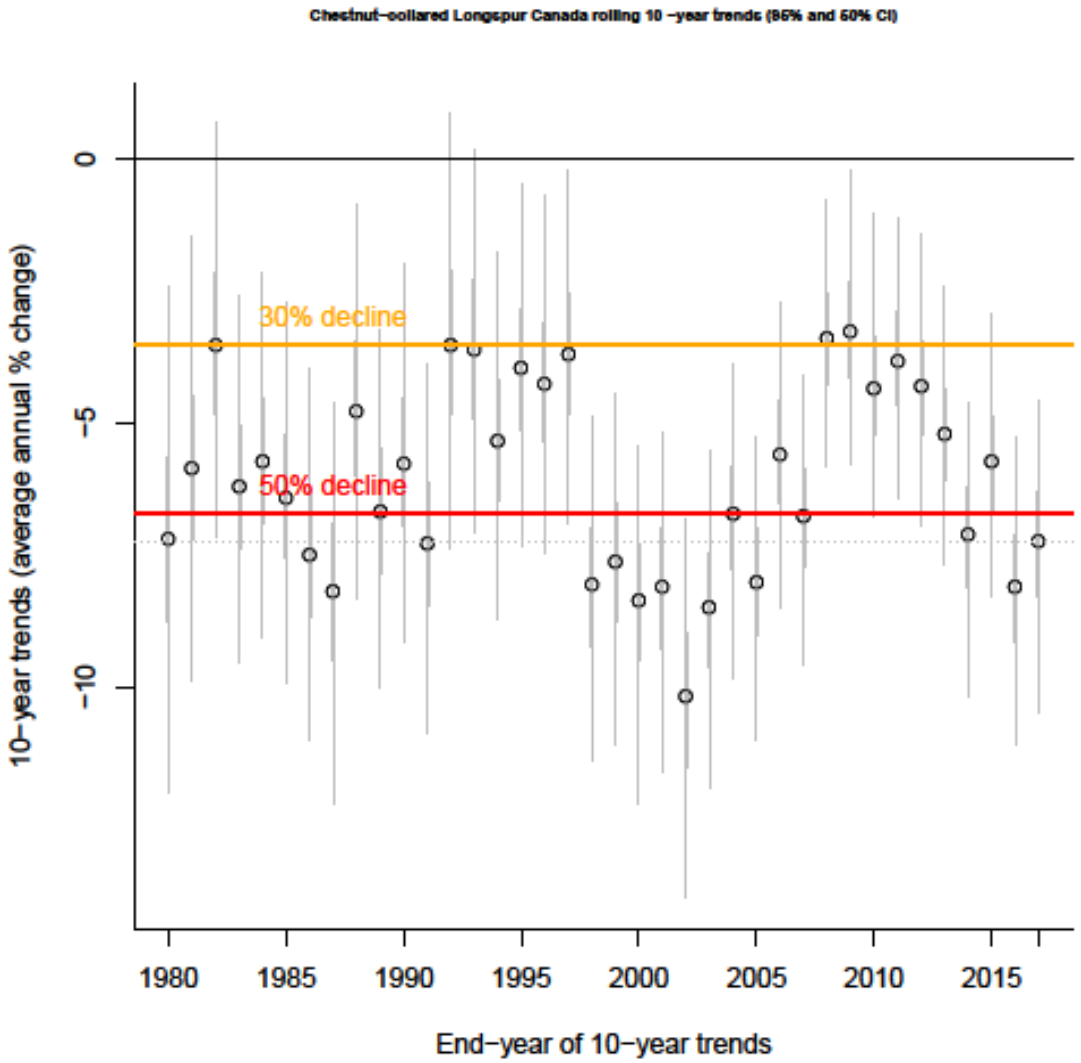


Figure 5. Rolling 10-year trends of Chestnut-collared Longspur population change in Canada based on BBS data from 1980-2017 (courtesy of Adam Smith, Environment and Climate Change Canada). Each point represents the average annual rate of change over the previous decade, with bars indicating 95% credible intervals. The orange and red lines indicate annual rates of decline equivalent to 10-year declines of 30% and 50%, respectively, while the dotted line represents the annual rate of change of -7.3% estimated for Canada from 2007-2017 BBS data.

## Christmas Bird Count

Long-term data from the CBC indicate a significant trend of -8.7% per year (95% CL -17.4% to -0.1%; n = 9 to 30 counts/year) on the U.S. wintering grounds from 1966 to 2017 (Table 4, Figure 6; Meehan *et al*. 2018). Over the 10-year period from 2007 to 2017, the decline increased to -17.5% per year, though this is heavily driven by exceptionally low numbers in 2017 (Figure 6). On the Mexican wintering grounds, long-term CBC data indicate a trend of -25.8% per year from 1996 to 2013 (Figure 7); however, this is based on only 1-2 counts in most years, and largely reflects a dramatic contrast between results from 1996-1999 and since 2000.

**Table 4. Long-term (1966-2017 for US; 1996-2013 for Mexico) population trends for Chestnut-collared Longspur based on Christmas Bird Count data, with 95% lower and upper confidence limits (LCL and UCL, respectively); annual rates in bold are considered statistically significant. Number of counts per year represents the minimum and maximum number conducted in a single year. Source: Meehan *et al.* 2018.**

| Region | Annual % Change (LCL, UCL) | Cumulative % Change (LCL, UCL) | # counts / year |
|---|---|---|---|
| United States | **-8.7 (-17.4, -0.1)** | -99.1 (-118.6, -79.6) | 9 - 30 |
| Texas | **-14.3 (-22.6, -5.9)** | -99.97 (-119.6, -80.4) | 1 - 13 |
| New Mexico | -1.2 (-9.6, 6.5) | -48.7 (-62.4, -35.1) | 1 - 12 |
| Arizona | **- 7.4 (-11.6, -2.7)** | -98.1 (-117.5, -78.7) | 1 - 7 |
| Oklahoma | -3.0 (-8.7, 1.9) | -79.5 (-97.0, -62.0) | 1 - 6 |
| Kansas | 0.2 (-10.7, 11.6) | 12.7 (5.7, 19.7) | 1 - 4 |
| Mexico | **-25.8 (-15.8, -35.8)** | -99.5 (-119.1, -80.0) | 1 - 2 |

