

# The Future of The FRI

*Natural Disturbance*

## *Healthy Landscapes* Program

### *Responding to Our Partners' Needs*

**By: The FRI Healthy Landscapes Activity Team:**

Dr. David Andison, Bandaloop Landscape-Ecosystem Services

and,

Tom Archibald, FRI

Dr. Rick Bonar, Hinton Wood Products

George Duffy, Alberta Newsprint Co.

Kevin Quintilio, Alberta SRD

David Smith, Jasper National Park

John Stadt, Alberta SRD



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# Introduction

Under the auspices of the FRI, the Natural Disturbance (ND) Program has been operating since 1996. Since then, more than 20 partners have participated in almost 25 research, decision-support, demonstration, and educational projects across western boreal Canada.

On October 12, 2011 The Program hosted a one-day workshop to discuss the future of the ND Program. Twenty four participants from government, industry, and academia were guided through a series of facilitated exercises designed to elicit a) constructive feedback on the Program, and b) advice on future direction(s). The intent was to use the output from this workshop to re-design the Program as necessary.

This report documents and summarizes the workshop findings, and offers nine recommendations by the ND activity team for moving forward with a new program vision.

This report is divided into three sections:

Part 1 (pages 3-10) is both a technical and conceptual summary of the ground covered by the ND Program to date. This material was presented by the ND Program lead, Dr. David Andison at the beginning of the workshop. The intent was to provide some context for the workshop participants – a ‘straw dog’ with which to work.

Part 2 (pages 11-14) is a summary of the comments and feedback from the workshop participants, organized into logical groupings.

Part 3 (pages 15 -19) summarizes the interpretations of the workshop feedback by the current activity team into a new mandate for the Program.

This report also includes an appendix (pages 22-25), which outlines the details of how the Program currently functions, including how funding decisions are made, partnership options, and different responsibility models.

*Note that in the first two sections part of the document that the Program name is referred to as the ‘Natural Disturbance’ (or ND) Program, which has been our name for the last 14 years. In the last section and the Appendix, the Program name shifts to the ‘Healthy Landscapes’ (or HL) Program, with a revised vision and mandate.*

# Part I: Overview: *What Have We Learned?*

*The following is a summary of a presentation given at the beginning of the workshop by Dr. Anderson, both to summarize the work of the ND Program to date, and to provide a conceptual framework for the discussions to follow.*

The FRI Natural Disturbance (ND) Program began in 1996 under a set of relatively simple assumptions; 1) that the natural range of variation (NRV) is a general-level (or *coarse filter*) proxy for biodiversity, 2) natural disturbance patterns are valuable guides for cultural disturbance activities, and 3) those patterns can be integrated into policy and practice. Thus, the original goal of the program was “*To understand the natural range of patterns and processes of natural disturbance, and help partners integrate that knowledge into planning and management*”.

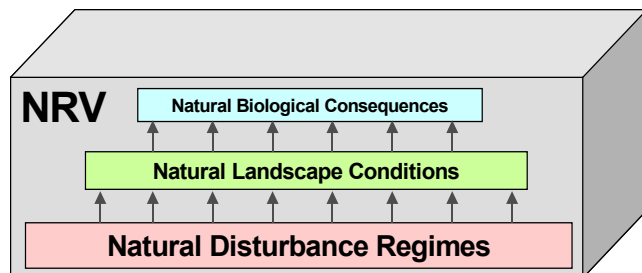
Fifteen years later, our experiences with the ND Program have taught us that the reality of these assumptions is far more complex than we imagined. To help provide a conceptual framework for workshop participants, we propose four different classification systems for the work that the Program undertakes.

**1. NRV Type:** There are three different pattern types associated with NRV (Figure 1). All types of NRV include a range of spatial and temporal scales, from site to biome, and hours to centuries.

1. **Disturbance regimes.** This is the classic definition of NRV, and includes the type, periodicity, timing, frequency, size, and severity of natural disturbances. Note that most landscapes have multiple natural disturbance regimes including fire, insects, landslides, floods, etc. The FRI ND Program has invested heavily in this research.
2. **Landscape conditions.** These are the (un-interpreted) outcomes of disturbances. The ND Program has invested considerable effort to quantify several landscape condition ranges for attributes such as seral-stages levels, old forest patch sizes, and large woody debris.
3. **Biological consequences.** These are the first-order interpretations of landscape conditions. Examples include MPB and wildfire threat, and habitat supply for individual species. Our investment in NRV of biological consequences has been limited, although there is significant potential.

