Pulling Together to Meet the Challenge of Invasive Species

Workshop Report

February 13, 2012, Yukon College, Whitehorse

PREPARED FOR:

YUKON INVASIVE SPECIES COUNCIL

www.yukoninvasives.com

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1. INTRODUCTION

Welcome / Overview

Bruce Bennett welcomed everyone to the workshop and recognized the wide range of organizations and individuals that were present. Bruce thanked the Kwanlin Dun First Nation and the Ta`an Kwach`an Council for the opportunity to have the meeting on their traditional territory.

Bruce explained the workshop was meant to be interactive with an overarching goal of collaboration and cooperation amongst the multi-jurisdictions to manage the spread of invasive species.

The goals of the workshop were to:

- Share knowledge and information about invasive species in the Yukon;
- Extend the network and collaboration related to invasive species by communicating and collaborating between all level of governments, researchers, professionals and the public; and
- Identify solutions to address the challenges and barriers around dealing with invasive species.

The Yukon Invasive Species Council (YISC) is a registered non-profit society formed to prevent the introduction and manage the spread of invasive species in the Yukon. A successful workshop was held in 2008 and this workshop managed to bring an even broader and larger group of participants together.

2. WORKSHOP PROCESS

There were 73 registered participants with representation from municipal, territorial, federal, and First Nation governments, non-profit organizations, farming, business, and private citizens. An additional number of participants who did not register also attended. (See Appendix 1 – Registration)

The workshop included a mix of presentations, large group discussions and small group collaboration. This provided the opportunity for people with technical expertise to share their information, allowed participants time to discuss this new information and explore opportunities for management strategies given their own area of expertise.

The three panels and the presentations that were given as part of the three panels were as follows:

Snap Shot on the Yukon and Our Neighbours

Territorial Update: What's New and What to Watch For	Bruce Bennett
Regional round up	Bruce Bennett
Yukon Invasive Species Council	Andrea Altherr

Managing and Recovery

Weeds and Yukon Agriculture	Matt Ball
Restoration Project at the abandoned Range Road Dumpsite and an Unexpected Outcome	Maureen Huggard
Defining Disturbance and Recovery – the influence of landscape specific ecological responses to linear disturbances in Yukon	Kirstie Simpson

Special Focus: Research

Aquatic Invasive Species: It's a small world after all	Maria Leung
Plant Traits in Native and Exotic Roadside Species on the North Klondike Highway: Different or the Same?	Jamie Leathem

Biographies and presentation descriptions are included at the end of this workshop report. (See Appendix 2—Biographies and Appendix 3-Abstracts) The power point presentations are available on the council's website: www.yukoninvasives.com

Questions were taken from the participants at the end of each panel presentation and then workshop participants worked with the other members at their table to identify one key issue that stood out for them from the presentation and one key opportunity. These key issues and opportunities were then processed further through small groups to develop key strategies for participants and the YISC to take forward.

Refreshment breaks and a lunch were provided by Access Consulting Group, Yukon Research Centre and the Agriculture Branch to provide additional networking time for the participants.

Ground Rules

Facilitator, Angela Walkley, reviewed the proposed Agenda for the day and the ground rules that were set for the workshop. (See Appendix 4 – Workshop Agenda)

- Cell phones off
- Respectful communication
- Save questions until the end of the presentation
- Raise your hand to speak
- Forgive the spelling mistakes
- No interrupting
- Be open to new possibilities

3. WHAT DO WE KNOW ABOUT INVASIVE SPECIES

The workshop began with an interactive exercise to have participants introduce themselves to each other in small groups and get a sense of the knowledge in the room. Each participant was asked to share what he or she knew about invasive species.

The following is a list of comments that came from the large group when asked what stood out from the discussions they just had.

- What is an invasive species?
- What is the definition and where do you draw the line on what is an invasive species?
- There are some native and exotic species that behave the same – are the native species a problem? Is there a functional role for them?
- Who is responsible for dealing with invasive species?
- We define an invasive species as a non-native plant that has the potential to harm the environment or economy.
- Some non-native species are vectors for diseases; are the diseases also considered invasive?
- How are the invasive species connected to climate change? For example, the Pine Beetle moving north.
- Getting beyond plants.
- Earth worms; they change soil characteristics, encourage new plants, etc.
- There are also new plant species coming from placer mining; ancient plants are re-establishing themselves through disturbances caused by placer mining.
- The greatest danger and biggest invasive species are humans.
- We touched on uncertainty on how this will play out. We talked of introductions (of invasive species) in other parts of the world, i.e. animals. And we don't know everything or how things will react in the face of changing climate.
- There is an issue of scale; to the region, country, and hemisphere. We need to define the scale.

4. PANEL #1 — SNAPSHOT ON THE YUKON AND THE NEIGHBOURS

All the presentations can be downloaded on the council's website

www.yukoninvasives.com/workshop.html

TERRITORIAL UPDATE: WHAT'S NEW AND WHAT TO WATCH FOR — Bruce Bennett

The number of invasive alien species continues to increase. What species should we be looking for and what steps are being taken, how to help, and where to get more information. The talk outlined recent discoveries, how Yukoners are working together to slow the spread, and what is just over the

border. Where to find Yukon specific resources and advice including a demonstration of how Yukon is working with the Alaska Exotic Plants Information Clearinghouse to help map the spread of Yukon invasive plants.

REGIONAL ROUND-UP — Bruce Bennett

Bruce Bennett reviewed what's new in Alaska, BC and NWT.

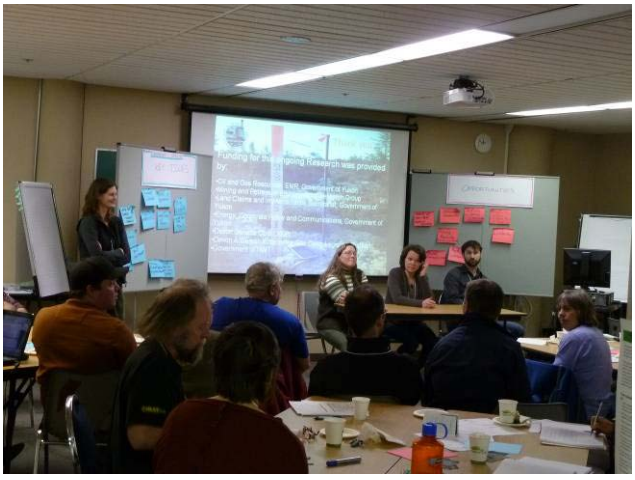
YUKON INVASIVE SPECIES COUNCIL — Andrea Altherr

The Yukon Invasive Species Council (YISC) is a registered non-profit society formed in 2010 with a mission to prevent the introduction and manage the spread of invasive species in the Yukon. The work of the YISC began as early as 2004.

