

Record of Decision 4: Appendix E

Biological Technical Memorandum

April 2017



BIOLOGICAL TECHNICAL MEMORANDUM

Noxious Weed and Wildlife – SH 56 to SH 392

April 2017

1.0 Introduction

Atkins North America, Inc. (Atkins) has prepared a biological evaluation for the I-25 North Project Record of Decision (ROD) 4. The ROD4 will document the final agency decision for improvements to Interstate 25 (I-25) which started with a Notice of Intent to prepare an Environmental Impact Statement (EIS) in 2003. The ROD4 Selected Alternative construction limits (ROD4 study area) is located along the I-25 corridor beginning at State Highway (SH) 392 and ending at SH 56 in Larimer and Weld Counties, Colorado (Appendix B, Figure 1).

This biological evaluation documents any changes to noxious weeds and wildlife resources since the Final EIS (FEIS) was published in 2011. The biological resources were evaluated using desktop data and field-verified during field surveys conducted on August 24 – 26, 2016 and September 7, 2016.

2.0 Methods

Atkins conducted a desktop review and field visit to evaluate the ROD4 study area for the presence of biological resources. The desktop biological evaluation included information from the following sources:

- National Land Cover Dataset (NLCD), land use layer of Colorado (NLCD, 2011)
- Colorado Noxious Weeds List A, B and C Species, Colorado Department of Agriculture (CDA, 2015a; Appendix A).
- Noxious weed 2015 occurrences data on the Colorado Department of Transportation (CDOT) Online Transportation Information System map viewer (CDOT, 2015b).
- Noxious weed locations along Colorado state road right of way, 2012-2014 shape files (CDOT, 2014).
- Mapped Colorado Parks and Wildlife (CPW) rare and/or sensitive species occurrence data obtained from Natural Diversity Information Source (NDIS, 2016).
- Maps of CDOT raptor nest locations within 1-mile of the ROD4 study area (CDOT, 2015c).

Atkins scientists visited the ROD4 study area August 24 – 26, 2016 and September 7, 2016, to document any changes to biological resources since publication of the FEIS. The following biological resources were field-verified by cross-referencing locations with desktop data obtained from the sources above.

- Vegetation
- Noxious weeds
- Recent disturbance to vegetation communities

- Raptor nests including burrowing owls (conducted within the ROD4 study area plus a 1-mile buffer)
- Prairie dog colonies
- Sensitive wildlife habitat (based on CPW NDIS data)
- Wildlife crossings

3.0 Results

3.1 Vegetation

Desktop data including aerial imagery and land use were evaluated to examine changes to vegetation communities within the ROD4 study area, such as new development or other land use changes. The only notable changes to vegetation were located at Crossroads Boulevard (Blvd.) and SH 392 due to interchange modifications and along the Big Thompson River due to the 2013 flood. Vegetation was evaluated during the field survey and changes to vegetation at Crossroads Blvd. and SH 392 were verified. Vegetation along the Big Thompson River has regrown since the 2013 flood, although due to altered geomorphology, the location and extent of vegetation coverage is different than pre-flood conditions.

There were no major changes to vegetation communities since the FEIS. The ROD4 study area is part of the High Plains Ecoregion and consists primarily of urban, agriculture, and developed habitats. Shortgrass prairie is the dominant native vegetative community for the High Plains Ecoregion; dominated by grasses such as blue grama (*Bouteloua gracilis*), little bluestem (*Schizachyrium scoparium*), buffalograss (*Bouteloua dactyloides*), and western wheatgrass (*Pascopyrum smithii*).

Riparian areas along streams and canals located in the project area contain native plains cottonwood (*Populus deltoids* spp. *monilifera*), and non-native Chinese elm (*Ulmus pumila*) and Russian olive (*Elaeagnus angustifolia*). Wetland species typically include native sandbar willow (*Salix exigua*), cattail (*Typha* sp.), sedges (*Carex* spp.), and rushes (*Juncus* spp.), as well as non-native redtop (*Agrostis stolonifera*), and curly dock (*Rumex crispus*). In addition to Russian olive, other noxious weeds were identified in the project study and are discussed in further detail below.

3.2 Noxious Weeds

The current list of Colorado noxious weeds and county lists were evaluated. The Colorado listed noxious weeds are placed into one of three categories:

- List A- species designated for eradication
- List B- species that must be managed in order to stop continued spread
- List C- species that are managed in jurisdictions that have chosen to require management of the species

For the most current noxious weed lists, please see Appendix A. During the field visits on August 24 – 26, 2016, and September 7, 2016, a total of 10 species were observed within the ROD4 study area (Table 1). No list A species were identified, but several List B and C species were observed.

Table 1. Noxious Weed Species Observed within the ROD4 Study Area

Common Name/Scientific Name	Colorado Noxious Weed List	Larimer County Weed List	Weld County Weed List
Canada thistle (<i>Cirsium arvense</i>)	B	Yes	Yes
Common mullein (<i>Verbascum thapsus</i>)	C	-	Yes
Field bindweed (<i>Convolvulus arvensis</i>)	C	-	Yes
Musk thistle (<i>Carduus nutans</i>) ¹	B	Yes	Yes
Plumeless thistle (<i>Carduus acanthoides</i>) ¹	B	-	Yes
Puncture vine (<i>Tribulus terrestris</i>)	C	-	Yes
Russian knapweed (<i>Acroptilon repens</i>) ¹	B	Yes	Yes
Russian olive (<i>Elaeagnus angustifolia</i>)	B	-	Yes
Salt cedar/ Tamarisk (<i>Tamarix</i> sp.)	B	Yes	Yes
Scotch thistle (<i>Onopordum acanthium</i>)	B	Yes	Yes

¹ Species not previously recorded in the Final EIS.

The CDOT 2015 noxious weeds mapped within the ROD4 study area were reviewed and 53 occurrences were documented within the ROD4 study area in 2015. The CDOT 2015 noxious weed locations were visited and a total of 26 occurrences are still present in the ROD4 study area (see Table 2). Locations of field-verified CDOT noxious weed occurrences is depicted in Appendix B, Figures 2a and 2b.

Table 2 Field-verified 2015 CDOT Noxious Weed Species Occurrences within the ROD4 Study Area

Common Name/Scientific Name	Number of field-verified occurrences still present	CDOT Object IDs
Canada thistle (<i>Cirsium arvense</i>)	7	31941, 31939, 31935, 32022, 5686, 19806, 31936
Field bindweed (<i>Convolvulus arvensis</i>)	6	5655, 5660, 9705, 9709, 31934, 5678
Musk thistle (<i>Carduus nutans</i>) ¹	9	31940, 5656, 5657, 5684, 5683, 5659, 5682, 5680, 19817
Plumeless thistle (<i>Carduus acanthoides</i>) ¹	1	5654
Russian olive (<i>Elaeagnus angustifolia</i>)	2	31922, 5685
Scotch thistle (<i>Onopordum acanthium</i>)	1	5661

¹ Species not previously recorded in the Final EIS.

Additional CDOT noxious weed occurrence data from 2012-2014 were reviewed, and four additional species have the potential to occur in the ROD4 study area, but were not observed during field -verification. These species include hoary cress (*Lepidium draba*), Johnson grass (*Sorghum halepense*), cutleaf teasel (*Dipsacus laciniatus*), and moth mullein (*Verbascum blattaria*).

In addition to field-verified CDOT noxious weeds, new noxious weed occurrences were observed during the field survey. A total of eight species comprising 37 weed populations were identified within the ROD4 study area. A list of those species and number of occurrences are presented in Table 3. Locations of noxious weeds observed during the field survey are depicted in Appendix B, Figures 2a and 2b.

Table 3 New noxious weed populations recorded within the ROD4 study area during the field survey

Common Name/Scientific Name	Colorado Noxious Weed List	Larimer County Weed List	Weld County Weed List	Number of Observations	Estimated Area (Acres)
Canada thistle (<i>Cirsium arvense</i>)	B	Yes	Yes	13	0.60
Common mullein (<i>Verbascum thapsus</i>)	C	-	Yes	2	0.27
Field bindweed (<i>Convolvulus arvensis</i>)	C	-	Yes	3	0.02
Musk thistle (<i>Carduus nutans</i>)¹	B	Yes	Yes	6	0.13
Puncture vine (<i>Tribulus terrestris</i>)	C	-	Yes	1	<0.01
Russian knapweed (<i>Acroptilon repens</i>)¹	B	Yes	Yes	8	1.19
Russian olive (<i>Elaeagnus angustifolia</i>)	B	-	Yes	4	0.98
Salt cedar/ Tamarisk (<i>Tamarix</i> sp.)	B	Yes	Yes	1	0.03

3.3 Wildlife

Desktop data along with a field survey were conducted to evaluate the ROD4 study area for any new changes to wildlife since the FEIS. The field survey was conducted August 24 - 26, 2016, and again September 7, 2016, to evaluate the ROD4 study area for the presence or absence of raptor nests, burrowing owl (*Athene cunicularia*), black-tailed prairie dogs (*Cynomys ludovicianus*), and sensitive wildlife habitat including wildlife crossings. Results of the field survey are presented below.

3.3.1 Raptors

Maps of raptor nest locations documented by CPW and provided by CDOT were reviewed and a total of 16 nests were documented within 1-mile of the ROD4 study area. Raptor nests within 1-mile of the ROD4 study area include the following species: red-tailed hawk (*Buteo jamaicensis*),

Swainson's hawk (*Buteo swainsoni*), osprey (*Pandion haliaetus*), great-horned owl (*Bubo virginianus*), and unidentified raptor nests.

