
Benton County Natural Areas and Parks

Prairie Baseline
Inventory Report
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Introduction

Institute for Applied Ecology (IAE) completed baseline monitoring as specified in the Benton County Prairie Species Habitat Conservation Plan (2010, HCP Chapter 7: Monitoring and Adaptive Management and Appendix A of this report) at five County owned or managed sites:

- Fitton Green Natural Area
- Bezell Memorial Forest
- Jackson-Frazier Wetland
- Benton County Fender’s Blue Butterfly Conservation Areas (“Crisp-Liddell” and “Pearcy-Schoener”)

Baseline monitoring was completed for the following species or habitats (Table 1):

- Bradshaw’s lomatium (*Lomatium bradshawii*)
- Nelson’s checkermallow (*Sidalcea nelsoniana*)
- Kincaid’s lupine (*Lupinus sulphureus* ssp. *kincaidii*= *Lupinus oreganus*)
- Fender’s blue butterfly (*Icaricia icarioides fenderi*) habitat- Host and nectar species.
- Taylor’s checkerspot butterfly (*Euphydryas editha taylori*) habitat- Host and nectar species.

Table 1 Summary of baseline prairie inventory at Benton County Natural Areas and Parks sites.

Site	Fender’s blue butterfly	Taylor’s checkerspot butterfly	Kincaid’s lupine	Bradshaw’s lomatium	Nelson’s checkermallow
Bezell	Nectar census- Bird Loop	Host and Nectar estimated in plots	Planted, Census		
Jackson-Frazier Wetland			Census	Census	Wild & Planted, Census
Fitton Green Natural Area		Host and Nectar estimated in plots	Planted, Census		
Fender’s Blue Butterfly Conservation Areas	Nectar and host census		Planted, Census		
Pearcy-Schoener	Nectar and host census		Census		

Census= Complete count/cover measurement at a site.

Methods

Monitoring at each site was completed as described in the HCP (See Appendix A of this report) and in the Benton County Natural Areas and Parks Prairie Management Plans.

HCP Species and Habitat Abundance

At each site, we assessed the abundance of HCP species or habitat present (See HCP Chapter 2 for more information about each species) (Table 1). Kincaid’s lupine, Bradshaw’s lomatium and Nelson’s checkermallow were censused (complete counts), as were host and nectar species cover for Fender’s blue butterfly (Table 2). We estimated the abundance of Taylor’s checkerspot habitat (host and nectar species-Table 3) at Bezell Memorial Forest and Fitton Green Natural Area using the abundance of Taylor’host and nectar species within the plots used for vegetation sampling (see Vegetation Sampling section below) and the overall meadow area. We calculated a 95% confidence interval to describe the uncertainty associated with the estimate of abundance.

Metrics for each species follow those described in HCP 7.2.1.2 (p. 109), and are included in Table 4.

Table 2 Host and native nectar plants for Fender’s blue butterfly (from Benton County HCP 2010).

	Species	Common Name
Host plant	<i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>	Kincaid’s lupine
Native Nectar Plants	<i>Allium acuminatum</i>	Narrow leaf onion
	<i>Allium amplexans</i>	Tapertip onion
	<i>Calochortus tolmiei</i>	Tolmie's mariposa lily
	<i>Camassia quamash</i>	small camas
	<i>Camassia leichtlinii</i>	tall camas
	<i>Cryptantha intermedia</i>	clearwater cryptantha
	<i>Eriophyllum lanatum</i>	Oregon sunshine
	<i>Geranium oreganum</i>	Oregon geranium
	<i>Iris tenax</i>	toughleaf iris
	<i>Lomatium triternatum</i>	nine-leaf lomatium
	<i>Plectritis congesta</i>	seablush
	<i>Sidalcea campestris</i>	meadow checkermallow
	<i>Sidalcea virgata</i>	dwarf checkermallow
<i>Vicia americana</i>	American vetch	

Table 3 Host and native nectar species for Taylor’s checkerspot butterfly (Benton County HCP 2010).

	Scientific Name	Common Name
Host plant	<i>Plantago lanceolata</i>	English plantain
Native nectar plants	<i>Calochortus tolmiei</i>	Cat’s ear lily
	<i>Fragaria virginiana</i>	strawberry
	<i>Linanthus bicolor</i>	Bi-colored flax flower
	<i>Lomatium utriculatum</i>	Common lomatium
	<i>Plectritis congesta</i>	seablush

Table 4 Metrics for measuring abundance of HCP covered species or habitat.

Species	Units of measurement
Kincaid’s lupine	Square meters of leaf cover.
Native Nectar Species for Fender’s blue butterfly	Square meters of leaf cover.
Nelson’s checkermallow	Individual plants, separated by ≥ 30 cm, or occupied square meters, when plants are in large patches.
Taylor’s checkerspot	Square meters of host plants (English plantain) and native nectar plants.
Fender’s blue butterfly	Square meters of foliar cover of Kincaid’s lupine and native nectar species.
Bradshaw’s lomatium	Individual plants. Plants ≥ 10 cm apart are considered separate individuals.

Noxious Weeds

Noxious weeds (A or B species following ODA classification- ODA 2011) (Table 5) were assessed in the prairie habitats with or adjacent to HCP species, or where species introductions are planned for the future. Established areas and satellite populations (isolated patches of one to a few individuals) of invasive plant species were identified and mapped using ArcPad software on a Nautiz handheld computer. Clusters of multiple plants were mapped as polygons, while patches of 1-2 individuals were mapped as points. Total abundance of noxious weed species by site was estimated as the area (square meters) of established polygons of the species, calculated in GIS. No evidence of invasive animals was observed.

Table 5 Noxious weeds inventoried and mapped.

Common name	Scientific name	Description	Notes
Bull thistle	<i>Cirsium vulgare</i>	Biennial forb	
Canada thistle	<i>Cirsium arvense</i>	Perennial forb	
Cutleaf blackberry	<i>Rubus laciniatus</i>	Shrub	
False brome	<i>Brachypodium sylvaticum</i>	Perennial grass	
Himalayan blackberry	<i>Rubus armeniacus</i>	Shrub	
Meadow knapweed	<i>Centaurea pratensis</i>	Perennial forb	
Medusahead	<i>Taeniatherum caput-medusae</i>	Annual grass	
Perennial pea	<i>Lathyrus latifolius</i>	Perennial forb	
Reed Canarygrass¹	<i>Phalaris arundinacea</i>	Perennial grass	Only mapped at Jackson-Frazier, and only in areas with rare species.
St. Johnswort	<i>Hypericum perforatum</i>	Perennial forb	Only patches of 3+ plants mapped.
Tansy	<i>Senecio jacobaea</i>	Biennial forb	Only patches of 3+ plants mapped.

¹Not an A or B species on the ODA Noxious Weeds list.

Vegetation Sampling

We sampled the plant community using 2 meter by 2 meter vegetation plots. Plots were not permanently marked, as new randomly selected locations should be sampled in each monitoring session in the future. Within each plot, we estimated percent cover of each vascular plant species present, moss, plant litter/thatch, bare ground and rock.

Prairie Perimeter Mapping

We delineated with GIS the transition/boundary between prairie and forest, to allow tracking of tree and shrub encroachment into openings. We visualized the boundary using July 2011 SDDS aerial orthoimagery (downloaded from <http://raster.nationalmap.gov/arcgis/services>), digitized it into a GIS shape file, and used GIS to calculate the acreages of meadow/prairie areas. Tree dominated areas were excluded from the prairie area measurement as possible.

Assessment of Anthropogenic and Natural Disturbance

Signs of man-made disturbance were evaluated at all sites. We used a GPS to map any signs of new or existing trails or parts of trails with use by horses, ATVs, mountain bikes, or hikers with GPS. We noted trampling off any established trail, and described basic surrounding land use.

Permanent Photo Points

We established and photographed permanent photo points at all sites. Photo points were permanently marked with green t-post fence posts, and tagged with labeled yellow tags. Photographs were taken in each of the four cardinal directions (north, east, south, west), from a height of approximately five feet.

Results

Work was completed between May 5 and July 7, 2011, with a crew of 2-5 people, on the following schedule:

- Jackson-Frazier Wetland: May 5 (Lomatium surveys), May 26 (vegetation), July 7 (checkermallow/lupine surveys, weed surveys, photos).
- Fender's Blue Butterfly Conservation Areas: June 2-3 and 9-10 (lupine/nectar census), 16-17 (vegetation sampling/weed surveys/photos).
- Fitton Green Natural Area: June 20 (weed survey), June 21 (vegetation, photos)
- Beazell Memorial Forest June 24, June 30 (vegetation, lupine/nectar surveys, weed surveys, photos).

