Invasive Plant Management & Restoration of Protected Areas

Project Numbers: COL-F19-W-2692 & UKE-F19-W-2693

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Executive Summary

Invasive species have numerous negative impacts on natural ecosystems: they threaten the health of British Columbia and Canada's limited native grasslands, may displace or extirpate endangered plant and animal species, negatively impact wildlife habitats, reduce productivity in forestry, agriculture and fisheries, and overall contribute negatively to functioning ecosystems. The Columbia Basin Trust and Fish and Wildlife Compensation Program provided financial support to the East Kootenay Invasive Species Council (EKISC) to retain functional and sustainable ecosystems by mitigating the impacts of invasive species on East Kootenay conservation areas and their adjacent lands. This was accomplished under two contribution agreements executed between the Fish and Wildlife Compensation Program and the East Kootenay Invasive Species Council: agreement COL-F19-W-2692 for activities conducted on invasive plant sites and conservation lands in the Upper Columbia Valley, and agreement UKE-F19-W-2693 for activities conducted on invasive plant sites and conservation lands in the Upper Kootenay watershed.

In 2018, invasive plant inventories and management treatments were completed on and adjacent to conservation lands in partnership with Nature Conservancy of Canada, the Nature Trust of British Columbia, the Ministry of Forests, Lands, Natural Resource Operations & Rural Development and BC Parks. Treatments included the use of herbicides, manual site treatments, as well as biocontrol agents. Additional invasive plant inventories and monitoring activities took place throughout the field season to ensure efficacy of management practices.

This successful collaboration has resulted in an efficient partnership to decrease existing invasive plant populations, with further benefits including reduction of propagule pressure from neighbouring invasive species populations, wildlife habitat conservation, and long-term cost savings through collaborative invasive species management action. EKISC is confident that continued collaborative invasive plant management planning will continue to benefit conservation lands across the East Kootenay region.

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Introduction

With financial support from the Columbia Basin Trust and the Fish and Wildlife Compensation Program (FWCP), the East Kootenay Invasive Species Council (EKISC) partnered with several agencies in the 2018 field season to inventory and manage invasive plants on conservation lands across the Regional District of the East Kootenay (RDEK). Partners included the Nature Conservancy of Canada (NCC), the Nature Trust of British Columbia (TNTBC), BC Parks, and the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD). Activities included invasive plant inventories and management control activities at high priority conservation sites within the East Kootenay region.

Prior to field season commencing, a planning meeting was organized with all project partners, in order to select, prioritize, and strategize invasive species management and restoration on high-value lands across the Upper Columbia Valley and Upper Kootenay watershed. EKISC used information gathered at this meeting to plan invasive plant treatment and monitoring activities.

Goals and Objectives

Project activities were aimed towards retaining functional and sustainable ecosystems in protected areas by mitigating the impacts of invasive species in adjacent lands. Discrete goals included identifying and prioritizing high-value wildlife sites, reducing the number of invasive plant sites across conservation lands, monitor for effectiveness to ensure efficacy of treatments, and to restore sites with appropriate seed mixed to outcompete weed establishment.

This project aligns with FWCP Columbia Upland & Dryland Action Plan (*Priority 1: prevent and manage invasive species on, or adjacent to, conservation properties, restoration sites, and other ecologically sensitive areas AND invasive plant species control prior to restoration treatment*) and the Riparian & Wetlands Action Plan (*Priority 2: Monitor and treat terrestrial invasive species in wetland and riparian areas*) objectives. Overall, these actions will be focused on invasive species monitoring, early detection and rapid response, and control of established populations, as well as efforts to prevent the establishment of new invasive species populations.

This project also aligns with the Upper Kootenay Ecosystem Enhancement Plan (UKEEP) Upland & Dryland Action Plan (*Action 13a: Support the development of invasive species monitoring and rapid response plans and identify areas where invasive species are likely to establish or have already established AND Action 14ab: Support the control of invasive plant species (i.e. remove or reduce) prior to habitat restoration treatments*) and Wetland & Riparian Action Plan (*Objective 18a: Support the development of invasive species monitoring and rapid response plans and identify areas where invasive species are likely to establish or have already established*).

Invasive plant sites are monitored for treatment efficacy and to assess changes in distribution and abundance, and when possible, treated sites were restored using a site-appropriate seed mix. This project utilizes an ecosystem-based approach to restore and enhance priority habitats for grazing ungulates and other open forest habitat species. The benefits of this programming include the reduction of propagule pressure from neighbouring invasive populations, wildlife habitat conservation, long-term cost savings from potential future invasive species management

action, restoration of chemically treated areas with native plant species, and training of various land managers. This report summarizes the activities that were completed.

Management/Study Area

EKISC's jurisdiction lies within the Regional District of East Kootenay (RDEK) and has been divided into Invasive Plant Management Areas (IPMAs) as shown in Figure 1. Administrative duties and operational activities were conducted throughout EKISC's territory, with a focus on priority sites on conservation properties associated with essential wildlife habitat corridors and grassland conservation.

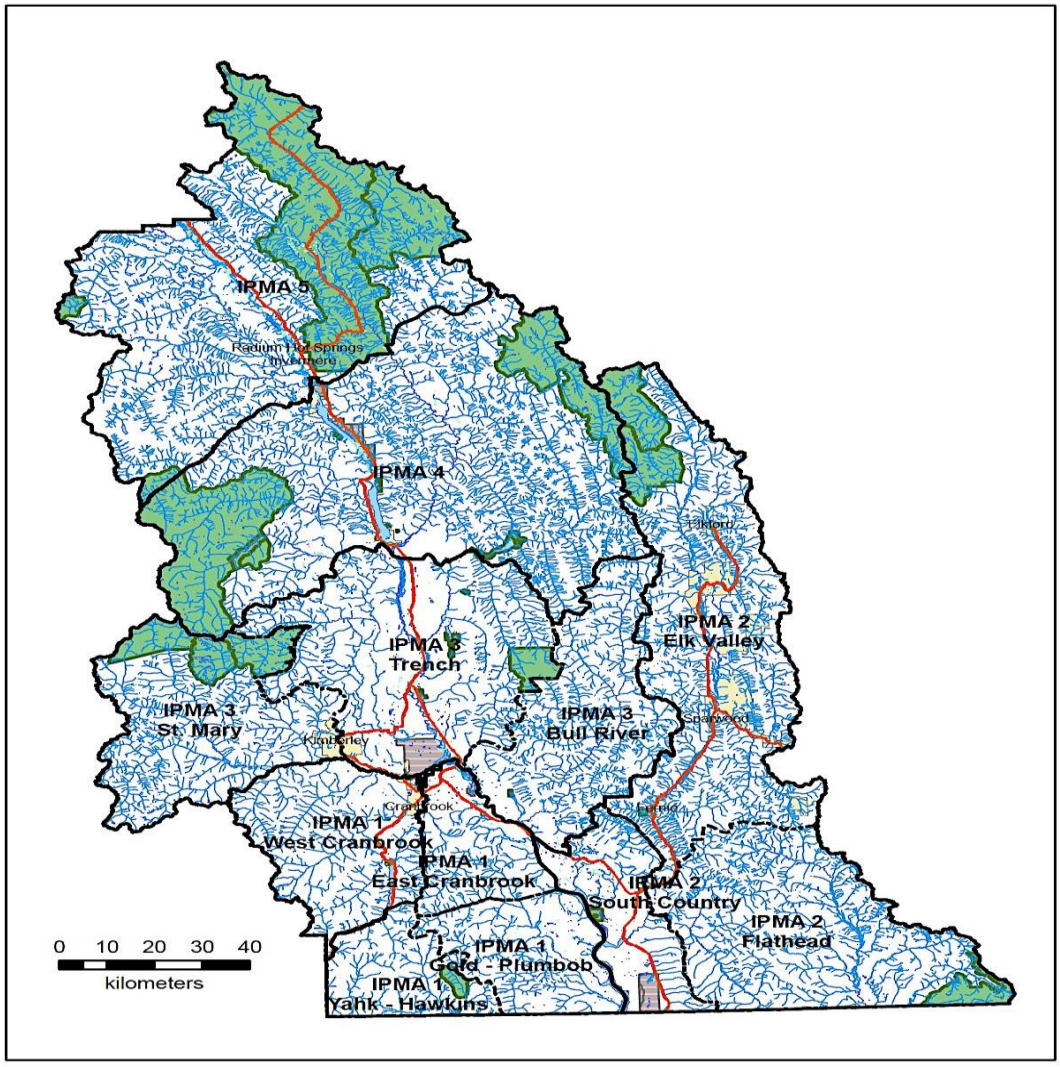


Figure 1 Invasive Plant Management Areas within the Regional District of East Kootenay.

Treatment Summary (Methods & Treatment Notes)

Invasive plant treatments commenced on May 22nd, 2018, and continued throughout the field season, ending on October 9th, 2018. A total of 335 sites were treated chemically across the RDEK, mechanically and with biocontrol. At several conservation properties, mechanical treatments were the most effective management option, as some sites were close to water, which disallowed the use of herbicides along the riparian zone. In addition, biological control (biocontrol) insects were surveyed, collected, and distributed at appropriate locations, where possible. This long-term management tool is useful for areas that will not be visited regularly or where herbicide treatment is not a viable option.

A total of 40,155.9 liters of herbicide mix was used, covering an area of 191.33 hectares. An additional 17.16 hectares were treated mechanically. Conservation properties that were chosen for invasive plant management in 2018 are described below, and treatment locations and herbicide use are outlined in Appendix II.

Conservation Properties

Below is a summary of treatments conducted at each conservation property in the RDEK. Appendix II contains treatment area summary tables (separated into chemical, mechanical, and biocontrol) and treatment maps for each conservation property.

BIG RANCH

Invasive plants on TNTBC's Big Ranch property were treated near the end of July. Invasive plant targets included orange hawkweed, spotted and diffuse knapweed, blueweed and St. John's wort.

BUMMERS FLATS

The EKISC field team managed four different invasive plant projects at Bummers Flats in the 2018 field season, including purple loosestrife, wood sage and wild parsnip, high priority species with limited distribution throughout the RDEK.

The first treatment in mid-June was a mechanical treatment of a 700m segment of spotted knapweed along the dyke from the water's edge to 1 meter (pesticide free zone - PFZ). The manual treatment was a collaborative pull with both EKISC and TNTBC field crews. In 2017, spotted knapweed plants along this segment were also chemically spot treated with glyphosate, a non-selective herbicide. Unfortunately, many desirable grasses were eliminated using this chemical. It had been recommended by EKISC that an application be made for a pesticide use permit exemption that would allow for the use of aminopyralid, a selective herbicide, in the buffer strip adjacent to the PFZ. This application was not successfully achieved, and therefore, glyphosate was used in September 2018 to chemically spot treat the spotted knapweed and bluebur, a secondary invasive plant invasion that occurred after the 2017 treatments. It is recommended that MFLNRORD apply for a pesticide use permit exemption for the use of aminopyralid within the 1-10m buffer zone, as stipulated on the herbicide label. It is imperative that bare spots that exist be planted with grass or shrubs in spring 2019 and chemical treatments occur on the dense spotted knapweed infestations.

Purple loosestrife mechanical treatment was conducted in the Bummers Flats wetland on July 25th, with 43 satellite infestations manually treated. This property has been an ongoing, collaborative project since 2013 with EKISC staff, TNTBC staff and volunteers from the Rocky Mountain Naturalists Society participating.

Wild parsnip was manually treated with clippers and grass trimmers twice during the 2018 field season. The wild parsnip infestation is located along the main access road west of the Canada Pacific Rail (CPR) line and extends for 300 meters. Several patches of wild parsnip located in the grassland areas north of the access road were also treated. The unmanaged wild parsnip along the CPR rail ballast is the source of infestation.

Several infestations of wood sage were treated on the hillside east of the CPR line. Wood sage is a priority one species in the East Kootenay, therefore all sites received a second pass treatment. Some plants were successfully treated through one pass, but other infestations required a second treatment in September. Wood sage infestations appear to be spreading and all new ones were observed, recorded and treated. Treatments of wood sage will continue going forward.

Bummers Pighin Property is Crownland managed by MFLNRORD. This property was treated mid-July and targeted burdock, spotted knapweed and hound's tongues. All treated species were sporadically distributed throughout the treatment polygon. Area controllers have conducted a series of adjacent treatment on the Bummers Pighin Property for the last four consecutive years starting from Lakit Road (2015) and heading north.

Figure 2 The EKISC crew collaborated with TNTBC, and the Rocky Mountain Naturalists Society for the annual purple loosestrife weed pull at Bummer's Flats.

CHERRY MEADOWS

Cherry Meadows is a property owned and managed by NCC. Currently, the former owner of the property is manually controlling the spotted knapweed on the property and would prefer that chemical treatments not be done. Money allocated for Cherry Meadows chemical treatments in 2018 was therefore redirected onto other NCC properties. An inventory of Cherry Meadow upland property was completed by EKISC staff. All spotted knapweed patches—located solely at the south end of the property—are currently well documented and were manually removed in conjunction with the inventory. There is continuous sporadic yellow hawkweed in openings on the south end of the property and density and distribution of yellow hawkweed will increase with time.

One recommendation for the south end would be to plant a quick growing tree species, such as lodgepole pine, in all historical landings. Inventory conducted also located and documented an infestation of sulphur cinquefoil and one patch of dalmatian toadflax on the north end of the property. It is recommended that these infestations be treated in 2019 to prevent further spread. It is necessary to respect the current landowner's request to continue manually treating (as opposed to chemically treating) the spotted knapweed unless permission to use chemicals is granted. The construction of the wetland in 2018 removed many Canada thistle plants, however, sporadic plants were re-establishing after soil disturbance and will continue to infest the wetland's riparian area.

COLUMBIA LAKE EAST

Invasive plant treatments at Columbia Lake East were a collaboration between MFLNRORD and TNTBC. One main priority for MFLNRORD allocation was chemical treatment of yellow hawkweed species; however, 2017 treatments by MFLNRORD staff were very successful and further treatment was not required in 2018. Funding was redirected into spotted knapweed management on the Shaw Tower and access roads throughout the property. Spotted knapweed infestations around the Shaw Tower Site have decreased in density through consecutive treatments (2015, 2016 and 2017) however, infestation has fanned out from the Tower Site and has spread onto grassland slopes beneath the rocky bluff. Treatments were extensive at the Shaw Tower Site and some funding was spent on spotted knapweed infestations below the bluffs.

COLUMBIA LAKE WEST

All Invasive Alien Plant Program (IAPP) sites on and adjacent to the property at the north end of Columbia Lake West were monitored and treated by the contractor in late June. The 2016 TNTBC summer crew had identified several yellow hawkweed infestations and one orange hawkweed satellite that were also monitored by the contractor and EKISC staff. To prevent spread, scentless chamomile, another priority 2 species, was treated on the northern access road outside of the west boundary. The south end of the Columbia Lake West property is comparatively clean. Existing IAPP sites at this end were treated in early September. Access through the property made reconnaissance difficult for the area controller and EKISC monitoring staff.

Sun Lakes is a MFLNRORD managed property and is adjacent to the Columbia Lake West TNTBC property. Prior treatments were conducted on the property in 2016 but not in 2017. Treatments

in 2018 occurred in early September targeting spotted knapweed and yellow hawkweed. The area controller found and treated several infestations of both species that had not been documented previously. Several spotted knapweed IAPP sites adjacent to the Sun Lakes property were also treated to prevent spread onto Sun Lakes Conservation Land. The area controller conducted an extensive reconnaissance of the Sun Lakes property monitoring for the presence of yellow hawkweed. Three infestations of small patches were treated.

Columbia Lake Lot 48 Conservation Property is owned and managed by NCC. It is adjacent to the MFLNRORD Columbia Lake East Wildlife Management Area (WMA) and Columbia Lake Provincial Park. Lot 48 has minimal invasive plants and is currently restricted to diffuse knapweed and spotted knapweed sites. It has been treated for four consecutive years starting in 2015 and less than 0.25 hectares of infestation has been treated annually. Treatments occurred in early August of this year. The spotted knapweed IAPP site has been reduced to a single patch; one diffuse knapweed site was eradicated by 2017 treatments and the other two diffuse knapweed sites have either a few sporadic individuals or a few patches in distribution.

EARL RANCH

The portion of the Earl Ranch field, scheduled for a wetland restoration project, was chemically treated in early June. Targeting Canada thistle and sulphur cinquefoil prior to wetland restoration. Early season treatment was planned to ensure the contractor could easily identify target species and before grasses were concealing them.

ELK VALLLEY HERITAGE CONSERVATION

The Elk Valley Heritage Conservation (EVHC) Property is owned by NCC. The property and adjacent Crownland has been treated consecutively since 2015 and the number of treatments has increased over the last four years. The working gravel pit on the EKHC property will continue to be a vector for invasive plant infestations particularly along the Hosmer Main and Branch Road. The property is also open to the public and easy access increases the introduction of invasive plants. 2018 treatments occurred in mid-August, targeting many invasive plant species including spotted knapweed, sulphur cinquefoil, scentless chamomile, wormwood, burdock and yellow toadflax.

HOODOO PROPERTY

The Hoodoo Property is collaboratively owned and managed by TNTBC and NCC and has been treated since 2016. Treatments on the TNTBC portion occurred in late July targeting spotted knapweed, a large infestation of diffuse knapweed on a machine disturbed site and a small infestation of common tansy (a priority 2 species). Yellow hawkweed is moving into the Hoodoo property on Hawke Road and the BC Hydro Line. There are also patches of cheat grass establishing on secondary/skid trails.

