2019 TO 2021

ELEPHANT HILL WILDFIRE INVASIVE PLANT PROGRAM

Final Report

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INTRODUCTION

Photo 1.. Burned grassland showing disturbance from wildfire and control efforts.

The Elephant Hill Wildfire of 2017 destroyed houses, forests and fences, but did not kill the invasive plants. Those plants lower biodiversity, generally supply poor habitats for wildlife, do a poor job of protecting soils from erosion, lower farm and range productivity and lead to ongoing costs for their control. Lands disturbed as a result of wildfire are also more prone to weed invasion. For these reasons the TNRD applied for funding from the Canadian Red Cross for funding to do control of Invasive Plants across multiple jurisdictions.

The TNRD Wildfire Invasive Plant Program objectives included: limiting the spread of invasive plants in the project area, mitigating impacts of invasive plants on landholders, expanding inventory of invasive species and improving public knowledge of invasive plants. The objectives were met with great success over the three year program, despite floods, wildfires, and a global pandemic. Over one hundred landholders were assisted and hundreds of kilometers of roadways were treated using Integrated Pest Management principles between 2019 and 2021.

As this program neared completion the 2021 wildfires occurred, covering about 10% of the TNRD's total area. This further highlighted the potential for spread of invasive plants due to fire impacts and wildfire control activities. Fire rehabilitation efforts need to consider the potential for invasive plant establishment and spread across multiple jurisdictions. Quick action to prevent infestation through seeding and control efforts will limit invasive plant impacts and management costs in the future.

BACKGROUND

The Elephant Hill Wildfire burned 192,000 hectares between July and September of 2017. There were major impacts to Crown, First Nations and private lands that extended from Ashcroft to Green Lake. Rehabilitation efforts on the Elephant Hill Wildfire were ongoing through that fall and into 2018. The main focus was on public safety and rebuilding efforts on private land. The Ministry of Transportation and Infrastructure (MOTI) also undertook a major effort to re-seed roadsides in areas of heavy disturbance. The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) did considerable work on inventory and treatment of invasive plants in the burn area.

In the spring of 2018, the TNRD applied to the Canadian Red Cross for funding to treat invasive plants on private lands and MOTI right-of–ways within the Elephant Hill wildfire area. Funding in the amount of $990,000 over three years was approved in the fall, and the TNRD initiated planning for on the ground work in 2019. The goal of the Elephant Hill Wildfire Invasive Plant Program was to prevent invasive plants from establishing and spreading within, and adjacent to, the fire area.

Funding needs were estimated at $500,000 for seeding and treatment on private land, $250,000 for work along MOTI right-of-ways, and $240,000 to support staffing to carry out program coordination, including: contract management, education and outreach, inventory and supporting mechanical treatments. In 2019, the budget was amended to $400,000 for private land treatments and $350,000 for treatment along MOTI right of ways. There were further amendments to the Red Cross Agreement to include treatments on First Nations, FLNRORD and Municipal Lands.

Photo 2.. Public Invasive Plant Workshop in Clinton

The program coordinator started in March, 2019. Immediate goals included: getting a seeding program in place for private lands, developing a control strategy, public outreach, and control contract development and implementation. Starting up a new program in a large area with limited inventory and contractors was challenging. By keeping application processes simple and ensuring timely communication with interested parties, the coordinator was able to develop a program plan and complete operations over the three year program.

The 2019 focus also included identifying the problem areas, carrying out post- fire seeding on disturbed ground, and carrying out high priority invasive plant control in burned areas. Knowledge gathered in 2019 was used to expand both highway and private control programs to areas adjacent to the wildfire in 2020. Monitoring and enhancement of biological controls, an invasive plant control program in the Village of Clinton, and projects with First Nations were also initiated. Considering Covid-19 impacts on contractors, and challenging early season weather, the 2020 season was very productive.

2021 brought an early start to efforts to complete work on highways and private lands. Control on First Nations Reserves was also expanded upon detection of new invaders. Work was interrupted during the summer due to extreme temperatures and wildfires. Control efforts re-commenced in the fall and were successfully completed, including some additional areas at the request of MFLNRORD. Surveys and treatments completed under the program were inputted to the BC Invasive Alien Plant program (IAPP).

Photo 3. First Nations Training - Back Valley Road

PLANNING & OUTREACH

One of the main challenges with any invasive species program is increasing public awareness of species of concern, their impacts, and programs available for their control. There are landholders seeking to keep current on information for the plants they already know about but many struggle to receive and accept information on new invaders. Due to the large area of the Elephant Hill Wildfire and limited inventory, outreach to all the communities was a large program focus for the first year.

During 2019, in order to gather local input regarding invasive plant priorities and locations, and to educate the public regarding the program, the following activities were undertaken:

- Meetings with major landholders
- Advisory group meetings in Clinton to review seeding program, invasive plant priorities and sites
- Clinton, Pressy lake and Loon Lake Open Invasive Plant Open Houses
- Ashcroft Community Meeting, Clinton Stockmen's Association meeting, Society for Range Management Fire Recovery Tour and Ashcroft/Cache Creek Rotary presentations
- Press releases for the aerial seeding program and for open houses, with follow up interviews with CBC and NL radio
- Wildfire program webpage added to the TNIPMC website and updated through the season.
- Doorknockers produced with program and contact information that were distributed broadly at events and door to door to over 100 people
- Updates and information was shared on relevant community and Facebook pages as well as the Thompson-Nicola Invasive Plant Management Committee's (TNIPMC) Facebook page.
- Individual site visits and calls to private land owners

Photo 4. Sign for Open House at Loon Lake Hall, 2019

PRIVATE LAND SEEDING

Seeding bare areas is a long accepted method to prevent invasive plant spread by offering competition of desirable plant species. However, there are many considerations prior to undertaking an expensive seeding program including proximity and type of invaders, available seedbed, seed type, application method, timing, and future chemical treatments. Individual management plans need to be developed and goals clearly defined for different properties. For example, goals may differ between private land with or without planned grazing and Crown land destined for multiple use. Under the Wildfire Invasive Plant Program there was a small window available to apply seed over a large area before all seedbed was lost. A major priority for the spring of 2019 was to seed those areas on private land where there was a concern for invasive plant infestation due to wildfire and wildfire control activities, such as fireguards, fire salvage logging and reconstruction.

Photo 5. Site seeded with Dryland Mix showing establishment on bare ground. Mature plants are naturally occurring Pinegrass.

To determine priority seeding areas, the following steps were taken:

- Contacted all impacted Agricultural operations from the Ministry of Agriculture's list
- Reviewed fire severity mapping to find areas that were heaviest impacted
- Put out public information directing residents to an online application/waiver form for free aerial seeding application
- Advertised aerial seeding contract, selected proponent and managed the contract
- Field visits with operators during April to check site disturbance on proposed seeding locations. Mapped proposed seeding areas in the field in digital format that could be given to aerial applicators
- Finalized seeding locations and staging areas and forwarded information to aerial applicator. They performed seeding operations over 6 days in early May, 2019
- Seeding success was monitored through the field season. Overall, germination appeared slow, but fall monitoring indicated good establishment in many areas.