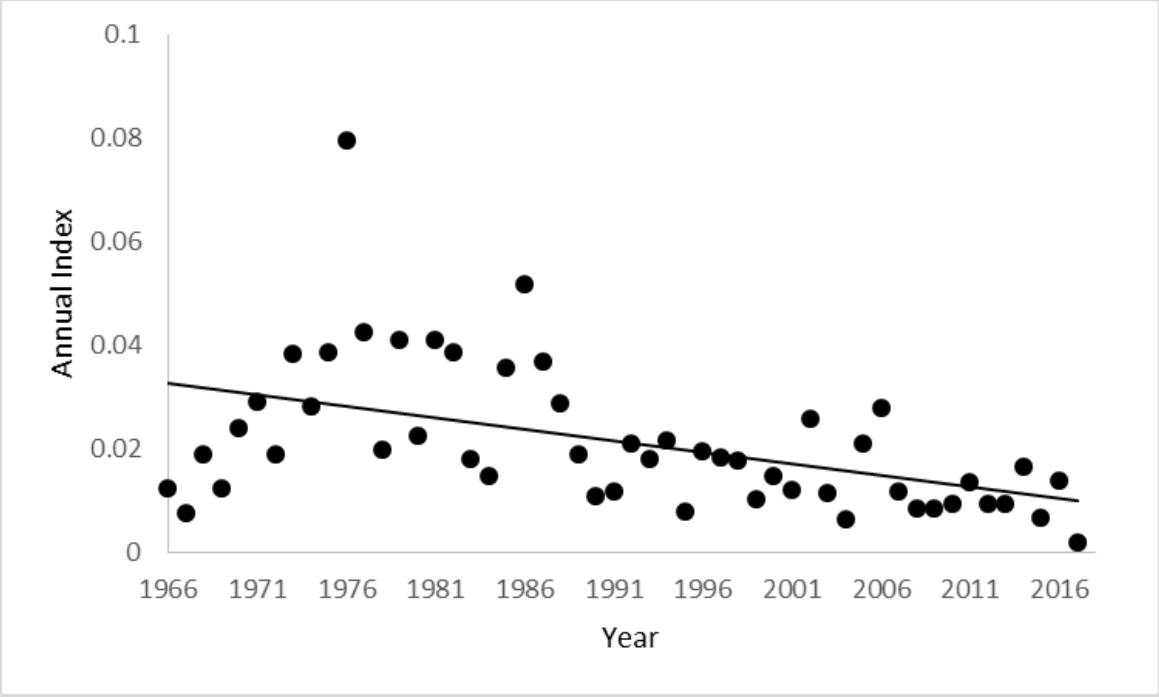


Figure 6. Number of birds per party hour for Chestnut-collared Longspur from the North American Christmas Bird Count across the entire United States, 1966-2017 (National Audubon Society 2018).

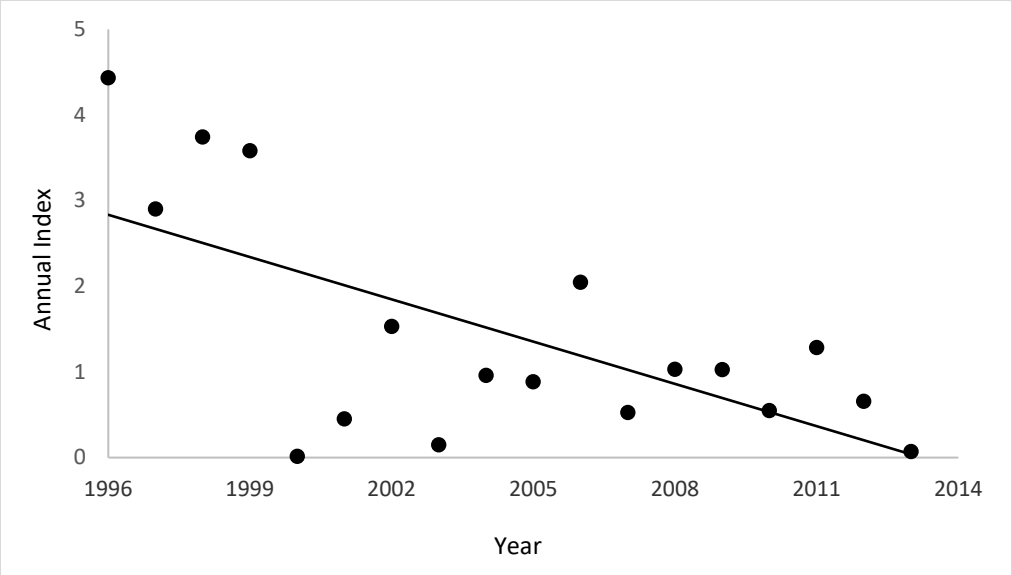


Figure 7. Number of birds per party hour for the Chestnut-collared Longspur from the North American Christmas Bird Count across Mexico, 1996-2013 (National Audubon Society 2018).

Summary

All available data agree that Chestnut-collared Longspur has experienced significant and sustained range-wide population reductions. For this species, the BBS provides the most reliable indication of trends for the Canadian population. Over the most recent decade for which data are available, declines have accelerated in Canada, to the extent that 53% of the population is likely to have been lost during this period. Although 10-year rolling trends for the species show some fluctuation, they have remained overwhelmingly negative since 1980, always below -3% per year.

## Rescue Effect

Rescue for Chestnut-collared Longspur in Canada could occur through immigration of breeding birds from the U.S. population, which is larger than that in Canada. Furthermore, there are large tracts of suitable habitat adjacent to or straddling the international border. However, survey-wide analysis of the U.S. populations indicate significant declines of -3.5% per year (95% CL = -4.4% to -2.5%; n = 123 routes) between 1966 and 2015 (Sauer *et al*. 2017), with long-term statistically significant declines in all states with a sufficient number of BBS routes to conduct confident trend analysis (Montana, North Dakota, and South Dakota; Sauer *et al*. 2018). Therefore, although rescue from the U.S. population is possible, the probability of it occurring is likely reduced by the significant ongoing declines there. In addition, grassland habitat continues to be converted in both Canada and the U.S. at alarming rates (Gage *et al.* 2016), further reducing the probability of rescue.

