# Dawson City Invasive Plant Survey 2019

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**Dawson City Invasive Plant Survey 2019 – Table of Contents**



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## INTRODUCTION

Invasive plant species are defined as plants that have been introduced to new habitat (exotic) and that also have negative impacts on our environment, economy, and health. Invasive plants may out-compete native species for resources and have the ability to substantially change their surrounding environment over relatively short periods of time. Many native plant species have coevolved with native insects and animals, forming dependent relationships that are sensitive to change (Clements and DiTommaso 2012). As invasive plants colonize an area and these important ecological interactions are altered, overall biodiversity may be reduced as a result (Smith et al. 2012).

Invasive plant species have a variety of characteristics that help them move to and establish in new areas (Clements and DiTommaso 2012). They typically have good seed dispersal mechanisms that allow them to travel long distances, depending on climate and local conditions. Additionally, they are good colonizers of newly disturbed habitat such as roadsides and recently cleared areas. Invasive plant seeds are also commonly transported via vehicles travelling along road systems. These characteristics, combined with a warming climate, have allowed invasive plant species from southern regions to disperse and establish themselves in Yukon (Bennett and Mulder 2009).

According to the Yukon Invasive Species Council (YISC 2019) Website: https://www.yukoninvasives.com/index.php/en/, 154 introduced plant species have been identified within Yukon. Of the 154 introduced plant species 78 have been observed in the Dawson area; 61 of these are considered to be at a low invasiveness level or higher (Yukon Conservation Data Centre 2019). Tracking invasive plant species distribution and abundance is important for developing effective management strategies and potential mitigation efforts.

This report is intended to follow up on results and recommendations from the 2008 invasive plant survey in the Dawson Area (Cooley 2009), in addition to providing relevant new findings. The objectives are to:

1. Determine the presence and relative density of key invasive plant species in downtown Dawson, along Mary McLeod Road, and along the Yukon River's edge adjacent to Dawson;
2. Compare relative differences in invasive plant presence and density between 2008 and 2019; and
3. Raise awareness of invasive plants in the Dawson area and provide educational material in the form of this report.

Photo 1. White Sweetclover is one of Yukon's most prevalent invasive plant species.

# METHODS

## Survey Methods

The survey area included the streets of Dawson City (located in west-central Yukon), Mary McLeod Road, and the Yukon River's edge adjacent to town. Seven surveyors, divided into one group of three people and one group of four people, walked the streets systematically within the survey area and recorded data on provided data sheets. A youth Y2C2 crew provided assistance during the survey. The survey took place on July 23 and 24, 2019.

Survey species were chosen by prioritizing common, highly invasive species that were previously observed or suspected to be occurring in the Dawson area (Table 1). In order to allow for effective youth and public participation, the chosen survey species had to be easily identifiable. Two species were added in the 2019 survey based on the suggestions of a Yukon Government plant expert - Russian Leafy Spurge (*Euphorbia virgata*) and Siberian Cow Parsnip (*Heracleum sibiricum*). These species were not surveyed in 2008, but were known to occur in the Dawson area. Narrow-leafed Hawksbeard (*Crepis tectorum*) and domestic escapee Icelandic Poppy (*Papaver croceum*) were recorded if seen, but were not systematically observed and quantified like other survey species. All observers received invasive plant species identification training offered by the YISC. A basic survey species identification guide was provided to all observers during the survey.

Survey methods were kept relatively consistent with methods used in the 2008 survey (Cooley 2009). Sample units were categorized by dividing each side of the street in each city block or along Mary McLeod Road into individual units (Figure 1). Sample units were approximately 1 meter in width (exaggerated in maps throughout this report for visual convenience), extending outwards from the approximate edge of the street. Sample units along the Yukon River's edge were located along the approximate high water level. Each sample unit needed to be entirely visible in order to estimate percent cover of survey species and other features, therefore, long streets/roads or long stretches of river edge were divided into sample units that ranged in length between approximately 50-100 meters. Small alleyways were not included in the survey. Observers used georeferenced maps with labelled sample unit grid numbers to ensure that data were recorded systematically. Sample unit grid numbers were kept consistent with grid numbers used in 2008 for the downtown area and new grid numbers were added for Mary McLeod Road and the Yukon River's edge.

Percent cover of each survey species was estimated visually to the nearest 5% for each sample unit. Where less than 5% cover was observed, 1% was the recorded value. Where less than 1% cover was observed (i.e. only 1 or 2 plants), 0.1% was the recorded value.

Table 1. List of invasive plant species surveyed in Dawson City, 2019.

| Species | Family | Invasiveness Rank |
|---|---|---|
| *White Sweetclover (*Melilotus albus*) | Fabaceae | High |
| *Tufted Vetch (*Vicia cracca*) | Fabaceae | High |
| *Bladder Campion (*Silene vulgaris*) | Caryophyllaceae | Medium |
| *Yellow Sweetclover (*Melilotus officinalis*) | Fabaceae | High |
| *Butter-and-eggs (*Linaria vulgaris*) | Plantaginaceae | Medium |
| *Oxeye Daisy (*Leucanthemum vulgare*) | Asteracaeae | High |
| **Russian Leafy Spurge (*Euphorbia virgata*) | Euphobiaceae | High |
| **Siberian Cow Parsnip (*Heracleum sibiricum*) | Apiaceae | Low |

*Same species as in 2008 survey
**Species added for 2019 survey
***Presence of Narrow-leaved Hawskbeard (*Crepis tectorum*) and Icelandic Poppy (*Papaver croceum*) was noted

In addition to percent cover of invasive plants being recorded, the general availability for suitable establishment and growth was recorded by percent cover for each sample unit. The classification criteria in 2019 was kept relatively consistent with methods used in the 2008 survey (Cooley 2009) (Table 2; Table 3).