Aerial seeding was completed on 859 ha with 3 different seed mixes. 40 different landowners received seeding on 84 properties in the program area. Locations are shown in Appendix I.
Some areas were deemed either too small for aerial seeding or were not ready for the program as there was to be further disturbance. At these locations either hand-seeding was completed or seed was supplied to the landowner to apply themselves. In total, there were 5 properties in the Pressy and Loon Lake areas with an area of less than 1 hectare total that were hand-seeded. Another 3 landowners received seed to be applied.

In 2020, there was one private pasture that had been sprayed that had very little plant cover. It was seeded in October 2020 with the goal of having desirable vegetation establish to out- compete Diffuse knapweed. Additional private land, where the ground was disturbed for fireguards, was also seeded in 2020.

There was also seed supplied to one rancher who did post harvest logging in the winter of 2021 for spring application, but seeding was delayed due to drought. On areas such as this private, logged property, shown below, the following factors were considered:

- End goal – weed control, erosion protection and forage production with quick establishment
- Invasive concerns – adjacent Spotted knapweed and Burdock
- Seedbed – good recovery of native vegetation under logging left limited disturbance
- Seeding area – skid trails and landings only as majority of management block was recovering naturally
- Seeding method – ATV spreader as too small an area for aerial treatment
- Seed type – dry forest land mix with domestic grasses and legumes, including cover crop
- Seeding timing –late spring, missed the ideal window in April, then spring drought delayed seeding until fall.
- Other considerations – grazing needs to be limited on young seedlings.

Photo 6. Burned area that was logged . Seeding planned for skid trails,. -May 20, 2021

Ideally all areas proposed for seeding would go through an assessment to make seeding more efficient and help achieve end goals. In the case of the Wildfire program, the fire severity map was used as a basis for disturbance, with the plan to seed in only areas of high to severe disturbance where recovery was slow. Despite a thorough review of the mapping and ground truthing, many of the areas that were seeded later showed significant cover of Pinegrass and/or Fireweed and limited seed take. Some other areas were crusted over or moss dominated preventing seed establishment and germination. Another consideration when planning seeding programs on Crown land within First Nations traditional use areas is the general desire to promote native species establishment and growth where possible.

PRIVATE LAND TREATMENTS

A major goal of this program was to treat private lands to limit invasive plant spread in the vicinity of the wildfire. On private lands, with limited known infestations, invasive plant locations were determined through the public input processes, combined with information from the spring seeding checks completed in 2019. The coordinator spent a significant amount of time dropping off informational doorknockers, meeting with landowners, and aiding them in the program application process over the term of the program. Contractors were involved with contacting private landowners to confirm areas to be treated, and signing Permission to Treat Agreements with them, enabling treatment on their land.

Putting a plan in place and finalizing contracts delayed the start of treatments until July of 2019, with focus on treatment in the southern area of the Elephant Hill wildfire. A significant number of larger properties, particularly between Clinton and Ashcroft were treated in 2020, and the largest number were treated in 2021, with a focus on areas near and north of Clinton. This occurred despite wildfire and heat dome impacts thanks to our contractors committing to complete work late in the season.

The following table includes data from the Village of Clinton mechanical treatment program which is summarized in the attached Appendix VIII. Some sites were treated in multiple years, with well over 100 landholders receiving treatment in total. Private locations are shown in Appendix III.

Table 1. Private Land Data

Measure	2019	2020	2021	Totals
# Sites Surveyed	32	63	113	208
Cumulative area of infestations (Ha)	33	125	198	356
# Sites Treated	32	83	98	213
# Mechanical Treatments	12	73	75	160
# Chemical Treatments	21	45	248	314
Area Chemically Treated (Ha)	17	54	36	107

The primary species treated was Spotted knapweed, but numerous others were targeted, including Diffuse and Russian knapweeds, Burdock, Leafy spurge, Canada thistle and Meadow goatsbeard. There was high priority placed on treating the small areas of Hoary alyssum, Common tansy and Orange hawkweed infestations in the Elephant Hill fire vicinity. A large Blueweed infestation on private land south of Clinton was also identified and treated in conjunction with adjacent Hydro and Crown land. Overall 21 species were treated on private lands.

The 2021 private treatments were recorded in the Invasive Alien Plant Program (IAPP), and are available to the public and other invasive plant land managers.

Photo 7. Treatment of Russian knapweed by hayfield

Photo 8. Treatment of Spotted knapweed at Loon Lake

Photo 9. Knapweed mechanical treatment area in a Pesticide Free Zone

Photo 10. Treatment of Spotted knapweed near Clinton

Over the program area there is a lot of variability in invasive plants due to climate, elevation, land use, historic invasive plant distribution and numerous other factors, including fire intensity. This led to varying prescriptions over the project area to make the most effective use of funding. Completed work by area is summarized in Appendix I. As TNRD operated programs are limited on private land there are not recommendations listed by area. In general, a focus on educational opportunities and promotion of existing TNRD programs, such as the 50/50 and sprayer loan out programs needs to include outreach to Areas "E" and "I" on the west side of the TNRD. Direct contact with landowners, including First Nations was one of the great successes of the Wildfire Program. Future inventories of highways and Crown lands should include looking "over the fence" and communicating with landholders. Education regarding new invaders is most critical.

MOTI TREATMENTS

Highways are known as a major pathway for invasive plant spread as vehicles and maintenance equipment transport invasive plant parts along the transportation corridors. To prevent spread along roads, management of invasive plants within and adjacent to the Elephant Hill Wildfire was a high priority. Major transportation routes in this area included Highways 1, 97 and 97C and side roads, such as the North Bonaparte, Loon Lake, Mound and Scottie Creek Roads. Treatments were carried out along the right of ways of these corridors over the three year program.

Using IAPP data and contractor knowledge it was decided to focus 2019 work on specific areas with limited infestations and in vulnerable areas with significant exposed soil. These included the Scottie Creek, North Bonaparte and Boule-Young Roads, as well as the east end of Loon Lake Road. There was also follow up work completed on Hwy 97 on Common tansy and Leafy spurge sites which are still limited in size.

Photo 11. Treatment of Spotted knapweed near Ashcroft

Highway 1 east and south of Cache Creek, Highway 97C and the Cornwall Road near the start of the Elephant Hill Fire, Highway 97 from Loon Lake North past 70 Mile as well as roads done in 2019 were targeted in 2020 with 361 sites being surveyed and most treated. Those left either had no weeds, had too many for treatment, were not in treatable areas due to water or adjacent properties, or were deferred.

During 2021, the priorities were to complete work on major highway corridors adjacent to the Elephant Hill wildfire, expand highways treatments to some key secondary roads and do repeat treatments on priority species. Additional roads treated included the Mound-Loon, Pavilion-Clinton and Big Bar Roads. Treatments are outlined in Appendices IV and V.

