ANNUAL REPORT

Healthy Landscapes Program Annual Report 2017/18

Annual Report

fRI Research Healthy Landscapes Program

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David W. Andison, Bandaloop Landscape Ecosystem Services

fRI Research
Informing Land & Resource Management

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Any opinions expressed in this report are those of the author, and do not necessarily reflect those of the organizations for which he works, or fRI Research.

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1. Introduction

1.1 Program History and Overview

Under the auspices of fRI Research, the Healthy Landscapes Program (HLP) has been operating since 1996. Since then, more than 30 funding and academic partners have participated in 46 research, tool, communication, demonstration, and educational projects across western boreal Canada. HLP output has been used widely within virtually all Canadian jurisdictions, as well as certification agencies (i.e. FSC), and the Canadian Boreal Forest Agreement (CBFA).

Since 1996 the HL Program has undergone significant evolution. The original vision of what was then the *Natural Disturbance (ND) Program* was to "*…understand disturbance patterns of all types, at all scales, on the Foothills Model Forest*" (Andison 1998). Within several years, the ND Program project list had expanded well beyond this mandate in terms of geographic extent, the scope of the research, and the types of projects being undertaken. Starting in 2000, each of the annual ND Program work plans, as well as each annual long-term plan revision, defined and tracked projects according to one of three themes; 1) research, 2) communications, or 3) integration. However, while this rapid and early expansion of the Program was encouraging, the evolution was neither agreed upon, nor formally recognized by the Program activity team of the day. This triggered a comprehensive, external Program review in 2012, culminating in a one-day stakeholder workshop. Partner feedback confirmed the value of, and interest in the topic area, but suggested that a new Program vision was in order. The new vision was defined as "…to *understand natural and cultural (forest landscape) patterns, and help partners explore and demonstrate how natural pattern approaches can contribute to sustainable resource management solutions*" (Andison et al. 2012). In so many words, this mandate redefined the focus of the new Program as EBM (Ecosystem-Based Management).

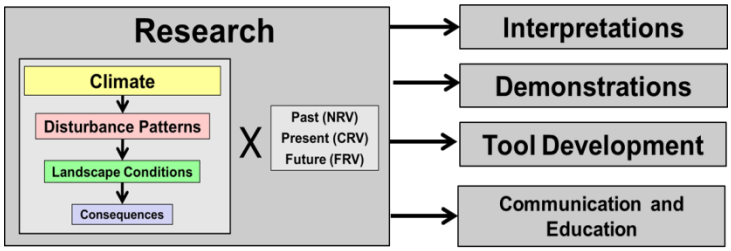

Figure 1. The HL Program elements and long-term strategy.

The Program elements shown in Figure 1 reflect this new reality. Research remains at the core of the Program, but we now classify all research projects according to:

1) **Level.** Climate, disturbance, conditions, or consequences, and
2) **Era.** Natural (i.e., pre-industrial) range of variation (NRV), current range of variation (CRV) or future range of variation (FRV).

The other four major Program themes expanded slightly from the original three to become: 1) interpretations, 2) demonstrations, 3) tool development, and 4) communication and education (Figure 1). As the summary of projects in this report will demonstrate, there is a great deal of integration between and within project theme areas.

1.2 FUNDING

Over the 2017/18 fiscal year, the HL Program spent a total of $860,000. The total direct cash spent on HLP projects in 2017/18 through fRI Research was $541,000. Another $284,500 was spent on HLP projects via other agencies that did not flow through fRI Research. The last $34,500 was contributed directly as professional fees by various consultants. In-kind contributions are estimated at another $150,000, bringing the total value of the HL Program to over $1,000,000 last year. The sources of direct funding vary widely, but fall into one of six main types.

1) fRI Research core funding. fRI Research has a number of partners who contribute funds to a general fRI Research fund each year, the disbursement of which to the various Programs is decided by the fRI Research Board of Directors. The HLP applies each year for general fRI Research core funds to be directed to the HLP via a rigorous work plan process. These monies have been pivotal in providing a long-term strategic foundation for HL Program growth, funding outreach, strategic planning, proposal writing, partner support, project administration, and collaborator support. Our partnership expansion from four partners within the west-central Alberta foothills, to more than 25 across boreal Canada over the last 20 years is largely a consequence of the stable support of the HLP by the fRI Research Board of Directors. In 2017/18, the HLP applied to fRI Research for $154,000, of which only $115,000 was approved. The 115k represents 13% of the total HLP cash spent in 2017/18.
2) HLP Program-based. Any funding provided directly to the HLP at the Program level (to be used to support a variety of projects at the discretion of the Program Lead) above and beyond any contributions from those same agencies to fRI Research overall. The government of the Northwest Territories and Tolko Industries were the only Program-based funding agencies for the HLP this year, of which $46,000 was spent in 2017/18 (5%).
3) HLP Project-based from partners. Project-based funding partners include: West Fraser Mills (WF), Alberta-Pacific (AlPac), Daishowa-Marubeni International (DMI),Vanderwall Contractors, and the government of NWT. The value of project-based funds to the HLP in 2017/18 was $90,000 (10%).
4) HLP project-based from other funding agencies. The HLP was very successful in attracting matching funding this year from a variety of research funding agencies, including NSERC, CFS, FRIAA (Alberta), Alberta Innovates, and Mitacs. Not all of these funds flowed through fRI Research. The value of these funding sources to the HLP in 2017/18 was $290,000 (33%).
5) HLP project-based from research collaborators. Many HLP projects rely on collaborations with other research agencies. The time, travel, and related resources to support HLP projects are highly relevant. Note that this is not 'in-kind' support as it is all directly applicable to the completion of project deliverables. Other collaborators include UBC, U.Vic, CFS, University of Laval, and U. of Alberta. The value of these funding sources to the HLP in 2017/18 was $284,500 (33%).
6) Donated time. As above, this category covers direct time and resource allocations to specific research, education, or completion of one or more HLP projects by HLP collaborators who donated time. This list includes Andison, Pyper, LeBoeuf, and WOLF staff for a total value of $34,500 (4%).

The HLP had 10 agencies contributing cash to the HLP in 2017/18 (Table 1). Of that there was one government agency, five forest industry companies, and three research funding agencies. The remaining agency, fRI Research, is funded through nine shareholders.

The vast majority of the HLP partner contributions were at the project level. Only fRI Research, Tolko, and the government of NWT contributed funding at the Program level.

Table 1. Overview of partner participation level in the HLP during 2017/18

Agency	Support Level	
	Program	Project
fRI Research	yes	yes
Gov't of NWT	yes	yes
Tolko	yes	yes
DMI	no	yes
AlPac	no	yes
West Fraser	no	yes
Vanderwall	no	yes
Mitacs	no	yes
Alberta Innovates	no	yes
FRIA of Alberta	no	yes

2. THE 2017/18 HLP PROGRAM

2.1 HLP PROGRAM OVERVIEW

During the 2017/18 fiscal year, the HLP had 12 active projects, including one for ***Program Management***, no ***Interpretation*** projects, four ***Communication and Education*** projects, one ***Demonstration*** project, one ***Tool*** project, and five ***Research*** projects (Table 2). Of those, one is now finished (3) and five others only require final reports and/or manuscripts (4, 5, 8, 9, and 10). One (7) is a long-term product (NEPTUNE). The total output produced over the year included 21 funding proposals, 41 reports, workshops, tools, or other products, five publications or submitted manuscripts, and 29 presentations (Table 2).

