2015 Surveys for Silver-bordered Fritillary (*Boloria selene*)

On the Ochoco National Forest

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SUMMARY

The silver-bordered fritillary (*Boloria selene*) is designated as an ISSSSP Special Status/Sensitive Species in Oregon. In June and July of 2015, surveys were performed for this regionally rare butterfly on public lands managed by the Ochoco National Forest and Bureau of Land Management where there was either historical occurrence or a likelihood of undiscovered populations of the insect.

Populations were documented at 8 distinct locations from Big Summit Prairie south to Williams and Gray prairies. All observed populations were in the North Fork Crooked River drainage at sites that contained at least some seasonally wet or marshy habitats with violets (the *Boloria selene* larval hostplant).

Three fairly sizeable populations were located – at Elliot Creek (north Big Summit Prairie), along the BLM North Fork Crooked River/lower Lookout Creek site immediately south of Big Summit Prairie, and at NW Williams Prairie. Comparatively few of the butterflies were observed elsewhere.

Observed damage to fragile critical habitats, such as at Elliot Creek (off-road vehicles) and Williams Prairie (cattle grazing), must be avoided in the future to prevent habitat degradation, population decline and potential local extirpation of the insect.

It is recommended that additional surveys for silver-bordered fritillary take place on National Forest and BLM lands to: 1)more completely document the species regional range and distribution; 2) to more accurately assess population/meta-population size; 3) to assess the impact to future generations from observed mid-season damage to critical habitats; 4) to verify benefits (increased abundance or local persistence) to populations from habitat protection or habitat restoration; 5) to determine butterfly response to short or long term environmental conditions such as drought.

INTRODUCTION

The silver-bordered fritillary, *Boloria selene*, ranges throughout much of the northern United States and Canada. In Oregon, the butterfly was unknown until 1961 when it was reported by Ray Albright from Big Summit Prairie in Crook County. While most subsequent Oregon records are from that location, it has also been documented sparingly from Grant and Baker counties (Warren 2005). The Oregon subspecies of the silver-bordered fritillary is unnamed and has been placed in a regional grouping of populations called "Pacific Northwestern segregates" (Warren et al 2013).

Boloria selene is a Special Status/Sensitive Species in Oregon. As such, it is a Federal (Forest Service and Bureau of Land Management) priority conservation species. Under the ISSSSP program, select species are those for which population viability is a concern and for which the goal is to improve the condition of the species and its habitats such that it does not become imperiled and require Federal or State listing.

Within its limited known range in Oregon, *Boloria selene* is associated with riparian areas of mid-elevation prairies where bog or marsh microhabitats support willows and where violets (including *Viola nephrophylla*) serve as the larval hostplant. Adults typically fly for several weeks between early June and mid-August as one or more broods per year (Warren 2005).

It is worth noting that our knowledge of *Boloria selene* in Oregon is based on the historical collection records gleaned from past and present amateur butterfly collectors (Evergreen Aurelians). Many of these important specimens are now housed in the Oregon State Arthropod Collection (OSAC) at Oregon State University in Corvallis.

METHODS

A list of silver-bordered fritillary survey sites was generated by Prineville District/Ochoco National Forest personnel with the goal of visiting each site twice during the course of the flight season. Surveys were conducted during the butterfly's historical flight period in June and early July. Sites surveyed included McKay Saddle, Moccasin Prairie, Spears Prairie, Big Summit Prairie (numerous locations), Little Summit Prairie, Williams Prairie and Gray Prairie (Table 1, Figure 1).

Whenever possible, surveys were conducted during warm and sunny conditions most conducive to butterfly activity and detection. Sites were surveyed on foot with the primary goal of *Boloria selene* detection. If documented, a thorough site-wide search and count was made . Additional notes were made regarding areas of use, nectar resources and general

threats to butterflies or habitats. Finally, a checklist of all butterfly species encountered was created for each site on each date visited (Table 2).

If a site was deemed unsuitable for *Boloria selene* during the first visit, it was omitted from future surveys. For Big Summit Prairie – a large site with many sub-areas to assess – sites surveyed were based on both reasonable access and the likelihood to host the butterfly. Prior to field surveys, Google Earth was used to determine the presence of open wet or marshy areas there.

Given the need to visit a large number of sites for the initial determination of presence-absence of the butterfly, a limited amount of time was spent at each location. As such, while it is unlikely that *Boloria selene* was overlooked if present, other very localized, rare or inconspicuous butterfly species may have been.

Finally, while these surveys were originally planned as a one-person effort, the addition of a second capable surveyor (Gary Pearson of Springfield, Oregon) added significantly to what was able to be accomplished.

RESULTS & DISCUSSION

Subnormal precipitation and relatively high daytime temperatures in June-July coincided with an early and compressed flight period for *Boloria selene* in the Ochoco survey area. Whereas peak flight for the species has historically been from late June into July, peak flight in 2015 was observed during the 2nd week of June and all flight finished by the first week of July for most local populations. For sites such as McKay saddle and Moccasin Prairie this may have meant that small populations, if present, could have been overlooked given that some June 9 surveys were aborted due to a localized thunderstorm.

The silver-bordered fritillary was documented at 8 of 21 sites surveyed (Table 1) for a total of 185+ individual observations. Namely, at Big Summit Prairie (Howard Creek, Fox Creek, Elliot Creek, Peterson Creek/Reservoir, Dudley Creek) Williams Prairie, Gray Prairie and along the North Fork Crooked River/lower Lookout Creek. The butterfly was not observed at McKay Saddle, Moccasin Prairie, Spears Prairie, or certain Big Summit Prairie locations (Cram Creek, Merritt Creek, Indian Creek, the lower Cold Springs area, North Fork Crooked River at road junction 42/3010, road junction 42/4230, Brush Creek and a small tributary of Johnson Creek). A map and summary of observations for each site are presented below. A total of 59 species of butterflies were documented during all surveys combined and are presented by site (Table 2, pages 47-49).

Table 1. Observed numbers of *Boloria selene* at sites surveyed.

Site#	Site Name	# Boloria selene
1	McKay Saddle	0
2	Mocassin Prairie	0
3	Spears Prairie	0
4	BSP-Cram Creek	0
5	BSP-Merritt Creek	0
6	BSP-Howard Creek	5
7	BSP-Indian Creek	0
8	BSP-Crosswhite Creek	0
9	BSP-Fox Creek	6
10	BSP-Elliot Creek	50+
11	BSP-Peterson Creek/Reservoir	2
12	BSP-Lower Cold Springs area	0
13	BSP-N Fk Crooked R	0
14	BSP-Rds 42/4230	0
15	BSP-Dudley Creek	2
16	BSP-Brush Creek	0
17	BSP-Johnson Creek (BLM)	0
18	N Fk Crooked R/Lookout Creek	75
19	Williams Prairie	39
20	Gray Prairie	6
21	Little Summit Prairie	0
	Total *Boloria selene* observed -->	**185+**