HCP Species or Habitat Abundance

Total 2011 abundance or estimated abundance of HCP species or habitats is reported in Table 6.

Table 6 Overall HCP species and habitat abundance at Benton County Natural Areas and Parks properties/easements as of June 2011.

Site	Fender's blue Native Nectar Species	Taylor's checkerspot	Kincaid's lupine	Bradshaw's lomatium	Nelson's checkermallow
Beazell	15.7 m ² total	401.6 m ² host ^a , 3,027.7 m ² nectar ^b	4.35 m ²		
Jackson-Frazier Wetland			1.1 m ²	213 plants	81 Wild & 143 Planted
Fitton Green Natural Area		5,759 m ² host ^c , 10,620 m ² nectar ^d	<1 m ²		
FBBCA Crisp- Liddell	130 m ² total		576.2 m ²		
FBBCA Percy- Schoener	45.3 m ² total		297.1 m ²		

^a Estimated from vegetation plot data: 95% confidence interval from 553 m²-250.3 m².

^b Estimated from vegetation plot data: 95% confidence interval from 4,867.1 m²-1,188.3 m².

^c Estimated from vegetation plot data: 95% confidence interval from 1,168 m²-10,350 m².

^d Estimated from vegetation plot data: 95% confidence interval from 3,510 m²-17,730 m².

Noxious Weeds

Maps of A or B list noxious weed locations at each site are included in Appendix B. A summary of the weeds at each site is included below and in Table 7.

Beazell Memorial Forest

The most prevalent noxious weeds in the North Meadow are Canada thistle (primarily in the north end and “annex” and medusahead (primarily in the southern half). There are also several small patches of false brome, scattered individuals of bull thistle and young Scotch broom.

The Middle Meadow is weediest at the north end, at the top of the slope; there is a large patch of Canada thistle and several patches of false brome. Bull thistle is also present, primarily at the top on the east side, near the neighboring property. On the southwest side of the bottom (lower slope) of the meadow, there is a significant patch of Scotch broom.

The primary problem in the Summit Meadow is a huge patch of Canada thistle covering roughly the lower third of the meadow. There are occasional false brome clumps and scattered bull thistle.

The South Meadow has scattered bull thistle, a small patch of false brome near the trail entrance on the west side, and a small patch of Canada thistle on the mid-slope west side, but few other noxious weed issues.

The Bird Loop area has a variety of noxious weeds in small amounts, including Canada thistle, false brome, Scotch broom, Himalayan blackberry, medusahead, bull thistle, and perennial pea.

Table 7 Area (square meters) of invasive species polygons and number of scattered individuals within targeted prairie/meadow areas at County owned/managed sites.

Site	Species	Polygon area (m ²)	Scattered Individuals (#)
Bezell Memorial Forest	Bull thistle	10.3	95
	Canada thistle	13479.7	30
	Cut leaf blackberry		2
	False brome	222.2	18
	Himalayan blackberry	130.2	8
	Medusahead rye	7360.8	
	Perennial pea		1
	Scotch broom	20.5	36
	Tansy ragwort		49
Crisp-Liddell	Bull thistle		28
	Canada thistle		3
	False brome		7
	Himalayan blackberry	1600.1	17
	Medusahead rye	299.8	
	Scotch broom	3093.5	50
	Tansy ragwort		5
Fitton Green Natural Area	Bull thistle	11.4	45
	Canada thistle	516.0	6
	False brome	177.8	54
	Himalayan blackberry		5
	Medusahead rye	1689.8	2
	Tansy ragwort		10
Jackson-Frazier Wetland	Canada thistle		2
	False brome		6
	Reed canarygrass ¹	46.6	
	Tansy ragwort		1
Pearcy-Schoener	Bull thistle		4
	Canada thistle	391.3	1
	False brome	714.1	18
	Himalayan blackberry		6
	Meadow knapweed		1
	Medusahead rye	3809.5	3
	Scotch broom	249.8	26
	Tansy ragwort		4

¹ Reed canarygrass was assessed in areas with the HCP species only. It also occurs in other areas of Jackson-Frazier Wetland that were not targeted in monitoring.

Fitton Green Natural Area

The South Meadow has scattered clumps of false brome particularly along the meadow perimeter. There are also a few patches of Canada thistle, scattered bull thistle, and some small patches of Himalayan blackberry. There are two small areas of medusahead near the top (north) end of the meadow.

Jackson-Frazier Wetland

The habitat area around the Nelson's checkermallow is relatively free of noxious weeds. There is a small patch of reed canarygrass on the northwest side, and rare individuals of Canada thistle, tansy ragwort, and St. Johnswort.

The area around the Bradshaw's lomatium is free of noxious weeds at this time.

The small opening with Kincaid's lupine includes Himalayan blackberry and false brome.

Fender's Blue Butterfly Conservation Area: Crisp-Liddell

The primary noxious weed challenges at this site are from Scotch broom and Himalayan blackberry. There are a few small clumps of false brome, medusahead and Canada thistle as well. Isolated individuals of bull thistle are also present.

Fender's Blue Butterfly Conservation Area: Percy-Schoener

This site has patches of medusahead on the west (near the road access entrance) and south sides. There is a significant patch of false brome on the east side, and scattered small clumps throughout. Scotch broom is present, with a fairly frequent scattering of plants on the eastern half of the site. Canada thistle is present primarily in three patches- two in the Winter Creek drainage down the center, and one on the east side. Individual plants of bull thistle and small amounts of Himalayan blackberry are scattered throughout. A single plant of meadow knapweed was found and removed, but may have seeds present in the soil.

Vegetation Sampling

Maps of 2011 vegetation plot locations are included in Appendix C. A total of 51 plots (2 meter x 2 meter) were sampled, with 24 at Bezell, five at Fitton Green, six at Jackson-Frazier Wetland, eight at Crisp-Liddell, and six at Percy-Schoener. The average percent cover of native species, exotic species, shrubs and plant litter/thatch found within the plots at each site is summarized in Table 8.

Prairie Perimeter Mapping

We used ArcMap GIS software to digitize the meadow-forest perimeter from 2011 SDDS orthoimagery. Meadow acreages are included in Table 9.

Table 8 Summary of data from vegetation plots, including average percent cover of native species, introduced species, shrubs and plant litter, with standard errors.

	Plot #	Native Species Cover (%)		Introduced Species Cover (%)		Shrub Cover (%)		Plant Litter Cover (%)	
		Average	±SE	Average	±SE	Average	±SE	Average	±SE
Bezell Memorial Forest	24	28.1	5.9	51.7	3.8	6.3	2.7	30.7	5.2
Fitton Green Natural Area	5	47.1	13.0	39.4	8.3	17.1	10.4	24.6	6.3
Crisp-Liddell	8	36.4	8.1	45.6	5.9	5.6	2.8	32.5	1.8
Pearcy-Schoener	6	32.5	17.6	55.2	10.7	0.5	0.4	22.8	0.1
Jackson-Frazier Wetland	6	65.7	10.8	10.7	6.4	16.4	9.4	16.8	3.9

Table 9 Prairie or meadow acreages in 2011 at Benton County Natural Areas and Parks owned or easement sites.

Site	Meadow	Map Date	Acres
Bezell Memorial Forest	North	8/2/2011	14.33
	Middle	8/2/2011	4.74
	Summit	8/2/2011	12.89
	South	8/2/2011	3.61
	Bird Loop	8/2/2011	1.08
Fitton Green Natural Area	South	8/2/2011	24.12
Crisp-Liddell	Entire	8/2/2011	22.5
Pearcy-Schoener	Entire	8/2/2011	18.13
Jackson-Frazier Wetland	Main	8/2/2011	35.62

Assessment of Anthropogenic and Natural Disturbance

The only areas of anthropogenic disturbance found outside established trails were found at Bezell and Fitton Green. In the Summit Meadow at Bezell, we found roughly 25 meter (75 feet) long ruts from ATVs near the ridge of the meadow, and evidence of a campsite (campfire ring and stacked branches). At Fitton Green’s South Meadow, we mapped an unauthorized trail heading south from the lower road into the lower portion of the meadow. We also noticed ATV use straddling the main trail up through the meadow, with crushing of the vegetation on either side of the trail. Maps of these sites are included in Appendix D.

At Jackson-Frazier Wetland, near the smaller, further west population area of Bradshaw’s lomatium, there had been recent work on the road/culvert over the small creek/ditch. A map is included in

Appendix D. The ground disturbance did not appear to have resulted in mounds or in piled soil over the lomatiums.