Table 2. Overview of the progress and products from the 2017/18 Healthy Landscapes Program. Also included is breakdown of the funding to each project based on the six funding types from Section 1.0.

Proj. No.	Project Name	Project Type	Total fRI Spent	Funding for 17/18							Output			
				% of Total fRI $ Spent				Other Direct		Total $ Value				
				fRI Core	HLP Program-based	HLP Project-based	Other Funding Agencies	HLP Collaborators	Prof. Time Donated		Funding proposals	Products	Papers	Presents
1	Program management	Strategic	112,000	88	12	0	0		$10,000	$122,000	9	9		6
2	Dedicated HL communications and education Initiative	C&E	9,000	30	0	70	0			$9,000		3		2
3	Planning for healthy landscapes short course	C&E	2,500	100	0	0	0	$3,500	$2,000	$8,000		2		
4	EBM Dialogue Sessions	C&E	118,000	0	0	0	100			$118,000		6		
5	EBM Workshop	C&E	5,000	0	0	0	100	$8,000		$13,000	1	3		
6	Linking NRV concepts with fine-filter values	Demonstration	2,000	0	0	0	100	$12,000	$10,000	$24,000	1			
7	NEPTUNE spatial decision-support tool	Tool	2,000	0	0	100	0		$1,000	$3,000				
8	LandWeb simulation modelling	Research & Tool	156,000	0	5	55	40	$160,000		$316,000	3	9		11
9	Historic wildfire burn patterns at sub-landscape scales	Research	3,500	100	0	0	0	$0	$3,500	$7,000			0.5	1
10	Creating wildfire mortality maps and metrics from Landsat imagery	Research	18,000	10	0	50	40	$8,000	$4,000	$30,000	1	3	1.5	5
11	Historic fire regimes, water and climate in the foothills	Research	9,500	40	0	0	60	$8,000	$4,000	$21,500	1		1.5	1
12	Landscapes in Motion (formerly mixed severity fire regimes…)	Research	103,500	0	0	100	0	$85,000		$188,500	5	6		3
	TOTALS		**$541,000**					**$284,500**	**$34,500**	**$860,000**	**21**	**41**	**2 full**	**29**
													3 In Rev.	

The successful funding proposals in 2017/18 totaled just over $750,000, spread out over the next 1-3 years. Of that, $122,000 was from HLP partners (16%). Most of the remaining $628,000 came from competitive awards from research funding agencies.

Only parts of three of the 12 projects were funded mostly from fRI Research core funds, five mostly by project-specific HLP funding and four mostly from external funding agencies (Table 2).

2.2 2017/18 HLP PROJECTS

A summary of each project, including the specific accomplishments during the 2017/18 fiscal year, the partners involved, and the current status, are to follow. All of the documents and presentations listed in this document are available on the fRI Research website, or upon request to Dr. David Andison (andison@bandaloop.ca)

2.2.1 PROGRAM MANAGEMENT

This "project" represents the coordination of the current 12 HLP projects in terms of writing funding proposals and coordination and administration including contracts, developing new partnerships, new project approvals, fRI Research requirements with respect to quarterly updates and budgets, meetings, and workshops, developing annual workplans, bi-annual HLP activity team meetings, compiling the annual HLP report, and responding to partner requests and updates as they arise. The summary of activities and outcomes for the 2017/18 fiscal year are as follows:

- Funding model (of $112,000 spent):
  - 88% #1 (fRI Research core)
  - 12% #2 (HLP program-based from gNWT, Tolko)
- Funding proposals: (*note that the proposals listed below were written using resources from Program Management in cases where there were not project specific funds available to do so*).
  - Support for Program-level coordination and administration:
    - fRI support for the 2018/19 workplan. Submitted to the fRI BoD Jan. 2018. ***Partially successful*** ($77,000 of the $153,500 requested)
    - Tolko contributed up to $13,200 to help with Program Management.
    - The gNWT contributed up to $8,000 to help with Program Management.
  - Support for the HLP C&E initiative proposal "*Small project shopping list for 2017/18 Healthy Landscapes Program*" (see next section for details):
    - West Fraser Mills contributed $4,000
    - Alberta Pacific contributed $12,500
    - DMI contributed $5,000
  - Projects with no existing seed funding as of April 1, 2017. These proposals are associated with project that either had no previous funding, or if they did, it was associated with other specific deliverables.
    - *EBM workshop: Gaining perspective and developing a roadmap with stakeholders.* Proposal submitted to FRIAA Open Funds. ***Successful*** ($62,968).
    - *A spatiotemporal investigation of natural and anthropogenic disturbances on landscapes and species resilience*. Full proposal submitted to FRIAA Open Funds initiative. ***Successful*** ($165,000).
    - Creating wildfire maps and metrics from Landsat imagery for the NWT. Proposal submitted to the government of NWT to use NWT as the test site for the next phase of model development and testing. ***Successful*** ($36,000).

- Products:
  - Andison, D.W. 2018. The HL Program annual 2018/19 workplan. fRI Research, Hinton, Alberta. (available online to HLP and fRI partners).
  - Andison, D.W., and J. LeBeouf. 2017. TOR for the revised Healthy Landscapes Program activity team (v2.0). June 13, 2017.
  - 2016/17 fRI Research annual report.
  - HLP text for the annual fRI Research "value-report"
  - HLP text for the 2017/18 fRI Research annual report
  - Program updates to the fRI BoD (x4)
- Presentations:
  - Andison, D.W. 2017. What is the HL Program – and why? Presented at the joint Program Lead – Board of Directors meeting. June 29, 2017, Hinton Alberta.
  - Andison, D.W. 2017. The Healthy Landscapes Program at fRI Research. Keynote presentation to the North American Forest Commission. Sept. 30, 2017, Jasper, Alberta.
  - Andison, D.W. 2018. What is the HL Program – and why? Presented at the *Discover fRI Research* workshop. Jan. 16, 2018, Edmonton, Alberta.
  - Andison, D.W. 2017. HLP Updates. Presented at the May 26th, 2017 HLP Activity Team meeting, Edmonton, Alberta.
  - Andison, D.W. 2016. HLP Updates and new projects. Presented at the Mar. 14th 2018 HLP Activity Team meeting, Edmonton, Alberta.
  - Andison, D.W. 2017. Healthy Landscapes. Presented to the Wabikimi Park Society. Thunder Bay, Ontario. Nov. 24, 2017.
- Meetings: (minutes available upon request)
  - HLP activity team meeting. May 26th, 2017. Edmonton, Alberta
  - HLP Executive team meeting. June 14, 2017 (conference call)
  - HLP Executive team meeting. Jan. 10, 2018 (conf. call)
  - Meeting with the Wabakimi Park Society. Sept. 18, 2017 (conf call
  - Meeting with the Wabakimi Park Society. Nov. 22nd, 2017, Thunder Bay, Ontario
  - HLP activity team meeting. March. 14th, 2018. Edmonton Alberta
  - fRI Research Program Lead meetings (conference calls). x4: (Feb. 1, 2018, Nov. 28, 2017, Sept. 13, 2017
  - fRI Research workshop on new planning process. Oct. 18, 2017 (conf call)
- Status:
  - Provided two rounds of feedback on the fRI Research publishing policy
  - The large number of proposals for both new and ongoing projects written this year required considerable time and resources

