

Elk Valley Invasive Plant Management Year 4

Project Number: COL-F24-W-3853



FWCP
Fish & Wildlife
COMPENSATION PROGRAM

Prepared with financial support of the Fish and Wildlife Compensation Program on behalf of its program partners: BC Hydro, the Province of BC, Fisheries and Oceans Canada, First Nations, and Public Stakeholders. Additional funding partners include the Habitat Conservation Trust Foundation, The Nature Trust of BC, Ministry of Forests, Ministry of Transportation and Infrastructure, Wild Sheep Society of BC, BC Backcountry Hunters & Anglers, Elkford Rod & Gun Club, Sparwood Fish & Wildlife Society, and the Grassland Rangeland Enhancement Program.

Prepared for:
Fish and Wildlife Compensation Program
333 Dunsmuir Street, Vancouver, BC
V6B 5R3

Prepared by:
East Kootenay Invasive Species Council
1902 Theatre Road, Cranbrook, BC
V1C 7G1

March 29, 2024.



Executive Summary

The Elk Valley is rich in biodiversity and provides habitat for Rocky Mountain bighorn sheep, a blue-listed species in British Columbia. The upper Elk Valley is known to provide high quality winter range habitat, with several herds occupying the east and west sides of the valley. Ewin Ridge, located in the Elk Valley, has been considered the most important bighorn sheep winter range in British Columbia. In addition to providing high value habitat for wildlife, the upper Elk Valley is valued for industrial activities, specifically mining and forestry, as well as recreation. Although these activities play an important role both culturally and economically in the Elk Valley, they can have negative impacts on the landscape. On the east side of the upper Elk Valley, preferred winter range habitat declined by 30% between 1980 and 2000 because of industrial activity and associated habitat degradation.

Of growing concern is the introduction and spread of invasive plant species into areas of high habitat value. Invasive species are a significant threat to biodiversity and ecological integrity across British Columbia and globally. Invasive plants can grow rapidly and reproduce quickly allowing them to out-compete native species for resources, potentially resulting in deleterious impacts on entire ecosystems. Increased industrial activity and backcountry recreation in the Elk Valley has resulted in the introduction and spread of invasive species into previously uninfected areas. Invasive species have already been documented in high elevation grasslands, which are critical for bighorn sheep overwintering habitat.

To address the risk of invasive species in the Elk Valley, land managers and user groups came together to develop a multi-partner invasive plant management plan for the area. In 2020, implementation of the Elk Valley Invasive Plant Management Project began, administered by the East Kootenay Invasive Species Council. The project has been monetarily supported the Fish & Wildlife Compensation Program, Habitat Conservation Trust Foundation, Columbia Basin Trust, Ministry of Forests, Ministry of Transportation and Infrastructure, Nature Trust of BC, Wild Sheep Society of BC, BC Backcountry Hunters & Anglers, Elkford Rod & Gun Club, Sparwood Fish & Wildlife Society, Ministry of Environment, Canfor Forest Products, and the Grassland Rangeland Enhancement Program. Other groups were also engaged, including Ktunaxa Nation Council, City of Elkford, Elkford Snowmobile Association, and Teck Resources Ltd.

In Year 1 of the Elk Valley project, invasive plant inventories were completed on approximately 330 km of roadways and trails, collecting 342 inventory points. Treatments took place along approximately 52 km of rights-of-ways, focusing on high-value habitat and access management areas. Ten vegetation monitoring plots were established, along with ten photo monitoring locations. EKISC was able to connect and engage with new local partners, delivered an Elk Valley specific invasive plant ID and workshop, and collected information on where area users think invasive plant signage will make positive impacts on prevention and awareness.

In Year 2, 425 treatments covering approximately 320 km of FSRs, recreation trails, and roads scheduled for deactivation were completed. Forty-seven new invasive plant inventory points were collected. Data was collected at the established monitoring plots and an additional three plots were installed. Treatment monitoring occurred at a minimum of 10% of sites. New seeding trials in densely infested areas were implemented. EKISC engaged with all partners throughout the project term and delivered an education workshop specific to the Elk Valley. Four invasive species education signs were designed for installation in 2022.



In Year 3 of the project, treatments were completed at 199 sites covering 165 km of road and trail networks, totalling 59.72 ha of treated area. Inventory was completed on the Boivin Creek Trail. Data from thirteen vegetation plots was collected, as well as from four grass seeding trial plots. Thirteen photo plots were visited to document landscape level changes. In addition, 75 kg of a restoration grass mix was distributed in bare ground areas with a higher likelihood of invasive plant infestations. Twenty-five kg of seed was used at the Big Ranch Complex and 50 kg was used in the Chauncey-Todhunter Access Management Area. Educational signs were printed and distributed to project partners for installation at various location in the Elk Valley. Education and outreach continued in Year 3 with a variety of activities including a school weed pull, local farmer's markets, and social media and e-newsletters releases.

In year 4 a total of 206 sites were treated covering 53.98 Ha and 151.9 km of roads. Access to some areas was difficult in 2023 due to wildfire related closures in the northern section of the project area. Data from 11 vegetation plots was collected and photo monitoring was completed. Restoration grass seed was once again applied to outcompete invasive plants reemerging at treated sites and prevent invasive plants from establishing in new areas. Twenty-five Kg of a restoration seed blend was applied to disturbed and treated areas in the Chauncey-Todhunter Access Management Area. Education and outreach diversified from mainly in person events in previous years to the development of online content. A YouTube video was made to showcase the project as well as project highlights in newsletters and social media. Farmers markets in Elkford and Sparwood were also attended.

Landscape-level invasive plant management has taken place in the Upper Elk Valley since 2020. The first four years of the project have focused on partnership engagement, invasive plant inventories, and large-scale treatments. The goal of this project is to work collaboratively with stakeholder groups to prevent invasive plants from spreading into high-value bighorn sheep habitat and support the retention of ecological function in the Upper Elk Valley.

The project aligns with the FWCP-identified Habitat-based priority actions and intended outcomes in the Columbia Upland and Dryland Action Plan under Prevention and Control of Invasive Species: COLUPD.ECO.HB.11.01 Prevention and control of invasive species-P1. Under this priority action, this project will contribute to the prevention and control of high priority terrestrial invasive species that have the potential to negatively impact FWCP project investments on, or adjacent to, conservation properties and FWCP restoration sites. The projects Goals and Objectives will improve the understanding of the distribution of invasive species in the Columbia Region with an increased ability to respond quickly to new invasive infestations. Activities to be completed will be in collaboration with the Province of BC and regional invasive species councils and societies as appropriate.



Table of Contents

Executive Summary.....	2
List of Figures	5
List of Tables	6
Introduction	7
Goals and Objectives.....	8
Study Area.....	8
Methods.....	9
Invasive Plant Inventory.....	10
Invasive Plant Treatment	10
Grass Seeding	11
Invasive Plant Monitoring	11
Treatment Efficacy Monitoring	11
Vegetation Plot Monitoring.....	11
Photo Plot Monitoring.....	12
Results and Outcomes	13
Invasive Plant Treatment.....	13
NTBC Big Ranch Conservation Property	16
Chauncey Todhunter Access Management Area	18
Elk River, Round Prairie, and other Forest Service Roads	20
Fording River Road	22
Grass Seeding	22
Treatment Efficacy Monitoring	24
Vegetation Plot Monitoring	24
Photo Monitoring Plots.....	26
Outreach and Community Engagement.....	29
Discussion.....	30
Invasive plant treatment.....	30
Grass seeding	30
Vegetation Plot Monitoring	31
Photo Monitoring Plots.....	32
Program Recommendations	34



Outreach and Community Engagement.....	34
Acknowledgements.....	35
References	36
Appendix A: Priority Species List for the Upper Elk Valley 2023	38
Appendix B: Photo plot comparison demonstrating a decrease in yellow hawkweed in the Elk Valley project area.	39
Appendix C: Elk Valley boot brush sign on the Big Ranch conservation prope.....	40

List of Figures

Figure 1. Upper Elk Valley Invasive Plant Management Plan Project Area.	9
Figure 2. Diagram of a vegetation monitoring plot established at all monitoring locations in the Upper Elk Valley project area.	12
Figure 4. Invasive plant treatments that occurred in the Elk Valley Project Area in 2023.....	14
Figure 5. Invasive plant treatments and survey records on the Nature Trust of British Columbia's Big Ranch Conservation Property in 2023.	17
Figure 6. Invasive plant treatments that occurred in the Chauncey Todhunter Access Management Area in 2023.	19
Figure 7. Chemical invasive plant treatments that occurred on the Elk Valley and Round Prairie roads and associated spur roads in 2023.	21
Figure 8. Seeding locations and treatment sites in the Chauncey Todhunter Access Management Area in 2023.....	23
Figure 9. Treatment sites on NTBC's Big Ranch Conservation Property in 2023... Error! Bookmark not defined.	
Figure 10. Permanent monitoring plots and photo monitoring locations within the Upper Elk Valley project area.	25
Figure 11. Treated caraway infestation in 2021 showing significant decrease in invasive plant density and distribution in 2022..... Error! Bookmark not defined.	
Figure 12. Treated yellow hawkweed infestation in 2021 showing significant decrease in invasive plant density and distribution in 2022..... Error! Bookmark not defined.	
Figure 13. Treated blueweed infestation in 2021 showing significant decrease in invasive plant density and distribution in 2022..... Error! Bookmark not defined.	
Figure 14. Total mean invasive species percent cover at monitoring plots in the Elk Valley, collected in 2020, 2021, 2022, and 2023.....	32
Figure 15. Treated yellow hawkweed infestation in 2021 and 2022.	33



