Bugs & Diseases

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Alberta's eye on forest health

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Alberta

Forest Health 100 Training—June 2019

Hear ye, hear ye… Coming in late spring there will once again be an offering of the much vaunted and highly anticipated Forest Health 100 (FH 100) course, at the Hinton Training Centre (HTC)! This course provides an introduction to Forest Health through classroom sessions and field tours, leading to a basic understanding of forest health issues and current forest health best practices. This course aims to provide a familiarity with forest health which is necessary to effectively integrate forest health into natural resource management practices.

Topics covered will include:

- The importance of maintaining healthy forests in Alberta.
- The link between forest health and sustainability.
- Possible effects of climate change on forest health.
- Roles and responsibilities related to managing provincial forest health issues.
- Biotic and abiotic forest health agents of concern.
- Tactics used to manage forest pests.

Too often, forest health concerns are addressed reactively, after damage is very apparent and often too late for effective management. FH 100 stresses incorporation of forest health considerations into forest and land management operations and planning, to allow for more proactive management.

The intended audience for FH 100 includes: Government of Alberta employees, forest industry professionals, municipal government staff, and any other individuals involved in forest, and/or other natural resource, management planning. Or, really, anyone else interested in the identification of forest health damaging agents and their management.

FH 100 will be held on June 18, 19 and 20, 2019 at the HTC – there are no prerequisites. Previously attendees have received CAPF/CAPFT continuing competency credits, and we will be working with the AAFMP to ensure this will once again be the case. So, hear ye, hear ye…come one, come all to what will be the best FH 100 yet. Registration information is **here**.

Tom Hutchison - Edmonton

View from the Sky – 2018 Aerial Overview Survey Results

Every summer Forest Health staff collect data on forest disturbances (excluding wildfire) that occur on forested public land. We use fixed-wing aircraft to efficiently and economically conduct these aerial overview surveys (AOS) over such a large area each year. AOS are timed to capture the activity of as many damage agents as possible (mid-June to the end of July). This survey doesn't include mountain pine beetle related tree mortality since this is best captured in the fall. During the survey, observers map various types of defoliation, tree disease and mortality, in addition to damage from abiotic events such as hail and wind storms. These surveys are some of the most important work that Forest Health does throughout the year because it provides valuable information on the state of the forest.

More than 2 million hectares of forest disturbance were mapped in 2018 (Table 1), an increase of 25 per cent from 2017, primarily due to increased bark beetle, defoliator activity and abiotic damage. Aspen defoliators were responsible for 35 per cent of the total damage mapped. Large aspen tortrix populations expanded again this year, up 73 per cent, to 508,814 hectares. Bruce spanworm is responsible for some of the defoliation attributed to large aspen tortrix - these two species overlap and it is difficult to distinguish between the two defoliators from the air. Forest tent caterpillar was very active in the southern part of the Lac La Biche Forest Area, but provincially the area defoliated decreased by 30 per cent compared to 2017. Spruce budworm defoliation increased for the first time since 2014, mostly in High Level Forest Area, but remained predominately moderate in severity. Willow leaf-blotch miner activity has been observed in the northern reaches of the province since 2013—2018 is the second consecutive year that defoliation was formally reported. Red areas on the leaf (photo right) result from feeding by the larva within the leaf.

A & B) Willow with red foliage. C) Willow leafminer larva removed from within leaf. Credit: Fraser McKee.

There was a large increase in the amount of tree mortality mapped in 2018, primarily comprised of dying aspen stands located along the Peace River valley in the Grande Prairie Forest Area. These stands were repeatedly defoliated by forest tent caterpillar and recently experienced several years of drought. Research conducted by the Canadian Forest Service on the impact of climate change on aspen health has revealed that defoliation and drought act together to cause more damage than either agent alone. We will likely see additional mortality for several more years.

Conifer mortality due to bark beetles, excluding mountain pine beetle, rose from 6,066 hectares in 2017 to 9,382 hectares in 2018. Provincially, spruce beetle activity remained low but eastern larch beetle infestations expanded, particularly in the Rocky Mountain House Forest Area. An increase in the activity of eastern larch beetle in our province may suggest that the vigour of these stands is being challenged and/or climate is altering their population dynamics - we'll continue to monitor these populations closely.