- Stable funding
- Awareness building for industries and the public
- Coordination and collaboration in the Yukon and across the jurisdictional borders
- Research, surveying, and monitoring
- Recommendations and guidelines

YISC has a broad membership with representatives from municipal, territorial, federal, and First Nation governments, non-profit organizations, farming, industry, and private citizens. The Council keeps membership open and facilitates discussion between different groups and governments in the Yukon and outside.

To learn more about the Yukon Invasive Species Council (YISC) or to get involved contact us at info@yukoninvasives.com



PANEL 1 QUESTIONS / COMMENTS

- Do we know if there are any animal invasive species?

Bruce Bennett responded that House Mice may be considered by some to be invasive and some fishes, i.e. Rainbow Trout in the Yukon River is potentially an invasive species. Arctic Char as well have few native populations. There is nothing deemed invasive (for animals) at the moment; with the idea of invasive having economic or ecological harm. The most concern currently is about insects. i.e. Green Alder Sawfly and Larch Sawfly.

- What about Birds (being an invasive species)?

Bruce Bennett replied there are introduced species including House Sparrow, Rock Dove, and European Starling. As well there are some native things that are moving northward. However none is currently considered invasive.

- What is the definition of invasive species?

Bruce Bennett explained the definition was outlined in the 2004 *An Invasive Alien Species Strategy for Canada*. The legal definition is a non-native species that causes environmental or economic harm that can be demonstrated or suspected (e.g. Creeping Thistle can do economic harm, but they don't want to wait until the harm is done).

Alien species are species of plants, animals (including fish), and micro-organisms introduced by human action outside their natural past or present distribution. They are also known as exotics, or specified as being foreign or non-native. Introductions of alien species may be deliberate or accidental, and may be beneficial, as in the examples of corn, wheat, and domestic livestock, or damaging, such as leafy spurge, zebra mussels and wild boars.

Invasive alien species are those harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health2. Alien bacteria, viruses, and fungi, and aquatic and terrestrial plants, mammals, birds, reptiles, amphibians, fish, and invertebrates (including insects and molluscs) can all become invaders. (IASSC 2004)

Smooth Brome in Yukon is another example: In places where it is the most important crop grown as hay; it's not a problem, but it is not meant for along roadsides (which has been done in the past) so they are not using this outside of agriculture any more. It's an important plant but is listed as an invasive species; Bruce said they need to know the context (of the plant).

- What is the definition of native?

Bruce Bennett replied that he was told by an Elder that 'you're just too hasty, you have to think in 7 generations and think longer term'. So Bruce was not sure if there was some way to say what is native or at what point something becomes native; it's a challenge. They tend to look at things that were not in North America prior to 1600 or 1700 (European origin). They also can have 'native' species that move into 'non-native habitat'. For example, a species can be in one watershed (without problems),

but it is not meant to move to another watershed. There is usually human activity involved; e.g. the cougars follow the deer, who follow the highway, etc.

- How do bison fit in?

Bruce Bennett said that bison are a native species in Yukon; traditional knowledge has one in Teslin around 300 years ago. Bison are considered a "re-introduction".

- Can we use the interactive map that is on the (Alaskan) website?

Bruce Bennett explained the interactive map was just for plants; the public can report sightings to Bruce (brbennett@klondiker.com) (or to the YISC). Bruce asked everyone to please report anything suspicious; there are people from other jurisdictions that can work (collaborate) with the Alaska Natural Heritage Program (who has the interactive map at http://aknhp.uaa.alaska.edu/maps/akepic/)

Key Issues:	Key Opportunities:
• Lack of data – insects – animal • Lack of knowledge and research, not enough data • Sweet clover • Rate of spread • More than just plants • Funding • Government support • Lack of ownership / responsibility • Defining invasive species environmental / economic impact • Challenge of framing issues under 'economy' and / or ecology • Elimination ethics. plants versus warm things • Public awareness	• Retail of non-felt bottom options (boots) • Along roadsides – disturbed areas (not in undisturbed area) • Action – e.g. training, coordination, punishment • Education – information collection • Regulatory framework • Young jurisdiction – giving 'us' a chance to set things up • Leadership – (opportunity for someone to take leadership to start something) • Political will for action – demonstrate risk • Better communication

5. PANEL #2 — MANAGING AND RECOVERY

WEEDS AND YUKON AGRICULTURE — Matt Ball, Yukon Government Agrologist

Matt Ball spoke about weeds in Yukon agriculture and the differences depending on the sector and the farm history, including a discussion of the management strategies to deal with them.

- Small farms; about 150 in Yukon. Geographically separated by forest blocks, slowing the spread of weeds and making control easier. Different than i.e. Alberta agricultural industry (with farms right beside each other). The trigger for weed introduction and spread is disturbance. Market

garden sector or grains with annual ploughing and disturbance of the land is a trigger for weeds. Pasture lands with grazing animals can have high levels of disturbance as well.

- For livestock, Yukon has a couple of thousand horses, seasonal poultry production on many farms, cattle, elk, goats, sheep, etc.
- Where issues come from
- Early agriculture: Dawson, Gold Rush; a lot was grown in Yukon – cabbage, potatoes, hay. Long history of agriculture so has different weeds than Whitehorse
- Leafy Spurge was identified in 1990s and in 2000s action was taken with hand picking on a monthly basis, this is slowly working. Spraying, tilling, etc. are all options but there was good success with hand picking where other plants provided mulch.
- Whitehorse; 75% farms are in Whitehorse, the Takhini Valley is good area to keep track of introductions and spread of weeds through movement of equipment, animals, etc. Found different ranges in this area are Wild Oats, Stinkweed, Narrow Leaf Hawksbeard, Shepherd's purse, etc.
- Weeds that cause concern on farms are different at different stages of development. E.g. early stages of development aspen and willows are considered weed concerns, along with fireweed, etc. As the farm ages you will see a change to the common weeds. Some can come in to a farm by seed, highway or equipment, etc. and reside only at that farm because of the geographic spread and forest blocks separating farms.
- In a well established 20 year old Brome stand that is only marginally maintained later in life you will find only willows and weeds. Fields were well prepared, now there is ecological 'stagnation', it's good for a farm, even if it is not so good for reclamation.
- Control option are wide ranging, through small market garden hand picking, to mechanical tillage with discs and ploughs, some use of sprays, we are in an enviable position with not a lot of spraying required and mostly limited to herbicide use (infrequently used). Ag branch nor YG keeps track of on farm herbicide application or personal (cosmetic use).
- There is a lack of tracking of weeds on farms; a bit of concern. This is because of issues of confidentiality and no regulatory framework.

