

**Range, Abundance and Movement Patterns of
Wintering Streaked Horned Larks (*Eremophila alpestris strigata*)
In Oregon and Washington**

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2005

Prepared for: The Nature Conservancy, Ft. Lewis, and U.S. Fish and Wildlife Service

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Recommended Citation: Pearson, S.F., M. Hopey, W. D. Robinson, R. Moore. 2005. Range, Abundance and Movement Patterns of Wintering Streaked Horned Larks (*Eremophila alpestris strigata*) in Oregon and Washington. Natural Areas Program Report 2005-2. Washington Dept. of Natural Resources. Olympia, WA.

INTRODUCTION

The Streaked Horned Lark (*Eremophila alpestris strigata*) is a recognized subspecies of the Horned Lark (AOU 1957). The breeding range of the lark has contracted over time with the loss of larks from British Columbia, the northern Puget lowlands of Washington and the loss of breeding larks in the Rogue Valley in Oregon (Rogers 2000, Altman 1999). Because of this apparent reduction in the breeding range and because there are few breeding populations remaining, this subspecies is: 1) a priority species for conservation by Oregon-Washington Partners in Flight (Altman 2000) and British Columbia Partners in Flight (Fraser et al. 1999); 2) listed as State Sensitive by the Oregon Department of Fish and Wildlife (Critical Status; Oregon Sensitive Species List, 1997); 3) listed as a candidate for listing under the Washington Endangered Species Act (Washington Department of Fish and Wildlife, 28 October 1998); 4) considered a Red list species in British Columbia; 5) listed as a federal Candidate species under the Endangered Species Act, U.S. Fish and Wildlife Service.

Over the past three breeding seasons, considerable work has been devoted to understanding the habitat requirements and assessing reproductive success of breeding larks in the southern Puget Sound and along the Washington Coast and lower Columbia River (Pearson 2003, Pearson and Hopey 2004, Pearson and Hopey 2005). Little is known about this subspecies wintering range or movement patterns between breeding and wintering locations. The goals of this work are: 1) survey and count all Streaked Horned Larks on known wintering sites; and 2) assess movement patterns between breeding and wintering sites.

METHODS

Streaked Horned Lark habitat was surveyed for wintering birds from November 2004 through February 2005 in Oregon and Washington. For the most part, Doug Robinson and Randall Moore at Oregon State University surveyed Oregon habitat from the Portland area south and Mark Hopey and Scott Pearson surveyed Washington and Columbia River island sites (see Figure and Table 1 for a map and list of localities). In Washington, we surveyed nearly all known breeding and wintering sites, appropriate habitats, and any sites identified by local birders (a request for information on wintering larks was sent out on a regional birding listserv). In Oregon, Robinson and Moore (2004) surveyed 18 lat/long blocks selected at random and 295 point counts within those blocks during the winter of 2003-2004 and found Streaked Horned Larks to be present in the Willamette and Columbia River valleys throughout the winter. During the winter of 2004-2005, we re-surveyed all the sites where birds were located during the 2003-2004 survey. In addition, we visited the Rogue River Valley and any new sites identified by local birders.

We visited five sites in the Puget Sound region including 4 airfields and a native Puget prairie. On the coast of Washington, we surveyed 4 sites composed of low dunes,

sparsely vegetated beach and accreted lands, primarily along the central coast. On the Columbia River, we surveyed 6 island sites created primarily through dredge spoil dumping and we surveyed one site along the Columbia River floodplain north of Portland, Oregon. In the Willamette Valley region, we surveyed 12 sites composed primarily of agricultural lands in Linn, Benton, Polk and Marion Counties. Finally, we surveyed one agricultural site in the Rogue River Valley (Jackson County).

Sites were visited 1 to 8 times during the winter, and the amount of effort spent searching for birds varied due to timing, location and winter weather conditions. During each survey we recorded the total number of horned larks and other flock associated species and the subspecies, age and sex of each Streaked Horned Lark.

Larks were banded in the Puget lowlands, Washington coast and Columbia River islands as adults and nestlings during the 2002 and 2004 breeding seasons. In 2002, we banded 26 nestlings with a USFWS band and a unique color combination and in 2004, we banded 24 adults and 61 nestlings with USFWS bands and unique color combinations. For all birds observed during our winter surveys, we attempted to identify all banded birds and all band combinations. We use this information to assess movement patterns between wintering and breeding locations and among wintering locations.