KOOTENAY RIVER RANCH (ISLAND AND PEBBLE POND)

Biocontrol (*Mogulones crucifer*) was released on a hound's tongues infestation on the west side of Highway 93/95. EKISC staff also recorded several hound's tongue satellites on the east side for future releases. Chemical treatments were conducted from mid-June to early July on the east

side of Highway 93/95. Continuous patches of spotted knapweed and yellow hawkweed with sporadic occurrences of St. John's wort were targeted along all old roadbeds and old landings adjacent to the roadbeds.

LOWER NORBURY/O'GRADY PROPERTY

The O'Grady property is owned and managed by TNTBC. The Gypsum Mine area is Crownland and is important habitat for bighorn sheep. Blueweed is well established on the Property and previous treatments have been minimal (2016). 2018 treatments were extensive and focused on continuous blueweed, patches of yellow hawkweed and sulphur cinquefoil. Treatments were conducted on all roads and trails, and behind the barn in late May. When additional funding became available, the eastside of the approaching driveway and in the field south of Fenwick Road were treated in late August. The Gypsum Mine area was treated in late May targeting yellow toadflax, blueweed and yellow hawkweed. In late June the area controller conducted a "touch up" treatment on the blueweed that had not responded to treatment in May.

LUXOR LINKAGE

Luxor Linkage is an NCC owned and managed property and has been consecutively treated for the last three years mainly targeting spotted knapweed. There are several large infestations of spotted knapweed on the west portion of the property that are mostly located on the old highway and road system. A leafy spurge infestation was identified by EKISC staff in 2017 and subsequently treated and three more infestations were inventoried and treated by the area controller in 2018.

MARION CREEK BENCHLANDS

Marion Creek is owned and managed by NCC. Frocklage Dam, on the Marion Creek Bench, has been consecutively treated by EKISC for the last four years, targeting spotted knapweed and Canada thistle. Prior to 2018, the dam was manually pulled by EKISC staff; however, in 2018, NCC staff conducted the manual treatment in the PFZ and EKISC used glyphosate on the top of the dam. Small infestations near the dam were also treated. Additional treatments were conducted by the area controller who targeted patches of spotted knapweed and burdock. Treatments are important on the NCC Marion Creek Bench as property boundaries are adjacent to TNTBC property that was also treated in 2018. Both organizations work collaboratively to control the spread of invasive plants.

MORRISSEY CONSERVATION PROPERTY

Morrisey Conservation property is owned and managed by NCC. Invasive plant treatments were conducted on the NCC Morrisey property in mid-September. The target species were wormwood, spotted knapweed, burdock, Canada thistle and caraway. Treatments focused on the homestead property, the old hay barn, and the riparian zones along the west side of the Elk River.

PINE BUTTE

Pine Butte is an NCC owned and managed property in the Wycliffe Wildlife Corridor. Pine Butte was treated in 2014, 2016 and 2017 targeting chicory, dalmatian toadflax, spotted knapweed and sulphur cinquefoil. 2018 treatments targeted extensive, continuous infestations of sulphur

cinquefoil and several patches of yellow hawkweed. A few sporadic spotted knapweed were also treated.

RED BARN

2018 invasive plant treatments at the Red Barn property were planned to occur early in the treatment season in preparation for a seeding project, and to treat yellow hawkweed at the bolting stage of plant growth. Glyphosate was applied in mid-June to treat the dense infestation of cheat grass in the lower field in preparation for the seeding project. Glyphosate treatments also targeted mullein and sulphur cinquefoil. Milestone was used in the remaining portion of the field targeting yellow hawkweed and sulphur cinquefoil. The access road through the upper Red Barn bench, as well as the bench perimeter, was treated in late June targeting yellow hawkweed, sulphur cinquefoil and spotted knapweed. Treatments extended into the fields (as far as a sprayer boom can reach), and satellites of spotted knapweed in the field were treated. The access road was treated up to the intersection with the Bull River Road. Previous treatments along the access road have successfully reduced the distribution and density of spotted knapweed and sulphur cinquefoil. Diffuse knapweed in 2018 was not present after 2017 treatments. Targeted yellow hawkweed will most likely be reduced in 2019.

The Ministry of Transport and Infrastructure (MOTI) funded manual treatments in the Bull River Bridge Parking Lot targeting spotted knapweed and blueweed. Dalmatian toadflax on the west side of the bridge was not treated. Manual treatments are not recommended because of the rhizomatous roots, and past chemical treatments have proven to be ineffective. It is recommended that biocontrol *(Mecinus spp.*) be released in 2019. A release of *Cyphocleonus achates* was completed in 2015 for spotted knapweed established along the Red Barn Access Road, so manual treatments were not conducted after sampling 20 plants. A blueweed patch and several Russian thistles were hand pulled in the riparian zone and road bank adjacent to the access road and Red Barn boundary.

SHEEP MOUNTAIN

The Sheep Mountain Property is owned and managed by TNTBC and is also Crownland managed by MFLNRORD. The Sheep Mountain Property has been treated for four consecutive years starting in 2015. St. Johns wort and sulphur cinquefoil have always been the target species on the property, however, there are smaller, less widespread infestations of blueweed and spotted knapweed. In 2017, the area controller treated yellow hawkweed, a species that is becoming prevalent through the Rocky Mountain Trench. Treatments in 2018 occurred in early July, targeting several well-spaced patches of St. John's wort and sulphur cinquefoil on the access road from the property boundary to the old truck (two passes on the east side of the road) as well as the east corner of the property. Two more treatments were conducted in August that were located adjacent to those done in the early July and focusing on St. John's wort, sulphur cinquefoil and a patch of burdock that was missed in early July. The home site access road, through the TNTBC property, was sprayed with Clearview in mid-July and cleaned up all the St. Johns wort plants that didn't respond to Milestone treatment in early July.

The Starr Ingram Property is Crownland managed by MFLNRORD. Treatments in mid-August targeted both St. John's wort and sulphur cinquefoil. Spotted knapweed had previously been treated in 2015, however, no spotted knapweed was observed at the IAPP site within the 2018 treatment polygon. Milestone was used at one treatment site and Clearview at the other.

THUNDER HILL

Thunder Hill Property is an NCC managed property and is adjacent to TNTBC Properties and Marion Creek Benchlands property. Thunder Hill property is free of invasive plants except for an infestation of burdock that has been treated for the past two years

WASA SLOUGH

The Wasa Slough has been consecutively treated for three years. In 2018, manual treatments were conducted in mid-June with a collaborative crew of TNTBC and EKISC staff. The top of the dike has very compacted soil and manual treatments rarely extract roots; therefore, VP 480 was used in 2017. Observations of the dike would suggest that manual and chemical treatments done in 2017 reduced the spotted knapweed. TNTBC management requested that glyphosate not be used in 2018; however, it is recommended that a glyphosate product be used in 2019 to increase effectiveness of reducing and controlling the spotted knapweed on the compacted dike surface and allow manual treatments to be focused on the east side of the dike. The Wasa Slough has been grass seeded in the past but has not been effective. It may be worth planting shrubs such as willow, or an increaser, for example, rose or snowberry.

WIGWAM FLATS

Invasive plant management at Wigwam Flats was a collaboration of treatments on TNTBC and MFLNRORD jurisdictions. Invasive plant treatments were conducted in late May, mid-June and early July. Species targeted included yellow hawkweed, St. John's wort, spotted knapweed and sulphur cinquefoil. 2018 treatments in the Wigwam Flats were adjacent to 2017 treatments. Treatments occurred along the main access road from the gate to the pipeline, the road from the orchard to the fishing parking lot, the apple orchard, openings of open range south of the apple orchard and the southern edge of treatment Unit 7 adjacent to the bluff treatments done in 2017.

WYCLIFFE WILDLIFE CORRIDOR

The Wycliffe Wildlife Corridor is managed by MFLNRORD and is adjacent to the NCC Pine Butte Ranch on the east side. The Corridor spans both sides of Highway 95A Kimberley. It has been treated for four consecutive years. In 2015, the invasive plant treatments focused on spotted knapweed; however, in 2016, yellow hawkweed species became established on the property and was subsequently treated. Treatments in 2018 focused on the trails off Stirton and Porteous Roads as well as the south west side of the highway. Treatments occurred in mid-July and mid-August targeting spotted knapweed, yellow hawkweed, dalmatian toadflax and sulphur cinquefoil.

Monitoring Summaries (Results) and Site-Specific Recommendations

Below is a summary of monitoring activities, along with successes and lessons learned for specific treatment areas. EKISC is continually taking inventory and assessing how treatment programs are progressing, determining if desired results are being achieved, and considering how invasive plant management could be improved upon in each area.

Big Ranch

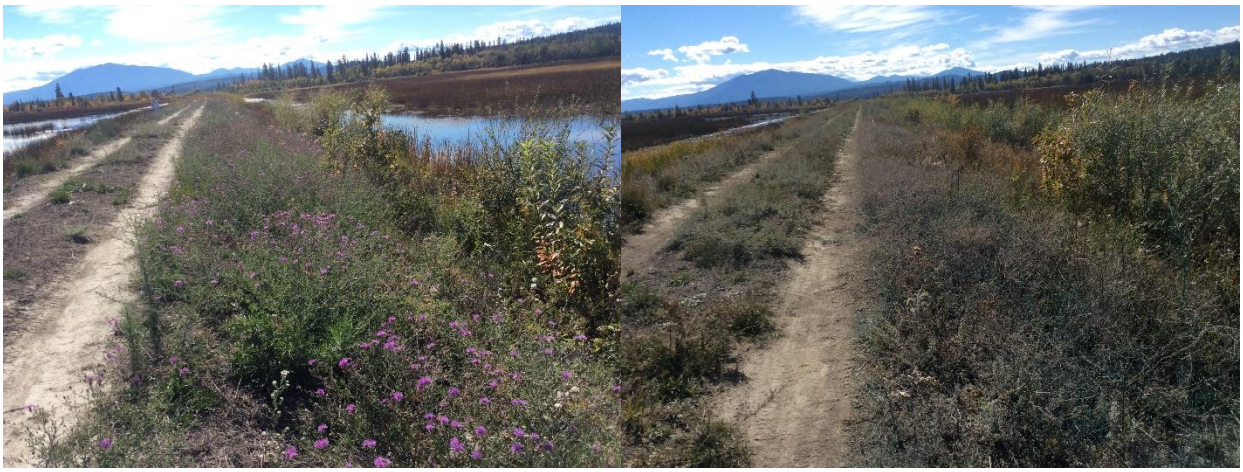
Three small orange hawkweed infestations inventoried by TNTBC in summer 2016 were visited by the area controller. One infestation was not observed by either the area controller or EKISC staff. This may have been a misidentification by the TNTBC summer crew. One orange hawkweed site was monitored, and treatments are assumed to be successful, though treated plants were not observed. Spotted knapweed infestations adjacent to the Elk River were all successfully treated, and any plants that were missed with herbicide application were hand-picked by EKISC staff. One infestation of spotted knapweed was misidentified as diffuse knapweed. There was no evidence of St. John's wort. Again, this may have been misidentified and realistically been golden rod. The blueweed infestation located on the Old Elk Valley Road required a second treatment by the area controller. It is recommended that any blueweed infestations be chemically treated, and seed heads clipped in 2019. Spotted knapweed at the old landfill at the north end of the Big Ranch property has been treated will require another treatment next year. The area did not appear to be treated in a grid pattern. A grid pattern is recommended for the 2019 treatment. There is a large, dense patch of Canada thistle in the old landfill site as well as frequent plants in opening adjacent to road vectors. Canada thistle is a low priority, established species in most invasive plant management areas. TNTBC may want to consider treating on the Big Ranch property if infestations are not riparian and become large and dense. It is recommended that a single wormwood and reed canary grass plant on the Big Ranch Property be treated in 2019 to prevent further infestation.

Bummers Flats

A total of 43 satellite populations of purple loosestrife were treated in 2018, which is a drop-in site from the 48 that were treated in 2017. It is recommended that biocontrol for purple loosestrife be released at this site; this will necessarily be a long-term treatment strategy but can be highly effective. The response of wild parsnip to manual treatment was monitored over the summer. The site required a second manual treatment in August. Ongoing management will be required to reduce and control this infestation.

(a) (b)

Figure 3 (a) Illustrates bare ground created after treatment – an area that could be planted to prevent re-establishment of invasive species, and (b) an infestation of bluebut post 2017 treatments.



(a) (b)

Figure 4 Spotted knapweed and bluebur (a) before glyphosate treatment, and (b) after glyphosate treatment.

Columbia Lake East

The Forest Service Road (FSR) on the way to the Shaw Tower was chemically treated, and all IAPP sites as far as Armstrong Bay and TNTBC Hilterman property boundaries were monitored for invasive plants and treated if required. Only a few sites required treatment, highlighting the success of previous treatments.

Monitoring indicates that spotted knapweed treatments at IAPP sites north of the Shaw Tower were all thoroughly and successfully treated. Treatments at the tower were also successful where they occurred, but there is still a large area that requires treatment. The Shaw Tower is critical habitat for big horn sheep. Preserving this habitat will require ongoing treatments and a large allocated annual budget. It is recommended that Shaw be collaborating with EKISC and MFLNORD by providing funding for treatment and by gating the property to prevent vehicle traffic, a vector for invasive plant movement.

The Columbia Lake Lot 48 site was not monitored in 2018 due to time constraints. It is recommended that treatments continue in 2019 and optimistically, both knapweed species will be eradicated within a few years if receiving consecutive annual treatments. Successful invasive plant treatments may leave bare ground, which is susceptible to further invasive plant infestation, need to be seeded and fertilized with native grasses and forbs. Consecutive yearly treatments will yield favorable results against the minimal knapweed sites found at Columbia Lake Lot 48.

Figure 5 Illustration of (a) previous successful treatment of spotted knapweed, and (b)resilience of spotted knapweed germination.

Figure 6 Image of 2018 treatments extended south of the Shaw Tower to where the land slopes.

Columbia Lake West

The orange hawkweed site was monitored by EKISC staff and the area controller, but no plants were observed. Unfortunately, the plant is difficult to observe unless in flower. Therefore, these locations should be monitored again in 2019. The yellow hawkweed infestations at the north end of the property were verified as successfully treated; however, hawkweed is becoming well established in the north end and funding would not allow all infestations to be treated. The main target species for treatment were spotted knapweed and common tansy, an EKISC priority 2 species. Milestone was used on the common tansy and although efficacy was fair, the plants may have only been suppressed. It is recommended that Grazon be used to treat common tansy in 2019 treatments. All treatments targeting spotted knapweed were successful, with only sporadic spotted knapweed plant observed on the follow-up/monitoring visit. It is easy to miss spotted knapweed in early treatments because of no visible flowers and leaves are small. Overall, the Columbia Lake West had excellent, thorough treatments.

Priority treatments in 2019 should focus on eradicating the common tansy found on the property and controlling the scentless chamomile to prevent infestation on the TNTBC property. The scentless chamomile IAPP site in the south end was monitored by the area controller and EKISC staff. Neither person observed any scentless chamomile at this time. 2013 treatments appear to have eradicated the small infestation. The scentless chamomile was located on an old logging disturbance prior to TNTBC purchasing the property. The site is vulnerable to invasive plant establishment and should be periodically monitored as a preventative measure. Access is a challenge.

Treatments of spotted knapweed monitored on the Sun Lakes property and Sun Lakes access road were very successful. It was difficult to access the yellow hawkweed sites with a truck therefore monitoring of those treatments was not conducted. Cold weather conditions during

early September or the hardened leaf cuticle made it difficult to successfully treat the dalmatian toadflax.

Earl Ranch

Continuous, frequent Canada thistle was the primary target of chemical treatments at the Earl Ranch. Other species included patches of sulphur cinquefoil and yellow hawkweed. Treatments were very successful. The area treated is an extremely rich, moist site and, at the time of monitoring, grasses had attained a height of 75 to 90 centimeters. Figures 7 a & b illustrate the success of spring treatment, the competitive grasses observed in early July and why early spring treatment was the best treatment option.

The area treated by herbicide will be restored to wetland in 2019, however, it is likely that Canada thistle will continue to grow around the edges of the wetland. A small portion of the wetland was treated with VP 480 Glyphosate. Results were mixed and there are large patches of Canada thistle in the riparian zone that remain untreated. It is important to retain grass coverage in the riparian zone, and therefore it is recommended that MFLNRORD apply for a pesticide use permit exemption for the use of aminopyralid within the 1-10m buffer zone, as stipulated on the herbicide label.

The baby's breath infestation on the upper field was manually treated on June 18th. As much of the crowns as possible was dug up to prevent new shoots from growing. Shoots will not grow from the roots. The results of the manual treatment should be monitored in 2019 to observe the efficacy of this type of manual treatment for baby's breath.

Cheat grass is very prevalent throughout the Earl Ranch property, along the roads and hillsides. A management plan for cheat grass is strongly recommended at this property.

Figure 7 Earl Ranch (a) after spring treatment, and (b) later in the summer after aggressive grass regrowth.

Elk Valley Heritage Conservation Property

Monitoring of the property indicated that treatment efficacy and site completion in late August were satisfactory, however additional treatment was requested on some treatment sites. Several sites were also missed, and treatment of those sites was requested as well. Retreatment requested by EKISC may not have occurred, but should be done in 2019 at area controller's expense. The gravel pit will continue to be a vector for invasive plant management thus continual treatments are required to contain the infestation to the gravel pit and control and reduce other infestation outside of the gravel pit footprint. It is recommended that consecutive treatments continue for several years focusing on current infestations along Hosmer Main and Branch Roads. One option is to focus treatment dollars on one section of the property in 2019, and intensively treat all invasive plant species. Openings along Hosmer Main Road have good grass coverage but invasive plants such as sulphur cinquefoil, wormwood and burdock are establishing. In 2019, treating wormwood and burdock in the openings as well as along the road should be a focus.