During the field survey each of the 16 nests that were visited to determine whether nests were still present. Among the 16 nests, three were still present, two were no longer present, and 11 were unconfirmed (Appendix B, Figures 3a and 3b). The nests that were present were likely active earlier in the season; this is an assumption based on observations of raptor activity in the vicinity of the nests at the time of field surveys. Several of the nests could not be confirmed due to poor visibility from public roads and trees having full foliage at the time of the survey.

An additional 10 nests not previously documented by CPW were observed within 1-mile of the ROD4 study area. Of the 10 newly documented nests, one of the nests was observed within the ROD4 study area (Appendix B, Figures 3a and 3b). The nest observed in the ROD4 study area is located approximately 0.3 mile south of the intersection of SH 392 and I-25N, and approximately 60 feet east of SE Frontage Road (40.298683, -104.991057 Decimal Degrees [DD]).

3.3.2 Sensitive Wildlife Habitat Areas

The CPW NDIS data from 2015 was reviewed and two new resources were identified within the ROD4 study area (Appendix B, Figures 4a and 4b). An osprey nest is located near an unnamed pond east of Boyd Lake which was not previously identified in the FEIS (Appendix B, Figure 4a), and a new bald eagle (*Haliaeetus leucocephalus*) nest site is located along the Big Thompson River approximately 2.19 miles east of the ROD4 study area.

3.3.3 Big Game and Movement Corridors

The CPW wildlife crossings shape file data was reviewed and no new crossings were identified within the ROD4 study area since the FEIS (NDIS, 2016; Appendix B, Figures 4a and 4b). No additional wildlife crossings were identified during the field survey, although mule deer footprints were observed at both of the crossings previously identified.

3.3.4 Prairie Dog Colonies

A prairie dog survey was conducted within the ROD4 study area and resulted in identification of six active black-tailed prairie dog colonies (Appendix B, Figures 5a and 5b). No inactive colonies were observed. A description of each colony is provided in Table 4.

Table 4. Active Black-tailed Prairie Dog Colonies

Description of Location	Number of Individuals Observed	Approximate Colony Area (Acres)
Northwest of intersection at County Road 48 and I-25N, east of Gateway Drive	83	10.2
Approximately 0.10 mile north of County Road 30, east of Southeast Frontage Road.	63	3.5
Approximately 0.36 mile north of County Road 30, east of Southeast Frontage Road.	6	0.1
Approximately 100 feet east of I-25N/Crossroads Blvd. southeast exit ramp.	10	0.9
Directly south of Crossroads Blvd. at the intersection of I-25N southeast exit ramp.	8	0.6
Northwest of intersection at E. County Road 32 and I-25N, east of Southwest Frontage Road.	58	2.0

4.0 Summary

The project will result in some direct impacts to vegetation that could result in the establishment and spread of noxious weeds. A more extensive review and management of noxious weeds will be addressed in a Noxious Weed Management Plan that will be prepared by the Contractor.

Raptor activity, including nesting and roosting within 1-mile of the ROD4 study area could be impacted from the project. Direct effects to raptors and other birds would occur if an active nest is disturbed or removed. Indirect effects could occur as a result of lighting, construction noise, vibration and other construction related activities in the immediate vicinity of an active nest, potentially resulting in nest failure or abandonment. It is recommended that an additional raptor nest survey be conducted prior to and during the season construction will take place, to locate any active nests within 1-mile of the ROD4 study area. Should any active raptor nests be identified, CPW Recommended Buffer Zones and Seasonal Restrictions (CPW, 2008) should be followed to minimize impacts to raptors.

Significant impacts to migratory birds and raptors can be minimized by following CDOT Standard Specifications, Section 240, of limiting vegetation clearing/grubbing outside the migratory bird nest season (April 1 through August 31). It is recommended that any ground nesting habitat be removed prior to the nesting season. If the removal of habitat (clearing/grubbing) is not possible prior to the nesting season, it is recommended that a qualified individual survey the site for nesting migratory birds before clearing/grubbing or other construction activities. If active nests are found in the ROD4 study area, the USFWS must be contacted for further guidance.

The prairie dog colonies occurring within the ROD4 study area may need to be relocated or removed in accordance with CDOT's black-tailed prairie dog policy prior to construction. The CPW manages the conservation of prairie dogs and issues permits for prairie dog capture, transport, and relocation that is otherwise unlawful. If active prairie dog burrows are identified within the prosed

alignment during construction, it is recommended that CPW be contacted for guidance and any permits be obtained for removal of prairie dogs.

Further information about mitigation measures and environmental commitments is available in the FEIS.

5.0 References

Colorado Department of Agriculture (CDA). 2015. Colorado Noxious Weeds (including Watch List), effective December 30, 2015. Retrieved from:

http://www.colorado.gov/pacific/sites/default/files/Current%20Noxious%20Weed%20List_123015.pdf

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CPW. 2008. *Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors*. Denver, CO: Colorado Parks and Wildlife, revised February 2008. [CPW, 2008]

US Geological Survey. 2011. National Land Cover Dataset for Colorado. Retrieved from:

<https://gdg.sc.egov.usda.gov/GDGOrder.aspx>

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APPENDIX A COLORADO AND COUNTY NOXIOUS WEED LISTS

Colorado Noxious Weeds (including Watch List), effective December 30, 2015

List A Species (25)

<i>Common</i>	<i>Scientific</i>
African rue	(<i>Peganum harmala</i>)
Bohemian knotweed	(<i>Polygonum x bohemicum</i>)
Camelthorn	(<i>Alhagi maurorum</i>)
Common crupina	(<i>Crupina vulgaris</i>)
Cypress spurge	(<i>Euphorbia cyparissias</i>)
Dyer's woad	(<i>Isatis tinctoria</i>)
Elongated mustard	(<i>Brassica elongata</i>)
Flowering rush	(<i>Butomus umbellatus</i>)
Giant knotweed	(<i>Polygonum sachalinense</i>)
Giant reed	(<i>Arundo donax</i>)
Giant salvinia	(<i>Salvinia molesta</i>)
Hairy willow-herb	(<i>Epilobium hirsutum</i>)
Hydrilla	(<i>Hydrilla verticillata</i>)
Japanese knotweed	(<i>Polygonum cuspidatum</i>)
Meadow knapweed	(<i>Centaurea nigrescens</i>)
Mediterranean sage	(<i>Salvia aethiopsis</i>)
Medusahead	(<i>Taeniatherum caput-medusae</i>)
Myrtle spurge	(<i>Euphorbia myrsinites</i>)
Orange hawkweed	(<i>Hieracium aurantiacum</i>)
Parrotfeather	(<i>Myriophyllum aquaticum</i>)
Purple loosestrife	(<i>Lythrum salicaria</i>)
Rush skeletonweed	(<i>Chondrilla juncea</i>)
Squarrose knapweed	(<i>Centaurea virgata</i>)
Tansy ragwort	(<i>Senecio jacobaea</i>)
Yellow starthistle	(<i>Centaurea solstitialis</i>)

List B Species (37)

<i>Common</i>	<i>Scientific</i>
Absinth wormwood	(<i>Artemisia absinthium</i>)
Black henbane	(<i>Hyoscyamus niger</i>)
Bouncingbet	(<i>Saponaria officinalis</i>)
Bull thistle	(<i>Cirsium vulgare</i>)
Canada thistle	(<i>Cirsium arvense</i>)
Chinese clematis	(<i>Clematis orientalis</i>)
Common tansy	(<i>Tanacetum vulgare</i>)
Common leasel	(<i>Dipsacus fullonum</i>)
Corn chamomile	(<i>Anthemis arvensis</i>)
Cutleaf leasel	(<i>Dipsacus laciniatus</i>)
Dalmatian toadflax, broad-leaved	(<i>Linaria dalmatica</i>)
Dalmatian toadflax, narrow-leaved	(<i>Linaria genistifolia</i>)
Dame's rocket	(<i>Hesperis matronalis</i>)
Diffuse knapweed	(<i>Centaurea diffusa</i>)
Eurasian watermilfoil	(<i>Myriophyllum spicatum</i>)
Hoary cress	(<i>Cardaria draba</i>)

Houndstongue	(Cynoglossum officinale)
Jointed goatgrass	(Aegilops cylindrica)
Leafy spurge	(Euphorbia esula)
Mayweed chamomile	(Anthemis cotula)
Moth mullein	(Verbascum blattaria)
Musk thistle	(Carduus nutans)
Oxeye daisy	(Leucanthemum vulgare)
Perennial pepperweed	(Lepidium latifolium)
Plumeless thistle	(Carduus acanthoides)
Russian knapweed	(Acroptilon repens)
Russian-olive	(Elaeagnus angustifolia)
Salt cedar	(Tamarix chinensis, T. parviflora, and T. ramosissima)
Scentless chamomile	(Tripleurospermum perforata)
Scotch thistle	(Onopordum acanthium, O. tauricum)
Spotted knapweed	(Centaurea stoebe)
Spotted x diffuse knapweed hybrid	(Centaurea x psammogena = C. stoebe x C. diffusa)
Sulfur cinquefoil	(Potentilla recta)
Wild caraway	(Carum carvi)
Yellow nutsedge	(Cyperus esculentus)
Yellow toadflax	(Linaria vulgaris)
Yellow x Dalmatian toadflax hybrid	(Linaria vulgaris x L. dalmatica)