List of Tables

Table 1. Invasive plant treatments that occurred in the Upper Elk Valley project area, in 2023.	15
Table 2. Mechanical treatments that took place in the Elk Valley project area in 2023.....	16
Table 3. Mean percent cover of invasive species, species type, and organic and inorganic material at monitoring plots in the Elk Valley, collected in 2023. Note that only native and non-invasive species (e.g., Dandelion and clover) were included in percent cover for Grass spp, Forb spp, and Shrub spp.....	24
Table 4. Treated invasive species site comparison between 2020, 2021, 2022, and 2023	30



Introduction

The Elk Valley is rich in biodiversity and provides habitat for seven ungulate species and seven large carnivore species (Poole et al., 2018; Chow et al., 2018). Of the ungulate species, Rocky Mountain bighorn sheep (*Ovis canadensis*), hold a particular significance in this area due to their high harvest and cultural value (Poole et al., 2018). Due to habitat loss and degradation, they are now a blue-listed species in British Columbia. The upper Elk Valley is known to provide high quality winter range habitat, with several sheep herds occupying the east and west sides of the valley (Poole et al., 2013). Ewin Ridge, located in the Elk Valley, has been considered the most important bighorn sheep winter range in British Columbia (Demarchi, 1968).

In addition to providing high value habitat for wildlife, the upper Elk Valley is valued for industrial activities, specifically mining and forestry, as well as recreation. Although these activities play an important role both culturally and economically in the Elk Valley, they can have negative impacts on the landscape. On the east side of the upper Elk Valley, preferred winter range habitat declined by 30% between 1980 and 2000 because of industrial activity and associated habitat degradation (Poole et al., 2018). Wildlife biologists are concerned about the impacts on bighorn sheep and other wildlife species if further habitat is lost (Irene Teske, personal communication, Oct 15, 2019). Of growing concern is the introduction and spread of invasive plant species into areas of high habitat value (Poole & Ayotte, 2021).

Invasive species are a significant threat to biodiversity and ecological integrity across British Columbia and globally (Invasive species council of BC, 2018; Duenas et al, 2020). Invasive plants can grow rapidly and reproduce quickly allowing them to out-compete native species for resources, potentially resulting in deleterious impacts on entire ecosystems (Invasive Species Council of BC, 2018). Increased industrial activity and backcountry recreation in the Elk Valley has resulted in the introduction and spread of invasive species into previously uninfected areas. Invasive species have already been documented in high elevation grasslands, which are critical for Bighorn sheep overwintering habitat (Irene Teske, personal communication, March 30, 2022).

To address the risk of invasive species in the Elk Valley, land managers and user groups came together to develop a multi-partner invasive plant management plan (IPMP) for the area. In 2020, implementation of the Elk Valley Invasive Plant Management Project began, administered by the East Kootenay Invasive Species Council (EKISC). The project has been monetarily supported the Fish & Wildlife Compensation Program (FWCP), Habitat Conservation Trust Foundation (HCTF), Columbia Basin Trust (CBT), Ministry of Forests (MOF), Ministry of Transportation and Infrastructure (MOTI), Nature Trust of BC (NTBC), Wild Sheep Society of BC, BC Backcountry Hunters & Anglers, Elkford Rod & Gun Club, Sparwood Fish & Wildlife Society, Ministry of Environment (BC Parks), Canfor Forest Products, and the Grassland Rangeland Enhancement Program. Other groups were also engaged, including Ktunaxa Nation Council, City of Elkford, Elkford Snowmobile Association, and Teck Resources Ltd.

Landscape-level invasive plant management has taken place in the Upper Elk Valley since 2020. The first three years of the project have focused on partnership engagement, invasive plant inventories, and large-scale treatments. The goal of this project is to work collaboratively with stakeholder groups to prevent invasive plants from spreading into high-value bighorn sheep habitat and support the retention of ecological function in the Upper Elk Valley. The Elk Valley project aligns with FWCP-identified habitat-based priority actions and intended outcomes in the Columbia Upland and Dryland Action Plan. In Columbia Upland and Dryland habitats, this project aims to protect conservation lands and FWCP investment sites against the establishment and spread of invasive species, improve understanding of



invasive species distribution, and allow early detection and rapid response to new invasive plant infestations. This report discusses the results from Year 4 of the Elk Valley Invasive Plant Management Project.

Goals and Objectives

Project Goals and Objectives align with the FWCP-identified Habitat-based priority actions and intended outcomes in the Columbia Upland and Dryland Action Plan under Prevention and Control of Invasive Species: COLUPD.ECO.HB.11.01 Prevention and control of invasive species-P1. Under this priority action, this project will contribute to the prevention and control of high priority terrestrial invasive species that have the potential to negatively impact FWCP project investments on, or adjacent to, conservation properties and FWCP restoration sites. The projects Goals and Objectives will improve the understanding of the distribution of invasive species in the Columbia Region with an increased ability to respond quickly to new invasive infestations. Activities to be completed will be in collaboration with the Province of B.C. and regional invasive species councils and societies as appropriate.

Specific goals for Year 4 of the project were as follows:

1. Update the comprehensive multi-stakeholder IPMP based on information acquired during the previous year of the project, develop an annual work plan with stakeholders, and implement Year 4 of the IPMP.
2. Decrease the presence of invasive species and retain ecosystem health and biodiversity within priority areas through various treatment methods, and public outreach and education.
3. Prevent further spread and establishment of invasive plants in the upper Elk Valley.
4. Monitor effectiveness of treatment within the project area by revisiting permanent monitoring plots and completing treatment monitoring and evaluation.
5. Build community stewardship through connecting land managers and user groups with shared values.

Goals and Objectives will be achieved through strategic information acquisition (inventory), habitat-based actions (invasive plant treatments), and monitoring and evaluation.

Study Area

The project area is within the FWCP Columbia Subregion within the Regional District of East Kootenay (RDEK), extending from the Alberta border (northern and eastern boundaries) south past Elkford, BC to Airport Road (Figure 1). EKISC has divided the RDEK into five Invasive Plant Management Areas (IPMAs), and the Project area is located within EKISC's IPMA 02: Elk Valley North. The project area is largely comprised of public land, including BC Parks, MOF (includes Access Management Areas, tenured areas by guide-outfitters, and Canfor Forest Products), and MOTI rights-of-ways. There are tracks of private land within the project area, specifically Teck Resource Ltd., NTBC conservation land, and CanWel Fibre.

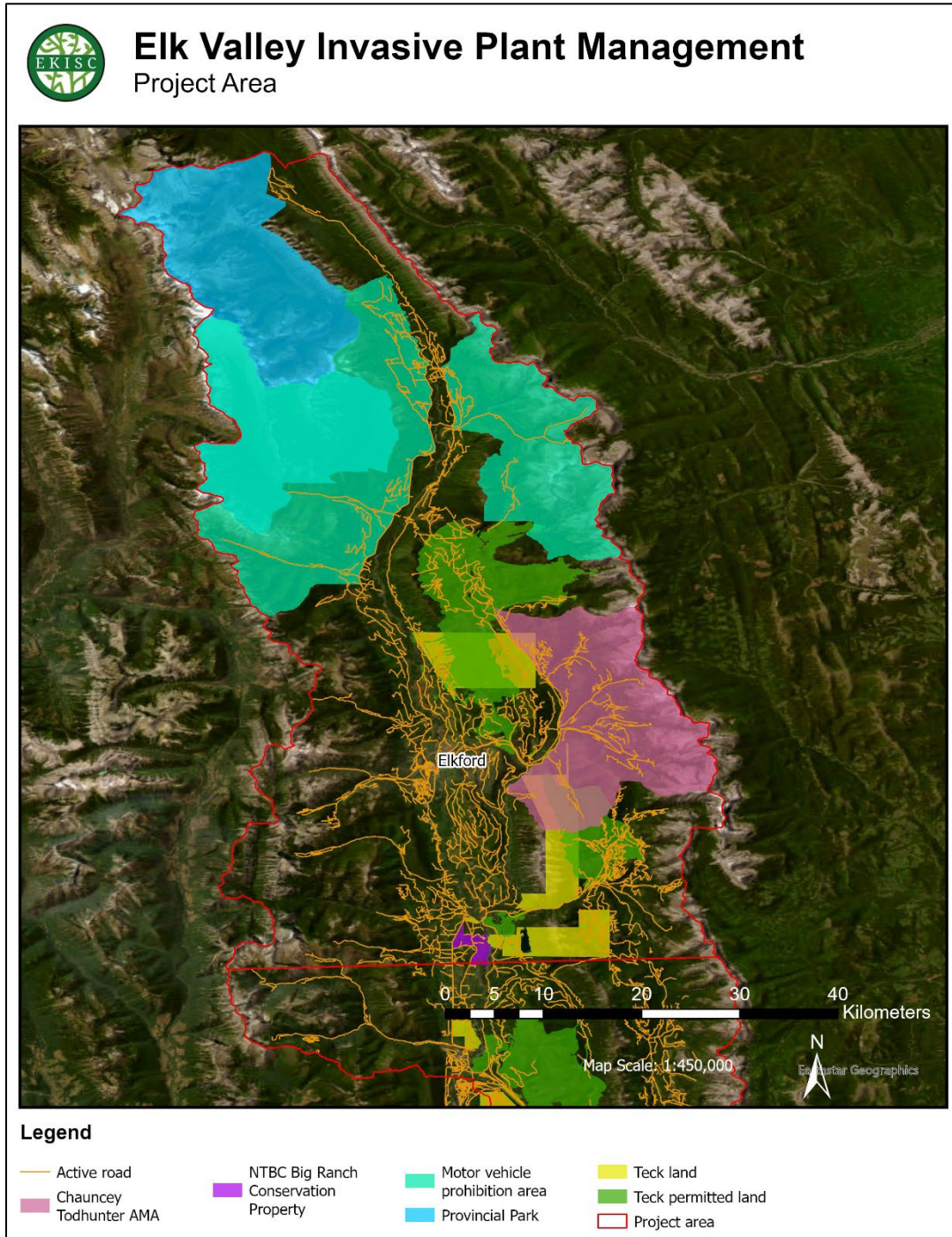


Figure 1. Upper Elk Valley Invasive Plant Management Plan Project Area.