ECOSYSTEM RESTORATION AND UNEXPECTED OUTCOMES — Maureen Huggard

A requirement of the University of Victoria restoration ecology program is that students undertake a restoration project and report on the outcomes. The following is a presentation on a restoration project at the abandoned range road dump at the confluence of McIntyre Creek and Yukon River. Locally selected willow and balsam poplar trees were planted as rooted plugs in two separate trials – one enriched with City of Whitehorse compost and the other without. The purpose of this project was to measure and compare the growth response of the plugs; however, the presence of a non-native plant has resulted in an unexpected outcome.

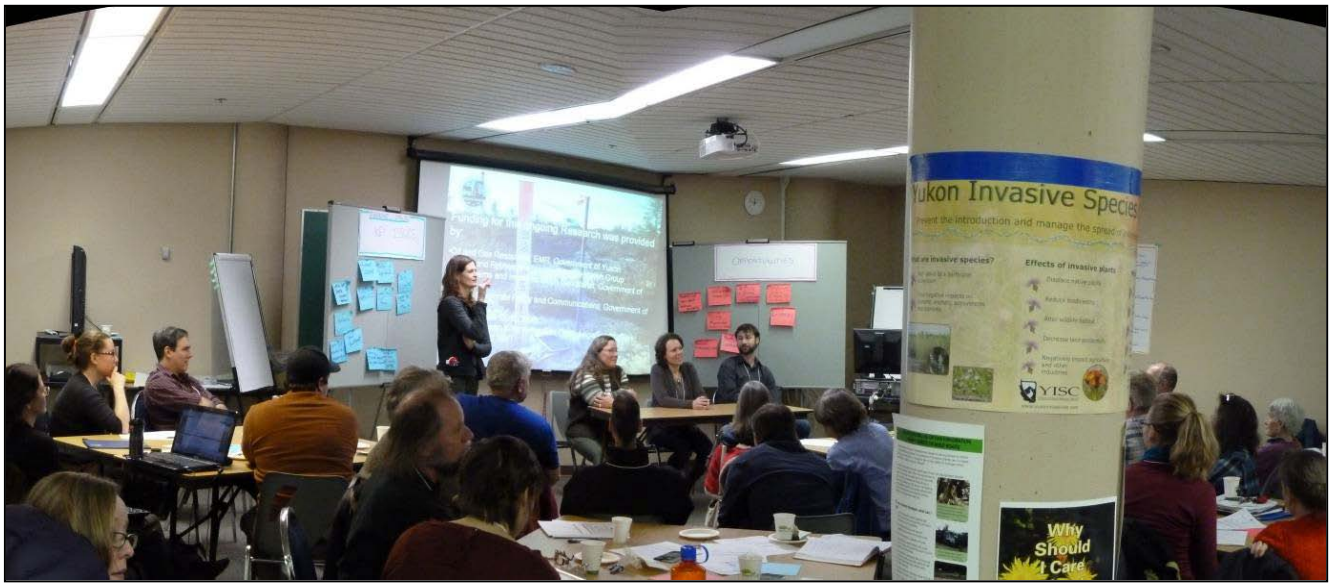
DEFINING DISTURBANCE AND RECOVERY — Kirstie Simpson

Across northern Canada evidence of oil and gas seismic exploration remains from the 1960's to current day. While many of these linear features are still visible, others can no longer be seen.

Research carried out by Yukon Government, Energy Mines and Resources from 2007 to 2009 looked at the status of historical oil and gas exploration disturbances and recovery in the north and south-east Yukon. A key question for this study was the definition of the words “disturbance” and “recovery”. What do we use for criteria in the determination of whether a site is disturbed or not, and when do we consider that a site has recovered? What variables are important to measure? Are invasive species one of those variables?

A key tool that was considered was a comparison with natural disturbance regimes in the study area. Regardless of whether or not a linear feature is still visible, if the ecological function had not been affected and the successional recovery trajectory follows that of the natural disturbances, is the site disturbed or recovered? Does natural recovery vary with the conditions under which the lines were constructed in the first place (level of disturbance) or is the limiting factor, or filter, the dominate ecological process in the area in which the exploration was carried out?

This presentation addresses the historical residual effects of oil and gas exploration activity from the 1960’s to the 1980’s in Yukon and the lessons that can be learned from understanding the ecological context as well as the anthropogenic influences behind the recovery successes and failures.



PANEL 2 QUESTIONS / COMMENTS

- For using fire to get rid of sweet clover, what would happen to trees?

Maureen Huggard thought those species (trees) would recover under a natural disturbance regime. For a quick burn fire, the trees may be damaged or not, more research is needed. They would have to do several treatments over time (behaves differently).

- For the Range Road Project what do you think will happen in that area – natural succession?

Maureen Huggard thought succession would advance over time and re-forest. She suggested that any help to advance the succession is worthwhile. Sweet clover is shade intolerant and allowing other species to get established can create shade and discourage Sweet clover growth. Pulling Sweet clover

in small plots will help to allow other species to establish themselves in these small areas. It doesn't take a lot of effort and is better than hand pulling on the whole site. This is so the trees can grow up over the Sweet clover.

Kirstie Simpson added that linear disturbance sites with Sweet clover were stagnated.

Matt Ball said to look at the disturbance level; on farms Sweet clover is there for years. It depends on the level of disturbance.

- In Atlin, there is reclamation of on-going and legacy placer mine sites that haven't seen much re-growth. Re-seeding is considered a best practise but there is recent concern around invasive species. I have a question on your insight; what's worse, leaving the site as is (as e.g. a gravel pit) or should they look at re-seeding and if there are ways to do that. I look at Sweet clover and think it is a good plant for these legacy sites.

Kirstie Simpson said her gut reaction was you were better off preparing the site for natural recovery and that getting the natural successional species such as willow to grow was best. Re-seeding in order to help stabilize the soil, as long as it was a short-lived species (two seasons and to get other stuff to grow) would be OK. If they re-seed with persistent grasses then they would be looking at successional stagnation.

Bruce Bennett added that in Alaska they re-disturbed the site and then only fertilized it, not re-seeded. The fertilization drove the succession.

