Photo: Rod Gilbert

Streaked Horned Lark Habitat Characteristics

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Purpose Statement

In this document, we attempt to identify landscape, site, and patch habitat features used by breeding streaked horned larks (*Eremophila alpestris strigata*). We provide this information in a hierarchical framework from weakest to strongest evidence of suitable habitat to help inform where to focus potential survey effort. We relied primarily on quantitative assessments to describe lark habitat but also use descriptions of occupied habitats and expert opinion where necessary.

When using this document, it is important to consider that we had little to no information on the relative influence of different habitat conditions on lark reproduction and survival. In addition, larks readily use landscapes recently modified by humans (e.g., airfields, expanses of dredged material, agricultural fields), which indicates that the landscapes used by larks today are not necessarily reflective of those used in the past. Thus, we don't discuss the fitness consequences of habitat selection to larks.

Finally, because larks tend to use early successional habitats and vegetation conditions may change rapidly within and between seasons, habitat suitability may change over time depending on the site, the type of vegetation, and the nature of past and ongoing human disturbance. Because of these changing conditions, it may be necessary to periodically re-evaluate a site's suitability. Our descriptions of landscape, site, and patch characteristics do not include information on the habitat used by larks historically or in portions of its range that are no longer occupied.

This document is not regulatory. It is up to regulatory agencies to determine if and how to use the information in this report. Our goal is to help focus monitoring and surveys in areas that are more likely to supporting nesting larks. Streaked horned larks are federally listed as Threatened under the Endangered Species Act, which is regulated and enforced by the US Fish and Wildlife Service. If readers have questions about habitat suitability or the need to conduct surveys, they should contact their local US Fish and Wildlife Service office for guidance.

Streaked Horned Lark Basics

The streaked horned lark[1] is a rare subspecies of the wide-ranging horned lark. It is listed as threatened under the federal Endangered Species Act and by the State of Washington. Streaked horned larks occur only in the Pacific Northwest and the range-wide population has been estimated at less than 2000 individuals (Altman 2011). The streaked horned lark faces a variety of conservation challenges including habitat loss, disturbance from human activities, high predation rates, low fecundity, small population size, low genetic diversity, and possibly the consequences of inbreeding (Camfield et al. 2010, 2011, USFWS 2013, Drovetski et al. 2005).

Larks are ground-nesting song birds that use short, sparsely-vegetated habitats dominated by grasses and forbs situated within wide open areas with few trees, shrubs or other tall

[1] In this document we use both the full common name "streaked horned lark" and also refer to this subspecies as "lark."

objects (Pearson & Hopey 2005). In winter larks feed primarily on seeds. During the nesting season, they eat invertebrates and seeds and exclusively feed invertebrate prey to their young (Beason 1995). Based on clutch initiation dates and behavioral observations, we have grouped the timing of different stages of the lark's life history into the following four general categories: pre-breeding, breeding, post-breeding, and wintering. It is important to note the timing of stages for individual birds may not perfectly align with the following dates.

Pre-breeding stage: mid-February through early-April. During this period lark flocks are breaking up, individuals begin arriving on breeding grounds and males begin to defend territories (Pearson 2003).

Breeding stage: mid-April – July. During this period the majority of lark breeding activity occurs. Male larks select and defend territories within which female larks build their nests on the ground, excavating and lining a small nest cup on the north side of a plant. Pairs can initiate up to 5 nest attempts per season (Stinson 2005), but 1-3 attempts is most common (Pearson et al. 2008, Anderson 2010, Camfield et al. 2010). Only the female incubates eggs, yet both parents feed and tend nestlings and fledglings (Beason 1995). Incubation lasts about 12 days and once hatched, nestlings remain in the nest for about 7-9 days (Beason 1995). Lark young are quite vulnerable immediately after leaving the nest because their feathers are not completely formed and they cannot fly. They become adept flyers about 2 weeks after fledging (Wolf and Anderson 2013).

Post-breeding stage: August – September. Most breeding attempts are complete by mid-August and territorial and aggressive behaviors are exhibited less often. Flocking begins. However, during this period breeding activity may still be occurring for some individuals and there may still be nests or vulnerable flightless juveniles on the ground (Wolf and Anderson 2013).

Wintering Stage: October – mid-February. During this period larks form wintering flocks. Some lark populations and individuals migrate south in the winter and others are resident on breeding grounds year-round (Pearson et al 2005a). In general, larks in the Puget lowlands winter on the lower Columbia River/ Washington coast or the Willamette Valley (Pearson et al. 2005a).

Geographic Scope

Historic Range

Streaked horned larks are endemic to lowland habitats west of the Cascade Mountains in the Pacific Northwest (i.e. their range is entirely in this area) (Altman 2011). Their historical breeding range included wet and dry prairie habitats and potentially ephemeral wetlands in the Georgia Depression in British Columbia, the Puget Trough, Willamette Valley, and the Rogue River Valley in southern Oregon (Rogers 2000, Stinson 2005, Altman 2011)(Figure 1). The historic range depicted in Figure 1 is based on Behle (1942) and historic occurrences on Stinson (2005).