## THREATS AND LIMITING FACTORS

Chestnut-collared Longspur is vulnerable to the cumulative effects of various threats, especially habitat loss or conversion on both the breeding and wintering grounds. Threats are scored in **Appendix 1** and summarized below following the IUCN-CMP (International Union for the Conservation of Nature – Conservation Measures Partnership) unified threats classification system, based on the standard lexicon for biodiversity conservation of Salafsky *et al*. (2008). The overall impact score for Chestnut-collared Longspur is high to very high, consistent with the observed 53% decline in the Canadian population over the past 10 years, and indications that the trend is continuing to worsen. The seven IUCN threats categories relevant to Chestnut-collared Longspur are described below, in order of greatest to least impact.

IUCN 2 Agriculture and Aquaculture (high impact threat)

*2.1 Annual and perennial non-timber crops (high impact threat)*

Conversion of short- and mixed-grass prairie to annual cropland began with European settlement about 150 years ago and native grassland continues to be converted across the northern Great Plains (Gage *et al*. 2016). Hill *et al.* (2014) concluded that habitat loss through agricultural intensification has been the largest factor in grassland bird population declines. It has likely been the biggest driver of Chestnut-collared Longspur declines historically, as the species occurs much more frequently in native and planted grassland than cropland (Davis *et al*. 1999; McMaster and Davis 2001) and avoids cropland edges by up to almost 2 km (Sliwinski and Koper 2012). In addition, Chestnut-collared Longspur is area-sensitive, requiring grassland patches at least 39 ha in size, and abundance declines as the proportion of edge to interior habitat increases (Davis 2004). Farming practices such as tilling, mowing, and haying negatively affect occupancy by Chestnut-collared Longspur (Dale *et al*. 1997; Martin and Forsyth 2003). For example, Chestnut-collared Longspurs were not detected in winter-wheat (no till) or summer fallow fields in Saskatchewan, and had occurrence rates of 5% in spring-seeded wheat (mostly no till), 52% in native pasture, and 19% in planted grassland (S. Davis unpubl. data).

Increasing demand for biofuel production may exacerbate rates of grassland conversion to cropland across the northern Great Plains, which could further restrict Chestnut-collared Longspur populations. For example, more than 203,000 ha of native grassland were converted to cropland in North Dakota, South Dakota, and Montana between 2002 and 2007, attributed to increased demand for ethanol, high corn prices, and reduced enrollment in the Conservation Reserve Program (Fargione *et al*. 2009). Similarly, between 2006 and 2011, nearly 530,000 ha of grass-dominated land was converted to corn and soybeans planted for biofuel production in North Dakota, South Dakota, Nebraska, Iowa, and Minnesota (Wright and Wimberly 2013). In 2007, the Government of Canada initiated an incentive program to increase the production of alternatives (mainly based on wheat and corn) to gasoline and diesel (Natural Resources Canada 2014). Between 2003 and 2014, over 5 million ha of grassland habitat was converted in Alberta, Saskatchewan, and Manitoba, representing a loss of 36% of remaining habitat across the Canadian

Prairies (Roch and Jaeger 2014). Biofuel production is one example of a multitude of socio-economic pressures that result in conversion of grassland habitat to annual crops; other factors include fluctuations in cattle prices, changes in agricultural policy, and advancements in the development of new crops.

Habitat conversion on the wintering grounds currently represents a particularly significant threat to Chestnut-collared Longspur populations. Pool *et al*. (2014) documented rapid and unsustainable rates of grassland conversion to cropland in large areas of the Chihuahuan Desert of northern Mexico between 2006 and 2011, primarily due to unauthorized expansion of ground-water irrigated cropland. Specifically, cropland expanded by ~6% per year in the Valles Centrales region of northern Mexico, resulting in a loss of over 69,000 ha of grassland habitat between 2006 and 2011 (Pool *et al*. 2014). Overall, a large portion of the Chestnut-collared Longspur population is exposed to agriculture and the severity of the effects is serious.

*2.3 Livestock farming and ranching (typically not a threat)*

Inappropriate grazing management is listed as a threat in the Chestnut-collared Longspur Recovery Strategy (Environment and Climate Change Canada 2018), as too much or too little grazing may create habitat conditions unsuitable for the species (Bleho *et al*. 2015). However, Chestnut-collared Longspur prefers short and sparse vegetation (Davis 2005), which can be maintained through disturbance such as grazing, mowing, or fire (Carragher *et al*. 2012; Bleho *et al*. 2015). Grazing is pervasive across the species range; although chronic overgrazing reduces habitat suitability, it is also economically unsustainable and generally avoided, therefore grazing tends to be beneficial for Chestnut-collared Longspur in terms of maintaining favourable breeding habitat, and so livestock farm and ranching is not considered a threat to the species.

<u>IUCN 7 Natural System Modifications (medium – low impact threat)</u>

*7.3 Other ecosystem modifications (medium – low impact threat)*

Reproductive output by Chestnut-collared Longspurs is lower in planted grasslands (see **Biology**), suggesting that these areas function as ecological traps. Such land cover is already extensive within the Canadian breeding range of Chestnut-collared Longspur, and likely to continue expanding (see IUCN 2, above). A large portion of the population is therefore exposed to this threat and the severity of the effects is considered to be slight to moderate. Invasive plant species are becoming increasingly prevalent in remnant grassland communities, with evidence that some (e.g., Crested Wheatgrass) are associated with lower nest survival and slower nestling growth for Chestnut-collared Longspur. There is little research investigating the threshold for longspurs to tolerate varying amounts of invasive grasses. Reduction of arthropod prey due to pesticides is likely not a particular concern for Chestnut-collared Longspur, as the grassland ecosystem is not bottom-regulated.

*7.1 Fire & fire suppression (low impact threat)*

Richardson *et al.* (2014) found the relative abundance of Chestnut-collared Longspur to be highest in burned plots and declined with time since burning, suggesting a positive effect of fire on this species. However, the response of grassland songbirds to burning, grazing, and the interaction of these processes is complex, as there is temporal and spatial variability in moisture conditions and grazing management, and the response of a species in one area may not be the same across its range.