Methods

EKISC follows the methods outlined in the Invasive Plant Management Plan for the Upper Elk Valley (Kaisner and Phillips, 2019), which can be referenced for more detail. An overview of activities undertaken is provided in the following sections.



Invasive Plant Inventory

Inventories have taken place over the lifespan of the project. In 2023 specific inventories were not conducted by EKISC staff, however, EKISC contractors surveyed and recorded invasive plant species concurrently with weed treatments. Areas that were data deficient were surveyed and treated on the same day. This process included collecting information on locations, infestation sizes, densities, distributions, and provided additional comments if necessary, using a standardized inventory record template in GIS Pro. Staff recorded information on invasive plant species that are provincially regulated by the BC Weed Control Act and Regulations. Point locations were entered when a new plant was inventoried; polygon data was collected to document where infestations were continuous over large distances or very dense, and line segments were collected to demonstrate linear infestations. The focus of inventories were recreation trails, spur roads, and forest service roads that have not been inventoried previously.

Invasive Plant Treatment

Priority areas for invasive plant treatments in the Upper Elk Valley are largely informed by critical habitat areas, invasive plant inventory data, and previous years' treatments. In 2023, treatments focused on:

- Roads, trails, and landings adjacent to high-value wildlife habitat.
- Roads, trails, and landings in Access Management Areas (AMA).
- Road segments scheduled for deactivation.
- Conservation properties.

Treatments focused on a backcountry-in approach, beginning at the highest elevation portions of the project area and moving systematically down into lower elevation areas. This method is used with the intent of containing species to the main lower valley and preventing further spread into critical bighorn sheep habitat (Kaisner & Phillips, 2019).

Invasive species targeted for treatment follow Priority Species List for the Upper Elk Valley (see Appendix A). This document is updated annually using Provincial legislation, invasive species data, and regional partners' knowledge. This list ensures all relevant species are searched for and captured at their appropriate response level. Noxious invasive species that have not been previously observed in this IPMA are ranked as Early Detection Rapid Response (EDRR) species. If found, the treatment goal is eradication. Species ranked as Priority 1, 2, or 3 are targeted for treatment, with varying goals of eradication or containment based on species distribution. Yellow hawkweed, classified as Priority 3, is widespread across the project area, but limited in extent north of km 143 on the Elk River FSR. A containment line was established for this species, with everything north of the 143 km mark being treated, with particular attention to areas where the species has been found in high elevation grassland habitat.

Invasive plant treatments are conducted using either mechanical hand pulling or chemical herbicide application. Treatment methods utilized for each invasive plant site depend on the species, location, timing, and weather. All herbicide applicators had valid Pesticide Applicator Certificates and followed the requirements and guidelines provided in BC's Integrated Pest Management Regulation as well as the MFLNRORD Pest Management Plan for Southern Interior BC (MFLNRORD, 2019).



Herbicide application takes place using utility terrain vehicles (UTV) equipped with a boom sprayer and hand reel. A combination of spot treatment and boom spray methods were used for all Elk Valley treatments. Treatments are targeted for the specific plant, and herbicide is only sprayed on the target species. Selective herbicides are used in conjunction with these methods to limit negative impacts to native plant species. Treatments are conducted by traveling along roads and trails and treating all target invasive species encountered. When infestations are detected off road, a hose reel system is used to apply herbicide directly to the plants. If infestations are large, the entire infestation is systematically treated using a UTV equipped with a boom sprayer. EKISC contractors record their travel and distance data using a GPS device. Point data and associated ancillary data is collected when a treatment begins. A new treatment point is created when an invasive plant has not been treated for 200m.

Grass Seeding

Grass seed was applied to increase desirable species cover and reduce regrowth of invasive plant species in critical bare ground and disturbed areas. A hand held grass seeder was used to apply the seeds at a consistent rate. A restoration grass seed mix was selected based on area, elevation, and desirable forage species.

Invasive Plant Monitoring

Three types of monitoring are utilized in the project, including: treatment efficacy monitoring, long-term effectiveness monitoring, and photo plot monitoring. Treatment efficacy monitoring is used as an accountability measure to ensure treatments are effective on target species and that treatment sites are completed by contractors. Long-term effectiveness and photo plot monitoring are used to evaluate the success of invasive plant management activities over time. Monitoring methods are described below and can be found in more detail in the Elk Valley IPMP (Kaisner and Phillips, 2019).

Treatment Efficacy Monitoring

A minimum of 10% of all treated sites (chemical and mechanical) are monitored for treatment efficacy and completion, 2-4 weeks post treatment. Efficacy monitoring is conducted to ensure compliance with all relevant policies and legislation, and to ensure protection of environmentally sensitive areas. Digital monitoring records congruent with Provincial templates are used to evaluate treatment efficacy and completion for each monitored site. Treatment sites are selected non-randomly to ensure that different habitat types, species of concern, and treatment dates are monitored.

Vegetation Plot Monitoring

In Year 1 (2020) 10 permanent vegetation monitoring plots were established to evaluate long-term treatment effectiveness at the site level. In 2021, an additional three plots were installed to include a wider variety of species and habitat types. Plot data collection occurs at approximately the same time annually, so plant growth data is as close to seasonally standardized as possible. Vegetation plots show how invasive plant treatments are impacting targeted weed species and desirable native species over time. Results will be used to inform future treatment prescriptions.

Plot establishment followed a modified version of MOF's Ecosystem Restoration Program Routine Monitoring Protocol for Understory Cover Sampling. Locations are selected non-randomly, within areas of dense infestations designated for treatment. Subjective site selection is used to capture areas with dense invasive plant infestations, a variety of habitat types, elevation levels, and invasive species. At each site, 5 subplots were established. The center subplot was marked with a stake, and 4 subplots were placed at each cardinal direction 5m from the center (Figure 2). Each subplot was permanently marked

with a stake, and labeled with the plot number, cardinal direction, and date of establishment. Subplot locations were recorded, and a photograph was taken.

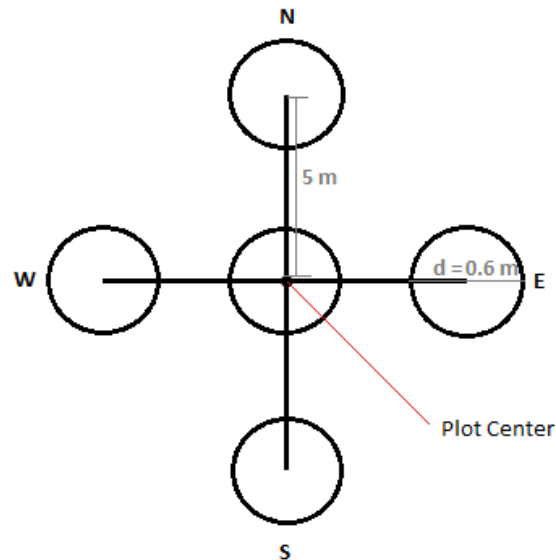


Figure 2. Diagram of a vegetation monitoring plot established at all monitoring locations in the Upper Elk Valley project area.

Data was collected from each subplot by placing a circular quadrat (0.60m diameter) over the center stake and recording percent cover and frequency for every invasive species observed within the quadrat area. Percent cover of non-invasive forbs, shrubs, grass, and trees was recorded and identified to genera or species when possible. If additional vegetation was observed but the species was unknown, a percent cover was still recorded. Lastly, the percent cover for bare ground, rock, woody debris, cryptogammic crust, litter, and scat was also recorded.

Photo Plot Monitoring

In Year 1 (2020), five photo plot monitoring sites were established. In Year 2 (2021) an additional eight were created, totaling 13 photo monitoring plots. Plots were established at infestations of note within the project area. All images are taken using the Theodolite application at the same height, angle, and cardinal direction. All sites are visited at approximately the same time annually, so plant and landscape-level observations can be as close to seasonally comparable as possible. The permanent photo plots will enhance long-term monitoring for the project, by providing a qualitative means of evaluating treatment success over time.



Results and Outcomes

The following sections summarize results from invasive plant management activities that occurred during Year 4 of the project.