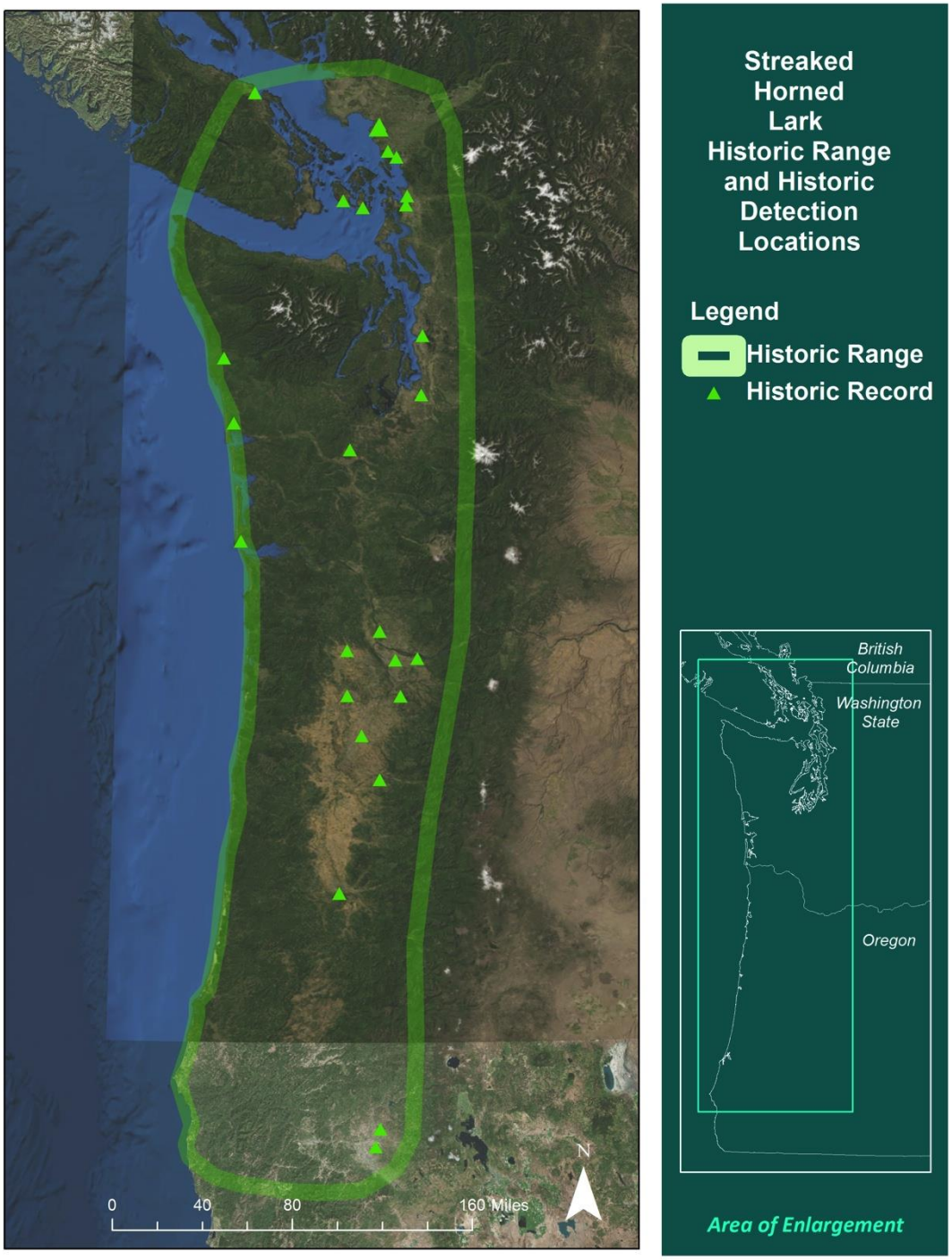

Figure 1. Approximate historic range of streaked horned lark. For a more detailed description of the subspecies historic range, see Behle (1942) and Stinson (2005).

** Is the area of interest within the historic range of streaked horned larks? If not, it is extremely unlikely that streaked horned larks will occur.*

Current Range

To describe the current streaked horned lark distribution we have distinguished large regions, or landscapes (see below) that are currently occupied by breeding larks. These regions are based on similarities in land use/land cover and may, in some cases, represent populations of larks. We consider the larks using the Puget Lowlands as a breeding population because there is some movement of larks among breeding sites in this region (Pearson et al. 2008, Wolf and Anderson 2013), but little apparent immigration by larks from other regions, suggesting that this is functionally a "population" with many nesting sites or subpopulations. This same dynamic is evidenced in other regions as well, but is not as well documented.

The general regions within the currently occupied lark range that we use in this document are: the Puget Lowlands, the lower Columbia River and Washington coast (with a coastal and river subunit), and the Willamette Valley (Table 1; Figure 2). Individual landscapes within these regions are significantly different in their make-up of landscape type, but share common features selected by streaked horned larks.

Table 1. Streaked horned lark regions and subregions within its currently occupied range.[1] Throughout their range, larks use relatively open habitats (few or no shrubs and trees) dominated by grasses, forbs, and bare ground.

Region	Sub-region	Landscape Features
Puget Lowlands		Primarily glacial outwash soils that support native and degraded grasslands. Most occupied sites are airports or native prairies.
Lower Columbia River/ Washington Coast	Lower Columbia River	Suitable habitats (primarily dredged material sites) on islands and along the river's banks (and tributary banks) from the Sandy River east of Portland to the confluence of the Columbia with the Pacific Ocean. Includes the lower Willamette River in the Portland metropolitan region and the very lower sections of the tributary rivers (e.g., Cowlitz, Willamette, Sandy). Occupied sites include islands where dredged material has been placed, an airport, and industrial areas where dredged material has been placed or the vegetation has been scraped from the surface.
	Washington Coast	Dune backed beaches and deflation plains in areas where active accretion is occurring between the Moclips River to the North to Cape Disappointment to the South (includes suitable sites/islands in Grays Harbor and Willapa Bays).
Willamette Valley		Very large open expanses composed primarily of grass seed agriculture in the southern and eastern portion of the Willamette River, and mixed agricultural field types in the western and northern portions of the valley. Also includes airports.

[1] Note that this document was prepared in advance of a recovery plan, which ultimately may modify designations or spatial boundaries of regions.

** Is the area of interest within the current range of streaked horned larks? If not, it is less likely that it would support streaked horned larks.*