Key Issues:	Key Opportunities:
• Treat every disturbance individually for reclamation • Define your goal or project – what do you want • We are more reactive than proactive – prevention is key • Land use – planning; (plan for the land to be used for something, i.e. agriculture – then do it for long term) • Regulation of invasives • Sweet clover: value as a nutrient vs problem • *Assisted directional succession *Initial disturbance • Different prescriptions for different environmental conditions • Economics of dealing with invasives	• Build on momentum of meeting to arrest the growth / spread of invasives proactively • Regulate the level of disturbance (and timing) • Input into Land Use Planning • Land Use Planning with respect to invasive species • Use existing knowledge to justify smaller / less disturbed footprints • Research • Different disturbances need different responses • Learn from mistakes • Test different techniques – i.e. to get rid of invasives • Promote what we know, monitor and learn

6. PANEL # 3 — SPECIAL FOCUS: RESEARCH

AQUATIC INVASIVE SPECIES: IT'S A SMALL WORLD AFTER ALL — Maria Leung

The Yukon has the potential to have representative species from around the world in the form of Aquatic Invasive Species. I highlight the life history of several species, ranging from fish, molluscs and crustaceans to parasites, vascular plants and algae. Introduced populations of these species can displace native flora and fauna and damage infrastructure. As Yukon currently has few Aquatic Invasive Species, there is still opportunity to implement measures that would prevent or slow their spread into the territory

PLANT TRAITS IN NATIVE AND EXOTIC ROADSIDE SPECIES ON THE NORTH KLONDIKE HIGHWAY: DIFFERENT OR THE SAME? — Jamie Leathem

Numbers and spatial spread of exotic species have increased rapidly in Yukon in recent decades. Identifying plant-trait differences between these groups, especially along roadsides as common vectors for spread, could be important in helping to identify mechanisms of invasion and in predicting future invasions. We measured three traits: maximum height, specific leaf area (SLA; a measure of leaf thickness) and leaf area (size of leaf) and found greater maximum height in exotic species but no difference for other traits. We also examined how natives and exotics tracked environmental conditions and found significantly different relationships. In exotic species, SLA increased with latitude (i.e., thinner leaves tended to occur farther north) but this relationship did not exist in native species. Conversely, height in native species was positively correlated with latitude and age of plot (years since last road construction disturbance), and negatively correlated with elevation (i.e., plants were shorter farther south and in more recently disturbed areas, and taller at lower elevation sites). In addition, native leaf area was smaller in older sites and at higher latitudes. These results suggest possible fundamental differences in traits and trait-by-environment interactions that may be important in understanding why and how exotic species are successful and some ultimately invasive.

PANEL 3 QUESTIONS / COMMENTS

- I want to know more about rock snot (Didymo) in Yukon; where is it?

Maria Leung explained that she had seen reference to a paper from 1992 for Didymo in Yukon but was unable to locate a copy of it. From talking to people who were in the Yukon back then, it sounded like Didymo has occurred in the Yukon in the invasive bloom form since the 1990', but was then mistaken for something else.

Oliver Barker added that currently it is widespread; there are samples of frustules (silica case of the diatom) in high elevations. It's all over the place; and there are fossil records. He didn't know how long it's been here and if it's having negative impacts. That is unknown.

Bruce Bennett added that like other invasives, it may have a native component.

- Has anyone looked if it is at Kathleen River?

Oliver Barker replied that it has been confirmed at the Kathleen River.

- Have there been border issues with the Canadian Border Services Agency with mussels?

Maria Leung heard about people crossing the border with Zebra Mussels and were told to go back; but they don't know (what happened after that).

Nathan Millar explained there has been inconsistent application of rules on the American side; i.e. Haines Junction resident turned back for Zebra mussels. Across the country, it depends where you are. At the national level there are talks with (border agency) and DFO in the early stages; but these are location specific.

- Why use the word 'exotic'?

Jamie Leathem said it means 'not native'.

- Are Crayfish and Snakefish edible?

Maria Leung replied Snakefish are edible and found in live food markets; they were introduced in Japan as a sport fish. For Crayfish she was not sure anyone ate them.

Oliver Barker indicated that they are edible.

- What did you learn from managing invasive species? (to Jamie Leathem)

Jamie Leathem thought plant height could possibly contribute to their success. She would follow up research with testing whether exotic species may be more plastic and possibly adapt to more ranges of situations; natives are not so used to adapting to human disturbances so may lose out. A useful way to predict the danger of a given exotic species becoming invasive might be to use a scoring sheet to rank invasiveness, as has been developed in Australia and elsewhere.

- What about the plants compared with down south?

Jamie Leathem said they didn't directly compare with plants down south, but it seemed like the same (problems).

Bruce Bennett added that a score sheet (would help); so they need reliable studies or anecdotal evidence to show the traits. He referenced the information list Alaska has and said Yukon needs to do that. They do know it's more cost effective to control invasives now rather than waiting.

- Good research; did you look at abundance in plots? i.e. the taller plants are more abundant?

Jamie Leathem replied that they compared that exactly; they used abundance in deciding if the plant communities were taller or shorter in the north, as part of looking at height.

- In the roadside plots was there a noticeable difference if the area had been disturbed in the past one to two years or five to ten years?

Jamie Leathem said there was not good information on the highway disturbance times so they didn't specifically measure for this. It did seem like at the 2 years period there was a lot of gravel and more Sweet clover and invasive species. The plots that were not disturbed tended to have less invasive species but she was not sure how that would be over time. Also, they went 50 metres off the road from the plot to check for invasive species; they found exotic species in 3 places in the most recent burns which shows that natural disturbances areas can be vulnerable if there are seeds nearby.

- Is the Sweet clover growing here taller here than down South?

Jamie Leathem replied that the tallest Sweet clover they found was 2 meters tall; the Flora of Yukon has it listed at 1.5 meters so she was not sure if it meant the plant was getting taller, etc. she thought it would be an interesting comparison.

Key Issues:	Key Opportunities:
• Lack of monitoring and information • Limited monitoring of water systems • Difficulty in limiting spread of aquatic organisms (international trade) • Marry reclamation with natural succession and avoid using non-native species • Control of entry • Enforcement inconsistent across jurisdictions - proximity to Skagway aquatics • Vulnerability to climate changes and (increase) human activity Communication between different involved parties • Finding balance between / with precaution and over-reacting	• Pro-active approach for control of entry • Regulate the level of disturbance • Research for Invasive Alien Species climate change and invasion into pristine system • Sharing and communicating information • Collaboration • Pool resources, funding, knowledge – focused delivery • Make smart out-reach, e.g. Video, an app (for mobile phones, etc.)