RESULTS

Winter distribution, counts and habitat associations

We conducted 62 visits to 28 sites located in Oregon and Washington [Puget Sound $n = 5$, Washington Coast $n = 4$, Columbia River $n = 7$, Willamette and Rogue Valleys $n = 12$ (Figure 1, Table 1)]. No Streaked Horned Larks were observed at twelve of the 28 sites surveyed. Larks were found in large flocks consisting of Streaked Horned Larks and other subspecies of Horned Lark (2-125 Streaked Horned Larks/1-170 Larks) in the Willamette Valley, variable sized flocks of larks on Columbia River islands (1-61 Streaked Horned Larks/1-69 Larks) and Washington coast (12-30 Streaked Horned Larks/no other subspecies of Lark) and in pairs or small flocks (1-2 Streaked Horned Larks/4-5 Larks) in the Puget lowlands (Table 1). Using the maximum Streaked Horned Lark count during any one visit to a site, we estimate that the maximum number of Streaked Horned Larks at all of the sites we surveyed was 542 birds. Caution should be used when using this number as an estimate of the total Streaked Horned Lark population for two reasons: 1) we did not survey all potential wintering locations and, if we did miss birds/localities of wintering birds, this is a low estimate; and 2) our re-sighting of banded birds suggest that birds move among Columbia River islands and between islands and the Washington coast during the winter. The movement of birds among sites could result in double counting birds and ultimately an overestimate of the population size. Of these 542 birds, 72% were observed in the Willamette Valley, 20% on Columbia River islands or floodplain, 8% on Washington coast, and 1% on a Puget Sound airport and prairie (see Table 1). There is no apparent geographic pattern to age or sex ratios.

Only three wintering larks were observed in the Puget lowlands and they were found on the Olympia Airport (1 male and 1 female) and one bird was observed on 13th Division Prairie. On the Washington coast, larks were found on dune and beach habitat. Larks on the lower Columbia River were primarily found on sparsely vegetated dredge spoils. Wintering birds on all of these sites are using the same habitats and locations used by breeding birds. For a detailed quantitative description of these habitat types see Pearson and Hopey (2005). Most of the birds in the Willamette Valley were found in fallow rye grass fields with little or no grass cover.

Figure 1. Oregon and Washington localities where Streaked Horned Larks were present and absent during our winter surveys.