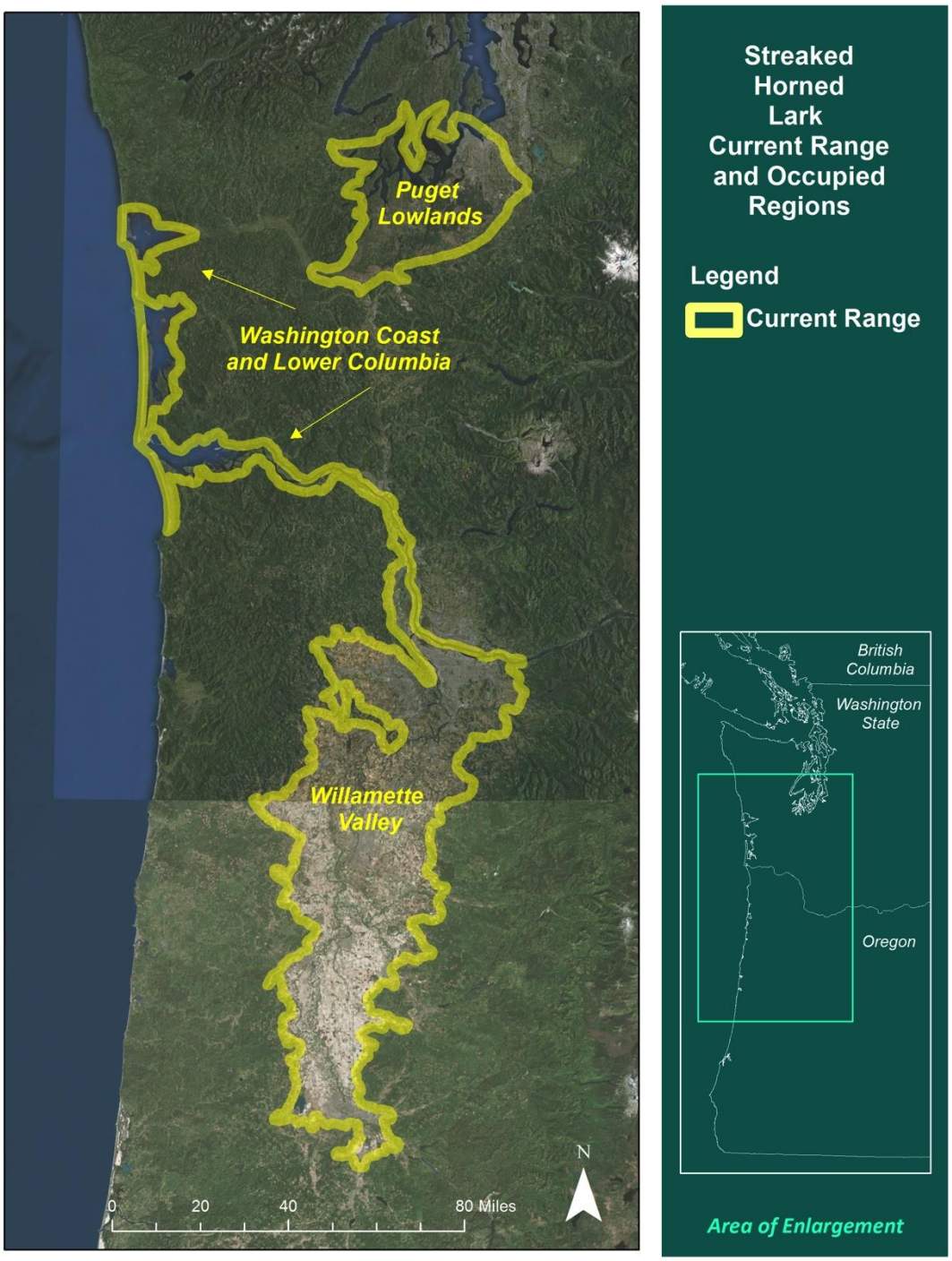

Figure 2. Approximate current streaked horned lark range and geographic regions based on known occurrences, physiographic characteristics, and expert opinion.

Known Occurrences and Movement

To date there has been no systematic range-wide survey of all potential streaked horned lark habitats to document distribution and habitat use. However, there have been several large-scale surveys to attempt to identify the range and abundance of the lark in both Washington (Rogers 1999, MacLaren 2000) and Oregon (Altman 1999, ODFW 2008, 2010). In addition, the subspecies has been the target of intensive research and monitoring by multiple entities for over 10 years (e.g., Pearson and Hopey 2005, Camfield et al. 2011, Wolf and Anderson 2013, Moore 2013, Anderson and Slater 2015). Figures 3-5 depict known breeding occurrences of streaked horned larks within each region. Areas that do not show occurrences are not necessarily a reflection of absence, but may simply be a result of limited survey effort.

There is limited information available about lark movement within and between breeding seasons (but see Pearson et al. 2005 and 2008). When habitat conditions remain suitable, sites remain occupied from year to year (e.g., Pearson et al. 2005b, Moore & Kotiach 2010, Wolf & Anderson 2013). This is particularly true for sites like airports that are maintained as open grasslands through continuous management. Further, adult larks exhibit very high site fidelity to their breeding site (Pearson et al. 2008). Like in other regions of their range, the Willamette Valley contains sites that are predictably occupied by larks from year to year such as airports and sites within the US Fish and Wildlife Service refuge complex and even some portions of the agricultural landscape. However, there are considerable portions of the agricultural landscape within the Willamette Valley where annual or nearly annual changes in agricultural uses or management result in changes in habitat suitability for larks. These changes are primarily driven by between year crop changes within a given field, the degree of seasonal flooding, crop health, and agricultural treatments within season (e.g., herbicide treatments, harvest of grass seed fields, and haying). As a consequence, the abundance and distribution of larks within portions of the Valley can shift both within and between seasons (Moore 2011).

Even under predictable suitable habitat conditions, it is still difficult to know how relevant proximity to a known occurrence is for likelihood of occupation. As habitat near known lark population centers becomes suitable, it can become quickly occupied (Moore 2011). Larks in the Willamette Valley have also been observed moving from one site to another within the breeding season as habitat conditions change (Moore, pers. comm.). However, within breeding season movements have not been documented in regions outside the Willamette Valley. During the wintering stage, larks have been documented over 100 miles from their breeding site (Pearson et al. 2005a), and during the post-breeding stage larks may move up to 100 miles away from their breeding sites (WDFW, unpublished data). Despite these long-distance movements, they tend to move to sites that are occupied by larks to the south.

** Is the area of interest near to any known occurrences? Areas close to known occurrences may be more likely to be occupied by streaked horned larks than those further away from known occurrences. This potential relationship needs to be examined quantitatively.*