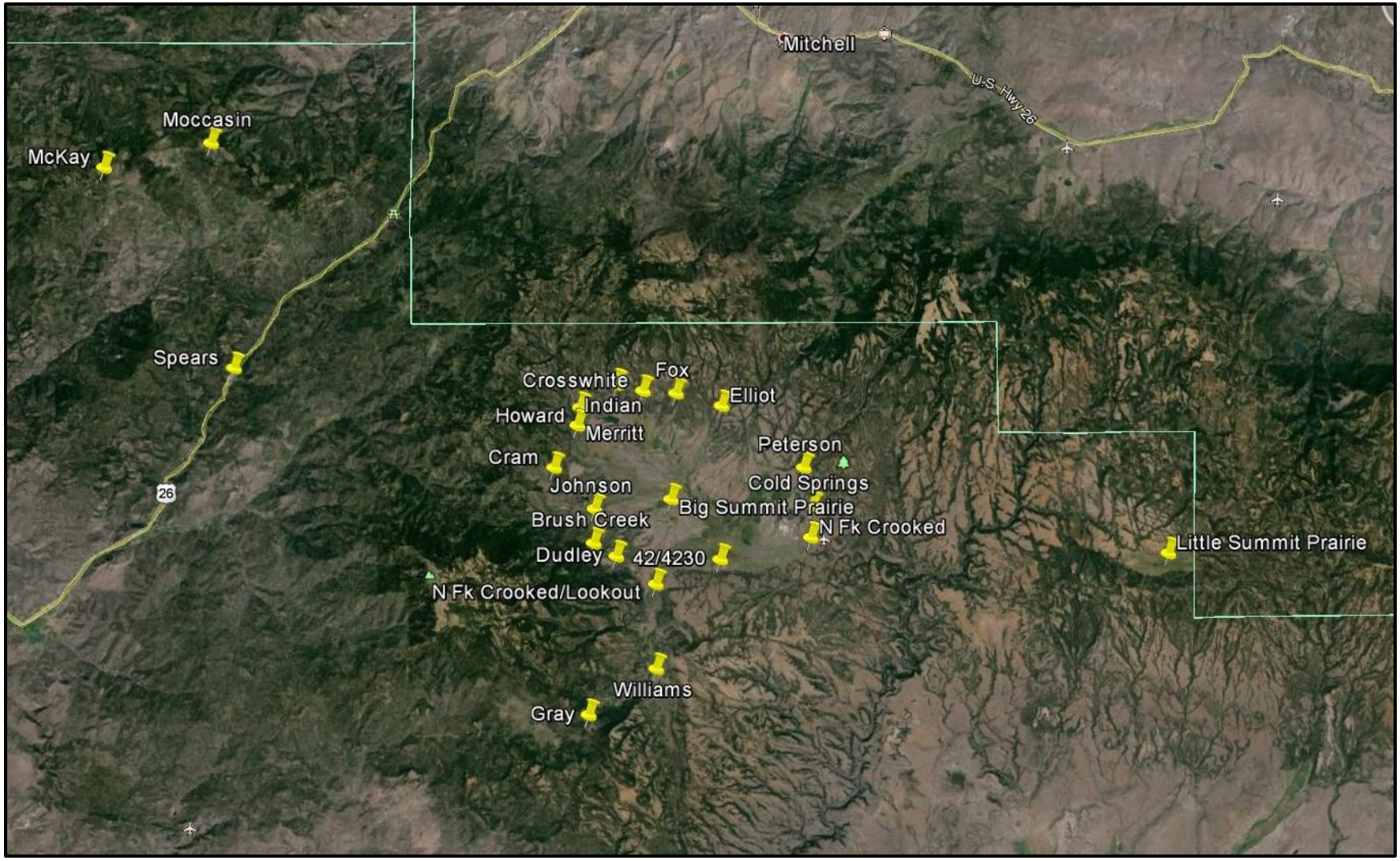

Figure 1. Map of the *Boloria selene* survey area and sites surveyed in 2015.

1. McKay Saddle

No survey possible June 9 due to local precipitation; site surveyed June 30.

Boloria selene. Not observed June 30, but may have been present on an earlier date.

Habitat. Meadow with locally moist areas and a moderate amount of nectar resources.

Threats. Observed nearby timber harvest that could secondarily impact site; adjacent road traffic may generate undesirable dust when conditions are dry.

Butterflies. Relatively few, with only 4 butterfly species observed at the site.

Photo 1. Potential *Boloria selene* habitat at McKay Saddle (June 9). Local precipitation prevented the first survey when meadow conditions were lush and local populations were in flight. By the second survey (June 30), meadow vegetation was rapidly senescing and few butterflies of any kind were observed there.

Figure 2. Map of the McKay Saddle survey area.

2. Moccasin Prairie

No survey possible June 9 due to local precipitation; site surveyed June 30.

Boloria selene. Not observed June 30, but may have been present on an earlier date.

Habitat. A meadow with a significant area of wet, boggy habitat and a well-flowered periphery.

Threats. No noticeable threats were observed.

Butterflies. Relatively abundant. A total of 13 species were observed, including the **Monarch** (*Danaus plexippus*), **Christina's Sulphur** (*Colias christina* "NE Oregon mountain subspecies") and **Lustrous Copper** (*Lycaena cupreus cupreus*).

Photo 2. While *Boloria selene* was not documented at Moccasin Prairie June 30, it contained ample boggy habitat and flowering forbs that attracted many other butterfly species.

Figure 3. Map of the Moccasin Prairie survey area.

3. Spears Prairie

Site surveyed June 9 and June 30.

Boloria selene. Not observed on either date and is probably not present at the site.

Habitat. A large meadow that incorporates portions of Marks Creek and the confluence of its tributaries Little Hay Creek and Wildcat Creek. The site contains a sizeable area of wet, boggy habitat that supported a rich and abundant native prairie flora on June 9. By June 30 the site had been heavily grazed by cattle and few nectar flowers or butterflies remained.

Threats. Cattle grazing. A fence at the north end of the site appeared to have been purposefully manipulated to allow cattle to get through. Spears Prairie was transformed from a thriving, flower-filled meadow to a visibly degraded site just 3 weeks later. The disturbance to both meadow and aquatic habitats undoubtedly impact trout, native pollinators and other native species and should be remedied if at all possible.

Butterflies. Abundant on June 9, with 14 species documented including **Christina's Sulphur**. On June 30, just 7 species and very few butterflies were observed. On the latter date, however, one individual of the day-flying tiger moth ***Grammia elongata*** (family Erebidae) was netted and represents the southernmost record for the Pacific Northwest, the 2nd Oregon State record, and the first Crook County record for the species.

Photo 3. Spears Prairie contained a rich diversity of butterflies on June 9, prior to grazing.