Observations of natural disturbance were minimal. No evidence of intensive grazing of HCP plant species was observed at any site. Minor rodent (gopher) disturbance was seen at the Percy-Schoener site, but it accounted for far less than 1% of the total habitat area. No signs of windfall, erosion or other hydrological changes were observed.

Permanent Photo Points

Maps of 2011 photo point locations are included in Appendix E.

Discussion

This year, 2011, was highly unusual due to a very cool and moist spring; as a result, the phenology of most native species was behind schedule. Field work for this project, particularly the vegetation sampling, was delayed by at least 2 weeks, and extended later into the summer than normal. The effects, if any, of these weather conditions on the results of baseline surveys are unknown.

For the vegetation sampling component of HCP effectiveness monitoring, the HCP (Section 7.2.1.3, p. 111) proposed use of large plots for vegetation sampling, e.g., 5 meters x 5 meters, with only a few placed per site. We deviated from this methodology, and used a greater number of smaller plots (2 meter x 2 meter), to capture more of the variability in the plant community. We also felt using a greater number of smaller plots would capture a more accurate estimate of host and nectar species abundance for Taylor's checkerspot at Beazell Memorial Forest and Fitton Green Natural Area. We consulted with USFWS for approval of this deviation from the methods in the HCP; USFWS approved the change, provided all modifications were described in the Benton County annual compliance report.

References

Benton County, Oregon. 2010. Prairie Species Habitat Conservation Plan. 160 pp plus appendices. Available at www.co.benton.or.us/parks/hcp/documents.

Oregon Department of Agriculture. 2011. Noxious weed policy and classification system 2011. Oregon Department of Agriculture Noxious Weed Control Program, Salem, OR, 11 pp. http://www.oregon.gov/ODA/PLANT/WEEDS/docs/weed_policy.pdf.

Appendix A: HCP Effectiveness Monitoring Protocols

(from the Benton County HCP (Benton County 2010))

Effectiveness Monitoring

Effectiveness Monitoring will be undertaken as a component of the HCP. The purpose of this monitoring is to determine the success of habitat restoration, enhancement, and management, as measured by tracking species status and habitat condition. Effectiveness monitoring will be conducted on Covered Lands where voluntary or mitigation related habitat restoration, enhancement, and management activities are implemented by Benton County or Cooperators. Each Cooperator is responsible for collecting and reporting their own Effectiveness Monitoring data to Benton County.

Effectiveness Monitoring objectives include:

- Tracking population trends of Covered Species on Covered Lands
- Detecting changes in habitat quality (plant community composition and species cover) over time
- Determining whether and what management actions are necessary
- Measuring success of restoration activities (i.e., evaluate effects of mowing, limited livestock grazing, burning, herbicide application, etc.)
- Measuring fulfillment of mitigation requirements
- Early detection of invasive plants and animals
- Detecting woody plant encroachment and litter/thatch build up
- Providing feedback for adaptive management

Monitoring shall be conducted by qualified biologists or natural resource specialists in possession of any permits required by regulatory agencies (state or federal) for the monitoring activities they are conducting.

Monitoring Plans at Sites where Effectiveness Monitoring may be Required

Monitoring plans will be developed for all sites where Effectiveness Monitoring is required, including mitigation sites. At Prairie Conservation Areas, the monitoring plan may be added to any existing management plans or guidelines, such that the required levels of monitoring for the HCP are included. Monitoring plans will be developed by qualified biologists/natural resource specialists, and in some cases, sites may already have a monitoring plan established.

At a minimum, each monitoring plan will include:

1. Name of site.
2. Management goals and objectives (e.g., control of invasive species) for the site.
3. Subject of the monitoring program (e.g., species and/or habitat status).
4. Description of what is being monitored (e.g., species and/or habitats), including a site description (which may be generated using the first year's monitoring data and any prior surveys) with information about the abundance of Fender's Blue or Taylor's checkerspot butterfly host plants and nectar plants or Covered plants.
5. Variables to be measured and how data will be collected.
6. Frequency (minimum of three year cycle), timing (dependent on species being monitored), duration (minimum of six years), and intensity (number of sample plots) of the sampling.
7. Field procedures.
8. Sampling locations.
9. How data will be analyzed, who will conduct analysis (e.g., qualified biologist, statistician), and how results will determine whether the HCP goals and objectives are being met through the Conservation Measures.
10. Adaptive management process (such as use of the results to update management methods).
11. Monitoring equipment needs.
12. Personnel responsible for implementing monitoring program.
13. Process for reviewing/modifying monitoring plan.

Effectiveness Monitoring Timing and Frequency

Monitoring shall be conducted during the growing season of the Covered Species or habitat. This may vary by 1-3 weeks per year due to weather conditions, and differences in site conditions (elevation, aspect, etc.).

The first year of monitoring data, along with data from any prior surveys, will serve as the site's baseline inventory. Once baseline conditions have been established, periodic re-sampling (monitoring) will occur at a minimum of every three years. If significant management activities (e.g., prescribed fire) are implemented, monitoring should be conducted at a greater frequency (e.g., to collect pre-and post-treatment data) if needed to supply data for adaptive management, then return to regular three year monitoring cycles.

If implementation of habitat restoration, enhancement, or management activities at a given site ceases, monitoring will be conducted for a minimum of two monitoring cycles (six years) after cessation of the activities, as long as no adaptive management thresholds (e.g., decrease in population abundance- see HCP Table 7.2) have been triggered. If an adaptive management threshold is triggered, monitoring will be required until the problem has been addressed.

Species Status Monitoring for Effectiveness Monitoring

Species status monitoring will be completed for Covered Species at sites where:

- Covered Activities occur that are likely to result in temporary impacts.
- Habitat restoration and enhancement activities are conducted for conservation purposes.
- Any mitigation work is completed by Benton County or a Cooperator.

Species abundance (or habitat, in the case of Fender's blue and Taylor's checkerspot butterflies) will be monitored. Direct counts of butterflies will not be required as these numbers are extremely variable from year-to-year, and fluctuations may be due to multiple conditions outside the control of the County or Cooperators, including weather. Abundance of each species will be measured using the following metrics:

- Fender's blue butterflies are quantified on the basis of square meters of Kincaid's lupine and native nectar species cover (see HCP Table 2.1 for a list of nectar species).
- Taylor's checkerspot butterflies are quantified on the basis of square meters of host plants (primarily English plantain) and native nectar plants present.
- Kincaid's lupine are quantified on the basis of square meters of foliar cover.
- Nelson's checkermallow are quantified on the basis of individual plants. Plants that are ≥ 30 cm (11.8 in) apart are considered separate individuals.
- Willamette daisy are quantified on the basis of individual plants. Plants that are ≥ 10 cm (3.9 in) apart are considered separate individuals.
- Bradshaw's lomatium are quantified on the basis of individual plants. Plants that are ≥ 10 cm (3.9 in) apart are considered separate individuals
- Peacock larkspur are quantified on the basis of individual plants.

Species abundance will be censused by:

- Counting individuals of the covered plants, using the descriptions above to differentiate individuals. Where necessary, sites will be divided with a grid. The grid will be marked with permanent or GPS markers as needed. This will allow tracking of population trends within specific areas of the population and site.
- Measuring the quantity of butterfly habitat, including cover of host and nectar plants within sections of a grid. The grid will be marked with permanent or GPS markers as needed. This will allow tracking of population trends within specific areas of the population and site.

Prairie Habitat Condition Monitoring for Effectiveness Monitoring

Prairie Habitat Condition Monitoring will be completed at sites where habitat restoration and enhancement activities are implemented. Monitoring will include measurements of:

- Shrub and tree encroachment into prairie habitats
- Invasive species
- Disturbance (anthropogenic and natural)
- Thatch and plant litter accumulation
- Plant community composition

Shrub and Tree Encroachment into Prairie Habitat

The first round of monitoring at a site (baseline monitoring) will include mapping of prairie areas by delineating prairie boundaries. When appropriate, individual trees and shrubs (identified to species) or patches of trees and shrubs will be mapped using a combination of sketch maps, aerial photos, photo points, and GPS.

Invasive Species

During baseline monitoring, established and satellite populations (isolated patches of one to a few individuals) of invasive plant species will be identified and mapped. Methods will include using a combination of sketch maps, aerial photos, photo points, and GPS. Occurrences of invasive animals will be noted and areas of damage caused by these species will be mapped.