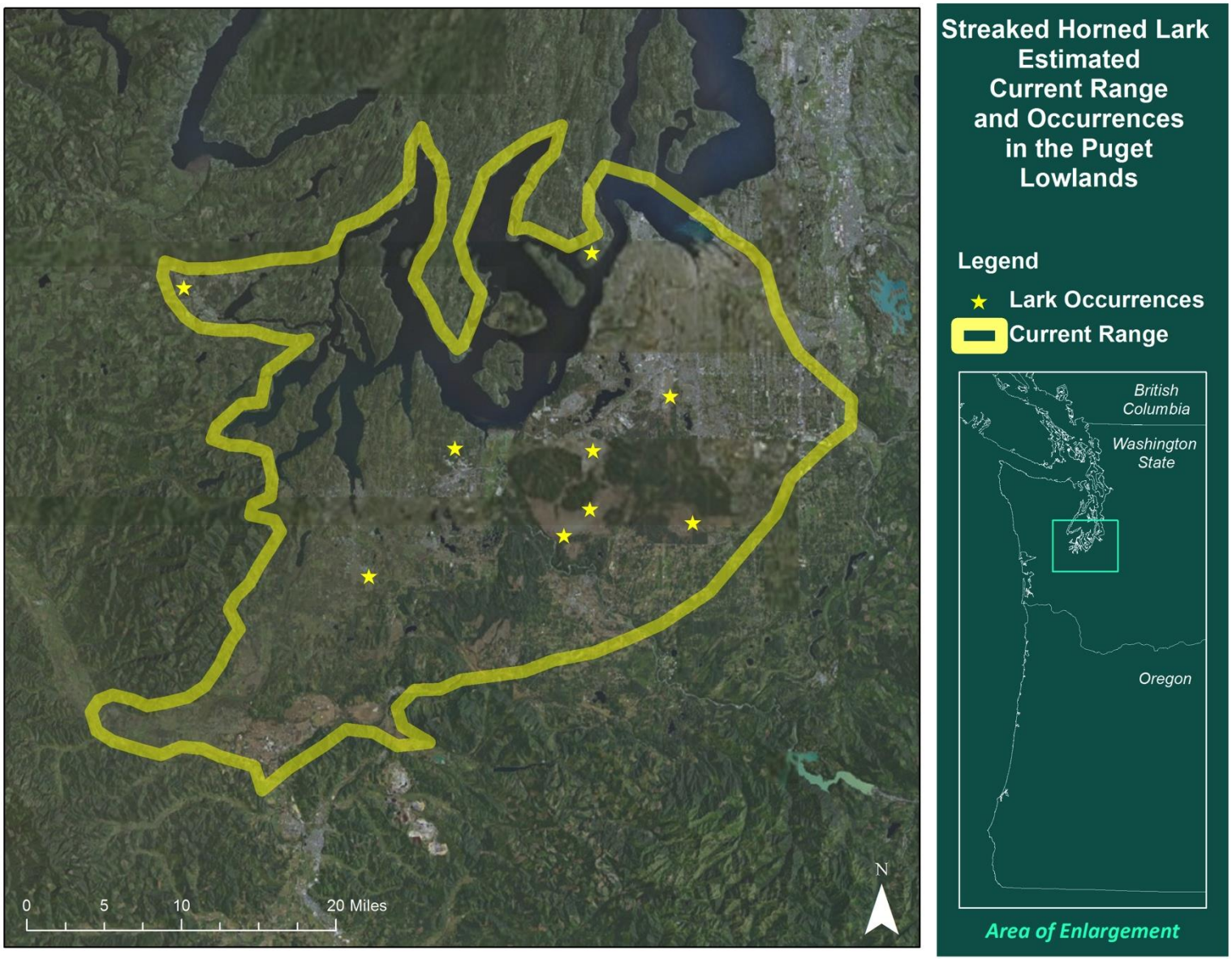

Figure 3. Primary Puget Lowland region and streaked horned lark breeding season occurrences. Areas that do not show occurrences are not necessarily a reflection of absence, but may simply be a result of limited survey effort.

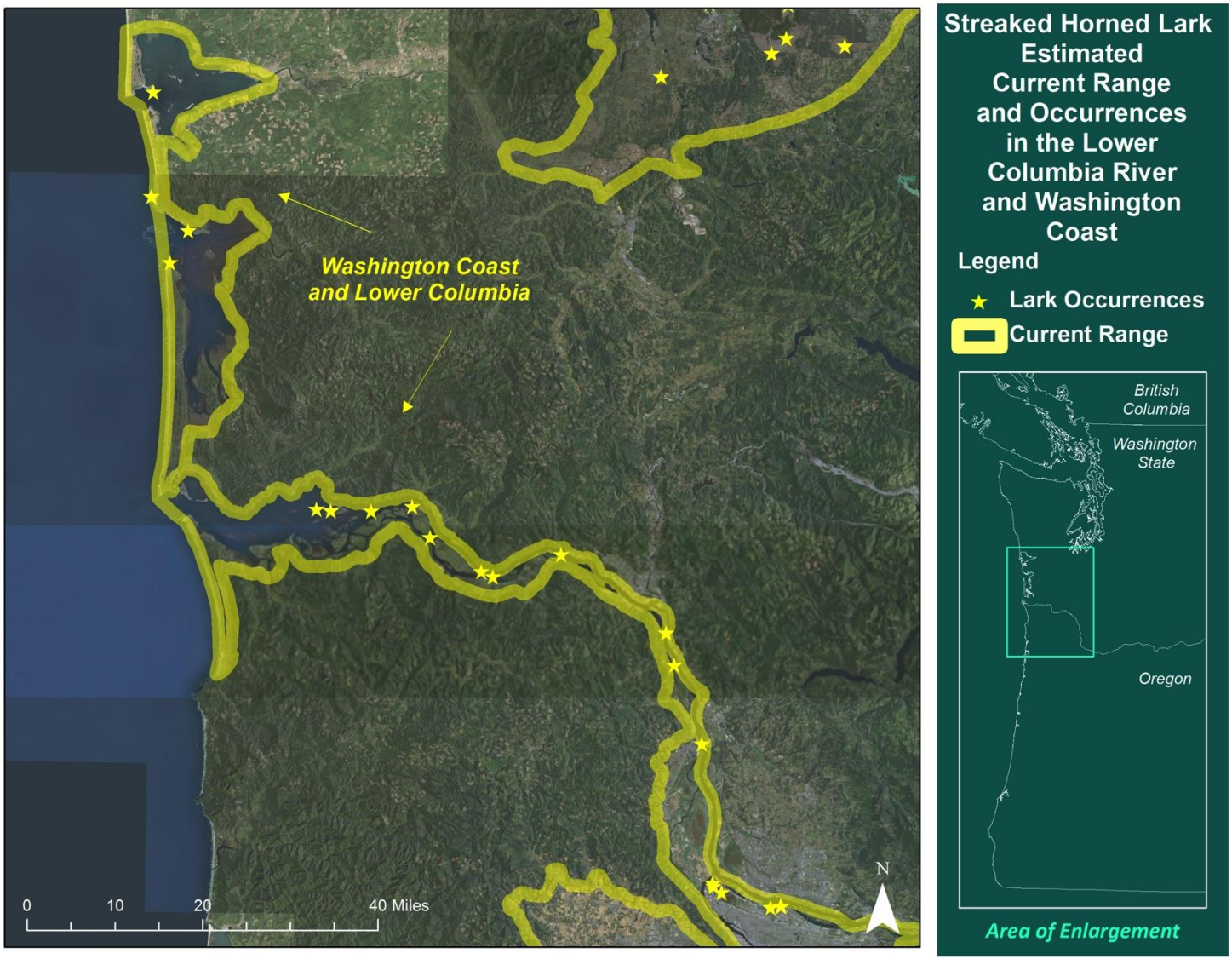

Figure 4. Lower Columbia River and Washington Coast region and streaked horned lark breeding season occurrences. Areas that do not show occurrences are not necessarily a reflection of absence, but may simply be a result of limited survey effort.

