



**Annual Compliance Report  
for the Yamhill County Habitat Conservation Plan  
for Fender's Blue Butterfly and Kincaid's Lupine**



**December 2024**

# Yamhill County Habitat Conservation Plan

## 2024 Annual Compliance Report

### Background

Yamhill County (County) maintains the right-of-way easements along County roads for the purposes of public safety and optimum travel conditions. Some of the road maintenance activities have the potential to affect Fender's blue butterfly (*Icaricia icarioides fenderi*), Kincaid's lupine (*Lupinus oreganus*), and their habitat as defined under the Endangered Species Act (ESA, 16 U.S.C.5131-1344, 87 Stat. 887). In March 2014, the U.S. Fish and Wildlife Service (USFWS) issued an Incidental Take Permit (ITP) TE10049B-0 pursuant to Section 10 (a)(1)(B) of the ESA. The ITP includes County Road and right-of-way maintenance activities. The ITP is conditional upon implementation of the Yamhill County Habitat Conservation Plan (HCP; Cardno ENTRIX 2013). The HCP provides measures to minimize the adverse effect from these essential services on Fender's blue butterfly and Kincaid's lupine.

This report records actions completed during the Fiscal Year (FY) 2021-2022 (July 1, 2021, through June 30, 2022) under the 30-year ITP issued to Yamhill County for Fender's blue butterfly on March 14, 2014 (TE10049B-0). As part of HCP implementation, the County is required to submit an annual report to USFWS documenting the following:

- A description of conservation measures initiated, continued, or completed during the previous year, and a description of conservation measures projected to be implemented during the upcoming year.
- A summary of findings, results, and conclusions of monitoring activities, and a projection of monitoring needs for subsequent years.
- A tabulation and description of funds expended during the previous year, and a projection of funds to be expended during the upcoming year.
- Other recommendations if any, such as minor modifications or amendments to the HCP document.

### Conservation measures during FY 2023-2024, and projected for FY 2024-2025

Following is a description of conservation measures initiated, continued, or completed during FY 2023-2024, and a description of conservation measures projected to be implemented during FY 2024-2025:

- Director Mark Lago consulted with Michal Wert to recruit new members; Patrica Farrell and Jordan Anderson for the Roadside Vegetation Technical Advisory sub-committee under Road Improvement Advisory Committee (RIAC), and to secure Board of Commissioners' reappointment of all Roadside Vegetation Technical Advisory sub-committee under Road Improvement Advisory Committee members.
  - The County adhered to the measures described in the HCP for maintenance in the existing Threatened and Endangered Species Special Maintenance Zones (T&E SMZ) and in the newly created T&E SMZs around the seven Kincaid's lupine locations that were identified as being occupied by Fenders blue butterflies (during the butterfly dispersal survey). This will be continued in FY 2024-2025.
  - The County adhered to the requirements of the HCP in non-occupied sites by refraining from adverse management activities such as application of broad-spectrum and broadleaf specific herbicides or spring/early summer mowing and brush cutting that would have harmed the lupines. This will be continued in FY 2024-2025.
  - The County again contracted with Dr. Paul Hammond to perform Fender's blue butterfly surveys at sites not covered by USFWS funding within Yamhill County during June of 2024. Surveys followed USFWS protocols established for Fender's blue butterfly and the HCP monitoring plan was followed. This will be continued in FY 2024-2025.
-

- The County will conduct a field visit with species experts and members of the Habitat Conservation Plan Implementation Committee (HCPIC) in May or June of 2025. This visit will continue to be used by the County to help formulate its habitat restoration plans in the T&E SMZs and Deer Creek Park as described in the HCP and ITP.
- The County continues to clear Himalayan blackberries at Deer Creek Park and other HCP areas, which allowed for vigorous lupine growth observed at some sites by Dr. Hammond. During next fiscal year, the County will cut back blackberries, scotch broom and trees in the right-of-way that shade lupines. The County has also continued to mow HCP sites between August 1 and April 14 and will continue to spray tall oat grass in the T&E SMZs in order to expose Kincaid’s lupines to more sunlight. These management practices will continue in accordance with SMZ work plans and as recommended by Dr. Hammond.
- The County added more signage for lupines.
- This Annual Report will be reviewed by the HCPIC, and their comments will be integrated within it.

**Findings, results, and conclusions of monitoring activities during FY 2023-2024 and projected for FY 2024-2025**

The weather conditions were cool, cloudy, and rainy during May and June again this year, delaying the butterfly season up to 2 weeks. Hence, butterfly numbers seemed to be down in lower and north facing areas, but somewhat normal in south facing and higher elevation areas. Therefore, Dr. Hammond’s findings and conclusions after surveying in May/June of 2024 there were some successes and some need for attention. The County’s efforts at cutting dense stands of brush and small trees as well as spraying a grass specific herbicide on exotic tall oat grass, were successful habitat management efforts which increased the lupine population again this year. However, there is still vegetation removal and management to be done to allow the Kincaid lupines to flourish in all locations. Per his recommendation, that such treatment should be conducted in other areas of suppressed lupines. The County will continue to implement this management action during the upcoming year.

The Deer Creek Park environment had very low butterflies when surveyed this year. This not because of anything different the County’s has done, in fact, the lupine population has expanded. The County will continue to follow Dr. Hammond’s recommendation of increased chemical and brush management of encroaching vegetation and invasive weeds to sustain these improvements.

There continues to be a decline in butterfly population on Moores and Gopher Valley, it is suspected that adverse weather conditions in these areas at a lower elevation are a contributing factor. Elsewhere in Yamhill County (i.e., Oak Ridge) the numbers indicate recovery is occurring.

Dr. Hammond’s 2024 survey is attached.

**Funds expended during FY 2023-2024, and projected for FY 2024-2025**

Below is a tabulation of funds spent during FY 2023-24 by the County on HCP activities.

| <b>Expenses</b>   | <b>Cost</b>     |
|---|-----------------|
| County Personnel (Vegetation Manager) and Materials for Maintenance | \$26,485        |
| Dr. Hammond survey (\$6000)   | \$6,000         |
| Reserve for Future Obligations                                      | \$10,000        |
| <b>Total HCP Expenses</b>   | <b>\$42,485</b> |

The County Public Works Department expended over \$26,485 from the road fund in the 2023-24 fiscal year for labor (including mowing, brush-cutting, tree removal, weed spraying, etc.), equipment, and material costs in improving habitat environments.

It is estimated that \$26,983 will be expended during FY 2024-25 on continued restoration and mitigation, as required by the HCP, section 7.10. Most of the FY 2024-25 expenditure will be to continue developing and implementing restoration and mitigation plans, which include utilizing the expertise of Dr. Paul Hammond once again to survey lupines and butterflies in the Deer Creek Park mitigation site, and in other sites in accordance with the HCP's species status monitoring requirements. The County will continue to implement his suggestions for mowing, cutting, and spraying to improve the roadside habitat, and release more and invigorated lupine populations for butterfly egg laying.

Yamhill County Public Works, under Director Mark Lago, has purchased a new sprayer truck for vegetation control staff to use throughout the County. The department will continue to expand and refine its management of the species as it takes on a chapter with Vegetation Management Supervisor, Nick Wilkinson and Technician, Tracy Womack this year as they partner with Yamhill Soil & Water Conservation District to share resources. The department will also continue its partnership with the Parks Manager, Travis Pease.

**Other recommendations**

There are no recommendations for changes to the HCP at this time.