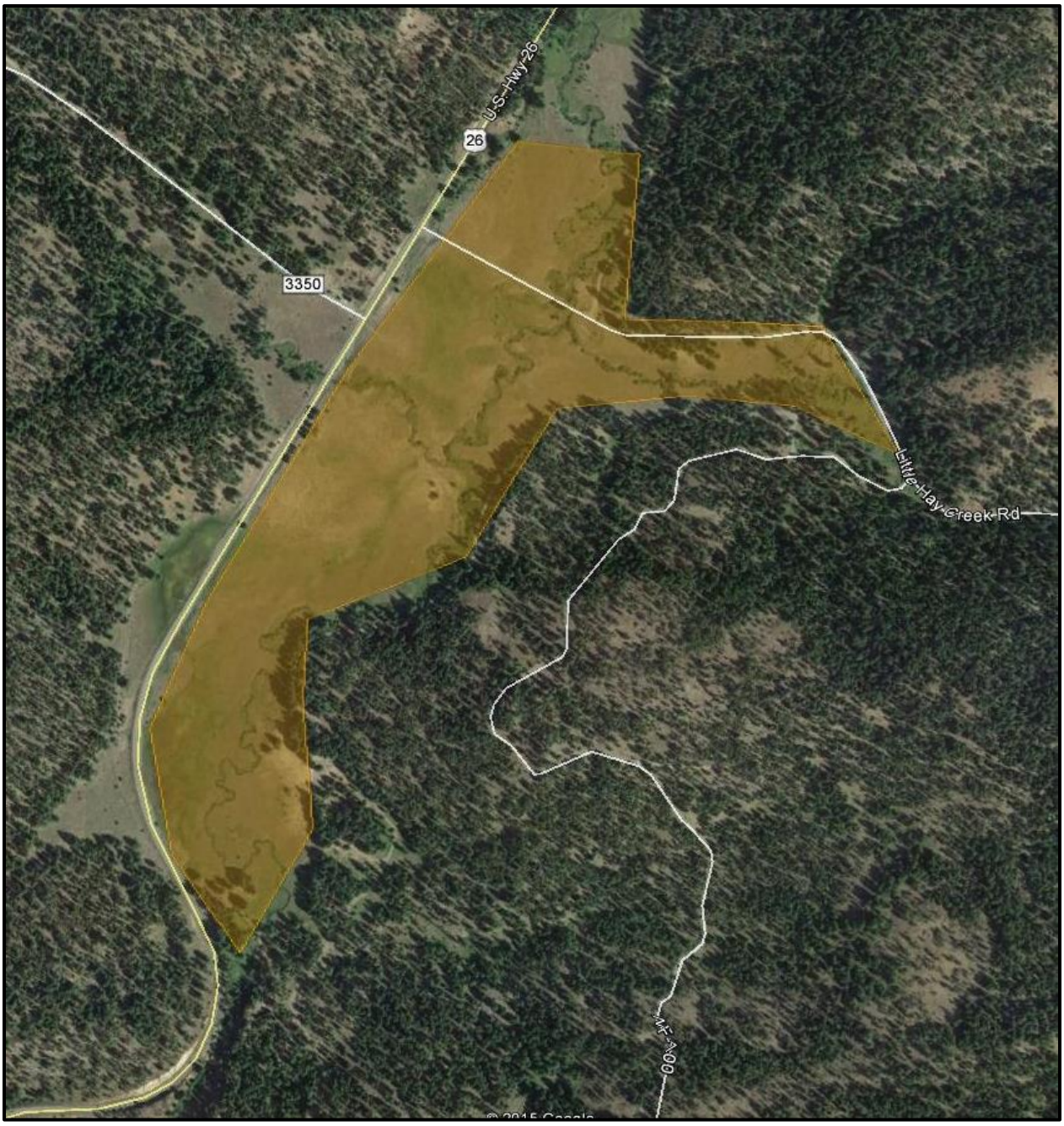

Figure 4. Map of the Spears Prairie survey area.

Big Summit Prairie: sites 4 – 17 are public lands on the periphery of private inholdings.

4. Cram Creek

Site surveyed June 10.

Boloria selene. Not observed on a date when the butterfly was in full flight at other nearby locales. As such, it is probably not present at the site.

Habitat. A small creek with short, steep banks and virtually no boggy habitat that would be expected to support the target species. Butterflies and nectar flowers were both moderately abundant.

Threats. Feral horses. Approximately 100 horses (including newborns) were observed during the survey. Some damage to riparian (stream banks) and other adjacent habitats was noted.

Butterflies. Fairly abundant, with 11 species documented including **Christina's Sulphur**.

Photo 4. Cram Creek (June 9) did not appear to have ample boggy habitat to support silver-bordered fritillaries.

Figure 5. Map of the Cram Creek survey area.

5. Merritt Creek

Site surveyed June 10.

Boloria selene. Not observed on a date when the butterfly was in full flight at other nearby locales. As such, it is probably not present at the site.

Habitat. A small, somewhat intermittent creek, without sufficient boggy habitat to support the target species. Butterflies and nectar flowers were both moderately abundant.

Threats. One small area had been heavily impacted by grazing, or possibly used as a temporary holding area for cattle.

Butterflies. Fairly abundant, with 11 species documented including **Christina's Sulphur**, **Lustrous Copper**, **Edith's Checkerspot** (*Euphydryas editha* "Ochoco Mountain segregate") and the day-flying moth ***Tarache knowltoni*** (family Noctuidae), an indicator of high quality prairie habitat.

Photo 5. Privately owned prairie habitat adjacent to the more forested Merritt Creek site.

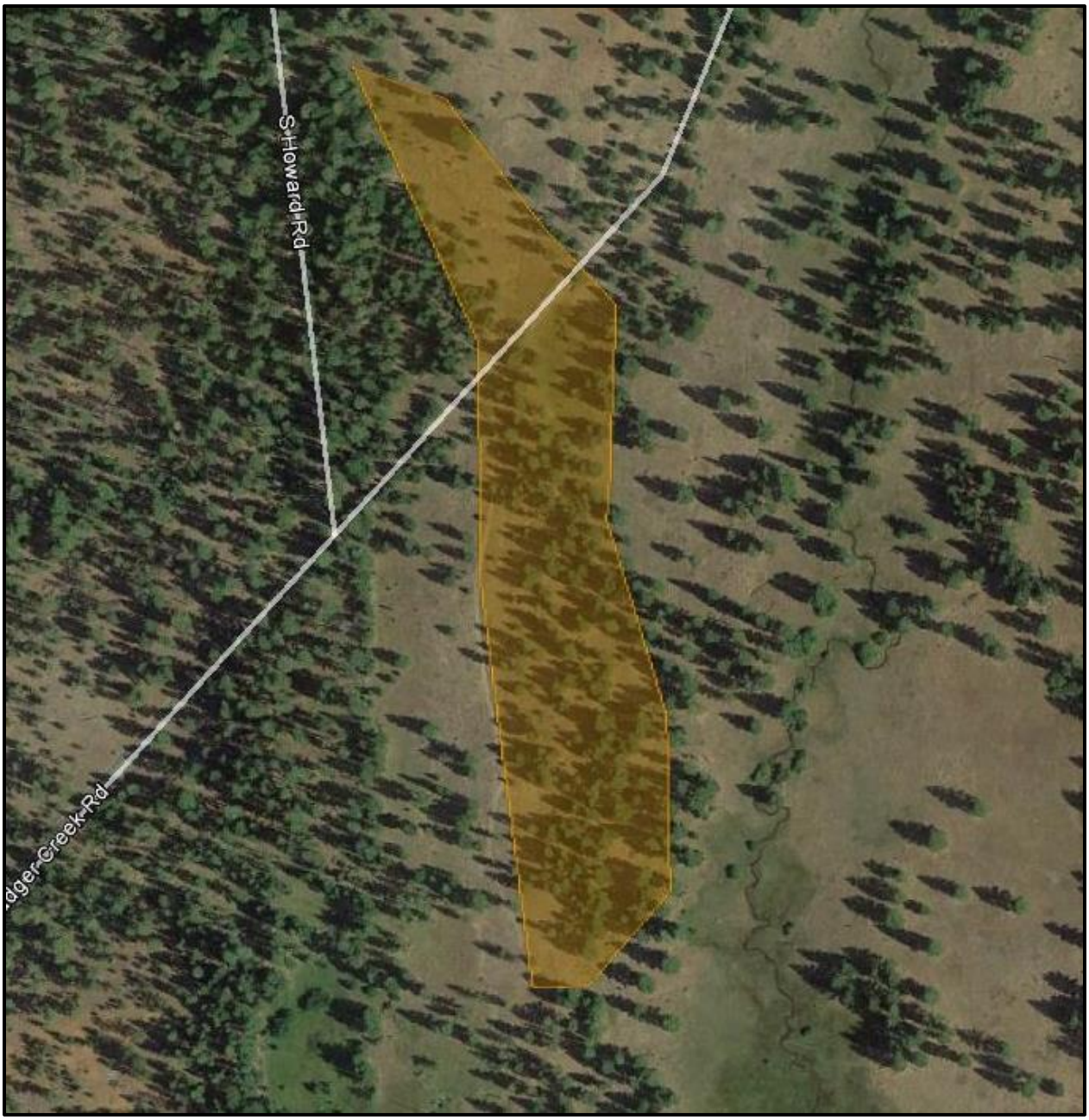

Figure 6. Map of the Merritt Creek survey area.