Invasive Plant Treatment

Invasive plant treatments took place over 13 days starting on August 2 and ending on October 12, 2023. A total of 206 sites, containing one or more priority species were treated covering approximately 151.9 kms or 53.98 ha of FSRs, recreation trails, and roads scheduled for deactivation (Figure 3). A total of 11.79 Kg of undiluted herbicide¹ was used. Species targeted for treatment included:

- Blueweed (*Echium vulgare*)
- Canada thistle (*Cirsium arvense*)²
- Caraway (*Carum carvi*)
- Chicory (*Cichorium intybus*)
- Common tansy (*Tanacetum vulgare*)
- Hound's-tongue (*Cynoglossum officinale*)
- Scentless chamomile (*Tripleurospermum inodorum*)
- Spotted knapweed (*Centaurea stoebe*)
- St. John's wort (*Hypericum perforatum*)
- Sulphur cinquefoil (*Potentilla recta*)
- Wormwood (*Artemisia absinthium*)
- Yellow hawkweed (*Hieracium caespitosum*)
- Yellow toadflax (*Linaria vulgaris*)

¹ The amount of undiluted herbicide used varies greatly based on the type of herbicide. Each herbicide is diluted to the application rate specified on its label. The amount of undiluted herbicide used at a project site should not be used as a metric to evaluate invasive plant infestation size or success of treatment when comparing following years.

² Canada thistle was only treated advantageously alongside high priority species.



Table 1. Invasive plant treatments that occurred in the Upper Elk Valley project area, in 2023.

Invasive plant	Priority Ranking (1-4)	Number of sites treated	Herbicide used	Area treated (ha)	Amount of undiluted herbicide used (Kg)
Blueweed	1	8	Clearview	1.35	0.31
Canada thistle	4	4	Clearview	0.89	0.18
Caraway	2	2	Clearview	0.082	0.019
Chicory	4	1	Clearview	0.011	0.0026
Common tansy	1	3	Clearview	0.013	0.0030
Hound's-tongue	4	1	Clearview	0.023	0.0052
Perennial sow thistle	4	1	Clearview	0.18	0.036
Scentless chamomile	2	72	Clearview	5.078	1.10
Spotted knapweed	2	60	Clearview	5.61	1.25
St. John's wort	1	5	Clearview	1.00	0.23
Sulphur cinquefoil	3	2	Clearview	0.032	0.0063
Wormwood	3	9	Clearview	0.85	0.19
Yellow hawkweed	3	68	Clearview	33.33	7.24
Yellow toadflax	3	21	Clearview	5.52	1.21
Total:				53.98	11.79



In addition to chemical treatments, two mechanical treatments took place in the Elk Valley project area (Table 2). These treatments were conducted in pesticide free zones adjacent to waterbodies.

Table 2. Mechanical treatments that took place in the Elk Valley project area in 2023.

Treatment date	Species treated	Location
2023-06-19	Caraway	Big Ranch Conservation Property
2023-09-14	Spotted Knapweed	Fording River FSR beside road adjacent to stream

NTBC Big Ranch Conservation Property

The Nature Trust of British Columbia’s Big Ranch Conservation Property is part of the larger Invasive Plant Management Plan developed for the Elk Valley. Big Ranch is located at the southern end of the project area, approximately 20 Km south of Elkford. The Big Ranch Ecosystem Enhancement Project (BREEP) developed land management goals for the property, in collaboration and coordination with the Elk Valley IPMP. The project works to mitigate the impacts of land-use changes and restore grassland habitat to improve forage for large ungulate species (SDFWA & NTBC, 2020). In 2023, large-scale invasive plant treatments were once again completed on the Big Ranch property, funded by SDFWA on behalf of BREEP. A total of 34 treatments were completed, which targeted eight unique invasive plant species within the Big Ranch property and adjacent jurisdictions, from August 2 to October 12, 2023 (Figure 4). A total 5.24 ha were treated on the Big Ranch property, using funding provided by numerous partners under the BREEP project. An additional 2 sites were treated on adjacent jurisdictions using funding provided by the Fish and Wildlife Compensation Program (FWCP) through the Elk Valley project, the Ministry of Forests, and BC Hydro. Species targeted included: blueweed, caraway, perennial sow thistle, scentless chamomile, spotted knapweed, St. John’s wort, yellow hawkweed, and yellow toadflax.

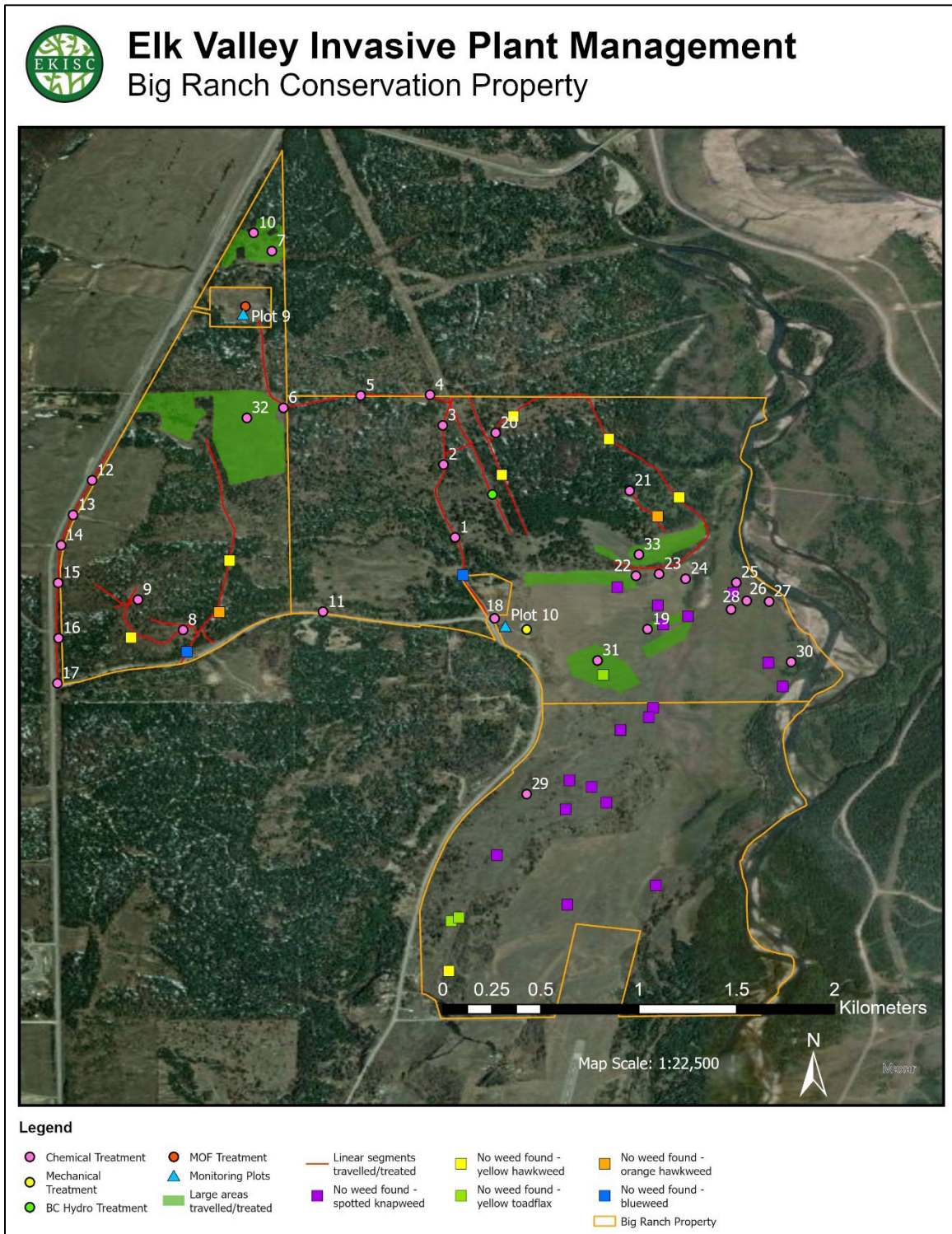


Figure 4. Invasive plant treatments and survey records on the Nature Trust of British Columbia's Big Ranch Conservation Property in 2023.



Chauncey Todhunter Access Management Area

Treatments were conducted on all main FSRs and accessible spur roads in the Chauncey Todhunter Access Management Area (AMA). This area has been flagged as a priority for treatment due to its proximity to high-elevation grassland habitat. In addition, this area has high levels of logging activity which contributes to the spread of invasive species. A total of 73 treatments were completed within the Chauncey Todhunter AMA, over four treatment days from August 10 - 13, 2023 (Figure 5). A total 15.33 ha were treated, targeting scentless chamomile, spotted knapweed, yellow hawkweed, and yellow toadflax.