Any "A" or "B" Noxious Weeds, following Oregon Department of Agriculture's classification (e.g., ODA 2009) will be identified and mapped. "A" classified weeds are weeds of known economic importance not known to occur in Oregon, or occur in small enough infestations to make eradication/containment possible. "B" classified weeds are weeds of economic importance which are regionally abundant, but which may have limited distribution in some counties (HCP Table 7.1). New problem species may be added to the groups as they are identified in Oregon and the project sites. Problem species may also be re-classified as their status changes. Group A and B classified weeds will be addressed specifically through adaptive management (HCP Table 7.2).

Disturbance

Signs of man-made disturbance will be evaluated during habitat assessments at all sites, especially those with known use by the public. Any signs of new or existing trails or parts of trails with use by horses, mountain bikes, or hikers, will be mapped and tracked using a combination of sketch maps, aerial photos, photo points, and GPS during each monitoring cycle. Trampling off any established trail will be noted. Changes in surrounding land use will also be noted and described.

Signs of natural disturbance will be evaluated during habitat assessments at all sites, including:

- Soil disturbance by animals such as rodents
- Game trails
- Intensive herbivory by animals
- Windfall of trees
- Erosion
- Changes in hydrology

Plant Community Composition and Thatch/Litter Accumulation

Measurement of plant community composition and thatch and litter accumulation will involve fine scale habitat sampling using an appropriate number of randomly placed 5 m x 5 m (16.4 ft by 16.4 ft) plots to sample plant community attributes. The number of plots will vary with the size of the site, the proportion of the site occupied by the Covered Species, and the heterogeneity of the site. Within each plot, the following variables will be estimated:

- Percentage cover of each vascular plant species present
- Percentage cover of plant litter, moss, gravel/rock, and bare soil

Table 7.1 Examples of Oregon Department of Agriculture "A" and "B" classified weeds.

Common Name	Latin Name	Group A	Group B
oblong spurge	<i>Euphorbia oblongata</i>	x	
squarrose knapweed	<i>Centaurea virgata</i>	x	
Himalayan blackberry	<i>Rubus armeniacus</i>		x
Canada thistle	<i>Cirsium arvense</i>		x
oneseed hawthorn	<i>Crataegus monogyna</i>		x
false brome	<i>Brachypodium sylvaticum</i>		x
Italian thistle	<i>Carduus pycnocephalus</i>		x
meadow knapweed	<i>Centaurea pratensis</i>		x
milk thistle	<i>Silybum marianum</i>		x
Scotch broom	<i>Cytisus scoparius</i>		x
spotted knapweed	<i>Centaurea maculosa</i>		x
spurge laurel	<i>Daphne laureola</i>		x
Future species identified as EDRR priorities		x	
Any Oregon State A-listed noxious weeds		x	
Any Oregon State B-listed noxious weeds			x

Effectiveness Monitoring Data Management

Proper data management, analysis, and reporting are critical to the success of the monitoring and adaptive management program. Data on monitoring methods, results, and analysis must be managed, stored, and made available to interested parties including, but not limited to, Benton County staff, Cooperators, any technical advisors, USFWS, ODA and the Oregon Natural Heritage Information Center (ORNHIC). A database and clear reporting procedure are also required for incidental take permit compliance. Information about data management is available in Section 8.2.2. The data will be managed to ensure accurate and up-to-date information is available for making management decisions.

Appendix B: Noxious Weed Maps

Bezell Memorial Forest

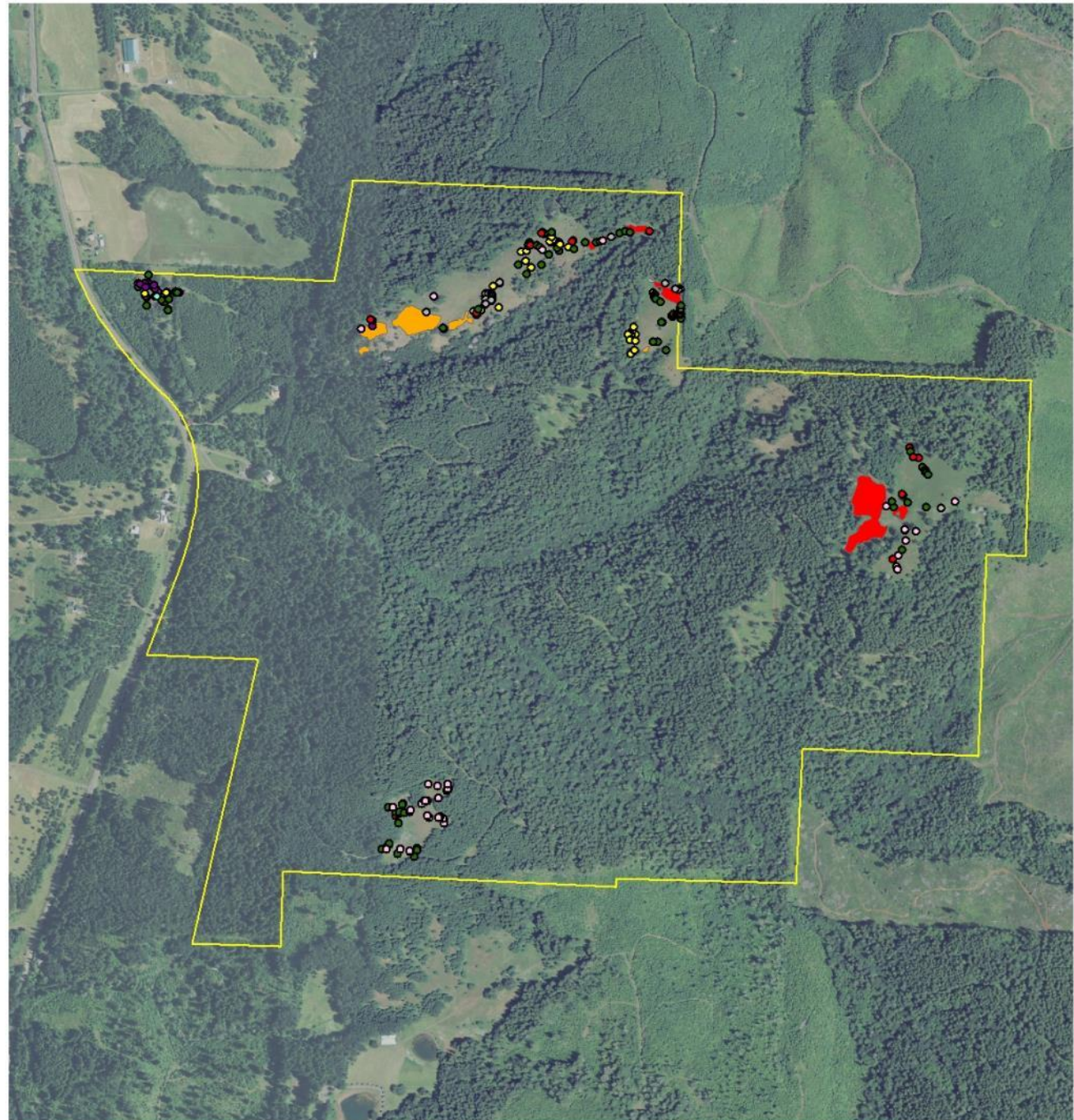
Weed Species

- Bull thistle
- Canada thistle
- False brome
- Himalayan blackberry
- Lathyrus latifolius
- Meadow knapweed
- Medusahead rye
- Reed canarygrass
- Rubus laciniatus
- Scotch broom
- Tansy ragwort
- Site boundary