2.2.2 Dedicated Communication and Education Initiative

In 2013, the HL Activity Team has directed the HL Program to invest more resources and effort into communication and education on the topic of EBM / Healthy Landscapes. This resulted in the first draft of a HL Program C&E plan, which has been updated annually since. At the direction of the HLP Activity Team in 2016, Andison developed and presented: *"Small project shopping list for 2017/18 Healthy Landscapes Program"* that included overviews of 11 different C&E projects, including support and upgrading our new www.lessonsfromnature.ca website, a regular webinar series, canned presentation material, the revival of the *Quicknote* series, and more. A summary of activities and outcomes during the 2017/18 fiscal year are as follows:

- Funding model (of $9,000 spent):
  - 30% #1 (fRI Research core)
  - 70% #3 (HLP project-based from DMI, West Fraser, and Alberta-Pacific)
- Funding proposals:
  - Technically - the FRIAA Open Funds proposal for the EBM workshop is a product of the HLP C&E strategy. However, as a new project with no seed funding available, the proposal was developed under the auspices, and with the support of the of the Program Coordination project (see above).
- Products:
  - Maintenance and minor upgrades to the HLP www.Lessonsfromnature.ca website
  - First draft of HLP/EBM universal slide-deck
  - Initiation of the HLP Webinar Wednesdays' series.
    - Including the pilot, two webinars were given in 17/18 on the first Wednesday of February and March, 2018.
- Presentations:
  - Pyper, M. 2017. Using drones and dialogue to inform new approaches to resource management. Presented at the North American Forest Ecology (NAFE) Workshop. June 2017, Edmonton, Alberta.
  - Pyper, M. 2018. Tools in the knowledge exchange workbox: Separating distractions from impact. Presented at the Wetland BMP Knowledge Exchange, Ducks Unlimited, Feb. 2018, Edmonton, Alberta.
- Status:
  - The lessons from nature (LFN) website attracted 356 users, with a total of 777 page views from April 1, 2017 to March 31, 2018. The flow of visits and page views was quite constant over the year, which is a good thing. However, the one exception was revealing. The website experienced a significant spike in traffic after the Pyper presentation at the NAFE workshop. This suggests that active marketing pays off.
  - The full list of deliverables for the funds received is not yet complete. There was some "roll-over" funds from the C&E shopping list in 2017/18. Other projects took priority over some of the things still yet to be completed with existing funds.

2.2.3 PLANNING FOR HEALTHY LANDSCAPES SHORT COURSE

In 2010, the HLP Activity Team and fRI Research Board approved funding of professional course to help planners design cultural disturbance events (from harvesting, fire, or other activities) that look and feel more like natural disturbances. The course uses the spatial language developed by Andison (2012) and used in the NEPTUNE DSS tool, as well as the 12 years of research results from the Wildfire Patterns Study. In 2010, a course DACUM (Developing A Curriculum) developed with a focus group, and after some negotiations, fRI Research singed a contract in 2014 with WOLF (Woodlands Operations Learning Foundation) from Slave Lake, Alberta, to create the course. A summary of activities and outcomes for the 2017/18 fiscal year are as follows:

- Funding model (of $2,500 spent):
  - 100% #1 (fRI Research core)
- Products:
  - "Planning for healthy landscapes" course is completed and is now available on-line, live-online, or live by WOLF (www.w-o-l-f.ca/event/planning-for-healthy-landscapes/)
  - Live on-line course given July 11, 2017. Thirteen participants. Others have taken the on-line individual version.
- Status:
  - No further investment will be made to this Phase I course.
  - The HLPAT agreed that, while this was a good foundation course, there is a real need for training of how to design more "natural" disturbance events on a more technical level. The HLP short list of projects over the last two years has included this as a "new" project option, with no uptake from the HLP partnership.

2.2.4 EBM DIALOGUE SESSIONS

Another element of the HLP C&E plan was to host a series of 'dialogue sessions', designed to explore the source(s) of both support and discomfort with the concept and application of EBM principles. The sessions are open to any stakeholders or members of the public, but specifically target senior managers and policy-makers. The idea of dialogue is to introduce an active listening component, as opposed to more of a workshop style event where lectures are given on EBM. These sessions are designed to help understand the nature of what is often a highly uneven acceptance level of EBM across Alberta - and beyond. The EBM Dialogue Team was David Andison, John Parkins, Jules LeBoeuf, and Matthew Pyper. A summary of activities and outcomes during the 2017/18 fiscal year are as follows:

- Funding model (of $118,000 spent):
  - 100% #4 (Other research funds via Alberta FRIAA Open Funds initiative)
- Products:
  - Innovation Anthology radio series: Interview with Andison (recorded August 24, 2017).
  - Marketing flyer http://friresearch.ca/file/hl-dialogueflyer-17-04-26pdf
  - EBM Dialogue Session #1. May 30, 2017. Athabasca, Alberta (10 participants)
  - EBM Dialogue Session #2. Sept. 12, 2017, Grande Prairie, Alberta (13 participants)
  - EBM Dialogue Session #3. Oct. 25, 2017, Calgary, Alberta. (23 participants)

- EBM Dialogue Session #4. Dec. 12, 2017. Edmonton, Alberta (34 participants)

- Meetings:
  - EBM Dialogue team meeting. Aug. 28, 2017 (conf call)
  - EBM Dialogue team meeting. Jan. 11, 2018. U of A, Edmonton Alberta
  - EBM Dialogue team meeting, Jan. 25, 2018 (conf call)
  - EBM Dialogue team meeting, May 19, 2017 (conf call)
  - EBM Dialogue team meeting, Aug 28, 2017 (conf call)
  - EBM Dialogue team meeting. Oct. 5, 2017 (conf call)
  - EBM Dialogue team meeting. Nov. 10, 2017 (conf call)
  - Post-workshop #1 debrief. May 21, 2017
  - Post-workshop #2 debrief. Sept. 13, 2017
  - Post-workshop #3 debrief. Oct. 26, 2017
  - Post-workshop #4 debrief. Dec. 13, 2017
  - EBM dialogue team meeting. June 5, 2017 (conf call)
  - Conf call to discuss final report/paper. Mar. 23, 2018
  - Conf call to discuss final report/paper. Mar. 6, 2018
  - Team meeting. Dec. 8, 2017 (conf. call).
- Status:
  - A second draft of the final report has been completed. Anticipate completion and submission of the final report by Sept. 30, 2018.