---

The 2024 Surveys of Fender's Blue Butterfly and Kincaid's Lupine Sites in Polk and Yamhill  
Counties, Oregon

by  
Paul C. Hammond

Institute for Applied Ecology  
and  
U.S. Fish and Wildlife Service  
and  
Yamhill County Department of Public Works  
September, 2024

Table of Contents

|   | <u>Page</u> |
|---|-------------|
| Introduction -----  | 1           |
| Results -----   | 2           |
| 1. Polk County – Mill Creek -----                                 | 2           |
| 2. Yamhill County – Gopher Valley Metapopulation -----            | 2           |
| 3. Yamhill County – Moores Valley Metapopulation -----            | 9           |
| 4. Yamhill County – Oak Ridge Metapopulation -----                | 13          |
| 5. Yamhill County – Turner Creek Metapopulation -----             | 22          |
| Management for Kincaid’s Lupine under Ecological Succession ----- | 24          |
| Literature cited -----  | 25          |

Map of Yamhill Oaks Preserve Fender’s Blue Butterfly Habitat Areas

Map of Oak Ridge Area 4 Fender’s Blue Butterfly Habitat Areas

## INTRODUCTION

Surveys were conducted in Polk and Yamhill Counties, Oregon during May and June of 2024 at known sites of Fender's blue butterfly (*Icaricia icarioides fenderi*) and Kincaid's lupine (*Lupinus oregonus*) that included peak butterfly counts and an assessment of habitat conditions for the Institute for Applied Ecology, U.S. Fish and Wildlife Service, and Yamhill County Department of Public Works. This work specifically monitored the results of on-going habitat management in designated management areas, on private properties, and along Yamhill County roadsides during the 2015-2024 field seasons. These management studies included techniques for controlling several invasive plant species including braken fern, purple vetch, and sickle-keeled lupine that threatened Kincaid's lupine and butterfly populations. This included studies of the impact using early season mowing and glyphosate herbicide applications on Kincaid's lupine. A summary of these management experiments as they affected Kincaid's lupine was included in the 2018 report (Hammond, 2018).

In sharp contrast to the 2022 field season (see Hammond, 2022), weather conditions were initially cool, cloudy, and rainy during most of April in 2024, and the adult butterfly flight season was delayed for about two weeks until about the middle of May. However, the weather then became quite warm and sunny through the remainder of May and June, and butterfly numbers quickly reached a peak by the end of May. The flight season was only minimally extended through the first week in June this year, and was not extended through most of June as in 2022.

A conservative population estimate of Fender's blue butterflies for each of the metapopulation areas described below in 2024 can be made by taking the highest count of male butterflies at the peak of the flight season, and doubling that number to account for females assuming an equal sex ratio. An additional 20% of the combined male-female number is added to this sum to account for butterflies in the tail ends of the flight season that would not have been present on the peak day count. This is probably a very conservative estimate for large populations that are dispersed over large geographic areas where many butterflies were probably missed during the surveys, but is probably accurate for small populations with a more limited geographic distribution. For several large sites, separate subcounts were made for different subareas on the sites that had substantially different habitat conditions of temperature and aspect or different management histories. The peak subcount for these subareas was then used for calculating the total population estimate.

A comparison of this peak count method with the distance sampling method for generating population estimates was included in the 2023 report (Hammond, 2023).

## RESULTS

### 1. Polk Co. – Mill Creek

This site owned and managed by the Oregon Department of Transportation consists of native prairie with a high diversity of native plants and large patches of Kincaid's lupine. It has historically supported a population of around 50 Fender's blue butterflies (Hammond, 2007), but only had about 12 butterflies still surviving in 2010 (Hammond, 2010). All of the habitat has become densely overgrown with thick stands of invasive tall oat-grass that greatly suppresses the Kincaid's lupine and other native plants. The Oregon Department of Transportation has been conducting late season mowing at the site over the past few years. As a result, the lupine has actually been spreading and increasing in abundance during 2021-2024. As of the 2016 field season, the butterfly appeared to be extinct at this site (Hammond, 2016). However, 2 males were seen during the 2021 field season and 1 male was present in 2022. This suggests that a re-colonization event might have taken place at this site resulting from long distance dispersal taking place from some unknown colony in the general area. No butterflies were seen during the 2023 field season.

This site was only visited once on May 17 during the 2024 field season at what should have been the peak of the butterfly flight season, but no butterflies were observed.

### 2. Yamhill Co. – Beaver Creek Road (Gopher Valley Metapopulation)

Very large patches of Kincaid's lupine are located on both the north and south sides of Beaver Creek Road in Gopher Valley. This site was surveyed four times in 2024 at the peak of the lupine blooming as shown below, but no Fender's blue butterflies were present.

|         |   |
|---------|---|
| May 16  | 0 |
| May 26  | 0 |
| June 5  | 0 |
| June 10 | 0 |

During 2016, young oak trees on the embankment were cut and removed, and extensive thickets of blackberry and other brush were cut along the entire length of the lupine habitat area. This work greatly improved the habitat conditions for lupine growth, and much new lupine was observed during the 2017-2024 field seasons that had been previously shaded by trees and brush during 2015-2016. As a result, large patches of lupine have been growing vigorously and blooming along this entire length of the road during 2021-2024. In 2023-2024, the lupine was particularly prolific not only along the immediate roadside, but also on the higher and drier upland areas of the hillside. However, young trees and brush are starting to grow back again, particularly poison oak, blackberry, and young oak trees, indicating that brush cutting will be needed again within the near future.

### 3.) Yamhill Co. – Deer Creek County Park (Gopher Valley Metapopulation)

The habitat at Deer Creek County Park in Gopher Valley consists of pristine native prairie with a rich diversity of native plants. This site was surveyed four times in 2024 with the following results.

|         |   |
|---------|---|
| May 16  | 0 |
| May 26  | 0 |
| June 5  | 0 |
| June 10 | 0 |

No Fender's blue butterflies were present at this site during 2017-2018, but one male and one female were seen in 2019. In 2020-2023, a small colony of the butterfly successfully became re-established. Yamhill County has designated Deer Creek Park as a mitigation site under its Habitat Conservation Plan for Kincaid's lupine and Fender's blue butterfly. In 2014, the site was threatened with invasive blackberry, Scotch broom brush, and small trees. Yamhill County management conducted extensive habitat renovation work during the 2015-2016 field seasons, and cleared away all of the woody vegetation. As a result of this work, the Kincaid's lupine has been growing vigorously and expanding rapidly over the hill during 2017-2024, and habitat conditions throughout the site were excellent in 2021-2023. However as of the 2023 field season, young Scotch broom seedlings were becoming widely established over a considerable part of the habitat on the hill, although fortunately not within the Kincaid's lupine patches. During 2024, these broom plants were spot-sprayed with herbicide that killed much of the young broom seedlings, but a follow-up spray will probably be necessary in 2025 to kill all of the broom.

The historical peak numbers of male butterflies present over the past six years are shown below. Cold, rainy weather conditions during the springs of 2022-2023 may have caused the drop in butterfly numbers in 2023-2024. Considering the abundance and coverage of lupine at Deer Creek Park at present, a small colony of several dozen butterflies might be expected in a year with favorable, warm weather conditions.

|      |         |
|------|---------|
| 2019 | 1 male  |
| 2020 | 5 males |
| 2021 | 2 males |
| 2022 | 3 males |
| 2023 | 1 male  |
| 2024 | 0       |

#### ④ Yamhill Co. – Gopher Valley Road (Gopher Valley Metapopulation)

Large patches of Kincaid's lupine occur on the roadsides of Gopher Valley Road in two areas. Area 1 is located at the junction of Gopher Valley Road and Dupee Valley Road. Area 2 includes the roadside lupine patches on both the west and east sides of the road adjacent to the Yamhill Oaks Preserve. In Area 1, the habitat was recently renovated in 2021 by cutting young oak and conifer trees that had shaded and overgrown the lupine. In 2022-2024, the lupine was just starting to recover from this suppression. No butterflies have been present in Area 1 over the past few years.

However, the roadsides of Area 2 were mowed and woody brush and young trees were cut by Yamhill County management in 2018-2019, uncovering considerable lupine that had been previously shaded. As a result, these lupine patches were growing quite vigorously during the 2019-2024 field seasons. Management problems during 2024 included some over-growth of the lupine by braken fern and exotic purple vetch late in the spring. These sites were surveyed four times in 2024 with the following results. The cool, cloudy, rainy weather during the spring of 2022-2024 appears to have suppressed butterfly numbers over these past three years as on the adjacent Yamhill Oaks Preserve.

|         |   |
|---------|---|
| May 16  | 0 |
| May 26  | 1 |
| June 5  | 0 |
| June 10 | 0 |

Peak numbers of male butterflies observed in the roadside lupine patches are shown below for the past few years. The increases in 2020-2021 appear to be the result of the recent roadside management work that greatly expanded the amount of lupine available for the butterfly, while the reduced number of butterflies over these past three years was likely due to the adverse weather conditions during the springs of 2022-2024 as noted above.

|      |   |
|------|---|
| 2016 | 4 |
| 2017 | 1 |
| 2018 | 2 |
| 2019 | 0 |
| 2020 | 5 |
| 2021 | 4 |
| 2022 | 0 |
| 2023 | 1 |
| 2024 | 1 |