Hoodoo Property

Several spotted knapweed sites, common tansy and diffuse knapweed were monitored. All treatments had excellent efficacy and completion. Applying Aspect on common tansy produced excellent results. The heavily disturbed area with diffuse and spotted knapweed will require more treatments as the area is large and there will be a substantial seed bank.

Kootenay River Ranch

Monitoring 2018 treatments indicated successful reduction of spotted knapweed and yellow hawkweed. Yellow hawkweed will most likely continue to spread to the Kootenay River Ranch from adjacent Crownland. It will be necessary to continue monitoring spotted knapweed along skid trails (sporadic plants were missed) and more extensive treatments on landings at the south end will be required. The 2017 wildfire in the Kootenay River Ranch has produced some very favourable vegetation coverage, that is, mostly grasses. There is a mixture of both native forbs—fireweed and aster—and nuisance weeds—mullein and lamb's quarters—but no evidence of noxious weeds after one year of recovery. It is important to continue monitoring for invasive plants that will inevitably establish on the burn.

Lower Norbury / O'Grady Property

The grid pattern treatment used by the area controller at O'Grady's property was very successful with few live rosettes observed during monitoring, except behind the barn, east of the homesite. More treatments will be required behind the barn, as the blueweed seed bank is well established. Grass seeding mineral soil in this area would be a further recommendation. Ongoing, consecutive chemical treatments of blueweed will be required on the property. To further reduce and control, it would also be worth allocating a day for the TNTBC summer crew to deadhead blueweed behind the barn. This will further eliminate the future seedbank in this area.

Treatments of the sulphur cinquefoil were successful and no yellow hawkweed was observed. The Gypsum Mine treatments targeting yellow toadflax and blueweed were very successful. Figures 8 a & b illustrates the successful treatment of yellow toadflax. The 2017 treatments had reduced the blueweed significantly in some of the Gypsum Mine areas. Blueweed will continue

to be an ongoing problem in this area; however, consistent treatments will reduce and control the infestations. Unfortunately, some of the areas treated are bare except for moss. This may be the effect of too much herbicide applied over several years.

Figure 8 Before (a) and after (b) successful yellow toadflax treatments.

Luke Creek Wildlife Corridor

Monitoring indicated that treatments were very successful (see Figures 9 a & b) but there is still a large and continuous infestation of sulphur cinquefoil on the property, and consecutive adjacent treatments will be required into the future if the objective is to reduce and control it. There are large infestations of mullein on the property and many rosettes were observed. These infestations will continue to increase in distribution and density. The Luke property is heavily grazed by cattle, which can increase invasive plant infestations.

Figure 9 (a) Successful sulphur cinquefoil treatments, and (b) prolific mullein rosettes.

Luxor Linkage

Monitoring several treatments of the target species indicated good success. Consecutive treatments have controlled and substantially reduced the distribution and density of spotted

knapweed on the east side of the Luxor property. Treatment efficacy on the leafy spurge was also very good but sporadic plants have popped up outside the treatment boundaries. The Luxor property east side is very clean with few weeds of concern, but an annual reconnaissance is recommended. The yellow hawkweed inventoried and successfully treated in 2017 should be a high priority for inventory in 2019. Invasive plant treatments should continue in 2019 on current infestations. The area controller is very thorough and is doing an excellent job. The area controller also successfully treated Kindersley FSR, a vector for invasive plants that goes through the Luxor property.

Morrissey Meadows

The spotted knapweed and wormwood adjacent to the Elk River were successfully treated. The burdock treated throughout the homestead demonstrated a degree of efficacy, but some plants were either not treated or did not respond to the Milestone applied. The caraway and Canada thistle infestations around the old homesite were dense and continuous prior to treatment and although treatments were effective, this extensive infestation will be difficult to control and reduce.

It is recommended that treatments in 2019 should consist of “touch ups” of 2018 treatment and if funding is available treat adjacent to 2018 treatment. An infestation of yellow toadflax, west of the river, was not treated because it was too close to water to apply chemicals. It is currently a small infestation and it is recommended that glyphosate be used in 2019 to prevent an increase in distribution and density.

Pine Butte

2018 treatments monitored were successful, but it is recommended the area controller in 2019 create treatment polygons to better track invasive plant management progress into the future. The extensive sulphur cinquefoil on the Pine Butte property will require ongoing treatments and collaboration with MFLNRORD along the borders between the two jurisdictions. Sulphur cinquefoil is widespread through the Wycliffe Prairie and at best can only be reduced on a site-specific basis. There are sections of Pine Butte that are not infested with continuous sulphur cinquefoil. A reconnaissance and demarcation of these areas would be worthwhile, and all future treatments should radiate out from these more integral ecosystems.

Red Barn

Glyphosate treatments in the lower field were successful with only a few small patches of live sulphur cinquefoil and sporadic mullein observed; however, a dense infestation of mullein rosettes was also observed after seeding. These were subsequently treated with Grazon mid-August. Unfortunately, the grass seeding was not successful due to drought conditions. The remainder of the lower field was successfully treated with Milestone targeting yellow hawkweed and sulphur cinquefoil.

Previous treatments along the access road have successfully reduced the distribution and density of spotted knapweed and sulphur cinquefoil. Diffuse knapweed was completely eradicated by 2017 treatments. In 2018, all treatments for continuous yellow hawkweed and sporadic

individuals of spotted knapweed, sulphur cinquefoil and blueweed were very successful. Targeted yellow hawkweed will most likely be significantly reduced in 2019. It is recommended that treatments continue on the Red Barn property focusing on the upper fields. Treatments will reduce the sulphur cinquefoil and yellow hawkweed that will inevitably spread into the fields.

Figure 10 Successful treatment of sulphur cinquefoil.

Sheep Mountain Property

The treatments along the access were successful in treating sulphur cinquefoil, however, Milestone may not be as effective in treating the St. John's wort. The area controller did go back to the property mid-August and re-treat the St. Johns wort along the home site access road. The treatment in the east corner of the property was successful in treating both species, which is puzzling as both areas were treated on the same day with Milestone at the same application rate. The only difference would have been time of day with the access road being treated at 7 AM and the field at 8:45 AM.

There are large infestations of mustard and cheat grass in the field south of the home site where 2018 treatments were conducted. There are also continuous sporadic goatsbeard, an invasive plant considered a nuisance weed. The controller treated a patch of catchweed, another nuisance species related to blueweed. This species has become problematic on farm and ranchland in the southern East Kootenay area. Local ranchers say the plant may be coming in on hay purchased from Creston. Treatments were done at two different times (late fall and early summer) using two different herbicides (Milestone and Clearview). Herbicide efficacy could be monitored in the spring to observe any significant difference between herbicides. Significant differences may determine future treatment options. It is recommended that treatments continue on the Sheep Mountain Conservation Property. There have been several different contractors that have worked on the property and it would be important to maintain consistency of controllers.

Producing a map that illustrates polygon treatments is also recommended to efficiently plan adjacent polygons scheduled for treatment in 2019.

The Starr Ingham treatments were not monitored by EKISC due to time constraints. The area controller who treated Starr Ingham was the same controller who treated adjacent Sheep Mountain TNTBC Property. EKISC expects both properties to have similar and successful treatments.

Thunder Hill

Treatments at Thunder Hill were to be conducted by EKISC staff; however, the area controller treated out of routine, as they had completed that treatment the past two consecutive years. Treatment in 2018 was very successful and may have eradicated the burdock infestation in the corral. An infestation of spotted knapweed on the BC Hydro line was monitored and was successfully eradicated. The site should continue to be monitored. Sulphur cinquefoil is on the BC Hydro property and may threaten Thunder Hill. EKISC plans to continue monitoring its spread as needed. Patches of poisonous water hemlock are present throughout the wetland but are of no concern in the absence of cattle grazing.

Wigwam Flats

Treatments were successful at this later date as yellow hawkweed and St. John's wort were easier to observe when in flower. Treatments done in 2017 appeared to be successful but where required, the area controller had done "touch up" treatments. All 2018 treatments were deemed successful, apart from small patches of sulphur cinquefoil and St. John's wort that were missed, especially the upper east edge of the apple orchard. St. John's wort also appears to have either sprouted after treatment or not responded to treatment. The Milestone application rate may not be as effective on St. John's wort as it is on the other targeted species. Area controllers prefer to use Milestone on conservation properties and if this preference continues it is recommended that they consider increasing the rate of litres per hectare for treating St. John's wort. Treatments in Wigwam Flats should continue in 2019 and occur adjacent to land treated in 2018 or 2017. It is recommended that area controllers doing the work be retained on the property. Historical knowledge of past treatments brings consistency is an important component of invasive plant management plans.

Figure 11 Images of treatment areas post-herbicide application.

Wycliffe Wildlife Corridor

Only the Stirton and Porteous Road trails were monitored, indicating that treatment of spotted knapweed was thorough. Yellow hawkweed treatment was successful; however, funding was not adequate for complete treatments and the infestation is growing. Treatment of Dalmatian toadflax was satisfactory, but several plants did not respond to the Clearview treatment, most likely a reflection of treatment date. Dalmatian toadflax responds to treatment more favorably when the leaf cuticle is more pliable in the spring. It is recommended that treatment of the yellow hawkweed continue long term. The sulphur cinquefoil is many large, dense patches of sulphur cinquefoil on the east side of the highway and will never be controlled without substantial ongoing funding.

Discussion and Overall Program Recommendations

This project has allowed for continued development of multiple partnerships between EKISC and conservation land managers across the Columbia Valley and Upper Kootenay region, allowing EKISC to maintain a level of coordinated management programs on adjacent public lands, thus reducing long-term costs and maintenance associated with the spread of invasive plants.

Many of the invasive plant inventories, chemical and mechanical treatments, and biocontrol treatments across conservation lands in the East Kootenays were considered as success but do require continued monitoring and treatments. Many treatment areas have seen marked improvement after consecutive treatments, and new invasions have been located, inventoried, and treated as well. Due to time and fiscal constraints, some restoration activities were not completed as expected. For example, native seed mix was not spread at all hand-pulling sites or planned treatment locations. It is recommended that restoration efforts, such as spreading native seed mix and planting, is continued during 2019 monitoring visits.

Overall, the collaboration between EKISC and partnering conservation land managers based within the East Kootenay has allowed for efficient and timely delivery of an invasive plant management plan on conservation properties. In addition to the site-specific recommendations

outlined above, overall program recommendations to ensure a more effective long-term management strategy include:

- Increased budget for invasive plant inventory, treatments and monitoring
- Conduct invasive plant inventories on the areas where the status of invasive plant is unknown
- Provide employees with additional invasive plant identification training to assist with inventory of invasive plants in remote areas
- Communication with EKISC staff throughout the year of known or new invasive plant sites that need to be inventoried and/or treated
- Once again, participation by all conservation land managers in an invasive plant treatment planning meeting with EKISC in the spring of 2019 to create a strategic plan for invasive plants on priority conservation properties
- Obtain and release biocontrol at Bummers Flats for purple loosestrife
- Apply for a pesticide use permit exemption for the use of aminopyralid, a non-selective herbicide, for use within the 1-10m buffer zone around water and specific sites
- Collaborate with other land managers including Ecosystem Restoration experts for a wider scope of invasive plant management in the East Kootenay region
- Encourage use of proper invasive plant management practices when working on conservation properties:
    - Cleaning boots and pants free of plant materials on site
    - Spraying trucks or ATVs to prevent the transport of seeds
    - Seeding immediately after any land disturbances
    - Staying on dirt roads or skid trails as much as possible

Acknowledgements and Partner Contributions

This project is funded by the Columbia Basin Trust and Fish and Wildlife Compensation Program (FWCP). The FWCP is partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations and public stakeholders to conserve and enhance fish and wildlife in watersheds impacted by BC Hydro dams. EKISC also acknowledges the partnership contributions of The Nature Trust of BC, Nature Conservancy of Canada, Ministry of Forests, Lands, Natural Resource Operations & Rural Development, and BC Parks.

Appendix I

Table 1 Invasive species acronym list.

Acronym	Invasive Plant
BT	Bull thistle
BU	Burdock spp
BW	Blueweed
BY	Baby's breath
CA	Caraway
CT	Canada thistle
DK	Diffuse knapweed
DT	Dalmatian toadflax
HC	Hoary cress
HT	Hound's tongue
LS	Leafy spurge
MU	Mullein
OD	Oxeye daisy
OH	Orange hawkweed
PL	Purple loosestrife
RT	Russian thistle
SC	Sulphur cinquefoil
SH	Scentless chamomile
SJ	St John's wort
SK	Spotted knapweed
YH	Yellow hawkweed species

Appendix II

The following figures and tables summarize treatment data for each conservation property, and includes information on species treated, treatment method, amount of herbicide used, and total area treated.

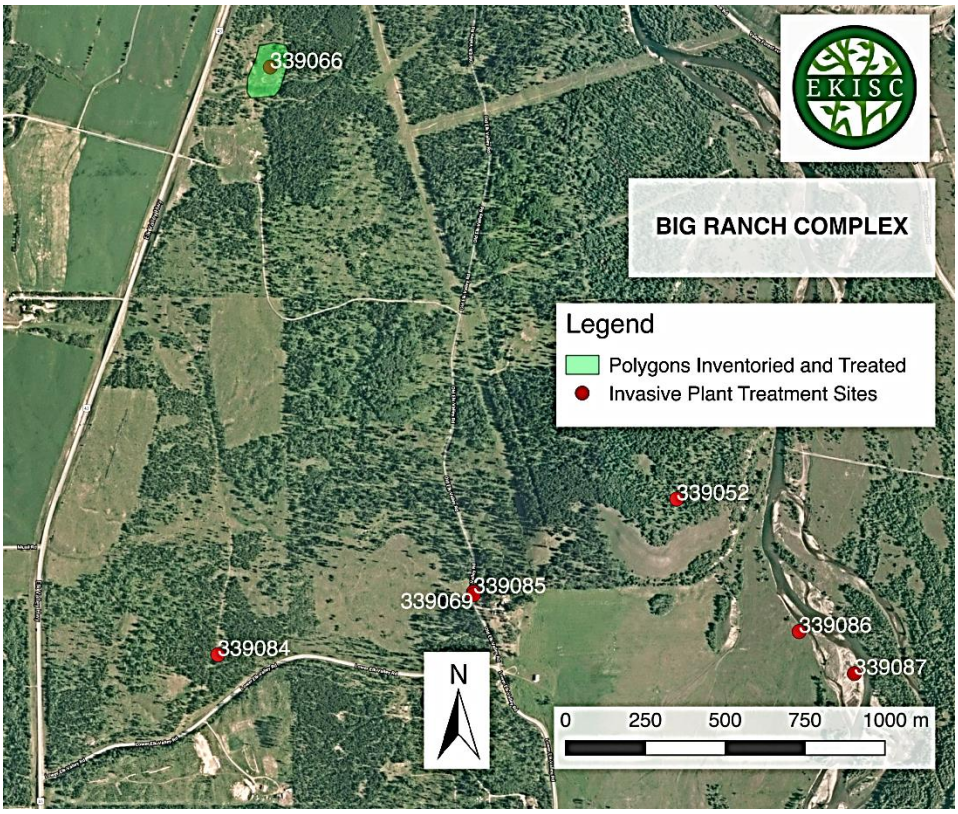


Figure 12 Map of 2018 chemical treatment sites at Big Ranch Complex.

Table 2 2018 chemical treatment data for Big Ranch Complex.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Big Ranch	339052	July 25, 2018	OH	Milestone	3.5	0.0039	0.0078
	339066	July 25, 2018	SK	Milestone	62	0.0719	0.25
	339069	September 17, 2018	BW	Clearview	3	0.0018	0.009

	339084	July 25, 2018	OH	Milestone	1.5	0.0017	0.003
	339085	July 25, 2018	BW	Clearview	1	0.0006	0.003
	339086	July 25, 2018	HT	Vantage XRT	0.5	0.0067	0.001
	339087	July 25, 2018	DK	Vantage XRT	1	0.0133	0.002
	Total				72.5L	0.0999	0.2744ha

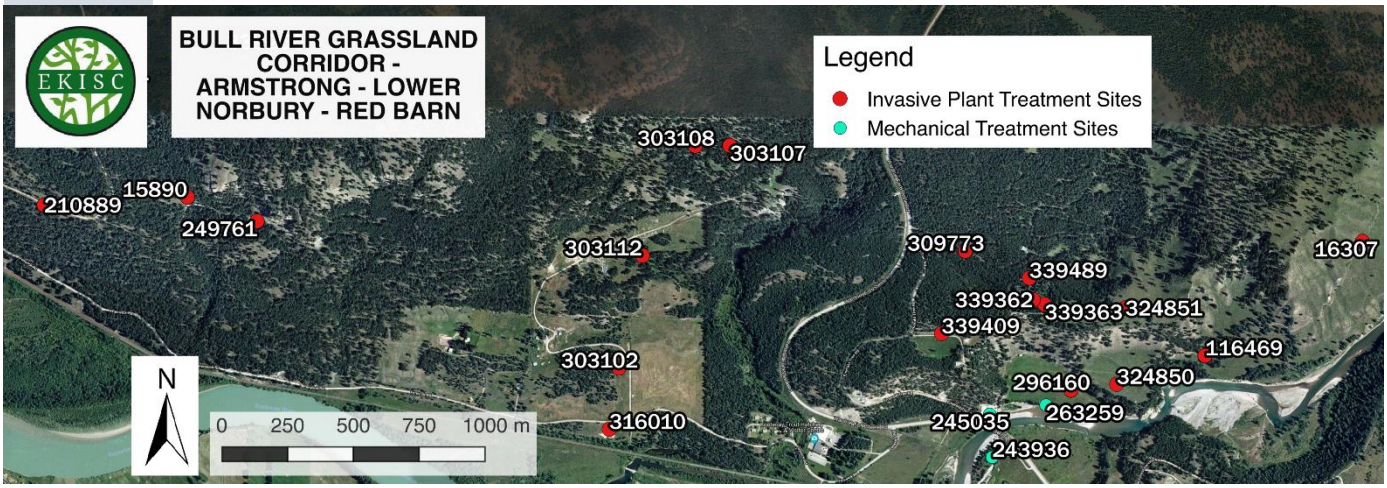


Figure 13 Map of chemical treatment locations at Bull River Grassland Corridor, Armstrong, Lower Norbury/O'Grady & Red Barn.