7. KEY OPPORTUNITIES

The key opportunities identified from each of the three panels were grouped together to paint a picture of what could be possible for invasive species management in the Yukon. The groupings made were as follows:

Grouping #1

- Pro-active approach for control of entry
- Young jurisdiction – giving 'us' a chance to set things up

Grouping #2

- Regulatory framework
- Regulate the level of disturbance (and timing)

Grouping #3

- Action – e.g. training, coordination, punishment

Grouping #4

- Leadership – (opportunity for someone to take leadership to start something)
- Political will for action – demonstrate risk

Grouping #5

- Retail of felt bottom boots
- Test different techniques – i.e. to get rid of invasives
- Different disturbances need different responses
- Use existing knowledge to justify smaller / less disturbed footprints

Grouping #6

- Promote what we know, monitor and learn
- Learn from mistakes
- Monitor and Learn

Grouping #7

- Research
- Research for Invasive Alien Species climate change and invasion into pristine system
- Pool resources, funding, knowledge – focused delivery

Grouping #8

- Input into Land Use Planning
- Land Use Planning with respect to invasive species

Grouping #9

- Incorporate First Nations traditional knowledge

Grouping #10

- Sharing and communicating information
- Better communication
- Make smart out-reach, e.g. Video, an app (for mobile phones, etc.)
- Education – information collection

Grouping #11

- Collaboration

8. KEY STRATEGIES

Participants self-identified the area they wished to work in to develop key strategies; 11 different groupings were identified out of the key opportunities. These strategies can be incorporated into the work of the YISC and others.

#1 Proactive approach

Goal: Making sure that invasives do not take hold in new locations.

Barriers:

- Economic incentives (financial gain or avoid financial loss)
- Public awareness (lack of)
- Legislation (not in place) top down
- Political environment - $$ to somewhere else, we forget about invasives
- Funding / time commitments
- Enforcement: large area, low density

Strategies:

1. Education: figure out where the target audience is (for limited funding); those at the highest risk of bringing invasives into our location.
2. Lobbying: from the bottom to the top; people at the top put in legislation
3. Target audiences: identify them
4. Learn from strategies attempted in other jurisdictions: e.g. protocols of equipment operation (what worked in other places in the world and what hasn't worked; i.e. New Zealand has checking and cleaning stations for boats)
5. Model potential range of distribution considering climate change – where are the high risk places? (Create models for highways, pathways and consider how our climate is warming and changing)
6. Identify high risk areas: high risk areas for i.e. aquaticinvasives would be an access point to water.

#2 Regulatory framework

Goal: Building a Yukon regulatory framework based on Canadian framework guidelines with the aim of preventing new and controlling and eradicating introduced species.

Barriers:

- Overlapping mandates between governments: i.e. Yukon / Federal government or municipal governments. Who's job and who's legislation, who spearheads. This can also be an opportunity for collaboration.

- Lack of acknowledgement of problems; legislators need to be motivated to develop regulations.
- Designing good regulations that meet the needs of multiple and diverse stakeholders. (e.g. Sweet clover is valued in one situation, and how to control in other situations.

Strategies:

1. Using existing successful frameworks from other provincial / territorial government, (based on what works elsewhere).
2. Fostering partnerships between provincial, federal and municipal governments.
3. Identifying economic value to action versus inaction and put on government radar. This goes back to the politicians and legislators knowing about the problems and getting the decision makers to understand the consequences of not doing actions.

#3 Specific actions: training, coordination, punishment / Pro-active approach for control of entry

Goal: Control and stop the spread of alien invasive species.

Barriers:

- Lack of specific definition. There is more than one definition; alien, invasive, exotic, and the need to narrow what we talk about
- Lack of public knowledge and awareness
- Apathy, a lot of invasives are pretty plants, etc.
- Lack of funding for education, action and research

Strategies:

1. Education: Start with kids through curriculum, presentations (e.g. Bruce Bennett) and contests; to public in general, and include Government leaders, and YESAB. How do they know what is invasive?
2. Political will to allocate funds.
3. Fund and support activists groups like the YISC
4. Policy and regulations with severe consequences for violation; i.e. big companies need something severe if they are bringing something into our territory then you shouldn't come in here. Very serious consequences.

#4 Leadership / Political will

Goal: Raise awareness and political will, and take action. Demonstrate a need to take action; e.g. demonstrate risk – Cost / Benefit argument.

Barriers

- Lack of accountability; no one owns it; agencies are implicated but everyone does their own mandate, no coordinating body or ownership.
- Lack of leadership
- Lack of awareness that problem exists

- Groups in silos (narrow mandates)
- Political short-sightedness; i.e. optics; one person only from department at workshop,
- Reasons not to act, perceived as too expensive, inconvenient, too hard.

Strategies

1. Coordinate amongst all key players / audiences.
2. Encourage an attitude shift in government, society
3. Create incentives to take the risk; payout is government commits funds, etc.
4. Accountability and owning the issue /challenge. Own 'ministry' / office of IAS.
5. Show as a good investment in land management – achievable, easy to do (e.g. similar to recycling program).
6. Champions at different levels:
7. Increase studies / info to create argument
8. Embarrass government into action; get head out of sand because everyone else is taking action and other jurisdictions have done this, what are we doing? Articles in paper.
9. Education: basic school curriculum / YISC makes a kit, i.e. for grade 3.

#5 Direction action / Collection of techniques and approaches -- Proactive tasks, i.e. retail of non felt soled bottoms, etc.

Goal: Eliminate or reduce current or potential invasives.

Barriers

- Research cost
- Not knowing what works in long term
- Identifying vulnerable areas.
- Shift of practices from decision-makers (open mindedness).
- Funding
- Scheduling and environmental timing; timing of awarding contracts, etc. might not allow for seeding that year, etc.

Strategies:

1. Education
2. Communicate the cost of inaction
3. Create a community investment; people want to see change
4. Legislation – Develop policies for adaptive management for new construction. Highway inspections – tractor trailer, farm equipment. Possibly offer wash stations, etc.
5. Natural seeding and reclamation scheme; in construction phase, there are plans for the reclamation before work begins, e.g. list out what seeds
6. Target – species, areas, vulnerable areas
7. Control of current effected areas; ones that are already (invaded)
8. Knowing what works in the long term.

#6 Promote what we know, monitor and learn / Learning from mistakes

Goal: Process knowledge and create awareness to general public.

Barriers:

- Funding
- Media being to specific audience
- Volunteer burnout
- Capacity
- Political unawareness

Strategies

1. Highlight a specific species at the (right time) for management / control; and present one at a time to not overwhelm audience.
2. Build on successful strategies.
3. Report a Weed – Public monitoring; with rewards / incentives, i.e. recycling centre.

#7 Research

Goal: to increase our knowledge of invasive species in Yukon.