List C Species (16)

<i>Common</i>	<i>Scientific</i>
Bulbous bluegrass	(Poa bulbosa)
Chicory	(Cichorium intybus)
Common burdock	(Arctium minus)
Common mullein	(Verbascum thapsus)
Common St. Johnswort	(Hypericum perforatum)
Downy brome	(Bromus tectorum)
Field bindweed	(Convolvulus arvensis)
Halogeton	(Halogeton glomeratus)
Johnsongrass	(Sorghum halepense)
Perennial sowthistle	(Sonchus arvensis)
Poison hemlock	(Conium maculatum)
Puncturevine	(Tribulus terrestris)
Quackgrass	(Elymus repens)
Redstem filaree	(Erodium cicutarium)
Velvetleaf	(Abutilon theophrasti)
Wild proso millet	(Panicum miliaceum)

Watch List Species (24)

<i>Common</i>	<i>Scientific</i>
Asian mustard	(Brassica tournefortii)
Baby's breath	(Gypsophila paniculata)
Bathurst burr, Spiny cocklebur	(Xanthium spinosum)
Brazilian egeria, Brazilian elodea	(Egeria densa)

Common bugloss	(<i>Anchusa officinalis</i>)
Common reed	(<i>Phragmites australis</i>)
Garden loosestrife	(<i>Lysimachia vulgaris</i>)
Garlic mustard	(<i>Alliaria petiolata</i>)
Himalayan blackberry	(<i>Rubus armeniacus</i>)
Japanese blood grass/cogongrass	(<i>Imperata cylindrica</i>)
Meadow hawkweed	(<i>Hieracium caespitosum</i>)
Onionweed	(<i>Asphodelus fistulosus</i>)
Purple pampas grass	(<i>Cortaderia jubata</i>)
Scotch broom	(<i>Cytisus scoparius</i>)
Sericea lespedeza	(<i>Lespedeza cuneata</i>)
Swainsonpea	(<i>Sphaerophysa salsula</i>)
Syrian beancaper	(<i>Zygophyllum fabago</i>)
Water hyacinth	(<i>Eichhornia crassipes</i>)
Water lettuce	(<i>Pistia stratiotes</i>)
White bryony	(<i>Bryonia alba</i>)
Woolly distaff thistle	(<i>Carthamus lanatus</i>)
Yellow flag iris	(<i>Iris pseudacorus</i>)
Yellow floatingheart	(<i>Nymphoides peltata</i>)
Yellowtuft	(<i>Alyssum murale</i> , <i>A. corsicum</i>)

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Municipal Separate Storm Sewer System (MS4)

Weed Management

Weed Management

Identifying Plants

Eradication Weed Species - List A

Control Weed Species - List B

Suppression Weed Species - List C

Watch List Species

Other Plants

Plant ID Guide for The Field

Controlling Weeds

Eradication Weed Species - List A

The Colorado Department of Agriculture has evaluated the noxious weed situation throughout the state. As a result they have created a hierarchy policy for certain species across the state. Plants on the 'A List' have the potential to be very invasive noxious weeds that quickly transform an area. The plants on this list either are not in Colorado yet or are present in very limited numbers and eradication of these species is still possible.

Keep in mind, the noxious weeds mandated for control are plants that are non-native to North America. Consequently, these plants do not have the natural checks found in their native land such as insects or diseases. Due to the competitive aggressive nature of these plants they tend to out compete our native vegetation by forming mono-cultures. Many of these species are also toxic to livestock and wildlife, or have limited grazing potential.



In Colorado

- African Rue
- Cypress Spurge
- Dyers Wood
- Elongated mustard
- Giant knotweed
- Giant med
- Hairy Willow-herb
- Japanese knotweed
- Meadow Knopweed
- Mediterranean Sage
- Myrtle Spurge
- Orange Hawkweed
- Purple Loosestrife
- Yellow Starthistle

Bordering Colorado

- Bohemian Knotweed
- Camelthorn
- Common Cupina
- Flowering Rush
- Giant Salvinia
- Hydrilla
- Medushead
- Parrotfeather
- Rust Stalkedweed
- Squarose Knopweed
- Tansy Ragwort

Contact Information

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Larimer County Weed List

The following 16 weed species are categorized as List B weeds with Colorado Department of Agriculture, and are considered significantly troublesome in Larimer County. These weeds are emphasized in identification and management outreach programs and require management by landowners in the county. For the most part, compliance with county weed law requires prevention of the dispersal of seed, or at a minimum, mowing. The exceptions on the Larimer County list are bull thistle, Scotch thistle and spotted knapweed which are uncommon enough that eradication is possible. County Weed Law requires management methods that prevent seed production of these weeds: pulling, digging, or herbicide application. For effective management of any noxious weed remember:

- Weeds are typically opportunistic and readily invade disturbed sites.
- Cultural control, the establishment of desirable and competitive vegetation, prevents or slows down invasion by non-native species and is an essential component of successful noxious weed management.
- Prevention of new infestations through identification and on-the-spot eradication (early detection and rapid response) saves substantial time and expense.

Descriptions, management recommendations and [methods of control](#) are listed below.

Quick Access to Weeds

[Canada thistle](#) | [Musk thistle](#) | [Bull thistle](#) | [Scotch thistle](#)
[Dalmatian toadflax](#) | [Yellow toadflax](#) | [Diffuse knapweed](#) | [Spotted knapweed](#)
[Russian knapweed](#) | [Leafy spurge](#) | [Houndstongue](#) | [Common teasel](#) | [Tamarisk](#)
[Hoary alyssum](#) | [Hoary cress](#) | [Perennial pepperweed](#)

Canada thistle (*Cirsium arvense*)



Canada thistle flower

Canada thistle is a deep-rooted perennial that reproduces by seed or underground rootstalks. Seed can remain viable in soil for up to 20 years. Canada thistle originated in Eurasia, was introduced to the U.S. 300 years ago, and has become the most common weed problem in the Western United States.

The most effective herbicides for control of Canada thistle are Perspective,

Milestone, Curtail, Redeem, Transline, Tordon, and Telar. Fall applications, prior to a hard frost, are rated best for control but any of these listed herbicides applied in the spring or summer provides good control. Because of the extensive underground root system, Canada thistle is very resilient and eradication requires several seasons of management.



Canada thistle rosettes

Insect agents are available that feed on Canada thistle but have not been proven effective.



A small stand of Canada thistle

Canada thistle is palatable to livestock, and grazing can provide suppression through spring and summer.

Shallow tillage (disk, sweep) on a deep-rooted perennial can be counter-productive, creating a denser, more uniform stand. Deeper tillage such as moldboard plowing, if feasible, can provide 1-2 years control.

Mowing effectively suppresses Canada thistle, and in combination with a fall herbicide application provides best control. To read more about Canada thistle see the article "[Canada Thistle](#)."

▲ [Top](#)

Musk thistle (*Carduus nutans*)



A close-up of the musk thistle flower

Musk thistle is a tap-rooted biennial that reproduces only by seed. Plants typically germinate in late summer or early fall, over-winter as a rosette, bolt and flower in the spring or early summer, disperse seed in mid-summer. Seed longevity is variable but can last up to 10 years. Mature plants are 2-8 feet tall. Musk thistle is fairly common in Larimer County.

Since musk thistle reproduces only by seed, management methods should be applied prior to seed set.



Musk thistle rosettes

The most effective herbicides for control of musk thistle are Perspective, Milestone, Curtail, Redeem, Transline, Tordon, and Telar. Apply anytime from rosette stage to early flower. Applications after the early flower stage are not beneficial since the plant can produce viable seed while dying down.

A seed head weevil, *Rhinocyllus conicus*, released for control of musk thistle, is well dispersed throughout Colorado and further releases are unnecessary. The impact from this weevil has been cyclic, some years very effective, other years not. Other insect predators are available, but have only been marginally effective.

Because population levels are low in Larimer County, required management methods are those that result in eradication like herbicide application, digging or pulling. Grazing, mowing and insect biocontrol are not acceptable forms of treatment in Larimer County. When digging or hand pulling it is essential to dig up at least 3-4 inches of the tap-root to prevent re-growth.

▲ [Top](#)

Bull thistle (*Cirsium vulgare*)



Bull thistle flower

Bull thistle is a tap-rooted biennial that reproduces only by seed. Plants typically germinate in late summer or early fall, over-winter as a rosette, bolt and flower in the spring or early summer, disperse seed in mid-summer. Seed longevity is variable but can last up to 10 years. Mature plants are 1.5 - 6 feet tall. Bull thistle is not common in Larimer County but appears to be spreading.

Since bull thistle reproduces only by seed, management methods should be applied prior to seed set.



Bull thistle rosette

The most effective herbicides for control of bull thistle are Perspective, Milestone, Curtail, Redeem, Transline, Tordon, and Telar. Apply anytime from rosette stage to early flowering. Applications after the early flower stage are not beneficial since the plant can produce viable seed while dying down.

No effective insect biocontrol agents are available for bull thistle.

Because population levels are low in Larimer County, required management methods are those that result in eradication like herbicide application, digging or pulling. Grazing, mowing and insect biocontrol are not acceptable forms of treatment in Larimer County. When digging or hand pulling it is essential to dig up at least 3-4 inches of the tap-root to prevent re-growth.