2.2.5 EBM Workshop

At the May 2017 HLP meeting, the group agreed that a workshop was needed to help bridge between the science, interpretation, and application. The team also agreed that there were valuable lessons to be learned from other jurisdictions such as Ontario and Quebec. A first draft of a workshop outline was completed by Witiw, Daniels, Trenchard and Vinge by Sept. 2017 and distributed. The HLPAT agreed at the Feb. 2017 meeting to ask Dave and Matthew to write and submit an EOI to FRIAA Open funds. This was submitted Dec. 2017, and approved for a full proposal. A full proposal was written and submitted May 2017, and approved in July. The workshop is planned for June 19-20, 2018 at the Coast Edmonton Plaza in Edmonton, Alberta. The core planning team included David Andison, Matthew Pyper, Jules LeBoeuf, and Sonya Ogden.

- Funding model (of $5,000 spent):
  - 100% #4 (Other research funds via Alberta FRIAA Open Funds initiative)
- Funding proposals:
  - The ***successful*** FRIAA OPEN FUNDS proposal was submitted under the auspices, and resources, of the general Program Management (Section 2.2.1).
  - Approached all of the HLP partners for sponsors for breaks and lunch (***pending***)
- Products:

- Daniels, T, J. Witiw, T. Vinge, and S. Trenchard. 2017. Some contextual elements of natural resource management realities in the western boreal Canada. Internal draft document.
- "Save the date" workshop flyer. Posted and distributed Nov. 17, 2017.
- Workshop invitation: http://frireserach.ca/event/concept-reality-creating-road-map-ecossytem-based-management-June-19-20

o Meetings:
- EBM workshop planning team. March 9, 2018 (conf call)
- EBM workshop planning team. Jan. 18, 2018. Edmonton, Alberta
- EBM workshop planning team. Feb. 28, 2018 (conf call)
- EBM workshop planning team. Feb. 23, 2018 (conf call)
- EBM workshop planning team. Feb. 15, 2018 (conf call)
- EBM workshop planning team. Jan. 23, 2018 (conf call)

o Status:
- Working on the final agenda, the list of invited speakers, and advertising.

2.2.6 LINKING EBM CONCEPTS WITH FINE-FILTER VALUES

The differences between (the historic) value-based and EBM approaches to forest land management are exemplified by the contrast in perspectives on disturbance. In a classic value-based approach, disturbance is generally considered to be negative influence on the provision of habitat, services, or human values (i.e., safety). An EBM perspective suggests that disturbance is not only a regular, natural phenomenon, but one that is critical to the long-term sustainability and health of the ecosystem. Unfortunately, the debate so far is largely based on opinion rather than facts. This project is designed to objectively address this gap by capturing the impact of disturbance on a range of fine filter values directly, and quantitatively.

This is technically the second phase of a project that began three years ago as a Government of Alberta project known as BURNDS (Biodiversity Using Range of Natural Disturbance Strategically). In the first phase, scenario modelling was used to explore the fine-filter implications of moving landscapes towards the conditions defined by NRV. Not surprisingly, the results suggested that pushing landscapes towards NRV by introducing greater levels of disturbance actually created higher levels of overall biodiversity.

This second phase of the project will be completed under the auspices of a Master's degree of Tim Vinge at U of Alberta. Tim's research team includes Dr. Scott Neilson (supervisor), Dr. David Andison (Bandaloop and fRI), Matthew Pyper (FUSE), and Neal McLoughlin (GoA).

o Funding model (of $2,000 spent):
- 100% #4 (FRIAA Open Funds)

o Funding proposals:
- A FRIAA Open Funds proposal for $165,000 over two years was ***successful***. See Program Management (Section 2.2.1) for details.
- Proposals for partner funding to the entire HLP team were distributed. ***Pending***.

- Meetings:
  - Research team meeting. June 27, 2017. ForCorp, Edmonton, Alberta
  - Research team meeting. Mar. 19, 2018 (conf call)
  - Research team meeting. Feb. 19, 2018 (conf call)
  - Research team meeting. Dec. 5, 2017 (conf call)
- Status:
  - Final report on phase I BURNDS pending (complicated by staff movements within GoA)
  - Mr. Vinge will register as a graduate student in the spring of 2018

2.2.7 NEPTUNE SPATIAL DECISION-SUPPORT TOOL

NEPTUNE (Novel Emulation Planning Tool for Understanding Natural disturbance Events) is a web-based spatial decision-support tool designed to help planners create more "natural" disturbance events. NEPTUNE uses the spatial language published by Andison (2012) to create "events" from input shapefiles of disturbed and residual patches. It then calculates 10 standard pattern metrics from the input data, and compares the results to that of NRV based on the work of Andison and McCleary (2014). NEPTUNE, and its associated research, meet and/or exceed the requirements of provincial regulations, FSC, and the CBFA for any and all within-fire metrics. NEPTUNE is calibrated for all of Alberta and central Saskatchewan, and our ultimate goal is to expand NEPTUNE calibration to other areas.

NEPTUNE is uniquely administered as a shareholder entity. There are eight shareholders at this time; West Fraser, Parks Canada, government of Alberta, government of Saskatchewan, Mistik Management, ANC, AlPac, and Bandaloop. Any employee or designate of a shareholder can request and will be granted access to NEPTUNE via the web portal and sign-in protocols. The current cost for a new shareholder is $40,000, which grants them these same rights for all employees. NEPTUNE shareholders are also responsible for making decisions on all model changes or upgrades. A summary of activities and outcomes for the 2017/18 fiscal year are as follows:

- Funding model (of $2,000 spent):
  - 100% fRI funding #3 (HLP project-based from the seven NEPTUNE partners listed above)
- Status:
  - This project (i.e., tool) requires continual financial input in the form of maintenance costs
  - Seeking new partners

2.2.8 LANDWEB SIMULATION MODELLING

The objective of the LandWeb project is to define historical NRV conditions at landscape scales across ~130 million ha of the western boreal from spatially explicit simulation modelling. The output will provide NRV for landscape scale metrics such as seral-stage levels and old forest patch sizes that will be CBFA, FSC, and all provincial NRV regulations compliant. There are 16 partners involved in LandWeb; the governments of Alberta, Saskatchewan and NWT, West Fraser, DMI, AlPac, Mistik Management, Alberta Newsprint Company, Millar Western, Canfor, Tolko (Alberta), Weyerhaeuser, Louisiana Pacific (Manitoba and BC), Vanderwall Contractors, and Ducks Unlimited.