Barriers:

- Funding
- What to research (we need a better understanding)
- Access to experts: help us to understand gaps

Strategies:

1. Develop / strengthen shared data base accessible to all interested parties
2. Set priorities on species and ecosystems and the damage
3. Gap analysis to know
4. Identify research priorities
5. Identify experts
6. Then seek funding (at the end of answering those questions – related to, e.g. the gap analysis)

#8 Land Use Planning

No participants chose to work with Land Use Planning; it will be kept on the radar because it came up in the opportunities. Comments from general participants included:

- A number of LUP bodies already at community level and YESAB; a checkmark on application for awareness and is being considered.
- It's most notable when looking at land development and what types of uses you will have. i.e. agriculture subdivisions or spot land applications. If you want to manage and reduce risk, the argument is you should look at concentrated development rather than spread out (as through

spot land applications). In road development it is being recognized they have to pay attention to reclamation, but for land development, it is not registering that people need to pay attention. As it has happened i.e. Whistle Bend and Mountain View Drive slopes.

#9 Making use of FNs knowledge

Goal: to incorporate a FN perspective on invasive species.

Wade Davis says if one is looking at a mountain as the home of your ancestors or if you are looking at the same mountain as a large rock containing gold and wealth - you will look at it differently. This is similar to the world views of invasive species. A way to bring in different way of knowing and seeing, you will do better at planning. One is longer perspective or holistic approach. Management will benefit.

Barrier

- Jargon and terms
- Lack of definitions
- Some Elders are not comfortable with sharing knowledge as it could be used in inappropriate ways (i.e. when elder share a story with me, they are sharing with just me, not everyone. This is unlike in a published paper, which once in the public realm is open to other users.
- Capacity for FNs to be their own spokespeople; not speaking through (others) but FN people. Much like others have, - so few people with so many priorities.
- Different time scales
- Funding for establishing dialogue; i.e. travel to workshops, etc. How to share information; when no government agencies, e.g. YISC? Or who?
- Priorities
- Starting from a different perspective
- Current lack of asking the questions and working together.

Strategies:

- Workshop or something to start to dialogue / Start working together
- Monitoring through Stewardship programs; a lot of eyes on the land. Would be helpful to have lots more eyes to watch for e.g. mussels sticking to things.
- Working with BC for example of success; FNs communities and BC Invasive Species Councils have a good working relationships and strong programs.
- Opportunity to work with traditional ecological knowledge and wisdom through curriculum (Grade 8 / 9; part of the land, part of the water).

#10 Education / Outreach

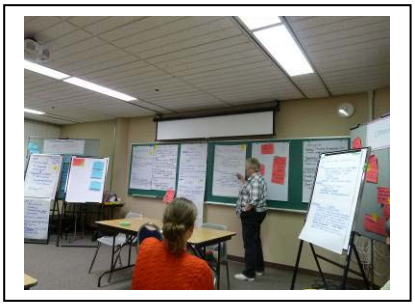
Goal: To provide accessible (easy to understand and easy to get to) accurate and up to date information to the public and policy makers. Capture and engage public (not just tell them but talk to them in a way to convince them).

Barriers:

- Funding / Political buy-in
- Coordinator for data base
- Website for data base
- Lack of public knowledge / engagement

Strategies

1. A spatial data base that is updated – people see and provide input.
2. Signage: (as a way of engagement) roads, boat launches i.e. power washing your boat – worth doing
3. Getting information out to specific groups; RRCs, schools, visitor centres
4. Advertisements – various media
5. Make it part of conversations; use word of mouth, share stories of impacts and what we should have done)
6. Integrating invasive species agenda into existing events; small idea but can be a presence i.e. at gardens, feed stores, etc.
7. Collaboration / funding (Has been in all – no one took this on)



9. PRIORITIES IDENTIFIED BY PARTICIPANTS

The final exercise for participants was to identify two key strategies that they wished to mark as a priority. Each participant was given two dots to mark their priority strategies. The following were the overall outcomes for strategies identified as top priorities for participants:

- Education: Start with kids through curriculum, presentations (have Bruce Bennett) and contests; to public in general, and include Government leaders, and YESAB. How do they know what is invasive? (11 stars) Plus Education (7 stars)

- Legislation – Develop policies for adaptive management for new construction. Highway inspections – tractor trailer, farm equipment. Possibly offer wash stations, etc. (8 stars)

- Signage: (as a way of engagement) roads, boat launches i.e. power washing your boat – worth doing (6 stars)

- Provide accessible (easy to understand and easy to get to) accurate and up to date information to the public and policy makers. Capture and engage public (not just tell them but talk to them in a way to convince them). (5 stars)

- Encourage an attitude shift in government, society (5 stars)

- Using existing successful frameworks from other provincial / territorial(4 stars)

- Target – species, areas, vulnerable areas (4 stars)

- Learn from strategies attempted in other jurisdictions: e.g. protocols of equipment operation (what worked in other places in the world and what hasn't worked; i.e. Australia has checking and cleaning stations for boats) (3 stars)

- Regulatory framework - Identifying economic value to action versus inaction and put on government radar. This goes back to the politicians and legislators knowing about the problems and getting the decision makers to understand the consequences of not doing actions. (3 stars)

- Additional strategies which received one or two stars

1. Making use of FNs knowledge
2. Advertisements – various media
3. Integrating invasive species agenda into existing events; small idea but can be a presence i.e. at gardens, feed stores, etc.
4. Lobbying: from the bottom to the top; people at the top put in legislation
5. Target audiences: identify them
6. Control of current effected areas; ones that are already (invaded)
7. Building a Yukon regulatory framework based on Canadian framework guidelines with the aim of preventing new and controlling and eradicating introduced species.
8. Political will to allocate funds.

10. FOLLOW-UP / NEXT STEPS

The information gathered in the Report will be available on the YISC website including the PowerPoint presentations.

11. FUNDING PARTNERS

Funding for this project has been provided by the Environmental Grant (City of Whitehorse), the Community Development Fund (Yukon Government) and the Invasive Alien Species Partnership Program (Government of Canada).