Table 2. Areas considered available for invasive plant establishment and growth.

| **Areas considered available** | |
|---|---|
| Level of permanency | Low |
| Potential for invasive plants to proliferate | Medium/high |
| Areas | Regular street edges, untended yards/features, unmaintained trails |

Table 3. Areas considered unavailable for invasive plant establishment and growth.

| **Areas considered unavailable** | |
|---|---|
| Level of permanency | Medium/high |
| Potential for invasive plants to proliferate | None/low |
| Areas | Roads/driveways, boardwalks, tended yards/features |

## Data Analysis

Percent cover classes were used to describe and map each species presence and relative density within each sample unit. Percent cover was based on species cover of each total sample unit area.

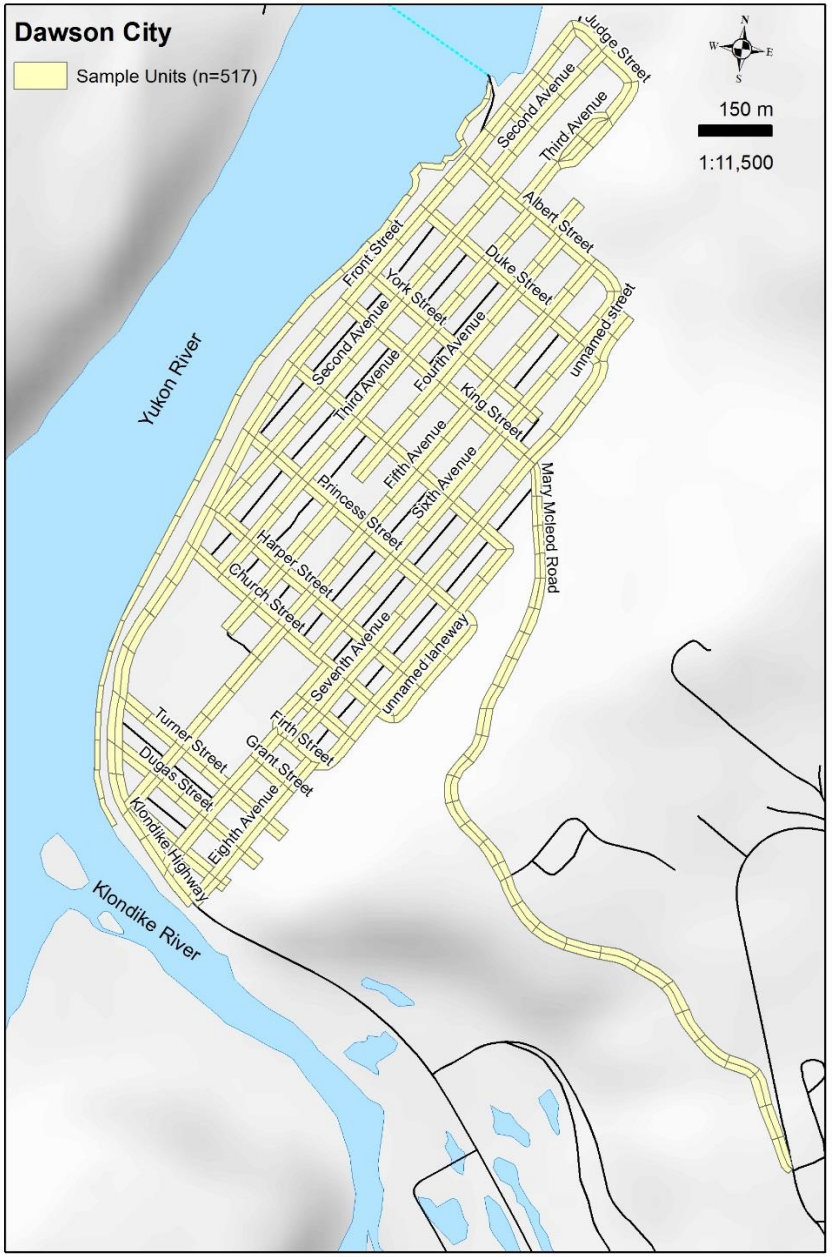


Figure 1. A total of 517 individual sample units were sampled in 2019. Sample unit width is exaggerated in map for visual convenience.

## RESULTS AND DISCUSSION

### Total area available for invasive plant establishment and growth

Of all 517 sample units, 411 (79.7%) were at least partially (1-100%) available for invasive plant establishment and growth; 106 sample units (20.5%) were 100% available (Figure 2). Twenty sample units could not be surveyed due to construction (most of which were in the southwest area of town).

Areas of downtown had relatively low availability for invasive plant establishment and growth (similar in 2008). Conversely, the north end of town, Mary McLeod Road, and the Yukon River's edge were highly available. These areas appeared to be not tended or poorly tended.

Periodic mowing and grading of street edges have the ability to temporarily reduce the presence of invasive plant species, therefore, the sample unit availability described in this report may not be representative of the entire growing season. Additionally, sample unit availability may change from year to year, reflecting new construction, new development, etc. Therefore, conditions for invasive plant establishment and growth may change in any given sample unit from year to year.