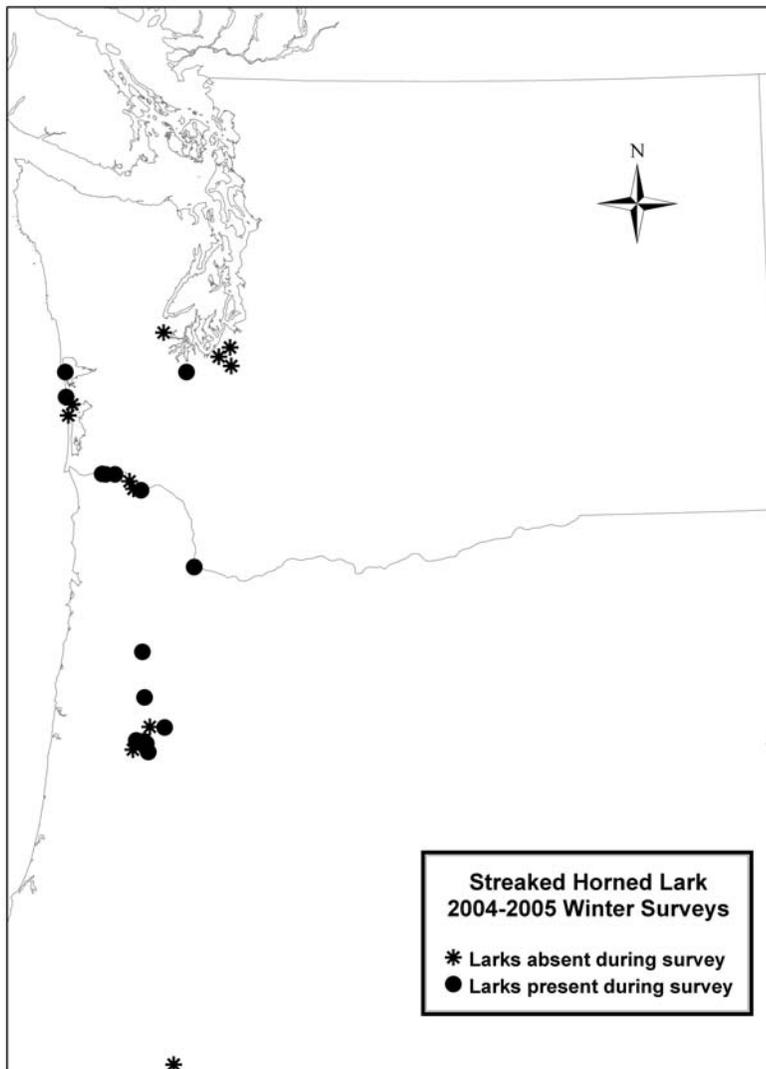


Table 1. Number of visits and maximum number of Horned Larks (all subspecies), Streaked Horned Larks, female Streaked Horned Larks, male Streaked Horned Larks and unknown sex of Streaked Horned Larks at sites in Oregon and Washington during the winter of 2004-05.

Site	State	Visits	HOLA	STHL	Female STHL	Male STHL	Unknown Sex STHL	County
Puget Sound								
McChord AF Base	WA	1	0	0	0	0	0	Pierce
Gray Army Airfield	WA	2	0	0	0	0	0	Pierce
13th Division Prairie	WA	4	7	1	1	0	0	Pierce
Olympia Airport	WA	3	5	2	1	1	0	Thurston
Shelton Airport	WA	2	0	0	0	0	0	Macon
Coastal Washington								
Damon Point	WA	2	12	12	4	6	2	Grays Harbor
Midway Beach	WA	3	~30	30	6	6	~18	Pacific
Graveyard Spit	WA	1	0	0	0	0	0	Pacific
Ledbetter Point	WA	1	0	0	0	0	0	Pacific
Columbia River								
Whites Island	WA	2	20	18	9	6	3	Wahkiakum
Lark Island ¹	OR	1	0	0	0	0	0	Clatsop
Coffeepot Island	WA	1	0	0	0	0	0	Wahkiakum
Pillar Rock Island ²	OR	1	2	2	1	1	0	Clatsop
Miller Sands	OR	1	1	1	0	0	1	Clatsop
Rice Island	WA/ OR	1	27	27	9	10	8	Clatsop/ Wahkiakum
Rivergate (N. Portland)	OR	4	69	61	23	28	10	Multnomah
Willamette Valley								
Livermore Rd.	OR	3	24	23	14	9	0	Polk
Harvest	OR	1	4	0	0	0	0	Linn
Dawson Rd.	OR	2	1	0	0	0	0	Benton
Creek Rd.	OR	11	~170	~125	0	~60	~65	Linn
Peoria Rd.	OR	1	2	2	1	1	0	Linn
Nicewood Rd.	OR	1	1	0	0	0	0	Linn
Cook Rd.	OR	1	4	0	0	0	0	Linn
Blatchford Rd	OR	1	35	35	13	12	10	Linn
Polk/Benton Co. line	OR	1	43	43	20	23	0	Polk-Benton
Guerber Rd	OR	2	~100	~80	0	0	~80	Benton
Malpass Rd	OR	4	110	80	0	0	80	Linn
Rogue Valley								
Ashland	OR	1	12	0	0	0	0	Jackson
Totals			~676	~542	102	163	~277	

¹Lark island is our name for an un-named island located just upstream of Tenasillahe Island across a narrow slough

²Pillar Rock Island is also known as Jim Crow Island

In the Willamette Valley, over wintering site fidelity among years appears to be low. We re-surveyed all sites where larks were found during the 2003/2004 winter and larks were present at only one of these sites during the 2004/2005 winter. We suspect this low site fidelity occurs because of the dynamic nature of over wintering habitat. Sites with Larks and appropriate habitat in 2003/2004 had inappropriate habitat and no Larks in 2004/2005. These sites moved from being fallow in 2003/2004 to being densely vegetated with annual rye grass in 2004/2005. Larks appear to move across the landscape in search of appropriate habitat and, when appropriate habitat is discovered, they appear to use it. During the winter of 2004/2005, very few agricultural fields were in a condition appropriate for over wintering larks suggesting that this habitat type may be limiting at times.