Invasive plants treated included all of those plants on the private property list, with Spotted knapweed remaining the most common. Hoary alyssum, Hoary cress, Common tansy and Blueweed were targeted as they are relatively scarce in the program area. Meadow goatsbeard becomes very common north of Cache creek and is found on almost every site. Infestations have gotten beyond treatment capability and Goatsbeard has spread onto many properties adjacent to Highway 97, potentially becoming a threat on burned areas. These sites will be left for regional containment to limit spread to the south and east.

This area had limited weeds and significant bare soil so a priority was put on doing multiple passes to stop the spread of invasives. Thirteen small infestations previously not identified in IAPP were surveyed and treated in this area.

Photo 12. Seeding along Boule-Young Road

Table 2. MoTI Data

Measure	2019	2020	2021	Totals
Km. Treated	55	103	95	253
# Sites Surveyed	176	361	204	741
# Sites Treated	125	233	195	553
# Mechanical Treatments	13	77	35	125
# Chemical Treatments	117	200	471	788
Area Chemically Treated (Ha)	7	77	31	115

MOTI BIOLOGICAL CONTROL

There have been numerous historical biological control releases completed within the Elephant Hill Fire area, primarily on Spotted and Diffuse knapweed, Dalmatian toadflax and Leafy spurge. These were commonly done on larger infestations near wetlands or other sites not able to be chemically treated. Establishment has been variable and required further assessment.

An experienced biocontrol contractor was hired to assess and augment bio-control agents over 2020/21. There were 78 sites, primarily on highways, surveyed in 2020. Seven different bio-agents, attacking four weed species were monitored for dispersal and there were four new biological control releases completed. Many of the releases were near riparian areas where infestations were too large for effective mechanical control and chemical treatment options were limited. In 2021 there were 8 new releases of 3 different bioagents made on Spotted knapweed and Dalmatian toadflax on sites found lacking insects in 2020. The summer of wildfire again limited the ability to collect and re-distribute Cyphocleonus achates (Spotted and Diffuse knapweed biological control agents) adults during its optimal collection window in August.

The summary report for biocontrol is available from the TNRD on request. Infestations that were surveyed for biological control agents are shown in Appendix VI..

Photo 13. .Biocontrol release site at Clinton water supply

MFLNRORD TREATMENTS

The majority of the land within the Elephant Hill wildfire is Crown land under the jurisdiction of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD). Significant time has been spent by FLNRORD Invasive Plant Program staff over the past three years surveying and treating invasive plants within the fire boundaries. Management coordination with FLNRORD occurred through operational planning meetings in 2020 and 2021, with some cross communication throughout the field seasons. Treatment on FLNRORD jurisdiction was not originally within the scope of this program; however these treatments were added in 2021 due to an anticipated surplus of funds in the final year of the program.

Photo 14. Single Nodding thistle patch on 3100 Road

With FLNRORD funding being curtailed in 2021, the TNRD, with agreement of the Red Cross, budgeted $25K for treatment of priority sites on MFLNRORD Crown lands. This was completed in September and October of 2021. Treatment was primarily on small Blueweed, Hoary alyssum and Common tansy patches with the goal of limiting their spread east towards the Elephant Hill fire. Also, considering the Flat Lakes, McKay Creek and Churn Creek wildfires of 2021, it was very beneficial to control these small patches to limit spread to the newly disturbed areas. Treatments are outlined in Appendices IV and V. Although the map shows numerous sites, most of them are very small and many had very few plants after previous year's treatment by FLNRORD.

Table 3. MFLNRORD Data

Measure	2021 / Totals
# Sites Surveyed	198
# Sites Treated	140
# Mechanical Treatments	21
# Chemical Treatments	225
Area Chemically Treated (Ha)	5.9

FIRST NATIONS TREATMENTS

Although not included in the initial funding application to the Red Cross, involvement with First Nations was a priority from the start of the Wildfire Invasive Plant Program. Unfortunately, Covid-19 and the 2021 wildfires limited interactions. First Nations Bands that were heavily impacted by the Elephant Hill Fire include Ashcroft, Bonaparte and Skeetchest'n. In addition, the Oregon Jack, High Bar and Whispering Pines Indian Bands (Clinton), are within the project area.

In May of 2019, the Program Coordinator met with the Elephant Hill First Nations Technical Table to review program plans. In June of 2019, the Coordinator worked with the TNIPMC to present invasive plant education to a group of First Nations and FLNRORD First Nations staff in Cache Creek. In August of 2020, the TNRD gave a Zoom presentation highlighting invasive plant identification and inventory to 11 participants from 5 Bands in partnership with the Secwepemcul'ecw Restoration and Stewardship Society (SRSS). High Bar First Nation also had a number of representatives attend the TNIPMC Field Day on new invaders at Clinton in July of 2021, and the Coordinator did a follow up field trip with High Bar First Nations employees to assist them in carrying out an invasive plant inventory on High Bar Reserve Lands.

Photo 15. Recovering grasslands just south of Elephant Hill

This photo shows excellent recovery of Bluebunch wheatgrass on Ashcroft Indian Band lands adjacent to Elephant Hill. There are still significant areas of bare ground between plants, with scattered Spotted knapweed plants on this area and large infestations adjacent which have been controlled under this program in 2020/21.

In 2020, a request to treat a section of the Ashcroft Indian Band (AIB) Reserve lands was made. Further discussion with AIB and the Canadian Red Cross resulted in the Wildfire Program being expanded to include management efforts on select Reserve lands. First Nations program participation was greatly expanded in 2021. Most of the Bands have a good awareness of the Knapweed infestations on their lands, but have limited access to funding for management. There is also less awareness of many of the new invaders, so when Hoary cress was found on Reserve lands, a high priority was placed on working with Band Councils and members to initiate control. Longer term programs need to be in place for control of new invaders on Reserves now that they have been identified. There were 33 treatments completed on 9 sites on First Nations Reserves under the Wildfire Invasive Plant Program, shown in Appendix III.

The wildfires of 2021 impacted all of the First Nation Bands mentioned above, plus many more in the Lytton, Spences Bridge and Merritt areas. Ensuring that planning for invasive plants is included in recovery plans should be a priority in those areas.

Table 3. First Nations Data

Measure	2020	2021	Totals
# Sites Surveyed	1	9	10
# Sites Treated	1	9	10
# Mechanical Treatments		1	1
# Chemical Treatments	3	29	32
Area Chemically Treated (Ha)	11.3	6.7	18

MOE- BC PARKS

BC Parks impacted by the Elephant Hill Wildfire of 2017 included Arrowstone, Chasm and Elephant Hill Provincial Parks. Invasive plant infestations in Chasm and Elephant Hill Provincial Parks are mostly limited to the access roads and are relatively small. Arrowstone Park has some large Spotted knapweed infestations, however in the Back Valley area there is established biological control. Some invasive plant management was completed on MOTI roads through the listed BC Parks over this program, but no direct management efforts were carried out on BC Parks lands.