2011 SDDS Orthoimagery



Meters
0 150




Fitton Green Natural Area

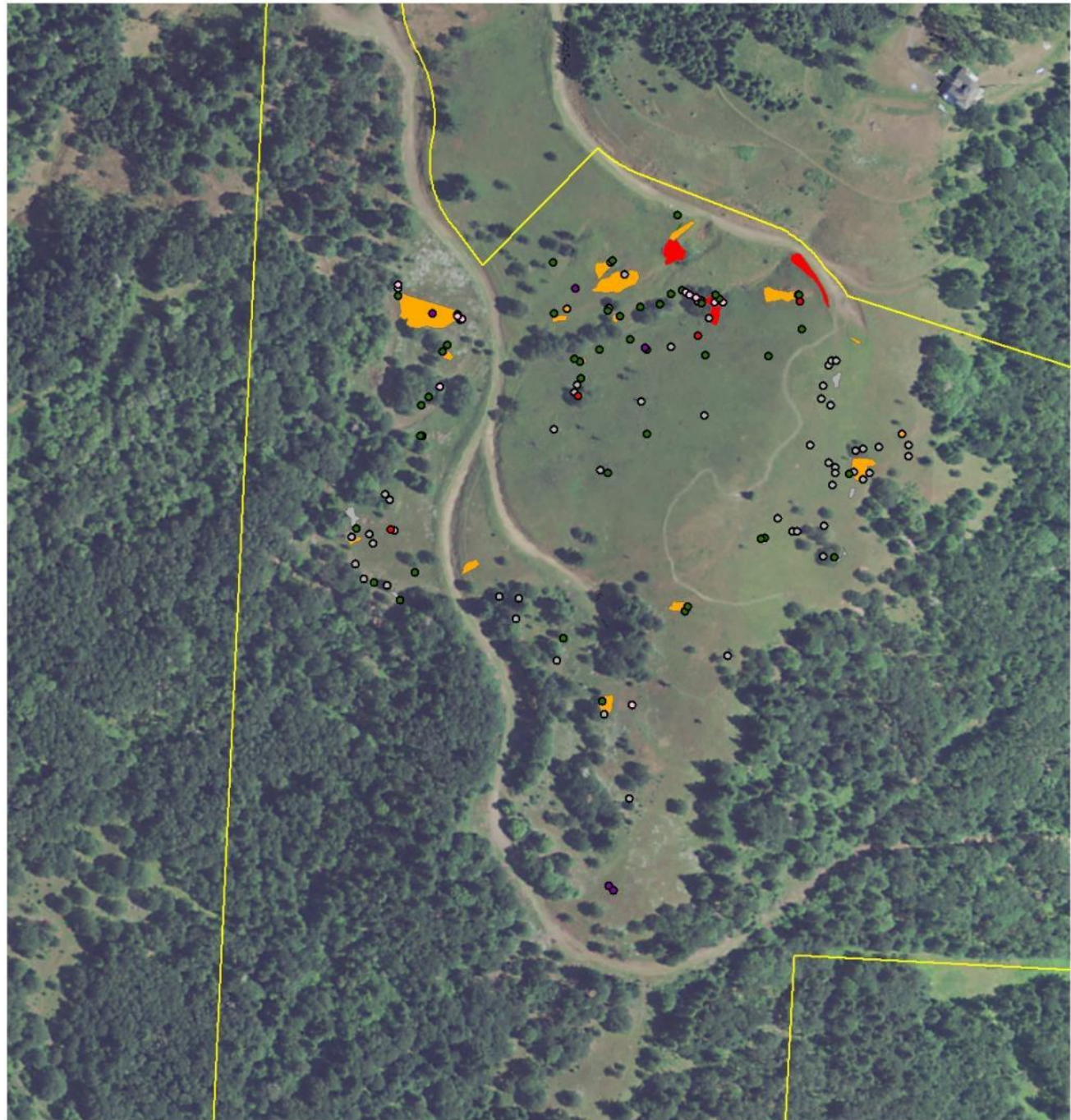
Weed Species

-  Bull thistle
-  Canada thistle
-  False brome
-  Himalayan blackberry
-  Lathyrus latifolius
-  Meadow knapweed
-  Medusahead rye
-  Reed canarygrass
-  Rubus laciniatus
-  Scotch broom
-  Tansy ragwort
-  Site boundary

2011 SDDS Orthoimagery



 Meters
0 50



Jackson-Frazier Wetland

Weed Species

-  Bull thistle
-  Canada thistle
-  False brome
-  Himalayan blackberry
-  Lathyrus latifolius
-  Meadow knapweed
-  Medusahead rye
-  Reed canarygrass
-  Rubus laciniatus
-  Scotch broom
-  Tansy ragwort
-  Site boundary

2011 SDDS Orthoimagery



 Meters
0 50

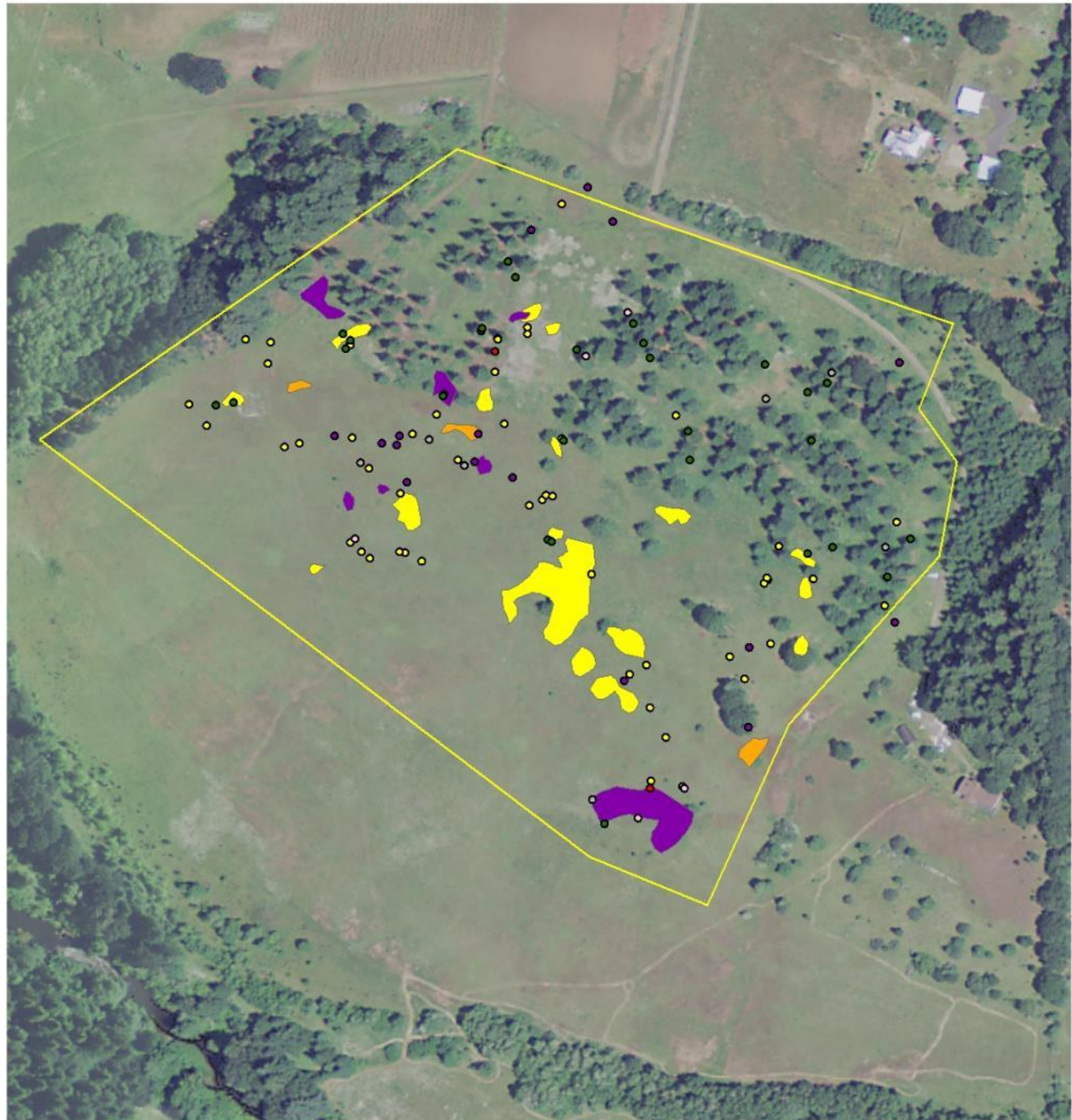
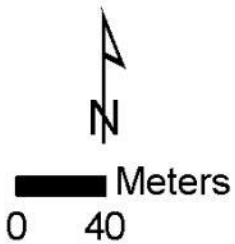


Fender's Blue Butterfly
Conservation Area:
Crisp-Liddell

Weed Species

- Bull thistle
- Canada thistle
- False brome
- Himalayan blackberry
- Lathyrus latifolius
- Meadow knapweed
- Medusahead rye
- Reed canarygrass
- Rubus laciniatus
- Scotch broom
- Tansy ragwort
- Site boundary