### 5. Yamhill Co. – Yamhill Oaks Preserve (Gopher Valley Metapopulation)

The butterflies in Area 2 covering the Yamhill Oaks Preserve were surveyed four times during the 2024 field season with the following counts of males.

|         |    |
|---------|----|
| May 16  | 34 |
| May 26  | 47 |
| June 5  | 17 |
| June 10 | 4  |

Habitat at this site consists of pristine native prairie with a high diversity of native plants. Large patches of Kincaid's lupine have been spreading in recent years over many different parts of the preserve. The attached map shows the location of these habitat areas. Separate male butterfly counts were made for each of the lupine areas as shown below.

|         | <u>Roadside</u> | <u>Northwest</u> | <u>North Central</u> | <u>Northeast</u> | <u>North Ravine</u> |
|---------|-----------------|------------------|----------------------|------------------|---------------------|
| May 16  | 0               | 0                | 2                    | 8                | 6                   |
| May 26  | 1               | 0                | 3                    | 16               | 8                   |
| June 5  | 0               | 0                | 0                    | 2                | 6                   |
| June 10 | 0               | 0                | 0                    | 1                | 0                   |

|         | <u>South Ravine</u> | <u>South Central</u> | <u>Southwest</u> | <u>Pugh Area</u> |
|---------|---------------------|----------------------|------------------|------------------|
| May 16  | 5                   | 4                    | 1                | 8                |
| May 26  | 5                   | 3                    | 0                | 11               |
| June 5  | 3                   | 1                    | 1                | 4                |
| June 10 | 0                   | 0                    | 0                | 3                |

The following table shows the total peak count of male butterflies and the population estimate for 2016-2024. The large drop in 2019 was the result of the prescribed fire during the fall of 2018 that burned most of the habitat, and apparently killed most of the diapausing larvae. However, the fire was highly beneficial for removing invasive woody shrubs like poison oak and young trees, and the lupine in the treated areas was greatly flourishing and spreading during 2019-2024. As a consequence, butterflies had returned to all of the previously occupied habitat areas during 2020, and the population recovered from the fire to the approximate level of 2018. During 2021, the population doubled in size to an estimated 300 butterflies, the highest number ever seen at Yamhill Oaks Preserve. This population explosion was likely the result of very favorable weather conditions in 2021 that resulted in particularly high survival of larvae, combined with lupine that have greatly spread within the original lupine patches during the past few years. In addition, lupine has been rapidly spreading into new areas previously not occupied, probably resulting from long-distance seed dispersal.

In 2022, cool, rainy weather persisted throughout May and June that was highly favorable for lupine growth and additional spread, but these conditions apparently resulted in high mortality of the developing butterfly larvae. As a consequence, the butterfly population sharply dropped in numbers during 2022, but recovered to previous levels in 2023 as shown below.

|                     | <u>2016</u> | <u>2017</u> | <u>2018</u> | <u>2019</u> | <u>2020</u> | <u>2021</u> | <u>2022</u> | <u>2023</u> | <u>2024</u> |
|---------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Roadside            | 4           | 1           | 2           | 0           | 5           | 4           | 0           | 1           | 1           |
| Northwest           | 0           | 0           | 0           | 0           | 1           | 1           | 0           | 0           | 0           |
| North Central       | 5           | 6           | 5           | 0           | 4           | 14          | 1           | 4           | 3           |
| Northeast           | 16          | 16          | 31          | 6           | 19          | 43          | 20          | 24          | 16          |
| North Ravine        | 4           | 5           | 5           | 1           | 7           | 14          | 3           | 5           | 8           |
| South Ravine        | 16          | 8           | 14          | 3           | 12          | 16          | 3           | 17          | 5           |
| South Central       | 0           | 0           | 0           | 2           | 3           | 6           | 1           | 4           | 4           |
| Southwest           | 0           | 0           | 0           | 1           | 2           | 1           | 1           | 1           | 1           |
| Pugh Area           | 0           | 0           | 0           | 3           | 10          | 28          | 5           | 8           | 11          |
| Total Peak Count    | 45          | 36          | 57          | 16          | 63          | 127         | 34          | 64          | 49          |
| Population Estimate | 108         | 86          | 137         | 38          | 151         | 305         | 82          | 154         | 118         |

In 2024, weather conditions were cool and rainy during the spring as in 2022 that appeared to decrease overall butterfly numbers compared to 2023. As shown in the above table, the history of individual lupine patches and the butterflies that they support has been quite variable over the past nine years (locations shown on map).

(1.) The Northwest patch was always quite small, and almost all lupine plants had disappeared during 2024.

(2.) The North Central patch has been experiencing severe ecological succession to tall competing exotic grass, and has not been so productive in butterfly numbers in recent years (see following section on Kincaid's lupine ecological succession).

(3.) The Northeast patch has been the largest area of lupine at Yamhill Oaks for many years, and has always supported the largest number of butterflies. The older central areas of this patch have also been experiencing severe ecological succession to tall grass, but the patch has been rapidly expanding into new adjacent areas over the past few years. Thus, butterfly numbers have been maintained at a relatively stable level.

(4.) The North Ravine patch has been rapidly expanding in recent years. Although it has a relatively cool, mesic aspect, good numbers of butterflies have been produced in this patch over the past nine years except in 2019 following the prescribed fire and in 2022 during the cold weather year.

(5.) The South Ravine patch has also been expanding in recent years. It has produced large numbers of butterflies over the past nine years except in 2019 following the fire, and it has produced fewer butterflies during the cold springs of 2022 and 2024.

(6.) The South Central patch did not exist prior to 2018 when a few lupine plants became established, apparently resulting from long distance seed dispersal. Since then, this patch has been rapidly expanding, and has been consistently supporting small numbers of butterflies over the past six years.

(7.) The Southwest patch near the road is quite small, but has existed for many years. It never supported any butterflies until 2019. Since then, it has been slowly expanding, and a few butterflies (1-2) have been present every year since then.

(8.) The Pugh Area patch is located on a steep west-facing hillside that has a very dry and warm aspect. It was initially a very small colony of lupine that had no butterflies, but it has been slowly expanding over the hillside during the past six years. During this time, butterflies have greatly proliferated on the site, and this patch has been supporting the second highest number at Yamhill Oaks for several years aside from the Northeast patch. In 2024, this patch was particularly productive in producing butterflies that were consistently present throughout the adult flight season from May 16 to June 10. The warm, dry aspect appears to result in high larval survival during years with a cold, rainy spring.

Thus, one of the strengths of the Yamhill Oaks Preserve is that it supports lupine patches growing under a variety of cold, mesic to warm, xeric aspects and habitat conditions. This helps to maintain butterfly populations despite years with variable weather conditions. During a hot, dry spring, larvae might survive better in the cool, mesic habitat, while a cool, wet spring may favor larval survival in a warm, dry habitat.

6. Yamhill Co. – Old Moores Valley Road – Sid Freidman Property (Moores Valley Metapopulation)

This site along Old Moores Valley Road is located just south of Area 5. A small patch of Kincaid's lupine covering an estimated 41 square meters is located at the northwest corner of the Freidman property, and an additional 40 square meters of lupine is located along the adjacent county road right of way on both the west and east sides of the road within a zone of remnant native prairie. This site was surveyed on four days in 2024 with the following results.

|         |   |
|---------|---|
| May 20  | 0 |
| May 27  | 0 |
| June 6  | 0 |
| June 12 | 0 |

As in previous years, the growing season in Moores Valley was quite delayed during 2024 because of the cool, wet conditions in the spring. Most of the lupine was still in the early spike phase on May 20, and much of the lupine was still in bloom on June 12. Habitat conditions at this specific site were very poor in the past because of infestations of both tall oat-grass and braken fern. The lupine on the Freidman property was still mostly suppressed this year by the tall oat-grass, and adjacent conifers are increasingly shading the site. However, conditions along the roadsides were greatly improved by treating the grass with a grass-specific herbicide during the spring, and the braken fern was mostly eliminated from around the lupine by hand weed-eaters and by hand-pulling that took place in 2017-2018. As a consequence, the lupine along the roadsides was flourishing and blooming extensively during 2019-2024. However, the tall oat-grass is now starting to return to the roadsides in this area, and it is suggested that another herbicide treatment be conducted during the spring of 2025.