Photo 16. Spotted knapweed ,that survived wildfire in BC Park, is ready to shed seed into newly burned area

Wildfire activity in BC Parks in 2021 lowered the priority to deal with invasive plants in the program area. However, with large areas of at least four Provincial Parks being burned within the Thompson-Nicola Region, there will be major invasive plant impacts. The TNRD will continue to collaborate with BC Parks and inform them of any newly report invasive plants on BC Parks land.

MUNICIPALITIES

In 2020 and 2021, the Program funded a dedicated staff position with the Village of Clinton, from July through September. Through this partnership, significant areas of municipal land and roads were surveyed and mechanically treated. Over 30 private landowners were assisted with invasive plant control on their properties in each year. Awareness of invasive plants was also greatly increased through Village promotion of the program. Treatment summaries are included in the private land treatment data

The TNRD also explored a similar partnership with the Villages of Cache Creek and Ashcroft for 2021. Ashcroft already carries on a municipal program and Cache Creek had capacity issues so those programs did not go forward. Invasive plant education programs should be an ongoing priority for the TNIPMC in the Ashcroft/Cache Creek area.

UTILITIES

The major utility corridor within the wildfire area is the Enbridge pipeline that runs northwest through the center of the Elephant Hill wildfire. Most of the pipeline is on Crown land and was generally outside of the scope of this project.

Main BC Hydro transmission lines through the south part of the fire have some large weed infestations, including a large Blueweed infestation south of Clinton. This multi-jurisdictional site was treated twice in 2021, with BC Hydro contributing to costs.

SUMMARY

The TNRD Wildfire Invasive Plant Program was very successful in meeting objectives over a broad area with multiple jurisdictions and within budget. Achieving this despite weather, wildfire and Covid-19 impacts was challenging and required the program to be very flexible. Offering complimentary seeding and control services on private lands was new for the TNRD. This led to development of online application processes that proved to be quite effective in limiting paperwork and enabling more efficient communication with contractors and land holders.

Treatment along the major travel corridors adjacent to the Elephant Hill fire was largely completed with many side roads being done as well. Over 100 private landholders had invasive plants treated and landowners appreciated the outreach and assistance. During site visits new infestations were often also identified, which was a large benefit of this project. Assessment and augmentation of bio-controls was also carried out to ensure adequate coverage in areas that could not otherwise be managed by conventional control methods.

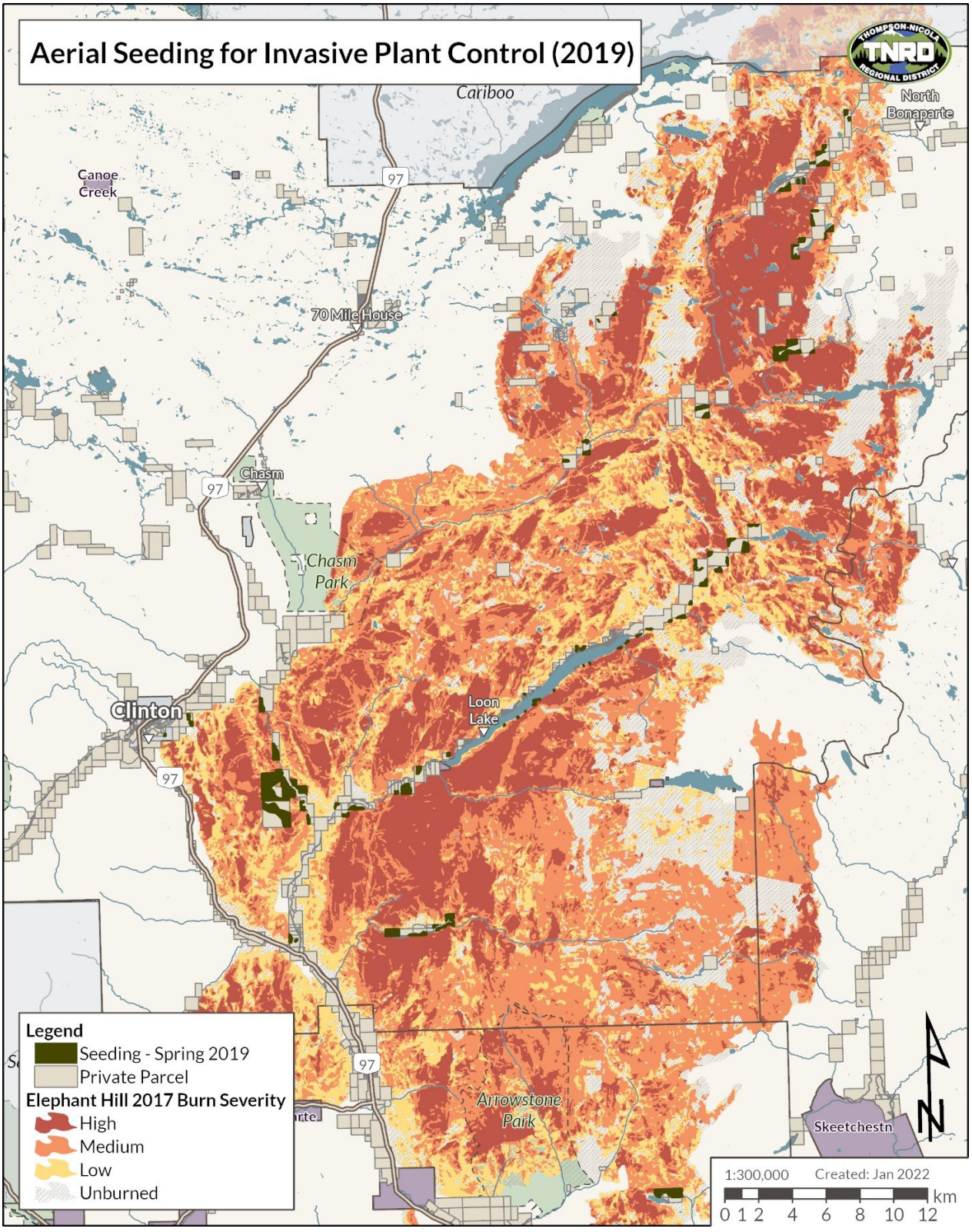
The program required enhanced coordination with numerous land managers and agencies, as weeds know no boundaries. This resulted in new partnerships formed and ongoing communication with many agencies. Some invasive plant infestations identified were unable to be treated for various reasons. As a result additional lands on First Nations Reserves and under the Ministry of Forests, Lands and Natural Resource Development were added to the program. A control program in cooperation with the Village of Clinton was developed and worked very well over 2020 and 2021.

Continued management efforts are required to minimize the ecological and economic impacts of invasive plants in the Elephant Hill Wildfire area. With 2021 being another major wildfire year the role of invasive plant control in recovery efforts needs to be strongly considered.

Extensive linear disturbances are perfect for the spread of invasive plants.

Photo 17. Fireguard with a treated patch of Spotted knapweed.