2011 SDDS Orthoimagery

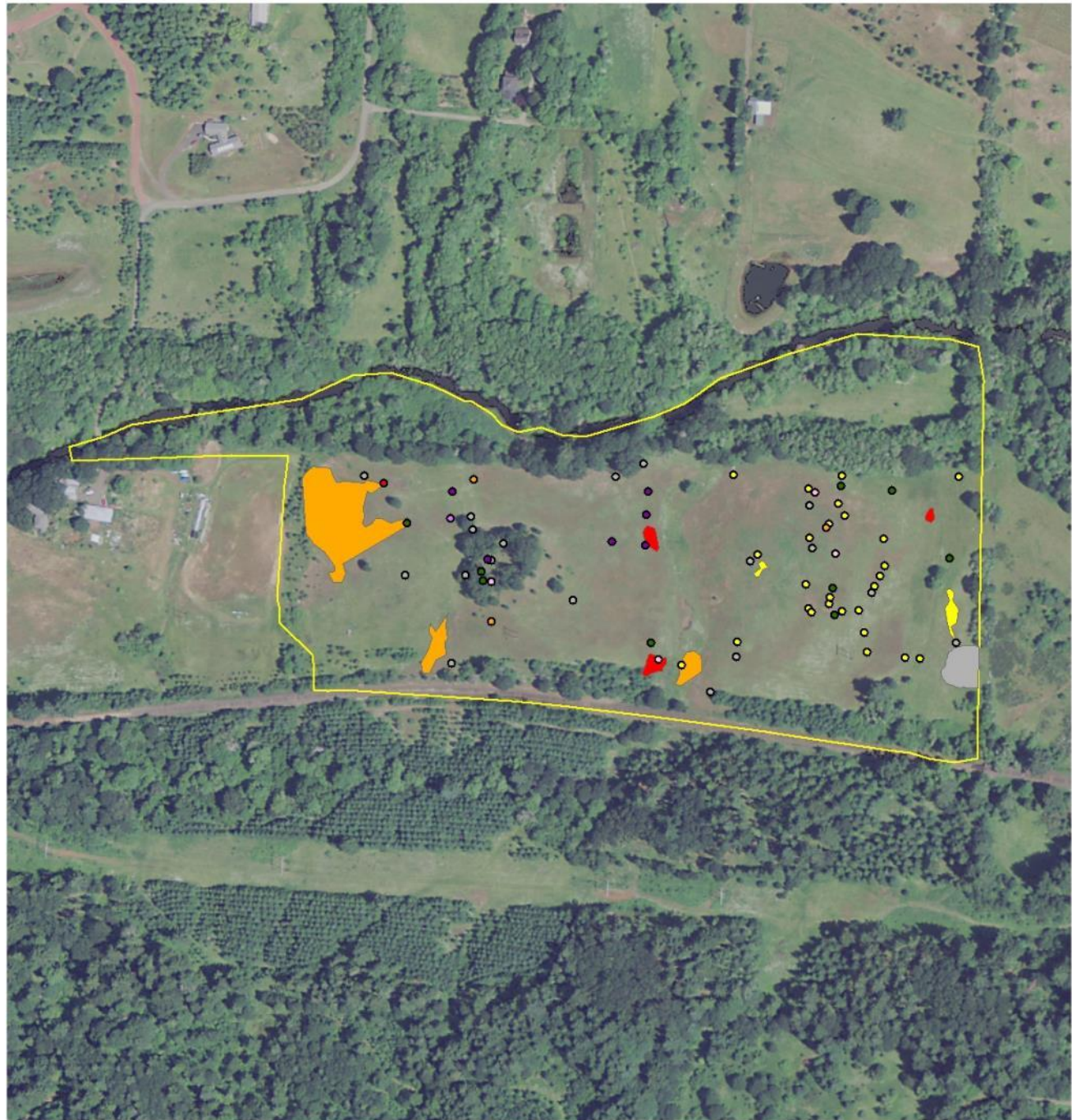
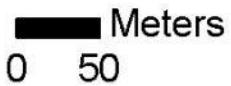


Fender's Blue Butterfly Conservation Area: Percy-Schoener

Weed Species

- Bull thistle
- Canada thistle
- False brome
- Himalayan blackberry
- Lathyrus latifolius
- Meadow knapweed
- Medusahead rye
- Reed canarygrass
- Rubus laciniatus
- Scotch broom
- Tansy ragwort
- Site boundary

