Southern Lakes Roadways Invasive Plant "Patrol and Pull" Project

Year 2 Report – 2016

Prepared for:

Government of Yukon

Department of Highways & Public Works

Transportation Maintenance Branch

October 31, 2016

Prepared by:

YUCAN Planning

PO Box 11277 ■ Whitehorse ■ YT Y1A 6N5

Contents

1 Introduction and Relationship to 2015 Study

In 2015, Yucan Planning was contracted by YG HPW Transportation Maintenance Branch (TMB) to design and implement a pilot project with the purpose of inventorying, documenting and controlling colonies of invasive plants along roadways in the Southern Lakes region using a "Patrol and Pull" method. The goal was essentially to determine whether it could be an effective management tool for a one or two person crew to drive slowly along Yukon roadways that have low (or unknown) densities of invasive plants and cut or pull all invasive plants that are encountered (i.e., "Patrol and Pull"). The roadways patrolled in the 2015 pilot study were the South Klondike Highway from its intersection with the Alaska Highway to Carcross, the Atlin road from km 0 to the BC border, and the entirety of the Tagish Road. All side roads to these three roadways were also patrolled.

The secondary goal of the 2015 pilot study was to inventory and map the occurrence of invasive species on these roadways for the purpose of establishing a GIS database that could be used as a baseline for future monitoring, and to examine the utility of GIS-based inventorying and monitoring methods for application to other Yukon roadways.

Other goals of the 2015 study included testing the extent to which small to moderate infestations of sweetclover can be contained by hand cutting on an annual basis, and testing whether pulling/cutting the first colonizing individuals of an invasive species can prevent the establishment of a resilient colony.

In order to evaluate the efficacy of the control measures undertaken in 2015, the Patrol and Pull program was repeated in 2016 (Project Year 2). In addition patrolling the same roadways and pulling/mowing any invasive plants that were encountered, the survey crew revisited locations where colonies were encountered/eradicated in 2015 to determine the status and resiliency of those populations—i.e., test the effectiveness of the 2015 control measures (the section of the South Klondike Highway from Carcross to the Alaska border was added to the study in 2016, as well). The current report documents the results of the control and monitoring work performed in 2016. The reader is referred to the 2015 report for more detailed information regarding the project's overall rationale and context.

2 Methods and Summary of Activities

2.1 2016 Control Measures

The Patrol and Pull technique employed in 2016 was essentially the same as in 2015. The survey crew slowly drove sections of Southern Lakes roadways delineated in Table 1; identified, recorded, and mapped each invasive plant/colony encountered; and then pulled or mowed the plants. Note that an additional section of road was added to the project in 2016 – the southern portion of the South Klondike Highway from Carcross (km 105) to the BC-Alaska border (km 24).

The specific methodology used was as follows:

- The patrol "crew" usually consisted of a single person, Ms. Toos Omtzigt, from Yucan Planning. Ms. Omtzigt is a trained professional biologist and botanist who has extensive experience working in the field of invasive plant management. Between July 8 and 28, 2016, Ms. Omtzigt drove the roadway sections, including all side roads, scanning for invasive plant species growing in the shoulder and

ditch. A list of the roadways surveyed can be found in Table 1. On two occasions, Paul Matheus accompanied Ms. Omtzigt on the patrol. Dr. Matheus also is a professional biologist and a partner in Yucan Planning.

- The crew conducted the survey in a company pickup truck driving at a speed of approximately 40-50 km/hr with a cab beacon light and hazard lights turned on. It is only realistic to survey one side of the road at a time; consequently each road had to be driven twice—first in one direction and then the other.
- Highway pull-offs (e.g., the truck chain-up pullout on the South Klondike Highway) were surveyed and treated, but gravel pits and other large public reserves (e.g., Carcross Airport) only received a cursory inspection and generally no eradication efforts were undertaken because they were outside the scope of this project. However, sweetclover in the gravel pit at km 151 on the South Klondike Highway was removed.
- Upon spotting a plant/colony of an invasive species, or a plant the crew did not recognize, they pulled the vehicle onto the shoulder and examined the plant/colony more closely. If there were more than a few plants to document and remove, and the crew knew it would be parked for more than 10 minutes, they set up traffic signs alerting vehicles to slow down due to the presence of workers. If the crew could complete the examination/mowing in less than 10 minutes they did not deploy the signs, but left the truck's hazard lights and beacon flashing.
- When an invasive plant/colony was spotted, the crew recorded the species, its location and the number of plants present or area covered by the plants, and then photographed the plant/colony with a GPS-linked digital camera.
- After recording and documenting the plant/colony, the plants were mechanically killed/destroyed in a manner that is effective for each given species.
    - Sweetclover plants were pulled when only a few plants were encountered, or cut when more than about 20 m^2 of plants were present. In either case, pulled/cut plants were left on the ground.[1] Cutting of sweetclover was performed with either a hand-held scythe or a gas-powered brush cutter (Stihl model FS240).
    - Essentially all other species that were encountered (e.g., perennial sow thistle, Altai lyme grass, spotted knapweed) are perennials that can regrow from roots left in the ground; therefore, they were pulled by hand to extract both the above ground and below ground parts. If the pulled plants did not have mature flower heads, they were left in the field.
    - Plants with mature flower heads were collected in plastic bags and allowed to decay before being disposed of at a landfill.[2]

[1] Sweetclover plants can actually regrow from rootstock left in the ground after cutting. However, if plants are cut late enough in the summer then the regrowth will not have enough time to produce flowers and seed. Since it is an annual/biannual plant, and because flowers stop developing when the plant is cut, simply cutting the plant essentially removes it from the population.

[2] Cut plants from members of the Composite family, such as sow thistle and knapweed, should not be left on the ground because they usually are cut when already in flower, and the discarded flower heads will continue to mature and produce seeds if not destroyed.

Table 1: Roadways Surveyed

Road Name		Kilometres Surveyed 2015	Kilometres Surveyed 2016
South Klondike Highway (km 24-158)		44	134
	Kookatsoon Lake Road	0.75	0.5
	Mosquito Road	1.25	1
	CCC Road	2.5	2.5
	Cowley Lake Road	2	2
	Ingo's Road	1	1
	Percival Road	1	0.5
	Linville Road	0.5	0.5
	Narrow Gauge Road	1.5	0.5
	Robinson Subdivision Road	5.5	5.5
	Annie Lake Road (and feeders)	30	30
	Meadows Road	0.5	0.5
	Lewes Lake Road	1.5	1
	Carcross lagoon and Carcross Rod and Gun Club access road	0.5	0.5
	Watson Lake Subdivision Road	2	2.5
Tagish Road (km 0-54)		54	54
	Airport Road	1.5	1.5
	Chootla Subdivision Road	2.5	2.5
	Crag Lake Road	1	1
	10 Mile Road	2	0.5
	Taku Subdivision roads	7	8
	Tagish Estates Road	3.5	3.5
	Tagish River Road	1.5	1.5
	Microwave Tower Road	2	2
	Secret Valley Road	1	1.5
Atlin Road (km 0-41)		41	41
	Lubbock River Road	2	1
	Snafu Campground Road	1	1
	Tarfu Campground Road	2	2
	Camp Yukon Road	1	1
	Total Kilometres Surveyed	**217**	**304**

2.2 Monitoring of 2015 Control Locations

In the 2015 pilot study, the survey crew recorded 140 GPS waypoints marking the locations where individual plants or colonies of invasive species were encountered along the three roadways, and were subsequently pulled or cut. Some of these waypoints were intentionally revisited for inspection in 2016, specifically those that marked large colonies of sweetclover and locations where species of high concern were found (e.g., spotted knapweed). However, it never was the intent in 2016 to specifically return to each and every waypoint from 2015 to look for the regrowth of plants and colonies that were pulled/cut. Instead, the GPS points for each plant/colony encountered in 2015 and 2016 were mapped and compared to discern patterns of colony persistence/resilience and ascertain the effect of control efforts. The results of this analysis are presented in the Section 4.3.

3 Results

3.1 General Comments and Results

Maps 1 – 12 show the point locations of all invasive plants/colonies encountered during this project for the three road areas surveyed in 2016. Tables 2, 3 and 4 attached at the end of this document provide the location information with notes on each waypoint/colony shown in the maps. In the electronic GIS version of this dataset, each point is hyperlinked to a photo of the colony, as well as any corresponding data and notes. The manner of data collection and presentation remained the same as for 2015. Maps 13 –20 show plant/colony locations from the 2015 study.

As in 2015, our general conclusion in 2016 is that the level of infestation of invasive plants along these Southern Lakes roadways is low in most areas. The main exception to this conclusion is the five areas that were found to have extensive sweetclover colonies in 2015:

1. The intersection of the South Klondike Highway and Alaska Highway
2. The intersection of the Tagish Road and the Alaska Highway
3. The first one kilometer of the Robinson Subdivision Road
4. Multiple small, but established, colonies between kilometre 16-18.5 along the Tagish Road
5. Multiple small, but established, colonies between kilometre 15-18.5 along the Atlin Road.

These sweetclover colonies were completely mowed with the brush cutter in 2015. The status of these colonies in 2016 was observed to be as follows:

1. Sweetclover growth at the intersection of the South Klondike Highway and Alaska Highway was just as widespread in 2016 as in 2015, but individual patches of plants within this general area were not as dense.
2. Growth at the intersection of the Tagish Road and Alaska Highway was just as widespread in 2016 as in 2015.
3. The two colonies along the first one kilometer of the Robinson Subdivision Road were just as extensive as in 2015.
4. The multiple small colonies between km 16-18.5 along the Tagish Road persisted into 2016.
5. The multiple small colonies between km 15-18.5 along the Atlin Road were virtually eliminated compared to 2015, and only individual plants and small patches were encountered and pulled in 2016.

More information about these problematic colonies can be found in the summary for each roadway below and in the Evaluation and Recommendation Section.

In 2016, we continued to find isolated plants or small colonies of white sweetclover throughout the project area. As well, there are still small to moderate infestations of the other invasive species found in 2015, including: yellow sweet clover (*Melilotus officinalis*), perennial sow thistle (*Sonchus arvensis*), spotted knapweed (*Centaurea biederstinii*), yellow clematis (*Clematis tangutica*), Altai lyme grass (or Altai wild rye; *Leymus angustus*), and unscented camomile (*Tripleurospermum inodoratum*) (Shasta daisy, *Leucanthemum* × *superbum*, was found growing with the camomile, but is not rated as invasive). In 2016, the list of invasive species in the area was extended by three new species, all on the Atlin Road, to include (1) oxeye daisy (*Leucanthemum vulgare*) at the entrance to two private properties near km 3, (2) a ~10 m^2 colony of

bird vetch (*Vicia cracca*) at the start of a private driveway at km 10.5, (3) and two yellow Lucerne plants at km 20. These three occurrences are discussed in more detail below under the Atlin Road summary.

Also noteworthy is the wide extent of Altai lyme grass growing along the South Klondike Highway in the area of the Alaska/BC border with 45 individual populations. This issue, too, is addressed in detail below.

Timing of work: Weather conditions in Spring/Summer 2016 were atypically warm and wet, and many native plants matured and flowered early in the season. Consequently, it seemed wise to start the survey early, so work was initiated on July 8. However, as the season unfolded, it became clear that sweetclover plants were actually slow to mature and flower in 2016, making it difficult to spot plants in early July. Other species, like perennial sow thistle and spotted knapweed, also were not in flower yet early July and were difficult to spot. It was therefore decided to patrol some roadways a second time in late July, to pull/cut late emerging/flowering plants.

3.2 South Klondike Highway and Side Roads

The Patrol and Pull was conducted along 134 km of the South Klondike Highway (SKH) from the Carcross Corner (km 158) to the Alaska-BC border (km 24), along with approximately 49 km of side roads that connect with this section of the highway. A total of 117 stops were made to remove and document invasive plants.

This year, the section of highway between the Carcross Corner and Carcross had a similar occurrence (location and species) of invasive plants as in 2015. The primary invasive species found along this section was again sweetclover. The overall extent of the sweetclover infestations was similar to 2015, but the size of individual colonies of sweetclover was noticeably smaller in most cases in 2016. All sweetclover plants encountered (at 58 locations) were cut or pulled.

As in 2015, the largest infestations were found at the Carcross Corner (~500 m^2) and within the first kilometer of the Robinson Subdivision Road (~300 m^2). South of the Carcross Cutoff, the frequency and size of sweetclover colonies decreases with distance down the South Klondike Highway. We encountered 15 colonies between the Cutoff and Annie Lake Road, six small colonies (including some single plant occurrences) between Annie Lake Road and Carcross, nine colonies in and around Carcross, and eight small colonies between Carcross and the BC-Alaska border. The average size of these small colonies ranges from one to twenty plants.

Most of the side roads were free of invasive plants, except for the large patch of sweetclover mentioned along the Robinson Subdivision Road and two small colonies on the Annie Lake Road (a patch of ~10 m^2 near km 3 and one single plant at km 5).

We briefly surveyed the two active gravel pits along the South Klondike Highway at km 129 (Lewes Lake) and km 151 (Mosquito Road). We only found a small infestation of sweetclover near the entrance of the km 151 pit. The other pit was free of invasives.

The section of highway between Carcross (km 105) and the BC-Alaska border (km 24) was surveyed for the first time in 2016. In the area near the border between km 24 and 56, the invasive plant of concern is Altai lyme grass, with 45 colonies varying in size from 1 to 20 m^2 along this stretch of road.

In total, 53 colonies of Altai lyme grass were encountered during the survey (including the 45 mentioned above in the border area between km 24 and 56 SKH). The infestations generally are within the highway right-of-way. A very large infestation occurs in Carcross, between the Nares River Bridge (km 104) and Montana Services gas station (km 105), extending well beyond the highway right-of-way. Altai lyme grass grows in tight, large tufts that are very well rooted; hand pulling is extremely difficult and only works in cases of small infestation where tufts are young and small. Consequently, we only removed (and bagged) plants from one location north of Carcross at km 144 (for more discussion on management options for Altai lyme grass, see Section 4).

In 2016, other isolated populations of four other invasive plant species were found in the South Klondike Highway area. These species include:

- Yellow sweetclover: ~25 m^2 at km 109 (RHS), found in the same location as in 2015. All plants were pulled or mowed. The size of the area was reduced from ~100 m^2 in 2015.
- Perennial sow thistle: ~1 m^2 patch was found at the corner with the Alaska Highway (LHS), in the same location as in 2015. All plants were removed and bagged for disposal.
- Yellow clematis: as found in 2015, this species is growing on both sides of the road along a 100 m long section near km 105 (in front of the CTFN building and Montana Services gas station). Although the growth (~50 m^2) is fairly extensive within this section, this species is not strongly invasive. The species is perhaps best classified as persistent, rather than invasive, and probably is not spreading aggressively in this area. It was therefore felt that removal of the plants was not a priority. Further discussion about managing this species is included in Section 4.
- Scentless chamomile: 7 plants at km 79.5 (RHS), in the newly surveyed section of the South Klondike Highway (south of Carcross). All plants were pulled and bagged.

It is noteworthy that we found a sign from the Northwest BC Invasive Plant Council posted along the road at km 73 (site SKH-97, in BC) with a notification that spot spraying for invasive plants had occurred in that location. We were not able to match this sign with any recorded location in an invasive plant species database that is maintained by the BC government (http://maps.gov.bc.ca/ess/hm/iapp/). However, this database did show two other sites nearby. The first site overlaps with the scentless chamomile site mentioned above at km 79.5 (SKH-44); however it is listed in the BC database as an oxeye daisy colony that received spot treatment (1 m^2) with Tordan 22 in 2012. We did not find oxeye daisy in this area, which either means the plants were eradicated, or that they were misidentified as scentless chamomile (the two species look similar). The database also records a second site further to the south, near km 78, that has been sprayed for spotted knapweed annually since 2009, and most recently on July 9, 2016. We did not find any knapweed, which is to be expected, since it had been sprayed just weeks prior to our survey. We have initiated further contact with the Northwest BC Invasive Plant Council to collaborate on future survey and management work, or at least sharing of information.

3.3 Tagish Road and Side Roads

Patrol and Pull work in the Tagish Road area included the entire Tagish Road (54 km) between Jake's Corner and the South Klondike Highway, along with approximately 22 km of side roads. A total of 63 stops were made to remove and document invasive plants.

Only the first few kilometers of the 10 Mile Road and Microwave Tower Road were surveyed because it became apparent that there was no adequate habitat for sweetclover along their roadsides. All other roads were surveyed for their entire length.

The primary invasive species found within the Tagish Road area was sweetclover; all sweetclover plants that were noted were also cut or pulled. The largest infestations were found at Jake's Corner (~150 m^2) and between km 16-18.5 of the Tagish Road (a total 800 m^2). Sweetclover patches were also found in three locations in the Taku Subdivision, as well as along the first 200 m of Ten Mile Road and at km 1 of Chinook Road.

Overall, the pattern of sweetclover infestation along the Tagish Road was similar to that encountered in 2015: 57 stops were made to document and remove sweetclover, in colonies ranging in size from a single plant to patches ~10 m^2 (~20-30 plants). This is an increase from the 50 total stops made in 2015, which were almost all for sweetclover as well.

In terms of single plant occurrences, we stopped for four single-plant occurrences of sweetclover in 2015, and found no sweetclover in those locations in 2016. However, we encountered seven new single-plant occurrences in 2016. These data suggest that the sweetclover situation on Tagish Road warrants continued monitoring and attention. It is possible that we discovered more occurrences of sweetclover in 2016 because we patrolled the road twice; given the later maturation of sweetclover in 2016, it's likely that we missed a few emerging plants during the first patrol but spotted them on the second patrol. However, the fact that new single plants are emerging each year suggests that there is a fairly widely dispersed seedbank in the right of way (see Section 4). To prevent the establishment of large, resilient colonies, it will be important to eradicate these numerous small colonies each year to exhaust the seedbank.