▲ [Top](#)

Scotch thistle (*Onopordum acanthium*, *Onopordum tauricum*)

A mature Scotch thistle plant
breaking in the nut

Scotch thistle is a tap-rooted biennial that reproduces only by seed. Plants typically germinate in late summer or early fall, over-winter as a rosette, bolt and flower in the spring or early summer, disperse seed in mid-summer. Seed longevity is variable but can last up to 10 years. Mature plants are 2-10 feet tall and extremely thorny. Scotch thistle is not common in Larimer County but appears to be spreading. Because population levels are low in Larimer County, required management methods are those that result in eradication like herbicide application, digging or pulling. Grazing, mowing and insect biocontrol are not

A dense Scotch thistle stand showing
their height compared to a grown male

acceptable forms of treatment in Larimer County. When digging or hand pulling it is essential to dig up at least 3-4 inches of the tap-root to prevent re-growth.

The most effective herbicides for control of Scotch thistle are Perspective, Milestone, Curtail, Redeem, Transline, Tordon, and Telar. Apply anytime from rosette stage to early flowering. Applications after the early flower stage are not beneficial since the plant can produce viable seed while dying down.

No effective insect biocontrol agents are available for Scotch thistle.

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Hoary alyssum (*Berteroa incana*)



Hoary alyssum invades a field near Estes Park.

Hoary alyssum is an annual, biennial or short-lived perennial plant that grows to 2 feet tall and produces white flowers. This member of the mustard family is commonly found along roadsides and disturbed areas of range and pasture. Hoary alyssum is a common weed in the Estes Valley, Red Feather Lakes and Loveland areas of Larimer County and is toxic to horses.

The most effective herbicides for control of hoary alyssum are Escort and Telar.

No insect biocontrol agents are available for hoary alyssum.

Digging and hand pulling can provide effective control if persistent.

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Hoary cress (*Cardaria draba*) & Perennial pepperweed (*Lepidium latifolium*)

Hoary Cress and perennial pepperweed are perennial plants of the mustard family. These species are problem weeds in rangeland, pasture and roadsides. Perennial pepperweed is generally more common on moist sites. Hoary cress greens up and blooms quite early.

The most effective herbicides for controlling these perennial mustards are Escort, Perspective, Plateau/Panoramic, and Telar. Herbicide application needs to occur at flowering for most effective results. Mustard species are frequently



Photo taken in Utah demonstrates how important weed issues are. In this case the infestation is hoary cress.

referenced in the herbicide guide because of this plant family's unique tolerance to numerous herbicides used for managing noxious weeds.

No insect biocontrol agents are available for control of these species. Mustards are generally not palatable to livestock.



Perennial pepperweed

Hand pulling and digging are generally not effective for control of these perennial weeds unless persistent. Mowing can provide suppression and reduced seed production.

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Dalmatian toadflax (*Linaria dalmatica*, *Linaria genistifolia*)



Dalmatian toadflax flower

A member of the snapdragon family that was introduced to this country from Eurasia as an ornamental plant. Dalmatian toadflax is termed an 'escaped ornamental', a former garden species that has become an invasive weed problem in rangeland and natural areas.

Dalmatian toadflax is particularly abundant on the shallow, rocky soils along Colorado's front-range. This perennial plant reproduces from seed and vegetative root



Dalmatian toadflax spreading up and over a hill

buds. Seeds can remain viable in the soil for at least 10 years. Plants grow to 3 feet tall and produce yellow flowers throughout the summer.

The most effective herbicides for control of Dalmatian toadflax are Telar, Tordon and Plateau. Fall applications provide best control.

The most effective insect for suppression of Dalmatian toadflax is *Mecinus janthiniformis*, a stem-boring weevil (not effective on yellow toadflax). Other toadflax-feeding insects are available, though only marginally effective. For more detailed information on infestation size and density to warrant an insect release, and for obtaining insects go to [Colorado Biological Pest Control Program](#).

Mowing, hand pulling, or digging can reduce seed production and stress plants, but this perennial will readily grow back.

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Yellow toadflax (*Linaria vulgaris*)



Yellow toadflax flowers

Better known as butter-and-eggs, this close relative to Dalmatian toadflax has become a significant problem in mountain communities. Yellow toadflax is an escaped ornamental plant that is generally more common than Dalmatian toadflax at higher elevations and cooler temperatures.

This perennial plant reproduces from seed and vegetative root buds. Seeds can remain viable in the soil for at least 10 years. Plants grow 1-2 feet tall and produce yellow flowers



Once used as an ornamental, yellow toadflax is aesthetically pleasing but multiplies quickly and can crowd out native vegetation.

with an orange center. Prior to flowering, the narrow leaves and overall size of yellow toadflax is similar to leafy spurge.

If in doubt, remember yellow toadflax lacks the milky latex present on leafy spurge stems and leaves found upon breaking or tearing these plant parts.

The most effective herbicides for control of yellow toadflax are Telar, Tordon, a tank mix of Telar & Tordon, or a tank mix of Tordon & Overdrive.

There are no recommended insect biocontrol agents for control of yellow toadflax.

Mowing, hand pulling, or digging can reduce seed production and stress plants, but this perennial will readily grow back.

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Diffuse knapweed (*Centaurea diffusa*)



Diffuse knapweed is a biennial plant and sometimes a short-lived perennial that germinates in fall or early spring, over-winters as a rosette, and bolts and flowers in the summer. Flowers are typically white, sometimes pink, with spiny bracts beneath. After flowering, diffuse knapweed sets seed in late summer or fall, after which the plant breaks off at the base and becomes a tumbleweed spreading seed as far as the wind will carry the plant. Diffuse knapweed reproduces only by seed, and the seed can remain viable in the soil for 15 years.



A close-up of the diffuse knapweed flower

The most effective herbicides for controlling diffuse knapweed are Tordon, Transline, Curtail and Redeem. Milestone is

effective for controlling plants at the rosette stage.

Numerous insects are available for biological control of diffuse knapweed and can provide fair to good results. The most effective have been a seed head weevil *Larinus minutus* and root weevils *Cyphactonus achates* and *Sphenoptera jugoslavica*. For more detailed information on infestation size and density to warrant an insect release, and for obtaining insects go to [Colorado Biological Pest Control Program](#).



Diffuse knapweed rosettes

Mowing and grazing can suppress populations, but plants will still flower and set seed from a reduced height. Hand pulling and digging, when feasible, is very effective. If hand pulling or digging plants that have flowered, be sure to bag and dispose the plants to prevent seed dispersal.

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Spotted knapweed (*Centaurea maculosa*)



A close-up of the spotted knapweed flower

Spotted knapweed is a short-lived perennial plant that reproduces only by seed. Plants grow to 3 feet tall and produce pink to purplish flowers with prominent black spots on the bracts beneath. Spotted knapweed is closely related to diffuse knapweed but is more prevalent at higher elevations. This noxious weed is not common in Larimer County but has the potential to thrive here much as it has in other western states and Canadian provinces. Montana alone reports infestations covering an estimated 5 million acres.

Because spotted knapweed is highly invasive and population levels are currently low in Larimer County, required management methods are those

that can result in eradication. Insect biocontrol, mowing, and grazing are not acceptable forms of management. Required methods are herbicide application, digging or hand pulling.



Spotted knapweed

The most effective herbicides for controlling spotted knapweed are Tordon, Transline, Curtail and Redeem. Milestone is effective for controlling plants at the rosette stage.

Spotted knapweed reproduces only by seed, so mechanical control methods should be conducted prior to seed production. Hand pulling and digging are effective if the top 2-4 inches of the tap-root is removed. If hand pulling or digging plants that have flowered, be sure to bag and dispose the plants to prevent seed dispersal.

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Russian knapweed (*Acroptilon repens*)



Russian knapweed flowers

Russian knapweed is a perennial that reproduces from seed and vegetative root buds. Russian knapweed grows to 3 feet tall and produces pink to lavender flowers with papery bracts beneath.

Seed remains viable in the soil for 3 years. Russian knapweed eliminates competing vegetation by exuding an allelopathic

chemical that inhibits growth of other plants and can result in solid stands. This noxious weed is toxic to horses and unpalatable to other livestock.

The most effective herbicides for controlling Russian knapweed are Tordon, Transline, Milestone, Curtail, Redeem, Telar, and Plateau.

There are currently no insect biocontrol agents available for control of Russian knapweed.

Mowing can reduce seed production and stress the plants, and combined with an herbicide application in the fall, provides excellent control.

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Leafy spurge (*Euphorbia esula*)



A close-up of leafy spurge flowers

Leafy spurge is a deep-rooted perennial that reproduces by rootstalks and seed. Leafy spurge emerges in early spring, flowers in April/May. Plants grow to 3 feet tall with yellow-green flowers that, when mature, can propel seeds 15 feet. Seeds can remain viable for 8 years. The entire plant contains a milky latex that can be toxic to livestock and irritating to humans. Leafy spurge is the most difficult-to-control weed in Larimer County.

Paramount,
tank mixed
with
Overdrive

provides effective control of leafy spurge without injuring grass or trees. Other effective herbicides for control of leafy spurge are Perspective, Tordon, Tordon/2,4-D, dicamba,



Russian knapweed plants
beginning to take over this field.

and Plateau (fall applied). Tordon, Perspective and Plateau can be very effective, but the higher application rates necessary for good control can cause injury to grasses or trees.

Several species of flea beetle (*Aphona spp.*) can be effective in significantly reducing stands of leafy spurge. Results are often site-specific, varying according to soil type, moisture conditions, and other factors. Leafy spurge is not palatable to horses or cattle and the latex in the plant can cause mouth blistering. Sheep and goats are immune to the blistering and can be trained to browse leafy spurge and provide suppression through the growing season.