2011 SDDS Orthoimagery



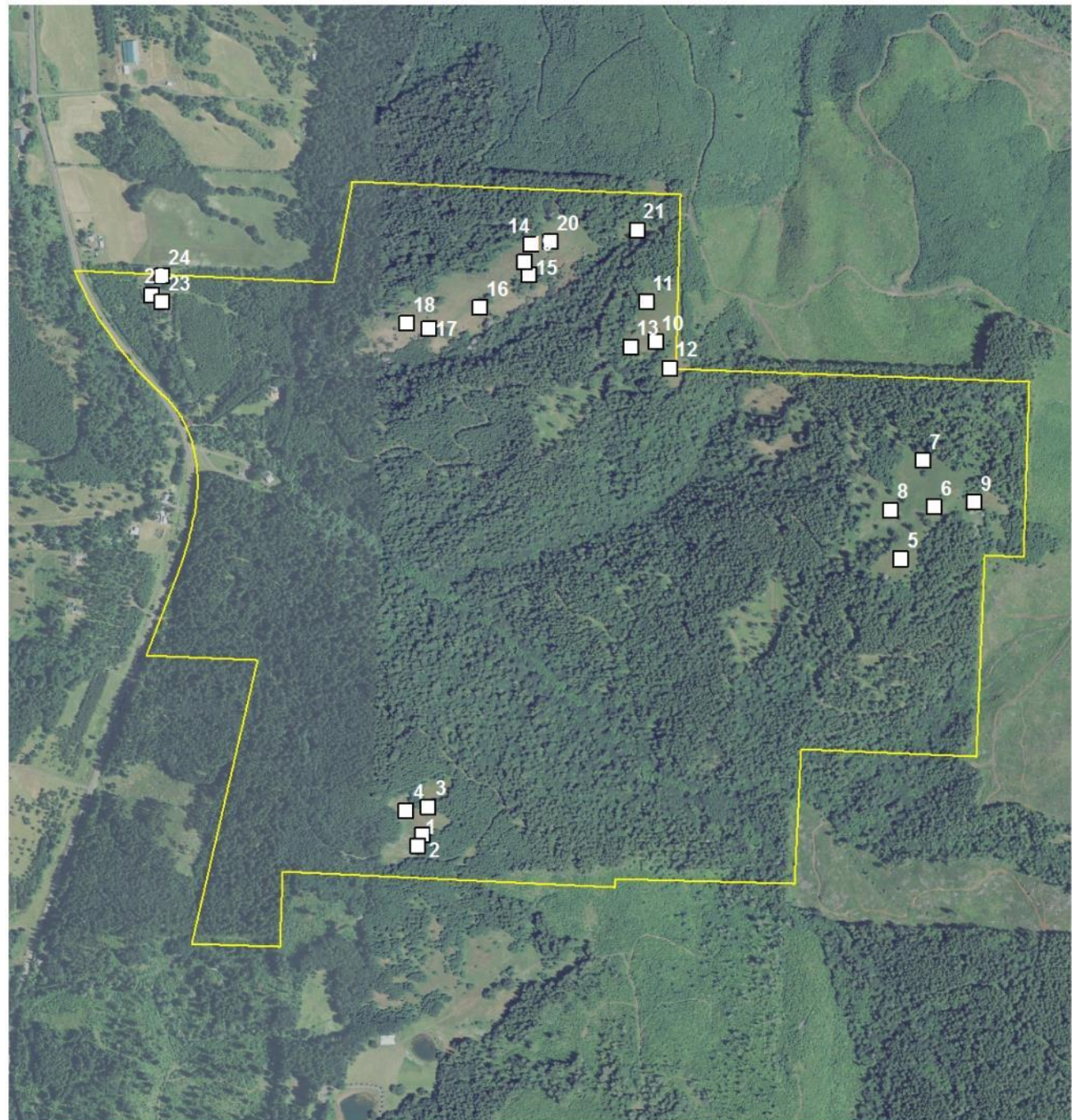
Appendix C: Vegetation Plot Locations

Beazell Memorial Forest

- 2011 Vegetation plot
- ▭ Site boundary
- 2011 SDDS Orthoimagery



0 150 Meters

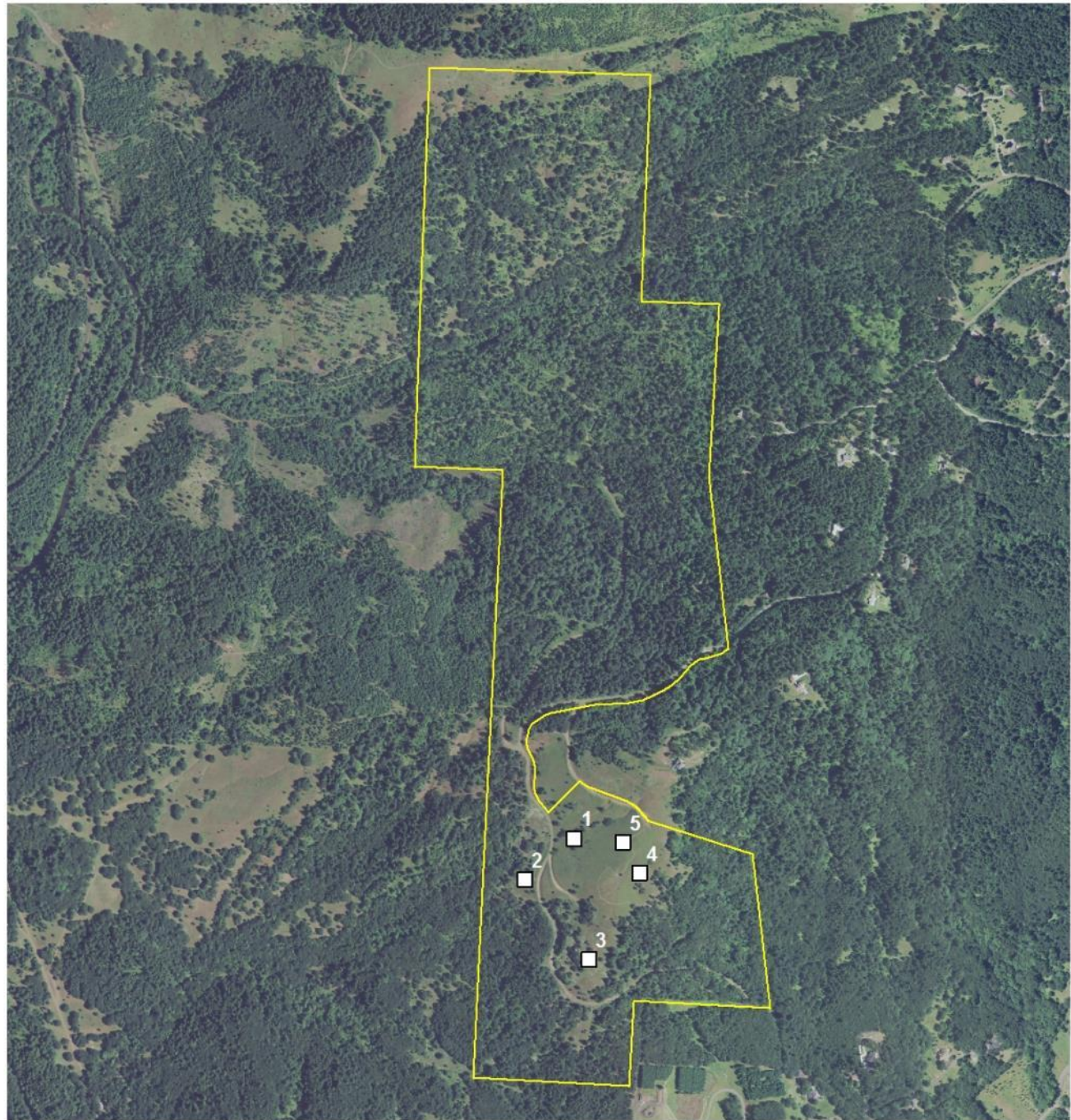


Fitton Green Natural Area

- 2011 Vegetation plot
 - ▭ Site boundary
- 2011 SDDS Orthoimagery



0 150 Meters



Jackson-Frazier Wetland

- 2011 Vegetation plot
- ▭ Site boundary
- 2011 SDDS Orthoimagery



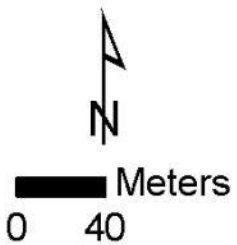
0 50
Meters



Fender's Blue Butterfly Conservation Area: Crisp-Liddell

- 2011 Vegetation plot
- ▭ Site boundary

2011 SDDS Orthoimagery



Fender's Blue Butterfly
Conservation Area:
Pearcy-Schoener

- 2011 Vegetation plot
- ▭ Site boundary

2011 SDDS Orthoimagery



0 50 Meters



Appendix D: Disturbance Area Maps

Fitton Green Natural Area

- Unauthorized trail
 - Site boundary
- 2011 SDDS Orthoimagery



0 50 Meters



Beazell Memorial Forest Summit Meadow