Other isolated populations of invasive plant species that were found in the Tagish Road area were growing in the same location as in 2015. These species include:

- Yellow sweetclover:
    - ~10 m^2 at km 21 (east of the Tagish Bridge). All plants were pulled or mowed.
    - ~25 m^2 at km 53 (just east of Carcross and intersection with SKH). All plants were pulled or mowed.
- Perennial sow thistle:
    - ~3 m^2 near km 5.5 Tagish Road (LHS). All plants were removed and bagged for disposal.
    - ~50 m^2 near km 19.5 Tagish Road (RHS). An extensive infestation. Plants were just beginning to flower and many were still developing flower shoots. Only the shoots with flowers were removed. Additional control methods will be required to contain this infestation (see Section 4).
    - ~3 m^2 near km 41.5 (RHS)). All plants were removed and bagged for disposal.
- Altai lyme grass: 5 m^2 near km 28 (RHS), the same location as in 2015. All plants were removed and bagged for disposal.

3.4 Atlin Road and Side Roads

Patrol and Pull work was conducted on 41 km of the Atlin Road from the intersection with the Tagish Road to the Yukon-BC border, as well as approximately 5 km of side roads. A total of 40 stops were made to remove and document invasive plants.

Similar to the other two roadways, the primary invasive species encountered along the Atlin Road was sweetclover. All sweetclover plants that were spotted were cut or pulled. In terms of side roads, only the first kilometer of the Lubbock River Road, and the access roads to the Snafu and Tarfu Lake campgrounds were surveyed because no sweetclover habitat existed further down these roads (even the first kilometer of these roads contains essentially no sweetclover habitat). No invasive plants were found on any of the other side roads.

The number of sweetclover colonies encountered along the Atlin Road in 2016 was 31, compared to 40 in 2015. Despite this decline, essentially all of the larger colonies reported in 2015 were still present in 2016. The extensive infestation along the old road alignment at km 6.5, while cut 100% in 2015, was found to be similar in size this year (75 m^2). However, a couple of other large colonies recorded and cut last year were in fact smaller this year, and several small colonies were no longer found to be present. Overall, sweetclover growth was noticeably less in 2016, which is further illustrated by the following examples:

- The largest sweetclover patch (~800 m^2) found at km 16 in 2015 was found to be reduced in size this year to a few small patches along 50 m of road, totalling ~50 m^2.
- In 2015, we noted 9 isolated sweetclover colonies consisting of a single plant. In 2016, no sweetclover was encountered in these locations, but 5 different single plant colonies were found.
- In both years, the survey included an old borrow area immediately adjacent to the road at km 22. In 2015, this area contained a large patch of sweetclover. Although sweetclover was found here again, the colony area was reduced in size from ~100 m^2 in 2015 to ~20 m^2 in 2016.

Other isolated populations of invasive plant species that were found along the Atlin Road in 2016 include:

- Perennial sow thistle: 5 plants near km 9.5 (RHS). All plants were removed and bagged for disposal. A slightly larger patch (~15 plants) of perennial sow thistle was found 300 m south of this location in 2015, but it was not present in 2016.
- Spotted knapweed: 4 flowering plants and 10 leaf rosettes near km 12.5 (LHS). All plants with roots were removed and bagged for disposal. This infestation was found 20 m from a dense patch of spotted knapweed that was removed in 2015 (this latter patch did not regrow in 2016).
- Oxeye daisy: two colonies of oxeye daisy totalling ~60 m^2 were growing within 200 m of each other, near the entrance to two private properties at km 3. This is a new finding. Oxeye daisies are often planted as ornamentals, which was likely the case for these two colonies, especially considering the location, size of the colonies and the fact that other ornamentals (sweet William, scentless chamomile, Lathyrus) were found growing alongside the oxeye daisy. Since these plants were growing in the ROW, they were all mowed. Further discussion regarding control of the oxeye daisy is included in Section 4.
- Unscented chamomile: As in 2015, two 10 m^2 areas with small unscented chamomile plants were encountered in 2016 on both sides of a private driveway entrance at km 10.5 (RHS). The plants

were growing alongside Shasta daisies, making it likely they were planted as ornamentals. Because scented chamomile is only weakly invasive, and Shasta daisy is not rated as invasive, we exercised sensitivity to the landowner and decided not to mow all of the plants. However, we did pull camomile plants on the periphery of the colony, and suggest that this section of ROW be mowed in the future; this will remove the invasive plants and perhaps discourage the landowner from future seeding in the ROW.

- Bird vetch: a ~10 m^2 colony of bird vetch was found at the start of the same driveway at km 10.5. This is a species of high concern as it can spread very quickly into wooded areas and smother other vegetation. We approached the property owner to talk about bird vetch. He was aware of the presence of the plants and said he has been battling infestations on his property. He said that a previous owner planted bird vetch and likely the other invasive plants next to the driveway. The property is currently for sale. We pulled all bird vetch growing along the portion of the driveway that cuts through the ROW, but not on the private property.
- Yellow Lucerne: One colony consisting of 2 plants was found near km 20, which is a new finding. The two plants were pulled and bagged for disposal.
- Yellow sweetclover: One small patch of ~ 2 m^2 was found near km 8, in the same location as a small colony found in 2015. All plants in this patch were pulled and left along the road. One single-plant colony that was found in 2015 at km 40 was not present in 2016.

4 Evaluation and Recommendations

With two years of the Southern Lakes Patrol and Pull project now completed, we are able to more accurately assess the status of invasive plant populations growing along Southern Lakes roadways, and start evaluating the efficacy of the applied control measures.

4.1 Updated Assessment of Invasive Plant Species Growing Along Southern Lakes Roadways

4.1.1 Sweetclover

As a conceptual and biological model, sweetclover colonies appear to exist in three population states along Southern Lakes roadways: 1) well-established colonies supported by "deep" seedbanks, 2) incipient colonies supported by moderate seedbanks, and 3) isolated plants resulting from recent seed dispersal events.

Well-Established Colonies: There are four well established sweetclover colonies on these roadways. They occur at:

1. The intersection of the South Klondike Highway and Alaska Highway
2. The intersection of the Tagish Road and the Alaska Highway
3. Kilometre 16-18.5 along the Tagish Road
4. The first one kilometer of the Robinson Subdivision Road

The first two colonies are essentially manifestations of the widespread sweetclover infestation found along the Whitehorse section of the Alaska Highway; both colonies have spread ~800 m down the South Klondike Highway and Tagish Road. The infestations along the Tagish Road and the Robinson Subdivision Road were established at least 10-15 years ago (personal observation) and without regular control have gradually spread along the roads during that time.

The four colonies were completely mowed with a brush cutter in 2015, but it was not surprising that this did not substantially reduce the size of each colony's regrowth in 2016; the possible exception is the colony at the Carcross Cutoff, which did appear to be less dense in 2016. The seedbanks at each of these colonies are probably very extensive and would take years to exhaust through annual mowing. However, further expansion of the colonies at their peripheries was likely thwarted by this mowing (though this is an untested assertion because we did not leave an un-mowed control section for comparison). This underscores the main reason for mowing established colonies: limiting their expansion and role as seed sources for long-range dispersal, rather than trying to eradicate the colony. Nonetheless, it would be a valuable experiment to repeat the mowing annually for the purpose of determining how many years of mowing is required to start exhausting a well-established sweetclover seedbank. As far as we know, this experiment has not been performed anywhere with sweetclover, even though it would test one of the main tenants of sweetclover management. And as noted, the 2015 mowing of the colony at the Carcross Cutoff may have been partially responsible for thinner regrowth in 2016.

Insipient Colonies: In our proposed model of sweetclover population states, incipient colonies consist of ~10 – 100 plants growing along approximately 100 – 200 m of roadway. Examples of these colonies can be found between kilometre 18-21 of the Tagish Road and kilometre 15-18.5 of the Atlin Road. Both of these

roadway sections were mowed thoroughly in 2015. It is noteworthy that mowed incipient colonies on the Tagish road section grew back to almost the same extent in 2016, while most mowed incipient colonies on the Atlin Road essentially did not grow back in 2016 (only a few isolated plants were encountered). This is likely a reflection of the different ages and histories of the colonies (seedbanks), which can be directly correlated to the timing of major road upgrades. The Atlin Road was upgraded over the course of the last 1 – 8 years, which establishes an upper age limit for its sweetclover colonies and the number of growing seasons available to build up a seedbank in ROW soils. In contrast, major upgrades to the Tagish Road (km 0-21) occurred about 10-15 years ago, so the seedbank has had almost twice as long to build up.

Mowing of incipient colonies along the Atlin and Tagish Roads can thus serve as a controlled experiment in sweetclover management. So far, the results of the experiment tell us that mowing incipient sweetclover colonies within the first 2 – 5 years after highway reconstruction could be highly effective at eliminating colonies, but waiting ten years gives the colonies too many seasons to build up a seedbank to make mowing effective at eliminating colonies with only a year or two of mowing. However, it will be a valuable exercise in this experiment to continue mowing incipient colonies on the Tagish Road in order to determining how many years it takes to exhaust the seedbed (see Section 4.3).

With multiple years of mowing and monitoring in this controlled experiment, TMB will finally have firm data to assess the efficacy of mowing as a tool to exhaust a sweetclover seedbank, with the following comparative populations:

1. Well-established colonies at the intersections with the Alaska Highway and on the Robinson Subdivision Road, where a large, established seedbank is assumed.
2. Young incipient colonies on the Atlin Road, where a small, young seedbank is assumed.
3. Intermediate age colonies on the Tagish Road, where a moderate, decade-old seedbank is assumed.

As stated above, a principle tenant of sweetclover management is that colonies can only be eliminated if the seedbank is exhausted. The situation on the Tagish and Atlin Roads presents TMB with an opportunity to test this tenant and add significantly to our knowledge of sweetclover management.

Isolated Plants: While the transportation of contaminated soil to a roadway can introduce a large amount of seed, and can lead to the formation of a significant sweetclover colony in a short period of time, small scale seed dispersal events can occur via a variety of natural processes (e.g, wind mobilization, animals) and human activities (e.g., vehicle traffic). These will lead to the development of small colonies containing only one or a few plants, with little or no additional seed in the soil to sustain the colony. In these situations, the hypothesis is that simply cutting or pulling the isolated plants should essentially eliminate the colony in one or two years. The results of this project over two years generally support that hypothesis. Overall, we did not find plants growing back in the exact same place in year two; however we did find that some sections of roadway are more prone to having isolated sweetclover plants re-appear. These areas are either within a few kilometres of an established colony, the reasons for persistence being the short distance to a seed source, or seem to represent areas where a seed-dispersal event occurred in the recent past—perhaps, for instance, where some small-scale roadwork has been conducted—or a vehicle pull-off area.

The presence, or lack thereof, of other vegetation along the roadway also will be a factor in determining whether dispersed seeds germinate and develop into colonies, because other vegetation growing along roadsides inhibits the growth of sweetclover. However, as long as there are well established colonies of sweetclover growing in the Southern Lakes area, then there will always be a trickle of seed being spread

down the roadways. The key is that using Patrol and Pull to remove the isolated sweetclover plants that result from this trickle of seeds will be relatively little work, but will effectively keep these main stretches of roads sweetclover-free

4.1.2 Other Invasive Plant Species

Yellow Sweetclover: In 2015, we encountered three small colonies of yellow sweetclover one near Tagish, one near Carcross, and one on the Atlin Road. In 2016, we encountered yellow sweetclover plants in these the same locations, and one additional location just east of Carcross. Yellow and white sweetclover are very similar plants, with similar biological properties, and some taxonomists consider them to be conspecific. All yellow sweetclover encountered on these roadways should be treated identically to white sweetclover.

Oxeye Daisy: This is a species that has high potential to become problematic, in particular when it spreads into grass fields. It spreads both by seed and vegetatively through its roots (rhyzomes), and can grow into dense, persistent colonies. These colonies outcompete and displace both native and agronomic grass species. The impact is especially damaging to hayfields and pastures because it reduces both crop yield and quality. Oxeye daisy can be pulled (the whole plant, including roots must be pulled), but elsewhere (e.g., British Columbia) it has been found that it is best managed by means of herbicidal spraying. The level of infestation in southern Yukon does not yet warrant spraying, but that may become a prudent action if oxeye daisy starts spreading. Experience in British Columbia shows that it is best to stop this species early in the colonization event, as it is very difficult to eradicate once it is established. Fortunately, oxeye daisy spreads slowly, especially early in colonization, but it is tenacious once established, so early eradication is both imperative and effective.

So far in this project, oxeye daisy has been found only near a private driveway entrance on the Atlin Road (it has been found in isolation elsewhere in southern Yukon). Vigilant pulling of individual plants each year should continue in that area. It would also be advisable to speak with the private landowners in the area to encourage them to control the plants on their property and not plant wildflower mixes (in public ROWs).

Spotted knapweed: The concern and approach to spotted knapweed is similar to those for oxeye daisy. It has strong invasive tendencies, and if allowed to take hold can form dense stands that reduce the vigour and diversity of native plants, as well as the quantity and quality of forage crops in agricultural fields (i.e., hay and pasture). Spotted knapweed is a biannual or short-lived perennial plant that reproduces and spreads by seeds, which are produced in abundance and are highly mobile. Pulling of plants can be effective for small populations (the entire plant, including root, must be pulled), but herbicidal spraying has been found to be necessary in many areas of western North America, mainly because mowing is not an effective control measure for infestations because it does not kill the plants. Likewise, the complete extrication of every individual plant through hand pulling is not realistic for large infestations.

A small but dense patch of spotted knapweed was encountered and pulled on the Atlin Road (near km 12.5) in 2015. This patch did not return in 2016, indicating effective eradication. However, four flowering plants and ten leaf rosettes were found in 2016, only 20 m distance from the eradicated patch. This indicates that there is probably a seedbank in the soil. Either way, the area should be monitored closely for the next few years, as it is important to ensure this does not become an established colony and the progenitor of an knapweed infestation in Southern Yukon.

Bird vetch: Bird vetch also is a very invasive species that is difficult to eradicate once it becomes established, and it can spread quickly and smother other vegetation soon after its first appearance. It has become a very problematic invasive species in interior Alaska. Consequently, it should be given high priority for monitoring and control.

We encountered a colony of bird vetch approximately 10 m^2 in size growing at the entrance to a private driveway at km 10.5 of the Atlin Road. We approached the property owner, who said he was aware of the presence of the plants and said he has been battling infestations on his property. Apparently, a previous owner planted the vetch and likely the other invasive species (scentless chamomile) found growing next to the driveway. The property is currently for sale. It is suggested that TMB stay in contact with private landowners along this stretch of the Atlin Road to coordinate efforts at eradicating invasive plants that have been seeded as ornamentals (see oxeye daisy discussion above).

Perennial sow thistle: Sow thistle can be very difficult to eradicate once it becomes established, primarily because mowing is ineffective, as all parts, including roots, of each plant in the colony must be pulled and destroyed. We did pull every plant and root in the patch of ~15 plants found near km 10 of the Atlin Road in 2015, and that seems to have effectively eliminated that colony. Its likely that the 5 new plants found near km 9.5 in 2016 either originated from the same seed source as the colony at km 10 or were progeny of that colony. All five of those plants and root bodies were pulled and destroyed, so in all liklihood that colony also has now been eliminated. However, this stretch of road should be monitored annually to ensure that sow thistle does not persist and become entrenched on the Atlin Road.

When a sow thistle colony becomes too well established, it is not realistic to pull every plant and root body, and if efforts to control these small colonies by hand-pulling proves to be ineffective, then herbicidal spraying should be considered as a control option, as it is the only other way to eradicate this species. There already is one well-established colony of sow thistle on the Tagish Road for which hand pulling is not realistic and we recommend herbicide application to manage that infestation.

Yellow lucerne: Yellow lucerne is an invasive plant that can take over agricultural fields and severley reduce crop growth. It already is problematic in the Haines Junction area, where it has invaded hay fields. The two lucerne plants found near km 20 of the Atlin Road do not represent a large threat because they are not indicative of as established colony. However, it would be prudent to re-examine this stretch of road annually to ensure any germinating lucerne is pulled or cut.

Yellow clematis: This non-native, vine-like climbing plant has been observed in the Carcross area, as well as Whitehorse, for many years. It is not strongly invasive and does not appear to be a biological threat or spreading significantly. We did not pull or cut any clematis in this study, and we do not believe that any control measures need to be taken at this time, other than continued monitoring.

Unscented chamomile: Two 10 m^2 patches of unscented chamomile were encountered in 2016 on both sides of the entrance to a private driveway at km 10.5 of the Atlin Road and 7 plants were pulled at km 79.5 of the SKH. The unscented chamomile on the Atlin Road was growing in the same area as Shasta daisy, an ornamental plant. Since the chamomile is only weakly invasive in Yukon, we exercised sensitively to the landowner and did not mow the entire patches. However, we did pull plants on the periphery of the colony, and suggest that this section of ROW be mowed in the future; this will remove the invasive plants and perhaps discourage the landowner from future seeding in the ROW.

Altai lyme grass: This species is challenging in terms of assessing its level of threat and the appropriate management response. It is not an extremely invasive species, yet it will readily colonize newly disturbed ground, particularly nutrient-poor sandy soil, and it is tenacious and can form dense patches when it gains a foothold. Controlling Altai lyme grass by hand or mowing is difficult, which adds to the challenge of chosing an effective management plan. It is a tufted grass that develops strong root systems, making all but the youngest plants difficult to pull. Pulling large or well entrenched patches is not realistic, and like other grasses, mowing will not eliminate it.