Photo 2. Mary McLeod Road (pictured) and the Yukon River's edge were highly available for invasive plant establishment and growth.

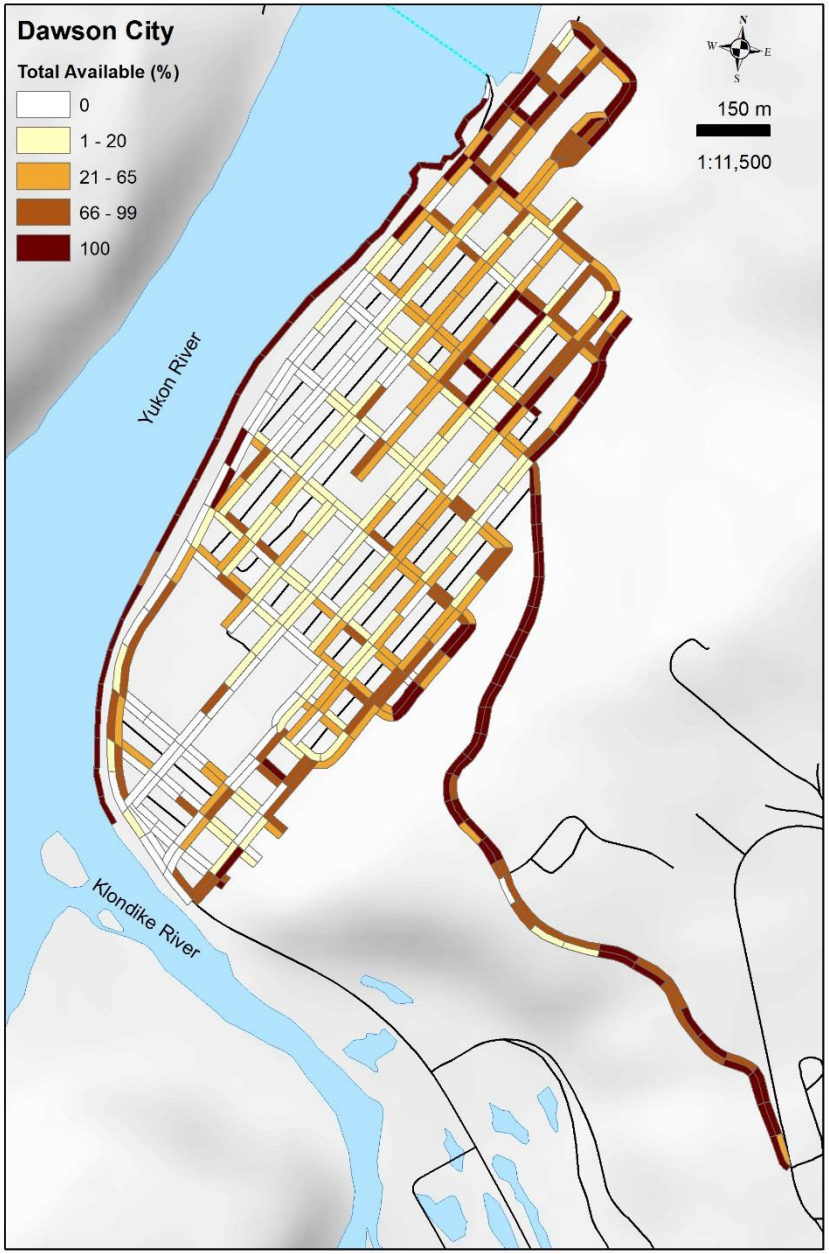


Figure 2. Total available area for invasive plant establishment and growth shown as percent of entire sample unit.

## Number of species present

The proportion of units with 0-3 invasive species present was relatively similar to proportions in 2008 (Table 4). In general, invasive species were most common in the north end of town, along Mary McLeod Road, and along the Yukon River's edge (Figure 3). Thirty-six of 60 sample units (60%) along Mary McLeod Road contained at least 1 species, and 24 sample units (40%) contained no invasive species. Twenty-three of 26 sample units (88%) along the Yukon River's edge contained at least 1 species and only 3 sample units (12%) contained no invasive species. Sample units with >1 species were most common in the north end of town and along the Yukon River's edge.

Table 4. Proportion of sample units with 0, 1, 2, and 3 invasive plant species present in 2008 and 2019. n=total number of sample units surveyed.

| | 0 Species | 1 Species | 2 Species | 3 Species |
|---|---|---|---|---|
| **2008** (n=431) | 59% | 33% | 7% | 1% |
| **2019** (n=517) | 60% | 29% | 11% | <1% |