7. Yamhill Co. – Area 5 Old Moores Valley Road (Moores Valley Metapopulation)

This site is limited to a strip of native prairie located in the county road right of way along Old Moores Valley Road just south of the junction with Moores Valley Road. A rich diversity of native prairie plants is found at this site, and large patches of Kincaid's lupine are located on both sides of the road. These patches were surveyed over four days in 2024 with the following results.

|         |   |
|---------|---|
| May 20  | 0 |
| May 27  | 0 |
| June 6  | 0 |
| June 12 | 0 |

Butterfly numbers have dropped in this area over the past ten years compared to a peak of 10 males in 2013. The population appears to have become mostly extinct during the 2017-2024 field seasons, due in part to the wet, cold weather conditions in Moores Valley during the spring development season.

In the past, very dense stands of tall oat-grass have severely repressed the lupine along the roadsides of this area. The grass-specific herbicide Poast (sethoxydim) was applied to this habitat area during April in both 2015 and 2019. As a consequence of these herbicide treatments, the lupine has responded with vigorous growth and extensive blooming in the 2019-2024 time period. As of this year, the tall oat-grass is now starting to spread over the roadsides again, and it is suggested that another herbicide treatment be applied to this area during the spring of 2025.

During 2020-2022, a severe soil erosion problem developed in the ditch along the west side of the road, creating a deep gully through particularly dense stands of Kincaid's lupine. Yamhill County management filled in the gully and installed netting to help reduce the erosion problem. This work was successful and the disturbance only minimally affected the lupine. During the 2023-2024 field seasons, dense and vigorous stands of lupine were successfully spreading through this disturbed area.

⑧ Yamhill Co. – Old Moores Valley Road – Toby Van Hee Property (Moores Valley Metapopulation)

This site along Old Moores Valley Road is located north of the junction with Moores Valley Road. Patches of Kincaid's lupine were growing vigorously and expanding rapidly along both the county road right of way and also on the adjacent Van Hee property during 2018-2023. However in 2024, the lupine was severely suppressed by dense stands of tall oat-grass on the Van Hee property. Both tall oat-grass and purple vetch were also suppressing lupine along the county road right of way. Thus, it is suggested that a grass-specific herbicide be applied to the roadsides during the spring of 2025. This management will then need to be monitored next year to see if this stimulates a growth flush in the purple vetch, which was observed in previous years along Oak Ridge Road.

In previous years, a few male Fender’s blue butterflies (1-2) have been present at this site in 2014-2016, 2019, and also last year in 2023. These lupine patches were surveyed five times during the 2024 field season with the following results.

|         |   |
|---------|---|
| May 15  | 0 |
| May 20  | 0 |
| May 27  | 0 |
| June 6  | 0 |
| June 12 | 0 |

9. Yamhill Co. – Area 6 Moores Valley Road – Thorton Property (Moores Valley Metapopulation)

This area consists of two sites within the county road right of way along Moores Valley Road. The first site is located near the junction with Old Moores Valley Road very close to the main habitat portion of Area 5. The second site is located on a dry, south-facing hillside further east along the road. Lupine patches occur on both the north and south sides of the road at both sites, and some lupine also occurs on the adjacent Thorton property near the fence line. These sites were surveyed five times during the 2024 field season with the following results.

|         |   |
|---------|---|
| May 15  | 0 |
| May 20  | 0 |
| May 27  | 0 |
| June 6  | 0 |
| June 12 | 0 |

During the past four years, Kincaid’s lupine has been growing very poorly along the roadside of Moores Valley Road. Some of this is due to suppression with exotic tall oat-grass at Site 1 near the junction with Old Moores Valley Road, and most lupine was severely repressed in 2023 by tall vegetation. This area was successfully treated with a grass-specific herbicide in 2024 that killed most of the grass. As a consequence, the lupine was growing much more

vigorously this year, and some even bloomed. At Site 2, the lupine grew very poorly because of severe drought-like conditions on the steep, south-facing hillside, and the only lupine that was able to bloom in 2024 was growing in the shade of some taller vegetation that provided the lupine with some shelter from the drying conditions.

10. Yamhill Co. – Sarah Miranda property (formerly Richard Blaha property) (Moores Valley Metapopulation)

This site is located along NW Fairdale Road. A large area of Kincaid’s lupine covering about 600 square meters is located on a remnant area of native prairie that is dominated by Roemer’s fescue bunchgrass. About two thirds of this lupine is located in a pasture that has been subject to occasional light livestock grazing, and the lupine has been actively expanding in recent years. Unfortunately, the pasture received very heavy livestock grazing during the spring of 2023 that ate most of the lupine down to the bare ground, and very little lupine was able to bloom in the pasture last year. In 2024, the lupine was beginning to grow back with moderate blooming. However, the lupine outside of the pasture was growing and blooming vigorously in 2023-2024. This site was surveyed five times in 2024 with the following results

|         |   |
|---------|---|
| May 15  | 0 |
| May 20  | 0 |
| May 27  | 0 |
| June 6  | 0 |
| June 12 | 0 |

**Summary of the total number of male Fender’s blue butterflies in the Moores Valley Metapopulation for 2014-2024**

|      |    |      |   |      |   |
|------|----|------|---|------|---|
| 2014 | 16 | 2019 | 2 | 2024 | 0 |
| 2015 | 14 | 2020 | 4 |      |   |
| 2016 | 4  | 2021 | 2 |      |   |
| 2017 | 0  | 2022 | 0 |      |   |
| 2018 | 0  | 2023 | 2 |      |   |

Thus, butterfly numbers have been very low in the Moores Valley Metapopulation area over the past nine years, even though the lupine has been flourishing along the roadsides due to the habitat management. This may be the result of unusually cold spring weather conditions in Moores Valley. Cold air and fog from the Coast Range often settles down in Moores Valley during the spring, when the top of adjacent Oak Ridge is exposed to warm, sunny weather at the same time. The last few years were particularly cold with cloudy and rainy weather, and lupine growth and flowering were delayed by about two weeks compared to the top of Oak Ridge. In turn, this may have resulted in heavy mortality of developing butterfly larvae. It is possible that the population actually went extinct in 2017-2018, and again in 2022, and was re-founded by stray females coming from Oak Ridge. As of the 2024 field season, the butterfly might again be extinct in Moores Valley.

11. Yamhill Co. – Area 1 Oak Ridge Road – Marvin King property (Oak Ridge Metapopulation)

Area 1 on Oak Ridge is located along the east and north sides of Oak Ridge Road, and is comprised of both the county road right of way and the adjacent Marvin King property. Large patches of Kincaid’s lupine are present covering about 1300 square meters. This site was surveyed five times in 2024 with the following numbers of male butterflies.

|         |   |
|---------|---|
| May 15  | 0 |
| May 20  | 0 |
| May 27  | 7 |
| June 6  | 4 |
| June 12 | 3 |

Much of this habitat has been severely degraded over the past few years, and has been badly overgrown with tall oat-grass, braken fern, and Scotch broom brush that has been repressing the lupine. As a consequence, butterfly numbers have been greatly reduced during 2016-2024 compared to previous years. Nevertheless, butterflies and lupine are still persisting on the King property despite these problems. At present, all of this habitat needs to be brushed to remove the Scotch broom brush from the King property. In addition, the braken fern needs to be cut with weed-eaters during June, and a grass-specific herbicide spray during April would be highly beneficial for restoring the habitat for the lupine and butterflies. Mr. and Mrs. King are supportive of such work, but require assistance with this management.