Leafy spurge spreading as far as the eye can see...

Flea beetles feed on the leaves of leafy spurge in the summer, but most plant damage occurs after the insects have laid eggs and the resulting larvae are underground feeding on the roots. Mowing, grazing, and herbicide application are only compatible with insect bio-control if these management efforts occur in the late summer or fall after the insects have laid their eggs and newly hatched larvae are underground.

Mowing and grazing are effective tools for depleting root reserves. Hand pulling or digging can reduce seed production and stress plants, but this perennial will readily grow back. For more on leafy spurge see the article "[Leafy Spurge - A Perennial Problem.](#)"

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Houndstongue (*Cynoglossum officinale*)



A mature houndstongue plant.

Houndstongue is a tap-rooted biennial that reproduces by seed only. Houndstongue germinates in summer/fall, over-winters as a rosette, bolts and flowers in spring/summer, sets seed in the fall. Plants grow to 4 feet tall with reddish-purple flowers. The velcro-like seeds are a nuisance, attaching tightly to clothing and animals. Houndstongue contains alkaloid compounds that are toxic to livestock.

The most effective herbicides for controlling houndstongue are dicamba, Escort, Telar, 2,4-D, Plateau, and Tordon.

No insect biocontrol agents are



Houndstongue seeds ready to stick to anything that passes by.

currently available in Colorado.

Digging or hand pulling houndstongue is effective if before seed set. Flowering plants should be bagged and disposed. Be sure to remove the top 2-3 inches of tap-root to prevent re-growth. For more information about houndstongue see the article "[Houndstongue.](#)"

▲ [Top](#)**Common teasel (*Dipsacus fullonum*)**

Common teasel flowers

Common teasel is a tap-rooted biennial that reproduces only by seed. Plants typically germinate in late summer or early fall, over-winter as a rosette, bolt and flower in the spring or early summer. Common teasel thrives on moist sites and can dominate wetlands. Though not yet common in Larimer County, common teasel is a significant weed problem on riparian areas of Boulder and Jefferson Counties.

Numerous herbicides are available that effectively control teasel: Milestone, Curtail, Redeem, 2,4-D, dicamba, Escort, Telar, Plateau, Tordon, and Transline. Check label restrictions for applications near water.

No insect biocontrol agents are currently available for control of common teasel.

Mowing can reduce seed production but plants generally re-flower and set seed from a reduced height. Hand pulling or digging is very effective prior to seed set.

▲ [Top](#)**Tamarisk or saltcedar (*Tamarix ramosissima*)**

A tamarisk flower

Tamarisk is a deciduous shrub or small tree introduced into this country for erosion control, windbreaks and as an ornamental. Tamarisk is a phreatophyte, (see the article "What the Heck is a Phreatophyte?") or moisture dependent plant that is invasive in riparian areas. This noxious species eliminates competition by exuding salts and creating a saline soil unfavorable to other vegetation. Tamarisk reproduces by seed, and is a prolific seed producer, but seed longevity is just a few months.

Due to this plants proximity to water, appropriate herbicide choices are limited to those that have an aquatic label or can be

applied to water's edge. Arsenal is the most commonly used herbicide for foliar application, if overspray has potential to go into water use Habitat - same active ingredient with an aquatic label. Larger trees can be controlled by cut-stump treatments - cutting the tree at the base and applying an herbicide over the stump to prevent re-growth. Garlon or Habitat are frequently used for stump application.



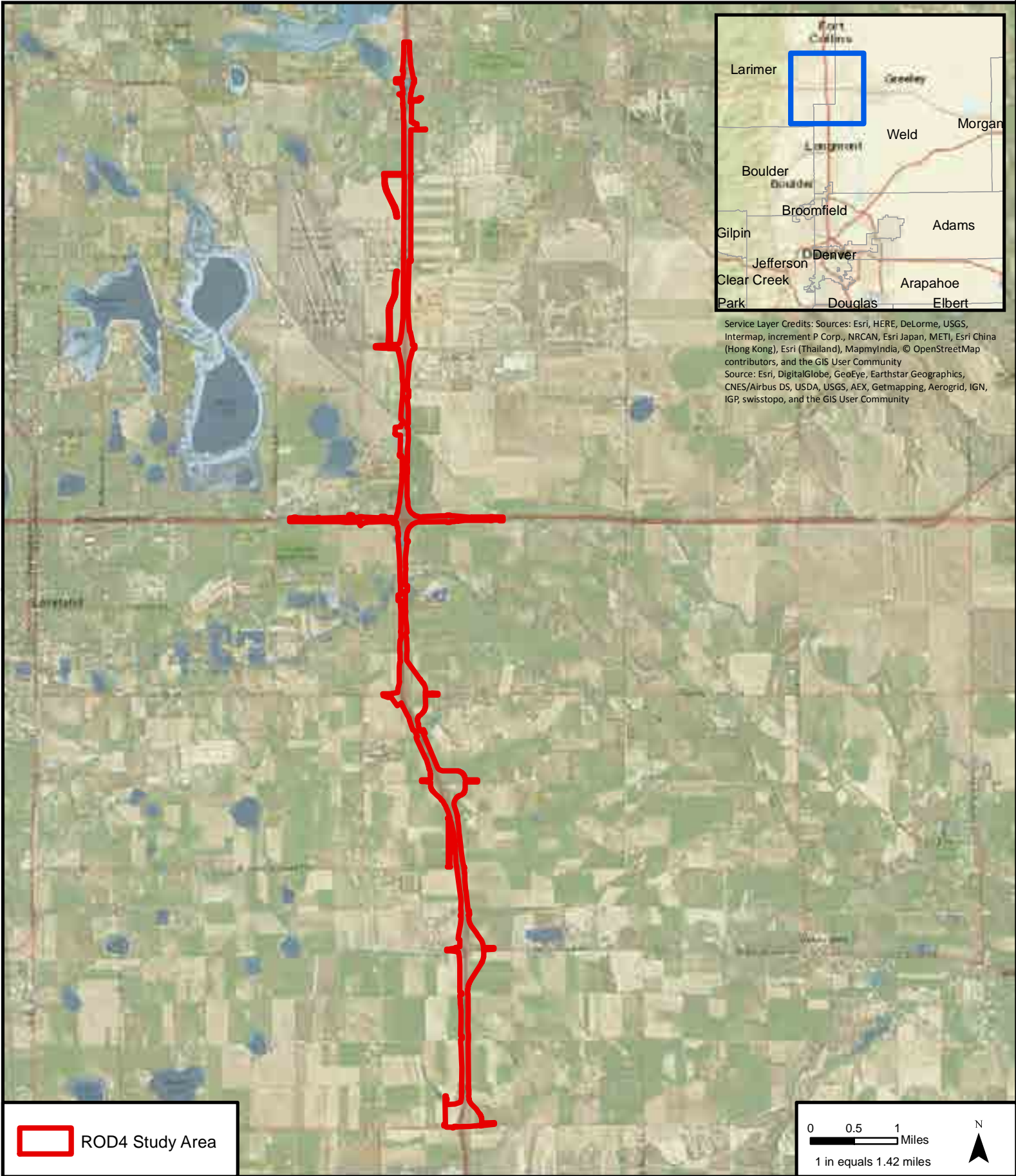
Tamarisk along a local reservoir

A leaf-feeding beetle, *Diorhabda elongata*, was released in Colorado in 2005, with promising results. Diorhabda beetles have significantly impacted the dense infestations of tamarisk in western Colorado and Utah. In Larimer County tamarisk is found in scattered stands near reservoirs and ditches, in densities too small to support diorhabda beetle life cycle and movement, making releases in this area impractical. Insect biocontrol is not an appropriate tool for tamarisk management when infestation levels are low enough that eradication is possible by other means.


Mechanical treatments such as cutting, bulldozing, and fire are only temporarily effective. Sprouting is a problem and an herbicide application is necessary to prevent subsequent re-growth.