Moreover, Altai lyme grass is a species of concern around the Carcross Desert area, where patches of the grass have become well established and compete with rare endemic grass species in this unique boreal dune system, where ground is frequently disturbed by wind. In the course of a few decades, as dune areas are continually exposed and colonized, Altai lyme grass could take over as a dominant grass, at the expense of rare endemic species. This is a real concern, but so far it has not happened, and the Altai lyme grass is mostly restricted to the road ROW, especially along the South Klondike Highway south of Carcross to the BC-Alaska border. Around Carcross, however, it has spread outside of the ROW and there are some very large patches, over 100 m^2 in size. This may indeed be a situation where it would be especially prudent to intervene and stop the spread of an invasive plant that could cause real biological degredation to a unique ecosystem if its expansion suddenly becomes exponential.

The Altai lyme grass situation is a strong candidate for use of spot application of an herbicide. Because the grass grows in patches, to the exclusion of most other plants, spot spraying an herbicide on patches will be an effective means of eliminating well-circumsribed patches without causing significant harm to other species or nearbye vegetation (in contrast to programs involving the broad application of an hercicide to control a highly dispersed species, where many other plants will be killed as well). The sprayed patches would likely be recolonized by native plants, as they would represent the strongest seed source in the area.

We suggest that TMB initiate the development of a long term Altai lyme grass control strategy/program in the Carcross area and southern portions of the South Klondike Highway (south the to BC-Alaska Border). TMB should be a major player in this control plan because so much of the Altai lyme grass is growing in the road ROW. However, because such a control program would be initiated to protect a specialized and sensitive ecosytem that extends beyond roadside vegetation managment, the situation probably calls for an integrated approach involving other agencies and stake-holders.

4.2 Broad Scale Patterns, Key Issues of Concern, and Notes on Management and Prevention

From a broad perspective, there are three general themes defining the pattern of invasive plants growing along Southern Lakes roadways: 1) a persisent presence of sweetclover, with infestations ranging in severity from the four well-established colonies to isolated and incipient colonies, 2) a suite of recently arrived, strongly invasive species growing along the Atlin road, and 3) extensive patches of Altai lyme grass growing near and south of Carcross.

Persistent Patches of Sweetclover: The sweetclover issue and its populations were discussed in detail above. The prudent approach to sweetclover management and control will be to manually mow and pull plants each year (mowing/pulling should be done by hand so that 100% of the plants are removed). Mowing the large colonies will control them at their margins, will prevent them from functioning as seed sources for new

colonies, and will ultimately help exhaust the extensive seedbank. Mowing and pulling isolated and incipient colonies will prevent them from becoming well established colonies, and should completely eradicate them in a few years time. As discussed, the situation on the Tagish and Atlin roads presents an opportunity to conduct a controlled experiment testing the efficacy of annual mowing as means of exhausting seed banks and eradicating colonies of varying size and age.

New Suite of Aggressive Species Growing on the Atlin Road: The small number of sweetclover plants growing along the Atlin Road gives the impression that this roadway is relatively free of invasive plants; however, the truth is quite the opposite. There is a suite of troublesome invasive plants growing along the Atlin Road, the most problematic being oxeye daisy, bird vetch, spotted knapweed, and perennial sow thistle. While their numbers are still low, all four species have high potential for becoming major disrupters to natural vegetation and damaging to agriculatural fields in southern Yukon if they are allowed to become well established. Eradicating these species should be given high priority, even if it means some limited spraying with an herbicide. Monitoring for yellow lucerne should continue around km 20, because this plant also can be devastating to agricultural fields; however the level of infestation appears to be very small—only two plants were encountered. The other invasive species encountered along the Atlin Road—unscented chamomille—is not strongly invasive in Yukon, and warrants less concern but pulling and continued monitoring are still recommended.

The appearance of these potentially harmfull invasive plants on the Atlin Road and nearby areas on the Tagish Road underscores a number of recurring issues regarding invasive species management and prevention. The first concerns the introduction of invasive plant meterial that can occur during highway reconstruction and roadside revegetation work. The knapweed and thistles found growing on the Atlin Road were likely introduced during road reconstruction that occurred in the past 5 years through seeds inadvertately transported on equipment mobilized from outside the territory, or contaminants in seed mixes applied by the revegetation contractor. Sweetclover growing along the roadway may have been introduced via those vectors as well, through the use of fill material originating from contaminated borrow sources, or from the redistribution of existig soil in the ROW that was already contaminated with seed (sweetclover was already growing in low density on the Atlin Road prior to reconstruction of the road).

Steps that could be taken to reduce these means of seed introduction include: 1) increased effort by contractors to throughly clean equipment prior to transport to Yukon for road reconstruction work (and increased enforcement by HPW), 2) demonstrated use of certified seed for revegetation work that is tested and shown to be free of invasive plant seed, 3) revegetation of distrubed ROW areas as soon as possible after completion of road construction, and 4) rigorously controlling invasive plants growing at gravel pits.

The second management and prevention issue on the Atlin Road concerns the inadvertent introduction that can result when private property owners sow seeds of invasive plants that are components of ornamental and wildflower seedmixes. This is the likely explanation for the occurrence of oxeye daisy, bird vetch, and unscented camomille on the Atlin Road. It may be appropriate for a representative from TMB to talk with these property owners and share information about efforts to prevent the introduction and spread of invasive plants.

Altai Lyme Grass: Thick, persistent patches of Altai lyme grass are commonly encountered in the highway ROW around Carcross and the South Klondike Highway between Carcross and the BC – Alaska border. Now that it has a strong foothold in the area, Altai lyme grass has a high potential to spread into the unique

Carcross Desert ecosystem, where the dynamic dune system provides ideal habitat for its colonization. If Altai lyme grass were to expand into the dune system, it would pose a real competitive threat to a number of rare endemic plant species unique to this system. Spot spraying of an herbicide would be a highly effective and prudent control measure, and since the potential impact of Altai lyme grass extends beyond the highway ROW, it is recommended that TMB work with other agencies and stakeholders in developing a comprehensive management plan. More details and suggested control measures were discussed in the previous section.

4.3 Assessment of Tools and Methods Used in Patrol and Pull

Overall Assessment: Patrol and Pull was proposed as a low-cost, low-tech, flexible tool for simultaneously inventorying and controlling invasive plant populations along Yukon roadways, particularly those not heavily infested with sweetclover. In this section, we comment on the efficacy of the methods and approach used in Patrol and Pull.

Perhaps the main value-added efficiency gained by the Patrol and Pull method is that it combines the survey and control aspects of invasive species management into a single activity. Previously, it was common to commission a stand-alone survey, to be followed-up with a discussion of control measures that should be enacted. In Patrol and Pull, when an invasive plant or colony is encountered it is immediately eradicated using a method appropriate for that species—either cutting (hand-mowing) or pulling (for those species where the rootstock must be removed). The survey crew simply carries a hand scythe or gas brush cutter with them and takes the additional time necessary to kill the plants they survey. Consequently, instead of just doing more surveys and talking about what should be done, Patrol and Pull simultaneously identifies and takes care of the problem.

Our experience leads us to conclude that this is an especially effective approach to managing invasive plants along roadways that have small and isolated colonies. Moreover, when Patrol and Pull is conducted annually, the survey/inventory part of the work simultaneously monitors of the efficacy of the previous year's control efforts. However, we have found that small crews can become bogged down when they have to stop to cut large patches of sweetclover. The problem is not that they are unable to cut the patches; in fact they are probably more thorough and more cost-effective than operations employing large mowing equipment. Rather, the inefficiency lies in the fact that a disproportionate amount of time (50-60% in our case) was spent hand-mowing large, well-known sweetclover patches, rather than patrolling for new or isolated colonies. This was not the most efficient use of a relatively expensive crew of trained biologists contracted for the Patrol and Pull work. It may be more cost-effective in the future to tender separate contracts for hand mowing of known infestations, or for TMB crews to perform the work. In terms of the suggestion that the surveys be conducted with larger crews, so large colonies could be mowed more quickly, we feel this would also be inefficient because it would leave much of the crew idle during the Patrol phase, when only one or two people are needed to survey the roadway and take only a minute or two to cut/pull plants.

Efficacy of Specific Tools: Hand pulling single plants or small patches of plants, including sweetclover, is the most expedient way to kill them, and in cases when the complete root stock must be removed pulling is the only option. When a moderate-sized patch of sweetclover is encountered (<.01 ha), a well-maintained sharp hand scythe is the best, low-hassle tool for mowing. To mow large (>.01 ha) patches of sweetclover, we carried a Stihl FS240 gas powered brush cutter with a steel blade attachment, which has proven to be a

good fit for the job. The FS240 model is perhaps overkill, and a smaller model would probably be adequate, but the standard hardware store "weed whacker" would not be.

If at some time in the future TMB needs to control large colonies of a perennial invasive plant species that reproduces through or persists from intact root stock, then simple mowing will not be effective at eliminating the colony, and hand-pulling will be unrealistic as well. Examples of this type of species currently of concern in southern Yukon include sow thistle and spotted knapweed. If either of these species starts to gain a strong foothold and spread, then the use of an herbicidal spray for spot spraying is highly recommended.

Timing of Patrol and Pull: Patrol and Pull must be planned to fall within an optimal seasonal time window. Crews should wait until plants are large enough to spot while driving at a reasonable speed of 40-50 km/hr, yet not so far developed that they are producing seeds, bearing in mind that some species, such as spotted knapweed and sow thistle, aren't easily spotted unless they are flowering—they must be pulled in the short window between flowering and seed maturation.

In 2016, we initiated our survey/pull on July 8, which was gauged in part on the early growing season we experienced this summer. However, that proved to be too early as many sweetclover plants were too small to spot; consequently, we ended up driving the main highways a second time three weeks later to pull/cut sweetclover plants that we missed the first time. Sow thistle and spotted knapweed were not flowering by July 8 either, so they were pulled on the second round of surveying. Our conclusion is that the optimal time to conduct the survey/pull in Southern Lakes is the last two weeks of July through the first week of August. All species of concern will be flowering by then, but will not yet have gone to seed.

Just as important, if sweetclover is mowed before the end of July it can still regrow, flower and produce viable seed that season. This means that even mechanical mowing programs will need to be timed carefully, if sweetclover control is one of the main goals.

Efficacy of Patrol and Pull for Controlling Sweetclover: As stated above, using the Patrol and Pull crew may not be the most cost-effective way to mow large colonies of sweetclover, i.e., those at the Carcross Cutoff, Robinson Subdivision Road, and intersection of Tagish Road with Alaska Highway. However, having a dedicated crew (even the Patrol and Pull crew) hand-mow these colonies with brush cutters will still be far more effective than using heavy-equipment to mow them, because the hand-mowing crews can realistically reach and mow 100% of the plants in the colony, whereas mechanical mowers cannot.

In terms of controlling for small, isolated, and incipient colonies of sweetclover, the Patrol and Pull method seems to be the ideal approach, because annual mechanical mowing of all Southern Lakes roadways is unrealistic. Moreover, mechanical mowing is likely to miss many isolated plants, which would defeat the purpose of preventing sweetclover from spreading. Slowly driving the roadway and stopping to pull individual sweetclover plants appears to be the only solution. It also allows for the roadway to be surveyed for other invasive species, with subsequent pulling of them as well (mowing of any kind will some eliminates some other species).

In terms of the overall effectiveness of Patrol and Pull as a tool for eliminating sweetclover from roadways, we believe the data from this study show that: 1) large colonies should be mowed annually to exhaust the seedbank and prevent spreading at the periphery, and hand mowing is the only effective way to cut 100% of those colonies, 2) Patrol and Pull is effective at identifying, controlling, and monitoring small, incipient

colonies, and annually cutting by hand during the survey will exhaust the seedbank in a few years, and 3) Patrol and Pull is the only effective way to spot and eliminate isolated sweetclover plants that will function as founders of new colonies (see next subsection).

Spatial Assessment of Colony Regrowth in Year 2: An important goal of this project was to test the hypothesis that small colonies of sweetclover, as well as other species, could be eradicated if they are pulled/cut annually, and to determine how many years of pulling/cutting was necessary to eliminate a colony. The experiment is not a perfect one, as it is just as much a measure of the variability in seedbank density in roadside soils. To test this and related hypotheses, we plotted waypoints of all plants (colonies) pulled/cut in 2015 and 2016 (Maps 1-20), which yielded the following observations.

First, the distribution of sweetclover plants, even single plant occurrences, is not random; rather, there is significant spatial overlap in the location of sweetclover colonies between the two years, meaning plants are growing back in the same areas they were pulled/cut the year before. This supports the hypothesis that sweetclover is mostly germinating from an existing seedbank, not from seed dispersal events. If new colonies were forming via annual seed dispersal, then we would expect to see a more random distribution pattern or one that correlates colony density with distance from seed sources; neither pattern is supported by the data.

While the regrowth of plants in specific locations each year supports the hypothesis that plants are germinating from an established seedbank, it is also reasonable to conclude that the seedbank is not a very dense or extensive, because most colonies consist of very few plants. But the data also appear to reflect variability in the seedbank density, since a few colonies were eliminated by pulling/cutting in 2015, while others persisted (the number of colonies eliminated slightly outnumbers the appearance of new colonies in 2016, yielding an overall reduction in colony numbers). This conclusion is partially subjective, however, as it is dependent on how a "colony" is defined. If we pulled a single plant in 2015, and found another plant growing within 100 m in 2016, we considered that to be regrowth in the same colony because it probably represents the same general area of seed-infested soil.

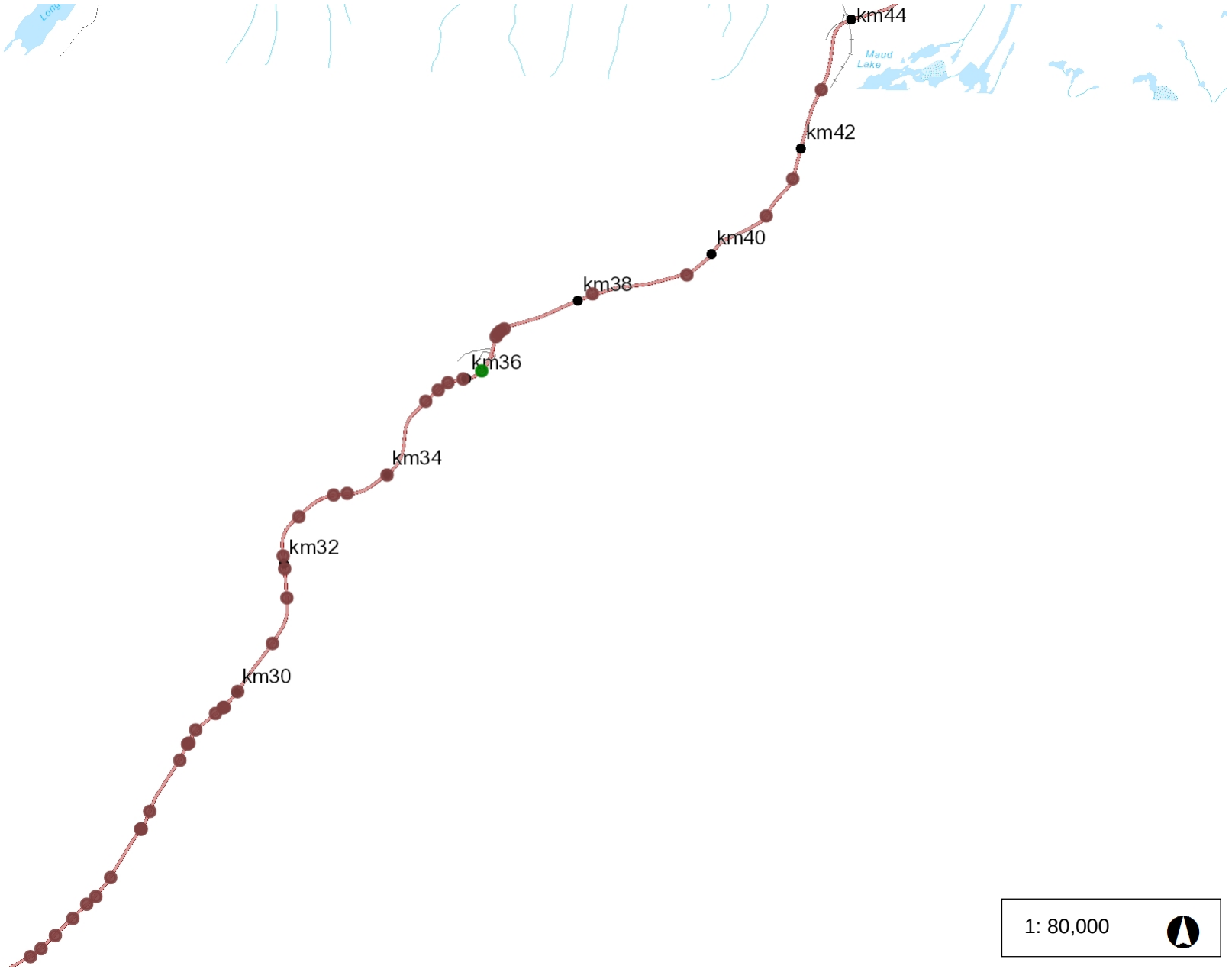
So far, this study has demonstrated that one year of pulling/cutting is not enough to eradicate most incipient colonies of sweetclover. However, the density of plants in most colonies (other than the very large colonies) was already substantially reduced in year two. Thus, even one year of cutting has had an impact on the seedbank. Continuing the Patrol and Pull program for additional years will allow for further testing of these hypotheses, specifically whether sweetclover colonies can be eliminated after a few years pulling/cutting by exhausting the seedbank.

Essentially all other species of invasive plants (non-sweetclover) found in 2015 show a clear pattern of persistence and recurrence along specific stretches of roadways. No new colonies of significance appeared in 2016. This indicates that these invasives are growing from established seed sources in the soil. Pulling through the Patrol and Pull program seems to be preventing the spread of these species, and has effectively eliminated some colonies.