In sharp contrast, Yamhill County management cut all of the Scotch broom brush along the county road right of way during the fall of 2019. This work resulted in exposing a large amount of lupine that had been previously suppressed by the brush, and this lupine was vigorously growing and blooming during the 2020-2024 field seasons. In turn, butterfly numbers in Area 1 have shown improvement over these past few years. While a few butterflies were present on the King property, the majority of butterflies were flying around the exposed and blooming lupine patches along the roadsides. Historical peak counts of Fender's blue butterfly males in Area 1 are shown as follows.

|      |    |
|------|----|
| 2002 | 68 |
| 2015 | 30 |
| 2016 | 13 |
| 2017 | 8  |
| 2018 | 8  |
| 2019 | 12 |
| 2020 | 8  |
| 2021 | 7  |
| 2022 | 14 |
| 2023 | 10 |
| 2024 | 7  |

12. Yamhill Co. – Area 2 Oak Ridge Road – Charles Goodwin Property (Oak Ridge Metapopulation)

The Area 2 habitat along Oak Ridge Road is comprised of both the county road right of way and the adjacent Charles Goodwin property. Large patches of Kincaid's lupine are present covering an estimated 4000 square meters. In 2014, the first comprehensive survey was conducted on the Goodwin property since 2011 with the permission and assistance of Mr. Goodwin. Over the past few years, Kincaid's lupine has greatly increased and spread over much of the Goodwin property to the west and southwest corners of the meadow. At present, both the lupine and butterfly are now widely distributed throughout the Goodwin property, and have greatly increased along the entire length of the county road right of way as well. Subcounts were

made for the roadside and adjacent Goodwin property, and for the interior of the Goodwin property not observable from the road during the 2014 survey. In 2015-2024, Mr. Goodwin did not want any additional surveys done on his property. Thus, the following surveys over five days in 2024 were limited to observations of male Fender’s blue butterflies along the roadside.

|         |    |
|---------|----|
| May 14  | 5  |
| May 20  | 22 |
| May 27  | 35 |
| June 6  | 19 |
| June 12 | 7  |

Mr. Goodwin has continued to manage his property with mowing, so it is not overgrown with Scotch broom, tall oat-grass, and bracken fern like the adjacent King property in Area 1. In addition, Yamhill County management has successfully controlled tall oat-grass along the roadside with applications of the grass-specific herbicide Poast, while infestations of exotic purple vetch (*Vicia villosa*) have been successfully controlled by mowing above the lupine plants during June. Specific details of this management work were discussed in the 2019 report (Hammond, 2019). As a consequence, the lupine was growing and blooming along the roadsides with great vigor during the 2020-2023 field seasons, and numerous female butterflies were seen ovipositing on the lupine in this managed habitat. The most recent mowing for purple vetch was conducted during late June of 2024.

The following table shows the extrapolated peak counts in parenthesis for male Fender’s blue butterflies in Area 2 for the 2014-2024 field seasons based upon the 2014 count of butterflies in the interior of the Goodwin property. In 2021-2023, the roadside peak count reached the highest number ever seen at this site.

|      | <u>Roadside</u> | <u>Interior Goodwin</u> | <u>Total</u> |
|------|-----------------|-------------------------|--------------|
| 2014 | 38              | 62                      | 100          |
| 2015 | 34              | (? 56)                  | (? 90)       |
| 2016 | 39              | (? 64)                  | (? 103)      |
| 2017 | 9               | (? 15)                  | (? 24)       |

|      |    |        |         |
|------|----|--------|---------|
| 2018 | 24 | (? 40) | (? 64)  |
| 2019 | 30 | (? 49) | (? 79)  |
| 2020 | 32 | (? 53) | (? 85)  |
| 2021 | 45 | (? 73) | (? 118) |
| 2022 | 45 | (? 73) | (? 118) |
| 2023 | 45 | (? 73) | (? 118) |
| 2024 | 35 | (? 57) | (? 92)  |

13. Yamhill Co. – Area 3 Oak Ridge Road – Carol Hebert Property (Oak Ridge Metapopulation)

The Area 3 habitat on Oak Ridge is comprised of both the county road right of way and the adjacent Carol Hebert property. Ms. Hebert has never allowed butterfly surveys to be conducted on her property, so all butterfly observations have been limited to the county roadside and what could be observed from the road on the Hebert property. Large patches of Kincaid's lupine are located in the road right of way and on the Hebert property immediately adjacent to the road. These cover an estimated 500 square meters on the road right of way and perhaps an additional 600 square meters on the Hebert property next to the road. In particular, the lupine appears to have spread considerably on the Hebert property in recent years, while the lupine on the road right of way has been released from suppression by dense stands of woody brush including poison oak, young trees, and exotic sweet pea by Yamhill County management over the past seven years. Specific details of this management were included in the 2019 report (Hammond, 2019). In late June of 2024, both exotic purple vetch and sweet pea were mowed along the road. Butterflies were surveyed five times in 2024 with the following numbers of male butterflies.

|         |    |
|---------|----|
| May 14  | 1  |
| May 20  | 7  |
| May 27  | 17 |
| June 6  | 13 |
| June 12 | 8  |

During the 2019-2024 field seasons, butterflies emerged and continued to fly in Area 3 over an extended time period. Thus, butterflies flying in the middle of May were probably not the same butterflies flying during the middle of June when several freshly emerged males and females were still observed. Butterfly numbers doubled during this time period due in large part to the improved habitat conditions along the roadsides resulting from Yamhill County management. In both 2022 and 2024, the cold and rainy weather conditions resulted in the adult butterfly flight season being delayed by about two weeks, with butterflies still flying during the middle of June. Moreover, the population was severely reduced in numbers compared to 2021 and 2023 with more favorable weather conditions. Again, cold, rainy weather during the spring appears to result in higher larval mortality compared to warm, dry weather. Peak counts of males for 2014-2024 are shown below.

|      |    |
|------|----|
| 2014 | 36 |
| 2015 | 26 |
| 2016 | 20 |
| 2017 | 12 |
| 2018 | 14 |
| 2019 | 32 |
| 2020 | 26 |
| 2021 | 32 |
| 2022 | 10 |
| 2023 | 34 |
| 2024 | 17 |

#### 14. Yamhill Co. – Area 4 Oak Ridge – Zakocs and Aplin Properties (Oak Ridge Metapopulation)

The habitat of Area 4 on Oak Ridge is located on the Ed Zakocs and Michael Aplin properties. There are four major patches of Kincaid's lupine on the Zakocs property covering an estimated 8000 square meters, and two major patches of lupine on the Aplin property that now cover about 3000 square meters. These lupine patches have been growing and expanding rapidly on both properties over the past few years. The locations of these lupine patches are illustrated

on the attached map. Zakocs 5 lupine patch shown on the map was formerly covered with invasive sickle-keeled lupine (*Lupinus albicaulis*) that was rapidly spreading over the Zakocs property and smothering out the Kincaid’s lupine. The sickle-keeled lupine was successfully eradicated with herbicide applications as discussed in the 2018 and 2019 reports (Hammond, 2018, 2019), and some isolated plants of Kincaid’s lupine were becoming established within the Zakocs 5 area as of the 2020-2024 field seasons. In 2024, a new patch of lupine (Zakocs 8) had become established at the southwest corner of the Zakocs property, apparently resulting from long distance seed dispersal. At the same time, much of the lupine in the original patches (Zakocs 1, 3, and 4) was becoming severely impacted from succession to tall exotic grass domination (see following section on Kincaid’s lupine ecological succession).

Area 4 was surveyed four times during the 2024 field season with the number of male butterflies shown for each individual lupine patch below (locations shown on map).

|                  | <u>Zakocs 1</u> | <u>Zakocs 2</u> | <u>Zakocs 3</u> | <u>Zakocs 4</u> | <u>Zakocs 5</u> | <u>Aplin 6</u> | <u>Aplin 7</u> | <u>Zakocs 8</u> |
|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|----------------|-----------------|
| May 15           | 14              | 1               | 7               | 0               | 0               | 12             | 4              | 1               |
| May 27           | 14              | 23              | 5               | 7               | 0               | 44             | 15             | 0               |
| June 6           | 6               | 23              | 4               | 4               | 0               | 42             | 4              | 0               |
| June 12          | 3               | 11              | 0               | 0               | 0               | 25             | 2              | 0               |
| Peak Count       | 14              | 23              | 7               | 7               | 0               | 44             | 15             | 1               |
| Total Peak Count | 111 males       |                 |                 |                 |                 |                |                |                 |

Thus, butterfly numbers were at peak at various times in different lupine patches between May 15 (Zakocs 1) and May 27 (Aplin 6). This is the result of variance in aspect and moisture conditions with butterflies on warm, dry aspects peaking first (Zakocs 1, 3, and 8), and butterflies on cool, wet aspects peaking later (Zakocs 2 and Aplin 6). Total population size in 2024 is estimated at around 266 butterflies.

The following table compares peak male butterfly numbers by lupine patch during 2018-2021, and in 2024. Overall numbers in Area 4 were in sharp decline in 2024 compared to previous years, partly resulting from the cool, rainy spring and partly from the ecological succession problems in many of the Zakocs lupine patches. These declines on the Zakocs property have been partially compensated by strong numbers of butterflies on the Aplin property.