In 2014, the HLP formed a partnership with the CFS at the Pacific Forestry Centre and the University of Laval to develop the model. The framework in which LandWeb will be developed is called SpaDES (Spatially Discrete Event Simulation). SpaDES is actually not a model, but rather a modelling framework in which other models and modules can "talk" to each other. SpaDES is freely available on-line, but we have not yet made the LandWeb modules public yet. A summary of activities and outcomes during the 2017/18 fiscal year are as follows:

- Funding model (of $156,000 spent):
  - 5% #2 (HLP Program specific directed by Andison from gNWT)
  - 55% #3 (HLP project-specific from the partners)
  - 40% #4 (other research from NSERC, FRIAA)
- Funding proposals:
  - Contribution from Vanderwall Contractors Ltd. ***Successful*** ($10,000).
  - Contribution from the Manitoba gov't. ***Not Successful.***
  - Contribution from the BC Gov't. ***Not Successful***
- Products:
  - Andison, D.W. 2018. LandWeb briefing note #1: *What is LandWeb?* First in the series of Q&A briefing notes distributed to the LandWeb partners. Jan. 15, 2018.
  - Andison, D.W. 2018. Pre-industrial fire regime attributes of the western boreal forests of Canada. Draft report submitted for review.
  - Andison, D.W. 2018. Modelling Historical Landscape Patterns on the Canadian Forest Products FMA in Alberta. Draft report submitted for review.
  - Andison, D.W. 2018. Modelling Historical Landscape Patterns on the Weyerhaeuser Grand Prairie FMA in Alberta. Draft report submitted for review.
  - Andison, D.W. 2018. Modelling Historical Landscape Patterns on the Upper Peace land use area in Alberta. Draft report submitted for review.
  - PIckell, P. 2018. Spatial vegetation layer for the 130,000 ha LandWeb study area. Provided to the fRI Research Woodland Caribou Program. Jan. 23, 2018.
  - SpaDES workshop (including LandWeb references and training). Feb. 7-9, 2018, Victoria, BC.
  - Andison, D.W. 2017. Final report to NSERC: *Development of historical landscape benchmarks for western boreal Canada*. May 21, 2017.
  - Andison, D.W. (et al). 2018. Third version of the long-term-fire-cycle (LTFC) map for western boreal Canada. Internal document to the fRI HL Program.
- Presentations:
  - McIntire, E. 2018. LandWeb overview and update. Presented at the LandWeb partners' workshop. March 13, 2018, Edmonton, Alberta.
  - Andison, D.W. 2017. Pre-industrial patterns of caribou habitat on the Alberta-Pacific FMA. Presented to the Regional Industrial Caribou Committee (RICC). Sept, 13, 2017, Calgary, Alberta.
  - Andison, D.W. 2017. Modelling historical landscape patterns on the upper peace. Presentation of pilot study results to Weyerhaeuser and Canfor, May 8, 2017, Grand Prairie, Alberta.

- Andison, D.W. 2017. Modelling historical landscape patterns on the upper peace. Presentation of pilot study results to the government of Alberta. May 25, 2017, Edmonton, Alberta.
- McIntire, E. 2017. LandWeb overview and update. Presented at the LandWeb partners's workshop. May 9, 2017, Edmonton, Alberta.
- Andison, D.W. 2018. Overview of the LandWeb model. Presented to the fRI Program Leads, January 15, 2018, Edmonton, Alberta.
- McIntire, E.J.B., S. Baudin, J. Marchal, A Clason, A.M. Chubaty, and S.G. Cumming. 2018. Predictive ecology in a world filled with dynamic data and models - entering continuous adaptive management. Presentation given at U Victoria Environmental Studies Seminar Series, Victoria, BC.
- Chubaty, A.M., and E.J.B. McIntire. 2017. Cumulative effects simulation and modern scientific forecasts: challenges and opportunities. Great Lakes Forestry Centre (GLFC) Seminar Series, Sault Ste Marie, Ontario, October 2017.
- McIntire, E.J.B., E.M., Campbell, R.S. Sinder, A.M. Chubaty, and M.A. Wulder. 2017. Building a continuous adaptive management system in SpaDES: Dialing down the risk for woodland caribou. CFS presentation, Ontario. June 2017.
- McIntire, E.J.B., D.W. Andison, S.G. Cumming, Y. Luo, and A.M. Chubaty. Building a continuous adaptive management system in SpaDES: using historical landscape variation for the LandWeb project. Presented at the Cdn. Soc. For Ecology and Evolution. Victoria, BC. May, 2017.
- Cumming, S.G., E.J.B. McIntire, Y. Luo, A.M. Chubaty, and D. Woolford. Burning in SpaDES: Automated parameter estimation for landscape fire models. Presented at the Can. Soc. For Ecology and Evolution. Victoria, BC, May, 2017.

o Meetings:
- Discussion with spatial modelling options with Saskatchewan Environment. Oct. 23, 2017 (conf call)
- LandWeb partners' workshop. May 9, 2017, Edmonton, Alberta
- LandWeb partners' workshop. Mar. 13, 2018, Edmonton Alberta
- Landweb partner meeting. July 14, 2017 (conf. call)

o Status:
- The deliverables for this project are almost a year overdue. There are multiple causes, including unforeseen technical obstacles, late or unfinished modules from various collaborators, and rules that prevented us from moving funds to and from our two main collaborators (CFS and Laval). We also had a delay of several months waiting for "current condition" data from all of the LandWeb partners.

2.2.9 HISTORIC WILDFIRE BURN PATTERNS AT SUB-LANDSCAPE SCALES

The assumption of a so-called "coarse-filter approach" in the boreal forest is that historic patterns can and will be closely approximated by cultural disturbance activities. This assumption is largely true at landscape scales. One can reasonably expect to compare metrics such as old forest levels, interior forest, and edge density between NRV and

the likely future range of variation (FRV) under forest management - since it is under the control of harvesting levels. At event scales the focus becomes residual levels, types, and locations, for which the same rule about the alignment of NRV with FRV generally holds. Again, harvest plans can dictate residual levels and locations to align with NRV.

However, the concept of "approximation" breaks down at intermediate scales. It is well recognized that the vast majority of the boreal forest that we see today is a result of the impact of a very small number of fires larger than 10,000 ha. Yet harvesting guidelines almost universally limit the size of harvesting events to less than 10,000 ha. This project tests the (untested) hypothesis that a simple event size metric adequately captures natural landscape dynamics at intermediate scales. This project tests that hypothesis using the natural wildfire database from northern Saskatchewan. No funds were approved or available to complete this project.