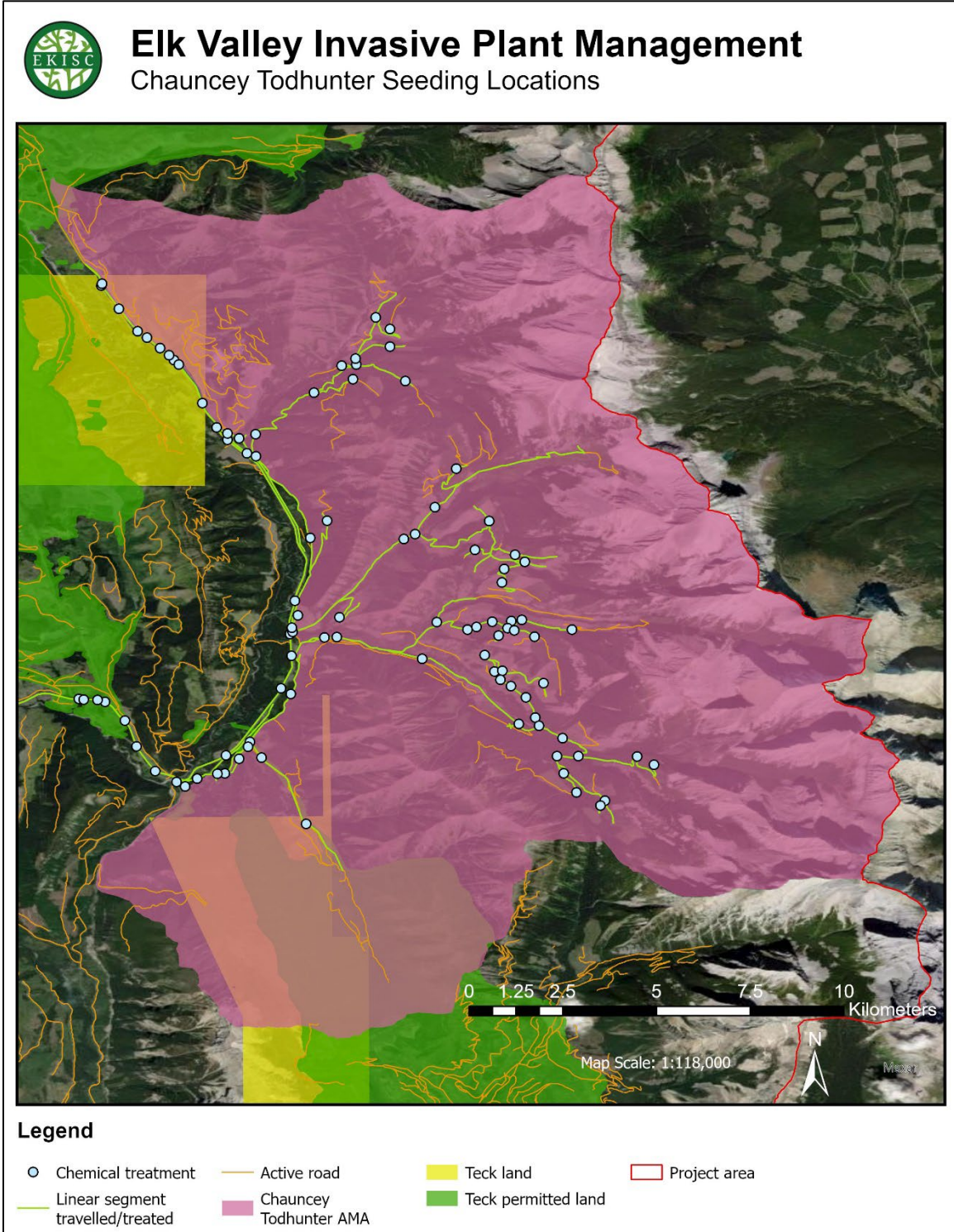


Figure 5. Invasive plant treatments that occurred in the Chauncey Todhunter Access Management Area in 2023.



Elk River, Round Prairie, and other Forest Service Roads

The Elk River and Round Prairie are the main forest service roads running on either side of the Elk River. They are the access point for Elk Lakes Provincial Park, Height of the Rockies Provincial Park, and all spur roads in the area. This area has extensive logging, with new spur roads being created every year. As such, this area has large densities and distributions of invasive species. Treatments were reduced in 2023 in the northern part of the project area compared to previous years due to the Mt. Bingay wildfire which limited access up the Elk River and Round Prairie from August 15 - September 5, 2023. After the area reopened, it was logistically out of the capacity of the contractor to go back and treat the area. Instead, new areas in the southern portion of the project area were treated. A total of 62 treatments were completed on main forest service roads, all accessible spur roads, and gravel pits over 6 treatment days from August 14 – October 12 2023 (Figure 6). A total 17.74 ha were treated, targeting blueweed, Canada thistle, caraway, chicory, common tansy, hound's tongue, scentless chamomile, spotted knapweed, St. Johns wort, wormwood, yellow hawkweed, and yellow toadflax.



Fording River Road

New to 2023 were chemical treatments on Ministry of Transportation and Infrastructure jurisdiction on Fording River Road. These treatments were funded by Teck and spanned from Elkford to approximately 13 km up the road along the edge of the Chauncey Todhunter Access Management Area (Figure 5). A total of 37 treatments were completed on August 14, 27 and 28, 2023 covering 15.55 ha. Weeds treated include blueweed, scentless chamomile, spotted knapweed, St. Johns wort, wormwood, and yellow toadflax.

Grass Seeding

EKISC staff spread 25 kg of restoration grass seed over 0.25 ha across various locations in the Chauncey-Todhunter Access Management Area on October 5 2023 (Figure 7). The grass seed mix consisted of slender wheatgrass (30%), western wheatgrass (24%), perennial ryegrass (13%), Idaho fescue (10%), Rocky Mountain fescue (10%), and Sandberg bluegrass (3%). Grass species were selected based on suitability to the Elk Valley.

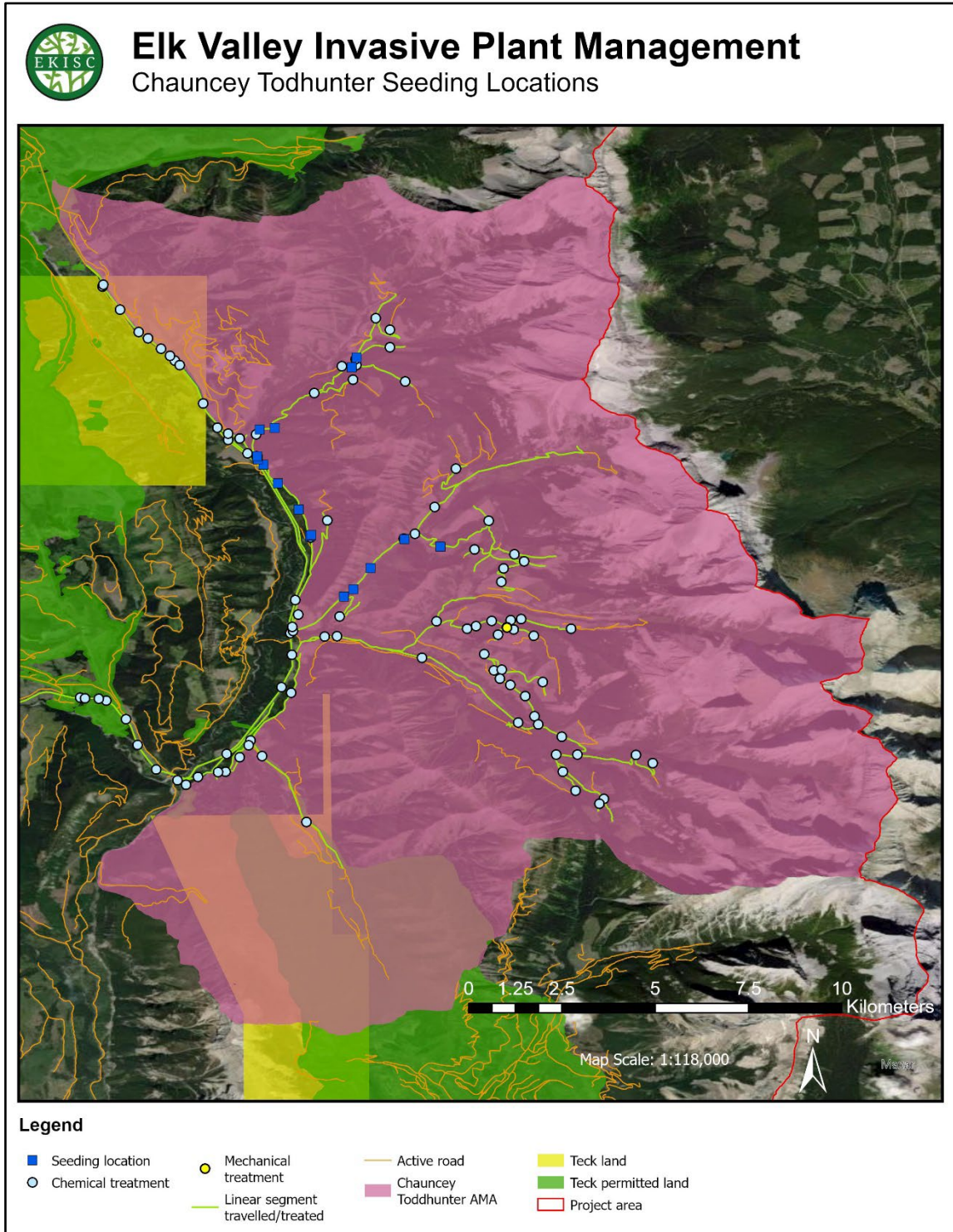


Figure 7. Seeding locations and treatment sites in the Chauncey Todhunter Access Management Area in 2023.



Seeding sites were chosen based on previous treatments, bare ground presence, and the presence of desirable native vegetation. Seeded areas primarily focused on large infestation areas that were treated in 2023. Seeding with desirable grass species should reduce invasive species regrowth in treated areas and increase native vegetation cover. Ultimately, increasing grass cover in the project area will provide additional forage for ungulate species, including bighorn sheep.

Treatment Efficacy Monitoring

EKISC conducted post-treatment monitoring of invasive plant control at a minimum 10% of all treated sites. All monitored treatments received passing scores for efficacy and completion.