Movement Patterns

Streaked Horned Larks banded in the southern Puget Sound during the breeding season were re-sighted on the Washington Coast and Willamette Valley during the winter (Table 2). Birds banded on the Washington coast during the breeding season were re-sighted on the Washington coast and the Willamette Valley during the winter (Table 2). Birds banded on the Columbia River during the breeding season were re-sighted on the Columbia River and Washington coast during the winter.

Table 2. Streaked Horned Lark breeding season banding locations and locations of winter re-sightings. Winter re-sightings occurred from November 2004 through February, 2004-2005. ASY = after hatch year birds (banded as adults in 2002 or 2004); SY = second year birds (banded as nestlings or fledglings in 2002 or 2004). 7 ASY (10) = seven after second year birds were re-sighted during the winter and one or more of these 7 birds were re-sighted on 3 additional occasions for a total of 10 re-sights.

		Winter re-location sites			
		Puget Sound	Washington Coast	Columbia River islands, OR & WA	Willamette Valley, OR
Summer banding locations	Puget Sound	-	2 ASY (2)	-	1 SY (1) 1 ASY (1 definite, 2 possible)
	Washington Coast	-	7 ASY (10) 2 SY (4)	-	1 SY (3)
	Columbia River islands	-	2 ASY (2)	3 ASY (5) 1 SY (1)	-

Several lines of evidence suggest that Streaked Horned Larks in the Puget lowlands are migrating south for the winter: 1) only 3 birds were observed during the winter in the southern Puget Sound and we know that at least 216 birds are in the southern Puget Sound during the breeding season (Pearson and Hopey 2005) indicating that birds are moving to other locations during the winter; and 2) birds banded in the southern Puget

Sound during the breeding season were re-sighted to the south in the Willamette Valley during the winter. Multiple re-sights of the same bird in the Willamette Valley, Columbia River and on the Washington Coast suggests that birds are staying in these regions throughout the winter.

We identified approximately 43 territories or 86 birds (all birds appeared paired) on the coast during the 2004 breeding season but only 42 birds were observed during the winter suggesting that we are either not locating all of the wintering birds or that some of these larks are moving to the Columbia River or Willamette Valley for the winter. Birds banded on the coast were re-detected along the coast and the Willamette Valley suggesting that some birds are moving to the Willamette Valley for the winter.

Two birds banded on the Columbia River were detected on the coast suggesting some seasonal exchange between these sites. The north Portland sight, also along the Columbia River, was not surveyed during the breeding season. However, the large concentration of birds in this area relative to the available habitat for breeding suggests that birds are moving into this area from the Puget lowlands or from the Washington coast.

Unfortunately, no birds were banded in the Willamette Valley during the breeding season and, as a result, we don't know if there is movement of birds between the Willamette Valley and either the Washington coast or Columbia River. Larks that breed in the Willamette Valley are probably resident because birds remain in the valley year round and are found in large flocks during the winter.

The sample size of re-sighted individuals was too small to look at differences in movement patterns between males and females and between first year birds and older birds. The sample size is also too low to look at differences in survival using mark recapture methods.

NEW FINDINGS AND RECOMMENDATIONS

New Findings

- First nearly comprehensive winter survey of known and potential over-wintering sites in the Puget Sound, Washington coast, Columbia River, Willamette Valley and Rogue River Valley
- The vast majority of the Streaked Horned Larks winter in the Willamette Valley (72%) and on the lower Columbia River (20%)
- Birds from the Puget lowlands move south to the Willamette Valley or to the Washington coast
- Many birds on the Washington coast and lower Columbia River appear to be resident or move between these two regions
- In the Willamette Valley, over wintering site fidelity among years appears to be low