The occurrence of forest tree pathogens decreased slightly between 2017 and 2018. Pine needle cast continues to be the most widespread pathogen in our forest, although the number of hectares observed decreased by 34 per cent. There is a large amount of innoculum present in the forests which may support overall higher-than-normal infection rates given local moisture levels. Close to 19,680 hectares of dwarf mistletoe were mapped this summer - this

is a difficult pathogen to map but Forest Health staff have been sharpening their skills and we will likely see the number of hectares mapped increase in the future.

Rest assured that whatever happens in 2019, our Forest Health staff are ready to map it!

Table 1. Highlights (in hectares) from Alberta Agriculture and Forestry aerial overview surveys.

	2016	2017	2018	
Bark beetles				
Douglas-fir beetle	--	--	785	
Eastern larch beetle	6,583	2,927	6,452	
Spruce beetle	10,465	3,139	2,145	
Total bark beetles	**17,048**	**6,066**	**9,382**	
Defoliators				
Aspen serpentine leafminer	--	1,277	1,443	
Aspen two-leaf tier	18,786	--	--	
Forest tent caterpillar	525,135	394,286	274,751	
Jack pine budworm	--	--	1,217	
Large aspen tortrix	213,316	294,123	508,814	
Linden looper	--	25,504	23,649	
Spruce budworm	19,265	17,337	30,470	
Unknown/other	859	8,321	17,545	
Willow leafminer	--	118,539	162,160	
Total Defoliators	**777,361**	**859,387**	**1,020,049**	
Diseases				
Armillaria root disease	--	11,665	30,273	
Dwarf mistletoe	--	7,195	19,680	
Spruce needle rust	--	--	16,629	
Pine needle cast	36,097	354,898	234,483	
Other	--	3,224	1,823	
Total diseases	**36,097**	**376,982**	**302,888**	
Other				
Dieback	115,728	350,158	33,078	
Flooding	2,415	9,075	12,528	
Foliar damage	34,000	38,640	5,004	
Hail	1,050	11,416	6,713	
Mechanical	--	1,869	4,797	
Mortality	144,693	130,631	674,638	
Windthrow/blowdown	1,338	2,376	3,513	
Total Other	**299,224**	**544,165**	**740,271**	
Total Disturbance	**1,129,730**	**1,786,600**	**2,072,590**	

Caroline Whitehouse — Edmonton

The Suspense is Over… for 2018

After all those rumours flying around the mountains of Alberta, BC, and the US, I'm sure y'all couldn't wait to find out how many endangered limber and whitebark pine cones and seeds Alberta collected this season. After some tree climbing safety training, the race was on to relocate our "plus trees" that show potential disease resistance and collect all the seeds we could.

Each tree needs to be visited and assessed for health, then – if it's still promising – climbed to the top where the cones are. The rare plus trees that we select for disease resistance only produce cones every 3 to 5 years. The support of FMB, Wildfire, Forest Area offices, and AEP was essential for success. We were able to hire two motivated seasonal staff and access many remote locations.

The final tally was 4,914 cones from 113 trees. For a normal tree that's not much. But since each cone needs to be manually protected from predation by a mesh cage early to collect these delicious and valuable seeds and then revisited to collect in late fall, nearly 5,000 cones is an impressive haul.

Caged whitebark cones

Limber pine cones: 1 box per tree

The final number is still being tallied, but a sample yielded around 175,000 limber pine seeds from 100 trees and around 15,000 whitebark pine seeds from 13 trees (give or take 10-20%).

Are we going to hoard all this seed away in the provincial seed vault? Some will be kept for long term genetic conservation. The rest will be used to grow lots of seedlings for restoration, hoping they will thrive and grow to produce their own cones in nature. Some seeds may be used to support research projects with partner agencies.