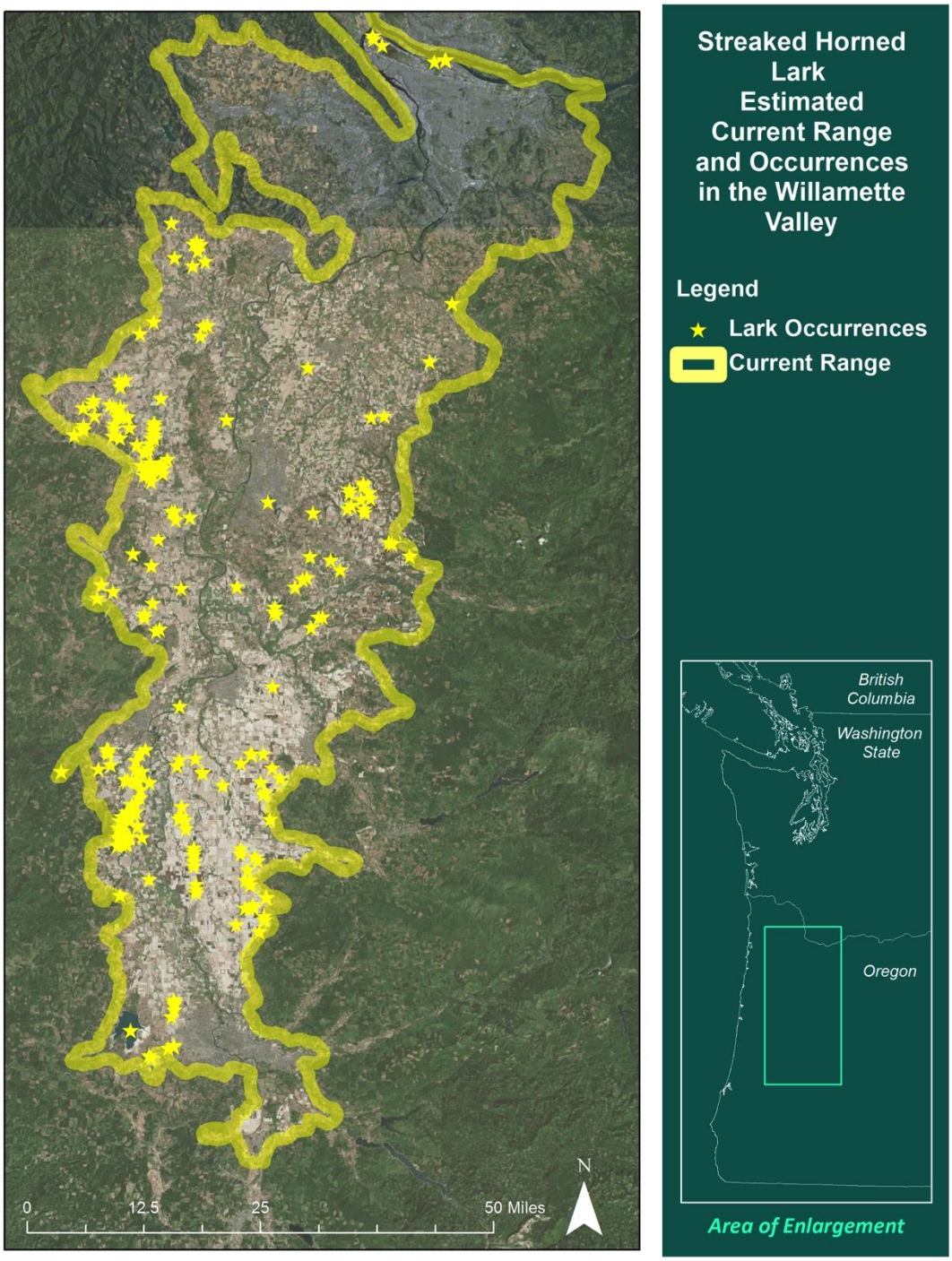

Figure 5. Willamette Valley region and streaked horned lark breeding season occurrences. Areas that do not show occurrences are not necessarily a reflection of absence, but may simply be a result of limited survey effort.

Suitable Habitat

Below we describe general characteristics of habitat at three spatial scales: landscape, site, and habitat patch.

Landscapes

Within their current range, streaked horned larks use large open landscapes with few trees or shrubs. At the broadest scale, they include agricultural landscapes, predominantly in the Willamette Valley, landscapes adjacent to open water, predominantly in the Lower Columbia River and Washington cost, and grasslands, predominantly in the Puget Lowlands of South Puget Sound.

The ecological processes that historically created these open landscapes no longer function (e.g., Native American burning, flooding, etc.). Today, larks occur in landscapes where human activities create the open characteristics selected by larks. These human activities include airport maintenance such as mowing, agriculture activities like grass seed farming, dredged material deposition to maintain the shipping channel on the Columbia River, military training such as artillery detonations, and the scraping of vegetation from sites in preparation for development.

** Is the area of interest situated in an open landscape? If not, it is less likely that the area has habitat that would support streaked horned larks.*

** Are the characteristics or land uses in the area of interest similar to the examples where larks are known to occur? Areas with similar characteristics to examples may be more likely to be occupied by streaked horned larks.*

Sites

We define a "site" as an open and largely treeless expanse of land dominated by grasses, forbs, and bare ground within which larks select suitable habitat patches. Site boundaries or edges are typically defined by tree lines, steep hills, or buildings that interrupt the site's open character (Figure 6).

Site Size and Context

There has been no research conducted on the minimum area needed to support at least one pair of larks and this remains an important unanswered question. Until recently, 300 acres was the smallest known occupied site in the Puget Lowlands, and all known occupied sites in the Willamette Valley were hundreds of acres in size. It is likely that because of their propensity for flocking in winter, larks will use smaller sites if the site provides quality food resources (Moore 2007b). However, the sites with the largest wintering flocks occur in the flattest and most open regions of the Willamette Valley (Moore 2007a).

These observations indicate that large, open sites that are hundreds of acres in size define suitable lark habitat at the site scale. However, there are several exceptions. The first is not truly an exception to the use of large, open sites 100s of acres in size, but rather a twist on how we think about what comprises an open site. On the Columbia River larks use sites of

much smaller land area than typically found in other regions of its range. These occupied sites, however, are situated directly adjacent to open water, which we suspect functionally adds to the apparent open habitat context. In effect, these sites are 100s of acres in size if one considers both the terrestrial and aquatic portions of the landscape (Figure 7). The majority of terrestrial components of river sites range from about 25 -100 acres in size, although larks have been documented on sites as small as 1 acre and the largest known occupied river site is 264 acres.