Woody encroachment may limit available habitat for Chestnut-collared Longspur on both the breeding and wintering grounds. Chestnut-collared Longspur occurrence declined as the extent of woodland plants increased in North Dakota and the species was sensitive to woody plants ranging in height from brush to tall shrubs and trees (Grant *et al*. 2004). Chestnut-collared Longspur density and abundance in Chihuahua Desert grassland is reduced in areas with high shrub density (≥10% shrub cover), tall forbs (≥ 30 cm), and tall shrubs (≥ 1.2 m); fire is recommended as one method to manage this habitat and maintain conditions preferred by Chestnut-collared Longspur on both the wintering and breeding grounds (Pool *et al*. 2012). Fire suppression is pervasive across the range of Chestnut-collared Longspur, but as grazing partially fills the role of fire in many parts of the species' range, the effects of this threat are slight.

<u>IUCN 9 Pollution (medium – low impact threat)</u>

*9.3 Agricultural and forestry effluents (medium – low impact threat)*

Nestling Chestnut-collared Longspurs consume primarily arthropods (Bleho *et al.* 2015). Spraying of broad spectrum insecticides to control grasshopper populations on grassland habitat is not common in Canada. However, it has been studied in southern Alberta, and found to have minimal effects on Chestnut-collared Longspur reproductive success, though parent birds had to fly farther on foraging trips and switch to less abundant prey items to feed nestlings (Martin *et al*. 2000), with possible implications for nesting success and survival of adults. Overall, the potential for exposure to agricultural pollution is large to pervasive, as birds are at risk throughout their life cycle (i.e., on the breeding and wintering grounds, as well as during migration), but more research is required to clarify the severity, which is currently believed to range from slight to moderate.

*9.6 Excess energy (low impact threat)*

Light pollution and anthropogenic noise may affect Chestnut-collared Longspur. It is primarily a diurnal migrant, but some movements occur at night and may be susceptible to negative effects of light pollution described for other species (Gauthreaux *et al*. 2006). Chestnut-collared Longspur has been found to be sensitive to noise produced by anthropogenic infrastructure (Ng *et al.* 2019). Although a large proportion of the population is likely exposed to excess energy, the severity of effects is likely slight.

IUCN 3 Energy Production and Mining (low impact threat)

*3.1 Oil & gas drilling (low impact threat)*

Linnen (2008), Kalyn Bogard and Davis (2014), Thompson *et al.* (2015), and Unruh (2015) found that Chestnut-collared Longspur occurs less frequently near most types of oil and natural gas wells in Alberta, Saskatchewan, and North Dakota, but effects of natural gas wells appear more minor, with Linnen (2008), Hamilton *et al.* (2011), and Rodgers and Koper (2017) reporting that abundance was not related to the density or proximity of gas wells in Alberta or Saskatchewan. Nenninger and Koper (2018) concluded that the probability of occurrence was higher near pumpjack oil wells in Alberta, but that there was no effect of screw pumps and abundance did not vary with grid versus generator powered wells. The effects of oil and natural gas development on Chestnut-collared Longspur reproductive success are also mixed. Gaudet (2013), Bernaith-Plaisted and Koper (2016), and Yoo and Koper (2017) concluded that nest success and nest survival were independent of the presence or proximity of oil and gas infrastructure. However, Yoo and Koper (2017) noted that clutch size decreased with well density, though this effect declined with well age. The number of young fledged per nest was higher closer to gas wells, but the species avoided placing nests near these structures (Gaudet 2013) and parental care was reduced at nests located near oil wells and compressor stations (Ng 2017). While a restricted portion of the population may be exposed to oil and gas development, the severity of the effects is likely moderate.

*3.2 Mining & quarrying (low impact threat)*

Gravel extraction and mine development (e.g., potash) are ongoing or potentially developing activities on native grassland habitat in all three Prairie Provinces. These activities result in complete loss of habitat at a local scale. It is possible that birds may be able to move to adjacent habitat, but the quality of nearby habitat may be lower. A small portion of the Chestnut-collared Longspur population is likely to be exposed to this threat, with effects considered moderate.

*3.3 Renewable energy (low impact threat)*

In South Dakota, Chestnut-collared Longspurs within 300 m of wind facilities were displaced beyond one year following construction (Shaffer and Buhl 2016). However, Chestnut-collared Longspur density did not change following development of a wind farm in South Dakota (Shaffer and Johnson 2008). Only a small portion of the Chestnut-collared Longspur population is likely to be exposed to the growth of renewable energy development in the Canadian Prairies in the near future, and the severity of the effects may range from slight to moderate; however, the impact of this threat may increase with further expansion of this industry within natural grasslands and pastures in the Canadian Prairies.

IUCN 4 Transportation & Service Corridors (low impact threat)

*4.1 Roads & railroads (low impact threat)*

The response of Chestnut-collared Longspurs to roads appears to be variable, but trends towards negative; the variation in response is likely due to differences in traffic volume, habitat structure, and relative abundance of invasive species among studies. Chestnut-collared Longspur abundance was lower near roads in Saskatchewan (Sutter *et al*. 2000). In Alberta, Wellicome *et al.* (2014) found Chestnut-collared Longspur abundance and frequency of occurrence to be significantly higher on off-road surveys than on road-side surveys and negatively correlated with human-modified habitats, such as roads. Ng *et al.* (2019) documented reduced parental care at nests near roads in Alberta, resulting in fewer young fledging more slowly. However, Yoo and Koper (2017) found no effect of roads and trails on Chestnut-collared Longspur nest success or clutch size. Similarly, Sliwinski and Koper (2012) and Thompson *et al.* (2015) found that Chestnut-collared Longspurs neither avoided nor were attracted to roads in Alberta and North Dakota, while Nenninger and Koper (2018) reported higher occurrence close to roads in Alberta. Vehicle collisions likely occur, but there is no evidence to suggest they are at a frequency that affects the population. Overall, a large proportion of the population is exposed to roads at some point in their annual life cycle, but given the mixed evidence, the severity of effects on the population is likely only slight.

*4.2 Utility & service lines (low impact threat)*

Power lines and other vertical structures provide potential perch sites for avian predators and brood parasites, particularly in landscapes where trees are naturally sparse (Patten *et al*. 2006; Lammers *et al*. 2007). Utility and service lines also represent a potential source of mortality through collisions with high tension lines (Faanes 1987; Erickson *et al.* 2005); however, the extent to which Chestnut-collared Longspurs are affected by collisions with such features is unclear. A proposed new transmission line between Birtle, Manitoba, and Tantallon, Saskatchewan, would bisect the Spy Hill-Ellice Community pasture, recently nominated as part of an Important Bird Area based on its high densities of Chestnut-collared Longspur. It is likely that a large portion of the Chestnut-collared Longspur population is exposed to utility and service lines, and the severity of effects on the population is probably at least slight.