6. Howard Creek

Site surveyed June 10 and July 2.

Boloria selene. On June 10, a total of 5 individuals were observed on public land along the fence line with adjacent private land. From that vantage point, several additional butterflies were observed beyond the fence. None were observed on July 2.

Habitat. A small perennial stream with some boggy habitat at the lower end. The public lands portion comprises a small part of the larger mesic area on adjacent private land. Moderately abundant nectar resources and hostplants (violets) were also present.

Threats. A well-used horse camp just upstream from sensitive fritillary habitat may pose some threat to habitat quality. Heavily used portions of the camp appeared to be encouraging the establishment of weedy plant species. A horse was observed tethered to a tree in the creek during the July 2 visit.

Butterflies. Fairly abundant, with 13 species (including **Christina's Sulphur**) observed on June 10, and 15 species documented on July 2. In addition, 2 species of noteworthy day-flying moths were present: ***Parasemia plantaginis*** is a tiger moth (family Erebidae) that was unknown from the State of Oregon until its discovery at Howard Creek on June 8, 2007, where it was using the same habitat as *Boloria selene*; and ***Tarache knowltoni***.

Photo 6. Public-private boundary at Howard Creek where *Boloria selene* was present June 10.

Figure 7. Map of the Howard Creek survey area.

7. Indian Creek

Site surveyed June 10.

Boloria selene. Not observed. The butterfly was in full flight at other nearby locales. Additional surveys are recommended due to the butterfly's possible intermittent use of habitat there.

Habitat. A small creek with some associated mesic habitat that appeared to be too dry to support the butterfly in 2015. Abundant and diverse flowering forbs were being heavily used by many pollinator species of various insect groups and make the site noteworthy.

Threats. None to the immediate riparian area where surveys took place. An adjacent upland area hosting abundant balsamroot (also an important pollinator resource) had been grazed and was heavily trampled.

Butterflies. Abundant, with 12 species that included **Christina's Sulphur** and **Snowberry Checkerspot** (*Euphydryas colon*).

Photo 7. The project was greatly benefitted by the assistance of lepidopterist Gary Pearson – shown here surveying at Indian Creek.

Figure 8. Map of the Indian Creek survey area.

8. **Crosswhite Creek** - Observed briefly and eliminated from surveys June 10.

Figure 9. Map of the Crosswhite Creek survey area.

9. Fox Creek

Site surveyed June 10 and July 1.

Boloria selene. A total of 6 individuals were observed within small mesic streamside meadows June 10. None were observed July 1.

Habitat. A small permanent stream with regular openings and a parallel primitive road. A few pockets of more mesic microhabitats supported a small colony of *Boloria selene*.

Threats. Nothing serious. Minor vehicle ruts and some ground disturbance from either cattle or elk was noted. A primitive campsite suggested somewhat regular human use.

Butterflies. Fairly abundant, with 13 species recorded June 10 and 9 species observed on July 1.

Photo 8. Streamside habitat supporting *Boloria selene* at Fox Creek (June 10).

Figure 10. Map of the Fox Creek survey area.

Photo 9. Female silver-bordered fritillary at Fox Creek (June 10).

10. Elliot Creek (habitats associated with 2 adjacent forks)

Surveyed June 10 and July 2.

Boloria selene. Late in the afternoon on June 10, a large (40+ individuals) population was documented in the open eastern portion of the survey area, centered at the very wet habitat adjacent to the lower fence line. An additional 9 butterflies were observed just to the west in moist openings along a separate fork of the creek. Fritillaries favored the boggy habitat near the fenced enclosure. On July 2, a single worn butterfly was found in the eastern area and none were seen to the west.

Habitat. Dry to very wet prairie habitats associated with two forks of the small, permanently flowing stream. Extensive boggy habitat with *Viola nephrophylla* at the lower end of the larger (east) area; a smaller area of similar habitat to the west. Abundant and diverse flowering forbs were present in June; less so in July due to rapid senescence under hot, dry conditions.

Threats. **Recent damage (deep ruts) to primitive dirt road** by a large 4WD vehicle was noted on July 2. The road is adjacent to the highest quality *Boloria selene* habitat where most butterflies were observed. The immediate concern is that surface and subsurface water flow that supplies the butterfly's critical habitat may be compromised (see photo below). Restoration of impacted soils and the future exclusion of vehicles, cattle and horses are recommended. Two **feral horses** and evidence of recent **cattle grazing** was observed.

Butterflies. Abundant on June 10, especially considering that the survey took place very late in the day. A total of 12 species were documented and included **Lustrous Copper**, **Snowberry Checkerspot**, **Edith's Checkerspot**, **Christina's Sulphur**. A total of 13 species were documented during the July survey.

Photo 10. Heavily rutted primitive road diverting natural water flow to the habitat supporting the large population of *Boloria selene* at Elliot Creek (lower east portion of site, July 2). Damage was not observed during the first visit on June 10.