The second exception to the apparent use of only large, open sites 100s of acres in size, may be explained by the high site fidelity exhibited by breeding streaked horned larks, and the slow erosion of the suitable habitat at this particular site. The Rivergate site in the Portland area is near the confluence of the Columbia and Willamette rivers, but is not situated adjacent the water. The site is currently 60 acres and is surrounded by warehouses. Horned larks were first documented at the site in 1991 and were regularly documented in succeeding years (Port of Portland, unpublished data). Wintering streaked horned larks were first explicitly documented at the site in 2004 (Pearson et al. 2005a) and breeding was first documented in 2005 (Moore 2010). At that time, the extent of the site was 99 acres and it may have been larger prior to that date. In winter of 2007-2008, industrial development reduced the site to 77 acres, and the loss of habitat was reflected in fewer breeding territories. In 2011, more development further decreased the site to its current size of 60 acres. The most recent development broke the once continuous site into two areas separated by a building and parking lot. Both areas were occupied by streaked horned larks in 2013 (Anderson, pers. obs.).

Finally, larks were documented in 2014 using sites smaller than hundreds of acres both in the Puget lowlands and the Willamette Valley. A signing male was detected at a site with an open context of approximately 90 acres in Lacey, Washington (K. McAllister, pers. comm.) and larks were detected on grassland sites surrounded by trees as small as 48 acres in Corvallis, Oregon. The Washington detection was within 15 miles of a known population and the Oregon detection was within one mile of the largest known population in Oregon. Larks may use smaller sites, especially if they are located relatively close to occupied sites.

However, nearly all known occupied sites have a landscape context (openness comprised of either low stature land cover or open water) of greater than 150 acres.

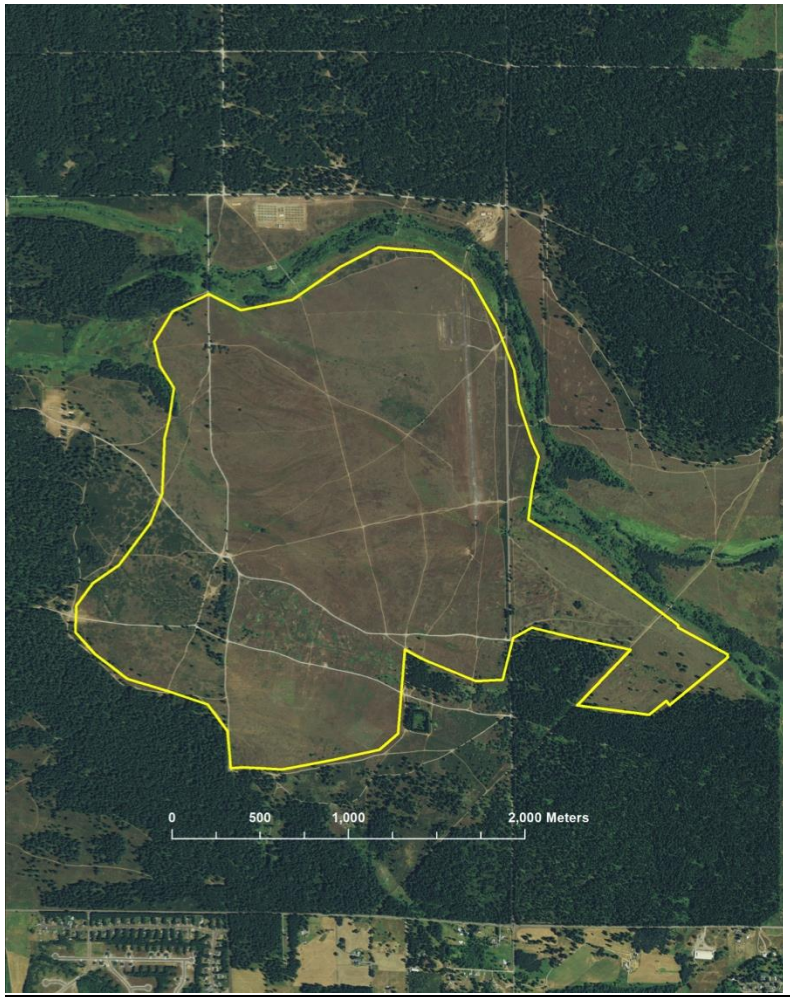

Figure 6. 1700-acre prairie in Puget Lowlands. Yellow line indicates the extent of open habitat dominated by grasses and forbs and is bounded by forest edge or riparian zone.

Figure 7. 41-acre dredged-material island in the Lower Columbia River. The yellow line indicates the extent of suitable nesting habitat. Although this site is smaller than what typically supports streaked horned larks, its adjacency to water creates a more open "site".

Site Configuration

All of the smaller documented sites used by larks are have high interior to edge ratios. Shape is not really a factor with larger terrestrial sites (100s of acres in size) because they likely support adequate interior habitat. We have never observed occupancy on a very long and narrow site (at least on a site narrower than about a third of a mile) unless it is adjacent to open water. Although most occupied sites are mostly treeless, there are occupied sites that do have clumped or very widely dispersed trees (Figure 8). In general, these sites have <5% tree canopy cover. Researchers have not investigated the relationship between density of tree patch configuration on lark occupancy.