IUCN 8 Invasive & Other Problematic Species & Genes (low impact threat)

*8.1 Invasive non-native/alien species (low impact threat)*

Domestic and feral cats are a significant source of bird mortality in Canada and the United States, and species that nest or forage on the ground are particularly vulnerable (Blancher 2013; Loss *et al*. 2013). Predation of grassland songbird nests by domestic cats has been documented in Wisconsin (Renfrew and Ribic 2003; Pietz *et al*. 2012); however, specific effects of domestic cat predation on Chestnut-collared Longspur have not been reported. Chestnut-collared Longspurs typically occur far from human habitation, therefore

it is likely only a small portion of the population would be exposed to cat predation and the severity of the effects are considered to be slight.

IUCN 11 Climate Change & Severe Weather (low impact threat)

*11.4 Storms & flooding (low impact threat)*

Severe weather events can kill adult Chestnut-collared Longspurs and contribute to nest failure through flooding or abandonment. Martin *et al*. (2000) reported finding 4-5 incubating female Chestnut-collared Longspurs (~1% of total nests) dead on the nest following severe hailstorms in southern Alberta. In southern Saskatchewan, large amounts of rainfall contributed directly to the failure of 10 grassland songbird nests (6% of the nests found that year; Pipher *et al*. 2016) and eight nests (2% of total nests) failed due to a hail storm (Gaudet 2013). Similarly, storm events resulting in hail and flooded nests caused direct mortality of adult grassland songbirds in Colorado (Conrey *et al*. 2016). In Montana, abandonment of 38 grassland songbird nests (25% of abandoned nests) was attributed to severe weather events, such as heavy rain and hail storms (Jones *et al*. 2010). Storms are often localized and therefore only a small to restricted portion of the population is likely to be exposed to extreme weather events. Winter storms in the Chihuahuan desert were found to reduce survival of Sprague's Pipit (*Anthus spragueii*), Grasshopper Sparrow (*Ammodramus savannarum*), and Baird's Sparrow (*Centronyx bairdii*; Strasser *et al.* 2018); Chestnut-collared Longspurs occur in the same area and may be similarly vulnerable, but effects are currently unknown. In the near future, only a small to restricted portion of the population may be exposed to increasing risk of storms and flooding; effects are likely slight to moderate, as the species re-nests easily but more study is needed to learn whether recruitment differs for nests initiated later in the breeding season.

## Limiting Factors

Chestnut-collared Longspur is an area-sensitive grassland specialist and although the species does use planted grasslands, these areas are of inferior habitat quality (see **Threats** section for more detail). The ability of the species to persist and/or recover from population declines is therefore dependent on large, contiguous tracts of native grassland persisting on the landscape, but such habitat patches are becoming scarce. Pastures considered to be in poor or fair range health based on short vegetation structure (<30 cm) and low levels of litter accumulation (Abougendia 1990; Henderson and Davis 2014), may be under economic pressure for improvement to taller grass and high levels of litter, rendering them unsuitable for Chestnut-collared Longspur.

First-year survival, followed by first-year reproduction by females, have the greatest influence on population viability (Sedgewick 2004). Predation and cowbird parasitism may be limiting factors.

## Number of Locations

The number of locations is difficult to estimate for Chestnut-collared Longspur because of its broad range and the wide distribution and variety of threats faced by the species. However, given that agriculture poses the biggest threat on both the breeding and wintering range, and this land use is under the control of many landowners, the number of locations is definitely greater than the COSEWIC threshold of ten for consideration as a criterion for status assessment.

# PROTECTION, STATUS AND RANKS

## Legal Protection and Status

COSEWIC designated the species as Threatened in November 2009. The COSEWIC status was re-examined and the species was designated Endangered in November 2019. Chestnut-collared Longspur is protected under the *Migratory Birds Convention Act, 1994*. It is also listed as Threatened in Canada on Schedule 1 of the *Species at Risk Act* (SARA), which makes it an offence to kill, harm, harass, capture, or take an individual; to possess, collect, buy, sell, or trade an individual; and to damage or destroy the residence of one or more individuals. In Manitoba it is listed as Endangered under *The Endangered Species and Ecosystems Act,* making it unlawful to kill, injure, possess, or disturb the species; destroy, disturb or interfere with the species habitat; or damage, destroy, obstruct, or remove a natural resource on which the species depends for its life or propagation. In Alberta, the species is listed as At Risk under the *Wildlife Act*, but this legislation provides minimal specific protection (Fluker and Stacey 2012). Chestnut-collared Longspur has no status under the Saskatchewan *Wildlife Act*. It is not listed under the U.S. *Endangered Species Act*.

## Non-Legal Status and Ranks

NatureServe (2018) lists Chestnut-collared Longspur as G5 (globally secure), N5B, N5N (nationally secure) in the U.S., and N3B, N3M (nationally vulnerable) in Canada. At a provincial scale, it is ranked S3S4B (vulnerable to apparently secure) in Alberta, S3B (vulnerable) in Saskatchewan, and S1S2B (imperilled to critically imperilled) in Manitoba. All of the Canadian rankings represent higher levels of concern than when the species was initially assessed by COSEWIC (2009).

In the U.S., status rankings are S2B (imperilled) in Montana, unranked in North Dakota, and S4B (apparently secure) in South Dakota, but these were last updated in 1997 and may not be accurate reflections of current status.

The IUCN Red List recently uplisted Chestnut-collared Longspur to Vulnerable based on rapid population declines, which are expected to continue (BirdLife International 2017). Chestnut-collared Longspur is not listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Chestnut-collared Longspur is included as a “D” Yellow Watch List species in the Partners in Flight Landbird Conservation Plan due to a declining population and moderate to high threats to the population (Rosenberg *et al*. 2016). Specifically, the global population of Chestnut-collared Longspur declined by 85% between 1970 and 2014, and it is estimated that a further 50% of the remaining population will be lost in the next 21 years if recent population trends continue into the future (Rosenberg *et al*. 2016).