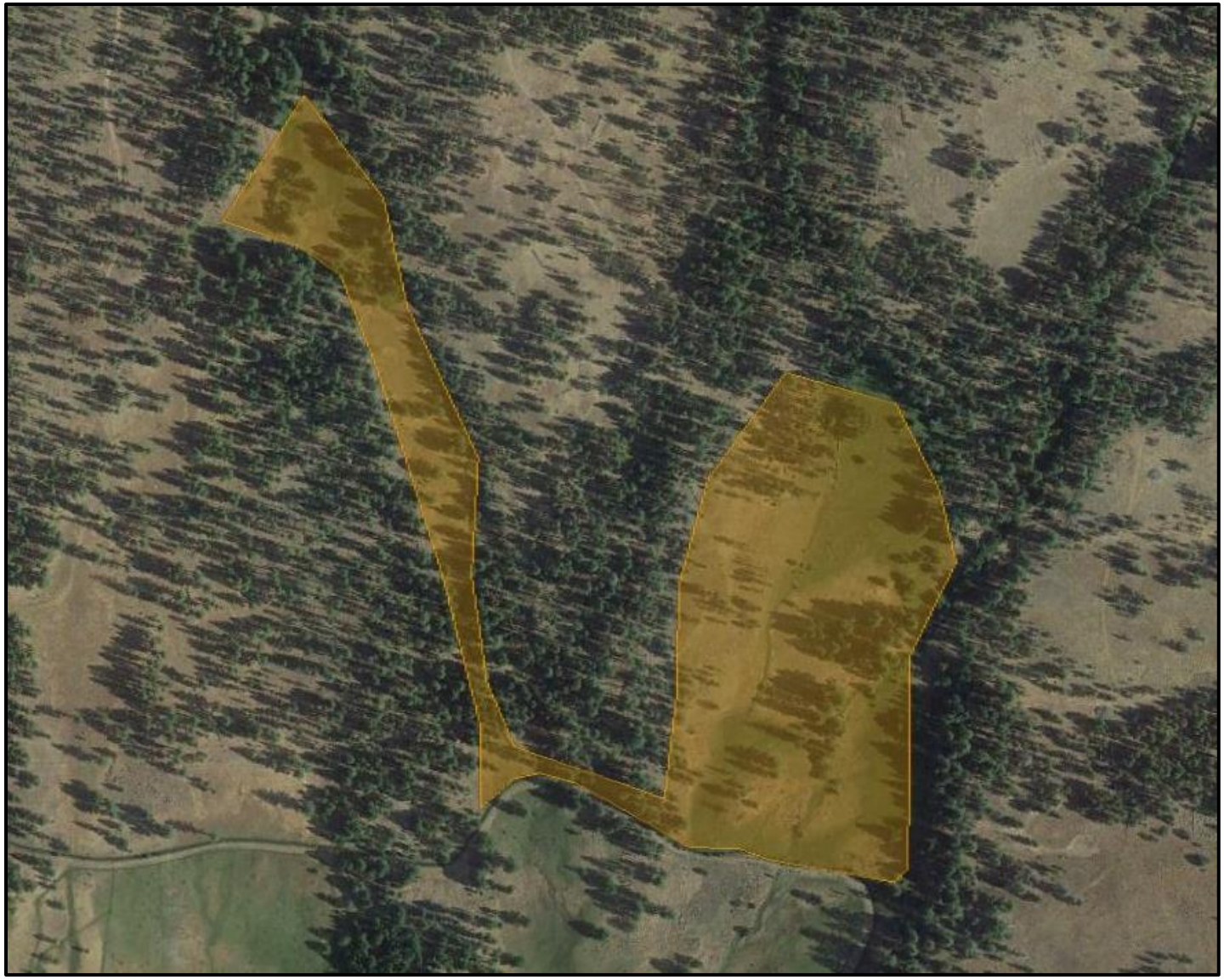

Figure 11. Map of the Elliot Creek survey area.

11. Peterson Creek and Reservoir

Surveyed June 10 and July 2.

Boloria selene. A singleton male was observed in the moist habitat at the reservoir fence line in the late afternoon on June 10. A second worn individual was documented ¼ mile up Peterson Creek in a mesic meadow on July 2.

Habitat. Wet prairie in the immediate vicinity of the reservoir, with mesic and xeric habitats upstream along the creek. Nectar resources were in moderate abundance on both dates.

Threats. Nothing notable. Cattle grazing, if allowed beyond the reservoir fence, could potentially impact the target species.

Butterflies. Only 3 species were observed during a brief, late afternoon survey June 10. A total of 16 species were documented when more time was spent surveying upstream areas on July 2.

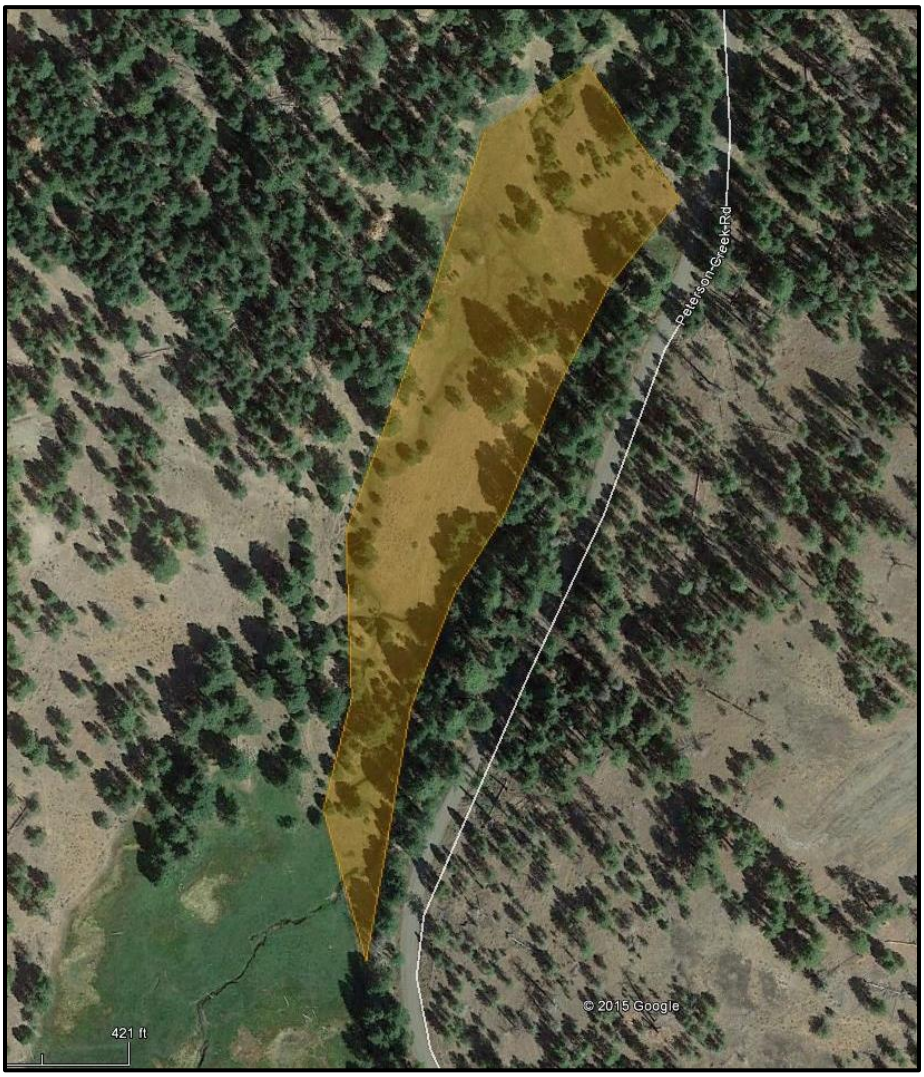

Figure 12. Map of the Peterson Creek/Reservoir survey area.

12. Lower Cold Springs area (to the west of Peterson Creek Rd.)

Surveyed June 11.

Boloria selene. Not observed.

Habitat. While some moister areas were present, most of the area was quite dry. Upon examining Google Earth after the field season, a sizeable area of much better looking wet habitat was noted upstream and further east of the road and should be checked.

Threats. Nothing significant, although the upstream area should be assessed.

Butterflies. A total of 8 species were documented.

Figure 13. Map of the lower Cold Springs area.

13. North Fork Crooked River at road junction 42/3010.

Surveyed June 11.

Boloria selene. Not observed.

Habitat. Boggy habitats lacking, although a few moist depressions could provide a small amount of habitat under wetter conditions. Flowers patchy and not abundant.

Threats. Riparian area at road crossing showed significant impacts from cattle, with cow patties on the river bank and in the stream.

Butterflies. A total of 11 species observed, including **Lustrous Copper** and **Edith's Checkerspot**.

Figure 14. Map of the North Fork Crooked River at road junction 42/3010 survey area.

14. Prairies, south side Rd 42 and just west of Rd 4230

Surveyed June 11.

Boloria selene. Not observed.

Habitat. High quality seasonally moist prairie lacking sufficient moisture to host the target species. The site may be suitable in a year of higher precipitation and could be re-surveyed.

Threats. None observed.

Butterflies. A total of 15 species observed, including **Lustrous Copper, Snowberry Checkerspot** and **Edith's Checkerspot**.

Figure 15. Map of prairies surveyed on the south side of Rd 42 and west of Rd 4230.

15. Dudley Creek.

Surveyed July 1.

Boloria selene. A total of 2 individuals observed. The late-season presence of adults suggests that **the population may be fairly large**. Additional surveys are needed to more accurately establish population size.

Habitat. The creek runs through a diverse wet to dry prairie with abundant forbs.

Threats. None observed.

Butterflies. An impressive **21 species** were observed. Notable species included **Christina's Sulphur, Snowberry Checkerspot** and at least **4 species of greater fritillaries** (*Speyeria* species).

Figure 16. Map of the Dudley Creek survey area.

16. Brush Creek

Surveyed July 1.

Boloria selene. Not observed.

Habitat. Good riparian habitat with some very wet adjacent areas, but narrow and shaded at lower end.

Threats. None observed.

Butterflies. A total of 10 species observed including **Christina's Sulphur**. Greater fritillaries were common.