Vegetation Plot Monitoring

Vegetation data was collected from the 13 previously established monitoring plots on July 27 and 28, 2023 (Table 3, Figure 8).

Table 3. Mean percent cover of invasive species, species type, and organic and inorganic material at monitoring plots in the Elk Valley, collected in 2023. Note that only native and non-invasive species (e.g., Dandelion and clover) were included in percent cover for Grass spp, Forb spp, and Shrub spp.

Species	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11
Bare ground	6	2.6	29	1.7	14	27	5	7	25	23	0
Cryptogram	41	40	0	13.3	18	3	0	14	2	4	0
CWD	0	0	0.6	0	0	0	5	0	0	0	0
Rock	3	15	9	43.3	18	14	63	10.6	25	1	1
Litter	12.6	11	6	8.3	8	9	6	15	9	25.8	13
Scat	0	0	0	0	0	0	0	0	0	0	0
Grass Spp.	28	24	56	33.3	37	43	21	40.6	40	41	32
Forb Spp.	8.2	5.4	0	2.9	6	12.8	0.2	14.4	0	5	58
Shrub Spp.	1	0	0	0	0	0	0	0.2	0	0	0
Blueweed	0	0	0	0	0	0	0	0	0	0	0
Canada thistle	0	0	0	0	0	0	0	0	0	0.2	0
Caraway	0	0	0	0	0	0	0	0	0	0.4	0
Oxeye daisy	4	3.2	0	0	0	0	0	3.2	0	1	0
Scentless chamomile	0	0	0	0	0	0	0	0	0	0	0
Spotted knapweed	0	0	0	0	0	0	0	0	0.6	0	0
Yellow hawkweed	0.6	0	0	0	0	0	0	0.6	0	0	0

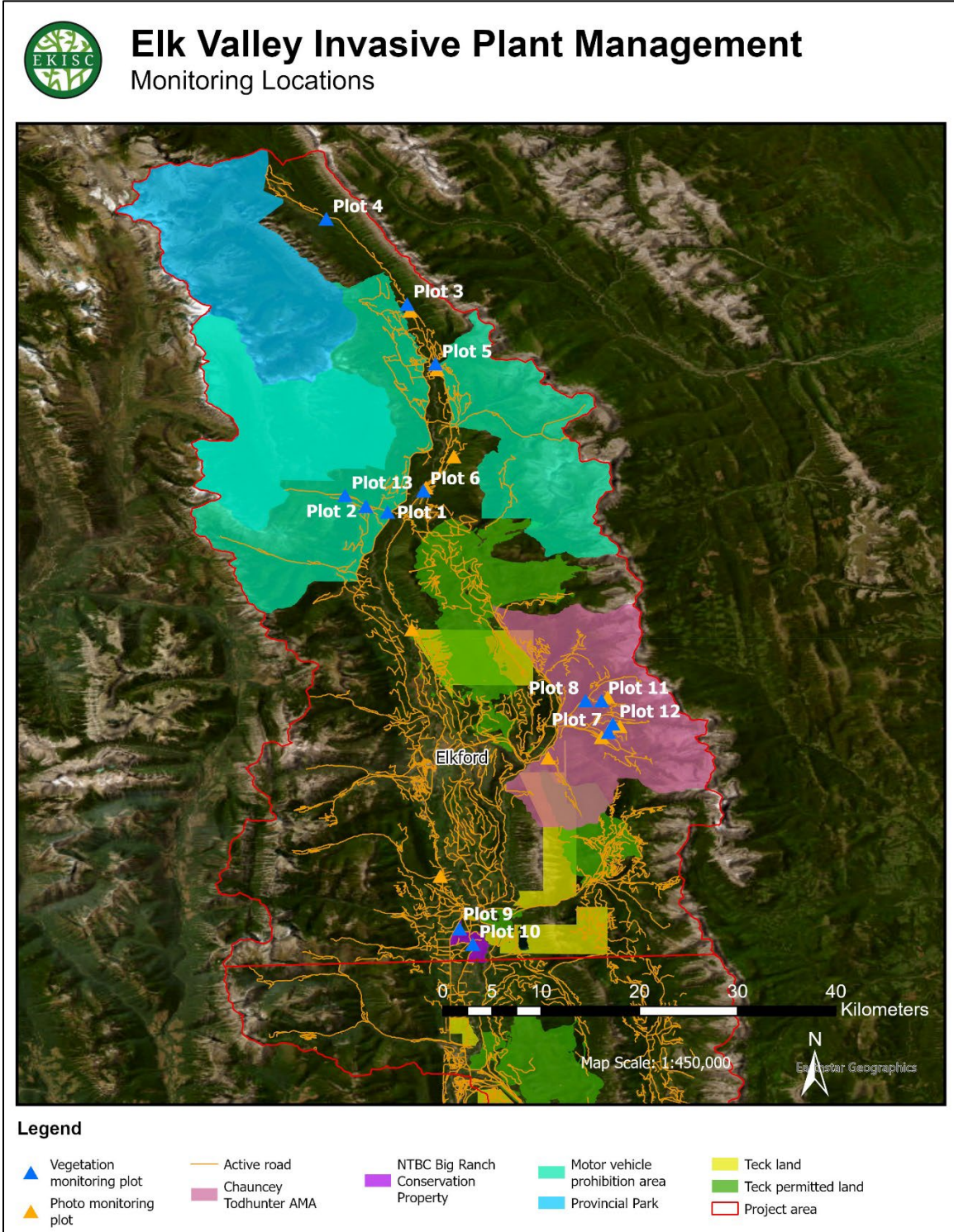


Figure 8. Permanent monitoring plots and photo monitoring locations within the Upper Elk Valley project area.

Photo Monitoring Plots

Photo monitoring plots were visited by EKISC staff on July 27, 2023. The permanent photo plots provide a qualitative means of evaluating treatment success over time. Decreasing invasive plant infestations have been documented. Figure 9 and 10 document the change in yellow hawkweed infestations and shows a decreased in yellow hawkweed and an increase in grass and native forb cover. Similarly, Figure 11 documents the decreasing levels of blueweed at a treated site. For additional photo plot comparisons see Appendix B.



Figure 9. Treated yellow hawkweed infestation in 2021 showing a decrease in invasive plant density and distribution and an increase in native forb cover in 2023.



Figure 10. Treated yellow hawkweed infestation in 2021 showing a decrease in invasive plant density and distribution and an increase in grass cover in 2023.



Figure 11. Treated blueweed infestation in 2021 showing a decrease in invasive plant density and distribution in 2023.



Outreach and Community Engagement

Education has been identified as a cost-effective method for the prevention of invasive species infestations (Invasive Species Council of BC, 2018). As such, education and outreach has been identified as an integral component of the Elk Valley Invasive Plant Management project. EKISC delivered the following outreach and community engagement activities in 2023:

1. Annual Elk Valley project planning occurred at EKISC's Spring 2023 Land Manager Planning Meeting; a meeting that invites all land managers and partners to discuss invasive species management in the East Kootenay. We hosted the meeting online with 25 participants.
2. At EKISC's AGM in May 2023, the Elk Valley Project was highlighted as a special project; the AGM was attended by 56 attendees.
3. EKISC attended one farmers market in Elkford and two farmer's markets in Sparwood, connecting with 206 people and gave out 108 resources. At the events, general invasive species education was provided, as well as information specific to the Elk Valley project.
4. EKISC worked with the Nature Trust of BC to secure three new signs for the Big Ranch Property; two for current kiosks and one boot brush station. These signs will educate the public on invasive species present in the Elk Valley and what they can do to reduce the spread of invasive plants across the landscape. (see Appendix C)
5. Regular updates and information were emailed to all local clubs, guide outfitters, and stakeholders providing a summary of work completed and next steps of the project. This provided an opportunity for new ideas and input to be delivered for the project.
6. A project spotlight was included in EKISC's August 2023 e-newsletter (viewed [here](#)); A total of 443 people received the e-newsletter containing the feature.
7. In August Teck reached out to EKISC to provide information about priority species in the Elk Valley for the "Teck Access Boundaries in the Elk Valley 2023-2024" map book, which is available to the public. EKISC submitted 5 short paragraphs titled "Tips and Tricks for Invasive Species Prevention in Elk Valley" (viewed [here](#)).
8. Features on social media were used to increase awareness and highlight the collaborative nature of the project. In October 2023 an Instagram post highlighting the Elk Valley Invasive Plant Project (viewed [here](#)) reached 250 people, and FWCP's Instagram account re-shared the post as well, reaching even more. The same post was shared on our Facebook page (viewed [here](#)) reaching 93 people.
9. A short YouTube video summarizing the collective work and successes of the Elk Valley Invasive Plant Management Project was created in the winter of 2023 and posted on EKISC's channel January 9th 2024 (viewed [here](#)) and has been viewed 32 times and shared on our social media pages including TikTok and LinkedIn.
10. The Final Report will be emailed to all project partners for their reference.

EKISC recognized FWCP in all communications and community engagement activities, including acknowledgement of support in EKISC's e-newsletter, as a project partner on EKISC's website, listed as a funder in our Annual Report, and during project presentations to local clubs.



Discussion

During Year 4 of the project, EKISC worked with project partners to conduct invasive species management, with a particular focus on areas of high wildlife value. Invasive plant infestations were treated to decrease their presence on the landscape and promote the growth of native forage species, resulting in improved ecosystem function and health. Preliminary project results are discussed in the following sections.