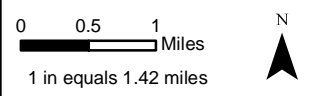
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APPENDIX B FIGURES




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 ROD4 Study Area

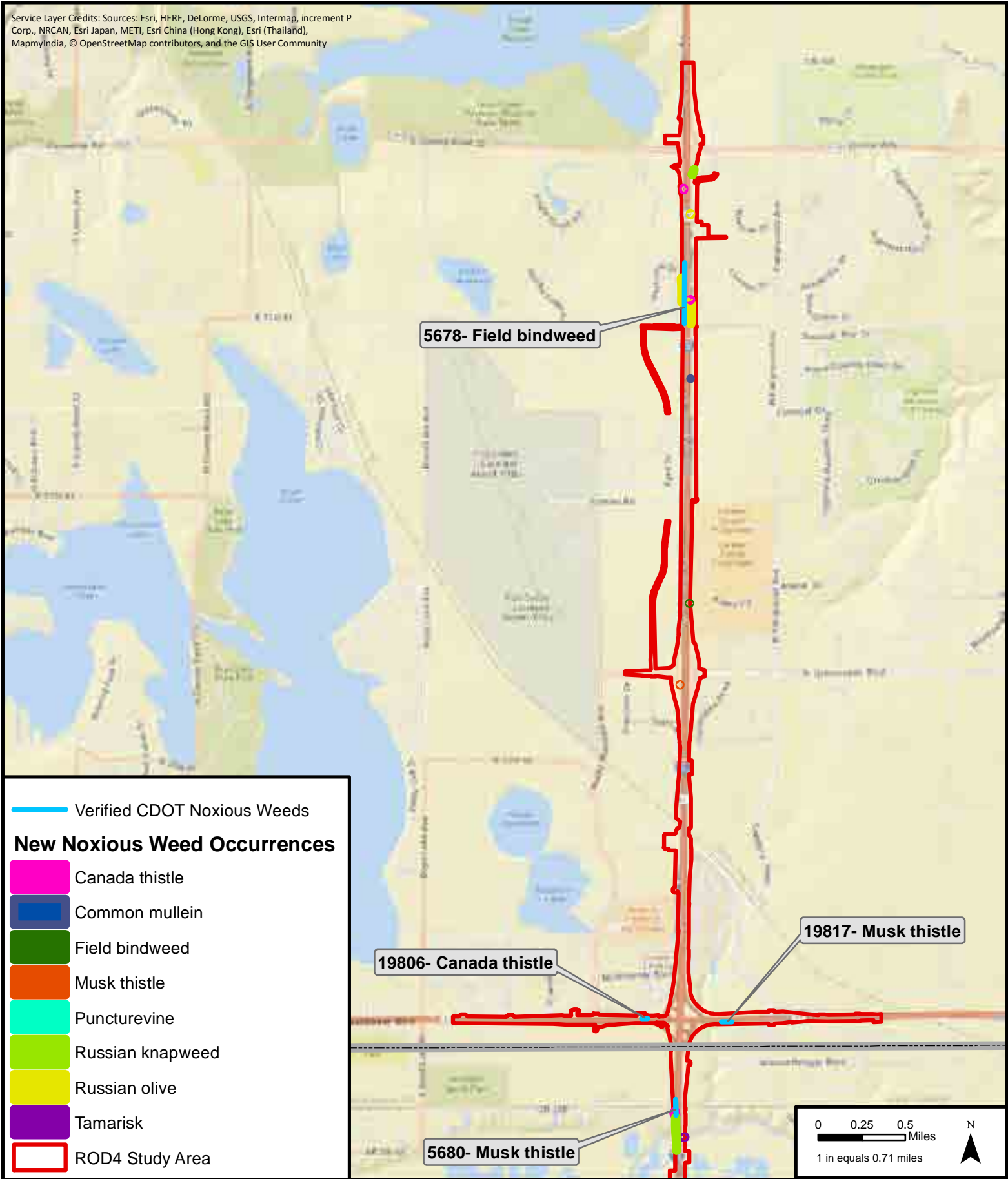


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Prepared For: 

Project Location Map
 North I-25 Record of Decision 4
 LARIMER AND WELD COUNTIES, CO

Dwn By:	HD	FIGURE 1
Ckd By:	MG	
Date:	12/28/2016	
Project No.:	100051572	



— Verified CDOT Noxious Weeds

New Noxious Weed Occurrences

- Canada thistle
- Common mullein
- Field bindweed
- Musk thistle
- Puncturevine
- Russian knapweed
- Russian olive
- Tamarisk
- ROD4 Study Area

0 0.25 0.5 Miles

1 in equals 0.71 miles

N

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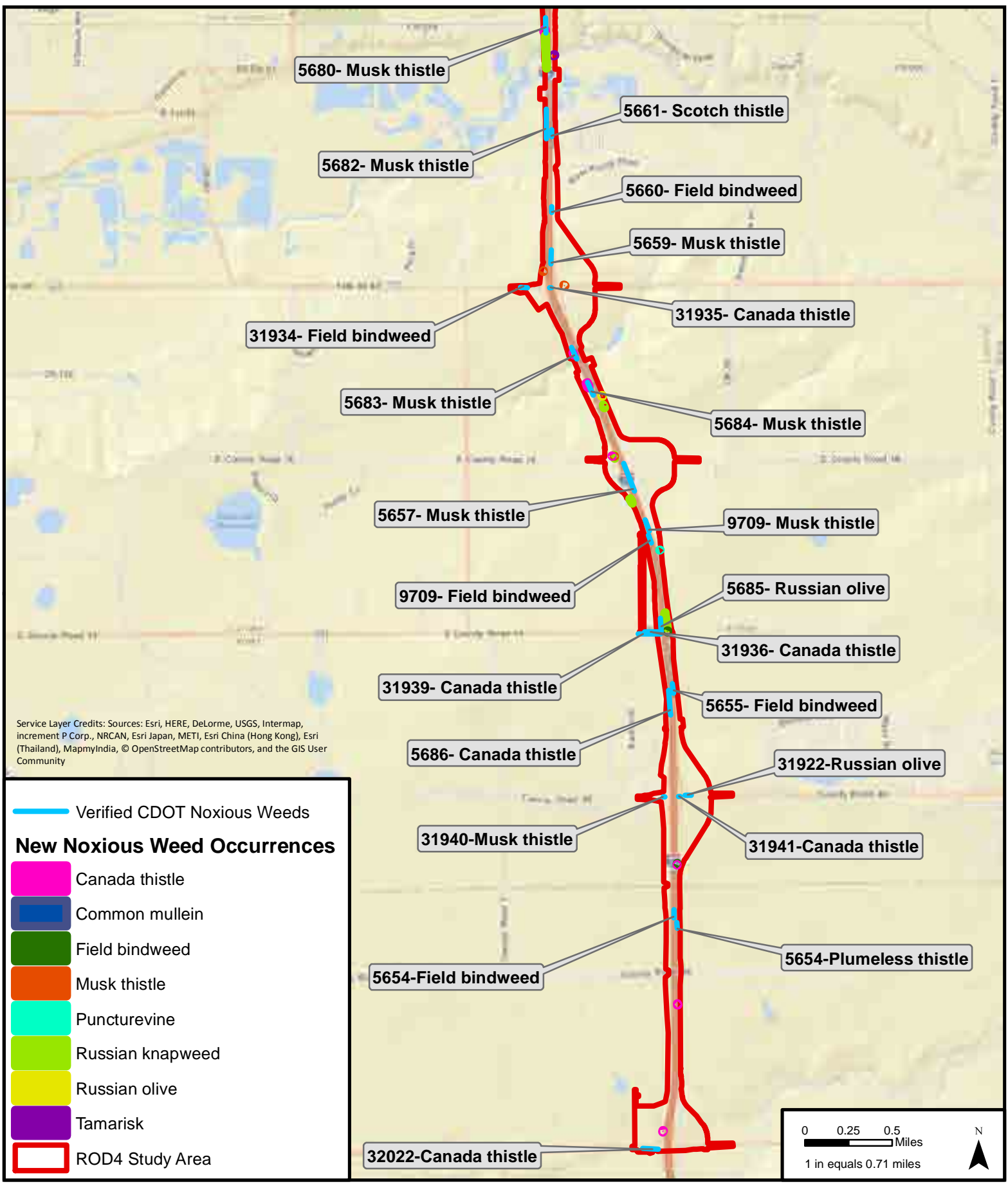
Prepared For:

Noxious Weed Map- North

North I-25 Record of Decision 4

LARIMER AND WELD COUNTIES, CO

Dwn By:	HD	FIGURE 2a
Ckd By:	MG	
Date:	12/28/2016	
Project No.:	100051572	



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Prepared For:

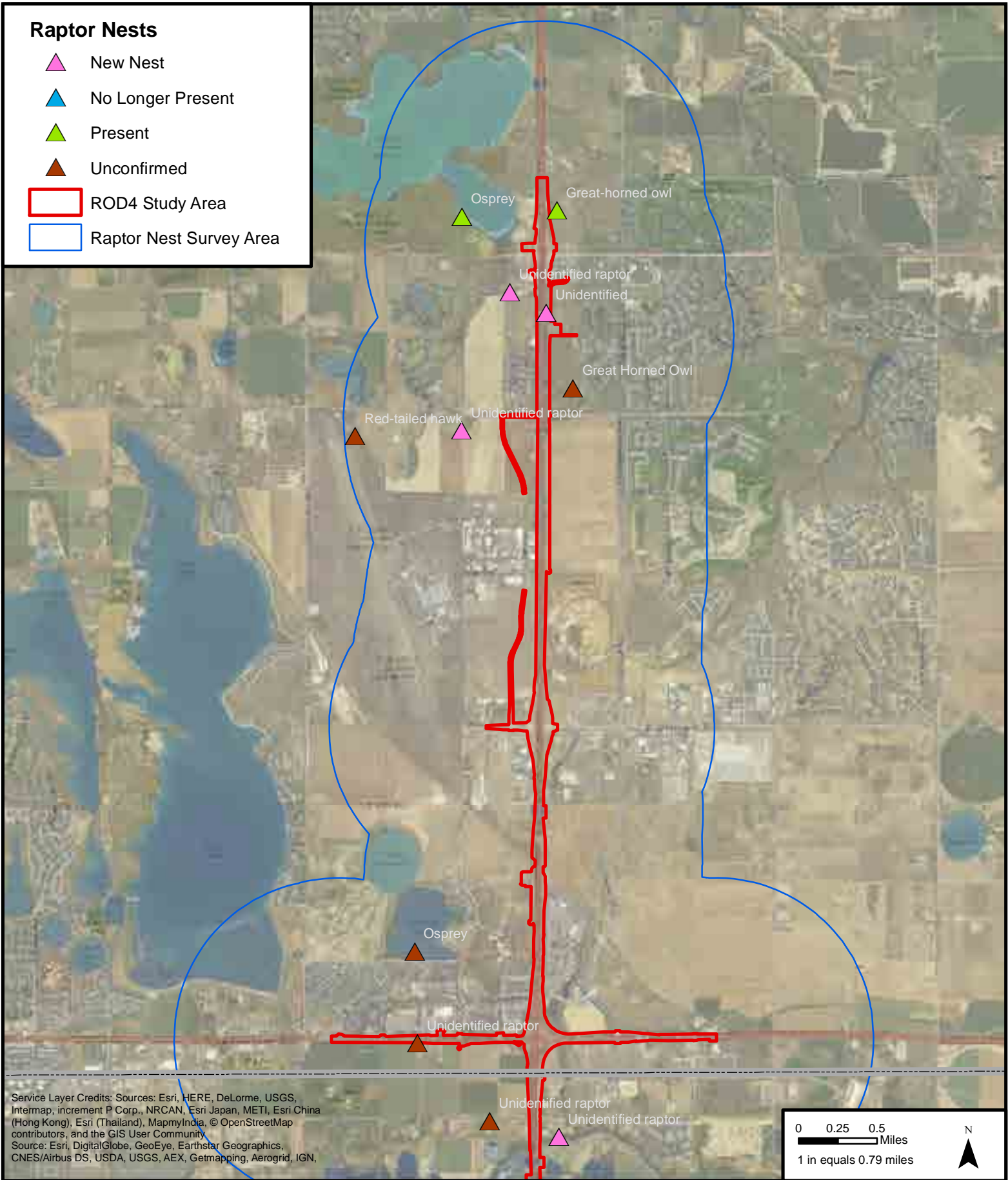
Noxious Weed Map- South

North I-25 Record of Decision 4
LARIMER AND WELD COUNTIES, CO

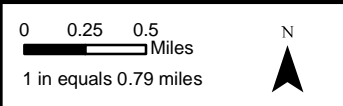
Dwn By:	HD	FIGURE 2b
Ckd By:	MG	
Date:	12/28/2016	
Project No.:	100051572	

Raptor Nests

- ▲ New Nest
- ▲ No Longer Present
- ▲ Present
- ▲ Unconfirmed
- ROD4 Study Area
- Raptor Nest Survey Area



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Prepared For: 

Raptor Nest Map- North

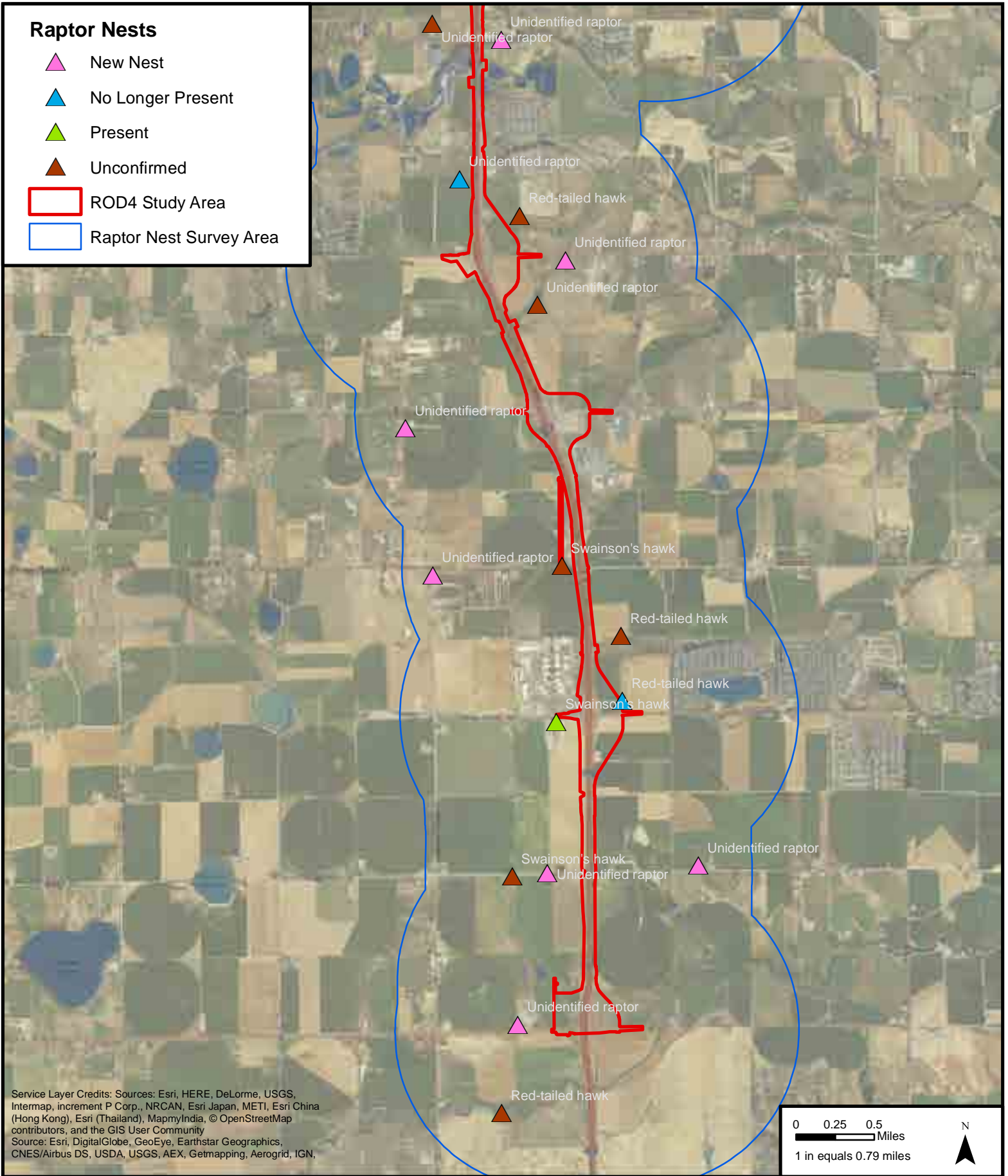
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LARIMER AND WELD COUNTIES, CO

Dwn By:	HD	FIGURE 3a
Ckd By:	MG	
Date:	12/28/2016	
Project No.:	100051572	

Raptor Nests

- ▲ New Nest
- ▲ No Longer Present
- ▲ Present
- ▲ Unconfirmed
- ROD4 Study Area
- Raptor Nest Survey Area



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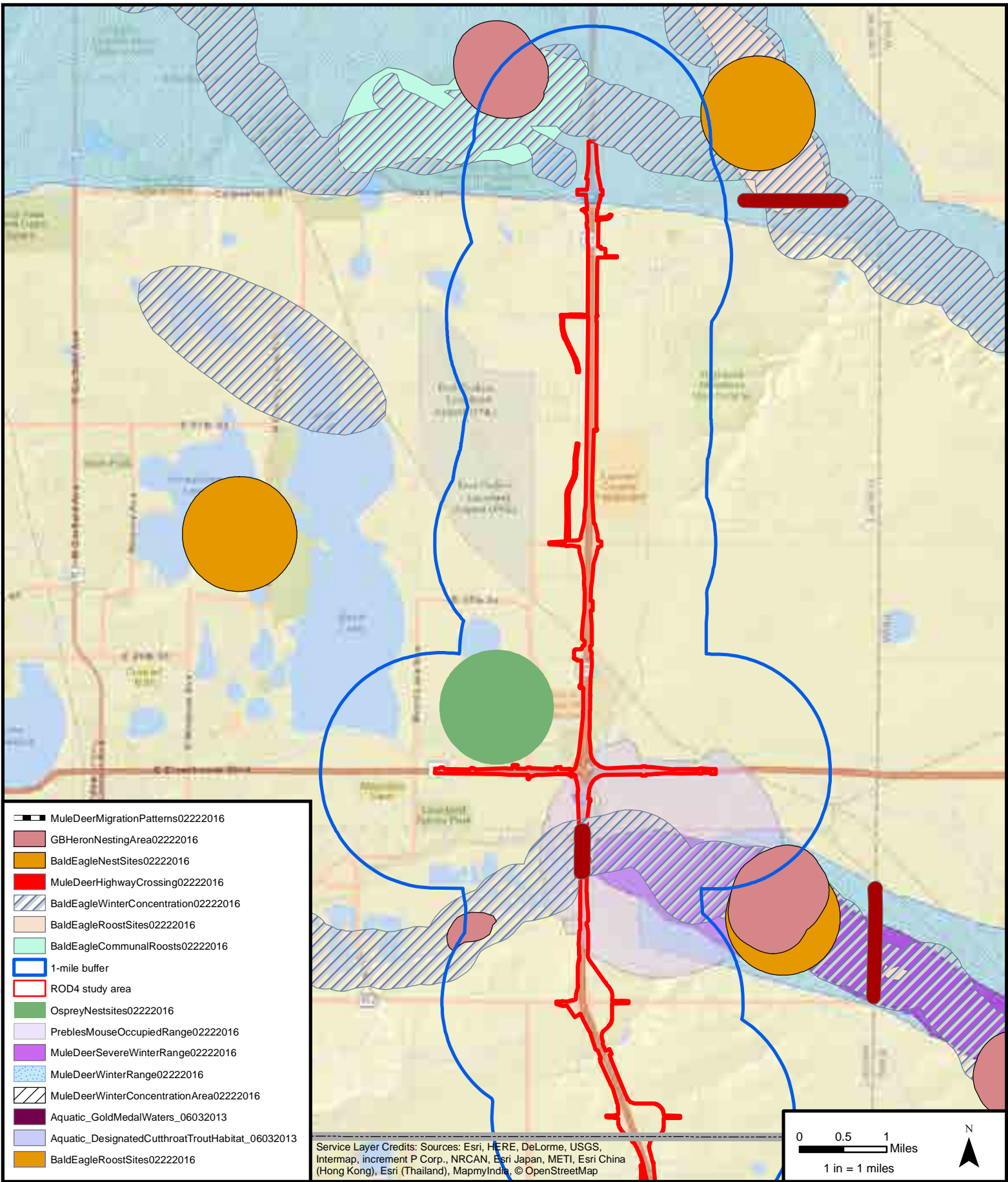
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Raptor Nest Map- South