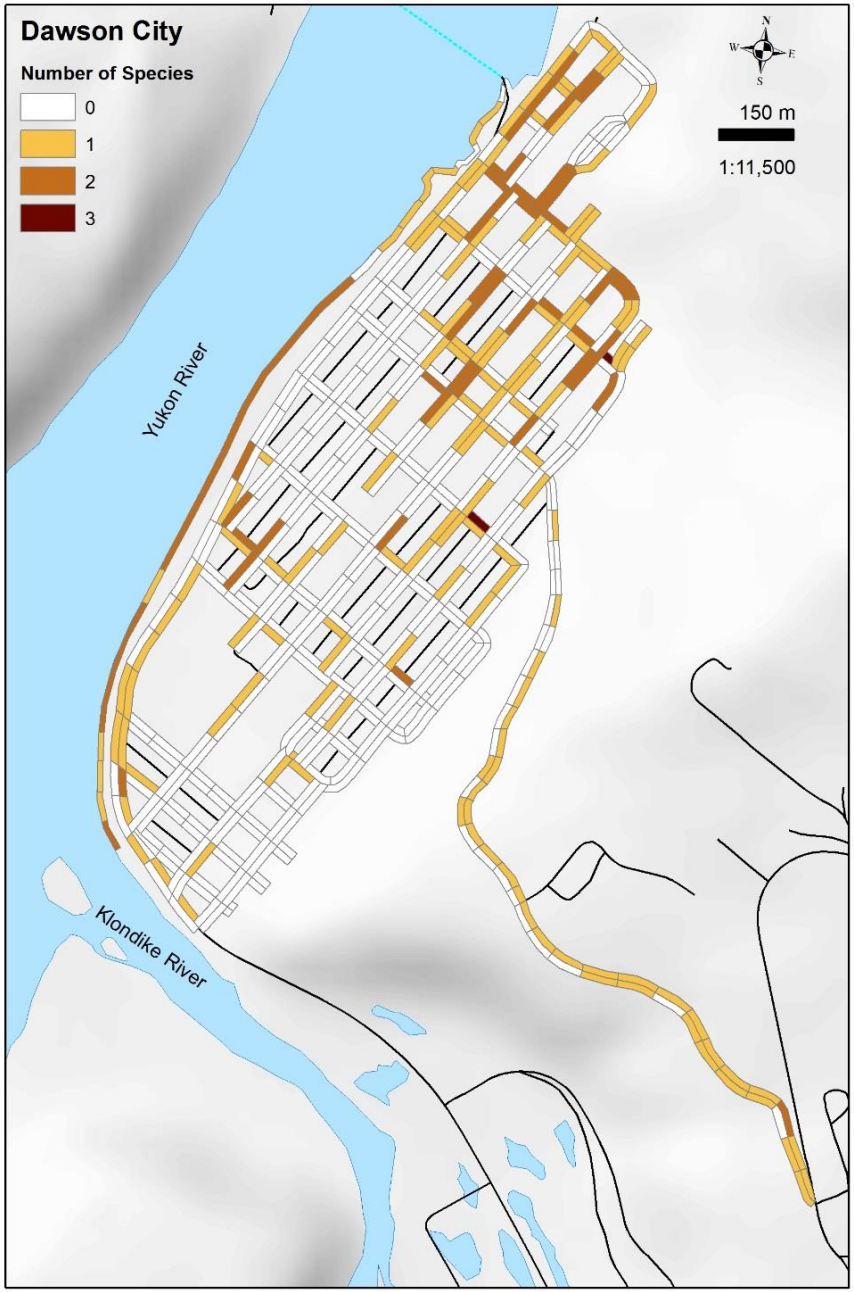


Figure 3. Number of invasive plant species found within each sample unit.

## White Sweetclover (*Melilotus albus*)

White Sweetclover was the most frequently observed species. It was observed in 144 of sample units (28%). In 2008, White Sweetclover was also the most frequently observed species, being observed in 23% of sample units. White Sweetclover was observed sporadically throughout downtown.

White Sweetclover occurred in high densities (e.g. 76-100% cover) along southeast sections of Mary McLeod Road (Figure 4). Additionally, White Sweetclover was common along the Yukon River's edge, but typically occurred in lower densities (e.g. 1-25% cover).

Photo 3. White Sweetclover was common along the Yukon River's edge and upper Mary McLeod Road.