Invasive plant treatment

In 2023, a reduction in common tansy treatment area occurred across the project area. The number of treated common tansy, and St. John’s wort sites has reduced from 2021 to 2023 (Table 4). The treated area for St. Johns wort has increased in 2023 but this is not indicative of an overall increase in the plant. Due to the area restrictions from the Mt. Bingay wildfire, new areas were treated which contained St. Johns wort, therefore the increase is due to new sites being treated that haven’t been in the past. For all species, numbers were lower in 2020 due to focus being on invasive plant inventory rather than treatments. Overall, the number of treatments is decreasing; a total of 415 sites covering a 91.47 ha area was treated in 2021, and 206 sites covering 53.98 ha in 2023. This reduction is indicative of a decrease of invasive species cover in the project area.

Table 4. Treated invasive species site comparison between 2020, 2021, 2022, and 2023

Species	Year	Number of sites treated	Area treated (ha)
Blueweed	2020	6	0.81
	2021	15	1.32
	2022	5	1.24
	2023	8	1.35
Common tansy	2020	9	0.01
	2021	10	0.21
	2022	4	0.6
	2023	3	0.013
St. John’s wort	2020	2	0.002
	2021	12	0.33
	2022	7	0.34
	2023	5	1.00

Grass seeding

In 2020 a grass seeding trial was initiated. In 2021, monitoring of the trial in July showed no grass; however, during fall monitoring of the same year, an increase in grass cover was observed. That fall (2021) three more trials were established. In 2022, monitoring the four grass seeding trials did not give conclusive results of an increase in grass cover in the seeded areas. However, this could have been a result of timing, as the first trial only showed an increase in the fall following seeding, and not in early summer when first monitored. In 2022, all seeding trails were monitored in either July or August, and due to staff capacity issues were not revisited in the fall. Furthermore, in 2022, EKISC decided to perform larger scale grass seeding across bare ground areas. This reduced effort in setting up small scale trials and added a restoration component alongside herbicide treatment to reduce invasive plant cover on the landscape. In 2023, grass seeding monitoring was integrated into the other monitoring techniques used. Grass germination is not specifically looked at with these techniques and the



information gained from these plots offers a landscape perspective of invasive species cover and bare ground. Due to the operational nature of this project, quantitative techniques for grass seeding are not practical, and it is clear based on field observations that grass is growing in seeded areas. In general, areas that don't seem to have much success with grass growth are prioritized for future seeding alongside sites that have bare ground and previous chemical treatments.

Vegetation Plot Monitoring

Comparison between plot data collected in 2020, 2021, 2022, and 2023 displays a decrease or maintenance in total mean invasive species percent cover in 8 out of 11 plots assessed (Figure 12). The most dramatic decreases occurred between 2020 and 2021, following the first year of treatment. Levels remained relatively constant between 2021 and 2023 in most plots, with only slight changes in invasive species cover documented. The exception to this trend was demonstrated in 2022 in Plot 10, which did not show a change in caraway percent cover. In 2023 the caraway cover in plot 10 dropped to 1.6% which was due to the mechanical treatment that occurred earlier in the year. Plot 10 is within the pesticide free zone and receives annual mechanical treatment, caraway cover will likely fluctuate over the years depending on the timing and success of the mechanical treatments. There are several plots that initially had relatively high invasive plant cover in the first year of data collection that reduced to 0 in 2023. These plots were 3, 4, 5, 6, 7 and 11 representing caraway, yellow hawkweed, oxeye daisy, and scentless chamomile infestations. This shows that treatments have been effective at reducing cover for a variety of invasive plant species over the project area. Data from plots 12 and 13 were not collected in 2023 due to insufficient time after a flat tire delayed field activities. Attempts to reschedule were not successful.

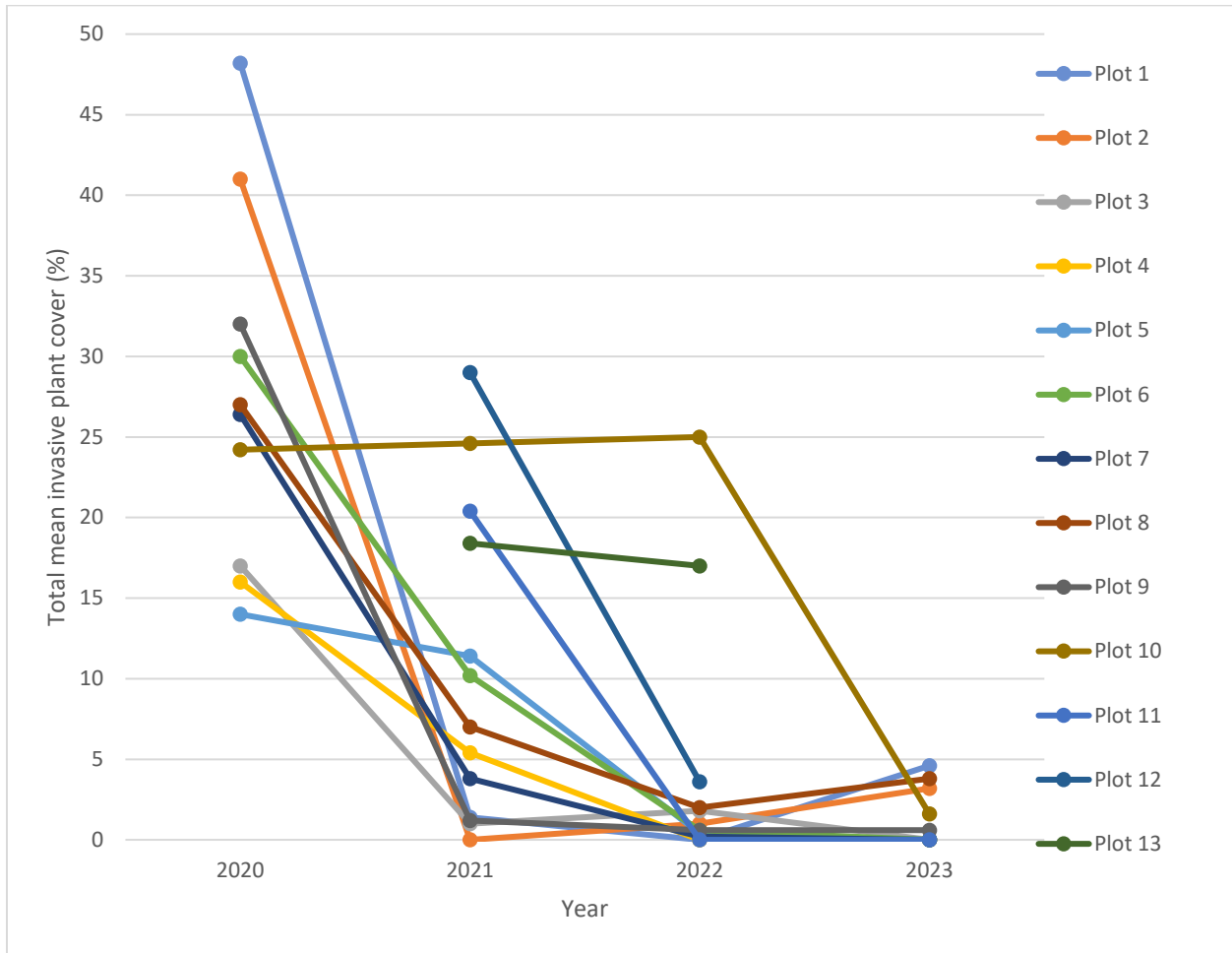


Figure 12. Total mean invasive species percent cover at monitoring plots in the Elk Valley, collected in 2020, 2021, 2022, and 2023.

Photo Monitoring Plots

Photo monitoring plots have documented landscape level change in the Elk Valley project area. Decreases in invasive plant infestations have been observed at select photo plot sites (Figure 9, 10, & 11, Appendix B). Additional sites have shown decreases, but it is challenging to document certain plant species in landscape level photos. For example, in Figure 13 a yellow hawkweed infestation is present with oxeye daisy, but the decreases observed on the ground are not as evident in the photographs. The oxeye daisy has decreased, but the targeted yellow hawkweed is not evident from the photos. Photo monitoring at all locations will continue, as photos provide qualitative means of documenting treatment success. However, they will not be used in isolation for monitoring, as additional information is required to fully document the decrease of invasive species on the landscape.



Figure 13. Treated yellow hawkweed infestation in 2021 and 2023.

Outreach and Community Engagement

In 2022, the biggest challenge faced by the Elk Valley project is low attendance to project volunteer events despite interested from user groups. This motivated a shift in tactics from in person events to online content development in 2023 including newsletter features and the creation of informative videos. More community members were likely reached in 2023 compared to 2022 with the wide online presence. As education is a key component of invasive species prevention, EKISC will continue to modify communication methods to engage with the most amount of people.