APPENDIX I- PRIVATE LAND SEEDING

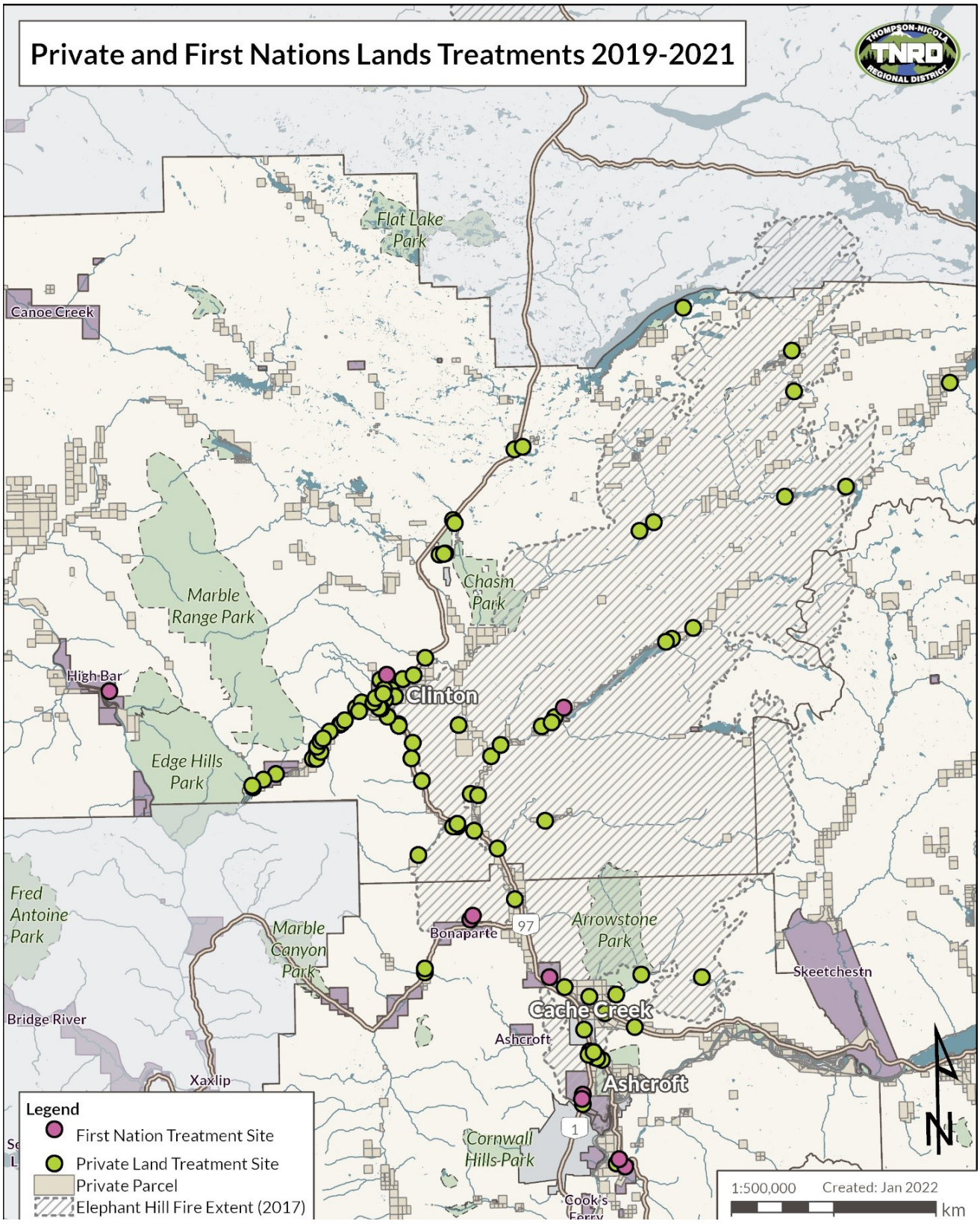


APPENDIX II- PRIVATE & FIRST NATIONS TREATMENT SUMMARY

Area	Wildfire Program Seeding and Treatments on Private and First Nations Lands
Cache Creek and South in Ashcroft Area	Limited seeding as most severe burn was on Crown Land. Extensive Knapweed treatments on private residential, industrial and First Nations Lands along Highway 97C and Cornwall Road. Significant Knapweed area on private against Elephant Hill Park left for biocontrol
Hwy. East of Cache Creek to Battle Creek	Only private treatments done were on Hoary cress in conjunction with MOTI treatments. Challenges with PFZ's and Hoary cress treatment timing as it matures early. Landowner also concerned with expansion of Meadow goatsbeard.
Back Valley Road	One large area seeded near Tsotin Lake with variable results. Treatment on five private properties, primarily for Knapweeds, including Russian knapweed.
Hwy 97 Cache Creek to Loon Lake turnoff	Mostly small landholders impacted by wildfire with limited interest in Invasive Plants. One property treated for Burdock on west side of Bonaparte River, and one for Diffuse knapweed. Treatment also done on new campground on First Nations land late in 2021 to prevent spread with camper traffic. Meadow goatsbeard expanding from highways onto private properties
Scottie Creek Road	Severely burned area with a number of patches seeded and ongoing treatments for Burdock and Spotted knapweed
Highway 99	Hoary cress identified on highway, private and First Nations lands with a number of treatments in 2021.
Loon Lake Rd. turnoff to Loon Lake	Aerial Seeding on nine properties. Chemical treatment on Knapweeds and newly identified Hoary alyssum on six properties, plus TNRD Ecodepot and the Loon Lake Hall site with ISCBC crews. One larger organic operation with mechanical treatments as well as old fish hatchery area by Loon Creek. Small burned and logged Reserve at Loon lake also had treatment on a number of IP's
Loon Lake Road along Loon Lake	Some of the highest density invasive plant infestations within the Elephant Hill Wildfire were along Loon Lake, including the Stephens Road area. Severe fire impact on south side. Aerial seeding on 20 properties on both sides of the lake. In this area, there were multiple private properties however there was limited interest in invasive plant management from mostly seasonal recreational lot owners. There were also limitations on treatment options due to the large water body and private wells. As a result, there was no chemical treatment done in this area. Focus was on monitoring and dispersal of biological controls
Loon Lake Rd. East	There was aerial seeding on 13 different sites on the large ranch at the east end of Loon Lake. Spotted knapweed treatment was also done there and on the subdivided ranch properties above the lake at the east end.
Hwy 97 Loon Lake turnoff to Clinton	Treatments on a number of species on 6 different operations plus the Rodeo Grounds. Some Common tansy to watch for plus a large Blueweed infestation on and adjacent to the hydro line