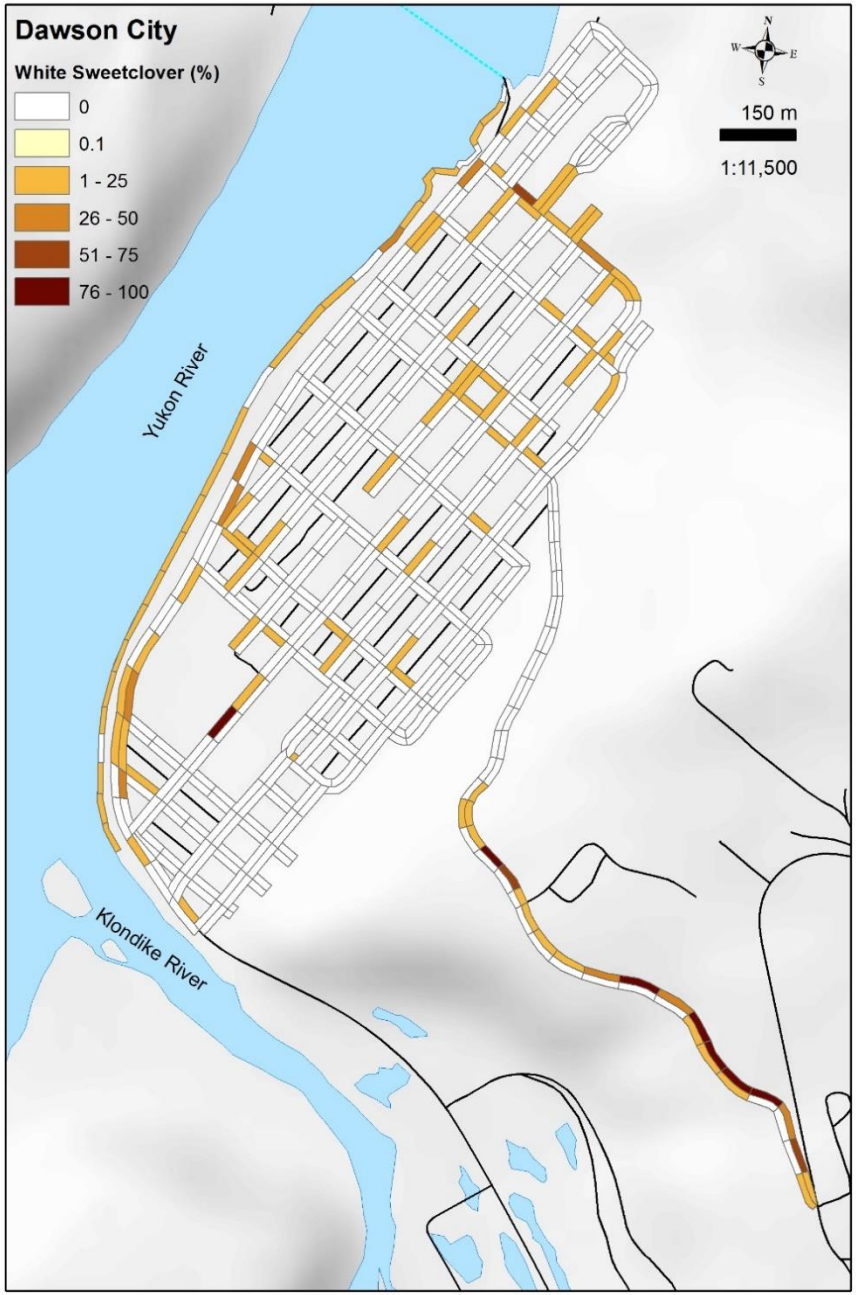


Figure 4. White Sweetclover distribution and percent cover.

## Tufted Vetch (*Vicia cracca*)

Tufted Vetch was observed in 86 sample units (17%). In 2008, Tufted Vetch was observed in 13% of sample units. Similar to 2008, Tufted Vetch was most common in the north end of town. Percent cover was high (e.g. >51%) in many sample units in the most northern area of town (Figure 5).

Tufted Vetch was not observed along Mary McLeod Road or along the Yukon River's edge.

Photo 4. Tufted Vetch was most common in the north end of town.

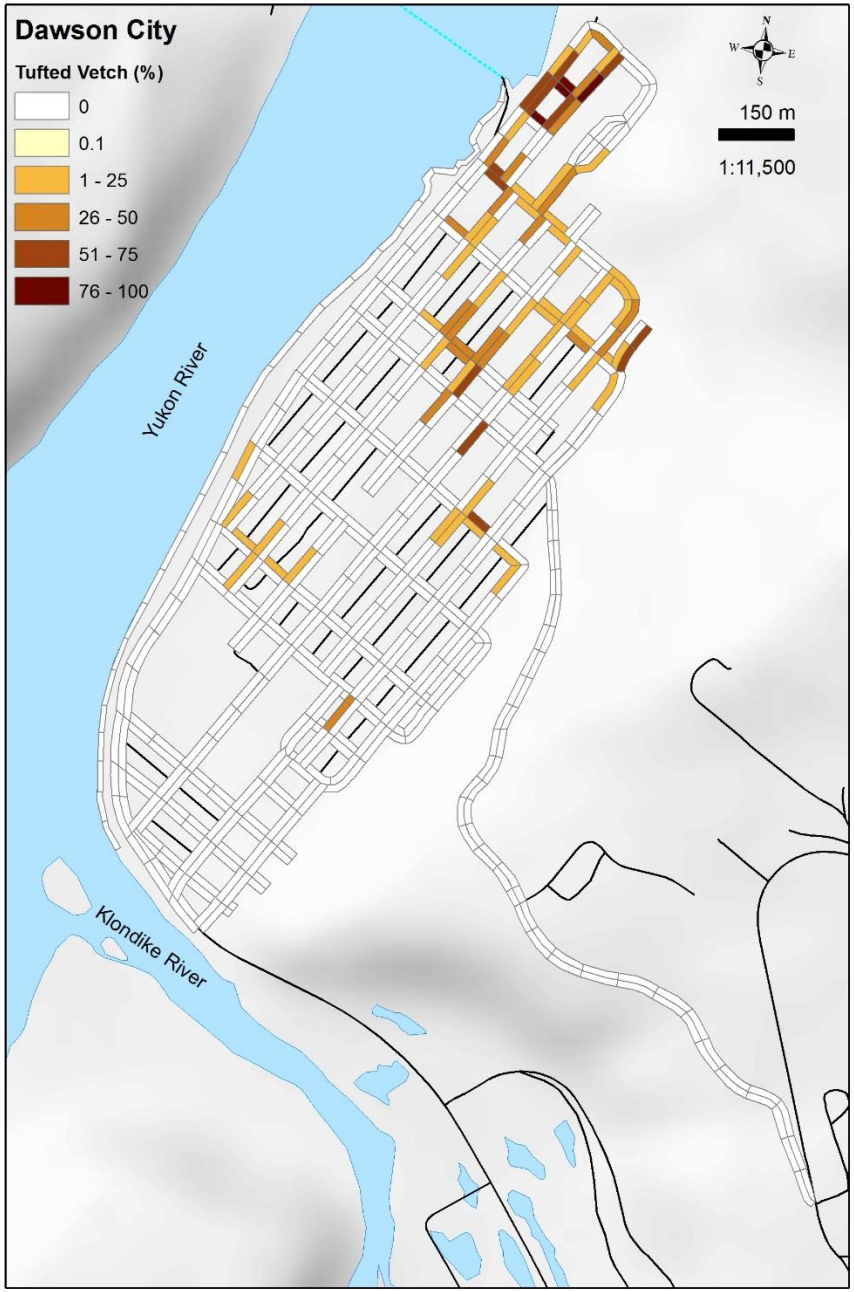


Figure 5. Tufted Vetch distribution and percent cover.