**Comparison of Peak Male Butterfly Numbers in Area 4 by Lupine Patch During 2018-2024**

|             | <u>2018</u> | <u>2019</u> | <u>2020</u> | <u>2021</u> | <u>2024</u> |
|-------------|-------------|-------------|-------------|-------------|-------------|
| 1. Zakocs 1 | 68          | 68          | 75          | 46          | 14          |
| 2. Zakocs 2 | 5           | 14          | 20          | 35          | 23          |
| 3. Zakocs 3 | 24          | 12          | 38          | 14          | 7           |
| 4. Zakocs 4 | 19          | 8           | 38          | 58          | 8           |
| 5. Zakocs 5 | 0           | 0           | 0           | 0           | 0           |
| 6. Aplin 6  | 30          | 41          | 41          | 56          | 44          |
| 7. Aplin 7  | 0           | 20          | 15          | 9           | 15          |
| 8. Zakocs 8 | 0           | 0           | 0           | 0           | 1           |
| <hr/>       |             |             |             |             |             |
| Total       | 146         | 163         | 227         | 218         | 111         |

During 2024, butterfly numbers in Area 4 were sharply lower compared to previous years. This was likely due in part to the cold, rainy weather conditions during the spring larval development season, but deterioration of the lupine habitat itself also appears to be a major contributory factor as well. As shown in the above table, the history of individual lupine patches and the butterflies that they support has been quite variable over the past seven years (locations shown on enclosed map). The history of each lupine patch is discussed in detail as follows.

(1.) Zakocs 1 lupine patch has been rapidly expanding each year, and has probably quadrupled in size since 2013. It includes the top of the hill that is relatively warm and dry, and a lower north-facing aspect that is cooler and moister. Butterflies start to emerge at the top of the hill beginning in early May and peak through the middle of May, but fresh butterflies continue to emerge in the north-facing area through the second week in June. Butterfly numbers were increasing each year since 2013 with the expanding extent of lupine coverage, but have been declining over the past four years. While this decline is partly due to poor weather conditions during this time, much of the Zakocs 1 lupine patch is presently experiencing severe decline due to lupine ecological succession (see discussion in following section). This has resulted in a particularly massive decline in butterfly numbers over the past two years.

(2.) Zakocs 2 lupine patch began as a purely Kincaid's lupine patch in 2013, but rapidly became overgrown with the infestation of sickle-keeled lupine by 2015. With the elimination of the sickle-keeled lupine and suppression of Kincaid's lupine by herbicide treatment in 2017, butterfly numbers greatly decreased in 2017-2018. However, the Kincaid's lupine recovered in 2019-2021, and this patch is now rapidly expanding. In turn, butterfly numbers have also been increasing over the past four years, although the western part of this lupine patch is currently being overgrown with an infestation of tall oat-grass. This site has a cool, north-facing aspect.

(3.) Zakocs 3 lupine patch is located at the top of the hill with a warm, dry south-facing aspect. It has probably quadrupled in size since 2013, and is currently expanding at a rapid rate. Butterfly numbers reached the highest level during the favorable weather year of 2016 with 78 butterflies present, but numbers sharply declined during the dry springs of 2019 and 2021. Much of this lupine patch is also in severe decline at present due to lupine ecological succession. Thus, only 7 butterflies were present in 2024.

(4.) Zakocs 4 lupine patch is located at the bottom of the hill with a warm, dry south-facing aspect. It also has quadrupled in size since 2013, and is currently expanding at a rapid rate as well. Unfortunately, most of this lupine patch is also in severe decline due to lupine ecological succession, and much is currently overgrown with exotic grass including tall oat-grass. The highest number of butterflies (88) occurred in 2015, and 58 were still present in 2021, but this number dropped to only 8 in 2024.

(5.) Zakocs 5 lupine patch on the northwest side of the hill was a sickle-keeled lupine site with virtually no Kincaid's lupine when it was eliminated with herbicides in 2017. Since then, scattered small patches of Kincaid's lupine have become established, apparently resulting from long-distance seed dispersal. Thus, butterflies are expected to become re-established in future years as the Kincaid's lupine spreads and expands, but no butterflies were yet seen during 2024.

(6.) Aplin 6 lupine patch is located on a cool, north-facing aspect. It has been rapidly expanding for many years, and although the central portions of the patch are starting to show indications of lupine ecological succession, this has not affected butterfly numbers as yet. Because of the cool, mesic conditions, butterflies fly in large numbers over an extended time period without a clear peak, and butterflies flying during the first two weeks of May are probably not the same butterflies flying during the first two weeks of June. As a consequence, the peak count numbers shown in the above table are probably not indicative of the total butterfly production levels in this lupine patch. During the 2024 field season, this lupine patch produced the most butterflies (44) in all of Area 4.

(7.) Aplin 7 lupine patch is located higher on the hill with a warm, drier aspect. It did not exist until four years ago. A few isolated plants had become established in 2018, apparently by long-distance seed dispersal, and the lupine has quickly spread and formed a very large patch as of the 2024 field season. Butterflies quickly became established in this patch from the

adjacent Aplin 6 patch. Although butterfly numbers dropped during the dry year of 2021, this patch has been consistently producing moderate numbers of butterflies over the past few years including in 2024. By contrast, butterfly numbers in the Aplin 6 patch with cool, mesic conditions reached the highest number ever (56) during 2021. At present, these two patches will likely continue to expand and merge together in the next few years.

(8.) Zakocs 8 lupine patch has just become established over the past 2-3 years. It began as an isolated plant resulting from long-distance seed dispersal on the southwest part of the hill with a dry, south-facing aspect. As of the 2024 field season, it had expanded into a small patch covering about 20 square meters, and the first male Fender's blue butterfly was seen in this patch on May 15. Because habitat conditions are very similar to that of the Aplin 7 lupine patch, this new patch is expected to rapidly expand over the next few years.

The following table summarizes peak numbers of male Fender's blue butterflies and a population estimate for the Oak Ridge Metapopulation in 2016-2021, and in 2024. Data was incomplete in 2022-2023.

|                     | <u>2016</u> | <u>2017</u> | <u>2018</u> | <u>2019</u> | <u>2020</u> | <u>2021</u> | <u>2024</u> |
|---------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Area 1              | 13          | 8           | 8           | 12          | 8           | 7           | 7           |
| Area 2              | 103         | 24          | 64          | 79          | 85          | 118         | 92          |
| Area 3              | 20          | 12          | 14          | 32          | 26          | 32          | 17          |
| Area 4              | 524         | 99          | 146         | 163         | 227         | 218         | 111         |
| Total Peak Count    | 660         | 143         | 232         | 286         | 346         | 375         | 227         |
| Population Estimate | 1584        | 403         | 518         | 686         | 830         | 900         | 545         |

Butterfly numbers in the Oak Ridge Metapopulation have remained somewhat stable over the past 10 years. Sharp decreases on the Zakocs property have been partially compensated by increases on the Aplin property. These decreases appear to have resulted from a combination of cool, wet weather conditions during the early spring over the past few years, and lupine ecological succession.

15. Yamhill Co. – Hacker Road (Turner Creek Metapopulation)

The Hacker Road habitat consists of a narrow strip of native prairie along the county road right of way that includes a surprisingly rich diversity of native prairie herbs and grasses. Late June observations in 2020 showed large populations of both *Brodiaea coronaria* and *Clarkia amoena*. Kincaid's lupine is abundant on the north side of the road extending for about a quarter of a mile, but also occurs on the south side of the road. In 2024, butterfly surveys were conducted over five days with the following results.

|         |   |
|---------|---|
| May 14  | 0 |
| May 20  | 0 |
| May 27  | 0 |
| June 6  | 0 |
| June 12 | 0 |

In recent years, only a few butterflies have occupied this habitat as shown by the peak counts below. In 2023, the population may have died out due to the poor weather conditions during the spring of 2022.

|      |                    |
|------|--------------------|
| 2015 | 4 males, 1 female  |
| 2016 | 6 males, 3 females |
| 2017 | 8 males            |
| 2018 | 5 males, 1 female  |
| 2019 | 1 male, 1 female   |
| 2020 | 0                  |
| 2021 | 1 male             |
| 2022 | 1 male             |
| 2023 | 0                  |
| 2024 | 0                  |

Part of the above decline in recent years may be due to a resurgence of tall-growing exotic grasses that are over-growing the lupine during the butterfly flight season, particularly tall oat-grass. Thus, it is recommended that this site be treated with a grass-specific herbicide during the spring of 2025.