Village of Clinton	Over 30 private properties received manual control under the partnership with the Village of Clinton in each of 2020 and 2021. Numerous species were identified, including a number of New Invaders. In addition there were chemical treatments on 12 properties within the Village boundaries in 2021, including industrial properties in the Boyd Pit Rd area.
Pavilion – Clinton Road	There are number of larger farm operations in this area, with Spotted knapweed fairly common throughout. There were chemical treatments on 20 properties there in 2021 and some small patches of New Invaders were identified.
Mound and McColl Roads	There were six larger areas seeded off of the Mound Road. Invasive Plant infestations are limited. One property was treated for Burdock. Main concern on McColl Rd was increase in Meadow goatsbeard and one property was treated. Single HA found on one property and pulled.
Mound-Loon Road	Infestations mostly confined to road edge with some on the adjacent Crown, and very scattered patches of SK on private parcels.
Chasm	Three parcels seeded on one ranch on the Chasm-Loon road with follow up chemical treatments on Spotted knapweed. On the Chasm road there was treatment on six different properties for a variety of Invasive Plants, including newly identified Hoary alyssum
Hwy 97 Clinton to TNRD Bdry	Spotted knapweed is quite variable along this corridor, and Meadow goatsbeard is increasing throughout. There were only three chemical treatments on private in this area, plus one on Common tansy on Hydro at 70 Mile
North Bonaparte Rd	There were a few small patches of private land seeded, but Invasive Plants were primarily confined to the roadsides so limited treatment on private lands
Young Lake Rd	Invasive Plants mostly confined to roadside but one small property on east Young and one larger property at the west end of Young Lake had chemical treatment
Eagan Lake Rd	In this area the spread of Orange hawkweed is a major concern. One large property was chemically treated in 2021
Green Lake South Rd.	Recreational properties at the north end of South Green Lake had small new infestations of Orange hawkweed on multiple properties. Landowners there were quite open to treatment to stop this New Invader so there were a number of small treatments completed.

APPENDIX III- PRIVATE & FIRST NATIONS TREATMENT MAP



APPENDIX IV- CROWN LAND TREATMENTS SUMMARY

Area	Wildfire Program Treatments on Crown	Recommendations
Cache Creek and South in Ashcroft Area	Hwy 1 treated to just south of Cornwall Rd. Cornwall Rd to Ashcroft, 97C from Ashcroft to Hwy 1 treated. Some areas with mechanical treatment due to organic dairy adjacent. Primarily SK with some small patches of New Invaders	Maintain regular treatments as infestations on most adjacent areas are not large, and New Invaders are scarce so monitor closely,
Hwy 1 east of Cache Creek to Battle Creek	Treated in 2020, primarily for SK, but also controlled MG here to limit spread towards Kamloops. Ongoing control of HC infestations with challenges re treatment timing and PFZ's. Very small Chicory patches treated	Hoary cress treatment needs to occur earlier in late May. Keep on top of Chicory treatment as there is relatively little in this IPMA. SK is still quite patchy.
Back Valley Road	No highway treatments due to First Nations concerns, SK density and PFZ's. Very heavy infestation of SK on MOTI and adjacent Crown.	Area has largely been left for biocontrol. Monitor for New Invaders,
Hwy 97 Cache Creek to Loon Lake turnoff	Some SK and DK scattered. Limited treatment with PFZ (Bonaparte river flooding) and First Nations concerns. Meadow goatsbeard throughout. One small area of Chicory treated just south of Loon turnoff	As with most of the following areas the Meadow goatsbeard is most evident, but beyond treatment. Monitor for New Invaders.
Scottie Creek Road	Severely burned area with a number of patches seeded and ongoing treatments for Burdock and Spotted knapweed. Identified new infestations on eastern end of Scottie Creek Road	SK remains treatable and there are limited other invasive plants. Coordinate with FLNRORD
Highway 99	In addition to Knapweed and MG infestations Hoary cress was identified on highway with three sites treated in 2021.	Biocontrol established on DK and SK. Priority HC sites on highway. Work with First Nations on IP education
Loon Lake Rd. turnoff to Loon Lake	Leafy spurge biocontrol augmented. Only small patches of IP's treated to Loon Canyon due to limited safe access and PFZ's. SK treated above canyon to Eco-Depot.	Focus on catching the Hoary alyssum. Biocontrol mostly in place for Knapweeds and limited value in treating with lack of treatment at Loon Lake
Loon Lake Road along Loon Lake	Some of the highest density invasive plant infestations within the Elephant Hill Wildfire were along Loon Lake. Limitations on treatment options due to the large water body and private wells. As a result, there was no chemical treatment done in this area. Focus was on monitoring and dispersal of biological controls	Continue with biological control. Monitor for New Invaders. Use social media top promote IP knowledge
Loon Lake Rd. East	Spotted knapweed treatment on road through ranch to east and TC treatment at end of Stephens Road. Infestations mostly small. Also treated some small priority FLNRORD sites for BW and HA	Monitor for New Invaders and coordinate with FLNRORD
Hwy 97 Loon Lake turnoff to Clinton	Treated all sites from turnoff to 6 Mile Lake area then spot treatments due to PFZ's. Small HA and TC sites identified and treated.	Priority to monitor and treat the HA and BW infestations in this area.

Village of Clinton	Mechanically or chemically treated numerous sites within Village but some areas of concern remain	Monitor for New Invaders, particularly HA in the Lagoon Court, Lebourdais Road and Teal road areas, and OH and BW sites.
Pavilion – Clinton Road	Most of the road to Leighwood Lake was treated, primarily for SK, but there is still extensive SK outside treatment zone, particularly on railway	Monitor for New invaders
Mound and McColl Roads	Main concern on McColl Rd was increase in Meadow goatsbeard, which was treated in this area to reduce spread to private. DT and SK treated on Mound, limited infestations	Monitor for New Invaders
Mound-Loon Road	Infestations mostly confined to road edge with some on the adjacent Crown	Monitor for New Invaders. Coordinate with FLNRORD.
Chasm	Road treated south of railway but not from railway to Hwy 97. Extensive SK on adjacent Railway. Monitored biocontrol. Previously untreated HA found on MOTI and private	Monitor for New Invaders
Hwy 97 Clinton to TNRD Bdry	Spotted knapweed is quite variable along this corridor, but Meadow goatsbeard is increasing throughout. A few small CT patches treated.	Monitor for New Invaders. Communicate with CCIPC re priorities and treatments
North Bonaparte Rd	Road spot treated with multiple passes primarily for SK, but small amounts of HA and DT found and one Chicory. Many areas left due to PFZ's which were monitored for bio-agents. Fireguard built adjacent in 2021 may increase IP spread	Continue with spot treatments, monitoring for New Invaders. Do education session at 70 Mile or Green Lake halls.
Young Lake Rd	Invasive Plants mostly confined to roadside but one small property on east Young and one larger property at the west end of Young Lake had chemical treatment	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD.
Eagan Lake Rd	Limited SK treated and a few small patches of TC and OH	Monitor for New Invaders, including into north end of Sparks Lake fire. Coordinate with FLNRORD.
Green Lake South Rd.	SK treated and a few small patches of TC and CT. OH at north end of road was treated on roadway and adjacent private	Continue with spot treatments, monitoring for New Invaders. Do education session at 70 Mile or Green Lake halls.
Green Lake North Road	Treated primarily for SK patches. Fireguard built adjacent in 2021 may increase IP spread	Monitor for New Invaders. Communicate with CCIPC re priorities and treatments
Hutchinson Road	Small patches of SK treated multiple years on this road through wildfire. Also Scentless chamomile concern, particularly on adjacent FLNRORD roads	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD.
Big Bar Lake and Meadow Lake Area	Treated portions of Big Bar Road plus known MOTI and FLNRORD sites in the Meadow Lake area. Primarily SK, with small patches of BW and HA	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD. Communicate with CCIPC re priorities and treatments