## Land Tenure and Ownership

Protected areas will provide optimal habitat for Chestnut-collared Longspur only if there is active management such as grazing or prescribed burns. Thus simply increasing the number of areas protected, without active management, will not in itself secure the long-term future of the species (COSEWIC 2009).

Approximately 8% of the Prairie Ecozone in Canada is under some form of protection through national and provincial parks, wildlife refuges, migratory bird sanctuaries, ecological reserves, provincial legislation, former Prairie Farm Rehabilitation Administration and provincial community pastures, and private conservation lands held by environmental non-government agencies (e.g., Nature Conservancy of Canada, Ducks Unlimited, and Manitoba Habitat Heritage Corporation). However, the extent of protection is variable, and some of these areas may remain vulnerable to disturbance or loss of habitat important to Chestnut-collared Longspur. Approximately 13% (31,870 $km^2$) of the Prairie Ecozone is protected in Saskatchewan, compared to only 2% in each of Alberta (2,936 $km^2$) and Manitoba (1,086 $km^2$). Overall, 79% of Canadian prairie habitat is in private ownership (Riley *et al.* 2007).

## Recovery Activities

A Recovery Strategy has been completed for Chestnut-collared Longspur (Environment and Climate Change Canada 2018) and critical habitat has been identified for the species in southwest Saskatchewan. Several key actions from the Recovery Strategy are underway: 1) population monitoring continues across the entire Chestnut-collared Longspur range, primarily through the BBS; 2) research focused specifically on or including Chestnut-collared Longspur has increased in recent years, particularly as it pertains to the species’ response to anthropogenic disturbance or alterations to the landscape (Sliwinski and Koper 2015; Bernaith-Plaisted and Koper 2016; Davis *et al*. 2016; Pipher *et al*. 2016; Rodgers and Koper 2017; Yoo and Koper 2017; Nenninger and Koper 2018; Ng *et al.* 2019), as well as climate change (Wilson *et al.* 2018); 3) many large-scale prairie conservation initiatives are currently underway that have a mandate to identify, restore and conserve native grassland habitat, as well as to improve land management.

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Bennett, R. Manager, Conservation Planning and Stewardship, Canadian Wildlife Service, Edmonton, Alberta.

Benville, A. Data Manager, Saskatchewan Conservation Data Centre, Regina, Saskatchewan.

Buell, D. Land Administrator – Habitat, Wildlife & Access, Eastern Irrigation District, Brooks, Alberta.

Court, G. Provincial Wildlife Status Biologist, Environment and Parks, Edmonton, Alberta.

Davis, K. Scientific Project Officer & ATK Coordinator, COSEWIC Secretariat, Gatineau, Quebec.

Davis, S.K. Wildlife Biologist, Canadian Wildlife Service, Regina, Saskatchewan.

De Smet, K. Species at Risk Biologist, Manitoba Conservation Data Centre, Winnipeg, Manitoba.

Gutsell, R. Wildlife Status Biologist, Government of Alberta, Edmonton, Alberta.

Latremouille, L. Saskachewan Breeding Bird Atlas Coordinator, Bird Studies Canada, Saskatoon, Saskatchewan.

McLoughlin, P. Associate Professor, Department of Biology, University of Saskatchewan, Saskatoon, Saskatchewan.

Mehl, K. Manager, Landscape and Habitat Assessment, Saskatchewan Ministry of Environment, Saskatoon, Saskatchewan.

Murray, C. Biodiversity Information Manager, Manitoba Conservation Data Centre, Winnipeg, Manitoba.

Nobre Soares, R. GIS and Scientific Project Officer, COSEWIC Secretariat, Ottawa, Ontario.

Pruss, S. Species Conservation Specialist, Parks Canada, Fort Saskatchewan, Alberta.

Schnobb, S. Program Support Specialist, COSEWIC Secretariat, Gatineau, Quebec.

Stephens, S. Resource Data Technician, Alberta Environment and Parks, Edmonton, Alberta.

Timm, K. Scientific Project Officer, COSEWIC Secretariat, Gatineau, Quebec.

Watkins, W. Zoologist, Manitoba Conservation Data Centre, Winnipeg, Manitoba.

Wilson, G. A/Head Conservation Planning Unit, Canadian Wildlife Service, Edmonton, Alberta.

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## BIOGRAPHICAL SUMMARY OF REPORT WRITER(S)

Sarah Ludlow is a conservation scientist with the Nature Conservancy of Canada, based in Regina, Saskatchewan. She earned her Bachelor of Science degrees in Biology and Geography and her M.Sc. in Biology from the University of Regina. Sarah's graduate work focused on the effects of oil and natural gas development on grassland songbirds. Sarah has worked on a variety of projects related to species at risk, avian monitoring and assessment, and habitat conservation. She was also a contributing writer on the Recovery Strategy for the Chestnut-collared Longspur (*Calcarius ornatus*) in Canada.

## COLLECTIONS EXAMINED

No museum specimens were examined in the preparation of this status report.

## Appendix 1. Threat calculator results for Chestnut-collared Longspur.

| | | | | |
|---|---|---|---|---|
| **Species or Ecosystem Scientific Name** | Calcarius ornatus | | | |
| **Element ID** | | **Elcode** | | |
| **Date (Ctrl + ";" for today's date):** | 10/04/2019 | | | |
| **Assessor(s):** | Sarah Ludlow (report writer), Marcel Gahbauer (co-chair), Dwayne Lepitzki (facilitator), Richard Elliot, Christian Artuso, Jean-Pierre Savard, Louise Blight, Andy Horn, Maggi Sliwinski, Stephen Davis, Nancy Mahoney, Gord Court, Ryan Fisher, Nicola Koper, Marie-France Noel | | | |
| **References:** | | | | |
| | | | | |
| **Overall Threat Impact Calculation Help:** | | **Level 1 Threat Impact Counts** | | |
| | **Threat Impact** | | **high range** | **low range** |
| | A | Very High | 0 | 0 |
| | B | High | 1 | 1 |
| | C | Medium | 2 | 0 |
| | D | Low | 4 | 6 |
| **Calculated Overall Threat Impact:** | | Very High | | High |
| | | | | |
| **Assigned Overall Threat Impact:** | **AB = Very High - High** | | | |
| **Impact Adjustment Reasons:** | | | | |
| **Overall Threat Comments** | Generation length is 2-3 years, therefore the time frame for evaluating severity and timing is 10 years. The calculated overall threat impact of very high to high is consistent with the estimated rate of decline of 53% over the past ten years, and indications that the trend is continuing to worsen. | | | |