2016 MAPS

Note: overlap of the locations of different species occurs on these maps. As a result some species/locations are not visible.

Southern Lakes Roadways 2016 Invasive Plant Survey - *S. Klondike Highway km 24-44*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

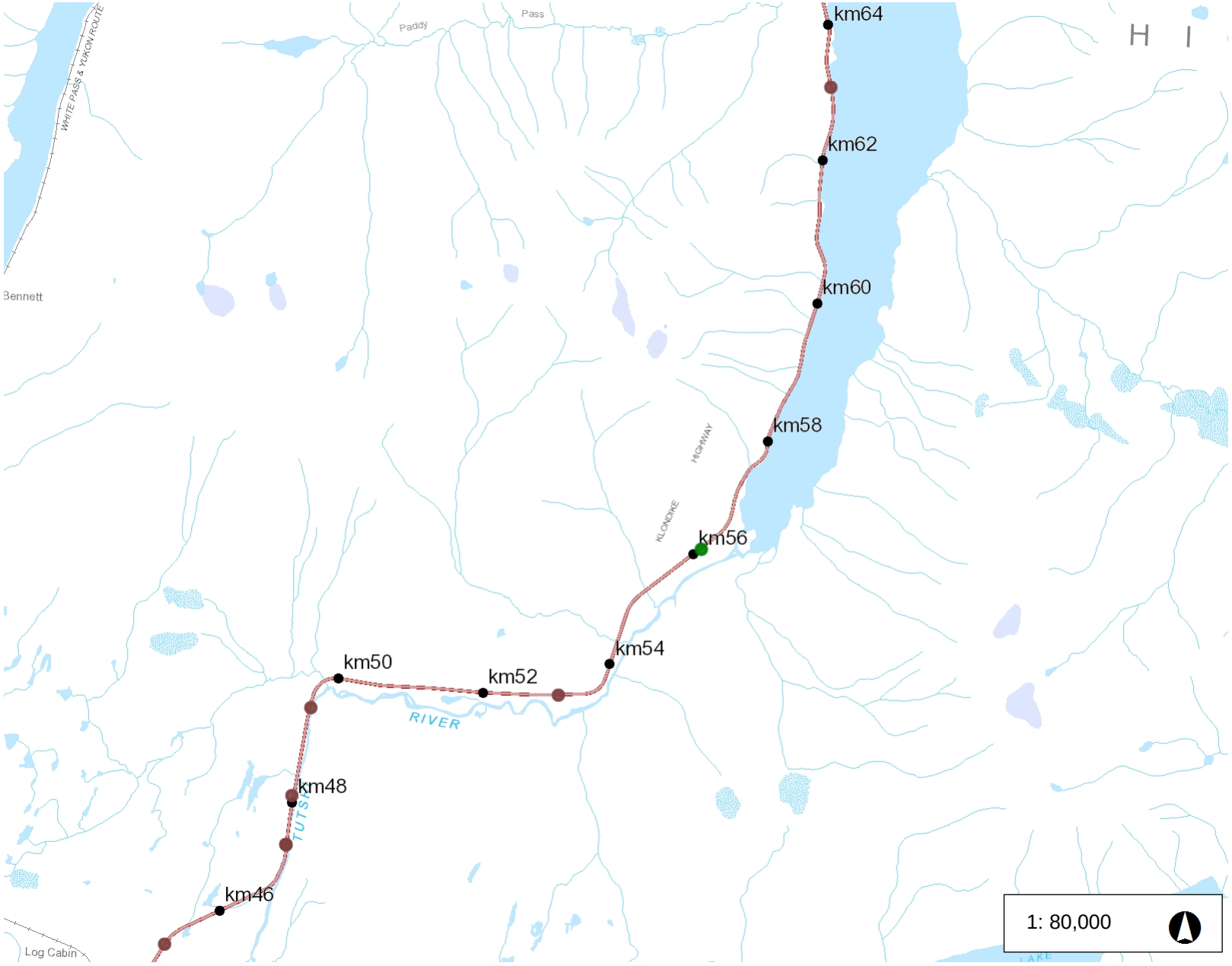
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Notes

Map 1

Southern Lakes Roadways 2016 Invasive Plant Survey - *S. Klondike Highway km 45-64*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

Notes

Map 2

4.1 0 2.03 4.1 Kilometers

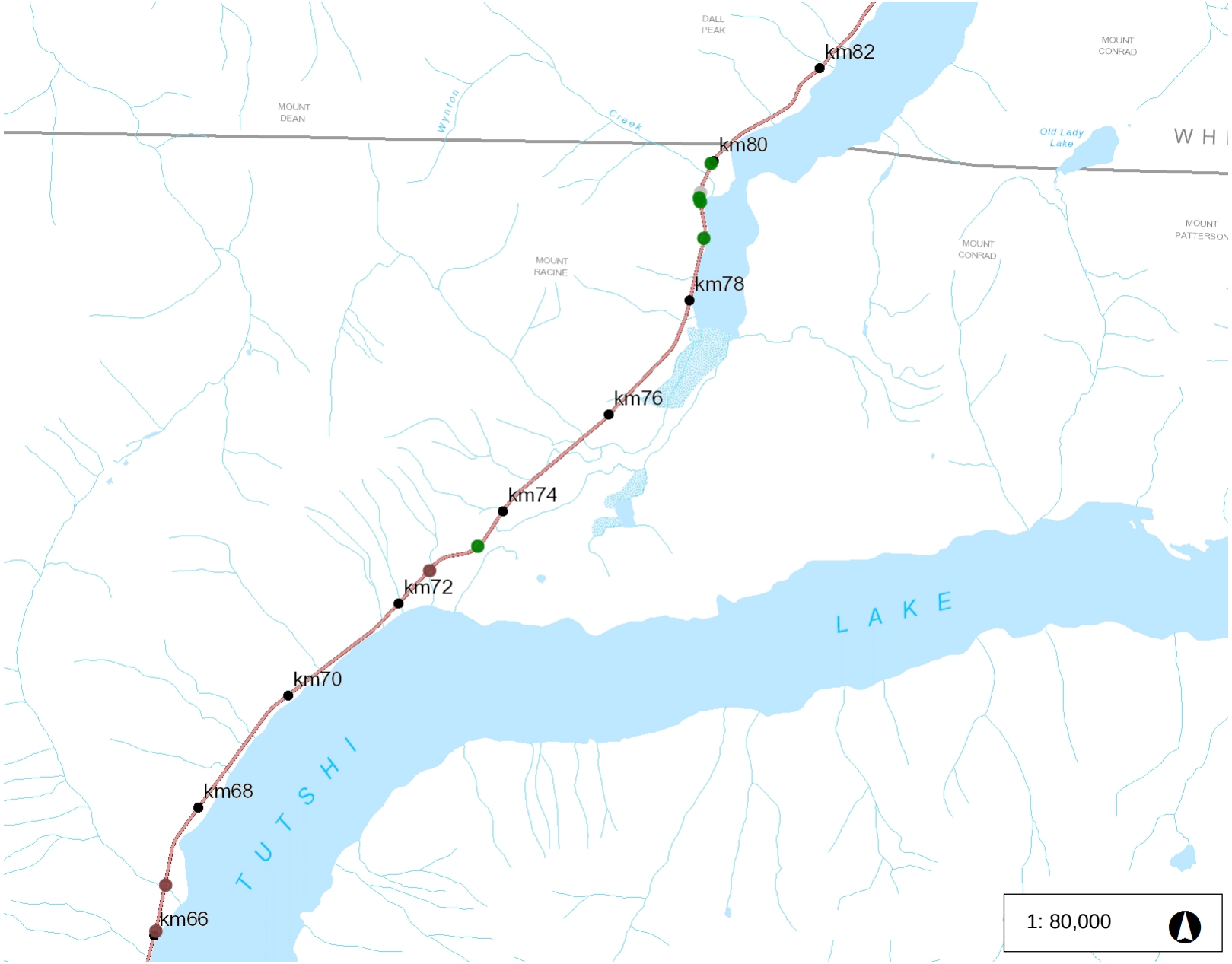
Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Southern Lakes Roadways 2016 Invasive Plant Survey - *S. Klondike Highway km 65-83*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Notes

Map 3

Southern Lakes Roadways 2016 Invasive Plant Survey - *S. Klondike Highway km 84-101*

Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Notes

Map 4

Southern Lakes Roadways 2016 Invasive Plant Survey - *S. Klondike Highway km 116-130*

Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Notes

Map 5

Southern Lakes Roadways 2016 Invasive Plant Survey - *S. Klondike Highway km 130-145*

Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

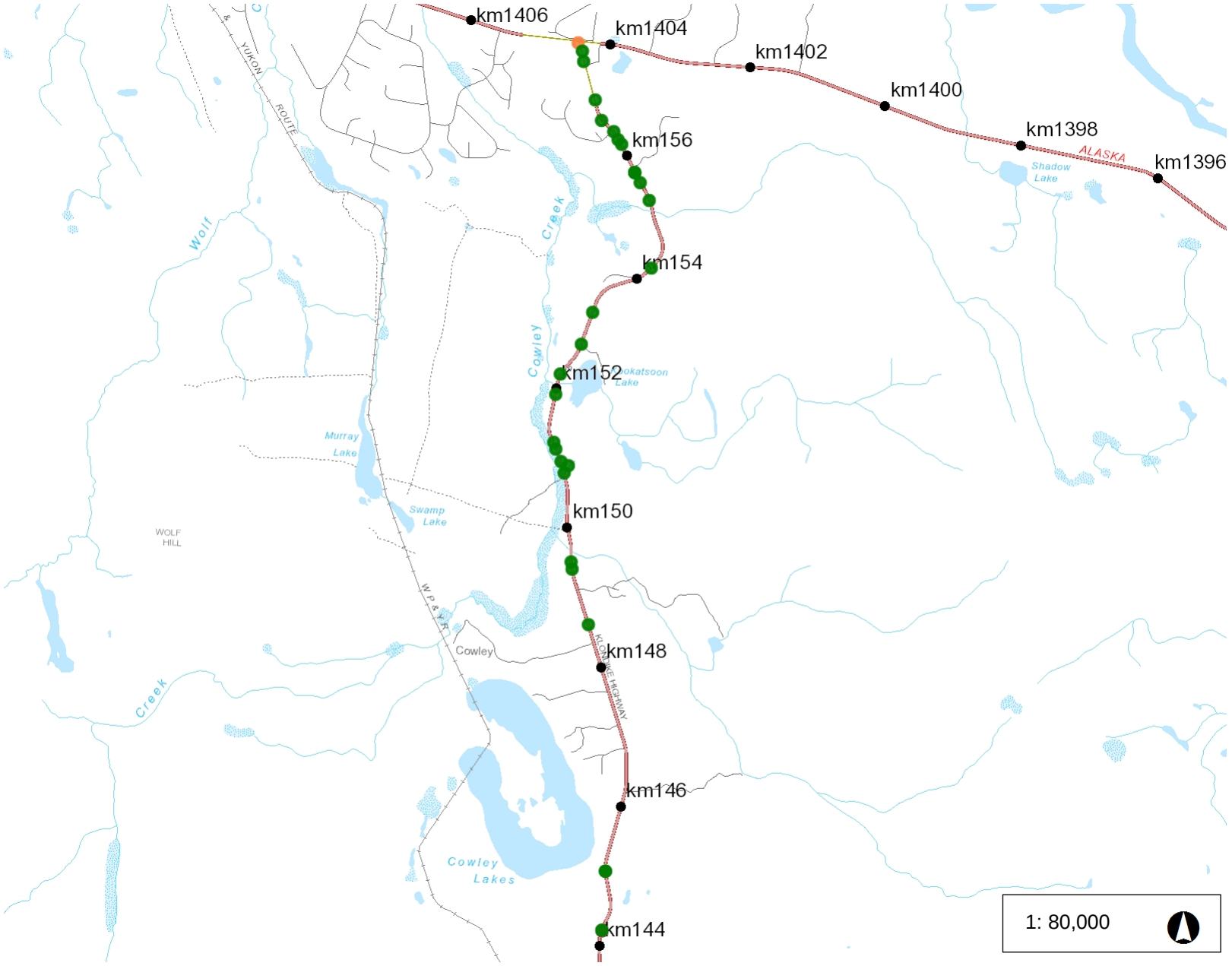
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Notes

Map 6

Southern Lakes Roadways 2016 Invasive Plant Survey - *S. Klondike Highway km 144-158*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

Notes

Map 7

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Southern Lakes Roadways 2016 Invasive Plant Survey - *Atlin Road km 0-12 & Tagish Road km 0-16*

Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

Notes

Map 8

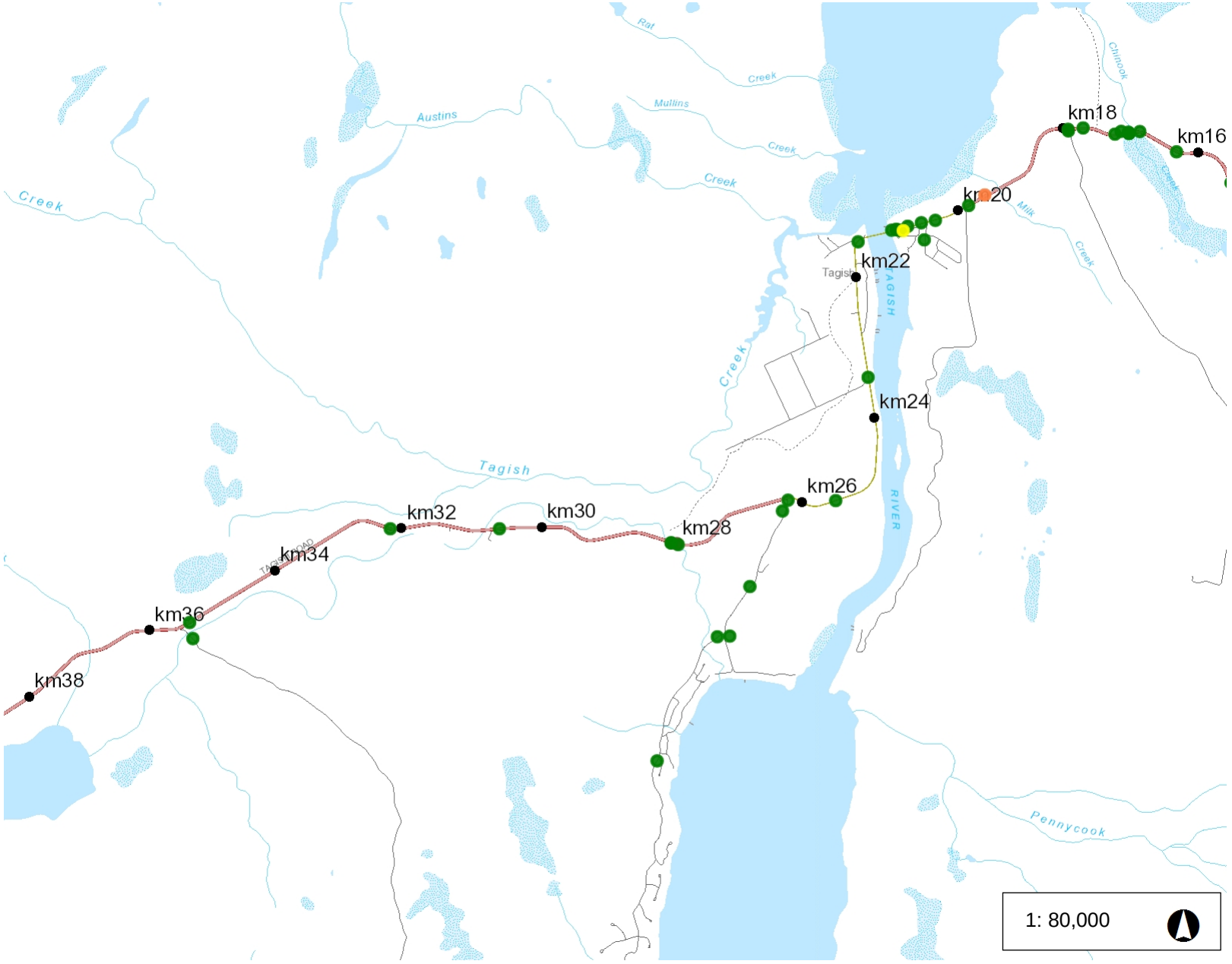
4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

Date Printed: 23-Oct-2016

Southern Lakes Roadways 2016 Invasive Plant Survey - *Tagish Road km 16-38*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