16. Yamhill Co. – Tupper Road (Turner Creek Metapopulation)

Small patches of Kincaid's lupine are distributed along the north side of Tupper Road near the junction of Turner Creek Road for about a quarter of a mile. However, this lupine has been badly overgrown with tall, dense stands of tall oat-grass in the past, including the 2018-2024 field seasons. No Fender's blue butterflies have been present during this time period. Because of the close proximity to the occupied habitat along Hacker Road and Belt Road, butterflies would probably occupy this site if the tall oat-grass was absent. Thus, it is strongly recommended that the grass should be sprayed twice with a grass-specific herbicide during March and April of 2025 to achieve better control or eradication of this pest. This site was surveyed over five days in 2024 with the following results.

|         |   |
|---------|---|
| May 14  | 0 |
| May 20  | 0 |
| May 27  | 0 |
| June 6  | 0 |
| June 12 | 0 |

17. Yamhill Co. – Sonja Kalbsleisch and Norvella Koelling Properties (Turner Creek Metapopulation)

Both of these sites along Belt Road and NW Richmond Road were not surveyed during the 2023-2024 field seasons. Both sites have major management problems as discussed in the 2022 report (Hammond, 2022), and butterfly numbers have been low at both sites in recent years. In 2022, the peak count was 3 males and 4 females on the Koelling property and only 1 female was seen on the Kalbsleisch property. Also, access to the Kalbsleisch property has become difficult because dense thickets of blackberry have overgrown the north access gate on Belt Road. This site is rapidly becoming overgrown with exotic Scotch broom brush. Habitat on the Koelling property was being degraded by a dense growth of exotic purple vetch that was over-growing the Kincaid's lupine. Both property owners require assistance with management on their properties.

## MANAGEMENT FOR KINCAID'S LUPINE UNDER ECOLOGICAL SUCCESSION

As discussed above with both the Yamhill Oaks site in Gopher Valley and the Zakocs-Aplin site on Oak Ridge, major declines in butterfly numbers over the last few years have revealed a serious problem with ecological succession within old lupine patches. Like most lupines, Kincaid's lupine tends to be an early successional species. It grows best on dry, nutrient poor soils with reduced soil nitrogen. On such sites, it faces little competition from taller vegetation such as tall-growing exotic grasses that produce large amounts of thatch. As with other legumes, this lupine does fix nitrogen, and over long periods of time, Kincaid's lupine patches appear to accumulate large amounts of soil nitrogen. In turn, this promotes the invasion of lupine patches with tall vegetation, particularly exotic grasses such as the bent grasses and tall oat-grass. As a consequence, the older lupine patches become severely suppressed and dominated by this taller vegetation and the dead thatch that they produce. As previously discussed, lupine patches 3 and 4 at Yamhill Oaks and the Zakocs patches 1, 3, and 4 have extensive areas suffering from this type of ecological succession (locations shown on maps).

At the same time, adult Fender's blue butterflies prefer the younger, more vigorous patches of lupine, both for mate searching and female oviposition. They strongly avoid lupine that is severely suppressed and over-grown with taller vegetation. At many sites without management, the lupine is over-grown with exotic grasses, bracken fern, and Scotch broom brush. Moreover, adult butterflies exhibit a strong behavioral preference for the expanding edges of lupine patches at the early stage of ecological succession, and generally avoid the interior of old, established lupine patches.

Therefore, it may be advisable to consider management strategies that would help to convert old, senescent lupine patches back to an earlier seral condition. There are a number of techniques that might be helpful for this purpose. (1.) Grass-specific herbicides used at the start of the spring growing season may be particularly useful for eliminating the tall exotic grasses such as bentgrass and tall oat-grass from senescent lupine patches. (2.) The mechanical mowing of strips through large, senescent lupine patches during the spring growing season would also set back succession, help control exotic grasses, and would create edges that adult butterflies prefer for their reproductive activities. (3.) Soil scarification that removes the upper 2 inches of soil with enriched nitrogen and grass roots would allow the deep-rooted lupine plants to grow without competition.

Experiments with one or all of these methods within grassland communities will probably become necessary if both Kincaid's lupine and Fender's blue butterfly are to survive at individual habitat sites through long-term perpetuity. Otherwise, such early successional species are ultimately doomed to disappear across the broader landscape of the Willamette Valley.