- Funding model (of $3,500 spent):
  - 100% #1 (fRI Research core)
- Papers:
  - Andison, D.W. (submitted). Why fire size is a bad coarse filter indicator. Submitted to For. Ecol. and Manage.
- Presents:
  - Andison, D.W. 2018. Why fire size is a bad coarse filter indicator. Webinar Feb. 7, 2018 as part of HLP Webinar Wednesdays series.
- Status:
  - Manuscript edits will be completed pending the status of available donated time

2.2.10 Creating wildfire mortality maps and metrics from Landsat imagery

The "Burning patterns of natural wildfires" research project was completed in 2016, but now includes data and historic NRV results for all of Alberta and central Saskatchewan. The detailed database of 129 wildfires is the largest and most precise of its kind in the world, and has thus far generated seven published papers and at least as many scientific conference presentations. It is also one of the cornerstones of the collective NRV requirements at the event-scale for provincial governments, the FSC, and the CBFA. Unfortunately, these data have been expensive and time-consuming to create using historical aerial photos. The reliance on finding timely, high quality aerial photos before and after each fire event also limits the utility of this method geographically. Landsat has become the tool of choice for most other burn severity projects since it is free and full spatial coverage exists since the mid-1980's. However, until now, the ability of Landsat procedures to predict mortality from wildfires has been poor to moderate, which makes it unsuitable in its current form as being scientifically-defendable (as per most forest management NRV requirements).

This project attempts to manage this knowledge gap by building a methodological "bridge" between photo-based and imagery-based interpretations of fire mortality maps. A PhD student (Mr. San Miguel) under the supervision of Dr. Nicholas Coops, UBC Forestry is looking at this question. The government of NWT has agreed to fund the last phase of this work into NWT over the next two years. We have already identified the criteria, the sample fires, and the imagery. The fires have all been mapped by Greenlink Forestry Inc. using criterial identical to previous fire mapping

projects under the auspices of the HLP, and the data delivered to UBC. A summary of activities and outcomes for the 2017/18 fiscal year are as follows:

- Funding model (of $18,000 spent):
  - 10% #1 (fRI Research core)
  - 50% #3 (project specific funding from gNWT)
  - 40% #4 (other funding from NSERC, student awards and scholarships)
- Funding proposals:
  - Proposal for year two of funding from gNWT to focus model and results on NWT. ***Successful ($36,000)***
- Products:
  - San Miguel, I. Expanding fine-scale wildfire pattern analyses to the taiga plans ecozone. Report to gNWT. Feb. 21, 2018.
  - San Miguel, I. 2017. Draft report for NWT: Preliminary results of fire mortality mapping in the NWT. June 26, 2017.
  - Predictive model for tree mortality after fire in the NWT. Delivered and demonstrated to gNWT staff. Feb. 21, 2018.
- Papers:
  - San Miguel, I, D.W. Andison, and N.C. Coops. 2017. Characterizing historical fire patterns as a guide for harvesting planning using landscape metrics derived from long-term satellite imagery. Forest Ecol. and Manage. (399: 155-165.)
  - San Miguel, I, N.C. Coops, R.D. Chavardes, D.W. Andison, and P. Pickell. (under review). What controls fire patterns: Predictability of fire characteristics in the Canadian boreal plains ecozone. *Submitted to Ecosphere March 2018.*
- Presentations:
  - Overview of new predictive model and research results to gNWT staff. Dec. 14 (conf call/webinar).
  - San Miguel, I. 2018. Regional fire patterns across the western boreal forest. Webinar Mar. 7, 2018.
  - San Miguel, I, N.C. Coops, and D.W. Andison. 2017. Fire patterns in the western boreal forest of Canada. (Fire Ecology and Management Congress. Orlando, Florida, Nov. 28-Dec. 2, 2017.
  - San Miguel. I. 2018. Seminar: Python for fire mapping. Master of Geomatics for Environmental Management (MGEM), UBC.
  - San Miguel, I, D.W. Andison, and N.C. Coops. (under review). Quantifying local fire regimes with the landsat data-archinve: a conceptual framework to derrive detailed fire pattern metics from pixel level information. Submitted to Int. J. of Digital Earth.
- Meetings:
  - Research team review (conf call). Mar. 15, 2018
  - Student committee meeting. Nov. 15, 2017, UBC, Vancouver, BC

- Status:
  - Ignacio will defend his PhD thesis in August, 2018.
  - One last manuscript to be completed.
  - One more final report and draft manuscript from the NWT data will be created.

2.2.11 HISTORIC FIRE REGIMES, WATER AND CLIMATE

The genesis of this project is worth noting as an example of the benefits of investing in a research ***Program***, as opposed to individual projects. In 1999, the first results of the (then titled) "Island Remnants Project" (now known as the Historical Fire Patterns project) suggested that the amount of surviving remnants from historical wildfires in the Alberta foothills ranged from very high to very low. The fires with very high remnants were unexpected. The expansion of this work to other parts of the western boreal forest confirmed these findings, suggesting that the western boreal may not be a simple stand-replacing ecosystem. However, the evidence at this point was fairly simplistic since it only captured the patterns of one (i.e., the most recent) fire at any given location. This spawned a pilot study in the northwestern area of the Hinton Wood Products FMA to look at the fire history of specific sites using dendrochronology (i.e., tree-ring) methods, which would allow us to extend fire history much further back in time. The results suggested that some historical fires were lower severity, on a higher frequency than previously assumed (Amoroso et al. 2011).

So now we knew there were some lower-severity fires in the central foothills area historically, but there was not enough evidence to make conclusive statements about the degree to which a "mixed severity fire regime" (MSFR) was operating in the area. However, the HLP Team agreed that it was enough to justify expanding the scope of the study. With the full support of the HLP Activity Team, in 2011, a team of four Principle Investigators (PIs) from four different Canadian Universities (Daniels, Gedalof, Pisaric, and Moser) submitted a proposal to NSERC to look for evidence of a MSFR across the southern Rockies (including study sites in both BC and Alberta) using both dendroecology (i.e., tree ring) and paleo-ecological (i.e., lake sediment) sampling methods. This project is largely completed. The one exception is the extension of the work of Mr. Raphael Chavardes who is continuing his work on fire history in the southern and central Rocky Mountain area for his PhD. A summary of activities and outcomes during the 2017/18 fiscal year are as follows:

- Funding model (of $9,500 spent):
  - 40% #1 (fRI Research core)
  - 60% #4 (other research from NSERC, Mitacs, UBC scholarships)
- Funding propsoals:
  - Mitacs (1 unit). March 15, 2018. ***Successful ($7,500).***
- Papers:
  - Chavardes, R.D., L.D. Daniels, Z. Gedalor, and D.W. Andison. 2018. Human influences supercede climate to disrupt the 20th century fire regime in Jasper National Park, Canada. Dendrochronologia 48: 10-19.

- Chavardes, R., L.D. Daniels, B. Eskelson, and P. Pickell. (under revision). Monthly derivatives of the drought code reveal nuanced fire-0climate associations in montane forests with a mixed severity fire regime. *Submitted to Int. J. Wildland Fire.*

- Presentations:
  - Chavardes, R.D. 2018. Altered fire regime reduced montane forest diversity. Presented at the Society of Ecological Restoration western Canada. SFU, Burnaby, BC, Feb. 13-17, 2018
- Status:
  - Chavardes is the only remaining active student on this project.