Management Implications

- Apparently most of the over-wintering streaked horned Larks are found on the lower Columbia River and Willamette Valley suggesting the importance of these habitats to larks. Streaked Horned Larks in these two regions are found in lark flocks (up to 125 Streaked Horned Larks in a single flock in the Willamette Valley and up to 61 Streaked Horned Larks in a single flock on the Lower Columbia) that are vulnerable to changes in habitat or stochastic events.
- We counted only 61 Streaked Horned Larks at the Multnomah County site during the winter of 2004/2005 but counted 150-200 Larks in the previous two years. This decline may be the result of changes in habitat conditions. Some grading occurred at the site in preparation for development resulting in completely unvegetated habitat and other parts of the site continued to be colonized by vegetation resulting in a higher percent cover of vegetation and making it less suitable to wintering Larks. In addition, there are survey markers on the site indicating that it will likely be developed in the near future.
- There are opportunities to create additional lark habitat on islands in the Columbia River through the deposition of dredge spoils. To maintain and deepen the Columbia River shipping channel, the Army Corps of Engineers deposits dredge spoils on many of the islands used by breeding larks. The timing, location and the amount of deposited materials can have dramatic impacts on the lark. To benefit the larks we recommend that spoils not be deposited on active over-wintering localities or immediately adjacent to over-wintering habitats during the winter. The un-vegetated landscape created by depositing dredge spoils is not used by larks for the first year or two after deposition. Spoils that are sparsely vegetated with annual grasses and a mixture of forbs are used by over-wintering larks. Consequently, keeping an adequate amount of habitat in appropriate successional stages is critical to maintaining Columbia River lark populations.
- Larks move among islands and appear to colonize suitable habitat (Pearson and Hoey unpubl.). In addition to creating new wintering and breeding habitat,

dredge spoils can be used to convert unsuitable habitats into suitable habitats. For example, if spoils are colonized by Scotch broom or equisetum (habitats not used by larks) they can be converted to appropriate habitats by depositing additional spoils.

- On the Washington coast, over-wintering larks use sparsely vegetated sandy areas. This habitat type is created by the accretion of sandy soils. These accreted soils are colonized by non-native beachgrasses (*Ammophila spp*) fairly quickly. We found that larks do not use habitats with a dense covering of beachgrass for breeding or over-wintering habitats. Consequently, maintaining habitat for larks on the coast requires either controlling non-native beachgrasses or maintaining the dynamic processes that create accreted habitats.
- In the Willamette Valley, Larks primarily use sparsely vegetated agricultural fields suggesting the need to maintain this habitat type in the long-term.
- Although no quantitative analysis of Streaked Horned Lark wintering habitat exists, we have found that over-wintering larks use habitats identical or very similar to breeding habitats. In the absence of quantitative winter habitat data we recommend maintaining relatively short grasses and forbs with little or no woody vegetation [0-6 inches (Altman 1999); 3.9 – 13.3 inches (Person and Hopey 2005)] and a relatively high percent of bare ground [17% (Altman 1999); 16% (Pearson and Hopey 2005)]. Altman (1999) recommended a higher percent cover of bare ground (31%) for Streaked Horned Lark nest sites. For foraging, Streaked Horned Larks select sites with low vegetation (mean = 4.2 inches), and with low vegetation density during the breeding season (Rogers 2000). A review of the effects of management practices on the horned lark (Dinkins et al. 2003) also indicates that larks prefer areas with short, sparse herbaceous vegetation with little or no woody vegetation.

Research Needs

- Quantify over-wintering habitat selection (examine habitat use vs. availability)
- Examine the relative importance of different wintering sites to lark survival
- Examine the dynamic relationship between intensive agricultural practices and Lark wintering habitat
- Further quantify movement patterns between breeding and wintering sites and movement patterns among wintering sites
- Determine whether or not streaked horned larks over-winter in California

ACKNOWLEDGMENTS

Funding was provided by Department of Defense (Ft. Lewis) to The Nature Conservancy, and US Fish and Wildlife Service. The following agencies provided access to research sites and logistic support: Port of Olympia (Olympia Airport), US Army (Ft. Lewis), and US Fish and Wildlife Service (Leadbetter Point). The following individuals provided invaluable logistic support and assistance: Sally Alhadeff, Hannah Anderson, Florence Caplow, Tara Chestnut, Alan Clark, Col. Steele Clayton, Dave Clouse, Pat Dunn, Al Frey and Kathy Gunther. Thank you all and a special thanks to Alan Clark with the US Fish and Wildlife Service for assisting with the lower Columbia River island surveys.

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