Notes

Map 9

4.1 0 2.03 4.1 Kilometers

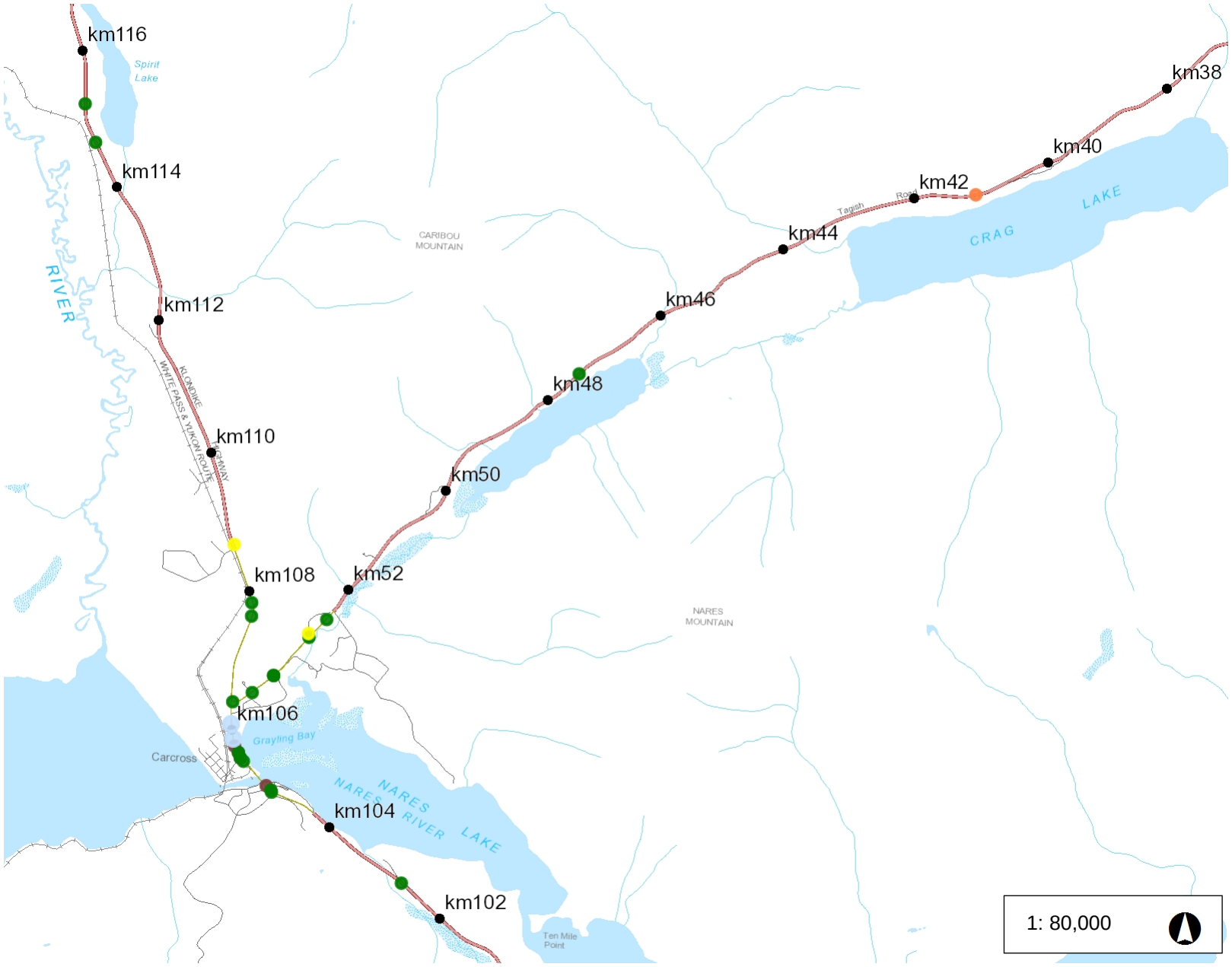
Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Southern Lakes Roadways 2016 Invasive Plant Survey - Tagish Road km 38-54 & *S. Klondike Highway km 101-116*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

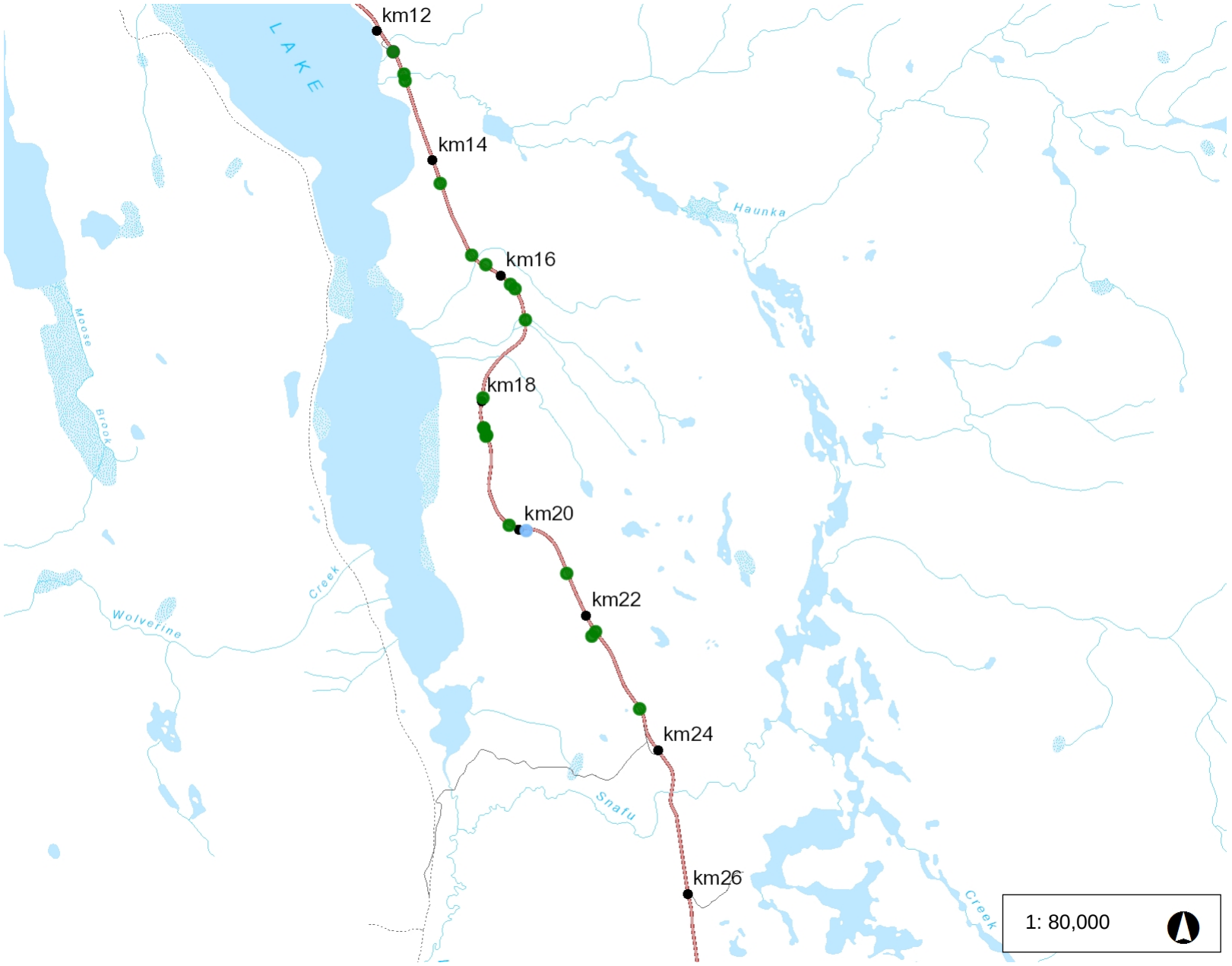
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Notes

Map 10

Southern Lakes Roadways 2016 Invasive Plant Survey - *Atlin Road km 12-27*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

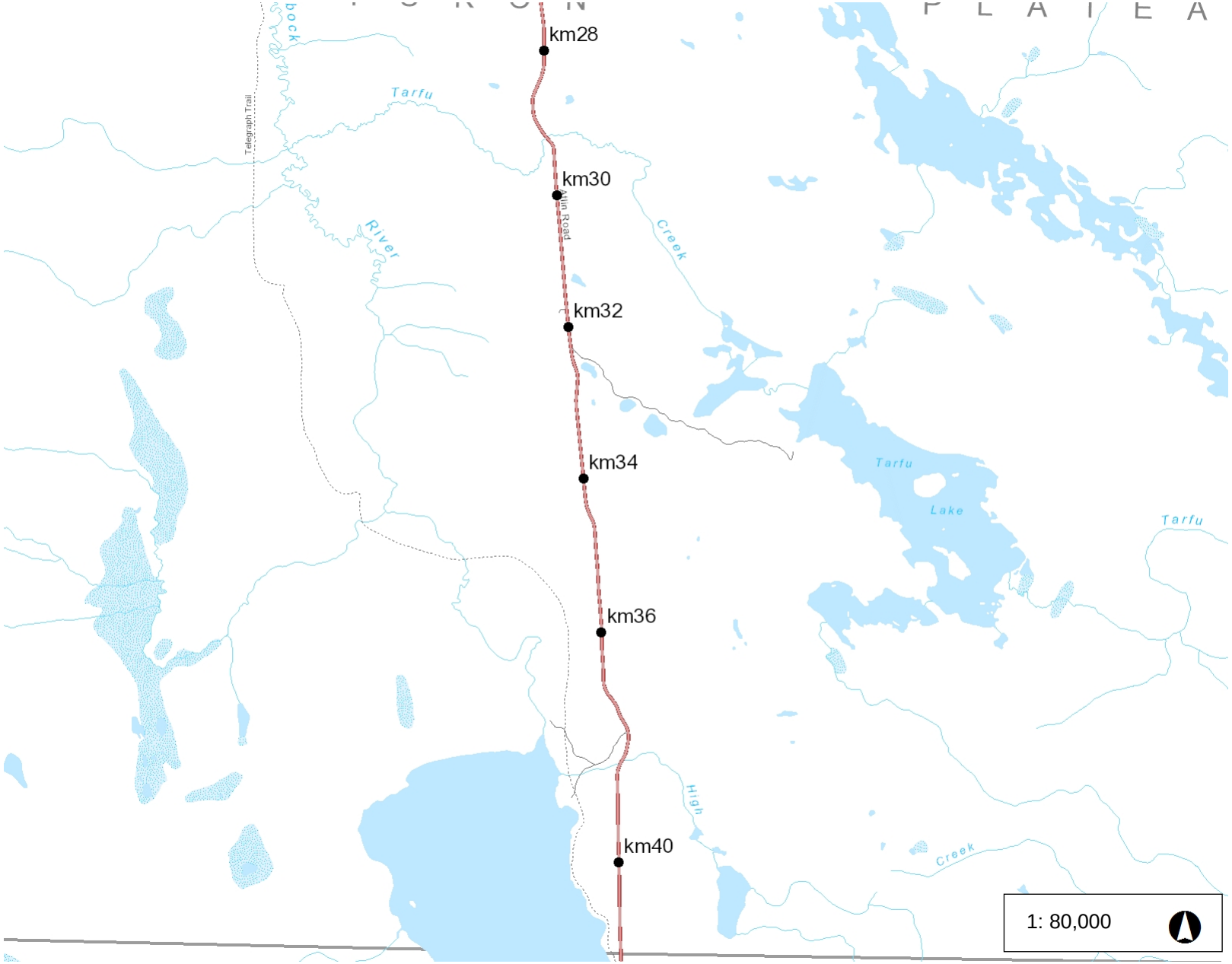
This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

Notes

Map 11

Southern Lakes Roadways 2016 Invasive Plant Survey - *Atlin Road km 28-41*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow lucerne
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sowthistle
- Oxeye daisy
- Bird vetch
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 23-Oct-2016

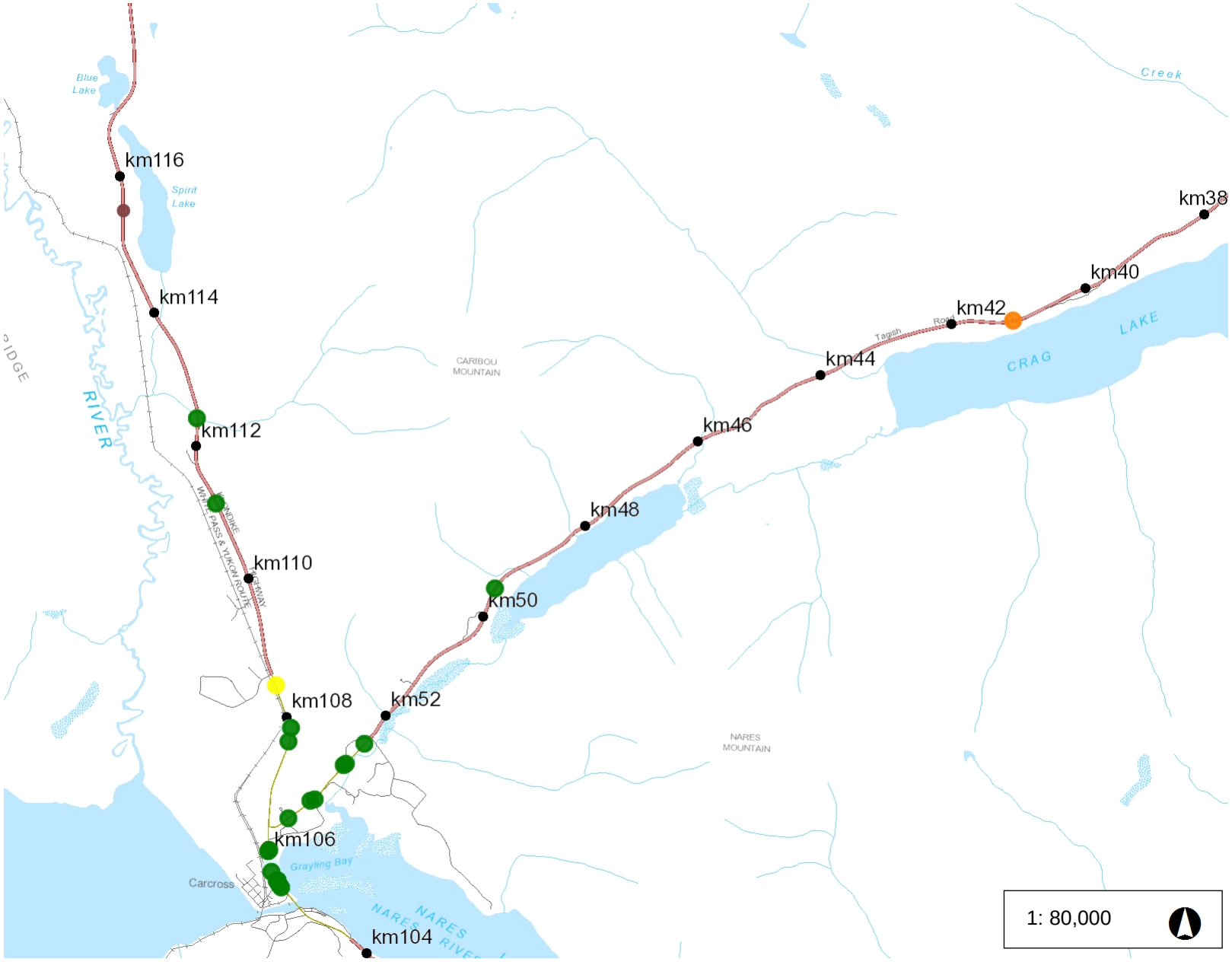
Notes

Map 12

2015 MAPS

Note: overlap of the locations of different species occurs on these maps. As a result some species/locations are not visible.

Southern Lakes Roadways 2015 Invasive Plant Survey - *S. Klondike Highway km 105-117 & Tagish Road km 38-54*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

1: 80,000

Notes

Map 13

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 26-Oct-2016

Southern Lakes Roadways 2015 Invasive Plant Survey - *S. Klondike Highway km 116-130*

Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

1: 80,000

Notes

Map 14

4.1 0 2.03 4.1 Kilometers

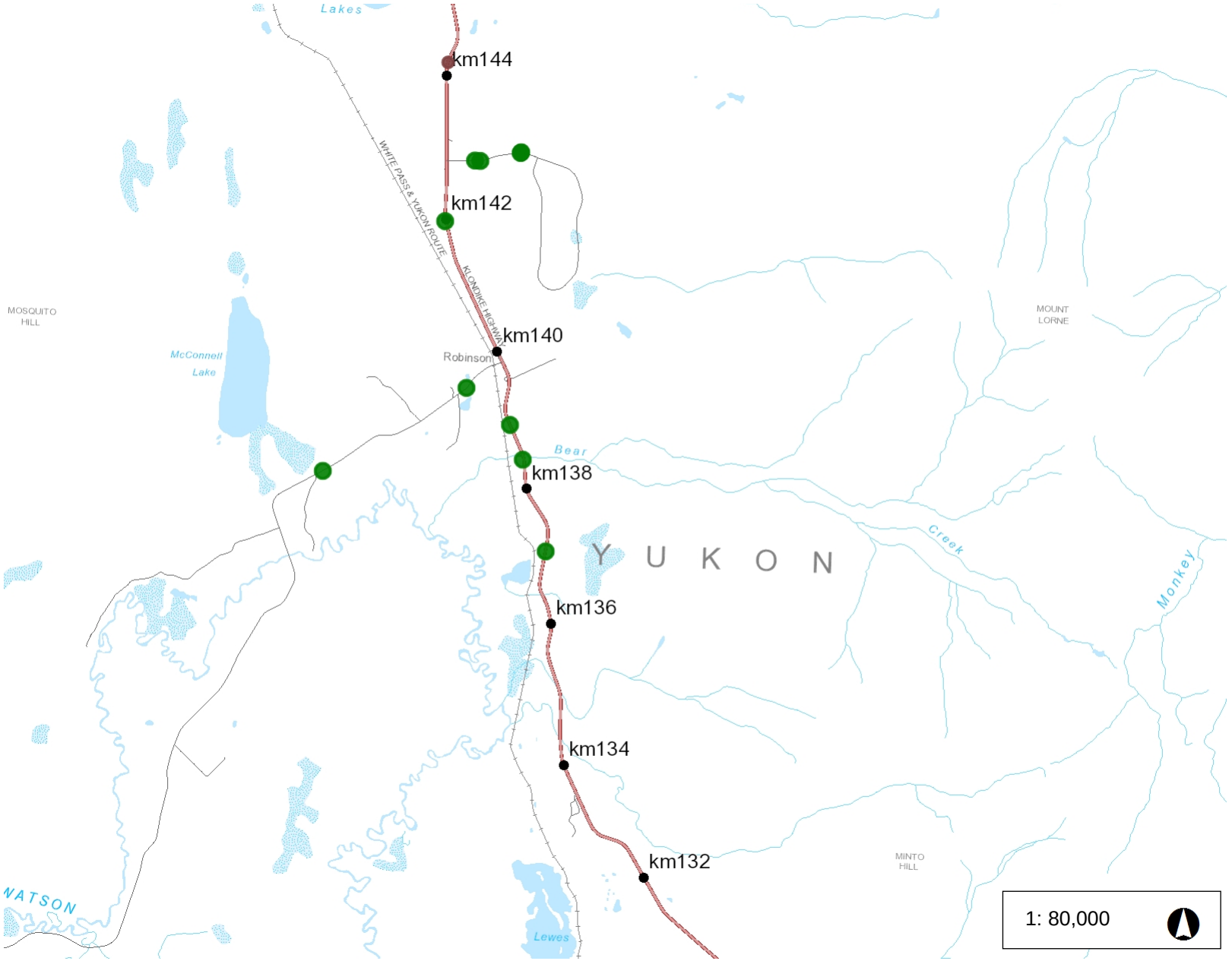
Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 26-Oct-2016