Table 3 2018 chemical treatment data at Bull River Grassland Corridor, Armstrong, Lower Norbury/O'Grady & Red Barn.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Bull River Grassland Corridor, Armstrong, Lower	15890	September 7, 2018	SK, SJ, YH	Clearview	10	0.0115	0.05
	16307	June 25, 2018	BW, SK, YH	Clearview	150	0.1725	0.75

Norbury/O'Grady & Red Barn	116469	June 25, 2018	SK, SC, YH	Clearview	40	0.46	0.2
	210889	June 25 & 27, 2018	BW, SK, SC, YH	Clearview & Milestone	300	0.4325	1.3952
	249761	September 7, 2018	BW, SK	Clearview	20	0.023	0.1
	296160	May 27 & August 19, 2018	SC, YH, MU	Grazon, Tordon 22K, Milestone, VP480 Glyphosate	2030	23.3055	9.4418
	303102	May 29, 2018	BW, YH	Clearview	1350	1.2555	6.279
	303107	May 30, 2018	BW, SC, YH	Clearview	750	0.6975	3.4884
	303108	May 31, 2018	SC, YH	Milestone	800	1.4136	3.7209
	303112	May 29, 2018	BW, SC, YH	Clearview	50	0.0465	0.2326
	309773	July 21, 2018	BW, BU, SJ	Clearview	110	0.1265	0.55
	316010	September 25, 2018	BW	Clearview	1500	1.6050	6.9767
	324850	June 25, 2018	YH	Clearview	20	0.023	0.1
	324851	May 25, 2018	SC, YH	Milestone	450	0.7952	2.093
	339362	June 21, 2018	BU, CD, WM	Tordon 22X	500	15.0	3.3333

	339363	May 25, 2018	BU, YH	Tordon 22X	150	3.1395	0.6977
	339409	June 21, 2018	YH	Clearview	180	0.2399	1.2
	339489	June 21, 2018	BW, YH	Clearview	50	0.0667	0.3334
	Total				8460L	48.3998L/Kg	40.942ha

Table 4 2018 mechanical treatment data at Bull River Grassland Corridor, Armstrong, Lower Norbury/O'Grady & Red Barn.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Area Treated (ha)
Bull River Grassland Corridor, Armstrong, Lower Norbury/O'Grady & Red Barn	243963	July 24, 2018	BW	0.01
	245035 *Ministry of Transportation site	July 23, 2018	BW, RT	0.025
	263259	July 24, 2018	SK	0.8
	Total			0.835

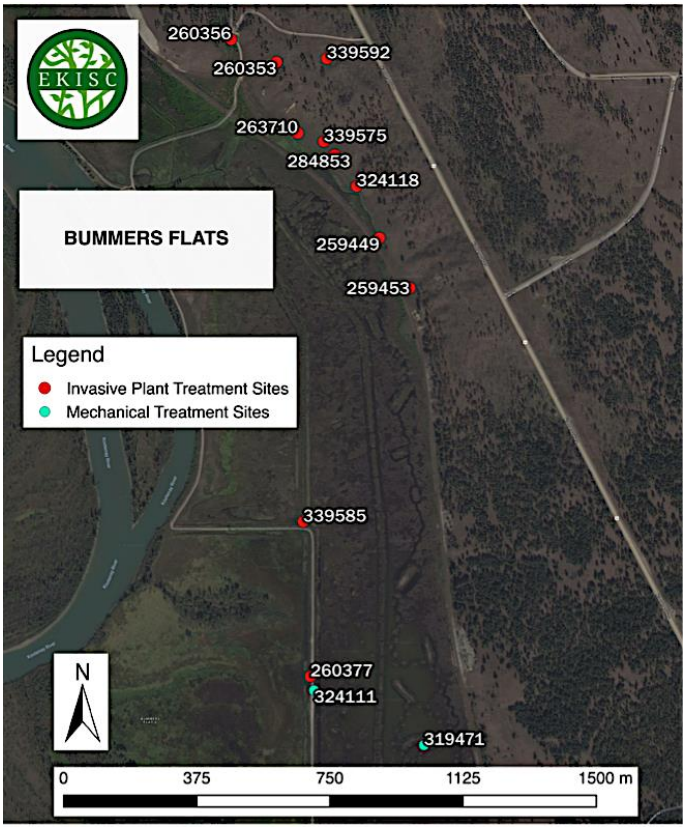


Figure 14 Map of chemical treatment locations at Bummers Flats.

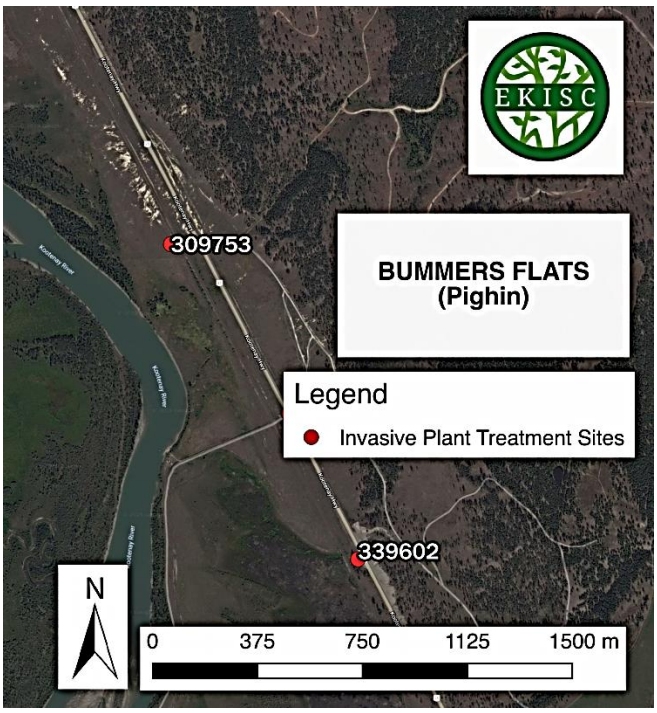


Figure 15 Map of chemical treatment locations at Bummers Flats (Pighin).

Table 5 2018 chemical treatment data at Bummers Flats.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Bummers Flats	259449	July 10, 2018	WS	Tordon 22K	0.8	0.008	0.0018
	259453	July 10, 2018	WS	Tordon 22K	2	0.02	0.0044
	260356	July 11, 2018	WS	Tordon 22K	4	0.04	0.0089
	260377	September 25, 2018	SK	VP480 Glyphosate	18	0.3150	0.045
	263710	July 10, 2018	WS	Tordon 22K	0.2	0.0002	0.0004
	309753	July 10, 2018	BU, HT, SK	Tordon 22K	70.5	0.1406	0.3511
	324118	July 10, 2018	WS	Tordon 22K	0.5	0.0006	0.0011
	339575	September 24, 2018	WS	Tordon 22K	0.75	0.0113	0.0025
	339585	July 4, 2018	SK	VP480 Glyphosate	15	0.1500	0.0333
	339592	July 26, 2018	WS	Tordon 22K	1	0.0113	0.0025
	339602	July 11, 2018	WS	Tordon 22K	0.5	0.0050	0.0011
	Total				113.25L	0.7018	0.4521ha

Table 6 2018 mechanical treatment data at Bummers Flats.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Area Treated (ha)
Bummers Flats	319471	July 25, 2018	PL	2.4
	324111	June 12, 2018	SK	1.6
	No site ID	June 29 & August 9, 2018	WP	0.03
	Total			4.03ha

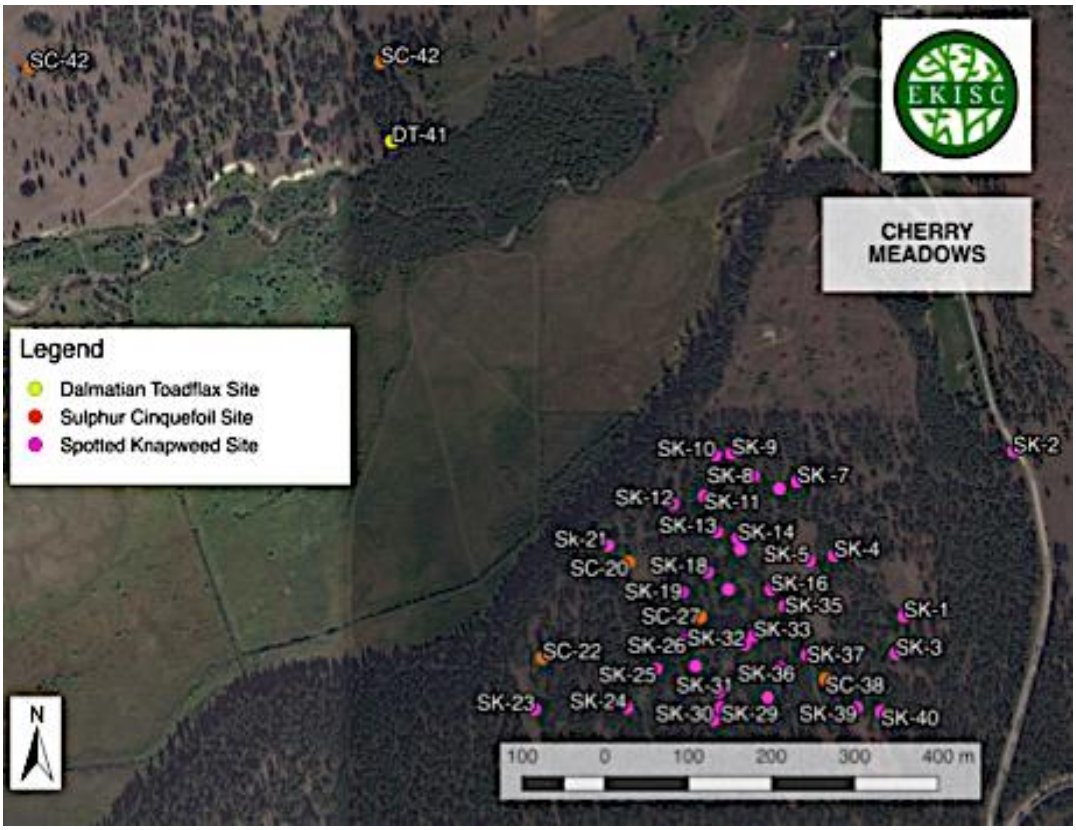


Figure 16 Map of chemical treatment locations for Cherry Meadows.

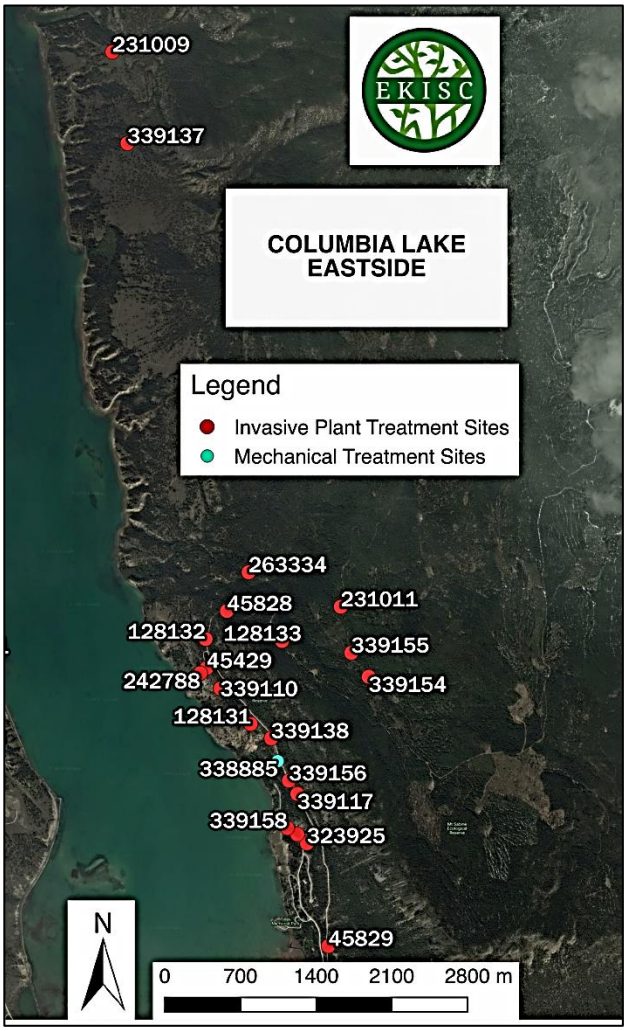


Figure 17 Map of treatment locations for Columbia Lake Eastside.

Table 7 2018 chemical treatment data at Columbia Lake Eastside.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Columbia Lake Eastside	45429	August 25, 2018	SK	Milestone	30	0.0750	0.1500
	45828	August 26, 2018	SK	Milestone	3	0.0075	0.0150

	45829	August 12, 2018	SK	Milestone	30	0.0750	0.1500
	128131	August 25, 2018	SK	Milestone	20	0.0500	0.1000
	128132	August 25, 2018	SK, YH	Milestone	105	0.2625	0.5251
	128133	August 26, 2018	SK, YH	Milestone	6	0.0030	0.03
	231009	August 26, 2018	SK	Milestone	6	0.0150	0.0300
	231011	August 26, 2018	SK	Milestone	12	0.0300	0.0600
	263334	August 26, 2018	SK	Milestone	9	0.0225	0.0450
	323925	August 12, 2018	SK	Milestone	15	0.0375	0.0750
	339110	August 25, 2018	SK, YH	Milestone	150	0.4	0.8
	339117	August 25, 2018	SK	Milestone	5	0.0125	0.0250
	339137	August 26, 2018	SK	Milestone	5	0.0125	0.0250
	339138	August 25, 2018	SK	Milestone	10	0.0250	0.0500
	339154	August 26, 2018	YH	Milestone	4	0.0100	0.0200
	339155	August 26, 2018	YH	Milestone	2	0.0050	0.0100
	339156	August 25, 2018	SK	Milestone	5	0.0125	0.0250

	339158	August 12, 2018	SK	Milestone	2	0.0050	0.0100
	Total				429L	1.0725L/Kg	2.1451ha

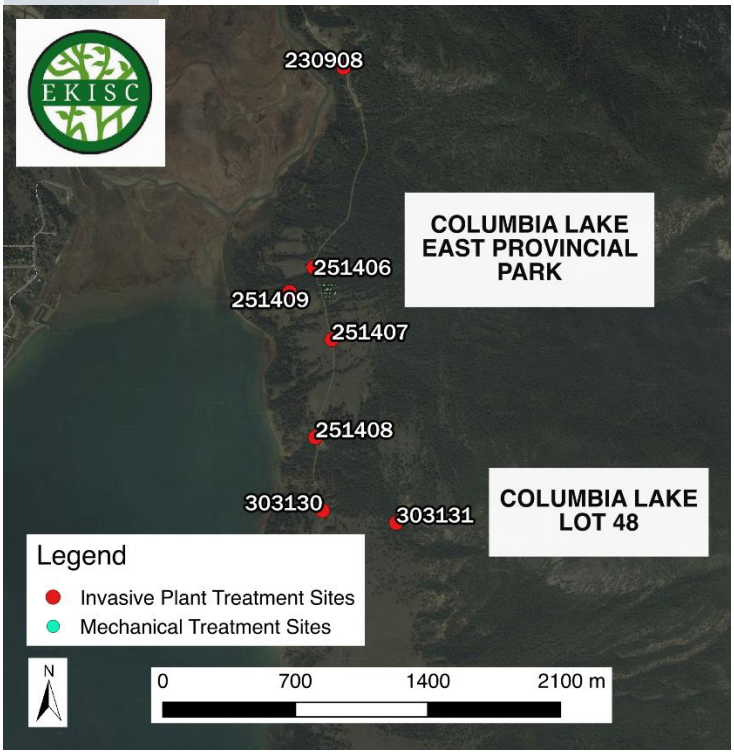


Figure 18 Map of treatment locations for Columbia Lake East Provincial Park and Lot 48.