| **Threat** | | **Impact (calculated)** | | **Scope (next 10 Yrs)** | **Severity (10 Yrs or 3 Gen.)** | **Timing** | **Comments** |
|---|---|---|---|---|---|---|---|
| 1 | Residential & commercial development | | | | | | This species generally does not occur near urban/commercial areas, and there is minimal likelihood of it being affected by such development. |
| 1.1 | Housing & urban areas | | | | | | |
| 1.2 | Commercial & industrial areas | | | | | | |
| 1.3 | Tourism & recreation areas | | | | | | No new facilities are expected within the near future. |
| 2 | Agriculture & aquaculture | B | High | Large (31-70%) | Serious (31-70%) | High (Continuing) | |

| Threat | | Impact (calculated) | | Scope (next 10 Yrs) | Severity (10 Yrs or 3 Gen.) | Timing | Comments |
|---|---|---|---|---|---|---|---|
| 2.1 | Annual & perennial non-timber crops | B | High | Large (31-70%) | Serious (31-70%) | High (Continuing) | Current rates of conversion in Alberta and Saskatchewan are low and not expected to increase greatly over the next ten years, but there has been accelerated loss of native grassland in Manitoba in recent years. Changes to agricultural policy could increase the risk of conversion of native grassland to more marketable crop products. Habitat loss is currently a larger concern on the wintering grounds, especially in northern Mexico where availability and suitability of habitat is being reduced through rapid conversion of grasslands to crops or hay fields, as well as increases in irrigation and depletion of water tables. |
| 2.2 | Wood & pulp plantations | | | | | | |
| 2.3 | Livestock farming & ranching | | Not a Threat | Pervasive (71-100%) | Neutral or Potential Benefit | High (Continuing) | Livestock grazing occurs through most of the breeding and wintering grounds. Overgrazing can reduce habitat suitability, and trampling of nests can contribute to mortality. However, lack of grazing may be of greater concern, as Chestnut-collared Longspurs prefer short vegetation. Grazing is therefore in principle beneficial for this species by maintaining optimal habitat, especially for breeding. However, because not all grazing is well managed, the overall effect on the species may be neutral rather than positive. |
| 2.4 | Marine & freshwater aquaculture | | | | | | |
| 3 | Energy production & mining | D | Low | Restricted (11-30%) | Moderate (11-30%) | High (Continuing) | |
| 3.1 | Oil & gas drilling | D | Low | Restricted (11-30%) | Moderate (11-30%) | High (Continuing) | Chestnut-collared Longspurs appear sensitive to disturbance associated with oil and gas drilling, although threshold distances are not well understood. The effects of oil and gas development are somewhat mixed, but overall are negative, and the effects of oil development are typically greater than gas. Helium production may be an emerging issue in Saskatchewan. |
| 3.2 | Mining & quarrying | D | Low | Small (1-10%) | Moderate (11-30%) | High (Continuing) | Gravel extraction and mining occurs in all three prairie provinces, but scope is likely toward the low end of the small range. These activities result in complete loss of habitat at a local scale; in some cases birds will be able to move to adjacent habitat, but it may have reduced suitability. |

| Threat | | Impact (calculated) | | Scope (next 10 Yrs) | Severity (10 Yrs or 3 Gen.) | Timing | Comments |
|---|---|---|---|---|---|---|---|
| 3.3 | Renewable energy | D | Low | Small (1-10%) | Moderate - Slight (1-30%) | High (Continuing) | Some evidence suggests displacement of Chestnut-collared Longspurs by wind turbine developments; risk of mortality from this source is possible but undocumented. |
| 4 | Transportation & service corridors | D | Low | Large (31-70%) | Slight (1-10%) | High (Continuing) | |
| 4.1 | Roads & railroads | D | Low | Large (31-70%) | Slight (1-10%) | High (Continuing) | At a landscape scale, Chestnut-collared Longspurs tend to avoid roads, but those that nest near them may experience reduced productivity; effects of roads can extend to approximately 500 m. Scope is likely near the high end of the range scored. There is also potential for mortality from vehicle collisions. |
| 4.2 | Utility & service lines | D | Low | Large (31-70%) | Slight (1-10%) | High (Continuing) | It is likely that a majority of Chestnut-collared Longspurs are exposed to utility and service lines, and that there is at least a slight mortality risk from collisions, as for most other species. Large networks of transmission and power lines exist across the prairies, which in addition to posing a collision risk, provide perches for avian predators. |
| 4.3 | Shipping lanes | | | | | | |
| 4.4 | Flight paths | | | | | | |
| 5 | Biological resource use | | | | | | |
| 5.1 | Hunting & collecting terrestrial animals | | | | | | |
| 5.2 | Gathering terrestrial plants | | | | | | |
| 5.3 | Logging & wood harvesting | | | | | | |
| 5.4 | Fishing & harvesting aquatic resources | | | | | | |
| 6 | Human intrusions & disturbance | | Negligible | Negligible (<1%) | Negligible (<1%) | High (Continuing) | |
| 6.1 | Recreational activities | | Negligible | Negligible (<1%) | Negligible (<1%) | High (Continuing) | There is minimal recreational activity in most Chestnut-collared Longspur habitat, and its frequency and intensity likely limits the severity of effects to negligible. Birders actively seek this species but mostly focus on roadsides or a few publicly accessible locations that support a negligible proportion of the population. |