Program Recommendations

Field Operations

Based on results and outcomes from Year 4 of the Elk Valley Invasive Plant Management Project, recommendations for subsequent project years include:

- **Continue utilizing a backcountry-in approach.** Using this approach prioritizes high-value wildlife habitat in the higher elevation areas of the Elk Valley. Continuing with this method will reduce invasive plant spread into high-value areas and contain invasives to the valley bottom.
- **Update the Upper Elk Valley IPMP and priority species list.** EKISC will review all data collected during the previous four years of the project and update the Upper Elk Valley IPMP and adjust species priorities if necessary.
- **Continue invasive plant inventories on an as-needed basis.** EKISC will identify areas that have not received any invasive plant inventory or treatment and conduct invasive plant management activities if necessary.
- **Inventory high elevation logging areas.** Yellow hawkweed was not observed in areas where native plants and grasses are well established, such as avalanche slide paths, meadows, and other open areas. Observations to date have concluded that, unless a disturbance has occurred, yellow hawkweed is unlikely to inhabit higher elevations. However, yellow hawkweed does establish in cut blocks, therefore it is recommended to assess areas where logging operations have occurred, to prevent yellow hawkweed establishment. Surveys can be conducted concurrently with road treatments.
- **Treat high priority species.** It is recommended to treat all high priority species annually. All species except yellow hawkweed, Canada thistle, and oxeye daisy will receive annual treatments.
- **Annual data collection from permanent monitoring plots and photo plots.** As part of project monitoring, it is recommended to collect data and images at all plots (permanent vegetation and photo plots) within the project area. Data collection should occur pre-treatment to understand residual herbicide effectiveness of sites treated.
- **Continue to seed areas of bare ground and disturbed sites to encourage native grass establishment.** Grass seeding should be used in areas of bare ground, or recently disturbed areas, to complement treatment efforts and to assist with native cover establishment.

Outreach and Community Engagement

Building off the successes in 2023, the following are recommendations on how to better engage and communicate with the community going forward:

- **Interactive Workshops and Webinars:** EKISC recommends more interactive workshops and webinars targeting local community members, landowners, and stakeholders. These sessions can cover topics such as identifying invasive plant species, their impacts on local ecosystems, and effective management strategies. Providing hands-on activities or virtual demonstrations can enhance learning and engagement.
- **Educational Materials:** EKISC would like to develop and distribute a project specific educational material such as brochures, fact sheets, and infographics highlighting key information about invasive plant species found in the Elk Valley region. These materials should be visually appealing, easy to understand, and readily accessible through online platforms and local community centers.



- **School Outreach Programs:** EKISC recommends more collaboration with schools in the Elk Valley area to incorporate invasive plant management into their curriculum (Develop age-appropriate educational resources, lesson plans, and hands-on activities that align with academic standards and encourage students to become stewards of their local environment).
- **Continue Social Media Campaigns:** EKISC intends to continue targeted social media campaigns to raise awareness about invasive plant species and the importance of their management. Utilize platforms such as Facebook, LinkedIn, and Instagram to share engaging content, success stories, and updates about ongoing initiatives. Encourage community members to participate by sharing their own experiences and photos using program-specific hashtags.
- **Community Events and Field Tours:** EKISC recommends community events, field trips, and guided hikes led by EKISC to engage residents and visitors in invasive plant management efforts. These events can include guided tours of restoration sites, volunteer workdays, or public presentations followed by Q&A sessions to address concerns and provide additional information.
- **Partnership Development:** Strengthen current partnerships with local conservation organizations, government agencies, businesses, and community groups to amplify outreach efforts and leverage resources as well as source new partnership opportunities. Collaborate on joint initiatives, fundraising campaigns, and public outreach events to reach a broader audience and foster a sense of collective responsibility towards invasive plant management in the Elk Valley.
- **Include Elk Valley project information in community events taking place in Sparwood and Elkford.** EKISC's Outreach and Education team organize events across the region, including communities within the Elk Valley. Information regarding the Elk Valley Invasive Plant Management Project will be disseminated at events hosted in Sparwood and Elkford. This will increase the reach of the project and help garner community support.

Acknowledgements

EKISC would like to acknowledge the generous support of the Fish and Wildlife Compensation Program, and the Habitat Conservation Trust Foundation, without whom Year 3 of the Upper Valley Invasive Plant Management Plan would not have been implemented. Year 3 of this project was also possible due to monetary and in-kind support from MOF, MOTI, MOE (BC Parks), HCTF, NTBC, BC Hydro, GREP, CBT, Wild Sheep Society of BC, Canfor Forest Products, BC Backcountry Hunters & Anglers, Elkford Rod & Gun Club, and the Sparwood Fish & Wildlife Society. Additional regional groups were engaged, including Ktunaxa Nation Council, Teck Resources Ltd.



References

- Bear Tracks Environmental Services. (2019). [pdf file]. 2019 Elk Winter Range Habitat Assessment for the Big Ranch Property.
- Chow, E, TJ, Gooliaff and T. Szkorupa. (2018). Kootenay Remote Camera Wildlife Monitoring 2017/18 Final Report. Prepared for: Fish and Wildlife Compensation Program. Prepared By Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Cranbrook, BC.
- Demarchi, D.A. (1968). An ecological study of Rocky Mountain bighorn sheep winter ranges in the East Kootenay Region of British Columbia. Progress Report. Fish and Wildlife Branch, Victoria, BC.
- East Kootenay Invasive Species Council. (2013). 2013-2018 Regional Strategic Plan. Available at: <https://www.ekisc.com/ekisc-publications>
- Fish and Wildlife Compensation Program (FWCP). (2019). Columbia Region: Upland & dryland action plan. Version one. Retrieved from <http://fwcp.ca/app/uploads/2019/08/Action-Plan-Columbia-Region-Upland-Dryland-Aug-21-2019.pdf>.
- Government of Canada. (2004). An Invasive Alien Species Strategy for Canada. [pdf file]. Retrieved from http://publications.gc.ca/collections/collection_2014/ec/CW66-394-2004-eng.pdf/
- Government of Canada. (2017). Why invasive alien species are a problem. Retrieved from <https://www.canada.ca/en/environment-climate-change/services/biodiversity/why-invasive-alien-species-are-problem.html>
- International Union for Conservation of Nature (IUCN). (2011). Invasive Species.
- Invasive Species Council of BC. (2020). What are their impacts for BC? Retrieved from <https://bcinvasives.ca/invasive-species/about/what-are-their-impacts-for-bc/>.
- Invasive Species Council of British Columbia. (2014). Invasive Species Toolkit for Local Government. Williams Lakes, BC.
- Liepa, I. (2013). East Kootenay Invasive Plant Council. Strategic Planning Report: The Connecting Link Consulting Services.
- Ministry of Forest, Lands, and Natural Resource Operations and Rural Development. (2019). Invasive Plant Pest Management Plan for Provincial Crown Lands in the Southern Interior of British Columbia.
- Mooney, H. A. (1999). The global invasive species program (GISP). *Biological Invasions*, 1(1), 97-98.
- Phillips, B. & Kaisner, T. (2019). Invasive Plant Management Plan for the Upper Elk Valley.
- Poole, K.G., C.R. Smyth, I. Teske, K. Podrasky, R. Serrouya, G. Sword and L. Amos. (2013). Bighorn Sheep and Elk Valley Coal Mines; Ecology and Winter Range Assessment.



Poole, K., I. Teske, K. Podrasky, J. Berdusco, C. Conroy, R. MacDonald, R. Davies, H. Schwantje, E. Chow, C. van Rensen, and T. Ayele. (2018). Bighorn Sheep Cumulative Effects Assessment Report.

Sparwood & District Fish and Wildlife Association, Nature Trust of BC. (2020). [pdf file]. Big Ranch Habitat Enhancement Project Proposal.

West Fork Resource Management Ltd. (2020). [pdf file]. Invasive Plant Inventory Summary 2020.



Appendix A: Priority Species List for the Upper Elk Valley 2023

EDRR Watchlist: Not currently found within the Elk Valley Project Area but determined to have some likelihood of introduction. If observed, should initiate an EDRR response and inventory and treat immediately.		
Baby's breath Bighead knapweed Black knapweed Common bugloss Field Scabious Hoary alyssum	Hoary Cress Knotweed spp. Flat peavine Leafy Spurge Meadow knapweed Policeman's helmet	Plumeless thistle Rush Skeletonweed Russian thistle Teasel Wood sage Yellow starthistle
Priority 1. Eradication: Currently found within the Project Area in very low numbers. Management objective is eradication. All existing sites should be treated a minimum of 1x per treatment year and 2x per year if resources are available. Any new occurrences to be inventoried and treated.		
Blueweed Diffuse knapweed	Common tansy	St. John's wort
Priority 2. Annual Control: Found within the Project Area but in low enough numbers to feasible treat all sites 1x per treatment year. Management objective is to reduce further spread of these species within the Project Area.		
Caraway Orange Hawkweed	Scentless chamomile	Spotted knapweed
Priority 3. Containment: Species is established in parts of the Project Area but is limited in other parts. Management objective is to contain these areas and prevent them from establishing further. All species will be treated north of Elkford, except Yellow hawkweed, which will be treated north of km 143 of the Elk River FSR and in the Forsythe Creek area.		
Dalmatian toadflax (biocontrol) Sulphur cinquefoil	Wormwood Yellow/common toadflax	Yellow hawkweed (north of km 143 on Elk River FSR)
Priority 4. Established: Species is established within the Project Area and will not be targeted for treatment. Species may be treated advantageously while treating higher priority species or have successful biocontrol agents.		
Burdock Canada thistle	Hound's tongue (biocontrol)	Oxeye daisy

Appendix B: Photo plot comparison demonstrating a decrease in yellow hawkweed in the Elk Valley project area.



Appendix C: Elk Valley boot brush sign on the Big Ranch conservation property