Table 8 2018 chemical treatment data at Columbia Lake East Provincial Park & Lot 48.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Columbia Lake East Provincial Park & Lot 48	230908	August 1, 2018	DK, SK	Milestone	15	0.0375	0.075
	251406	August 1, 2018	DK, SK	Milestone	3	0.0075	0.015
	251407	August 1, 2018	DK	Milestone	5	0.0125	0.025

	251408	August 1, 2018	DK	Milestone	10	0.025	0.05
	251409	August 1, 2018	DK, SK	Milestone	5	0.0125	0.025
	303130	August 1, 2018	DK	Milestone	6	0.015	0.03
	303131	August 1, 2018	DK	Milestone	15	0.0375	0.075
	Total				59L	0.1475L/Kg	0.295ha

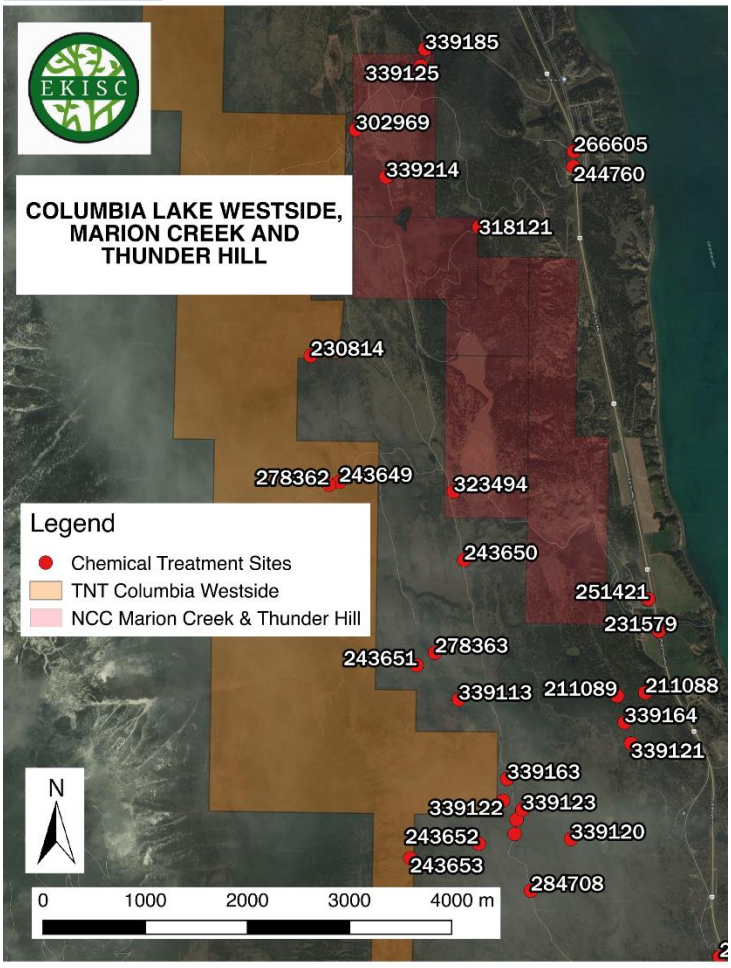


Figure 19 Map of chemical treatment locations at Columbia Lake Westside, Marion Creek Benchlands & Thunder Hill Ranch.

Table 9 2018 chemical treatment data for Columbia Lake Westside, Marion Creek Benchlands & Thunder Hill Ranch.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Columbia Lake Westside, Marion Creek & Thunder Hill	211088	September 4, 2018	SK	Milestone	10	0.025	0.050
	211089	September 4, 2018	SK	Milestone	25	0.0625	0.125
	230814	September 7, 2018	SK	Milestone	2	0.005	0.01
	243649	September 5, 2018	SK	Milestone	10	0.025	0.05
	243650	September 5, 2018	SK	Milestone	2	0.005	0.01
	243651	September 5, 2018	SK	Milestone	10	0.025	0.05
	243652	September 4, 2018	SK	Milestone	5	0.0125	0.025
	243653	September 5, 2018	SK	Milestone	35	0.0875	0.175
	278362	September 5, 2018	SK	Milestone	6	0.015	0.03
	278363	September 5, 2018	SK	Milestone	2	0.005	0.01
	284708	September 4, 2018	SK	Milestone	7	0.0175	0.035
	318121	July 31 & August 1, 2018	SK, BU	VP480 Glyphosate	17.5	0.118	0.0833

				& Lontrel 360			
	323494	July 27, 2018	BU	Milestone	3	0.0075	0.015
	339113	September 5, 2018	SK	Milestone	15	0.0375	0.075
	339120	September 4, 2018	YH	Milestone	100	0.25	0.5
	339121	September 4, 2018	SK	Milestone	10	0.025	0.05
	339122	September 4, 2018	YH	Milestone	30	0.075	0.15
	339123	September 4, 2018	YH	Milestone	8	0.02	0.04
	339125	July 31, 2018	YH	Lontrel 360	15	0.0525	0.075
	339163	September 4, 2018	SK, BU	Milestone	10	0.025	0.05
	339164	September 4, 2018	SK	Milestone	8	0.02	0.04
	339185	July 31, 2018	SK	Lontrel 360	3	0.0105	0.015
	339214	July 31, 2018	SK	Lontrel 360	2	0.007	0.01
	Total				335.5L	0.9258L/Kg	1.1783ha

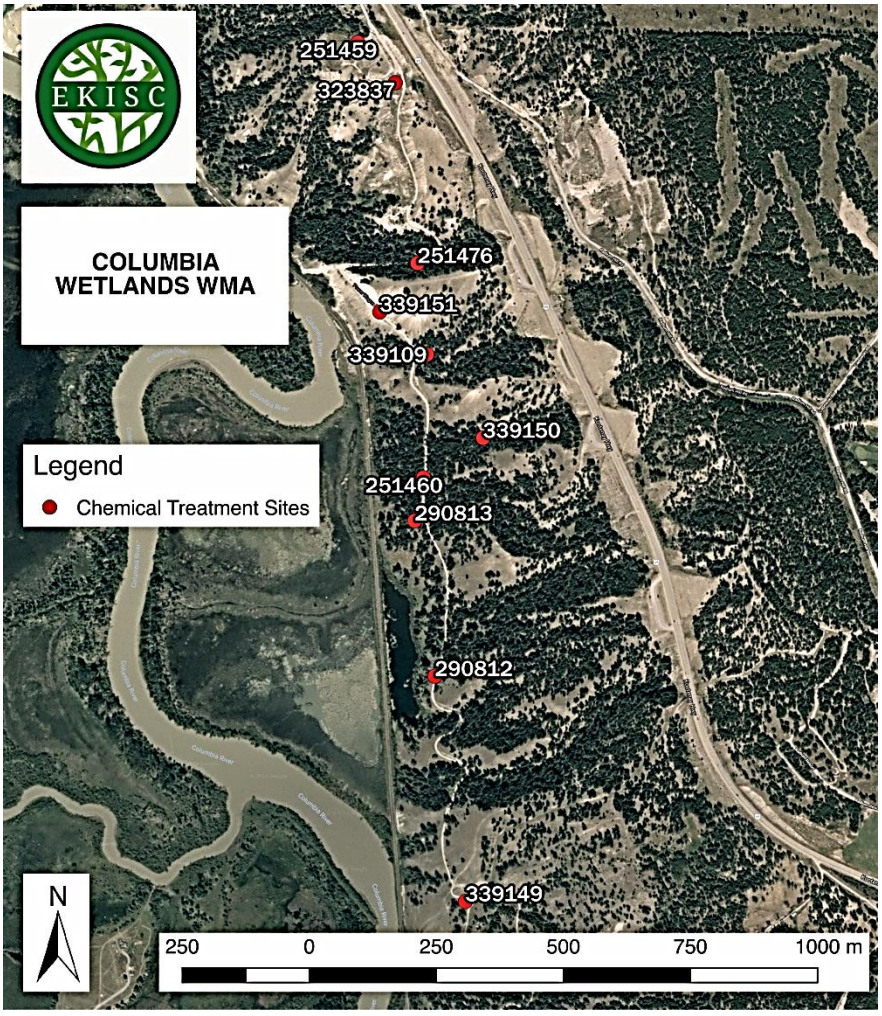


Figure 20 Map of treatment locations at Columbia Wetlands WMA (Old Coach Trail).

Table 10 Chemical treatment data for Columbia Wetlands WMA (Old Coach Trail).

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Columbia Wetlands WMA	251459	May 31, 2018	BY, LS, SK	Tordon 22K	60	1.35	0.3
	251460	October 1, 2018	TC, SK	Aspect	8	0.18	0.04

	251476	October 1, 2018	SK	Aspect	2	0.045	0.01
	290812	October 1, 2018	DK	Aspect	2	0.045	0.01
	290813	October 1, 2018	LS	Aspect	10	0.225	0.05
	323837	October 1, 2018	BY, TC	Aspect	125	2.8125	0.625
	339109	October 1, 2018	SK, TC	Aspect	20	0.45	0.1
	339149	October 1, 2018	SK	Aspect	3	0.0675	0.015
	339150	October 1, 2018	SK	Aspect	5	0.1125	0.025
	339151	October 1, 2018	SK	Aspect	2	0.045	0.01
	Total				237L	5.3325L/Kg	1.185ha

Figure 21 Map of invasive plant sites and roads inventoried at Dutch Creek Hoodoos & TNT Hoodoos Property.

Table 11 Summary of invasive plant inventory, including distribution and density codes, at Dutch Creek Hoodoos & TNT Hoodoos Property.

Site ID	Invasive Species	Distribution Code	Density Code
1-SK	SK, CT	3, 4	Medium
1-CT	CT	5	Medium
1-HS	YH	1	Low
2-SK	SK	5	High
2-HS	YH	3	Medium
3-HS	YH	3	High

3-CT/CM	CT, CM	4	Medium
4-OD	OD	1	Low
4-HS	YH	2	Medium
4-CT	CT	5	Medium
5-HS	YH	1	Low
5-OD	OD	1	Low
7 – MU AND PS	MU, PS	4	Low
6-CT	CT	3	Dense
8-SK	SK	3	Medium
9-SK	SK	1	Low
10-HS	YH	6	Medium
11-HS	YH	4	Medium
12-HS	YH	7	High
13-HS	YH	3	Medium
14-DK	DK, SK	6	Medium
15-HS	YH	3	Medium

Distribution Codes	**Density Codes**
1 – rare individual single occurrence	Low - <1 plant/m^2
2 – few sporadic individuals	Medium – 2-5 plants/m^2
3 – single patch clump	High – 6-10 plants/m^2
4 – several sporadic individuals	Dense - >10 plants/m^2
5 – a few patches clumps	
6 – several well spaced patches	
7 – continuous uniform occurrence	

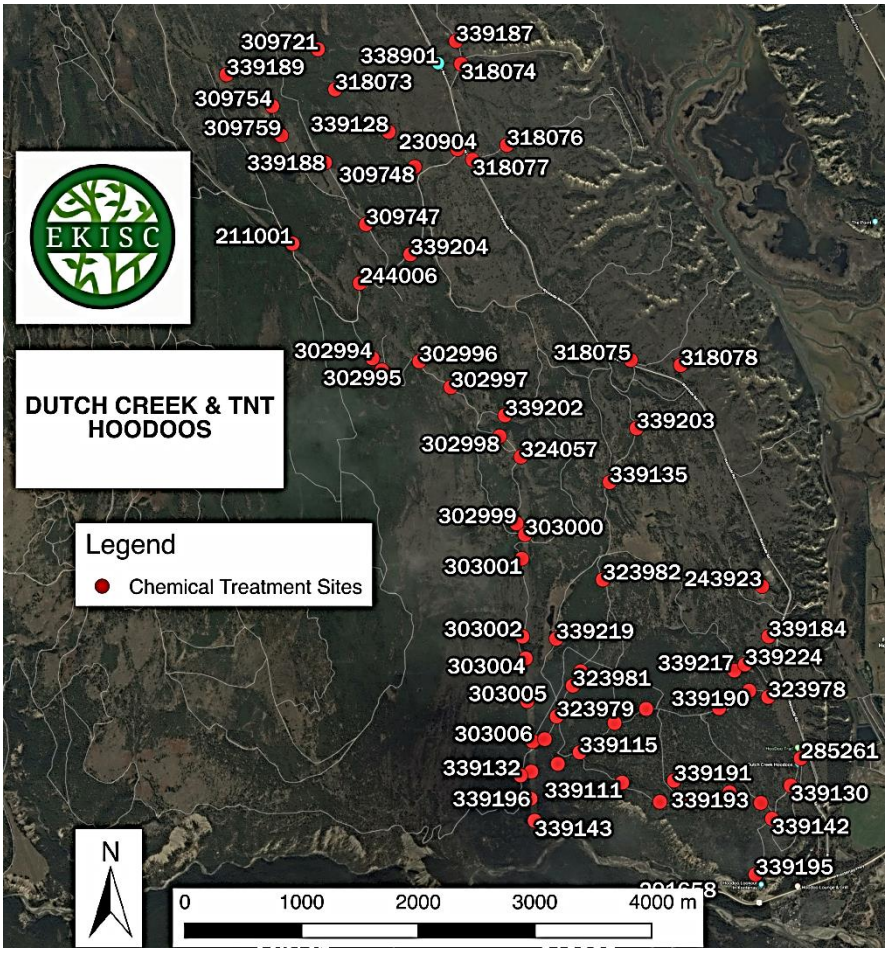


Figure 22 Map of chemical treatment locations at Dutch Creek Hoodoos & TNT Hoodoos Property.

Table 12 2018 chemical treatment data for Dutch Creek Hoodoos & TNT Hoodoos Property.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Hoodoos	211001	July 23, 2018	SK	Milestone	5.0	0.0125	0.0250
	230904	July 23, 2018	SK	Milestone	3.0	0.0075	0.0150
	243923	August 10, 2018	DK	Milestone	53.2	0.1330	0.2660

	244006	July 23, 2018	SK	Milestone	5.0	0.0125	0.0250
	285261	July 26, 2018	SK	Lontrel 360	15.0	0.0525	0.0750
	302994	July 23, 2018	SK	Milestone	4.0	0.0100	0.0200
	302995	July 23, 2018	SK	Milestone	2.0	0.0050	0.0100
	302996	July 23, 2018	SK	Milestone	4.0	0.0100	0.0200
	302997	July 23, 2018	SK	Milestone	3.0	0.0075	0.0150
	302999	July 23, 2018	SK	Milestone	2.0	0.0050	0.0100
	303000	July 23, 2018	SK	Milestone	7.0	0.0175	0.0350
	303001	July 23, 2018	SK	Milestone	5.0	0.0125	0.0250
	303002	July 23, 2018	SK	Milestone	1.0	0.0025	0.0050
	303004	July 23, 2018	SK	Milestone	3.0	0.0075	0.0150
	303005	July 23, 2018	SK, YH	Milestone	40.0	0.1	0.2
	309721	July 26, 2018	SK	Lontrel 360	1.0	0.0035	0.005
	309747	July 27, 2018	BY	Aspect	15.0	0.0715	0.075
	309748	July 26, 2018	SK	Lontrel 360	6.0	0.0210	0.0300

	309754	July 27, 2018	SK	Lontrel 360	5.0	0.0175	0.0250
	309759	July 27, 2018	SK	Lontrel 360	5.0	0.0175	0.0250
	318073	July 26, 2018	SK	Lontrel 360	1.0	0.0035	0.0050
	318074	July 27, 2018	SK	Lontrel 360	1.0	0.0035	0.0050
	318075	July 27, 2018	SK	Lontrel 360	3.0	0.0105	0.0150
	318076	July 27, 2018	SK	Lontrel 360	1.0	0.0035	0.0050
	318077	July 27, 2018	SK	Lontrel 360	1.0	0.0035	0.0050
	318078	July 27, 2018	SK, DK	Lontrel 360	74.0	0.259	0.37
	323979	July 25, 2018	SK	Lontrel 360	5.0	0.0175	0.0250
	323981	July 25, 2018	SK	Lontrel 360	10.0	0.0350	0.0500
	323982	July 25, 2018	SK	Lontrel 360	5.0	0.0175	0.0250
	324057	July 23, 2018	SK	Milestone	7.0	0.0175	0.0350
	339128	July 26, 2018	SK	Lontrel 360	60.0	0.2100	0.3000
	339130	July 26, 2018	SK	Lontrel 360	5.0	0.0175	0.0250
	339132	July 25, 2018	SK	Lontrel 360	3.0	0.0105	0.0150

	339142	July 26, 2018	SK	Lontrel 360	7.0	0.0245	0.0350
	339143	July 25, 2018	SK	Lontrel 360	4.0	0.0140	0.0200
	339184	August 10, 2018	SK	Milestone	15.0	0.0375	0.0750
	339187	July 27, 2018	TC	Aspect	1.0	0.0225	0.0050
	339188	July 27, 2018	SK, YH	Lontrel 360	7.0	0.0245	0.035
	339189	July 27, 2018	SK	Lontrel 360	1.0	0.0035	0.0050
	339191	July 26, 2018	SK	Lontrel 360	2.0	0.0070	0.0100
	339193	July 26, 2018	SK	Lontrel 360	7.0	0.0245	0.0350
	339195	July 26, 2018	SK	Lontrel 360	5.0	0.0175	0.0250
	339196	July 25, 2018	SJ, YH	Aspect	2.0	0.045	0.01
	339202	July 23, 2018	SK	Milestone	3.0	0.0075	0.0150
	339203	July 23, 2018	SK	Milestone	5.0	0.0125	0.0250
	339204	July 23, 2018	SK, SJ	Milestone	3.0	0.0075	0.0151
	339211	June 13, 2018	CA	Milestone	2.0	0.0050	0.0100
	339215	July 26, 2018	SK	Lontrel 360	10.0	0.0350	0.0500

	339217	July 25, 2018	SK	Lontrel 360	2.0	0.0070	0.0100
	339219	July 23, 2018	SK	Milestone	3.0	0.0075	0.0150
	339224	July 25, 2018	SK	Lontrel 360	1.0	0.0035	0.0050
	Total				440.2L	1.4415L/Kg	2.2011ha