2.2.12 Landscapes in Motion *(Formerly: Mixed-severity fire regimes in the southern foothills of Alberta)*

This project has three inter-related components, all related to the idea that not all fires kill most of the vegetation within the boundaries of the wildfire event. In 1998, empirical evidence that not all fires in the Alberta foothills were stand-replacing started to grow. The HLP project "*Burning patterns of natural wildfires*" was the first to note that the proportional of surviving vegetation "remnants" was well above the classic 20% threshold. This spawned the support and completion of the Berland pilot study under the auspices of the HLP, which found that indeed lower severity fires on more frequent intervals could occur (Amoroso et al. 2011). However, a simple pilot study says nothing about the prevalence, or influence of local conditions on the larger landscape. The only way to know for sure is to understand the relationship(s) between the severity, size, and frequency of historical fires over both time and space. The methods necessary to capture these regime dynamics are very specific: intensive field sampling to create a standard tree-ring chronology over one or more extended areas of a landscape. In other words; the sampling must reflect the need to understand not just fire mortality, but also fire size, fire frequency, and the main fire weather and fuel conditions. Although many pieces of this puzzle have been studied, no one has attempted to solve it as a whole.

The second component of this project is the development of a partial-severity burn module. There are several landscape scenario simulation models right now that will create NRV conditions – but they all include fire modules that assume complete mortality of a given pixel or cell. This is a function of both convenience and knowledge. We now have enough new knowledge to suggest that fire burning modules should be capturing partial mortality. The module will be SpaDES and LandWeb compatible, and we plan on using the research from part I of this study to calibrate it for the southern Alberta foothills study area.

A third part of this study is the analyses of photo pairs from the Mountain Legacy Project (MLP) to evaluate vegetation change over the last century. This part of the project is being managed by Dr. Eric Higgs, U. of Victoria.

- Funding model (of $103,500 spent):
  - 100% #4 (other research from Alberta Innovates and FRIAA Open Funds)
- Funding proposals:
  - Full proposal to FRIAA OPEN FUNDS: *Understanding and modelling historic landscape dynamics in the SW foothills.* ***Successful ($286,500)***
  - Mitacs Accelerate application for PDF support for the fire regime position. ***Successful ($22,500 over one year)***

- Mitacs Accelerate application for PDF support for the modelling position. ***Successful (22,500 over one year)***
- Mitacs Elevate application for PDF support for the fire regime position***. Successful ($60,000 over two years).***
- Canada Jobs Grant application for three field crews. ***Successful ($8,100).***

o Products:
- Stand-alone project website launched Oct. 20, 2017. (http://www.landscapesinmotion.ca). Two blogs per month featuring getting to know the team, and the research. Average of 101 users / month and 293 page-views / month since launch.
- Alberta Innovates annual update report. May 2017.
- Field sampling summer 2017: Five study areas, 88 plots, 1,350 tree samples
- Lab processing fall/winter: 50% of 980 field samples completed
- Image processing fall/winter: 1,892 panchromatic aerial images (>1m ha) obtained, mosaiced and ortho-rectified using ground control points
- Image processing: photogrammetric point cloud extraction from the mosaic image completed

o Presentations:
- Andison, D.W. 2018. What is a fire regime, and why should I care? Presentation to the Crowsnest Conservation Society. Feb. 7, 2018, Blairmore, Alberta.
- Naficy, C.E., L.D. Daniels, P. Tompaslski, and N.C. Coops. Unique spatio-temporal insights in mixed-severity fire regime forests using paired dendeoecological and photgrmmetric data. Presented at the Society of Ecological Restoration western Canada. SFU, Burnaby, BC, Feb. 13-17, 2018.
- Fortin, J. and A. Hakonson. What can we learn from Mountain Legacy Project photo pairs? Presentation to junior rangers. Bragg Creek Alberta, July 15, 2017.

o Meetings:
- LIM C&E team meeting. Dec. 7, 2017 (conf call)
- LIM C&E team meeting. Nov. 8, 2017 (conf call)
- LIM modelling team meeting. Oct. 13, 2017 (conf call)
- LIM C&E team meeting. June 26, UBC, Vancouver, BC
- LIM C&E meeting. Dec. 15, 2017 (conf call)
- LIM team meeting. Nov. 20, 2017, UBC, Vancouver, BC.

o Status:
- Dr. Cameron Naficy was hired January 2017 as the PDF for the fire regime work at UBC Forestry under the supervision of Dr. Lori Daniels
- Dr. Ceres Barros started September 2017 as the PDF for the fire modelling work at UBC / CFS in Victoria under the supervision of Dr. Eliot McIntire
- Dr. Chris Stockdale (NOFC, Edmonton) was part of the original proposal as part of the MLP team, and has remained involved in the project as part of his new duties at CFS.

3. 2017/18 IN REVIEW

The list of accomplishments of the HLP in 2017/18 exceeded those of any previous years. It represented the greatest number of proposals, final products, and presentations. It was a below-average year for publications, but that is less of a concern given the long timelines associated with most of our research. Aside from some late deliverables for both the C&E initiative and LandWeb, the products for the other ten HLP projects were all delivered on time. We had no significant issues with our budget, funding, staff, personnel, safety, sub-contractors, or output quality. Moreover, of the $860,000 spent on HLP projects, the HLP partners paid for only 12%, an investment ratio of better than 8:1.

This overview reveals both the advantages and the risks of supporting a ***program***, as opposed to individual ***projects***. A ***program*** is more efficient as regards costs and the ultimate list of outputs, but the risk of participating in a program is that it requires being part of a collaborative – meaning that every partner depends on the dedication, response, and capacity of other academics, researchers, and partners involved in the project(s).

What could we have done differently? It is hard to imagine how the LandWeb roll-out could have been expedited given the many technical and data challenges. We took extraordinary measures over the last two years to identify people and solutions to make it happen. Where we could have clearly done better is keeping the LandWeb partners informed in an open and more regular way – beyond the two meetings / year that we had.

Having said that, we had some notable successes that are both unique and valuable – ***to all HLP members***, and beyond. As in past years, some of our work gained national recognition.

1) The (risky) decision to include 60k worth of outreach in our FRIAA Open Funds application for the LIM project has paid off significantly. Those funds helped us develop a number of tools that helped us improve stakeholder outreach in a way that we have never experienced before. This has paid off in not only in terms of the HLP becoming more of a "trusted source", but the value of the EBM concept discussions. In the bigger picture, this was a valuable lesson, and perhaps a new template, in terms of how future HLP research projects will be developed – with a strong, continual outreach strategy.
2) Raphael's research on fire regimes in the Alberta front-range has re-ignited interest in the relationship between climate and fire regimes. His papers are very popular online.
3) Ignacio's research on wildfire patterns across the western boreal has revealed an entirely unique perspective on how, and what fires burn. Another author with some big hits online. His comparison work on fire patterns in NWT is fascinating, and raises many new questions.
4) The EBM Dialogue Session project was a huge success on several fronts. First, the participant list reflected a full range of perspectives and agencies. An ongoing concern of the HLPAT is that we do not have all of the "right people" in the room. Second, we heard a lot! We are still trying to process it, but clearly folks a) want to be involved, and b) are – mostly – not that different philosophically from managers or regulators, and c) very much liked our innovative format.
5) Despite some ongoing technical issues, the LandWeb rollout has gained considerable (positive) attention across Canada, and other modellers are learning how they might contribute. Other than the modules created

by the LandWeb group, other groups have been working on compatible modules for woodland caribou, mountain pine beetle, carbon, and economics. Courses and seminars on using SpaDES are being offered in at least two Universities. Given its momentum, this could become one of the most valuable decision-support tools of the next few years. The LandWeb partners are well positioned to take advantage.