Southern Lakes Roadways 2015 Invasive Plant Survey - *S. Klondike Highway km 130-144*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

1: 80,000

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 26-Oct-2016

Notes

Map 15

Southern Lakes Roadways 2015 Invasive Plant Survey - *S. Klondike Highway km 144-158*

Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

1: 80,000

Notes

Map 16

4.1 0 2.03 4.1 Kilometers

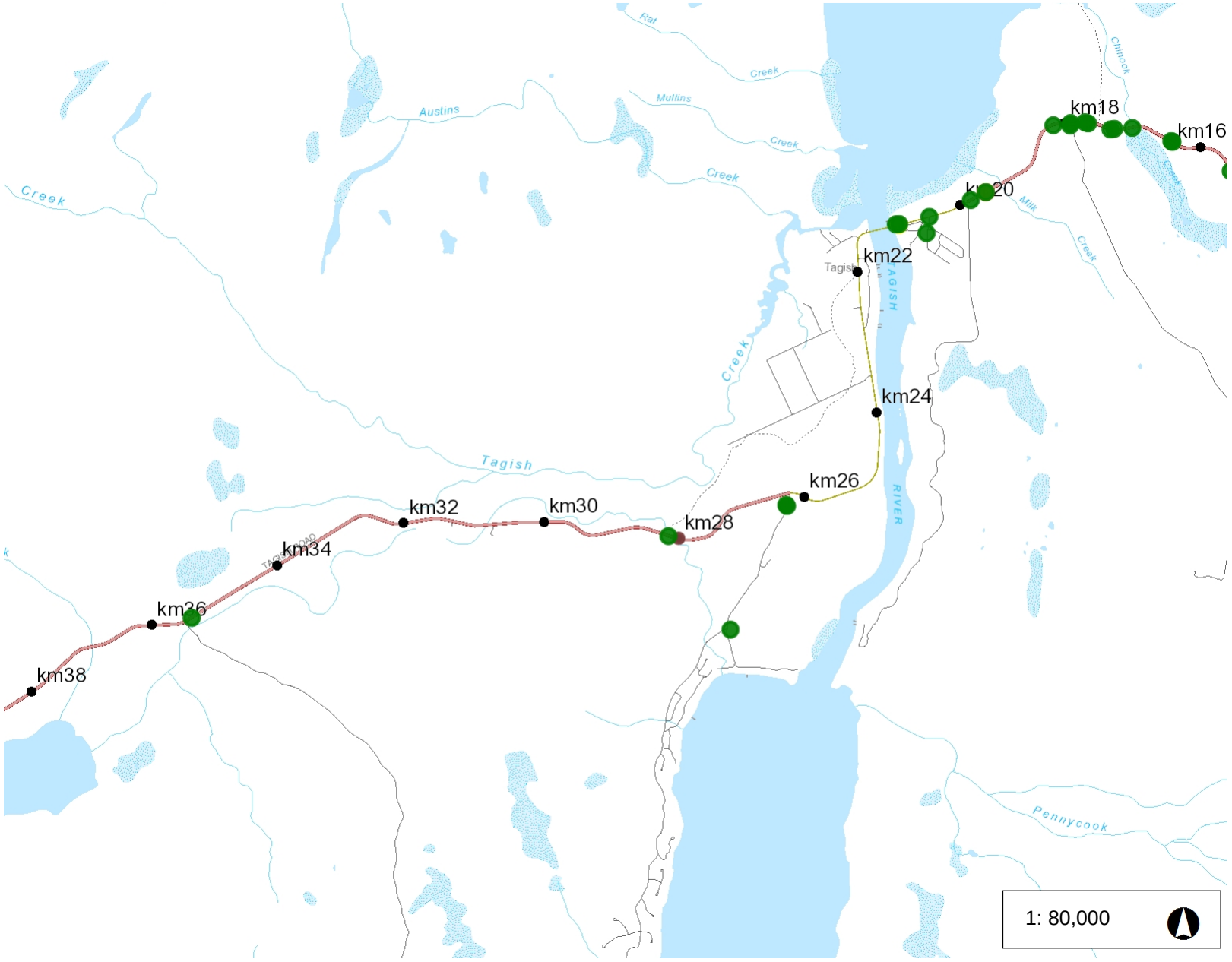
Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 26-Oct-2016

Southern Lakes Roadways 2015 Invasive Plant Survey - *Tagish Road km 16-38*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

1: 80,000

Notes

Map 17

4.1 0 2.03 4.1 Kilometers

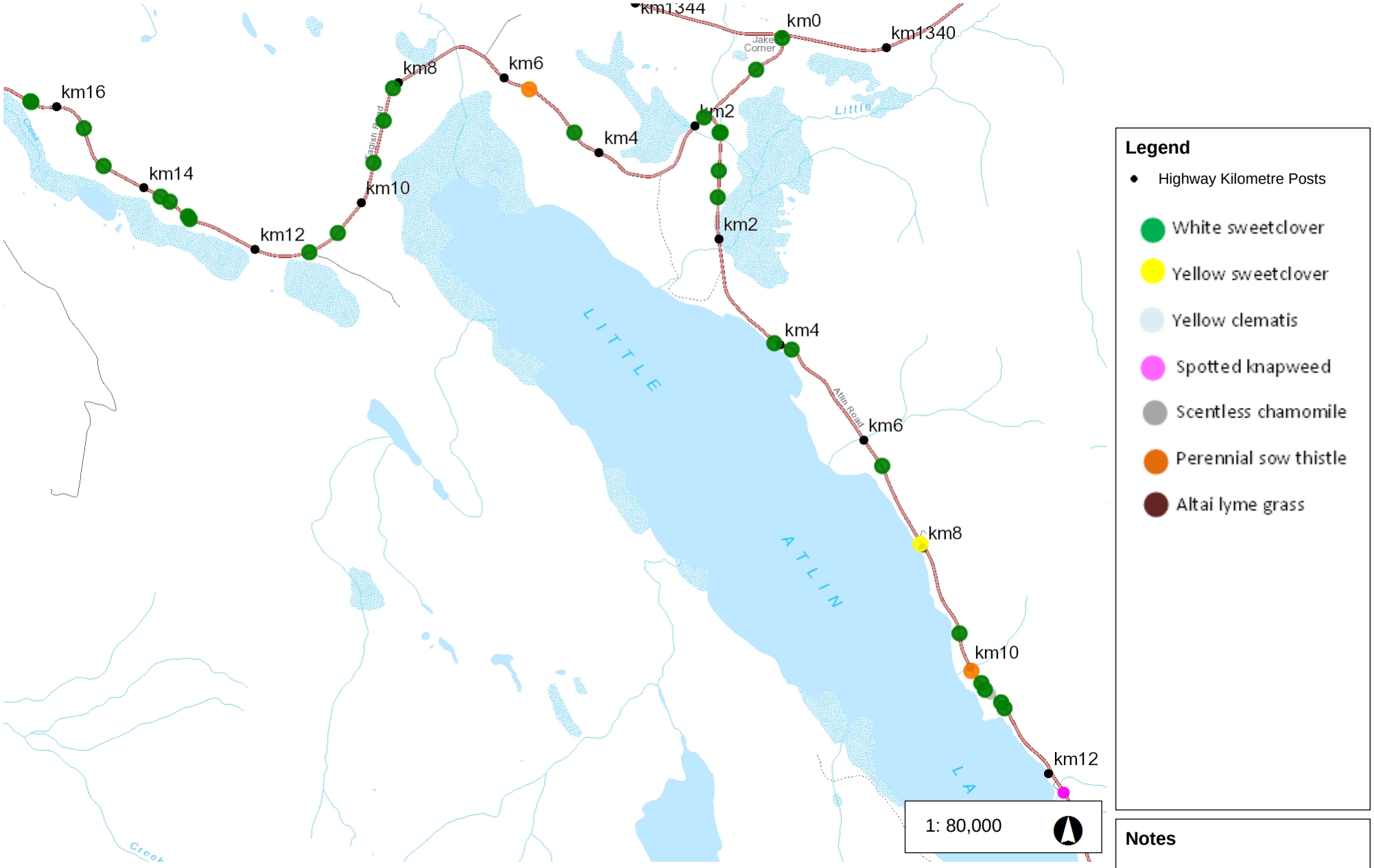
Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 26-Oct-2016

Southern Lakes Roadways 2015 Invasive Plant Survey - *Atlin Road km 0-12 & Tagish Road km 0-16*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

Notes

Map 18

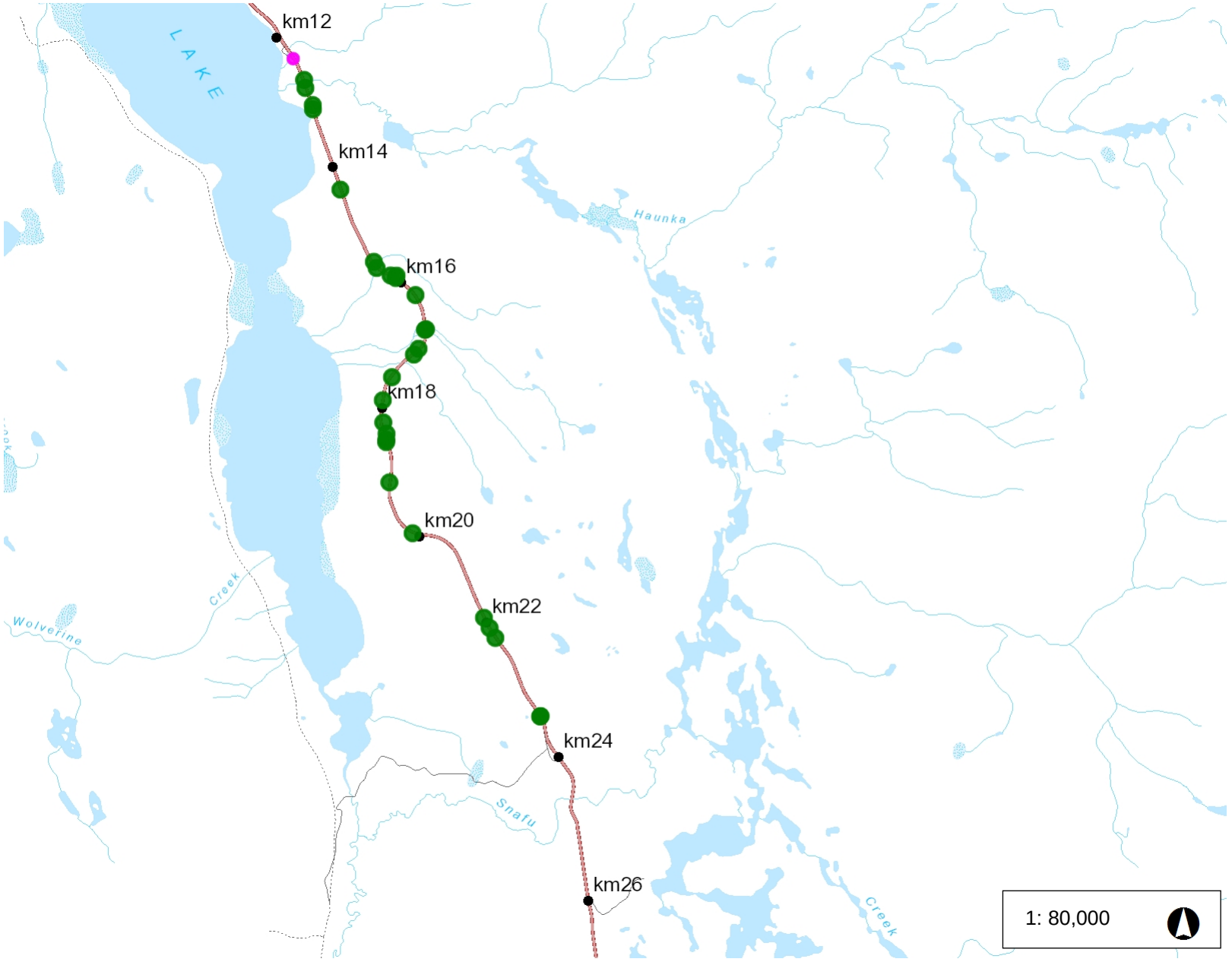
4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

Date Printed: 26-Oct-2016

Southern Lakes Roadways 2015 Invasive Plant Survey - *Atlin Road km 12-27*



Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

1: 80,000

Notes

Map 19

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Date Printed: 26-Oct-2016

Southern Lakes Roadways 2015 Invasive Plant Survey - *Atlin Road km 28-41*

Legend

- Highway Kilometre Posts
- White sweetclover
- Yellow sweetclover
- Yellow clematis
- Spotted knapweed
- Scentless chamomile
- Perennial sow thistle
- Altai lyme grass

Notes

Map 20

4.1 0 2.03 4.1 Kilometers

Yukon Albers

Produced from: Yukon Lands Viewer

Date Printed: 26-Oct-2016

2016 DATA LOGS

Table 2. South Klondike Highway 2016 Invasive Plant Data collected in WGS 84

Site ID	Nearest Km	Side of Road	GPS Latitude	GPS Longitude	Species	Notes	Photo File Name
SKH 16-01	144	RHS	60° 29' 18.306" N	134° 51' 49.536" W	**Altai lyme grass**	8 plants	SKH 16-01.JPG
SKH 16-02	144	RHS	60° 29' 18.660" N	134° 51' 49.746" W	White sweetclover	1 plant	SKH 16-02.JPG
SKH 16-03	145	RHS	60° 29' 45.210" N	134° 51' 48.372" W	White sweetclover	1 plant	SKH 16-03.JPG
SKH 16-04	148.5	RHS	60° 31' 35.832" N	134° 52' 12.312" W	White sweetclover	2 plants	SKH 16-04.JPG
SKH 16-05	151	RHS	60° 32' 0.510" N	134° 52' 29.082" W	White sweetclover	~10 m2 patch	SKH 16-05.JPG
SKH 16-06	151.5	RHS	60° 32' 3.732" N	134° 52' 30.228" W	White sweetclover	1 plant	SKH 16-06.JPG
SKH 16-07	151	RHS	60° 32' 47.004" N	134° 52' 36.012" W	White sweetclover	~3 m2 in gravel pit	SKH 16-07.JPG
SKH 16-08	151	RHS	60° 32' 43.608" N	134° 52' 39.582" W	White sweetclover	~5 m2 along 100 section	SKH 16-08.JPG
SKH 16-09	151	RHS	60° 32' 48.690" N	134° 52' 42.792" W	White sweetclover	~5 m2 patch	SKH 16-09.JPG
SKH 16-10	151	RHS	60° 32' 57.258" N	134° 52' 50.100" W	White sweetclover	1 plant	SKH 16-10.JPG
SKH 16-11	152	RHS	60° 33' 18.876" N	134° 52' 49.962" W	White sweetclover	3 plants	SKH 16-11.JPG
SKH 16-12	153	RHS	60° 33' 41.814" N	134° 52' 28.344" W	White sweetclover	1 plant	SKH 16-12.JPG
SKH 16-13	156.5	RHS	60° 35' 17.964" N	134° 52' 6.006" W	White sweetclover	Start of Carcross Cutoff section; ~300m2 along 500 m section	SKH 16-13.JPG
SKH 16-14	157	RHS	60° 35' 31.920" N	134° 52' 23.976" W	White sweetclover	Carcross cutoff section	SKH 16-14.JPG
SKH 16-15	157.5	LHS	60° 35' 53.634" N	134° 52' 37.356" W	White sweetclover	Carcross Cutoff LHS; 150 m2 over 500 m	SKH 16-15.JPG
SKH 16-16	157.5	LHS	60° 35' 49.014" N	134° 52' 35.904" W	White sweetclover	End of Carcross Cutoff LHS	SKH 16-16.JPG
SKH 16-17	156.5	LHS	60° 35' 22.788" N	134° 52' 17.532" W	White sweetclover	~ 3 m2 patch	SKH 16-17.JPG
SKH 16-18	156.5	LHS	60° 35' 14.424" N	134° 52' 1.794" W	White sweetclover	5 plants	SKH 16-18.JPG
SKH 16-19	155.5	LHS	60° 34' 59.814" N	134° 51' 45.318" W	White sweetclover	2 plants	SKH 16-19.JPG
SKH 16-20	155.5	LHS	60° 34' 55.452" N	134° 51' 40.152" W	White sweetclover	1 plant	SKH 16-20.JPG
SKH 16-21	153.5	LHS	60° 33' 56.352" N	134° 52' 19.128" W	White sweetclover	~5 m2 section	SKH 16-21.JPG
SKH 16-22	153	LHS	60° 33' 28.080" N	134° 52' 46.470" W	White sweetclover	5 plants	SKH 16-22.JPG
SKH 16-23	151	LHS	60° 32' 54.198" N	134° 52' 48.018" W	White sweetclover	1 plant	SKH 16-23.JPG
SKH 16-24	143.5	LHS	60° 29' 0.870" N	134° 51' 50.820" W	White sweetclover	1 plant	SKH 16-24.JPG
SKH 16-25	109	RHS	60° 11' 39.018" N	134° 42' 21.846" W	**Yellow sweetclover**	~25 m2 along 100 section	SKH 16-25.JPG
SKH 16-26	115	RHS	60° 14' 37.602" N	134° 44' 39.336" W	White sweetclover	1 plant	SKH 16-26.JPG
SKH 16-27	124.5	RHS	60° 19' 42.684" N	134° 46' 3.888" W	White sweetclover	1 plant	SKH 16-27.JPG
SKH 16-28	125	RHS	60° 19' 50.280" N	134° 46' 5.772" W	White sweetclover	~2 m2 over 50 m	SKH 16-28.JPG
SKH 16-29	117	LHS	60° 15' 51.666" N	134° 44' 53.004" W	White sweetclover	1 plant	SKH 16-29.JPG
SKH 16-30	115	LHS	60° 14' 54.756" N	134° 44' 49.974" W	White sweetclover	1 plant	SKH 16-30.JPG
SKH 16-31	108	LHS	60° 11' 13.164" N	134° 42' 4.224" W	White sweetclover	1 plant	SKH 16-31.JPG
SKH 16-32	107.5	LHS	60° 11' 7.134" N	134° 42' 3.978" W	White sweetclover	~1 m2 patch	SKH 16-32.JPG
SKH 16-33	106	LHS	60° 10' 18.318" N	134° 42' 19.050" W	**Yellow clematis**	1 large plant	SKH 16-33.JPG
SKH 16-34	106	LHS			White sweetclover	~1 m2 patch	no photo
SKH 16-35	106	LHS	60° 10' 8.382" N	134° 42' 15.126" W	**Altai lyme grass**	~30-50 m2 spread out along ROW in 200m2 area	SKH 16-35.JPG
SKH 16-36	105.5	LHS	60° 10' 3.276" N	134° 42' 9.690" W	White sweetclover	~1 m2 patch	SKH 16-36.JPG
SKH 16-37	105.5	LHS	60° 10' 3.276" N	134° 42' 9.690" W	**Altai lyme grass**	~ 20 m2 spread out along ROW	SKH 16-37.JPG
SKH 16-38	105.5	LHS	60° 10' 1.740" N	134° 42' 6.732" W	White sweetclover	3 plants	SKH 16-38.JPG
SKH 16-39	105	LHS	60° 9' 48.288" N	134° 41' 40.488" W	White sweetclover	~ 50 m2 along 100 m section	SKH 16-39.JPG
SKH 16-40	103	LHS	60° 9' 9.384" N	134° 39' 40.974" W	White sweetclover	1 plant	SKH 16-40.JPG
SKH 16-41	80	LHS	59° 59' 56.430" N	134° 39' 54.726" W	White sweetclover	~1 m2 patch	SKH 16-41.JPG