Table 13 2018 mechanical treatment data for Dutch Creek Hoodoos & TNT Hoodoos Property.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Area Treated (ha)
Hoodoos	338901	July 17, 2018	BY	0.001
	Total			0.001ha

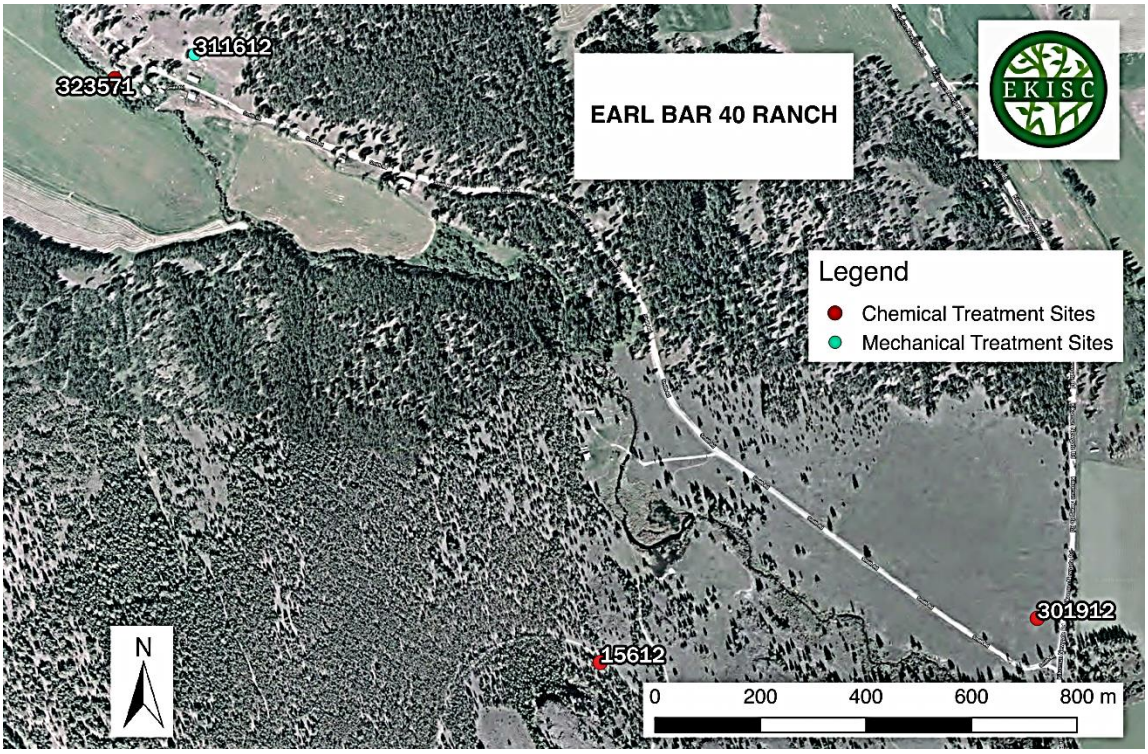


Figure 23 Map of treatment locations for Earl Bar 40.

Table 14 2018 chemical treatment data for Earl Bay 40.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Earl Ranch	15612	September 26, 2018	SJ	Clearview	60	0.0475	0.2791
	301912	September 10, 2018	WW	Clearview	2	0.0016	0.0093
	323571	June 2, 2018	CT, SC, YH	Milestone & VP480 Glyphosate	2380	6.0893	11.0696
	Total				2442L	6.1384L	11.358ha

Table 15 2018 mechanical treatment data for Earl Bay 40.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Area Treated (ha)
Earl Ranch	311612	July 10, 2018	BY	2.0
	Total			2.0ha

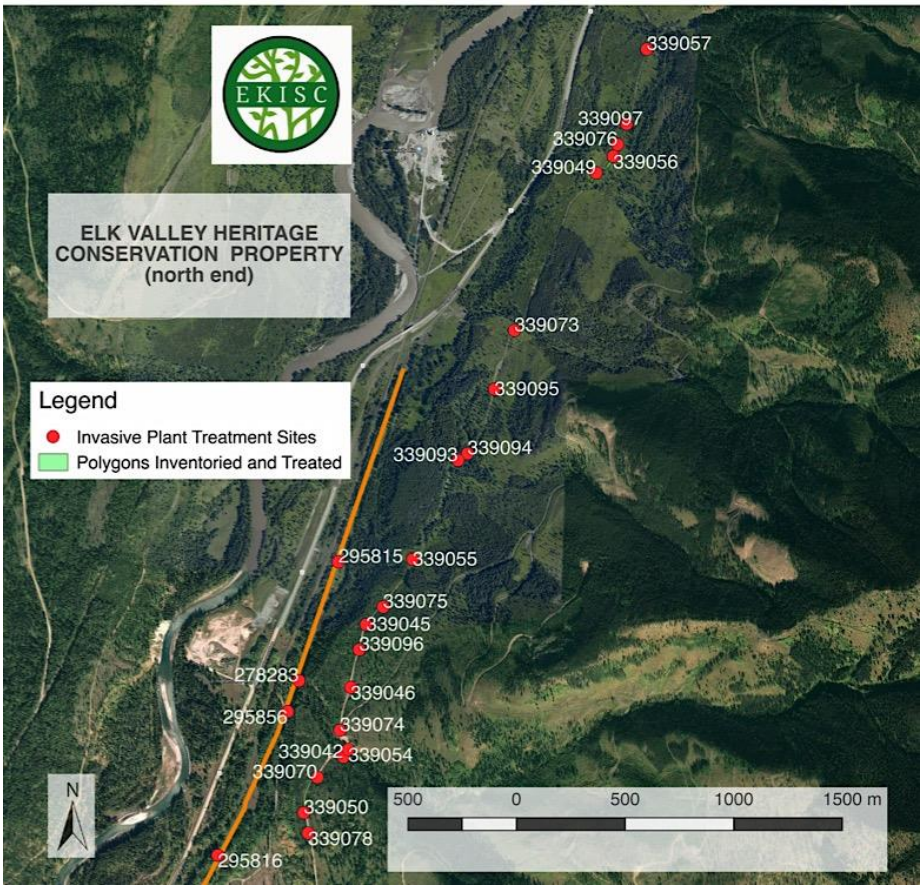


Figure 24 Map of treatment locations for Elk Valley North.

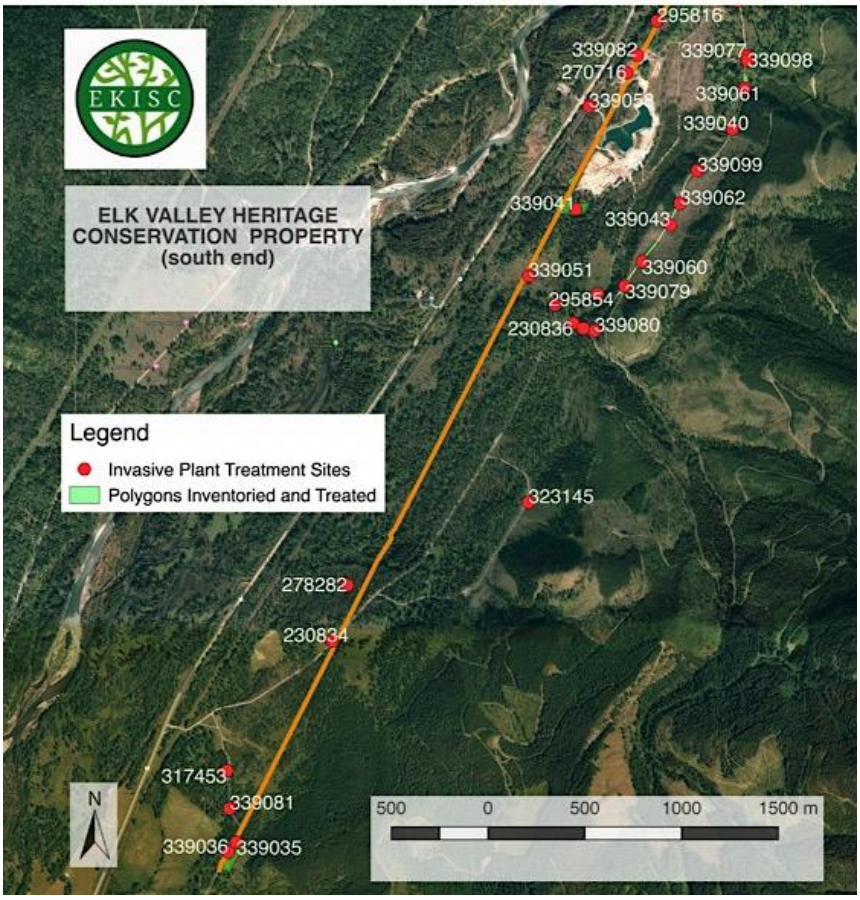


Figure 25 Map of treatment locations for Elk Valley South.

Table 16 2018 chemical treatment data for Elk Valley.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (Kg)	Area Treated (ha)
Elk Valley	230834	August 20, 2018	SC, SK, SJ	Clearview	10	0.006	0.03
	230836	August 20, 2018	SC, WW	Clearview	3	0.0018	0.009
	270716	August 20, 2018	BU, SK, SH	Clearview	14	0.0084	0.04
	278282	August 20, 2018	SH, SK	Clearview	15	0.009	0.04

	278283	August 20, 2018	CT, SK	Clearview	1	0.0006	0.003
	295815	August 20, 2018	SK	Clearview	13	0.0078	0.04
	295816	August 20, 2018	SK, SC	Clearview	2	0.0012	0.006
	295854	August 21, 2018	YT	Clearview	5.5	0.0024	0.01
	295856	August 20, 2018	CT, SK, SC	Clearview	2	0.0012	0.006
	317453	August 22, 2018	CT, SC, SH	Clearview	20	0.0119	0.06
	323145	August 20, 2018	SH	Clearview	2	0.0012	0.006
	323146	August 20, 2018	SH, YT	Clearview	3	0.0018	0.009
	339035	August 28, 2018	SH, SK, SC	Clearview	77	0.046	0.23
	339036	August 24, 2018	SK	Clearview	13	0.0078	0.04
	339039	August 24, 2018	SK	Clearview	12	0.0072	0.04
	339040	August 23, 2018	CT, HT, SC	Clearview	8	0.0048	0.02
	339041	August 23, 2018	SK, SC, YT	Clearview	260	0.1552	0.78
	339042	August 23, 2018	SH, SK	Clearview	5	0.003	0.01
	339043	August 23, 2018	SJ	Clearview	7	0.0042	0.02

	339045	August 28, 2018	SJ	Clearview	8	0.0064	0.03
	339046	August 28, 2018	SK, WW	Clearview	30	0.0273	0.14
	339049	August 24, 2018	CT, SJ, YT	Clearview	6	0.0028	0.02
	339050	August 23, 2018	SH	Clearview	15	0.009	0.04
	339051	August 22, 2018	SC, SK, WW	Clearview	265	0.1582	0.79
	339054	August 28, 2018	SH	Clearview	5	0.0045	0.02
	339055	August 28, 2018	SH, SK	Clearview	12	0.0109	0.05
	339056	August 24, 2018	SH, WW	Clearview	5	0.003	0.02
	339057	August 24, 2018	SJ	Clearview	2	0.0012	0.006
	339058	August 24, 2018	SK	Clearview	7	0.0042	0.02
	339059	August 23, 2018	SH, SC, WW	Clearview	4	0.0024	0.01
	339060	August 23, 2018	SH, CT	Clearview	19	0.0113	0.06
	339061	August 23, 2018	SH, HT, WW	Clearview	10	0.006	0.03
	339062	August 23, 2018	SH, SJ, WW	Clearview	5	0.003	0.01
	339070	August 23, 2018	SC	Clearview	2.3	0.0014	0.007

	339073	August 28, 2018	SC	Clearview	2.5	0.0023	0.01
	339074	August 28, 2018	SK	Clearview	3	0.0027	0.01
	339075	August 28, 2018	WW	Clearview	1	0.0009	0.005
	339076	August 24, 2018	SC, WW	Clearview	0.5	0.0003	0.001
	339077	August 23, 2018	SK	Clearview	1	0.0006	0.003
	339078	August 23, 2018	SH	Clearview	1.5	0.0009	0.005
	339079	August 23, 2018	SH, WW	Clearview	3	0.0018	0.009
	339080	August 23, 2018	BU	Clearview	1	0.0006	0.003
	339081	August 22, 2018	SK	Clearview	3	0.0018	0.009
	339082	August 20, 2018	SK	Clearview	1	0.0006	0.003
	339093	August 28, 2018	SJ	Clearview	2	0.0018	0.009
	339094	August 28, 2018	SK	Clearview	1	0.0009	0.005
	339095	August 28, 2018	BU, CT, SK	Clearview	5	0.0045	0.01
	339096	August 28, 2018	WW	Clearview	1	0.0009	0.005
	339097	August 24, 2018	SK, WW	Clearview	0.5	0.003	0.001

	339098	August 23, 2018	SK, SJ	Clearview	1	0.0006	0.003
	339099	August 23, 2018	SK	Clearview	0.2	0.0001	0.006
	Total				895L	0.5544Kg	2.78ha

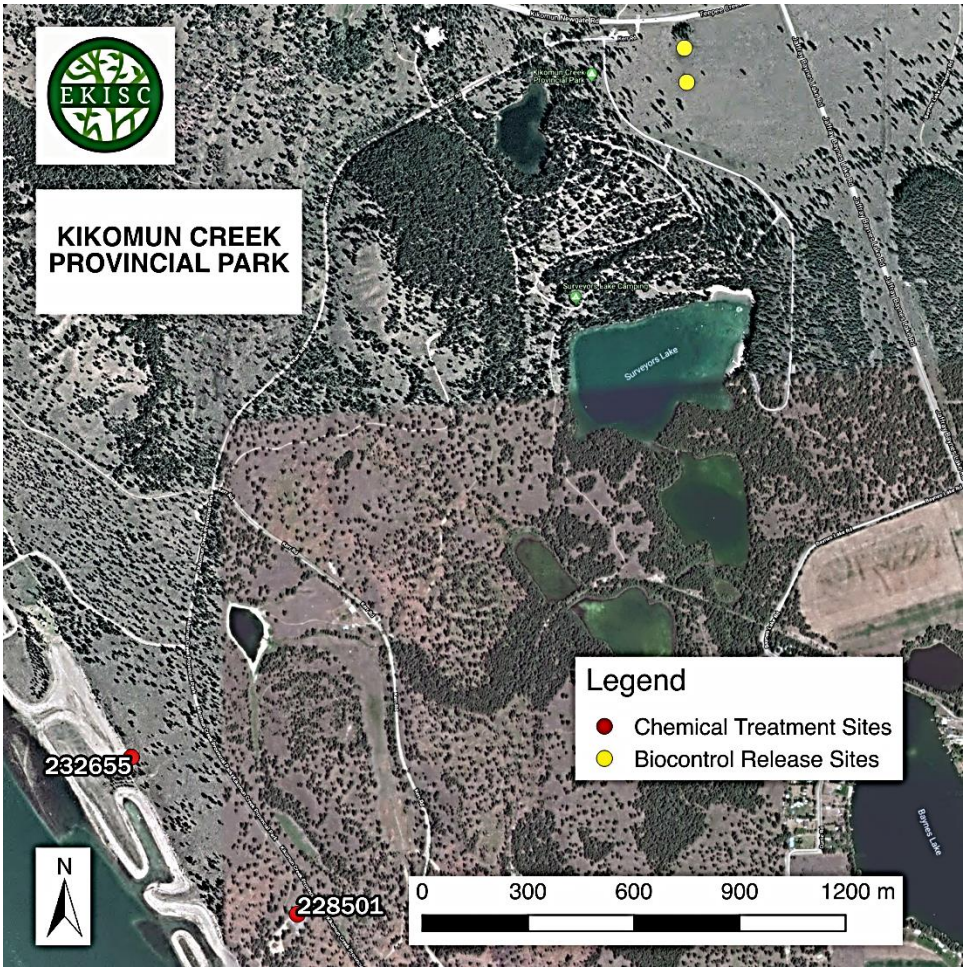


Figure 26 Map of treatment locations at Kikomun Creek Provincial Park.

Table 17 2018 chemical treatment data for Kikomun Creek Provincial Park.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Kikomun Park	228501	May 31, 2018	SK	Milestone	1.5	0.0013	0.0033
	232655	October 1, 2018	SK, SJ, MU	Clearview	1200	0.8796	5.1723
	Total				1201.5	0.8809L/Kg	5.1756ha

Table 18 2018 biocontrol treatment data for Kikomun Creek Provincial Park.