The list of potential future possibilities as regards follow-up to any of these projects is considerable.

4. LOOKING AHEAD: CHALLENGES AND OPPORTUNITIES

Much of the first part of 2018/19 will be consumed with completing existing project obligations. By the end of the year, six projects will be completed – which is unprecedented. This is both an opportunity and a challenge.

The opportunity is that it will allow HLP resources to move into some new projects. It is also an ideal opportunity to review, renew and redirect the Program strategically. However, these opportunities for growth and expansion come with several challenges. First and foremost, the deleterious funding trends noted last year continues. Not only was the HLP partner contribution to funding down to 12% of the overall budget, but most of that was directed at specific projects. Our continued success at attracting external funding (another $638,000 in 2017/18), is in part masking an alarming decline in funding support for the foundation work required at the *Program* level. Until now, we have relied heavily on fRI Research to fund the many critical functions of Program Management. However, that will change next year. The contribution to the HLP from fRI Research will decline to only $77,000 in 2018/19. This is just over half of what the HLP received from fRI Research on an annual basis since 2002. Last year, we were fortunate that some HLP partners were able to help provide Program level support to the HLP.

It will not be possible to manage/administer the HLP for more than one more year with only $77,000 to support Program Management. This will have several negative consequences for the HLP – and fRI Research.

1) There is no Program support to develop, write, and follow through with any new funding proposals. In fact, the fRI Board specifically eliminated the ~$22,000 ear-marked for this in the 18/19 work plan. The logic of deleting this item was that fund-raising should be a part of each proposal. The problem with this logic is twofold; first, most research funding agencies do not allow "proposal development" as a line item. The second problem is that this still leaves no funding for unsuccessful proposals. The cumulative result of lack of support for funding proposals to the HLP is that it will negatively impact the very thing that is keeping the HLP alive today; external support. Over a million dollars was raised by the HLP over the last two years across 40 proposals.
2) This funding level will not allow any "partnership development", which has been the primary source of Program growth over the last five years. There are now 20 funding agencies from across five provinces and territories involved in one or more HLP projects. This is a direct result of the Program Lead's efforts to develop new partnerships, sometimes spanning several years.

3) There will be very limited resources available for the HLP Program Lead to help with any new strategic Program development discussions, TORs, or structures. Over the last five years, Andison has developed and presented to the HLP Activity Team three different new strategic outlines and chaired several preliminary meetings with the new HLP Executive, and created a draft version of a new TOR.

Another challenge associated with the continued growth and evolution of the HLP is the high turnover of people at Activity Team meetings. After the NDP Review in 2012, the Activity Team of the day decided to allow membership to the HLP to be entirely open and without financial or other obligation(s). Combined with an aggressive, directed new partner development push, this was highly successful in attracting new partners. Over the last five years, an average of 20 people attended HLP Activity Team meetings. However, that included a total of 60 different people representing 22 different organizations. On average, each person attended only 30% of the meetings, and only 14 people attended more than half of the meetings. Only three (other than the Program Lead and chair) attended more than 75%.

These numbers offer further insight into some of the challenges facing the HLP. As noted above, there have been several attempts to introduce new strategic structure and oversight over the last few years. With that in place, the challenges associated with deteriorating support for Program Management could potentially be addressed. However, strategic discussions in HLP meetings often fail to get traction because not enough people have the context from previous discussions or documents. The high turnover rate also poses challenges for identifying new projects. When critical meetings take place where turnover from one to the next is over 50%, it is not surprising that the capacity of those who attend to make decisions is limited. The final negative impact of uneven attendance is that there is limited participation or involvement of partners beyond meetings. For example, virtually all of the agenda items and meeting deliverables fall to the Program Lead, which only adds more time to perform Program Management, which is exactly where investment is shrinking.

Most of these challenges are not new, and were meant to be addressed by the formation of an HLP Executive, and an associated new TOR for the HLP. This process will continue.

5. LITERATURE CITED

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Andison, D. W., and K. McCleary. 2014. Detecting differences in regional wildfire burning patterns in western boreal Canada. *The Forestry Chronicle, 90*(1), 59–69.

Pyper, M, and D.W. Andison. 2016. Healthy Landscapes Program Communication and Education Initiative.

6. APPENDIX A: ABBREVIATIONS USED IN THIS REPORT

AlPac – Alberta Pacific Forest Industries Inc.
ANC – Alberta Newsprint Company
Bandaloop – Bandaloop Landscape-Ecosystem Services Ltd.
BC – British Columbia
BURNDS – Biodiversity using range of natural disturbance strategically
CBFA – Canadian Boreal Forest Agreement
Canfor – Canfor Corporation
C&E – Communication and education
CFS – Canadian Forestry Service
CRV – Current range of variation
DMI – Daishowa-Marubeni International Ltd.
DU – Ducks Unlimited
EBM – Ecosystem-based management
EOI – Expression of interest
fRI – fRI Research
fRI BoD – fRI Research board of directors
FRIAA – Forest Resource Improvement Association of Alberta
FRV – Future range of variation
FSC – Forest Stewardship Council
GoA – Government of Alberta
gNWT – Government of the Northwest Territories
LandWeb – Landscape dynamics of western boreal Canada
LIM – Landscapes in motion
LFN – Lessons from nature (website)
HLP – Healthy Landscapes Program
HLP C&E – Healthy Landscapes Program Communication and Education strategy
HLPAT – Healthy Landscapes Program Activity Team
LP – Louisiana Pacific Corporation
MW / Millar Western – Millar Western Forest Products Ltd.
Mitacs – Mitacs Canada
MLP – Mountain Legacy Project
MSFR – mixed severity fire regime
NEPTUNE – Natural Emulation Pattern Tool for Understanding Natural Events
NSERC – Natural Sciences and Engineering Research Council of Canada
NDP – Natural Disturbance Program
NRV – Natural range of variation
PDF – Post-doctoral fellow
SpaDES – Spatially discrete event simulation

Tolko – Tolko Industries Ltd.
TOR – terms of reference
U of A – University of Alberta
UBC – University of British Columbia
U. Laval – University of Laval
U.Vic – University of Victoria
Vanderwall – Vanderwall Contractors Ltd.
WF / West Fraser – West Fraser Mills Ltd.
Weyco – Weyerhaeuser Company
WOLF – Woodlands Operations Learning Foundation)