Canoe Creek Area	Treated small BW and HA patches previously treated by FLNRORD. Most of these are now very small.	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD. Communicate with CCIPC re priorities and treatments
Loon Lake Rd. East	Spotted knapweed treatment on road through ranch to east and TC treatment at end of Stephens Road. Infestations mostly small. Also treated some small priority FLNRORD sites for BW and HA	Monitor for New Invaders and coordinate with FLNRORD
Hwy 97 Loon Lake turnoff to Clinton	Treated all sites from turnoff to 6 Mile Lake area then spot treatments due to PFZ's. Small HA and TC sites identified and treated.	Priority to monitor and treat the HA and BW infestations in this area.
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Young Lake Rd	Invasive Plants mostly confined to roadside but one small property on east Young and one larger property at the west end of Young Lake had chemical treatment	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD.
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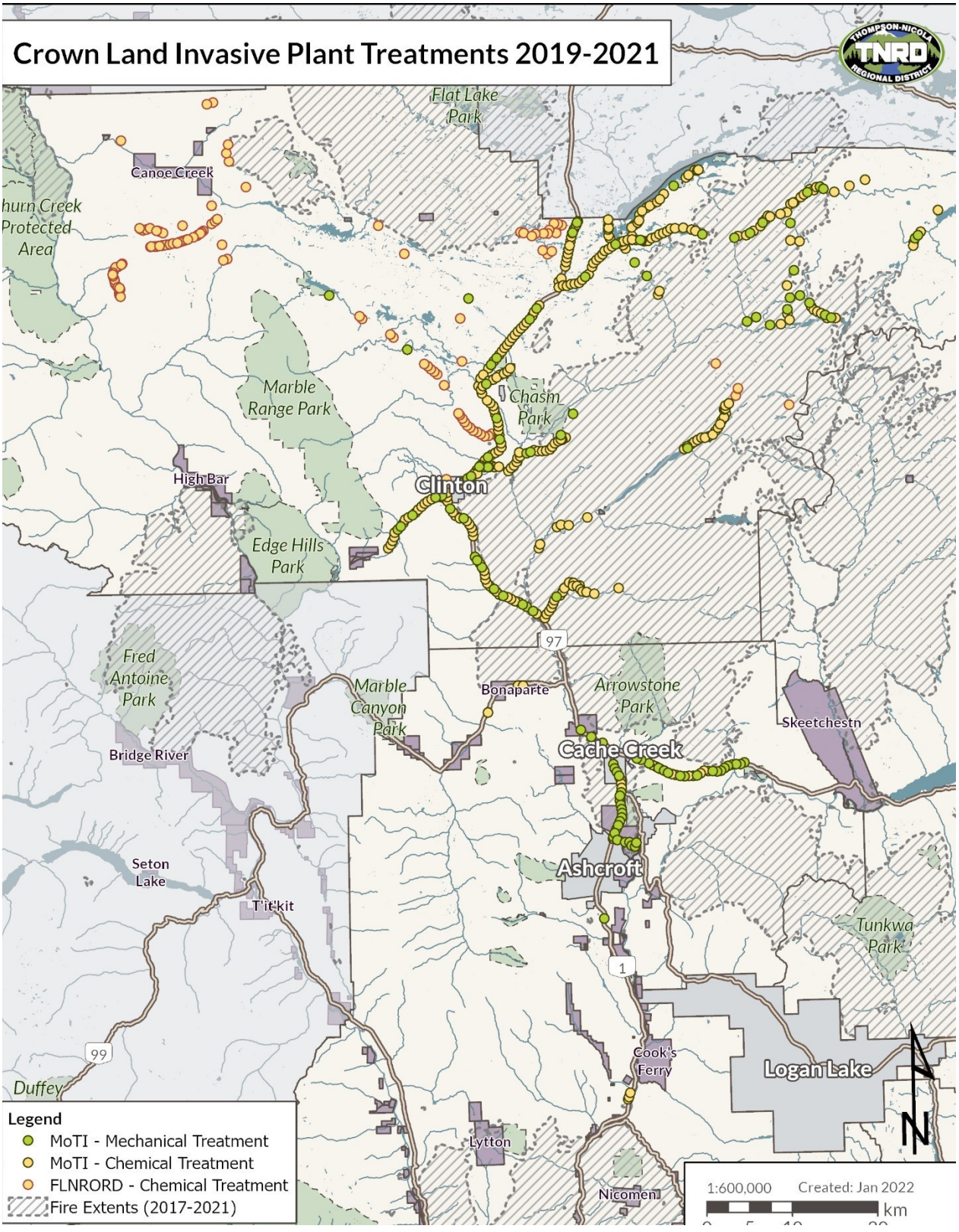
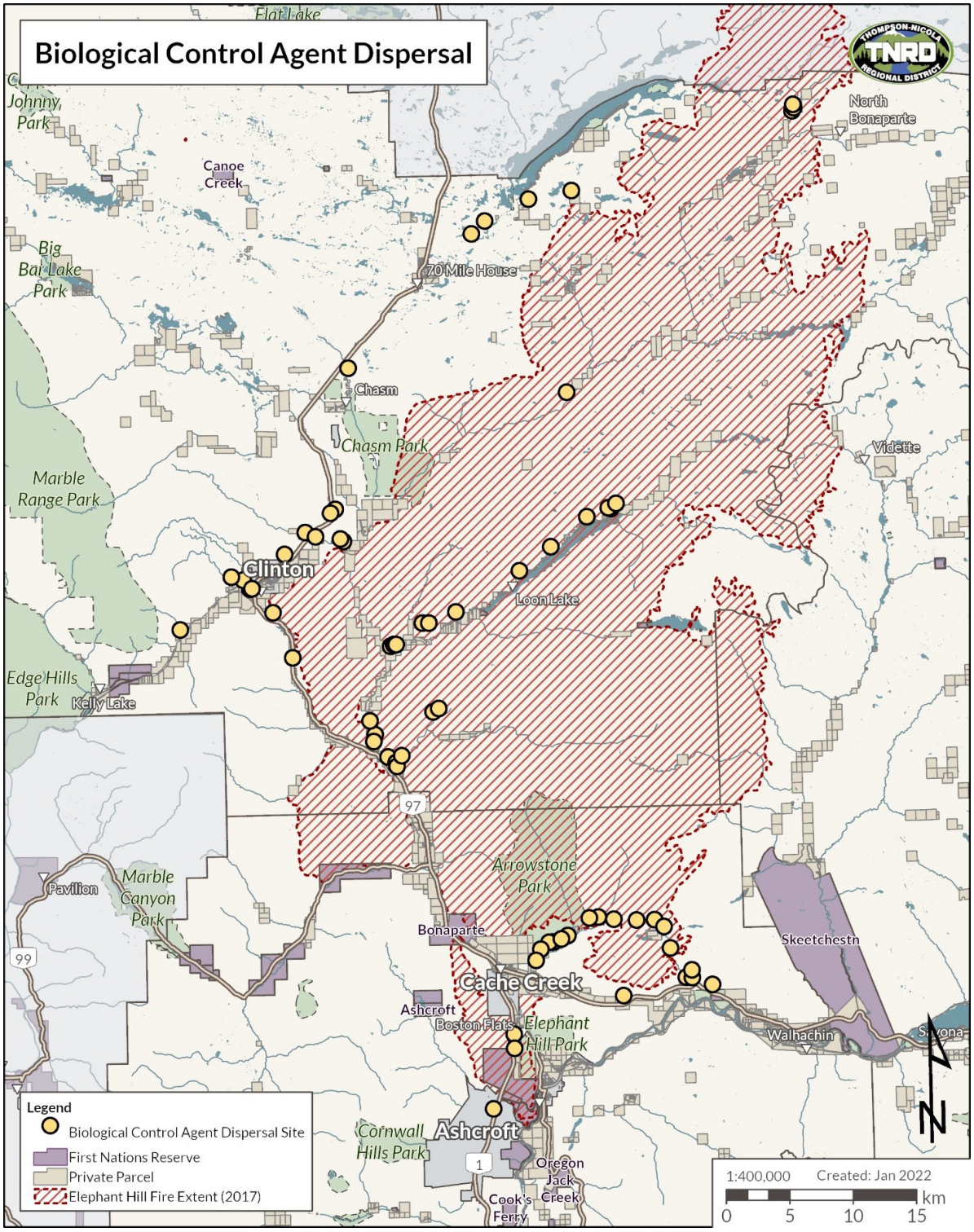
Green Lake North Road	Treated primarily for SK patches. Fireguard built adjacent in 2021 may increase IP spread	Monitor for New Invaders. Communicate with CCIPC re priorities and treatments
Hutchinson Road	Small patches of SK treated multiple years on this road through wildfire. Also Scentless chamomile concern, particularly on adjacent FLNRORD roads	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD.
Big Bar Lake and Meadow Lake Area	Treated portions of Big Bar Road plus known MOTI and FLNRORD sites in the Meadow Lake area. Primarily SK, with small patches of BW and HA	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD. Communicate with CCIPC re priorities and treatments
Canoe Creek Area	Treated small BW and HA patches previously treated by FLNRORD. Most of these are now very small.	Continue with spot treatments, monitoring for New Invaders. Coordinate with FLNRORD. Communicate with CCIPC re priorities and treatments