Biocontrol Released	Release Date	Target Plant	Number Released
Chrysolina hyperici	June 17, 2018	SJ	150 adults
Chrysolina hyperici	July 15, 2018	SJ	150 adults

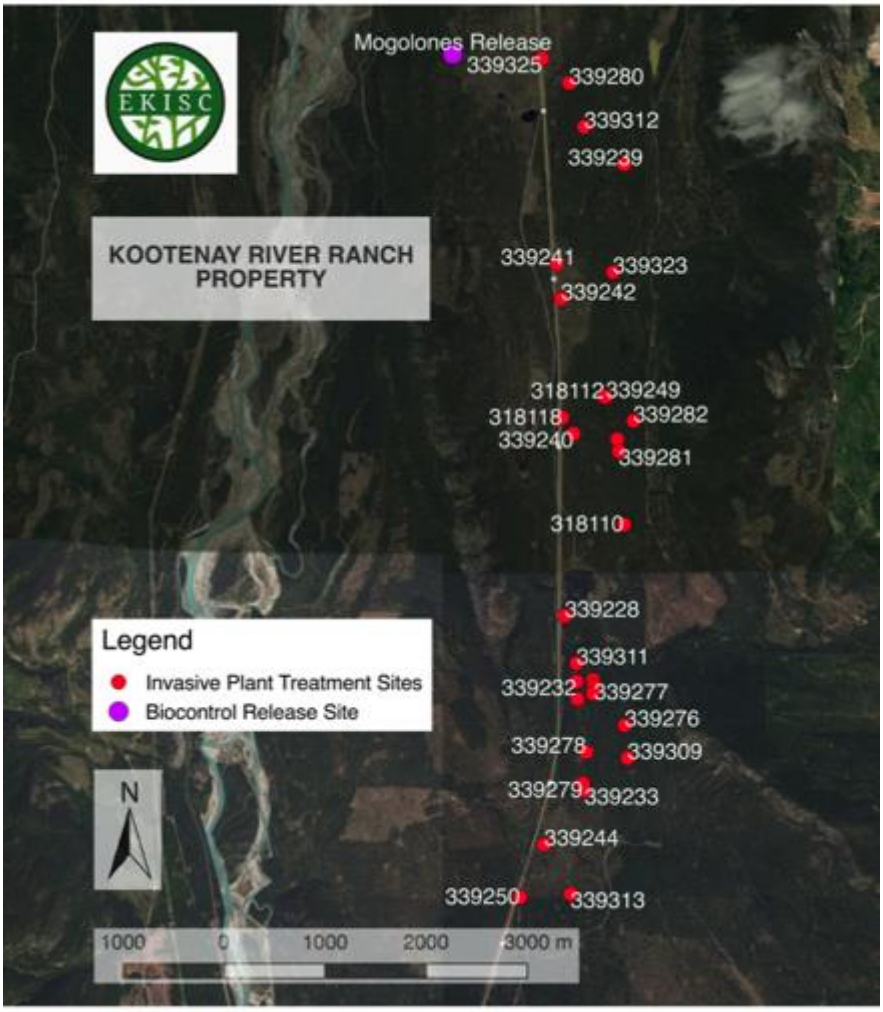


Figure 27 Map of treatment locations at Kootenay River Ranch (Island Pond & Pebble Pond).

Table 19 2018 chemical treatment data for Kootenay River Ranch (Island Pond & Pebble Pond).

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Kootenay River Ranch	318110	September 9, 2018	SK, YH	Milestone	65	0.13	0.33
	318112	June 19, 2018	SK, YH	Lontrel 360	300	1.05	1.45

	318118	September 6, 2018	SK, YH	Milestone	100	0.2	0.5
	339228	September 9, 2018	DK	Milestone	235	0.47	1.18
	339232	June 18, 2018	SK, YH	Milestone	160	0.32	0.8
	339233	June 18, 2018	SK, SJ, YH	Milestone	140	0.28	0.7
	339239	July 5, 2018	SC, YH	Milestone	40	0.08	0.2
	339240	July 5, 2018	SC	Milestone	15	0.03	0.075
	339241	July 5, 2018	SK, YH	Milestone	75	0.15	0.375
	339242	July 5, 20180.1575	SK, YH	Milestone	75	0.15	0.375
	339244	July 31, 2018	SK	Lontrel 360	45	0.1575	0.23
	339247	July 10, 2018	SK, YH	Milestone	30	0.06	0.15
	339248	July 10, 2018	YH	Milestone	30	0.06	0.15
	339249	July 5, 2018	SK, SC, YH	Milestone	40	0.08	0.2
	339250	June 18, 2018	SK, YH	Milestone	280	0.56	1.4
	339276	July 11, 2018	YH	Milestone	10	0.02	0.05
	339277	July 10, 2018	YH	Milestone	25	0.05	0.13
	339278	July 10, 2018	YH	Milestone	12	0.012	0.06

	339279	July 10, 2018	YH	Milestone	5	0.01	0.025
	339280	July 6, 2018	SK, YH	Milestone	10	0.02	0.05
	339281	July 6, 2018	YH	Milestone	18	0.036	0.09
	339282	July 6, 2018	YH	Milestone	12	0.024	0.06
	339309	July 11, 2018	YH	Milestone	5	0.01	0.025
	339310	July 10, 2018	YH	Milestone	5	0.01	0.025
	339311	July 10, 2018	YH	Milestone	10	0.02	0.05
	339312	July 6, 2018	YH	Milestone	15	0.03	0.075
	339313	June 18, 2018	SK	Milestone	20	0.04	0.03
	339323	July 6, 2018	YH	Milestone	5	0.01	0.025
	339324	July 6, 2018	YH	Milestone	3	0.006	0.015
	339325	July 5, 2018	YH	Milestone	220	0.44	1.1
	Total				2005L	4.5155L/Kg	9.99ha

Table 20 2018 biocontrol treatments at Kootenay River Ranch.

Biocontrol Released	Release Date	Target Plant	Number Released
Mogolones crucifer	May 25, 2018	HT	150 adults

Figure 28 Map of treatment locations at Luke Creek Wildlife Corridor.

Table 21 2018 chemical treatment data for Luke Creek Wildlife Corridor.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Luke Creek	339227	September 3, 2018	SC	Milestone	75	0.15	0.375
	339229	September 3, 2018	SC, YH	Milestone	65	0.13	0.325
	339230	September 3, 2018	SC	Milestone	160	0.32	0.8
	339231	August 29, 2018	HT, SC	Clearview	150	0.1725	0.75
	339258	August 29, 2018	YH	Clearview	20	0.0115	0.05

	339285	September 2, 2018	SC	Milestone	35	0.0700	0.175
	339286	September 2, 2018	SC, YH	Milestone	80	0.16	0.4
	339287	September 2, 2018	SC, YH	Milestone	185	0.37	0.925
	339289	August 29, 2018	SC, YH	Clearview	80	0.092	0.4
	339290	August 28, 2018	BW	Clearview	45	0.0518	0.225
	339327	August 29, 2018	SC, YH	Clearview	50	0.0575	0.25
	339328	August 29, 2018	BU, HT, YH	Clearview	40	0.046	0.2
	339329	August 29, 2018	SC, YH	Clearview	85	0.0978	0.425
	339330	August 29, 2018	BU	Clearview	5	0.0058	0.025
	339331	August 29, 2018	BU	Clearview	25	0.0288	0.125
	339332	August 29, 2018	BU	Clearview	15	0.0173	0.075
	Total				1105L	1.7808L/Kg	5.525ha

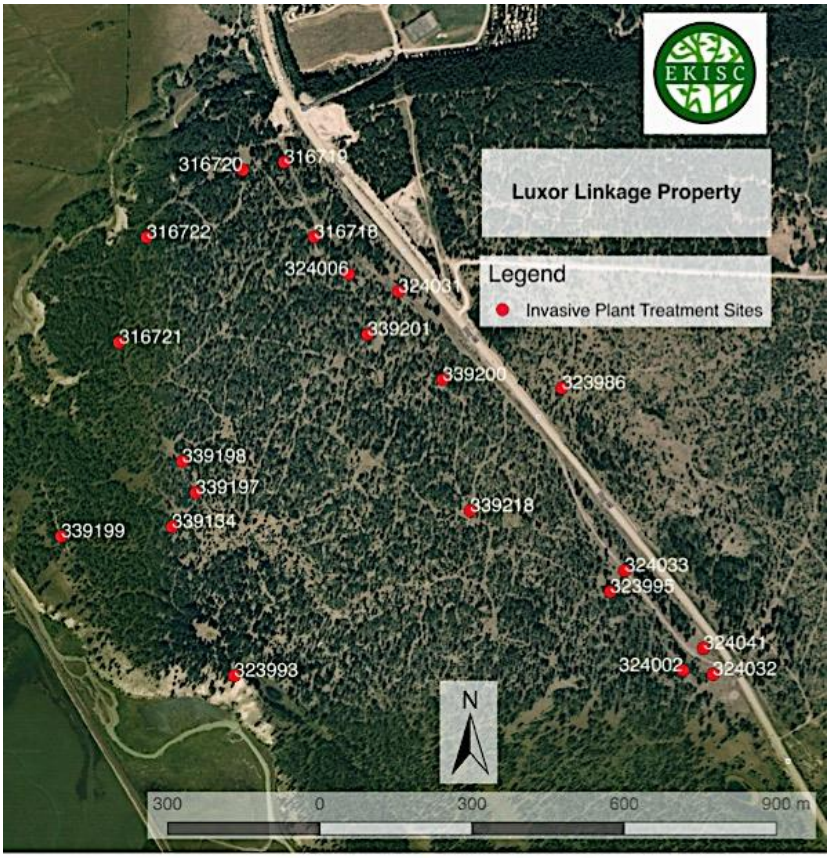


Figure 29 Map of treatment locations for Luxor Linkage.

Table 22 2018 chemical treatment data for Luxor Linkage.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Luxor Linkage	316718	July 24, 2018	SK	Lontrel 360	55	0.1925	0.275
	316719	July 24, 2018	SK	Lontrel 360	1	0.0035	0.005
	316720	July 24, 2018	SK	Lontrel 360	15	0.0525	0.075
	316721	July 24, 2018	SK	Lontrel 360	3	0.0105	0.015

	316722	July 24, 2018	SK	Lontrel 360	5	0.0175	0.025
	323986	July 24, 2018	LS	Aspect	28	0.6300	0.14
	323993	July 24, 2018	SK	Lontrel 360	3	0.0105	0.015
	323995	July 24, 2018	SK	Lontrel 360	2	0.0070	0.01
	324002	July 24, 2018	SK	Lontrel 360	1	0.0035	0.005
	324006	July 24, 2018	SK	Lontrel 360	3	0.0105	0.015
	324031	July 24, 2018	SK	Lontrel 360	5	0.0175	0.025
	324032	July 24, 2018	SK	Lontrel 360	15	0.0525	0.075
	324033	July 24, 2018	DK, SK	Lontrel 360	35	0.1225	0.175
	324041	July 24, 2018	DK, SK	Lontrel 360	5	0.0175	0.025
	339134	July 24, 2018	LS	Aspect	27	0.6075	0.135
	339197	July 24, 2018	LS	Aspect	12	0.2700	0.06
	339198	July 24, 2018	SK	Lontrel 360	2	0.0070	0.01
	339199	July 24, 2018	SK	Lontrel 360	12	0.0420	0.06
	339200	July 24, 2018	LS	Aspect	8	0.1800	0.04

	339201	July 24, 2018	SK	Lontrel 360	5	0.0175	0.025
	339218	July 24, 2018	SK	Lontrel 360	5	0.0175	0.025
	Total				247L	2.2895L/Kg	1.235ha

Figure 30 Map of treatment locations at Morrissey Meadows.

Table 23 2018 chemical treatment data for Morrissey Meadows.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L or Kg)	Area Treated (ha)
Morrissey Meadows	339034	September 18, 2018	BU, CT, CA	Milestone	215	0.43	0.86
	339047	September 18, 2018	SK, WW	Milestone	25	0.05	0.1

	339048	September 18, 2018	BU, WW	Milestone	40	0.08	0.16
	339053	September 18, 2018	BU, CT	Vantage XRT	5	0.12	0.02
	Total				285L	0.68L/Kg	1.14ha

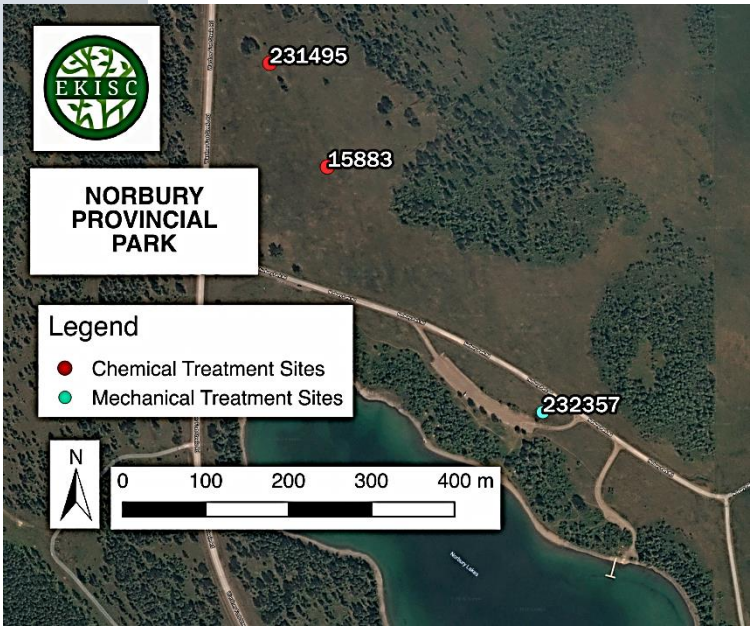


Figure 31 Map of treatment locations at Norbury Lake Provincial Park.

Table 24 2018 chemical treatment data for Norbury lake Provincial Park.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L)	Area Treated (ha)
Norbury Lake	15883	June 8, 2018	LS	Tordon 22K	7.5	0.075	0.0167
	231495	September 24, 2018	LS	Grazon	13.75	0.1835	0.0393
	Total				21.25L	0.9335L	0.056ha

Location	Site ID	Treatment Date	Invasive Plants Targeted	Area Treated (ha)
Norbury Lake	232357	July 19, 2018	SK	0.3
	Total			0.3ha

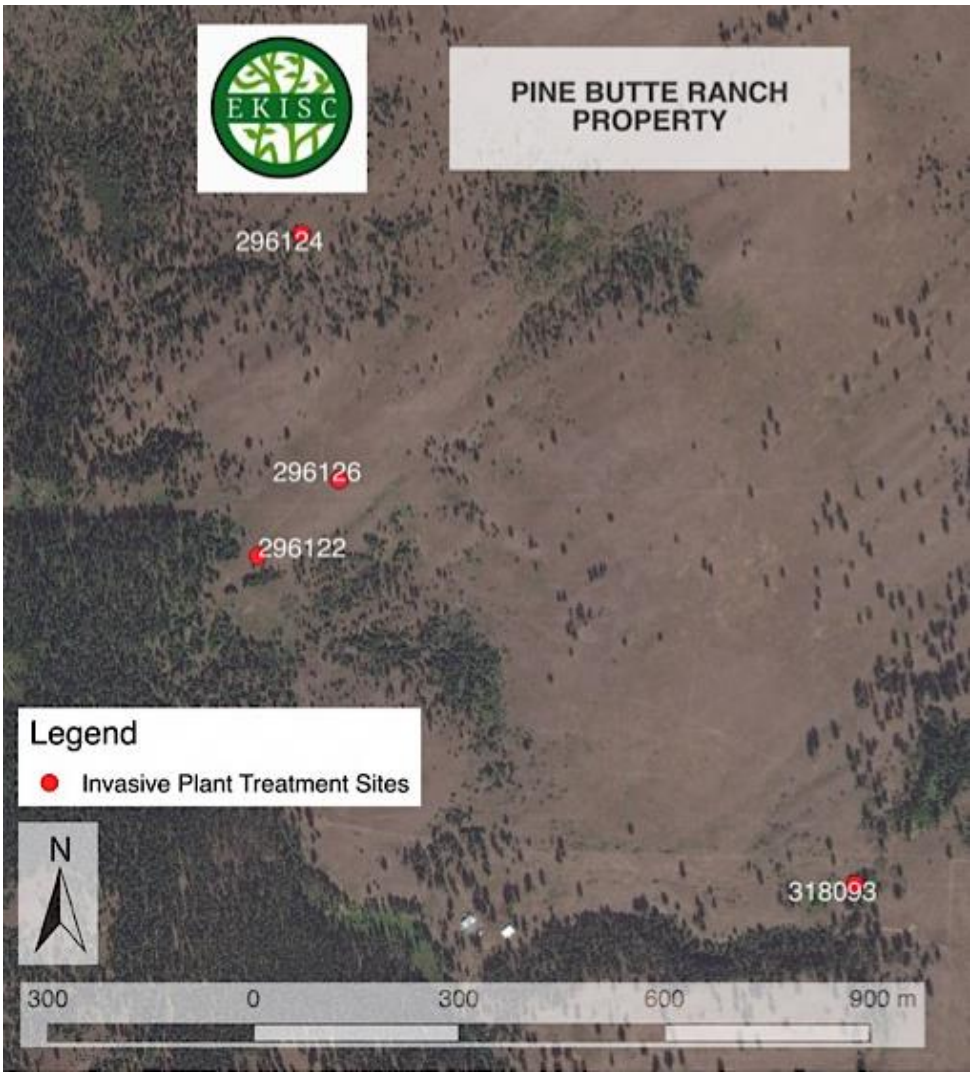


Figure 32 Map of treatment locations at Pine Butte.