Community Development Fund / Fonds de développement communautaire

Whitehorse
THE WILDERNESS CITY

This project was undertaken with the financial support of:

Environment Canada / Environnement Canada

Ce projet a été réalisé avec l'appui financier de :

Environnement Canada / Environment Canada

APPENDIX 1 – REGISTRATION

	Last Name	First name	Organization
1	Adam	Miranda	Little Lady Landscape Design+Drafting
2	Andrea	Altherr	YISC coordinator
3	Appleby	Elizabeth	Highway & Public Works - TEB
4	Armstrong	Cynthia	Town of Watson Lake
5	Ball	Matt	YG, Agriculture branch
6	Barker	Oliver	Environment Yukon
7	Bennett	Bruce	Environment Yukon
8	Boucher	Marie-Phare	
9	Boulerice	Marc	City of Whitehorse
10	Boyde	Jim	Department of Education
11	Bullen	Darren	Tr'ondek Hwech'in
12	Burke	Jeanne	
13	Burns	Bonnie	Laberge Environmental Services
14	Buyck	Steven	FN of Nacho Nyak Dun
15	Carter	Lori	Environmental Dynamics Inc.
16	Chouinard	Cory	EMR-Lands Management Branch
17	Church	Ian	
18	Clarke	Heather	Environment Yukon
19	Connor	Mark	Taku River Tlingit
20	Dar	Saleem	Environment Canada
21	Dillabough	Jim	Yukon Agricultural Association
22	Freese	Lloyd	Kluane National Park and Reserve
23	Gibson	Sylvia	Yukon Agricultural Association
24	Hoefs	Manfred	Laberge Renewable Resources Council
25	Hope	Dawna	Univ. of Alberta Student
26	Huggard	Maureen	Access Consulting
27	Inga	Katarina	
28	Irwin	Betty	City of Whitehorse
29	Jacobs	Jessica	Ta'an Kwach'an Council
30	Jennings	David	Univ. of Alberta Student
31	Jim	Michael	Champagne and Aishihik First Nations
32	Johns	Cora Lee	Ta'an Kwach'an Council
33	Johnston	Sandy	
34	Kempton	Sharron	
35	Kruse	Jerry	Selkirk Renewable Resources Council
36	Leathem	Jamie	UBC, MSc Candidate
37	Legare	Anne-Marie	Parks Canada/Kluane National Park
38	Leung	Maria	Consultant
39	Loewen	Val	Environment Yukon
40	MacDonald	Elizabeth	DFO

41	Makarewich	Pam	
42	Martel	Leo	
43	Marynowski	Jefferey	YG, Highways & Public Works
44	Mayer	Bob	Carmacks Renewable Resources
45	McDade	Kathleen	Environment Yukon
46	McIntyre	Jane	
47	Millar	Nathan	Environment Yukon
48	Mossop	Dave	Yukon Research Centre, Yukon College
49	Mullett	Jordan	Carmacks Renewable Resources
50	Nadalini	Enrica	Growers of Organic Food Yukon
51	Newton	Sarah	Yukon College, student
52	O'Donoghue	Mark	Yukon Fish & Wildlife Branch
53	Ogden	Aynslie	Government of Yukon
54	Powell	Todd	Environment
55	Reaume	Kristal	
56	Reynolds	Dan	Dawson District Renewable Resources
57	Robertson	Ian D.	Inukshuk Planning & Development Ltd.
58	Roots	Charlie	Yukon Geological Survey
59	Sampson	Alissa	EMR-Mineral Resources
60	Schaefer	Jim	Catalyst Environmental Services
61	Schweiger	Sabine	City of Whitehorse
62	Sharples	Robin	YG, Forest Management Branch
63	Simpson	Kirstie	Yukon Government EMR
64	Staniforth	Jennifer	Environment Yukon
65	Tanner	Trix	DFO
66	Tobler	Pat	Environmental Dynamics Inc.
67	Toleman	Chris	YG, Highways & Public Works
68	Trudeau	Debbie	
69	Van Tighem	Graham	Yukon Fish and Wildlife Management
70	Vincent	Jane	Alsek Renewable Resources Council
71	Walkley	Angela	Cambio Consulting
72	Whitley	Gerry	Consultant
73	Williams	Erin	

APPENDIX 2 – BIOGRAPHIES

Altherr Andrea

Andrea Altherr is the coordinator for the Yukon Invasive Species Council. Her love of the pristine Yukon wilderness brought her to join the council. info@yukoninvasives.com

Ball Matt

Matt Ball, Senior Agrologist, Agriculture Branch, Department of Energy Mines and Resources, Government of Yukon. Matthew.Ball@gov.yk.ca

Bennett Bruce

Bruce Bennett has been a plant taxonomist for over 20 years. He moved to Yukon in 1995 when he began to research invasive plants. He became a founding member of the Yukon Invasive Species Council (YISC) in 2004. His botanical work and interests have taken him throughout Yukon, Alaska, Northwest Territories and British Columbia. He has worked as a collections manager for the Royal BC Museum, a plant community technician with the Canadian Wildlife Service, a senior botanist with the University of Alaska and the US Parks Service and as a botanist for the Yukon's Conservation Data Centre. He has coauthored 14 papers on additions to the Yukon and NWT flora. Presently he is the co-chair of the COSEWIC Vascular Plant Specialist Subcommittee, a regional reviewer for the Flora of North America and works for Environment Yukon as the coordinator for the Yukon Conservation Data Centre Bruce.Bennett@gov.yk.ca (867) 667-5331

Huggard Maureen

Maureen Huggard has lived in the Yukon for twenty years. She currently is a project manager on the closure and reclamation of the historic United Keno Hill Mining District project.

Her interest in restoration began in the late 1980's when working as a student on the Washington Creek riparian restoration project in Ontario. In light of renewed mining exploration in the Yukon, Maureen sees an opportunity for the development of more research and restoration projects in the Territory to ensure disturbed sites are re-established as part of healthy, functioning ecosystems. Understanding the behaviour of invasive plant species is an essential component in restoration plans Maureen is developing for the district. She has been a member of the Yukon Invasive Plant Species Council since 2007 and is a newly elected director.

Maureen recently completed the Restoration of Natural Systems program at the University of Victoria and is planning on entering the MSc program in Land Reclamation, Remediation and Restoration at the University of Alberta this fall. mhuggard@accessconsulting.ca

Leathem Jamie

Jamie is currently finishing her MSc in Botany at the University of British Columbia and also holds a BA in Psychology. She is about to start a six week internship with the Yukon Conservation Data Centre as part of the BRITE program at UBC. She loves all things plant-related and credits the Yukon for inspiring her love of botany, and looks forward to continuing to develop her passion for plants and the North here in the future. She would also like to combine her two fields of study in investigating human connections to nature and how they are important for health and development, with the goal of using this as evidence to support conservation initiatives. kermit@interchange.ubc.ca

Leung Maria

Maria Leung completed a MSc. at University of British Columbia and a BSc at University of Guelph, and has been a wildlife biologist for well over 20 years. She currently lives in Whitehorse where she pursues the conservation biology of mammals, birds, fish and invertebrates. Last year, she took on the task of drafting the document "Development of a framework for management of aquatic invasive species of concern for Yukon: Literature review, risk assessment and recommendations." for the Fisheries Section of Environment Yukon. leungreid@northwestel.net

Simpson Kirstie

K. Simpson, M.Sc, Senior Advisor, Sustainable and Integrated Resource Management, Department of Energy Mines and Resources, Government of Yukon. Kirstie.Simpson@gov.yk.ca

Kirstie Simpson has 30 years of northern and arctic experience as a scientist in the fields of resource management, environmental monitoring, environmental assessment, and regulatory permitting as well as research related to ecological responses to oil and gas exploration in both the marine and terrestrial environments. She has worked in a number of capacities in relation to Beaufort, Mackenzie Delta, Arctic Islands and Yukon Oil and Gas exploration and development and is currently designing an Integrated Landscape Best Management Practices Model for industrial development in the Yukon.