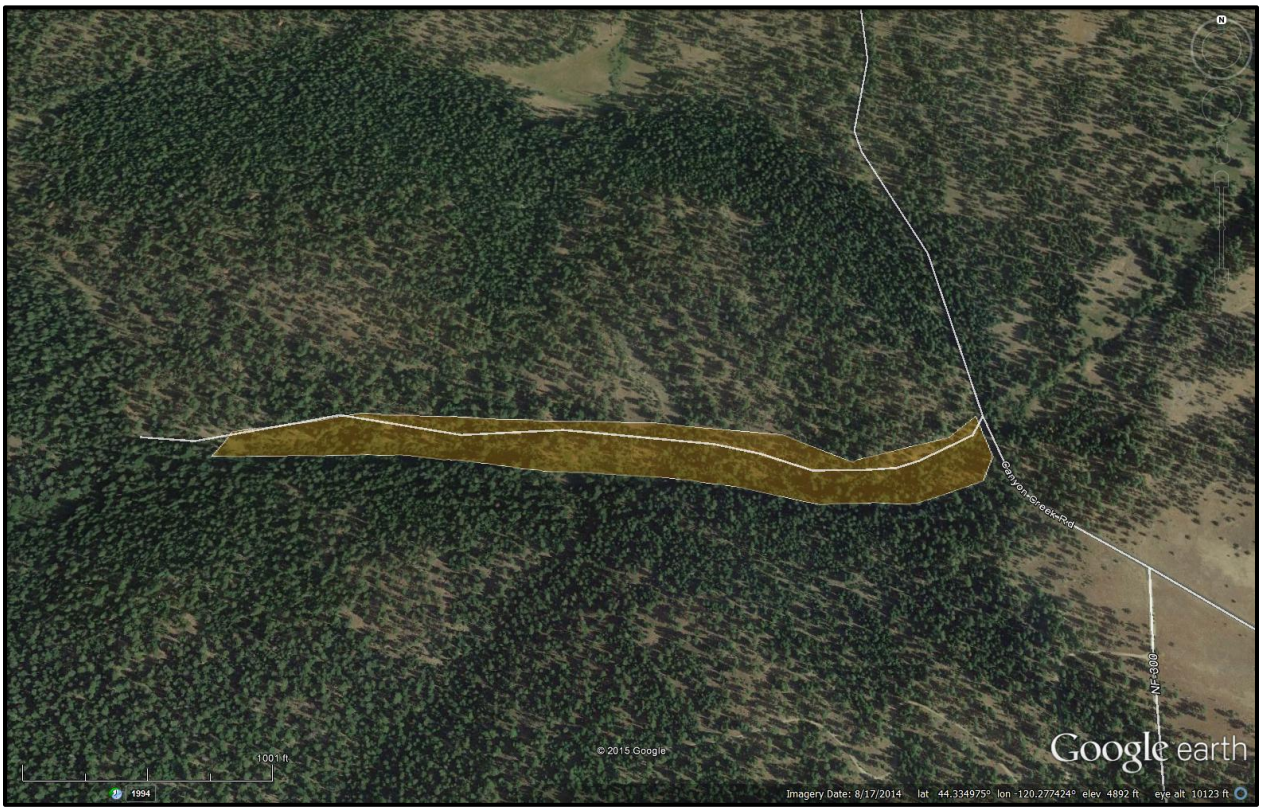

Figure 17. Map of the Brush Creek survey area.

17. Johnson Creek tributary (BLM)

Site surveyed July 1.

Boloria selene. Not observed.

Habitat. A large open area of marshy habitat with few shrubs or flowers.

Threats. None observed.

Butterflies. Just 4 species were observed, but there were few resources to attract most species to the area.

Figure 18. Map of the Johnson Creek tributary survey area.

18. North Fork Crooked River/lower Lookout-Jungle creeks (BLM)

Site surveyed June 12 and July 1.

Boloria selene. On June 12, **at least 56 individuals were observed** throughout the extensive wet areas from the site's west fence line to the confluence of creek and river. On July 1, **an additional 19 butterflies were counted** within another portion of the site: from the creek/river confluence along the river to near the north end of the site. **This appears to be the largest local population of the silver-bordered fritillary** and the most expansive area of high-quality habitat. Additional potential habitats undoubtedly occur downstream - at least intermittently - to include Antler Prairie and possibly Lytle Prairie. Occupied sub-areas and total (meta-) population size for the entire area will require additional effort but should be considered a necessary part of a meaningful conservation assessment.

Habitat. Optimum, with large expanses of marshy habitat, abundant larval hostplant and ample nectar resources.

Threats. None observed. The quality fencing appears to be doing an excellent job of keeping cattle out of this extremely fragile and highly diverse ecological area.

Butterflies. A total of 11 butterfly species were recorded June 12, with 16 documented on July 1. These included **Christina's Sulphur, Snowberry Checkerspot, Edith's Checkerspot, and two species of swallowtails.** The diurnal geometrid moth ***Epirrhoe sperryi*** was found at the site (a potential Oregon State record). Finally, a large population of the damselfly ***Calopteryx aequabilis*** (River Jewelwing) was observed along the smaller side channels of the river.

Photo 11. A freshly eclosed male Great Spangled Fritillary (*Speyeria cybele*).