Table 25 2018 chemical treatment data for Pine Butte.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L)	Area Treated (ha)
Pine Butte	296122	July 19, 2018	SK	Milestone	55	0.11	0.275
	296124	August 31, 2018	SC, YH	Milestone	495	0.99	2.475
	296126	July 20, 2018	SK, SC	Milestone	300	0.6	1.5
	318093	August 31, 2018	SK, SC	Milestone	105	0.21	0.525
	Total				955L	1.91L	4.775ha

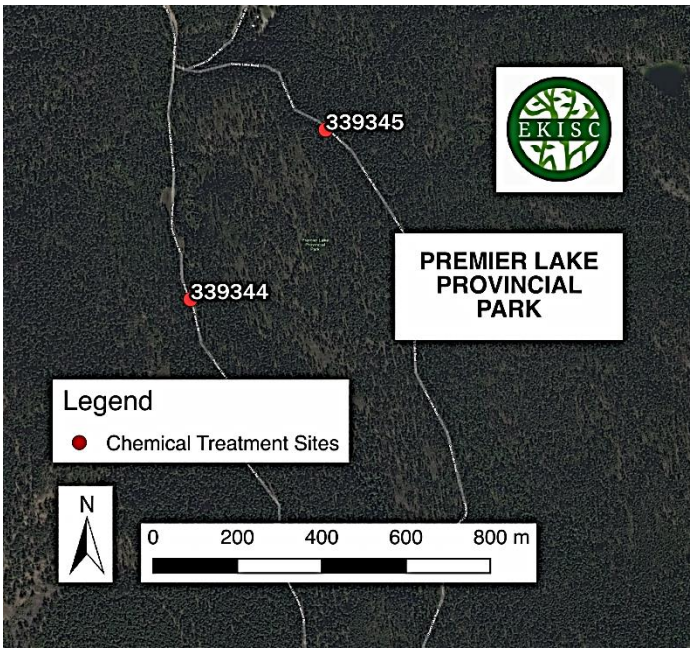


Figure 33 Map of treatment locations at Premier Lake Provincial Park.

Table 26 2018 chemical treatment data for Premier Lake Provincial Park.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L)	Area Treated (ha)
Premier Lake	339344	September 26, 2018	BT, BU, YH	Lontrel 360	150	0.5250	0.75
	339345	September 26, 2018	BT, CT, SK	Lontrel 360	90	0.3150	0.45
	Total				140L	0.84L	1.2ha

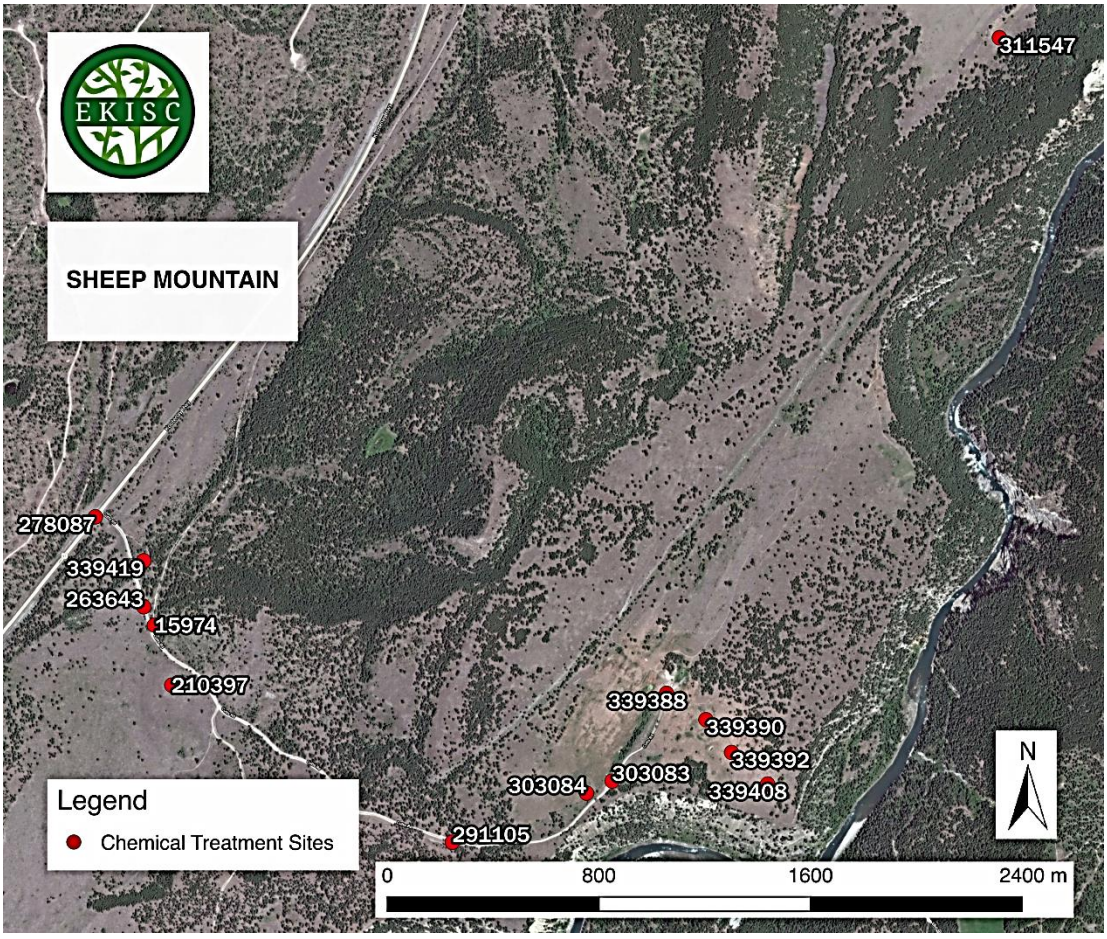


Figure 34 Map of treatment locations at Sheep Mountain.

Table 27 2018 chemical treatment data for Sheep Mountain.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L)	Area Treated (ha)
Sheep Mountain	15974	October 4, 2018	MU, SC, SJ	Clearview	1145	0.8393	4.9354
	210397	October 5, 2018	SJ, SC, MU	Clearview	500	0.3665	2.1551
	263643	October 4, 2018	BW	Clearview	55	0.0545	0.2371
	278087	June 26, 2018	BW, SK, SJ	Clearview	1300	1.391	6.0466
	291105	October 5, 2018	SC, SJ	Clearview	700	0.5131	3.0173
	303083	August 18, 2018	SJ	Grazon	200	4.3445	0.9302
	303084	July 5, 2018	SJ, SC	Milestone	300	0.5301	1.3954
	311547	August 18, 2018	SJ, SC	Clearview Milestone	1000	1.8655	4.6512
	339388	September 28, 2018	SC, SJ, BU	Clearview	1200	0.9492	5.5813
	339390	September 27, 2018	SC, SJ	Clearview	1200	0.9492	5.5813
	339392	September 26, 2018	SC, SJ	Clearview	1500	1.1865	6.9768
	339408	July 5, 2018	SC, SJ	Milestone	900	1.5903	4.186
	339419	October 9, 2018	SJ, SC, MU	Clearview	1200	0.8796	5.1723
	Total				11,200L	15.459L	50.866ha

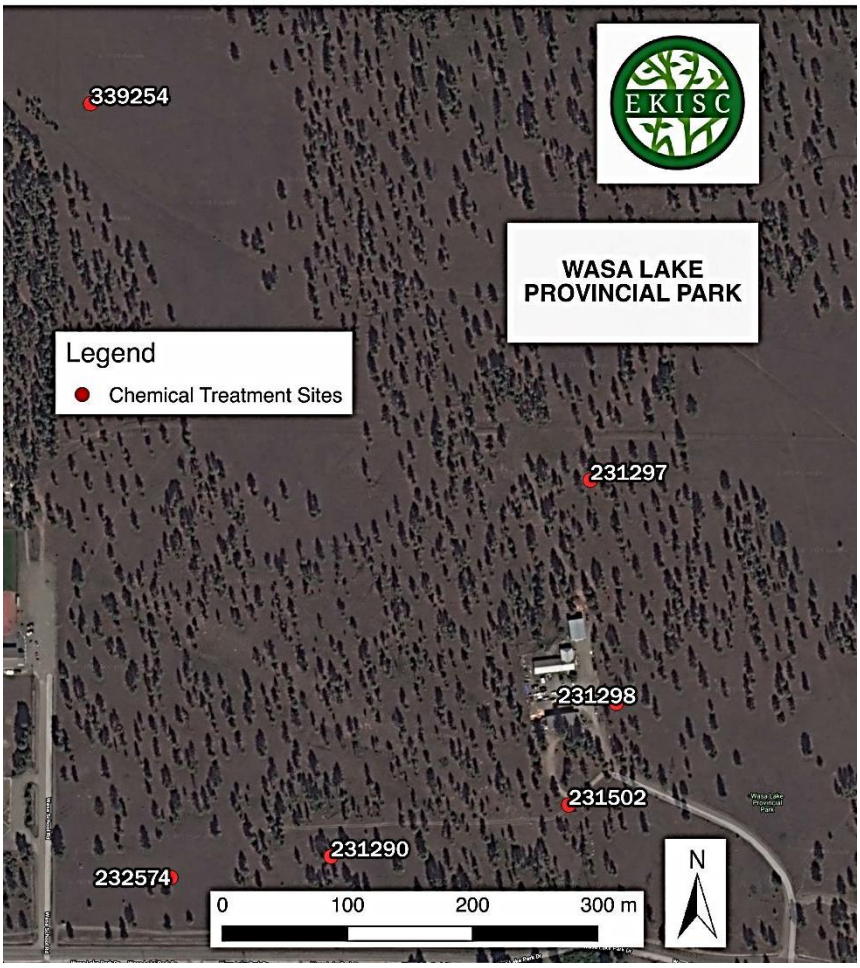


Figure 35 Map of treatment locations for Wasa Lake Provincial Park.

Table 28 2018 chemical treatment data for Wasa Lake Provincial Park.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L/Kg)	Area Treated (ha)
Wasa Lake	231290	September 12, 2018	SK	Milestone	10	0.02	0.05
	231297	September 12, 2018	SK	Milestone	10	0.02	0.05
	231298	September 12, 2018	SK, SJ	Milestone, Clearview	10	0.0158	0.05

	231502	September 12, 2018	SK	Milestone	10	0.02	0.05
	232574	September 12, 2018	SK, SC	Milestone	15	0.03	0.075
	339254	September 12, 2018	SC	Milestone	25	0.05	0.125
	Total				80L	0.1558L /Kg	0.4ha

Figure 36 Map of treatment location for Wasa Slough.

Table 29 2018 mechanical treatment sites for Wasa Slough.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Area Treated (ha)
Wasa Slough	319491	June 12, 2018	SK	10
	Total			10 ha

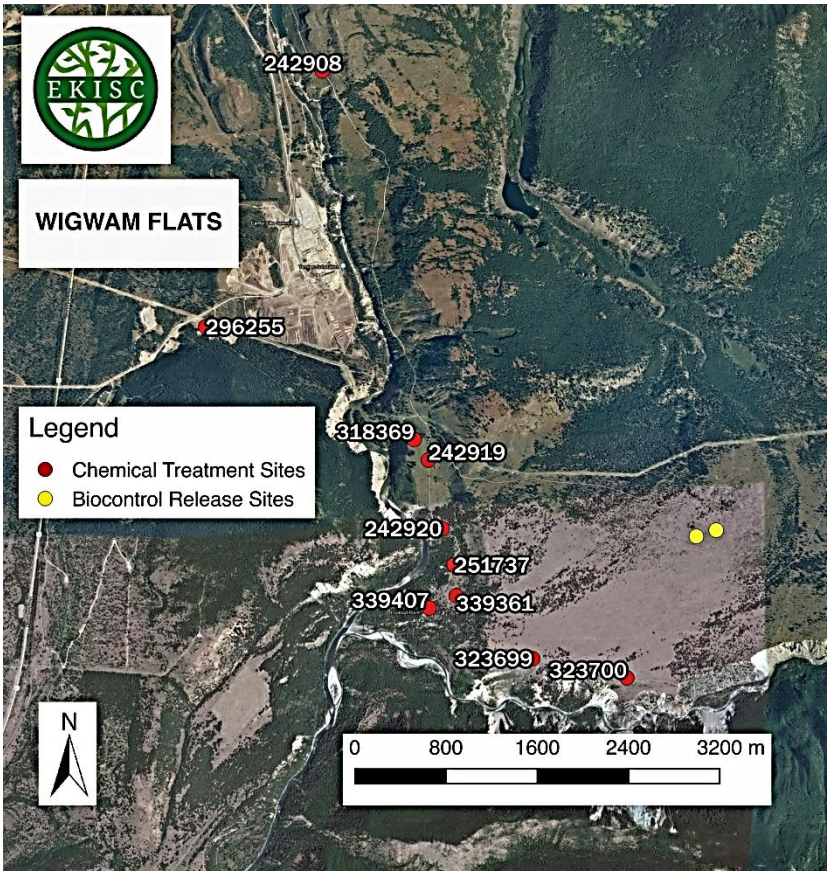


Figure 37 Map of treatment locations at Wigwam Flats.

Table 30 2018 chemical treatment data for Wigwam Flats.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L/Kg)	Area Treated (ha)
Wigwam Flats	242908	June 12, 2018	SJ, YH	Milestone	400	0.6552	1.7241
	242919	June 12 & 13, 2018	SC, YH, SJ	Milestone	900	1.5129	3.9815
	242920	July 4, 2018	SC, YH, SJ	Milestone	1300	3.2929	8.6666
	251737	July 4, 2018	SC, YH, SJ	Milestone	800	1.4136	3.721
	296255	May 22, 2018	SK, BW, DT	Clearview	1055	0.9812	4.9069
	318369	September 12, 2018	SC, YH, SJ	Milestone	1315	2.3236	6.1163
	323699	June 12, 2018	SC, YH	Milestone	180	0.2948	0.7759
	323700	June 13, 2018	SC, YH, SJ	Milestone	1000	1.767	4.6512
	339361	July 4, 2018	SC, YH, SJ	Milestone	700	1.2369	3.2559
	339407	July 5, 2018	SC, YH, SJ	Milestone	500	1.2665	3.3333
	Total				8150L	14.7446L /Kg	41.1327 ha

Table 31 2018 biocontrol treatment data for Wigwam Flats.

Biocontrol Released	Release Date	Target Plant	Number Released
Chrysolina hyperici	July 13, 2018	SJ	115 adults
Chrysolina hyperici	July 13, 2018	SJ	115 adults

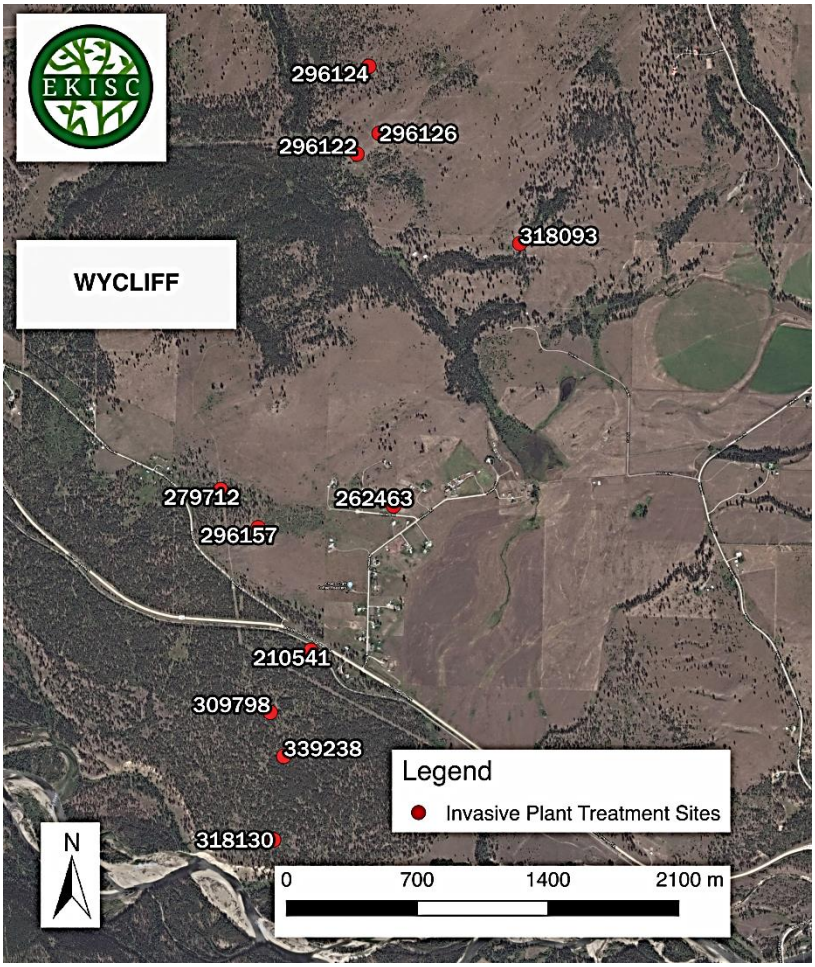


Figure 38 Map of treatment locations for Wycliff Wildlife Corridor.

Table 32 2018 chemical treatment data for Wycliff Wildlife Corridor.

Location	Site ID	Treatment Date	Invasive Plants Targeted	Herbicide	Amount of Mix Used (L)	Undiluted Herbicide Used (L/Kg)	Area Treated (ha)
Wycliff	210541	July 11, 2018	SK, SC, YH	Milestone	60	0.12	0.3
	262463	June 12 & August 14, 2018	HC	VP480 Glyphosate	2.7	0.0411	0.0056

				Tordon 22K			
	279712	August 18, 2018	SK, YH	Clearview	15	0.015	0.75
	296122	July 19, 2018	SK	Milestone	55	0.11	0.275
	296124	August 31, 2018	SC, YH	Milestone	495	0.99	2.475
	296126	July 20, 2018	SK, SC	Milestone	225	0.6	1.5
	296157	August 18, 2018	DT, SK	Clearview	10	0.01	0.05
	309798	July 11, 2018	SC, YH	Milestone	115	0.23	0.575
	318093	August 31, 2018	SK, SC	Milestone	105	0.21	0.5230
	318130	July 11, 2018	SK, SC, YH	Milestone	65	0.13	0.3251
	339238	July 11, 2018	YH	Milestone	60	0.12	3.0
	Total				1282.7L	2.5761L/ Kg	6.4062ha