Table 2. South Klondike Highway 2016 Invasive Plant Data collected in WGS 84

Site ID	Nearest Km	Side of Road	GPS Latitude	GPS Longitude	Species	Notes	Photo File Name
SKH 16-42	79.5	LHS	59° 59' 40.698" N	134° 40' 4.302" W	White sweetclover	~50 m2 along 150 m section	SKH 16-42.JPG
SKH 16-43	79.5	RHS	59° 59' 38.928" N	134° 40' 3.120" W	White sweetclover	~5 m2 along 100 section	SKH 16-43.JPG
SKH 16-44	79.5	RHS	59° 59' 43.098" N	134° 40' 3.318" W	**Scentless chamomile**	7 plants	SKH 16-44.JPG
SKH 16-45	79	LHS	59° 59' 22.614" N	134° 39' 58.974" W	White sweetclover	1 plant	SKH 16-45.JPG
SKH 16-46	73	LHS	59° 57' 0.642" N	134° 43' 11.490" W	White sweetclover	1 plant	SKH 16-46.JPG
SKH 16-47	48	LHS	59° 46' 59.640" N	134° 54' 59.214" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-47.JPG
SKH 16-48	47.5	LHS	59° 46' 37.410" N	134° 55' 2.676" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-48.JPG
SKH 16-49	41.5	LHS	59° 44' 18.594" N	134° 58' 26.610" W	**Altai lyme grass**	~ 3m2 patch	SKH 16-49.JPG
SKH 16-50	38	LHS	59° 43' 23.544" N	135° 1' 19.686" W	**Altai lyme grass**	~ 1m2 patch	SKH 16-50.JPG
SKH 16-51	37	LHS	59° 43' 5.274" N	135° 2' 39.612" W	**Altai lyme grass**	~ 0.5m2 patch	SKH 16-51.JPG
SKH 16-52	37	LHS	59° 43' 4.110" N	135° 2' 41.916" W	**Altai lyme grass**	~ 1m2 patch	SKH 16-52.JPG
SKH 16-53	37	LHS	59° 43'2.6408" N	135° 2' 43.3702" W	**Altai lyme grass**	~ 4m2 patch	no photo
SKH 16-54	36.5	LHS	59° 42' 47.016" N	135° 2' 54.804" W	White sweetclover	1 plant	SKH 16-54.JPG
SKH 16-55	36	LHS	59° 42' 43.032" N	135° 3' 11.028" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-55.JPG
SKH 16-56	35.5	LHS	59° 42' 41.130" N	135° 3' 24.282" W	**Altai lyme grass**	~ 15m2 patch	SKH 16-56.JPG
SKH 16-57	35	LHS	59° 42' 32.406" N	135° 3' 43.260" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-57.JPG
SKH 16-58	33.5	LHS	59° 41' 49.704" N	135° 4' 49.380" W	**Altai lyme grass**	Two ~5m2 patches	SKH 16-58.JPG
SKH 16-59	33	LHS	59° 41' 48.696" N	135° 5' 1.326" W	**Altai lyme grass**	One ~ 3m2 patch and one ~5 m2 patch	SKH 16-59.JPG
SKH 16-60	31	LHS	59° 40' 41.082" N	135° 5' 49.968" W	**Altai lyme grass**	Two ~1m2 patches	SKH 16-60.JPG
SKH 16-61	29.5	LHS	59° 40' 11.436" N	135° 6' 31.164" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-61.JPG
SKH 16-62	29.5	LHS	59° 40' 8.676" N	135° 6' 37.638" W	**Altai lyme grass**	~ 4m2 patch	SKH 16-62.JPG
SKH 16-63	29	LHS	59° 40' 0.912" N	135° 6' 54.570" W	**Altai lyme grass**	~ 10m2 patch	SKH 16-63.JPG
SKH 16-64	29	LHS	59° 39' 54.402" N	135° 7' 1.248" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-64.JPG
SKH 16-65	27.5	LHS	59° 39' 15.516" N	135° 7' 38.964" W	**Altai lyme grass**	~ 10m2 patch	SKH 16-65.JPG
SKH 16-66	26.5	LHS	59° 38' 40.806" N	135° 8' 24.318" W	**Altai lyme grass**	~ 3m2 patch	SKH 16-66.JPG
SKH 16-67	25	LHS	59° 38' 20.016" N	135° 9' 2.922" W	**Altai lyme grass**	~ 1m2 patch	SKH 16-67.JPG
SKH 16-68	29	LHS	59° 38' 16.218" N	135° 9' 12.030" W	**Altai lyme grass**	~ 1m2 patch	SKH 16-68.JPG
SKH 16-69a	26	RHS	59° 38' 26.154" N	135° 8' 50.790" W	**Altai lyme grass**	Nine patches 5-50m2 each	SKH 16-69a.JPG
SKH 16-69b	26	RHS	59° 38' 34.104" N	135° 8' 36.024" W	**Altai lyme grass**	Same section as SKH69a	SKH 16-69b.JPG
SKH 16-70	26.5	RHS	59° 38' 44.388" N	135° 8' 16.482" W	**Altai lyme grass**	~ 10m2 patch	SKH 16-70.JPG
SKH 16-71	27	RHS	59° 38' 53.172" N	135° 8' 4.158" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-71.JPG
SKH 16-72	27.5	RHS	59° 39' 15.456" N	135° 7' 39.396" W	**Altai lyme grass**	Two ~ 2m2 patches	SKH 16-72.JPG
SKH 16-73	28	RHS	59° 39' 23.568" N	135° 7' 32.106" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-73.JPG
SKH 16-74	28.5	RHS	59° 39' 47.022" N	135° 7' 7.374" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-74.JPG
SKH 16-75	29	RHS	59° 39' 54.954" N	135° 6' 59.910" W	**Altai lyme grass**	~ 1m2 patch	SKH 16-75.JPG
SKH 16-76	29.5	RHS	59° 40' 11.526" N	135° 6' 30.240" W	**Altai lyme grass**	~ 3m2 patch	SKH 16-76.JPG
SKH 16-77	29	RHS	59° 40' 18.888" N	135° 6' 18.888" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-77.JPG
SKH 16-78	31.5	RHS	59° 41' 1.776" N	135° 5' 38.826" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-78.JPG
SKH 16-79	32	RHS	59° 41' 14.772" N	135° 5' 41.784" W	**Altai lyme grass**	~ 10m2 patch	SKH 16-79.JPG
SKH 16-80	32	RHS	59° 41' 20.502" N	135° 5' 43.632" W	**Altai lyme grass**	~ 15m2 patch	SKH 16-80.JPG
SKH 16-81	32.5	RHS	59° 41' 38.364" N	135° 5' 31.236" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-81.JPG
SKH 16-82	34	RHS	59° 41' 58.626" N	135° 4' 14.760" W	**Altai lyme grass**	~ 10m2 patch	SKH 16-82.JPG
SKH 16-83	35.5	RHS	59° 42' 37.638" N	135° 3' 32.604" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-83.JPG

Table 2. South Klondike Highway 2016 Invasive Plant Data collected in WGS 84

Site ID	Nearest Km	Side of Road	GPS Latitude	GPS Longitude	Species	Notes	Photo File Name
SKH 16-84	37	RHS	59° 43' 6.246" N	135° 2' 36.534" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-84.JPG
SKH 16-85	39.5	RHS	59° 43' 33.690" N	134° 59' 56.892" W	**Altai lyme grass**	~ 1m2 patch	SKH 16-85.JPG
SKH 16-86	41	RHS	59° 44' 1.500" N	134° 58' 48.840" W	**Altai lyme grass**	~ 10m2 patch	SKH 16-86.JPG
SKH 16-87	43	RHS	59° 44' 58.992" N	134° 58' 4.368" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-87.JPG
SKH 16-88	45	RHS	59° 45' 50.658" N	134° 56' 47.274" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-88.JPG
SKH 16-89	47.5	RHS	59° 46' 37.572" N	134° 55' 3.054" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-89.JPG
SKH 16-90	49	RHS	59° 47' 39.456" N	134° 54' 45.384" W	**Altai lyme grass**	~ 15m2 patch	SKH 16-90.JPG
SKH 16-91	53	RHS	59° 47' 49.278" N	134° 51' 5.772" W	**Altai lyme grass**	~ 2m2 patch	SKH 16-91.JPG
SKH 16-92	56	RHS	59° 48' 57.204" N	134° 49' 3.450" W	White sweetclover	1 plant	SKH 16-92.JPG
SKH 16-93	63	RHS	59° 52' 26.976" N	134° 47' 23.088" W	**Altai lyme grass**	~ 1m2 patch	SKH 16-93.JPG
SKH 16-94	66	RHS	59° 54' 2.430" N	134° 47' 46.470" W	**Altai lyme grass??**	~ 20m2 patch; may not be altai lyme grass	SKH 16-94.JPG
SKH 16-95	66.5	RHS	59° 54' 23.304" N	134° 47' 39.258" W	**Altai lyme grass**	~ 15m2 patch	SKH 16-95.JPG
SKH 16-96	73	RHS	59° 56' 48.912" N	134° 43' 53.772" W	**Altai lyme grass**	~ 20m2 patch	SKH 16-96.JPG
SKH 16-97	73	RHS	59° 56' 48.936" N	134° 43' 53.814" W	**herbicide sign**	Northwest BC Invasive Plant Council responsible party - sign is likely misplaced	SKH 16-97.JPG
SKH 16-98	87	RHS	60° 3' 2.094" N	134° 35' 26.406" W	**Altai lyme grass**	~ 5m2 patch	SKH 16-98.JPG
SKH 16-99	99	RHS	60° 8' 0.252" N	134° 36' 47.634" W	White sweetclover	9 plants	SKH 16-99.JPG
SKH 16-100	105	RHS	60° 9' 49.248" N	134° 41' 41.214" W	White sweetclover	~ 5m2 patch	SKH 16-100.JPG
SKH 16-101	105	RHS	60° 9' 51.138" N	134° 41' 45.528" W	**Altai lyme grass**	~ 0.5m2 patch	SKH 16-101.JPG
SKH 16-102	105.5	RHS	60° 10' 5.622" N	134° 42' 11.520" W	**Altai lyme grass**	~ 30m2 along 100 m section	SKH 16-102.JPG
SKH 16-103	105.5	RHS	60° 10' 5.622" N	134° 42' 11.520" W	White sweetclover	2 plants	SKH 16-103.JPG
SKH 16-104	106	RHS	60° 10' 11.742" N	134° 42' 16.638" W	**Yellow clematis**	~ 50m2 along 50 m section	SKH 16-104.JPG
SKH 16-105	126.5	LHS	60° 20' 38.484" N	134° 46' 34.926" W	White sweetclover	1 plant	SKH 16-105.JPG
SKH 16-106	141	LHS	60° 27' 32.6241" N	134° 51' 23.6274" W	White sweetclover	1 plant	no photo
SKH 16-107	155	RHS	60° 34' 47.616" N	134° 51' 31.314" W	White sweetclover	1 plant	SKH 16-107.JPG
SKH 16-108	155.5	RHS	60° 35' 0.018" N	134° 51' 45.618" W	White sweetclover	3 plants	SKH 16-108.JPG
SKH 16-109	157.5	RHS	60° 35' 57.294" N	134° 52' 41.496" W	**Perennial sowthistle**	~1 m2 patch	SKH 16-109.JPG
SKH 16-110	156	LHS	60° 35' 12.372" N	134° 51' 58.362" W	White sweetclover	~2 m2 patch	SKH 16-110.JPG
SKH 16-111	154.5	LHS	60° 34' 17.250" N	134° 51' 27.060" W	White sweetclover	~2 m2 patch	SKH 16-111.JPG
SKH 16-112	145	LHS	60° 29' 45.234" N	134° 51' 48.540" W	White sweetclover	~2 m2 patch	SKH 16-112.JPG
IAPP 253824	78		59° 58' 45.4"N	134° 40' 13.6" W	Spotted knapweed	Site chemically controlled w/ Tordon 22 by NW IPC since 2009, most recently July 2016	
IAPP 286382	79.5		59° 59' 43.40"N	134° 40' 03.5" W	Oxeye daisy	Site chemically controlled with Tordon 22 by NW IPC in 2012; overlaps with SKH 16-44	
Robinson R 16-01	0.5	RHS	60° 28' 33.636" N	134° 51' 25.926" W	White sweetclover	3 plants	Robinson R 16-01.JPG
Robinson R 16-02	1	RHS	60° 28' 37.560" N	134° 50' 34.482" W	White sweetclover	~150 m2 patch	Robinson R 16-02.JPG
Robinson R 16-03a	0.5	LHS	60° 28' 36.036" N	134° 51' 4.428" W	White sweetclover	~150m2 patch	Robinson R 16-03a.JPG
Robinson R 16-03b	0.5	LHS	60° 28' 36.006" N	134° 51' 4.458" W	White sweetclover	Same as Robinson R-16-03a, mowed	Robinson R 16-03b.JPG
Robinson R 16-04	0	LHS	60° 28' 33.366" N	134° 51' 40.476" W	White sweetclover	4 plants	Robinson R 16-04.JPG
Annie Lk Rd 16-01	3	RHS	60° 26' 12.624" N	134° 53' 28.278" W	White sweetclover	~10 m2 patch	Annie Lk Rd 16-01.JPG
Annie Lk Rd 16-02	5	RHS	60° 25' 17.514" N	134° 53' 56.424" W	White sweetclover	1 plant	Annie Lk Rd 16-02.JPG