| Threat | | Impact (calculated) | | Scope (next 10 Yrs) | Severity (10 Yrs or 3 Gen.) | Timing | Comments |
|---|---|---|---|---|---|---|---|
| 6.2 | War, civil unrest & military exercises | | Unknown | Small (1-10%) | Unknown | High (Continuing) | There are several Canadian Forces Bases with extensive native grassland (most notably CFB Suffield and Shilo). Although military exercises may cause some disturbance, bases have staff biologists responsible for managing sites to comply with the federal *Species at Risk Act*, and the protection of large areas of grassland from agricultural or industrial development may be positive. Overall, effects of military activities apply to only a small portion of the population, and severity is unknown, but possibly beneficial. |
| 6.3 | Work & other activities | | Negligible | Negligible (<1%) | Negligible (<1%) | High (Continuing) | Some research is undertaken on this species, including capture and release for banding studies (Hill 1997).<br>The handling of individuals is subject to high standards of animal care safety, but presence of researchers and equipment (e.g., posts or cameras that can attract or serve as perches for predators) have potential to affect Chestnut-collared Longspurs. However, both scope and severity are likely negligible in most cases |
| 7 | Natural system modifications | CD | Medium - Low | Large (31-70%) | Moderate - Slight (1-30%) | High (Continuing) | |
| 7.1 | Fire & fire suppression | D | Low | Pervasive (71-100%) | Slight (1-10%) | High (Continuing) | Fire can be beneficial for Chestnut-collared Longspur, but is largely suppressed except in some protected areas that undertake prescribed burns. Woody encroachment due to fire suppression can result in loss of limited remaining grassland habitat. Grazing has filled the role of fire in many parts of the species' range, reducing the severity of this threat. |
| 7.2 | Dams & water management/use | | | | | | |

| Threat | | Impact (calculated) | | Scope (next 10 Yrs) | Severity (10 Yrs or 3 Gen.) | Timing | Comments |
|---|---|---|---|---|---|---|---|
| 7.3 | Other ecosystem modifications | CD | Medium - Low | Large (31-70%) | Moderate - Slight (1-30%) | High (Continuing) | Invasive plant species are becoming increasingly prevalent in remnant grassland communities, with evidence that some (e.g., Crested Wheatgrass) are associated with lower nest survival and slower nestling growth for Chestnut-collared Longspur. There is little research investigating the threshold for longspurs to tolerate varying amounts of invasive grasses. Reduction of arthropod prey due to pesticides is likely not a particular concern for Chestnut-collared Longspur, as the grassland ecosystem is not bottom-regulated. |
| 8 | Invasive & other problematic species & genes | D | Low | Small (1-10%) | Slight (1-10%) | High (Continuing) | |
| 8.1 | Invasive non-native/alien species/diseases | D | Low | Small (1-10%) | Slight (1-10%) | High (Continuing) | Feral cats are a concern for all ground-nesting birds. However, as Chestnut-collared Longspurs generally occur far from human habitation, they are likely to have only a small exposure to this threat. |
| 8.2 | Problematic native species/diseases | | | | | | Parasitism by Brown-headed Cowbirds is relatively infrequent, and is considered a limiting factor rather than a threat. Similarly, although there are various natural predators of Chestnut-collared Longspur, it is not apparent that their abundance has increased over time, therefore their influence on the species is also considered a limiting factor rather than a threat. |
| 8.3 | Introduced genetic material | | | | | | |
| 8.4 | Problematic species/diseases of unknown origin | | | | | | |
| 8.5 | Viral/prion-induced diseases | | | | | | |
| 8.6 | Diseases of unknown cause | | | | | | |
| 9 | Pollution | CD | Medium - Low | Pervasive - Large (31-100%) | Moderate - Slight (1-30%) | High (Continuing) | |
| 9.1 | Domestic & urban waste water | | | | | | |
| 9.2 | Industrial & military effluents | | | | | | |

| Threat | | Impact (calculated) | | Scope (next 10 Yrs) | Severity (10 Yrs or 3 Gen.) | Timing | Comments |
|---|---|---|---|---|---|---|---|
| 9.3 | Agricultural & forestry effluents | CD | Medium - Low | Pervasive - Large (31-100%) | Moderate - Slight (1-30%) | High (Continuing) | Although not documented specifically for Chestnut-collared Longspur, records exist of thousands of Lapland Longspurs dying from eating seeds coated with pesticides. The spring migration of Chestnut-collared Longspur corresponds with the planting of coated seeds in the United States. Because Chestnut-collared Longspurs tend to breed away from croplands and edges, this may be a lower threat during the breeding season and more of a concern during migration and over winter. More research is required to address uncertainty in the scope and severity of this threat. |
| 9.4 | Garbage & solid waste | | | | | | |
| 9.5 | Air-borne pollutants | | | | | | |
| 9.6 | Excess energy | D | Low | Large (31-70%) | Slight (1-10%) | | Chestnut-collared Longspur is primarily a diurnal migrant, but sometimes flies at night and may be at risk from effects of light pollution. It has been found to be sensitive to noise produced by infrastructure, up to 300-400 m from the source, with the magnitude of effect dependent on the type of noise, and often overlapping with other edge effects. |
| 10 | Geological events | | | | | | |
| 10.1 | Volcanoes | | | | | | |
| 10.2 | Earthquakes/tsunamis | | | | | | |
| 10.3 | Avalanches/landslides | | | | | | |
| 11 | Climate change & severe weather | D | Low | Restricted - Small (1-30%) | Moderate - Slight (1-30%) | High (Continuing) | |
| 11.1 | Habitat shifting & alteration | | Unknown | Unknown | Unknown | High (Continuing) | Although some shifts in habitat are likely underway, they are not easily quantified over a short time frame, and can be impacted by or masked by changes in land use. |
| 11.2 | Droughts | | Unknown | Pervasive (71-100%) | Unknown | High (Continuing) | Moisture conditions vary naturally on the Canadian prairies both temporally and geographically. However, a long-term review found little annual variation in the distribution centroid in response to fluctuations in environmental conditions (Wilson *et al.* 2018). Effects of drought may therefore be negligible, but more study is needed. |

| Threat | | Impact (calculated) | | Scope (next 10 Yrs) | Severity (10 Yrs or 3 Gen.) | Timing | Comments |
|---|---|---|---|---|---|---|---|
| 11.3 | Temperature extremes | | | | | | The natural range of temperatures during the breeding season is fairly high and it is unlikely that this will increase substantially over the next 10 years. |
| 11.4 | Storms & flooding | D | Low | Restricted - Small (1-30%) | Moderate - Slight (1-30%) | High (Continuing) | Nest losses can be caused by extreme weather events, and there is evidence of these increasing in frequency and intensity. Storms are often localized and not range wide; however, a portion of the population is likely affected by extreme weather events on a regular basis. The severity of this effect may be fairly low given that the species renests easily, though recruitment is lower from nests initiated later in the breeding season. |
| 11.5 | Other impacts | | | | | | |
| Classification of Threats adopted from IUCN-CMP, Salafsky et al. (2008). | | | | | | | |