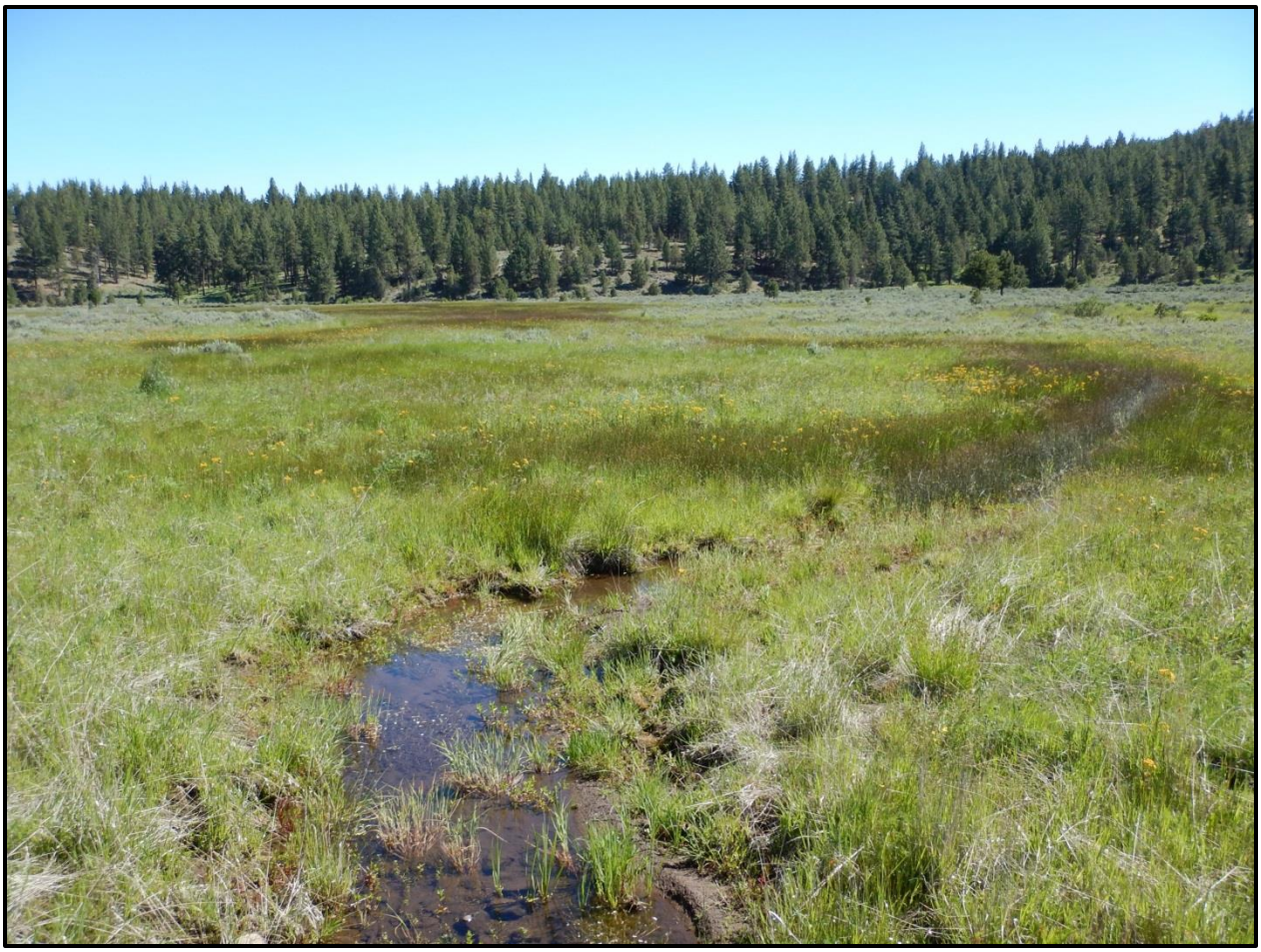

Photo 11. A portion of the high quality wet prairie habitat along lower Lookout/Jungle creeks in the vicinity of North Fork Crooked River, just south of Big Summit Prairie. The site supports a large population of *Boloria selene*.

Photo 12. High-quality habitat occupied by the silver-bordered fritillary along the North Fork Crooked River near the confluence of Lookout/Jungle creeks.

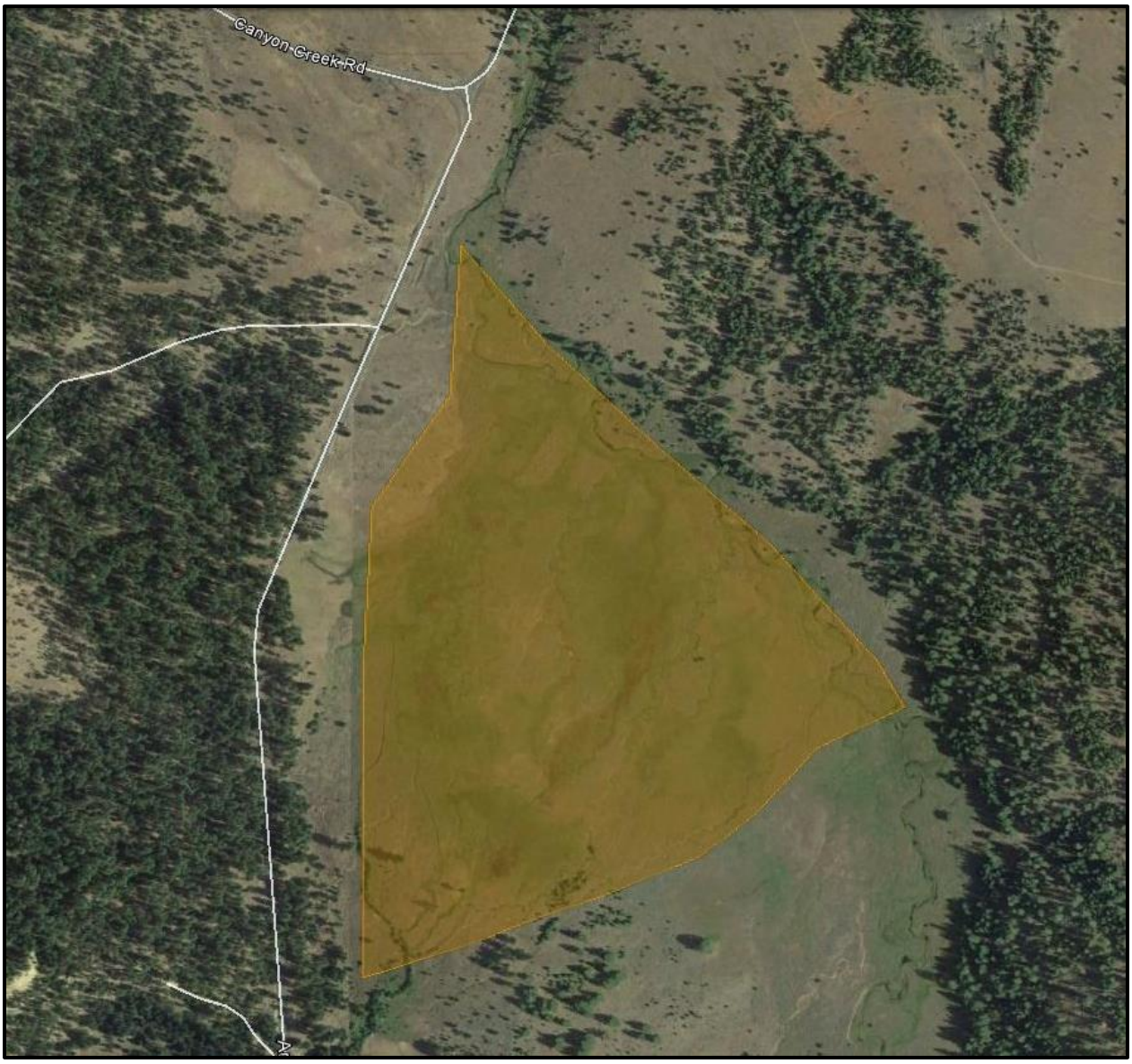

Figure 19. Map of the North Fork Crooked River/lower Lookout-Jungle creeks survey area.

19. Williams Prairie (NW area in vicinity of Williams Creek outflow)

Site surveyed June 11 and July 2.

Boloria selene. On June 11, a total of 38 butterflies were counted within the lush, wet meadow leading to Antler Prairie and out slightly into the more open habitats of Williams Prairie proper. On July 2, a single worn butterfly was found after an extensive search.

Habitat. On June 11 the site included lush, marshy areas supporting abundant *Viola nephrophylla* and a variety of flowers where *Boloria selene* was present in relatively large numbers. Some 21 days later, the site was in a post-grazed state and was nearly unrecognizable. It was apparent that a number of cattle had occupied the area long enough to consume virtually all taller grasses and flowering forbs. The transformation included a broken down streambank, compressed soils with deep hoofprints, cow patties and a deeply rutted cattle trail.

Threats. Any access of cattle to the site. The butterfly habitat is quite limited in size. If this important population of butterflies is to be conserved, cattle must be excluded from the habitat there as they are simply too damaging for such a fragile ecosystem to endure. While it is unknown if the site has been grazed regularly in past years, continued access of cattle to the site will likely depress or even extirpate the local *Boloria selene* population. It is likely that most eggs, larvae and/or pupae – *which would have been present when cattle arrived* – were either crushed or consumed. If necessary, the area should be fenced such that cattle are encouraged to use the road or another route around this area. Photos (below) shed some light on this issue. The site should be surveyed in 2016 to assess the above observed impacts to the site.

Butterflies. Butterflies were fairly abundant on June 11 when 9 species were documented. Far fewer individuals were observed on July 2, although 8 species were recorded. Noteworthy butterflies included **Christina's Sulphur, Snowberry Checkerspot and Lustrous Copper**.

Photo 13. Williams Prairie *Boloria selene* habitat in good condition (June 11).

Photo 14. High quality habitat in the corridor between Williams Prairie and Antler Prairie. On June 11, the area was lush and included a sizable marshy area supporting a good number of *Boloria selene* adults and many other butterflies.