Table 3. Tagish Road 2016 Invasive Plant Survey Data collected in WGS 84

Site ID	Nearest Km	Side of Road	GPS Latitude	GPS Longitude	Species	Notes	Photo File Name
TR 16-01	0	LHS	60° 20' 21.654" N	133° 59' 6.402" W	White Sweetclover	~75 m2 patch at Jake's Corner	No photo
TR 16-02	0	RHS	60° 20' 21.654" N	133° 59' 6.402" W	White Sweetclover	~75 m2 along 100 m section of road at Jake's Corner	TR 16-02.JPG
TR 16-03	0.5	RHS	60° 20' 9.984" N	133° 59' 19.920" W	White Sweetclover	~2 m2 patch	TR 16-03.JPG
TR 16-04	1	RHS	60° 20' 5.364" N	133° 59' 32.532" W	White Sweetclover	~2 m2 patch	TR 16-04.JPG
TR 16-05	2	RHS	60° 19' 41.706" N	134° 0' 20.514" W	White Sweetclover	~20 m2 patch	TR 16-05.JPG
TR 16-06	2	RHS	60° 19' 40.176" N	134° 0' 22.518" W	White Sweetclover	1 plant	TR 16-06.JPG
TR 16-07	55	LHS	60° 10' 28.320" N	134° 42' 18.246" W	White Sweetclover	1 plant	TR 16-07.JPG
TR 16-08	54.5	LHS	60° 10' 32.778" N	134° 42' 0.972" W	White Sweetclover	~1 m2 patch	TR 16-08.JPG
TR 16-09	53.5	LHS	60° 10' 58.470" N	134° 41' 11.550" W	White Sweetclover	~20 m2 patch	TR 16-09.JPG
TR 16-10	53	LHS	60° 11' 6.750" N	134° 40' 56.202" W	White Sweetclover	~10 m2 patch	TR 16-10.JPG
TR 16-11	47.5	LHS	60° 13' 1.032" N	134° 37' 16.422" W	White Sweetclover	5 plants	TR 16-11.JPG
TR 16-12	35.5	LHS	60° 15' 53.424" N	134° 26' 12.210" W	White Sweetclover	~2 m2 patch	TR 16-12.JPG
TR 16-13	28	LHS	60° 16' 35.712" N	134° 18' 59.322" W	White Sweetclover	1 plant	TR 16-13.JPG
TR 16-14	28	LHS	60° 16' 35.022" N	134° 18' 52.842" W	White Sweetclover	1 plant	TR 16-14.JPG
TR 16-15	26.5	LHS	60° 16' 56.421" N	134° 17' 14.72" W	White Sweetclover	~20 m2 at corner with Reid Rd	No photo
TR 16-16	25.5	LHS	60° 16' 56.820" N	134° 16' 31.602" W	White Sweetclover	1 plant	TR 16-16.JPG
TR 16-17	21.5	LHS	60° 18' 53.634" N	134° 16' 17.928" W	White Sweetclover	~1 m2 patch	TR 16-17.JPG
TR 16-18	21	LHS	60° 18' 59.223" N	134° 15' 37.354" W	**Yellow Sweetclover**	~10 m2 patch	No photo
TR 16-19	21	LHS	60° 18' 59.43" N	134° 15' 41.98" W	White Sweetclover	2 plants	No photo
TR 16-20	21	LHS	60° 18' 59.310" N	134° 15' 41.064" W	White Sweetclover	~50 m2 along 100 m section	TR 16-20.JPG
TR 16-21	20.5	LHS	60° 19' 4.248" N	134° 15' 8.544" W	White Sweetclover	~5 m2 patch	TR 16-21.JPG
TR 16-22	20	LHS	60° 19' 11.358" N	134° 14' 38.784" W	White Sweetclover	~10 m2 along 25 m section	TR 16-22.JPG
TR 16-23	18	LHS	60° 19' 46.176" N	134° 13' 10.368" W	White Sweetclover	~10 m2 patch	TR 16-23.JPG
TR 16-24A	17.5	LHS	60° 19' 45.279" N	134° 12' 28.111" W	White Sweetclover	Start of ~500 m2 along 500 m section	No photo
TR 16-24b	17.5	LHS	60° 19' 45.762" N	134° 12' 15.426" W	White Sweetclover	End of TR 16-24a	TR 16-24b.JPG
TR 16-24c	17.5	LHS	60° 19' 45.762" N	134° 12' 15.426" W	White Sweetclover	End of TR 16-24a	TR 16-24c.JPG
TR 16-25	16.5	LHS	60° 19' 38.052" N	134° 11' 31.944" W	White Sweetclover	~100 m2 along 100 m section	TR 16-25.JPG
TR 16-26	15	LHS	60° 19' 9.1" N	134° 10' 23.6" W	White Sweetclover	~10 m2 patch	No photo
TR 16-27	28	LHS	60° 16' 35.7" N	134° 18' 59.3" W	White Sweetclover	~2 m2 patch	No photo
TR 16-28	11.5	LHS	60° 18' 26.178" N	134° 7' 21.816" W	White Sweetclover	~10 m2 patch	TR 16-28.JPG
TR 16-29	11	LHS	60° 18' 26.514" N	134° 7' 5.436" W	White Sweetclover	~20 m2 along 50 m section	TR 16-29.JPG
TR 16-30	11	LHS	60° 18' 28.278" N	134° 6' 54.684" W	White Sweetclover	~3 m2 patch	TR 16-30.JPG
TR 16-31	10.5	LHS	60° 18' 38.454" N	134° 6' 26.940" W	White Sweetclover	~20 m2 patch	TR 16-31.JPG
TR 16-32	8	LHS	60° 19' 51.960" N	134° 5' 34.164" W	White Sweetclover	~40 m2 patch	TR 16-32.JPG
TR 16-33	9.5	RHS	60° 19' 13.962" N	134° 5' 53.202" W	White Sweetclover	~10 m2 patch	TR 16-33.JPG
TR 16-34	13	RHS	60° 18' 43.776" N	134° 8' 53.772" W	White Sweetclover	~20 m2 along 100 m section	TR 16-34.JPG
TR 16-35	15	RHS	60° 19' 9.042" N	134° 10' 23.178" W	White Sweetclover	~10 m2 along 25 m section	TR 16-35.JPG
TR 16-36	15	RHS	60° 19' 24.750" N	134° 10' 41.874" W	White Sweetclover	10 plants along 50 m section	TR 16-36.JPG

Table 3. Tagish Road 2016 Invasive Plant Survey Data collected in WGS 84

Site ID	Nearest Km	Side of Road	GPS Latitude	GPS Longitude	Species	Notes	Photo File Name
TR 16-37	17	RHS	60° 19' 46.746" N	134° 12' 5.664" W	White Sweetclover	Start of ~300 m2 along 500 m long section	TR 16-37.JPG
TR 16-38	17.5	RHS	60° 19' 46.308" N	134° 12' 15.990" W	White Sweetclover	~5 m2 patch	TR 16-38.JPG
TR 16-39	17.5	RHS	60° 19' 46.593" N	134° 12' 22.544" W	White Sweetclover	Start of ~500 m2 along 500 m section	No photo
TR 16-40	17.5	RHS	60° 19' 47.676" N	134° 12' 57.102" W	White Sweetclover	End of TR 16-39	TR 16-40.JPG
TR 16-41	18	RHS	60° 19' 46.872" N	134° 13' 10.710" W	White Sweetclover	~5 m2 patch	TR 16-41.JPG
TR 16-42	20.5	RHS	60° 19' 3.000" N	134° 15' 21.162" W	White Sweetclover	~2 m2 patch	TR 16-42.JPG
TR 16-43	20.5	RHS	60° 19' 1.260" N	134° 15' 33.420" W	White Sweetclover	1 plant	TR 16-43.JPG
TR 16-44	21	RHS	60° 18' 59.754" N	134° 15' 43.722" W	White Sweetclover	~20 m2 in ditch near gas station	TR 16-44.JPG
TR 16-45	21	RHS	60° 18' 59.256" N	134° 15' 47.850" W	White Sweetclover	~1 m2 patch next to bridge	TR 16-45.JPG
TR 16-46	23.5	RHS	60° 17' 52.740" N	134° 16' 5.460" W	White Sweetclover	1 plant	TR 16-46.JPG
TR 16-47	28	RHS	60° 16' 35.442" N	134° 18' 54.132" W	**Altai lyme grass**	~5 m2 patch	TR 16-47.JPG
TR 16-48	30.5	RHS	60° 16' 39.816" N	134° 21' 34.806" W	White Sweetclover	1 plant	TR 16-48.JPG
TR 16-49	41.5	RHS	60° 14' 27.336" N	134° 31' 24.288" W	**Perennial sowthistle**	25 plants, mostly small plants; 3 flowering	TR 16-49.JPG
TR 16-50	53	RHS	60° 11' 0.162" N	134° 41' 12.192" W	**Yellow Sweetclover**	~25 m2 patch	TR 16-50.JPG
TR 16-51	54	RHS	60° 10' 40.704" N	134° 41' 42.096" W	White Sweetclover	1 plant	TR 16-51.JPG
TR 16-52	54	RHS	60° 10' 40.806" N	134° 41' 42.408" W	White Sweetclover	~1 m2 at corner with SKH	TR 16-52.JPG
TR 16-53	32	RHS	60° 16' 38.358" N	134° 23' 13.488" W	White Sweetclover	~ 2 m2 patch	TR 16-53.JPG
TR 16-54	19.5	RHS	60° 19' 16.284" N	134° 14' 24.456" W	**Perennial sowthistle**	~50 m2 in 2 patches	TR 16-54.JPG
TR 16-55	7.5	LHS	60° 19' 59.034" N	134° 5' 13.470" W	White Sweetclover	~2 m2 patch	TR 16-55.JPG
TR 16-56a	5.5	LHS	60° 19' 53.394" N	134° 3' 18.744" W	**Perennial sowthistle**	~ 3 m2 patch	TR 16-56a.JPG
TR 16-56b	5.5	LHS	60° 19' 53.394" N	134° 3' 18.744" W	**Perennial sowthistle**	same as TR 16-56b	TR 16-56b.JPG
Chinook R 16-01	1	RHS	60° 18' 55.338" N	134° 15' 18.078" W	White Sweetclover	~ 1 m2 patch	Chinook R 16-01.JPG
Reid Rd 16-01	0.5	RHS	60° 16' 51.480" N	134° 17' 19.452" W	White Sweetclover	10 young plants	Reid Rd 16-01.JPG
Reid Rd 16-02	1.5	RHS	60° 16' 17.046" N	134° 17' 46.974" W	White Sweetclover	~1 m2 patch	Reid Rd 16-02.JPG
Reid Rd 16-03	2	LHS	60° 15' 54.474" N	134° 18' 3.888" W	White Sweetclover	~30 m2 at entrance to water plant	Reid Rd 16-03.JPG
Taku Blvd 16-01	2	RHS	60° 14' 57.360" N	134° 19' 6.306" W	White Sweetclover	~2 m2 patch	Taku Blvd 16-01.JPG
Taku Blvd 16-02	0	RHS	60° 15' 54.006" N	134° 18' 15.126" W	White Sweetclover	~10 m2 patch	Taku Blvd 16-02.JPG
Ten Mile Rd 16-01	0.2	LHS	60° 15' 46.248" N	134° 26' 8.844" W	White Sweetclover	~2 m2 patch	Ten Mile Rd 16-01.JPG

Table 4. Atlin Road 2016 Invasive Plant Survey Data collected in WGS 84

Site ID	Nearest Km	Side of Road	GPS Latitude	GPS Longitude	Species	Notes	Photo File Name
Atlin Rd 16-01	0.5	RHS	60° 19' 34.038" N	134° 0' 6.540" W	White sweetclover	~30m2 patch	Atlin Rd 16-01.JPG
Atlin Rd 16-02	1.5	RHS	60° 19' 0.744" N	134° 0' 7.098" W	White sweetclover	~5 m2 patch	Atlin Rd 16-02.JPG
Atlin Rd 16-03	2.5	RHS	60° 18' 20.010" N	133° 59' 59.556" W	**Oxeye daisy**	~10 m2 patch,	Atlin Rd 16-03.JPG
Atlin Rd 16-04	3	RHS	60° 18' 13.60" N	133° 59' 52.8" W	**Oxeye daisy**	Mixed in scentless chamomile, sweet William and Lathyrus sp.; area next to short road to private properties; appears seeded; ~50 m2	No photo
Atlin Rd 16-05	4	RHS	60° 17' 49.104" N	133° 59' 6.870" W	White sweetclover	~5 m2 patch	Atlin Rd 16-05.JPG
Atlin Rd 16-06	4	RHS	60° 17' 45.984" N	133° 58' 49.500" W	White sweetclover	4 plants	Atlin Rd 16-06.JPG
Atlin Rd 16-07	8	RHS	60° 16' 10.662" N	133° 56' 35.484" W	**Yellow sweetclover**	~2 m2	Atlin Rd 16-07.JPG
Atlin Rd 16-08	9.5	RHS	60° 15' 24.816" N	133° 55' 55.206" W	White sweetclover	3 plants	Atlin Rd 16-08.JPG
Atlin Rd 16-09	9.5	RHS	60° 15' 18.774" N	133° 55' 52.518" W	**Perennial sowthistle**	5 plants	Atlin Rd 16-09.JPG
Atlin Rd 16-10	10	RHS	60° 15' 7.884" N	133° 55' 42.180" W	White sweetclover	~1 m2 patch	Atlin Rd 16-10.JPG
Atlin Rd 16-11	10	RHS	60° 15' 8.616" N	133° 55' 43.914" W	**Scentless chamomile**	5 plants	Atlin Rd 16-11.JPG
Atlin Rd 16-12	10	RHS	60° 15' 5.586" N	133° 55' 39.144" W	White sweetclover	~5 m2 patch	Atlin Rd 16-12.JPG
Atlin Rd 16-13	10.5	RHS	60° 15' 1.014" N	133° 55' 33.444" W	White sweetclover	2 plants	Atlin Rd 16-13.JPG
Atlin Rd 16-14	10.5	RHS	60° 14' 56.796" N	133° 55' 23.706" W	**Tufted (Bird) vetch**	Along private driveway, property owner says lots of vetch on his property, ~10 m2 covering adjacent shrubs along both side of driveway	Atlin Rd 16-14.JPG
Atlin Rd 16-15	10.5	RHS	60° 14' 56.646" N	133° 55' 23.394" W	**Scentless chamomile**	Adjacent to private driveway, mixed in with shasta daisy; ~20 m2	Atlin Rd 16-15.JPG
Atlin Rd 16-16	11	RHS	60° 14' 50.352" N	133° 55' 8.760" W	White sweetclover	~10 m2 patch	Atlin Rd 16-16.JPG
Atlin Rd 16-17	13	RHS	60° 13' 55.164" N	133° 53' 55.266" W	White sweetclover	~1 m2 patch	Atlin Rd 16-17.JPG
Atlin Rd 16-18	14.5	RHS	60° 13' 9.324" N	133° 53' 21.636" W	White sweetclover	~1 m2 patch	Atlin Rd 16-18.JPG
Atlin Rd 16-19	16	RHS	60° 12' 24.534" N	133° 52' 16.302" W	White sweetclover	1 plant	Atlin Rd 16-19.JPG
Atlin Rd 16-20	18.5	RHS	60° 11' 15.942" N	133° 52' 35.352" W	White sweetclover	~50 m2 over 50 m stretch	Atlin Rd 16-20.JPG
Atlin Rd 16-21	20	RHS	60° 10' 36.114" N	133° 52' 12.780" W	White sweetclover	~ 1 m2 patch	Atlin Rd 16-21.JPG
Atlin Rd 16-22	20	RHS	60° 10' 33.864" N	133° 51' 57.312" W	**Yellow lucerne**	2 plants	Atlin Rd 16-22.JPG
Atlin Rd 16-23	21	RHS	60° 10' 14.982" N	133° 51' 19.986" W	White sweetclover	1 plant	Atlin Rd 16-23.JPG
Atlin Rd 16-24	22.5	RHS	60° 9' 49.032" N	133° 50' 52.890" W	White sweetclover	4 plants next to old borrow pit	Atlin Rd 16-24.JPG
Atlin Rd 16-25	22.5	RHS	60° 9' 46.992" N	133° 50' 56.148" W	White sweetclover	~20 m2 patch in old borrow pit	Atlin Rd 16-25.JPG
Atlin Rd 16-26	23.5	RHS	60° 9' 14.712" N	133° 50' 11.724" W	White sweetclover	1 plant	Atlin Rd 16-26.JPG
Atlin Rd 16-27	18.5	LHS	60° 11' 16.422" N	133° 52' 34.746" W	White sweetclover	3 plants	Atlin Rd 16-27.JPG
Atlin Rd 16-28	18	LHS	60° 11' 33.198" N	133° 52' 38.844" W	White sweetclover	1 plant	Atlin Rd 16-28.JPG
Atlin Rd 16-29	17	LHS	60° 12' 8.736" N	133° 52' 2.076" W	White sweetclover	2 plants	Atlin Rd 16-29.JPG
Atlin Rd 16-30	16.5	LHS	60° 12' 22.590" N	133° 52' 12.012" W	White sweetclover	~5 m2 patch at old borrow pit	Atlin Rd 16-30.JPG
Atlin Rd 16-31	15.5	LHS	60° 12' 37.302" N	133° 52' 51.828" W	White sweetclover	~ 5 m2 patch	Atlin Rd 16-31.JPG
Atlin Rd 16-32	13	LHS	60° 13' 58.182" N	133° 53' 56.520" W	White sweetclover	~ 1 m2 patch	Atlin Rd 16-32.JPG
Atlin Rd 16-33	6.5	LHS	60° 16' 48.498" N	133° 57' 15.264" W	White sweetclover	~75 m2 patch	Atlin Rd 16-33.JPG
Atlin Rd 16-34	0.5	LHS	60° 19' 33.504" N	134° 0' 5.562" W	White sweetclover	~5 m2 patch	Atlin Rd 16-34.JPG
Atlin Rd 16-35	10.5	LHS	60° 15' 3.204" N	133° 55' 35.130" W	White sweetclover	1 plant	Atlin Rd 16-35.JPG

Table 4. Atlin Road 2016 Invasive Plant Survey Data collected in WGS 84

Site ID	Nearest Km	Side of Road	GPS Latitude	GPS Longitude	Species	Notes	Photo File Name
Atlin Rd 16-36	12.5	RHS	60° 14' 8.082" N	133° 54' 6.684" W	**Spotted knapweed**	4 flowing plants and 10 leaf rosettes	Atlin Rd 16-36.JPG
Atlin Rd 16-37	15.5	LHS	60° 12' 33.180" N	133° 52' 38.868" W	White sweetclover	~2 m2 patch	Atlin Rd 16-37.JPG
Atlin Rd 16-38	1	RHS	60° 19' 15.480" N	134° 0' 6.324" W	White sweetclover	3 plants	Atlin Rd 16-38.JPG
Atlin Rd 16-39	18.5	LHS	60° 11' 19.350" N	133° 52' 37.224" W	White sweetclover	6 plants	Atlin Rd 16-39.JPG
Atlin Rd 16-40	18.5	LHS	60° 11' 19.746" N	133° 52' 37.668" W	White sweetclover	6 plants	Atlin Rd 16-40.JPG