## Bladder Campion (*Silene vulgaris*)

Bladder Campion was observed in 31 sample units (6%). In 2008, Bladder Campion was observed in 3% of sample units. Bladder Campion was observed sporadically throughout downtown. Percent cover was 1-25% throughout downtown, except 2 sample units that had 26-50% and 76-100% cover, respectively.

Bladder Campion was common along the Yukon River's edge, being observed in 31% of the Yukon River's edge sample units (Figure 6). Percent cover was 1-25% in all sample units along the Yukon River's edge.

Bladder Campion was not observed along Mary McLeod Road.

Photo 5. Bladder Campion was most common along the Yukon River's edge.

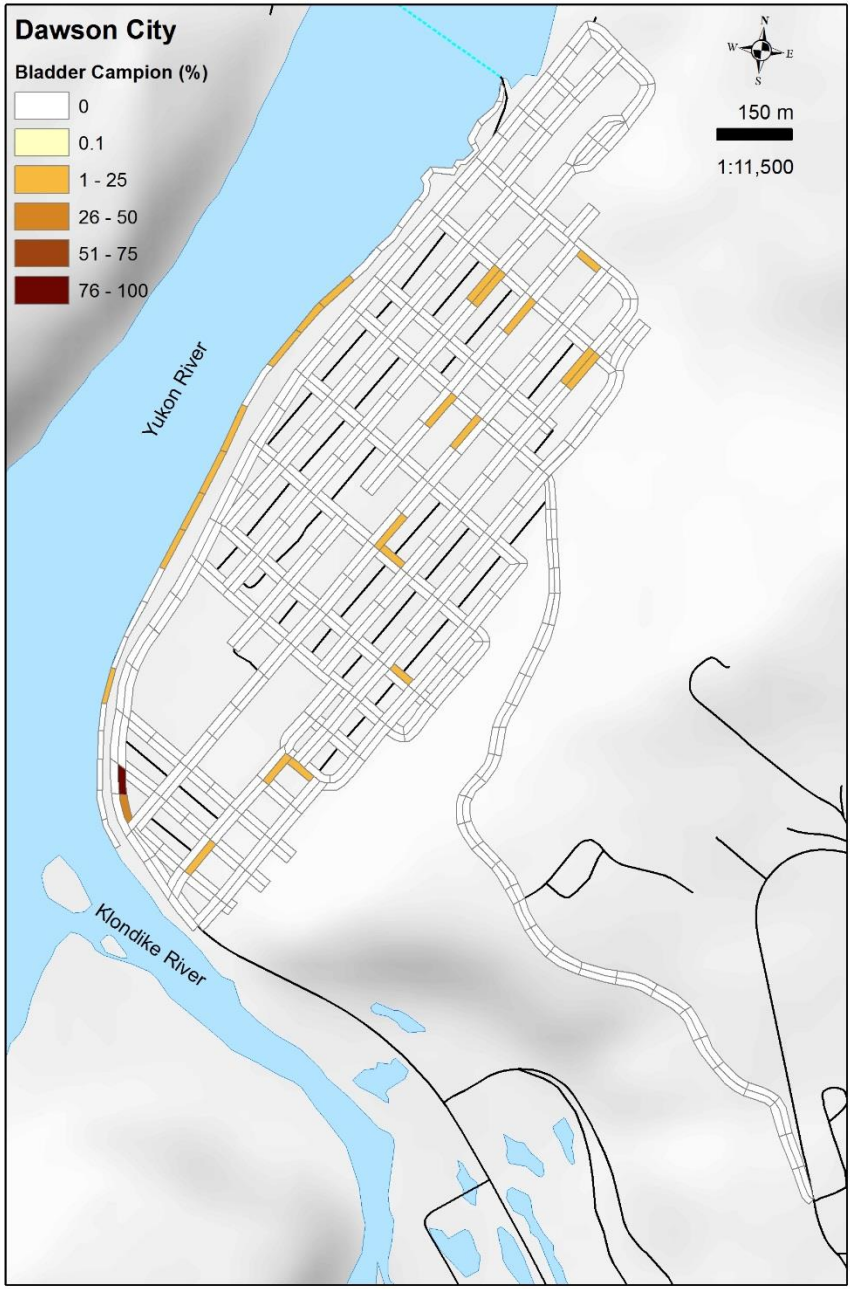


Figure 6. Bladder Campion distribution and percent cover.

## Yellow Sweetclover (*Melilotus officinalis*)

Yellow Sweetclover was observed in 2 sample units (<1%). In 2008, Yellow Sweetclover was observed in <1% sample units. Percent cover of both sample units was 1-25% (Figure 7).

Yellow Sweetclover was not observed along Mary McLeod Road or along the Yukon River's edge.

Photo 6. Yellow Sweetclover was present in only 2 sample units.