Extracted seeds: 1 tray per tree

Two field sites with monitoring transects were planted this fall with 1,050 tested resistant limber pine seedlings: half in Waterton Lakes National Park, and half in the Castle Wildland Provincial Park. About 7,800 limber pine plus tree seedlings will be ready to plant in fall 2019, and more whitebark pine and limber pine seedlings will be available in the following years.

Getting ready to plant seedlings

Assistance in planting, identifying field sites, and establishing monitoring plots in these sites is always welcome. Jodie.Krakowski@gov.ab.ca

Jodie Krakowski– Edmonton

U.S./Canada Softwood Lumber Trade Dispute, Part V

From 2006–2015, Canada and the U.S. had an agreement managing softwood lumber trade. This agreement brought predictability and stability to the lumber industry on both sides of the border. The Canada-U.S. Softwood Lumber Agreement ("SLA" or "Agreement") expired on October 12, 2015. The Agreement contained a standstill provision whereby the U.S. agreed not to launch trade action for one year after the SLA has expired. On November 25, 2016, the Committee Overseeing Action for Lumber International Trade Investigations or Negotiations (COALITION) filed countervailing (CVD) and ant-dumping (AD) duty petitions alleging Canadian lumber is unfairly subsidized and dumped into the U.S. market thus beginning what is currently referred to as Lumber V in the long standing trade dispute between countries.

During the standstill period much discussion took place between the two countries in what the framework of a new agreement might look like. In March of 2016 Prime Minister Trudeau and U.S. past President Obama discussed softwood lumber and issued a joint statement referring to "an appropriate structure, designed to maintain Canadian exports at or below an agreed market share to be negotiated, with the stability, consistency and flexibility necessary to achieve the confidence in both industries". Although various concept papers were exchanged between Canada and the U.S. during this period the result was the U.S. rejecting Canada's proposal claiming that it would not meet the objective of keeping Canada at or below an agreed upon market share. To date the COALITION has not moved off its position of a hard capped quota for Canadian exports and there have been no further negotiations since late 2017.

In the absence of a new negotiated trade agreement, litigation will persist...

On November 2, 2017 the U.S. Department of Commerce (Commerce) made final countervailing duty (CVD) and antidumping (AD) determinations in the Softwood Lumber case and on January 3, 2018, the U.S. Department of Commerce published the final countervailing (CVD) and antidumping (AD) duty orders in the Federal Register. Alberta producers were subject to combined duty rates between 20.23% and 23.56%. The final CVD rates were lower than the combined preliminary determined CVD/AD rates issued on April 28, 2017 which ranged from 9.87% and 30.88% on Canadian softwood lumber. In a parallel process, the International Trade Commission (ITC) published its final determination in the federal register on December 28, 2017 whereby it found that the U.S. industry producing softwood lumber products is materially injured by reason of subsidized imports of softwood lumber products from Canada.

The Government of Canada (GOC) has since initiated World Trade Organization (WTO) and NAFTA Chapter 19 appeal processes to challenge Commerce and ITC determinations on softwood lumber, however neither will provide immediate relief. The appeal processes are lengthy and rulings on the initial determinations are not expected until 2019. In appeal, Commerce and ITC determinations are challenged in terms of their consistency with U.S. trade law. Although province-specific issues are referenced in Canadian briefs, they are included to highlight inconsistencies with U.S. trade law to support broader Canadian argumentation.

In the absence of a new negotiated trade agreement, litigation will persist in subsequent administrative reviews. The U.S. Department of Commerce conducts an annual review of anti-dumping and countervailing duty orders and will recalculate the duties annually based on

updated time periods as part of the administrative review process. This administrative review process is similar to the process used for the initial investigations, but applies only to companies that are subject to the review. The administrative review process will establish duty assessment rates for shipments entered during the period of review and establish the new duty deposit rate going forward until the next annual administrative review. Administrative Review rates can be expected anywhere between January to July of 2020 based on potential extensions to the process that may arise. Only final rates are determined in an Administrative Review, therefore producers will be subject to the rates they are currently experiencing until such time that they are replaced by the Administrative Review rates.