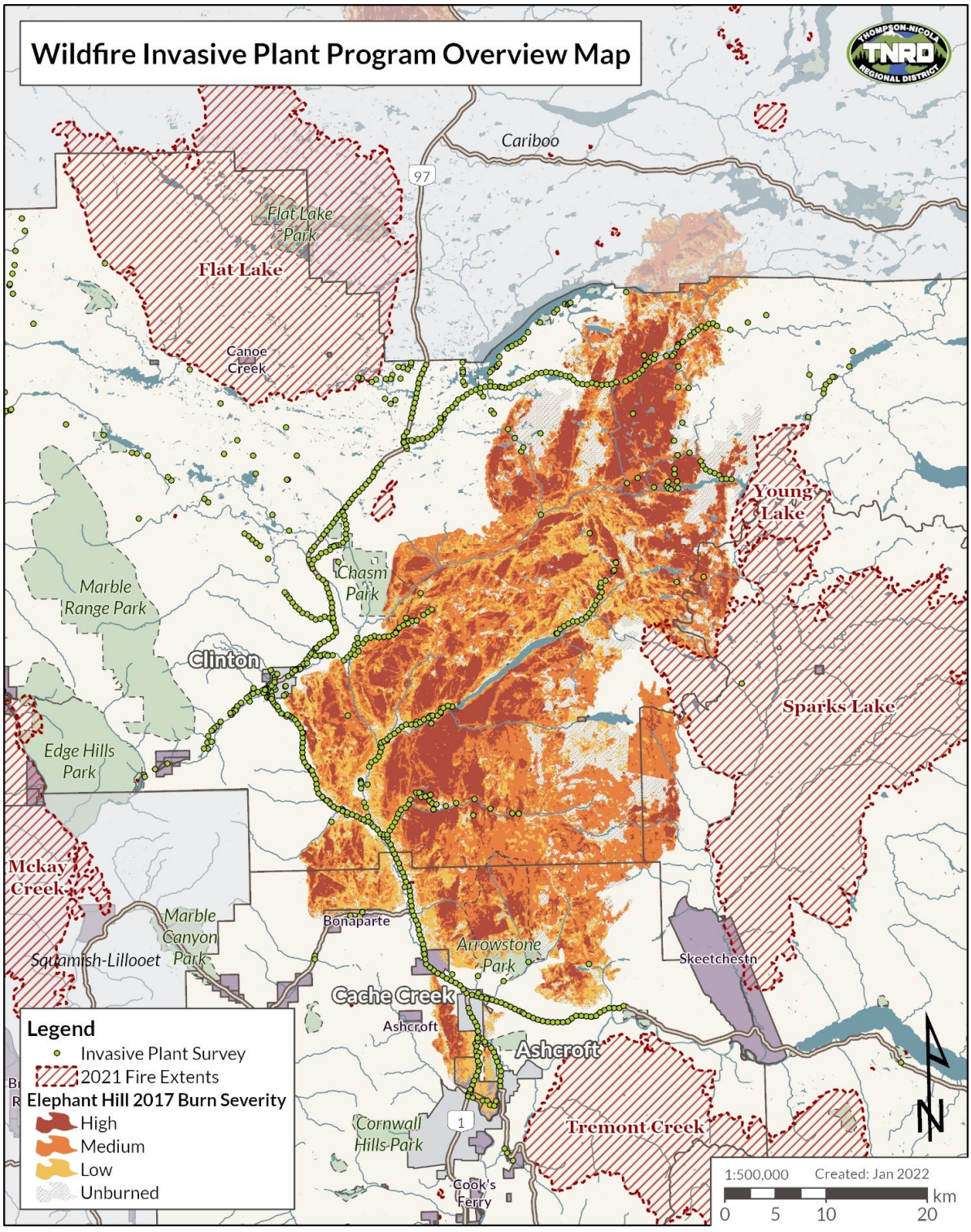
APPENDIX V- CROWN LAND TREATMENT MAP



APPENDIX VI- BIOLOGICAL CONTROL DISPERSAL MAP



APPENDIX VII- INVASIVE PLANT SURVEYS- ALL JURISDICTIONS FROM 2019 TO 2021



APPENDIX VIII- ADDITIONAL PROGRAM INFORMATION

2021 Clinton Invasive Plant Report

Elephant Hill Wildfire Invasive Plant Program: 2021 Biological Control Report