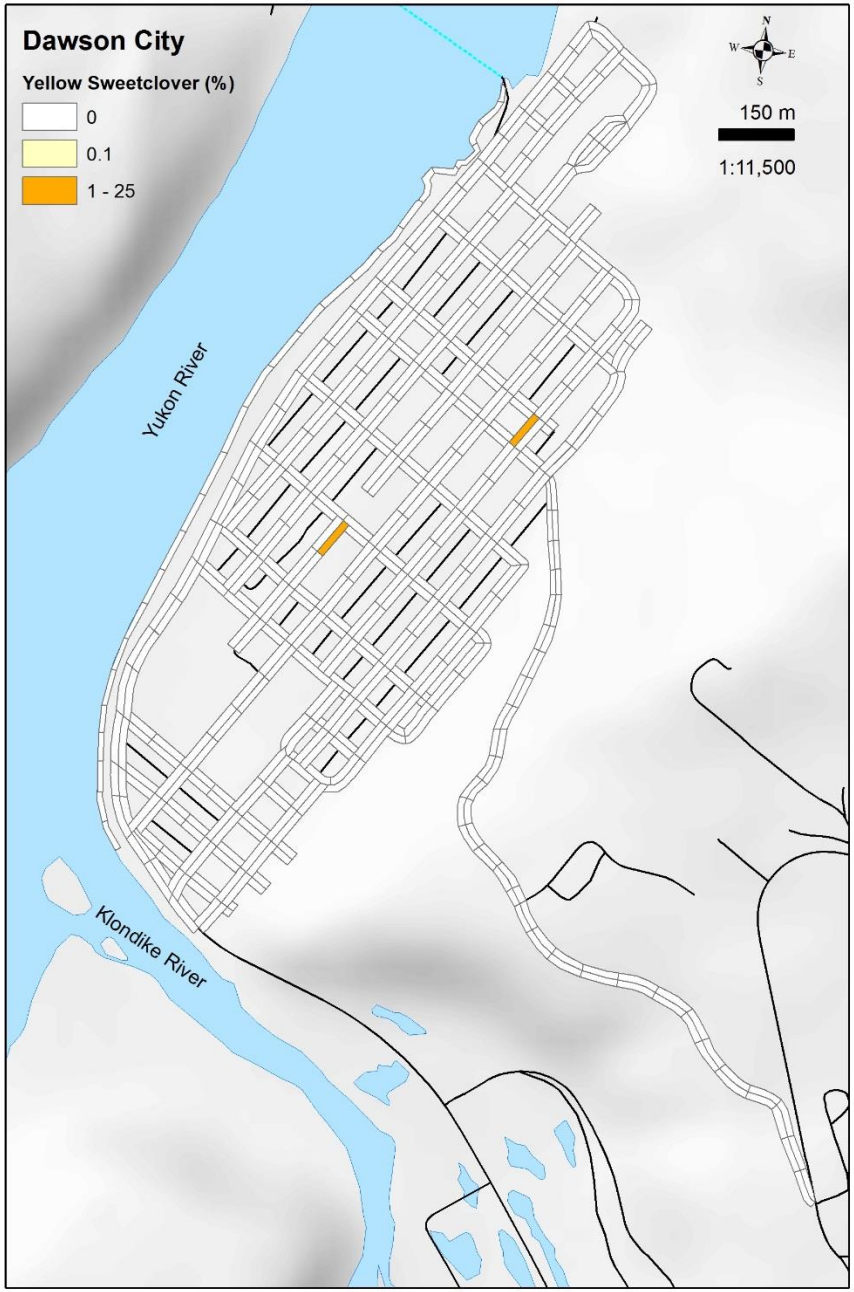


Figure 7. Yellow Sweetclover distribution and percent cover.

## Butter and Eggs (*Linaria vulgaris*)

Butter and Eggs was observed in 3 sample units (<1%). In 2008, Butter and Eggs was observed in <1% of sample units. Percent cover in all 3 sample units was 1-25% (Figure 8). At least one of these observations appeared to be in a tended yard.

Butter and Eggs was observed in 1 sample unit along Mary McLeod Road, and was not observed along the Yukon River's edge.

Photo 7. Butter and Eggs was present in only 3 sample units.