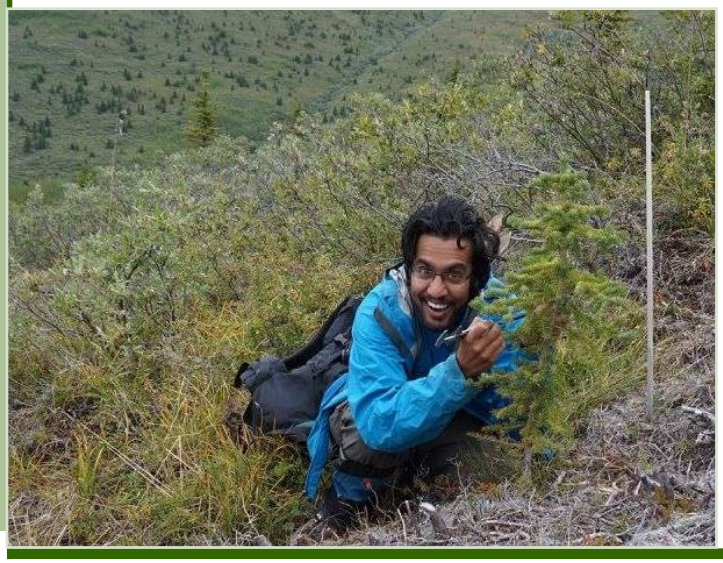
The Government of Alberta continues to work closely with the federal government and our forest industry to ensure Alberta's interests are well-represented in United States trade litigation.

Lee Woodham —Forest Tenure, Trade & Policy, Edmonton

Greetings from Dasvinder Kambo

Hello Everyone, I am thrilled to be joining the Alberta Tree Improvement and Seed Centre at Smoky Lake. Over the last few weeks, I've had the privilege of getting to know some of the staff - and I look forward to meeting the rest of you over the next little while. I also wanted to take this opportunity to briefly introduce myself. I am an ecologist / tree physiologist who has spent the last few years researching tree seedling dynamics in boreal-tundra ecotones. I did my undergraduate and Masters Degrees at the University of Toronto in ecology and evolutionary biology, specializing in plant invasions throughout northern Ontario. Following that, I joined Queen's University, where I did my PhD in Physical Geography, focusing my research on ecological mechanisms that influence tree seed damage, dispersal, germination and subsequent seedling survival in altitudinal treeline ecotones in Yukon.

On a personal note, I'm a little bit of a prankster – YouTube is a great teacher in that regard! I also recently got a subscription to Netflix and my new guilty pleasure show is Brooklyn Nine -Nine. Lastly, I am absolutely a die-hard hockey devotee and yes, my favourite team is the Toronto Maple Leafs. Moving to Alberta, I fear that in addition to the low relative humidity and cold winters, I must also get use to being around Edmonton Oilers fans... but have no fear: I hope to convert a few to the blue and white!



I look forward to meeting everyone.

Welcome Dasvinder!

Forest Health and Adaptation

Dasvinder Kambo—ATISC

What's the Buzz with the Four Spotted Ghost Moth?

Photo Credit: Rob Weber, Alberta Environment and Parks, 2017

This beautiful specimen is the Four Spotted Ghost Moth (*Sthenopis purpurascens).* Adult moths have a 6.6-10 cm wingspan and can be found in two colour forms; yellow-brown (like the one in the photo) and purple grey.

Ghost Moths earned their name because of the way the males fly to attract a mate. They will hover over the ground, rising and falling slowly, similar to the motion of a ghost. Once mating is complete the males die.

Adult Four Spotted Ghost Moths don't live for very long because they cannot feed due the lack of, or absent mouthparts. When it's time for female moths to lay their eggs, they will do so while in flight in the vicinity of their desired tree species, typically poplar, willow or alder. The newly hatched larvae then bore into the roots of the host tree where they will live most of their two year life cycle before emerging as moths. Mature larvae are about 50 -60 cm long, with brown heads and cream-white bodies.