North I-25 Record of Decision 4

LARIMER AND WELD COUNTIES, CO

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Sensitive Wildlife Habitat Map- North

North I-25 Record of Decision 4

LARIMER AND WELD COUNTIES, CO

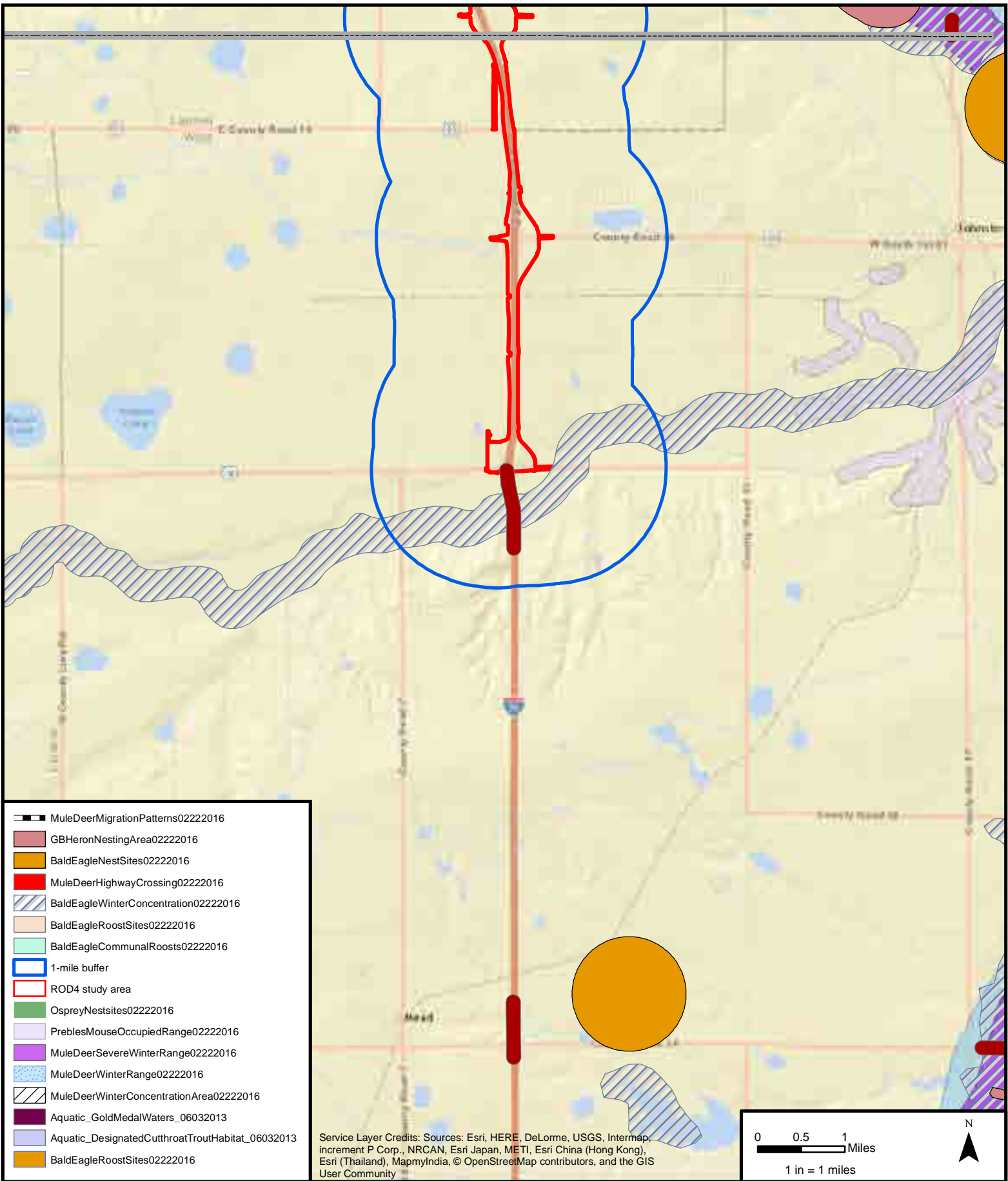
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FIGURE

4a

ATKINS





Sensitive Wildlife Habitat Map- South

North I-25 Record of Decision 4

LARIMER AND WELD COUNTIES, CO

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FIGURE



4b

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 ROD4 Study Area
 Prairie Dog Colonies

0 0.25 0.5 Miles
 1 in equals 0.71 miles

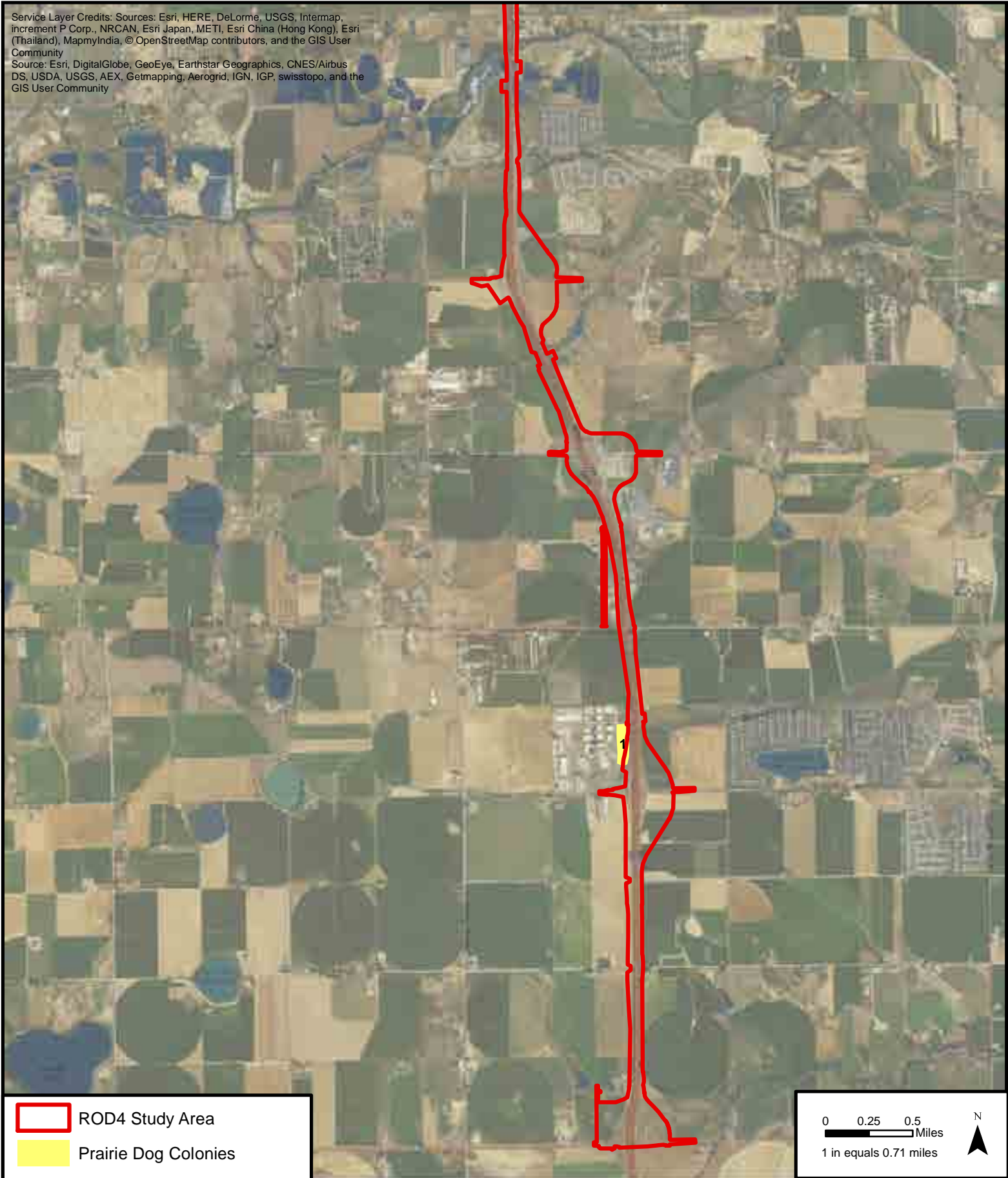


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Prairie Dog Map- North
North I-25 Record of Decision 4
 LARIMER AND WELD COUNTIES, CO

Dwn By:	HD	FIGURE 5a
Ckd By:	MG	
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Prepared For:



Prairie Dog Map- South
North I-25 Record of Decision 4
 LARIMER AND WELD COUNTIES, CO

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