Photo 15. A post-grazing hoof-print legacy. Beer can found at site shows scale.

Photo 16. By July 2, most of the former lush vegetation had been grazed and trampled.

Photo 17. A well-worn cattle trail through *Boloria selene* habitat at Williams Prairie (7/2/2015).

Figure 20. Map of the Williams Prairie survey area.

20. Gray Creek - narrow riparian openings E of Gray Prairie proper

Site surveyed June 11 and July 2.

Boloria selene. On June 11, a total of 6 butterflies were found within lush riparian openings along Gray Creek just east Gray Prairie. None were recorded from the area on July 2.

Habitat. While the main open portion of Gray Prairie did not appear to support appropriate wet areas favored by *Boloria selene*, small lush openings along Gray Creek just to the east did. While not extensive, a patchwork of small habitat islands with abundant nectar resources was surveyed with success.

Threats. None noted within the area surveyed.

Butterflies. On June 11, a total of 20 species of butterflies and the uncommonly recorded moth *Caenurgina annexa* (family Noctuidae) were tallied for the site. Just 11 species of butterflies were observed on July 2. Butterfly species included **Lustrous Copper, Christina's Sulphur** and **Snowberry Checkerspot.**

Photo 18. Habitat supporting *Boloria selene* just east of Gray Prairie.

Figure 21. Map of the Gray Creek survey area.

21. Little Summit Prairie (east end and southern edge)

Site surveyed June 11.

Boloria selene. None observed.

Habitat. Generally well flowered prairie habitats all appeared too dry (no boggy areas encountered) to support the target species.

Threats. During the survey, cattle entered the east end creek area and began to graze within the lush meadows. Some animals found their way to the creek. Additional post-grazed areas were observed at other locations outside of the fence line.

Butterflies. A total of 19 species were recorded between the 2 locations and included **Lustrous Copper, Christina's Sulphur** and **Snowberry Checkerspot.**

Photo 19. Little Summit Prairie. The site was dropped after the June 11 survey due to *Boloria selene* absence and a lack of boggy microhabitats.

Figure 22. Map of the Little Summit Prairie survey area.

Table 2. Checklist matrix of butterflies for all sites surveyed (see Table 1 on page 4 for site names by number).

		Site #																				
Family	Genus & species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Hesperiidae (Skippers)	*Erynnis persius*		X																X		X	X
	Euphyes vestris																					
	Hesperia colorado					X					X											
	Hesperia juba			X											X						X	X
	Polites sonora						X			X	X		X									
	Pyrgus communis			X		X	X	X		X			X	X	X	X			X	X	X	
Papilionidae (Swallowtails)	*Papilio eurymedon*			X									X	X			X		X			
	Papilio zelicaon				X														X			
	Papilio multicaudata													X								
	Parnassius clodius																					
Pieridae (Whites & Sulphurs)	*Anthocharis sara*						X															
	Colias christina	X	X	X	X	X	X	X		X	X					X	X	X	X	X	X	X
	Colias eurytheme											X							X			
	Euchloe ausonides													X					X		X	X
	Pieris marginalis					X	X	X								X						
	Pieris rapae		X	X																		
	Pontia occidentalis		X	X							X	X				X			X			
Lycaenidae (Gossamer-wings)	*Callophrys eryphon*				X	X				X			X		X							X
	Callophrys gryneus				X			X				X										
	Callophrys spinetorum																					
	Celastrina echo																					
	Cupido amyntula			X			X	X		X	X						X				X	
	Euphilotes (on E. heracleoides)													X	X							
	Glaucopsyche lygdamus																				X	X
	Glaucopsyche piasus																				X	

Table 2. (continued).

		Site #																				
Family	Genus & species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Lycaenidae (Gossamer-wings)	*Lycaena cupreus*		X			X					X			X	X					X	X	X
	Lycaena editha		X								X	X				X	X	X			X	
	Lycaena helloides																		X			
	Lycaena heteronea											X		X					X			
	Lycaena nivalis	X					X	X		X					X		X				X	
	Plebejus icarioides						X								X						X	X
	Plebejus lupini														X							
	Plebejus melissa						X					X				X	X				X	
	Plebejus saepiolus	X	X	X	X	X	X	X		X	X	X	X	X	X	X			X	X	X	X
	Strymon melinus		X	X										X								X
Nymphalidae (Brushfoots)	***Boloria selene***						**X**			**X**	**X**	**X**				**X**			**X**	**X**	**X**	
	Cercyonis oetus									X	X	X				X		X	X			
	Cercyonis pegala			X			X			X	X	X				X	X	X		X	X	
	Chlosyne palla																				X	X
	Coenonympha tullia			X	X	X		X		X	X	X	X	X	X	X			X	X	X	X
	Danaus plexippus		X							X												
	Erebia epipsodea			X	X	X	X	X		X	X				X				X		X	X
	Euphydryas colon						X	X		X	X	X			X	X			X	X	X	X
	Euphydryas editha					X					X			X	X				X		X	
	Limenitis lorquini									X						X	X			X		
	Nymphalis antiopa			X			X									X	X			X		
	Nymphalis californica						X										X					
	Nymphalis milberti		X																		X	X
	Oeneis nevadensis					X																

Table 2. (continued).

		Site #																				
Family	Genus & species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Nymphalidae (Brushfoots)	*Phyciodes mylitta*			X			X				X	X				X				X		
	Phyciodes pulchella	X	X	X	X	X	X	X		X	X	X	X		X	X			X	X	X	X
	Polygonia gracilis						X			X												X
	Speyeria callippe				X						X					X						
	Speyeria cybele						X				X	X				X						
	Speyeria hydaspe		X																			
	Speyeria mormonia		X													X			X		X	
	Speyeria zerene						X									X					X	
	Vanessa atalanta				X		X	X		X												X
	Vanessa cardui				X								X		X							X

CONCLUSIONS

2015 surveys established that a fairly sizeable meta-population of the silver-bordered fritillary (*Boloria selene* "PNW segregates") persists on public lands from the periphery of Big Summit Prairie to Williams Prairie and Gray Prairie to the south. Yet while 185+ individuals were documented at 8 distinct locations, the butterfly must still be considered range-limited, uncommon, and a rare habitat specialist that is vulnerable to local extirpation and population decline.

While some silver-bordered fritillary habitats - such as the one at the North Fork Crooked River/Lookout Creek confluence - appear to be well protected and should continue to support viable colonies of the butterfly, others - such as those at Elliot Creek and Williams Prairie – are under serious threat from off-road vehicle travel and cattle grazing. The relatively rare, moist habitats required by the butterfly and its larval hostplant are also needed to sustain populations of other bog/marsh specialist species. Given the relatively small size of these important sites, protecting them would seem to have a negligible impact on other activities.

Additional surveys are recommended for undocumented populations of *Boloria selene* that are almost certainly present within the greater Big Summit Prairie area. The North Fork Crooked River from Big Summit Prairie south through Antler Prairie and Lytle Prairie appears to offer high quality mesic habitats that should also support the butterfly. Follow-up surveys are recommended for sites where habitats were visibly harmed in 2015. Finally, if butterfly response to habitat restoration, fire or drought is desired, a population census methodology should be employed at an appropriate time.

To more completely assess the size, range and distribution of Oregon silver-bordered fritillary populations, additional areas with historical populations of the butterfly – such as in Grant and Baker counties – should be surveyed. Such work is entirely possible to do without unreasonable effort or expense with the assistance of experienced lepidopterists. By building on the work performed here, completing a statewide conservation assessment of the butterfly and its habitats could be completed in just a few years. The ultimate outcome could well be ISSSSP downlisting or delisting for the species.

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