In Alberta, the two year life cycle results in adult moths being spotted more frequently in odd-numbered years during the months of early July through mid-August. The Four Spotted Ghost Moth is fairly common and can be found across North America in poplar and mixedwood forests, particularly near wetlands. In Alberta, they are most common throughout the Boreal forest and Aspen Parkland regions.

References:
University of Alberta, Entomology Collection, Species Page. Retrieved from: http://www.entomology.museums.ualberta.ca/searching_species_details.php?s=2299

Crystal Ionson—Slave Lake Forest Area

5 Things You Didn't Know About 'Christmas' Trees

Evergreen conifers can survive temperature extremes, grow to towering heights, and create their own ecosystems...even providing habitat to tarantulas!

- In extreme cold the proteins, sugars and water in tree tissue turn into a hard glass without a crystalline structure, which prevents cell damage.
- The spruce-fir forests of N. Carolina are home to one of the world's tiniest tarantulas, the spruce-fir moss spider *Microhexura montivaga*.
- The world's tallest non-redwood conifer in Oregon is a staggering 99.7 m. Above 130 m the effects of gravity make it too hard for a tree to push water up through its tissues.
- The environment of tree canopies is cool and dry but provides shelter for spotted owls, flying squirrels, and red tree voles which live whole generations in one tree canopy.

Source: BBC earth

Marian Jones—RMH Forest Area

Get To Know a Forest Health Technician

Louis Price is one of the more recent additions to Alberta's Forest Health team. Louis started as the Forest Health Technician in the beautiful Calgary Forest Area on a snowy day at the beginning of April. Prior to moving to Calgary, Louis was the air attack officer for the Slave Lake Forest Area.

Mike: Can you tell me a bit about where you were born and grew up?
Louis: I was born and raised in central Newfoundland in a small pulp and paper town called Grand Falls-Windsor. I lived on the outskirts of town with plenty of access to endless woods trails right out my back door. It was inevitable that I would end up working in the forest industry in some capacity.

Mike: Where did you end up studying forestry?
Louis: I attended the University of New Brunswick where I obtained a Bachelor of Science in Forestry and a Master of Environmental Management. And like many of us, I did a significant amount of technical forestry training of all sorts at the Hinton Training Centre.

Mike: Can you tell me a bit about your past work experience? Any crazy jobs?
Louis: I have been with the GOA most of the last 12 years in various capacities, with the exception of two short breaks; one to pursue a masters degree in 2011, and one to work for an environmental consulting firm in 2013 while I chased my future wife to Edmonton. My craziest job was in the summer of 2004 working night shifts at an ice cream warehouse. It was a massive storage complex for the whole of central Newfoundland. I was supposed to drive a forklift around in a snowsuit in this -20 degree warehouse filling orders for groceries stores but I just seemed to eat ice cream all the time.

Mike: Hobbies/interests?
Louis: Some of my long time hobbies include skiing, softball, squash, gardening and camping. Some more recent interests have been hunting, canoeing and travelling.

Mike: You mentioned your future wife earlier. Can you tell me a bit about your family?
Louis: I got married in 2016, and Libby and I have a daughter named Shay who's a year and a half. We have another baby girl on the way who's due on February 7th.

Mike: Now for a few really important questions… favorite movie?
Louis: That would be Braveheart or Happy Gilmore, I can't decide. I'm not really into super hero movies but somehow Guardians of the Galaxy is right up there.

Mike: Favorite band?
Louis: Green Day. 90's alternative got me good, still does!

Mike: If you could travel in time where would you go?
Louis: I'd kick it in the 70's. If the movie Dazed and Confused is even partially accurate, that's where I'd wanna be.

Mike: What is your favorite forest pest?
Louis: Humans are my favorite forest pest. The damage we do is astonishing.

Mike: What would your dream meal consist of? If you could share it with anybody who would it be?
Louis: My dream meal would be a plate of nachos stacked to the damn ceiling, and a keg of Heineken. I'd share that with all my friends.