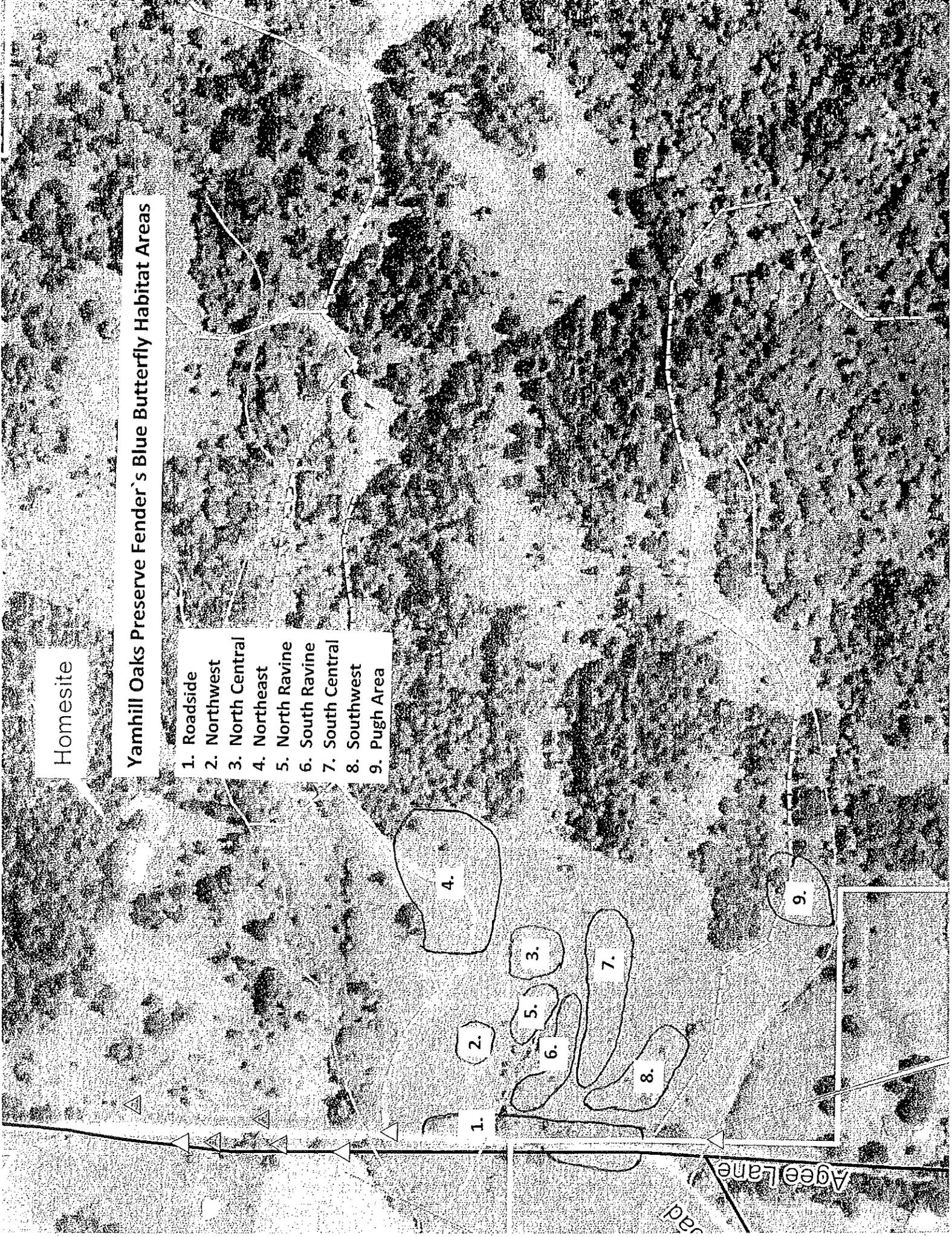
**LITERATURE CITED**

- Hammond, P.C. 2007. The 2007 study of the Fender's blue butterfly (*Icaricia icarioides fenderi*) in Benton, Polk, and Yamhill Counties, Oregon. The Nature Conservancy and U.S. Fish and Wildlife Service. 50 pp.
- Hammond, P.C. 2010. The 2010 study of the Fender's blue butterfly (*Icaricia icarioides fenderi*) in Benton, Polk, and Yamhill Counties, Oregon. Oregon Dept. of State Lands and U.S. Fish and Wildlife Service. 43 pp.
- Hammond, P.C. 2016. The 2016 surveys of Fender's blue butterfly and Kincaid's lupine sites in Benton, Polk, and Yamhill Counties, Oregon. Institute for Applied Ecology and U.S. Fish and Wildlife Service and Yamhill County Department of Public Works. 22 pp.
- Hammond, P.C. 2018. The 2018 surveys of Fender's blue butterfly and Kincaid's lupine sites in Benton and Yamhill Counties, Oregon. Institute for Applied Ecology and U.S. Fish and Wildlife Service and Yamhill County Department of Public Works. 25 pp.
- Hammond, P.C. 2019. The 2019 surveys of Fender's blue butterfly and Kincaid's lupine sites in Benton and Yamhill Counties, Oregon. Institute for Applied Ecology and U.S. Fish and Wildlife Service and Yamhill County Department of Public Works. 30 pp.
- Hammond, P.C. 2021. The 2021 surveys of Fender's blue butterfly and Kincaid's lupine sites in Benton, Polk, and Yamhill Counties, Oregon. Institute for Applied Ecology and U.S. Fish and Wildlife Service and Yamhill County Department of Public Works. 31 pp.
- Hammond, P.C. 2022. The 2022 surveys of Fender's blue butterfly and Kincaid's lupine sites in Benton, Polk, and Yamhill Counties, Oregon. Institute for Applied Ecology and U.S. Fish and Wildlife Service and Yamhill County Department of Public Works. 31 pp.
- Hammond, P.C. 2023. The 2023 surveys of Fender's blue butterfly and Kincaid's lupine sites in Polk and Yamhill Counties, Oregon. Institute for Applied Ecology and U.S. Fish and Wildlife Service and Yamhill County Department of Public Works. 25 pp.

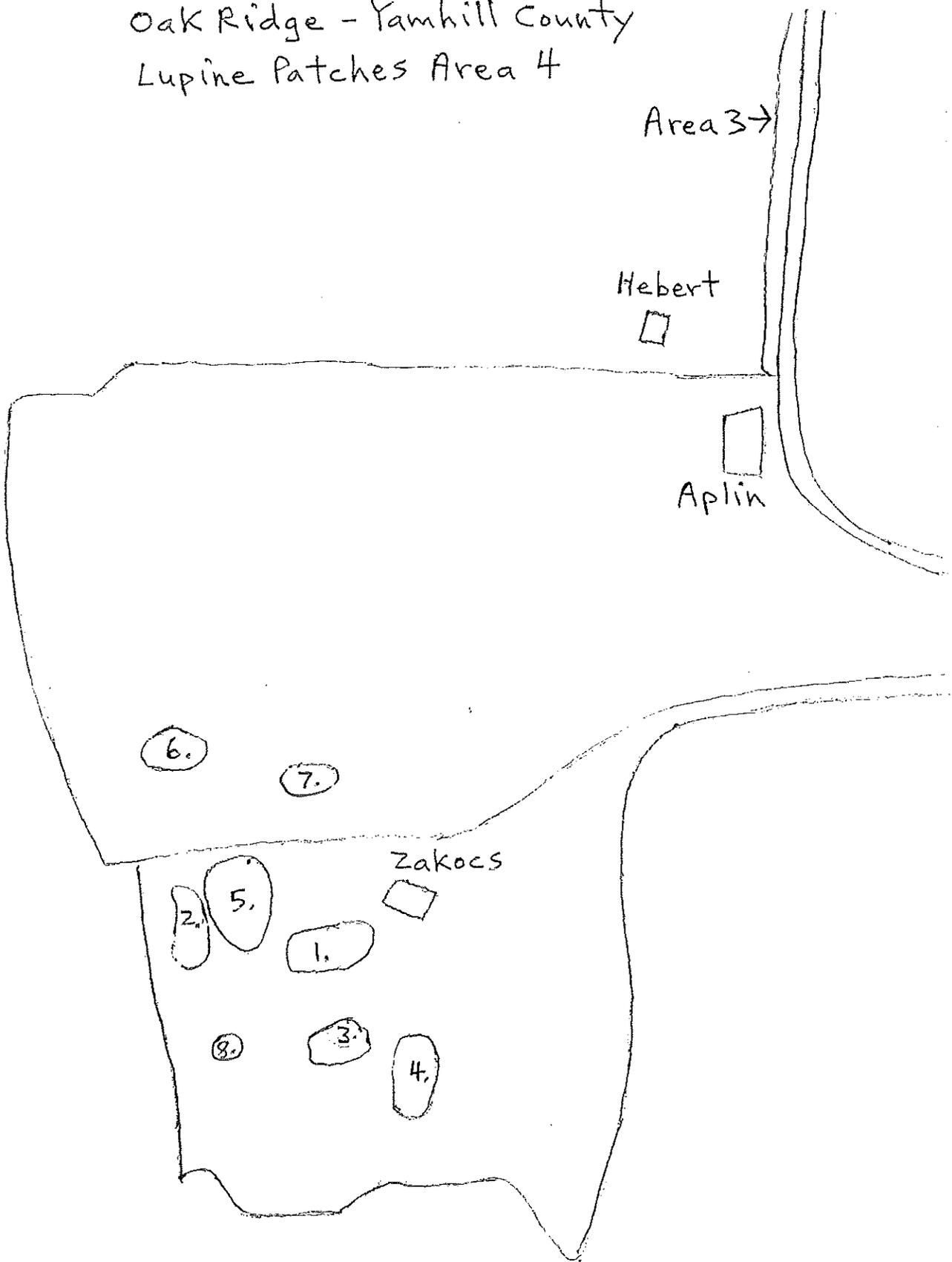
Homesite

Yamhill Oaks Preserve Fender's Blue Butterfly Habitat Areas

- 1. Roadside
- 2. Northwest
- 3. North Central
- 4. Northeast
- 5. North Ravine
- 6. South Ravine
- 7. South Central
- 8. Southwest
- 9. Pugh Area



Oak Ridge - Yamhill County  
Lupine Patches Area 4



**Management Plan for Yamhill County Roadsides for Kincaid's Lupine and Fender's Blue  
Butterfly in 2024-2025**

The following management recommendations for improving and maintaining roadside habitat of the Kincaid's lupine and Fender's blue butterfly in Yamhill County are suggested for the fall or winter of 2024 and the spring of 2025.

1. Beaver Creek Road in Gopher Valley

During 2016, young oak trees on the north embankment of the road were cut and removed, and extensive thickets of woody brush were cut along the entire length of the lupine habitat area. As of 2023-2024, young trees and brush are starting to grow back again, particularly poison oak, blackberry, and young oak trees. Thus, it is suggested that brush cutting be conducted at this site during the 2024-2025 fall or winter seasons.

2. Deer Creek Park in Gopher Valley

In 2024, most of the invasive young Scotch broom seedlings were successfully killed with a spot-spray of herbicide. However, some seedlings were missed, so a follow-up spray during the summer dry season in August and September of 2025 is recommended. A general herbicide such as glyphosate may be used for these control measures.

3. Old Moores Valley Road, Hacker Road, and Tupper Road

During 2015 and 2019, invasive stands of tall oat-grass along the roadsides were successfully treated with the grass-specific herbicide Poast (sethoxydim). This treatment released suppressed patches of Kincaid's lupine, resulting in vigorous growth and blooming of the lupine. As of 2023-2024, the tall oat-grass is again spreading and threatening the lupine in this habitat. Thus, it is suggested that the grass again be sprayed along these roadsides with a grass-specific herbicide during the spring of 2025. Two spray treatments should be conducted, the first in March and the second in April about 2-4 weeks apart.

4. Roadside in Area 3 along Oak Ridge Road adjacent to Carol Hebert Property

As of 2023-2024, young trees, woody brush, and exotic sweet pea are starting to grow back again over the lupine habitat along the west side of the road. Thus, it is suggested that brush cutting be conducted at this site during the 2024-2025 fall or winter seasons.

5. General Management

It is recommended that all lupine habitat along the roadsides in Yamhill County be mowed in late fall or early winter of 2024-2025.

Approved by the Yamhill County Board of  
Commissioners on 12/12/24  
via Board Order 24-358