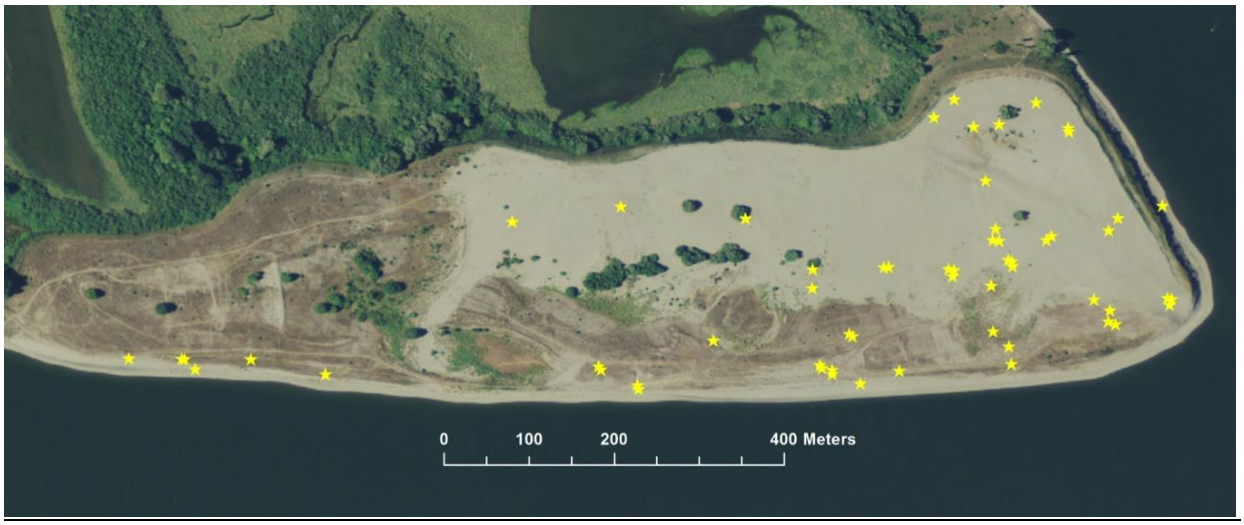

Figure 8. 102-acre site in Lower Columbia River. Note clumps of mature cottonwood trees in the center of site and quite near to lark detection locations, indicated by yellow stars.

Based on observations of currently or recently occupied sites, we offer the following notes on the potential influence of the dispersion of tall objects within a site on site suitability, regardless of region. If tall objects such as trees or buildings bisect the site, they would very likely reduce the size of the site by half.

For North American grassland birds generally, perimeter–area ratio, which reflects both the area and shape of a patch, is the strongest predictor of both individual species presence and overall species richness and is more important than patch area (Helzer and Jelinski 1999). Low perimeter–area ratio appears to be a very important predictor of grassland species presence and overall species richness; species richness was maximized in large patches (> 50 ha or around 125 acres) (Helzer and Jelinski 1999).

At smaller site sizes (e.g., < 125 acres) we suspect that shape likely becomes very important in minimizing the perimeter–area ratio. However, we have no empirical evidence for larks for this statement other than our observations of the size and shape of the smallest patches that they occupy.

** Does the area of interest have the size, context, and configuration necessary to support streaked horned larks? If not, it is less likely that the site will be occupied by breeding streaked horned larks.*

Habitat Patches

Within large, open landscapes streaked horned larks select patches with low, sparse vegetation with a relatively high percent cover of bare ground for foraging, nesting, and over-wintering and avoid areas dominated by shrubs and rhizomatous or sod-forming grasses.

Composition and Structure

Horned lark territories throughout North America consist of sparsely vegetated areas dominated by relatively short vegetation composed of grasses and forbs (Dubois 1935, Stewart and Kantrud 1972, Owens and Myres 1973, Weins 1973, Davis and Duncan 1999, Dinkins et al. 2003). Table 2 outlines habitat characteristics specifically associated with high use areas for streaked horned larks in the Puget lowlands and Columbia River/Coast. Habitat variables associated with lark territories in the Willamette Valley are similar to those observed elsewhere, although methods to collect vegetation data varied (Altman 1999). In general, territories are dominated by short grass and forb vegetation with considerable bare ground and interstitial spaces between plants.

There are few sites occupied by streaked horned larks that are dominated by native vegetation; many have no native vegetation at all. Researchers have not investigated the influence of nesting habitat plant species composition (e.g., native vs. non-native) on lark reproduction and survival. However, there is a growing body of evidence that grasslands with a mix of native and non-native vegetation can support grassland birds (Kennedy et al. 2008).

Table 2. Habitat variables associated with high use areas within a suitable patch in the Puget Lowlands, Lower Columbia River, and Willamette Valley during the nesting season[1].

	Puget Lowlands	Columbia River/Coast	Willamette Valley
Veg Height	17 - 25 cm	8 – 15 cm	0 – 15 cm
Shrubs	< 2%	< 1%	0%
Trees	0%	0%	0%
Bare ground	12 - 20%	11 – 79%	17-31%
Grass/Forbs	50 - 86%	15 - 44%	69 - 83%

[1]The Puget Lowland and Columbia River/Coast values in this table are from Pearson and Hopey (2005) table 9 converted to 95% confidence intervals. Note that nest sites did not differ in these same variables from the high use areas. Willamette Valley values reported in Altman (1999), pg. 18.

** Does the area of interest have the habitat patch composition and structure necessary to support streaked horned larks? If not, it is less likely that streaked horned larks would occur in the area of interest.*

Patch Configuration

The location of a suitable habitat patch within the site may be important for use by territorial streaked horned larks. In grassland habitats, Johnson and Temple (1986, 1990) and Burger et al. (1994) found higher predation and nest parasitism rates by brown-headed cowbirds on nests close to wooded edges relative to those away from edges. There is also evidence that some grassland bird species avoid nesting near patch edges (Johnson and Temple 1986, Delisle 1995, Helzer 1996). Horned larks were detected more frequently on interior plots (200m from the nearest suburban edge) but had high interior plot variances (Bock et al. 1999).

Researchers have not investigated the influence of tall edges on habitat use. We measured distances from 2014 lark detection locations in the Puget lowlands and Columbia River to a hard edge, such as a tree line. We report here all distances up to 250m, a threshold below which research has detected significant edge effects. More than 80% of the lark detections occurred 100m or greater from a hard edge (*n*=120) (Figure 9, CNLM, unpublished data). We also measured the distance from nest locations to hard edge; the minimum distance was 130m, mean of 447 (*n*=169).

These data suggest that habitat patches configured within 100m of a hard edge are less likely to support streaked horned larks than those further from the edge.

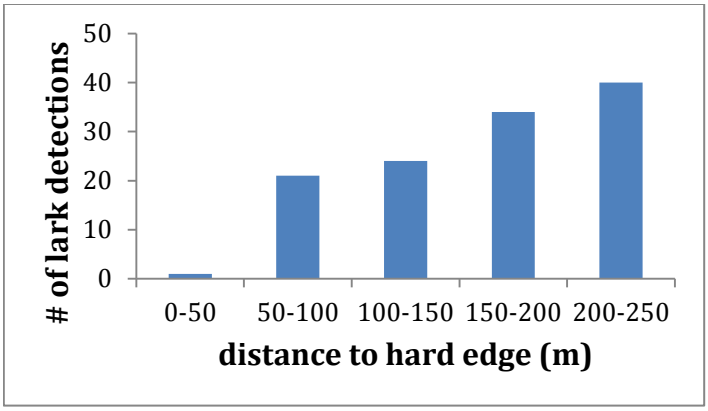

Figure 9. Histogram of number of lark detections and their distance to a hard edge (up to 250m) that interrupts openness of a site, such as a tree line or building.