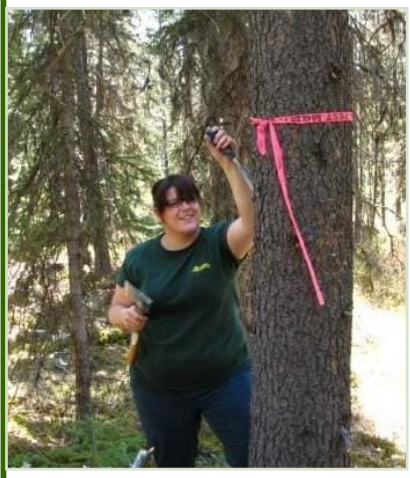
Mike: What do you currently enjoy most about your job?
Louis: I love the diversity of this job. It changes with the seasons which keeps things interesting. And lots of time outdoors is fantastic!

Mike: Now to get serious again, what do you think will be the greatest challenge for forest health practitioners in the coming decades?
Louis: Climate change is hands down the greatest challenge for forest health practitioners in the coming decades. We will truly need to unite on many fronts in order to avoid catastrophic changes in the forest and in life as we know it.

Mike: I can't argue with your assessment. We definitely have our work cut out for us.

Mike Undershultz—Edmonton

Farewell to Caroline Charbonneau

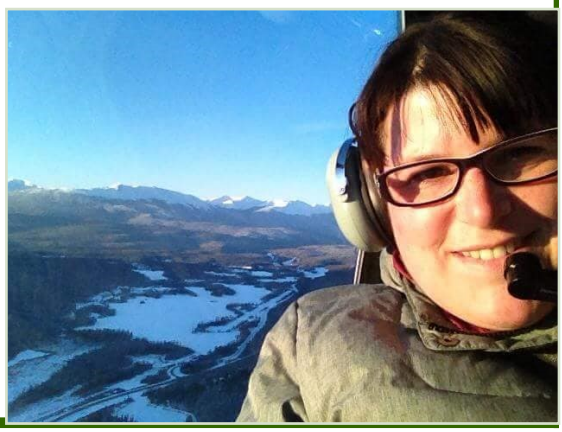


Caroline has been a long tern member of the Forest Heath & Adaptation team, working in the Hinton office of the Edson Forest Area. Caroline was heavily involved in the Mountain Pine Beetle Management program and was also a member of the team developing the Invasive Plant program. Caroline put her heart into the forest health work she did. While she is leaving the forest health group, we are happy she is staying with the department. As of October 1st, Caroline began her new role as the area Wildfire Information Coordinator in Edson.

Caroline's work colleague and shopping teammate had this to say: "I would like to wish Caroline all the best in her new role in the Edson Forest Area. Forest Health will certainly miss your strong work ethics, great organizational skills, and ability to solve complex issues under short time frames. I am going to miss my wonderful work colleague and close friend. Thank you Caroline for your hard work and dedication to Forest Health these past 11 years! "

All the forest health staff echo these thoughts and we are confident she will do a fantastic job as Information Coordinator.

Happy trails Caroline, and all the best in your new adventure!



Mushroom Smells

A Christmas Armillaria lament

sung to the tune of Silver Bells

Thinning of crown, browning needles,
Basal resinosus.
Certainly, there's a whole bunch of symptoms.
And it's just one, one of many,
Spanning mile after mile,
And if you peel off some bark there could be;

Mushroom smells, mushroom smells,
Could this be why this tree's dying?
Fungal ring, girdling,
Soon it will be its last day.

Overview flights, mapping tree plights;
Stands all bright red and green.
Every year it's becoming more common.
Seeing red fir, seeing dead fir,
Massive mortality;
Just a syndrome or tree root disease?

Mushroom smells, mushroom smells,
Could this be why this stand's dying?
Fungal ring, girdling,
Sure there must be root decay.

Can't find mycelium, but I've seen this before
Could this be why trees are dying?
It's armillaria, yes I've seen this before
Sure there must be root decay
A. sinapina *I'd say*

Listen Here *As performed by*

Hyphal Hutch and the Rhizomorphs

Tom Hutchison—Edmonton

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