APPENDIX 3 – ABSTRACTS

Aquatic Invasive Species: It's a small world after all. By Maria Leung

The Yukon has the potential to have representative species from around the world in the form of Aquatic Invasive Species. I highlight the life history of several species, ranging from fish, molluscs and crustaceans to parasites, vascular plants and algae. Introduced populations of these species can displace native flora and fauna and damage infrastructure. As Yukon currently has few Aquatic Invasive Species, there is still opportunity to implement measures that would prevent or slow their spread into the territory.

Defining Disturbance and Recovery - the influence of landscape specific ecological responses to linear disturbances in Yukon. By Kirstie Simpson

Across northern Canada evidence of oil and gas seismic exploration remains from the 1960's to current day. While many of these linear features are still visible, others can no longer be seen.

Research carried out by Yukon Government, Energy Mines and Resources from 2007 to 2009 looked at the status of historical oil and gas exploration disturbances and recovery in the north and south-east Yukon. A key question for this study was the definition of the words "disturbance" and "recovery". What do we use for criteria in the determination of whether a site is disturbed or not, and when do we consider that a site has recovered? What variables are important to measure? Are invasive species one of those variables?

A key tool that was considered was a comparison with natural disturbance regimes in the study area. Regardless of whether or not a linear feature is still visible, if the ecological function had not been affected and the successional recovery trajectory follows that of the natural disturbances, is the site disturbed or recovered? Does natural recovery vary with the conditions under which the lines were constructed in the first place (level of disturbance) or is the limiting factor, or filter, the dominate ecological process in the area in which the exploration was carried out.

This presentation addresses the historical residual effects of oil and gas exploration activity from the 1960's to the 1980's in Yukon and the lessons that can be learned from understanding the ecological context as well as the anthropogenic influences behind the recovery successes and failures.

Plant Traits in Native and Exotic Roadside Species on the North Klondike Highway: Different or the Same? By Jamie Leathem

Numbers and spatial spread of exotic species have increased rapidly in Yukon in recent decades. Identifying plant-trait differences between these groups, especially along roadsides as common vectors for spread, could be important in helping to identify mechanisms of invasion and in predicting future invasions. We measured three traits: maximum height, specific leaf area (SLA; a measure of leaf thickness) and leaf area (size of leaf) and found greater maximum height in exotic species but no

difference for other traits. We also examined how natives and exotics tracked environmental conditions and found significantly different relationships. In exotic species, SLA increased with latitude (i.e., thinner leaves tended to occur farther north) but this relationship did not exist in native species. Conversely, height in native species was positively correlated with latitude and age of plot (years since last road construction disturbance), and negatively correlated with elevation (i.e., plants were shorter farther south and in more recently disturbed areas, and taller at lower elevation sites). In addition, native leaf area was smaller in older sites and at higher latitudes. These results suggest possible fundamental differences in traits and trait-by-environment interactions that may be important in understanding why and how exotic species are successful and some ultimately invasive.

Regional Round-up. By Bruce Bennett

What's New in Alaska, BC and NWT

Restoration Project at the abandoned Range Road Dumpsite and an Unexpected Outcome. By Maureen Huggard

A requirement of the University of Victoria restoration ecology program is that students undertake a restoration project and report on the outcomes. The following is a presentation on a restoration project at the abandoned range road dump at the confluence of McIntyre Creek and Yukon River. Locally selected willow and poplar trees were planted as rooted plugs in two separate trials – one enriched with City of Whitehorse compost and the other without. The purpose of this project was to measure and compare the growth response of the plugs; however, the presence of a non-native plant has resulted in an unexpected outcome.

Territorial Update: What's New and What to Watch For. By Bruce Bennett

The number of invasive alien species continues to increase. What species should we be looking for and what steps are being taken, how to help, and where to get more information. The talk will outline recent discoveries, how are we working together to slow the spread, and what is just over the border. Where to find Yukon specific resources and advice including a demonstration of how Yukon is working with the Alaska Exotic Plants Information Clearinghouse to help map the spread of Yukon invasive plants.

The Yukon Invasive Species Council. By Andrea Altherr

The who, what, where, why, when of the Yukon Invasive Species Council.

Weeds and Yukon Agriculture. By Matt Ball

We will explore weeds in Yukon agriculture and the differences depending on the sector and the farm history, including a discussion of the management strategies to deal with them.

APPENDIX 4 – WORKSHOP AGENDA

8:30 Registration open

9:00 Welcome/ Overview

9:30 Reflection: What do we know about Invasive Species?

Panel presentations

9:45 Panel #1 Snapshot on the Yukon and the neighbours

- ❖ Territorial Update: What's New and What to Watch For — Bruce Bennett
- ❖ Regional round up (including northern BC, Alaska) — Bruce Bennett
- ❖ The Yukon Invasive Species Council — Andrea Altherr

10:15 Questions and identification of Key Issues

10:30 Refreshment Break

10:45 Panel #2 Managing and Recovery

12. Weeds and Yukon Agriculture — Matt Ball

13. Restoration Project at the abandoned Range Road Dumpsite and an Unexpected Outcome — Maureen Huggard

Defining Disturbance and Recovery - the influence of landscape specific ecological responses to linear disturbances in Yukon — Kirstie Simpson

11:35 Questions and Identification of Key Issues

12:00 Lunch and network

Panel presentations

1:00 Panel #3 Special Focus: Research

7. Aquatic Invasive Species: It's a small world after all — Maria Leung

8. Plant Traits in Native and Exotic Roadside Species on the North Klondike Highway: Different or the Same? — Jamie Leathem

1:35 Questions and Identification of Key Issues/Vision

2:00 Refreshment Break

Facilitated Group Discussion

2:15 Barriers/opportunities to achieving the vision for Invasive Species Management.

3:15 Key strategies needed to address the barriers, take advantage of opportunities and achieve the vision.

16:15 Wrap-up/conclusion

16:30 Closing