- Campsite
 - ATV Ruts
 - Site boundary
- 2011 SDDS Orthoimagery



0 30
Meters




Jackson-Frazier Wetland

-  Site boundary
-  Bradshaw's lomatium
-  Nelson's checkermallow

2011 SDDS Orthoimagery



 Meters
0 10



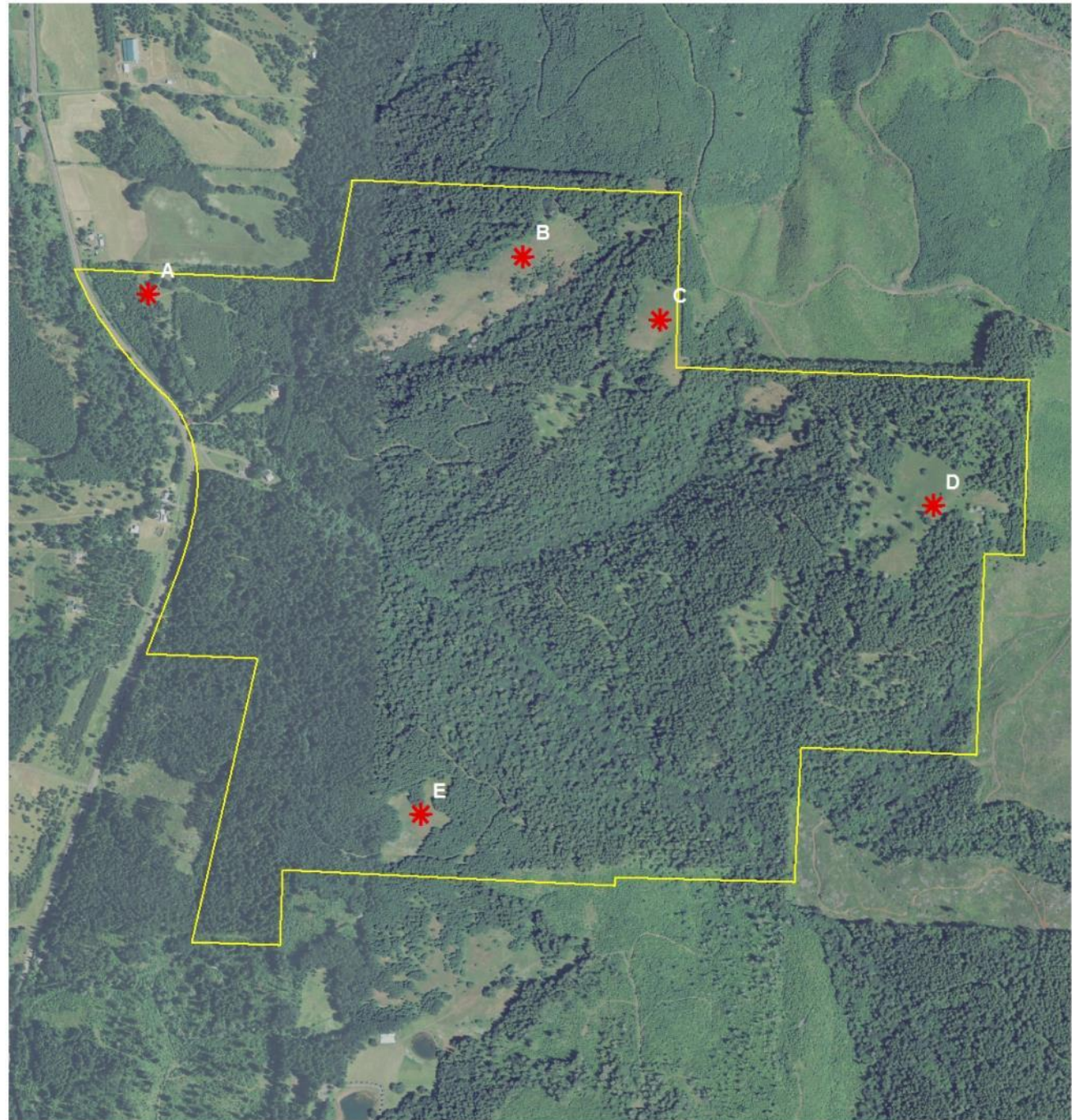
Appendix E: Photo Point Location Maps

Beazell Memorial Forest

- * Photo point
 - Site boundary
- 2011 SDDS Orthoimagery



0 150 Meters

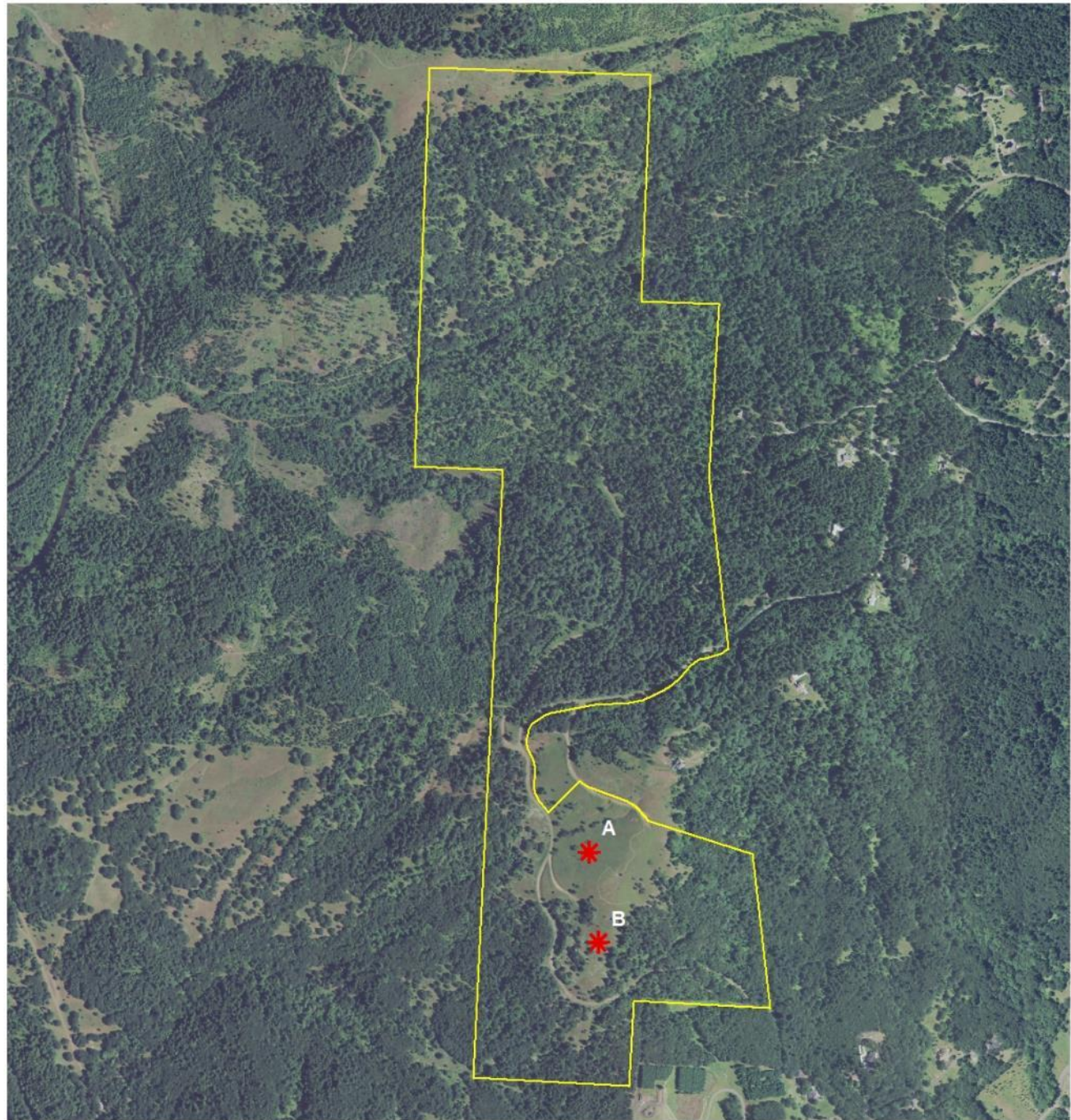


Fitton Green Natural Area

-  Photo point
 -  Site boundary
- 2011 SDDS Orthoimagery



 Meters
0 150



Jackson-Frazier Wetland

- * Photo point
 - Site boundary
- 2011 SDDS Orthoimagery



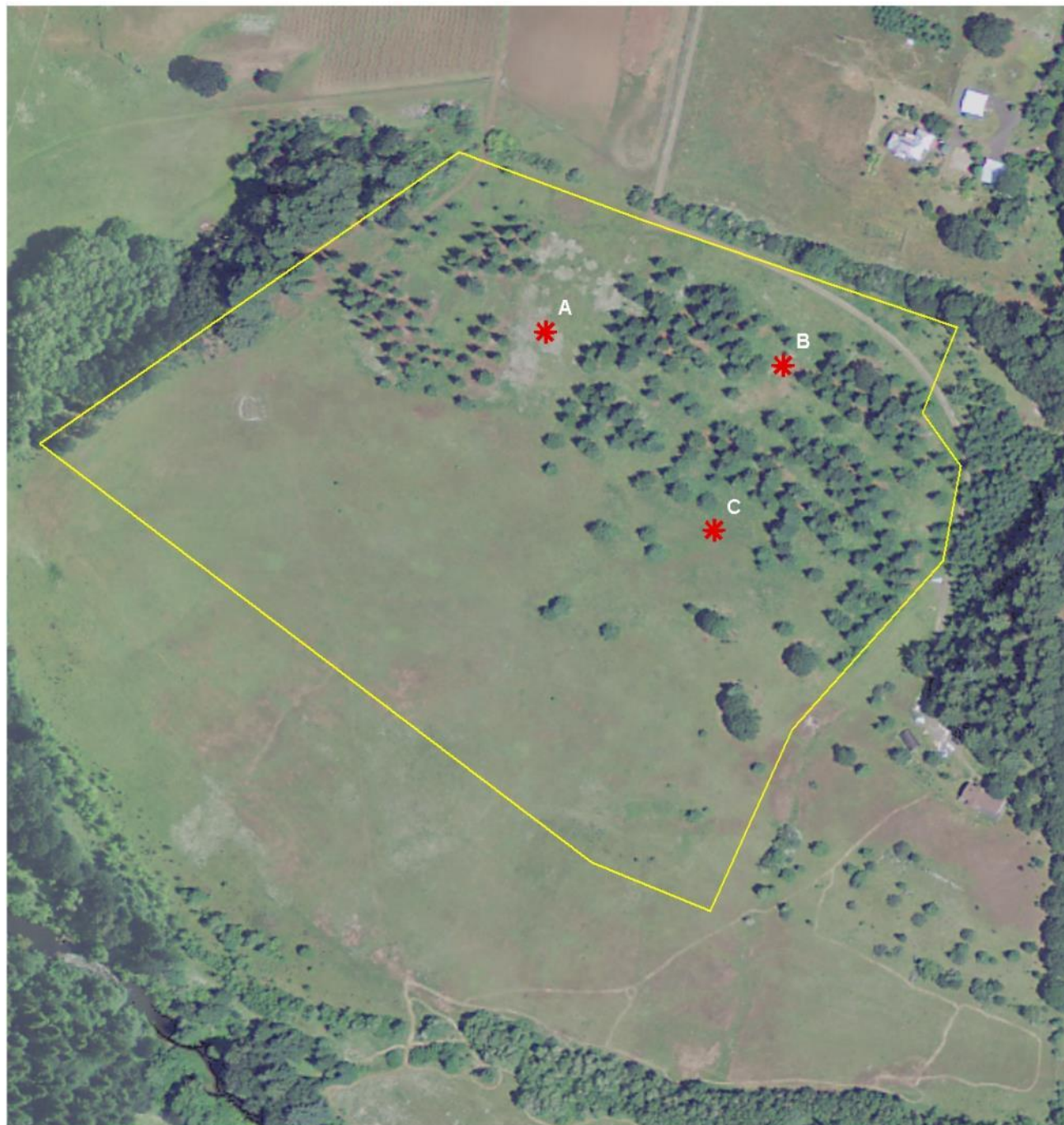
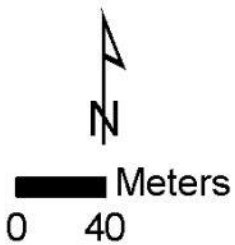
0 50
Meters



Fender's Blue Butterfly Conservation Area: Crisp-Liddell

- * Photo point
- Site boundary

2011 SDDS Orthoimagery




Fender's Blue Butterfly
Conservation Area:
Pearcy-Schoener

-  Photo point
-  Site boundary

2011 SDDS Orthoimagery



 Meters
0 50