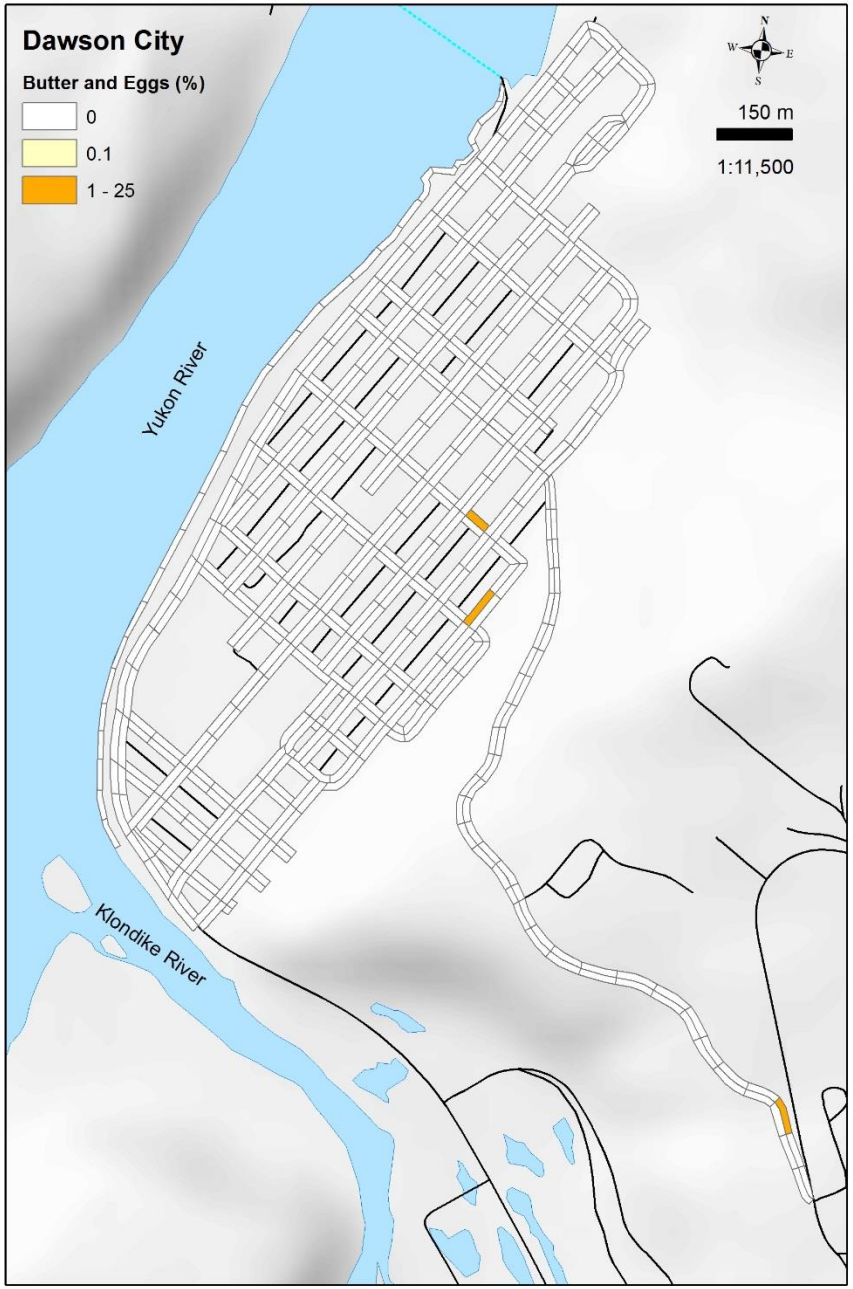


Figure 8. Butter and Eggs distribution and percent cover.

### Oxeye Daisy (*Leucanthemum vulgare*), Russian Leafy Spurge (*Euphorbia virgata*), and Siberian Cow Parsnip (*Heracleum sibiricum*)

Oxeye Daisy, Russian Leafy Spurge, and Siberian Cow Parsnip were not observed during the 2019 survey. In 2008, Oxeye Daisy was observed in 2 sample units (<1%) which were both noted as being potentially semi-tended (e.g. part of a garden). Russian Leafy Spurge and Siberian Cow Parsnip have been previously recorded in areas near Dawson (e.g. Henderson Corner), but were not observed within the survey area in 2019.

### Narrow-leaved Hawskbeard (*Crepis tectorum*) and Icelandic Poppy (*Papaver croceum*)

Narrow-leaved Hawksbeard and Icelandic Poppy were recorded incidentally, but were not systematically surveyed. Narrow-leaved Hawksbeard was recorded as present in 55 sample units (11%), however, it is similar in appearance to multiple other species and therefore could not be identified with high confidence. Icelandic Poppy was observed in 1 sample unit (<1%).

## SUMMARY

Results from 2019 indicated that the presence and relative density of the surveyed species were relatively similar to what they were in 2008. Additionally, the proportions of single and multiple species occurring in each sample unit were similar between 2008 and 2019.

Mary McLeod Road and the Yukon River's edge were highly available for invasive plant establishment and growth. White Sweetclover was common in sample units in both of these areas. Bladder Campion was common along the Yukon River's edge.

White Sweetclover, Tufted Vetch, and Bladder Campion were the most prevalent species observed (similar in 2008). Yellow Sweetclover, Butter and Eggs, and Icelandic Poppy were uncommon. Oxeye Daisy, Russian Leafy Spurge, and Siberian Cow Parsnip were not observed. Narrow-leaved Hawksbeard was identified as present in approximately 10% of sample units, however, positive identification could not be confirmed for all observations.

## RECOMMENDATIONS

Narrow-leaved Hawksbeard (*Crepis tectorum*) and Caragana (*Caragana arborescens*) should be added as survey species to future survey species lists. Caragana was prevalent during the 2019 survey, but was not recorded. Both of these species are listed as regularly occurring in the Dawson area and are ranked as highly invasive (Yukon Conservation Data Centre 2019).

Future survey areas could include the Dome Road, as it is known that invasive plant species occur regularly along the roadside. Adding the Dome Road may require 1 extra day of survey time (i.e. increased from 2 to 3 days).

In the future, timing of surveys should be as near as possible to the same dates as historical surveys. Doing so will help keep results consistent and comparable by reducing variation in observations due to seasonal changes in plant growth. Additionally, survey frequency should be increased if possible (e.g. once every 5 years) to better track potential temporal changes, especially in light of a changing climate.

In addition to continued monitoring, proactive, adaptive management and mitigation strategies should be developed and implemented if necessary. Collaborating with other jurisdictions (e.g. Alaska and British Columbia) may be useful for effective planning.

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Photo 8. The 2019 field crew included a Y2C2 crew of 5 people (left), Sonny Parker (right), and Martin Kienzler (not pictured).