Patch Size

Larks use habitat patches of various sizes. They'll use areas on sites that consist of very large patches of continuously suitable habitat (Figures 10 & 11), and they're also found using much smaller patches of suitable habitat situated within denser, or taller unsuitable vegetation.

Estimates of streaked horned lark territory sizes vary, ranging from 1.5 acres (Altman 1999) up to 8 acres (Moore 2011), and are typically about 2-5 acres. It appears that some habitat patches are more likely to be selected by territorial males and are selected earlier in the nesting season than others (Moore 2011, CNLM unpublished data). Territories in these preferentially selected areas tend to be on the small side. Conversely, territories on presumably poorer quality habitat (e.g., partially or completely denuded agricultural fields) tend to be larger (Moore 2011). This pattern of smaller territories in high quality habitat is generally true for many wildlife species (e.g., Diemer and Nocera 2014).

Lark territories are not necessarily comprised of continuous high quality habitat patches dominated by grasses and forbs. Rather, lark territories can include roads (i.e., pavement, gravel, or dirt), signs (e.g., airfield taxiway guides), and even tall features such as power or telephone lines and airfield instrument towers.

Figure 10. Structure of lark nesting habitat on a dredged-material island (mid-May) on the Lower Columbia River.

Figure 11. Structure of lark nesting habitat in a grass seed field (early June) in the Willamette Valley. *Image reprinted from Moore 2011.*

** Does the area of interest have the habitat patch size and configuration to support a streaked horned lark territory? If not, it is relatively unlikely that the area has habitat that would support streaked horned larks. If unsure, consider conducting a more comprehensive on-the-ground assessment of habitat quality.*

Summary

This document has aimed to provide a hierarchical approach for identifying suitable nesting habitat for streaked horned larks. Specifically, we describe habitat characteristics at landscape, site, and patch scales. On the following page we have provided a one-page summary from weakest to strongest evidence of suitable habitat. We also provide a summary table of lark habitat characteristics (Table 3).

Because we made an attempt to be concise and brief, there are many aspects of the species ecology that are not addressed here. Streaked horned larks have been the focus of research since the late 1990s resulting in a rich body of gray and peer-reviewed literature. Much of this information is readily available and can be found in the web-based technical library of the Cascadia Prairie Oak Partnership (www.cascadiaprairieoak.org).

Again, this document is non regulatory. It is up to regulatory agencies to determine how to use the information in this report and to determine when and how streaked horned lark occupancy surveys should be performed. Streaked horned larks are federally listed as Threatened under the Endangered Species Act, which is regulated and enforced by the US Fish and Wildlife Service. The user should contact their local US Fish and Wildlife Service office for guidance.

Photo: Adam Martin

STREAKED HORNED LARK HABITAT CHARACTERISTICS

This is a theoretical construct of suitable lark habitat based on current information.

RELATIVELY WEAK EVIDENCE

EVIDENCE OF HABITAT SUITABILITY

STRONGER EVIDENCE

1. Within historic range?

Larks historically occurred throughout the lowland habitats west of the Cascade Mountains in Oregon, Washington, and British Columbia. *See Figure 1 for map of historic range, page 4.*

↓

2. Within current range?

Larks occur in specific areas of the Puget Lowlands, the Lower Columbia River and Washington Coast, and the Willamette Valley. *See Table 1 for habitat features and Figure 2 for current range, page 6.*

↓

3. Near to known occurrences?

Localities near known occurrences may have a higher likelihood of being occupied by larks. *See page 7 and Figures 3-5 for more information, pages 8-10.*

↓

4. Open landscape with few trees or shrubs?

Larks use large open landscapes with few to no trees or shrubs. Today, these types of landscapes are typically maintained by human activities. *See page 11 for more information.*

↓

5. Similar to occupied landscape types?

Having similar landscape shape and structure as occupied areas, such as airports or appropriate agricultural fields, may increase the likelihood of larks occupying a site. *See page 11 for more information*.

↓

6. Large acreage with low perimeter-area ratio?

Suitable sites are typically hundreds of acres in size (including both land and water if adjacent to water) and have a low perimeter-area ratio. *See Pages 11-14 for more information.*

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7. Patches of short sparse vegetation?

Larks use patches of short sparse vegetation with a high percent cover of bare ground for foraging, nesting, and over-wintering. *See pages 15-17 for more information.*

↓

8. Habitat patch for at least one territory situated away from edge?

Larks are more likely to use habitat patches that are ≥100m from hard edges (e.g., trees, buildings). *See pages 14-15 for more information.*

Table 3. Summary of streaked horned lark habitat characteristics by region.

Region	Puget Lowlands	Lower Columbia River and Washington Coast	Willamette Valley
Site Size	Majority >300 acres, may be as small as 90 acres.	Majority > 25 acres, minimum size of 1 acre, max 264 acres. Patches smaller than 40 acres are only found directly adjacent to open water.	Majority >100 acres, minimum 48 acres.
Topography	Relatively flat, low elevation. Typically < 500 feet in elevation	Landscape can range from flat to gently sloping to even use of terraced hillsides adjacent open water. Coastal conditions can include some low relief swales and dunes. All sites are typically <200 feet in elevation.	Relatively flat or rolling. Nearly all recently occupied patches < 800 feet in elevation
Landscape Context	No continuous vertical structures (trees or buildings) bisecting the landscape patch.	No continuous vertical structures (trees or buildings) bisecting the landscape patch. Typically adjacent to the Columbia River or coastal marine waters.	No continuous vertical structures (trees or buildings) bisecting the landscape patch.
Habitat Patches	Large patches dominated by grasses, forbs, and bare ground (dirt, gravel, cobble or unvegetated surfaces, which can include roadways, taxiways, and runways). Typically < 5% tree cover.	The terrestrial portion of the environment is dominated by grasses, forbs, and bare ground (sand, dirt, gravel, cobble or unvegetated surfaces, which can include roadways, taxiways, and runways). Typically < 5% tree cover.	Large patches dominated by grasses, forbs and bare ground (in addition un-vegetated soil or natural gravel, includes paved or gravel surfaces such as roadway, taxiways and runways).
Occupied Site Examples	Airports, Puget prairie, industrial sites.	Sand dunes, dune backed beaches, deflation plains, industrial sites, and dredged material deposition sites. Coastal beaches currently used are areas where accretion is occurring or has occurred relatively recently.	Airports, agriculture fields (e.g., grass seed, mint, clover, and other fields with appropriate structure) and associated roadways (secondary and tertiary roads), wet prairie restoration sites, vernal pools, and industrial sites.

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