This classification raises several points. First, a formal recognition of different elements of NRV has never been proposed. For most, *NRV* is the equivalent of *disturbance patterns*. For example, Swanson et al.’s (1994) seminal depiction of NRV includes three axes, one each for frequency, severity, and size.

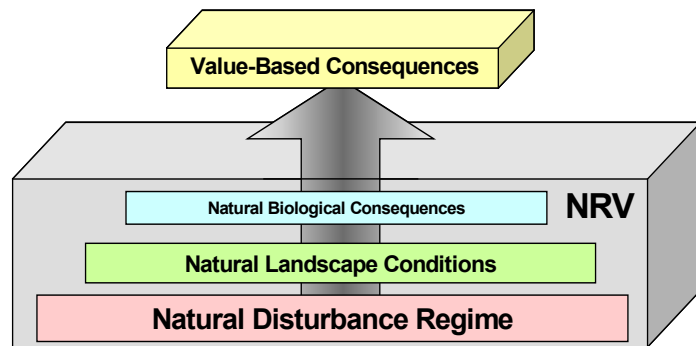
**Figure 1. Three Types of Natural Range of Variation (NRV)**



Second, there is a natural flow from cause to effect as one moves from 1-3, and upwards through Figure 1. Disturbance patterns are a trigger for change, which explains the tendency to equate NRV with disturbance regime parameters. Third, our understanding of natural processes and patterns declines from level 1 to level 3. For example, our confidence of the historical range of disturbance patterns far exceeds that of the historical range of historical habitat levels for caribou. And lastly, based on what we know so far, each of the three NRV boxes has a huge natural range (represented by the z-axis in the box in Figure 1). As we will see ahead, this natural range is both a challenge and an opportunity.

Deconstructing ecosystem dynamics as in Figure 1 also allows us to better appreciate how and why natural systems delivery ecological goods and services. For example, as shown in Figure 2 natural functioning ecosystems ultimately deliver *value-based consequences* through NRV, the foundation of which is disturbance regimes. It also makes it clear that we ultimately manage forested landscapes, and thus our many values, by managing disturbance activities. The fundamental importance of disturbance regimes as illustrated in Figure 2 is precisely why EBM proponents advocate disturbance emulation strategies (but see ahead).

**Figure 2. NRV is critical to the delivery of value-based consequences.**

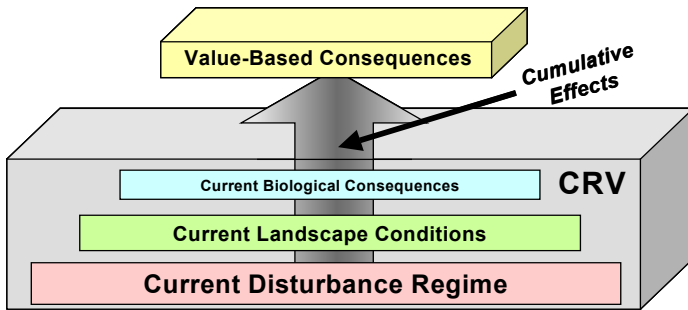


**2. Range of Variation Timelines:** Now that we have a conceptual diagram of how natural landscape ecosystems provide goods and services, we can distinguish range of variation patterns across three different timelines:

1. **Natural Range of Variation (NRV).** Patterns associated with historical, or *pre-industrial* (*i.e.*, no commercial and/or fire control) timelines. Varies from the early 1900's to 1980's depending on location. NRV often serves as the biological baseline. We are heavily invested in this research.
2. **Current Range of Variation (CRV).** Patterns associated with post-industrial era until the present. This period may be sub-divided into eras associated with different policies and practices. This category is generally poorly documented, although we are beginning to explore this with two more recent projects comparing NRV to CRV.
3. **Future Range of Variation (FRV).** This captures the many possible future disturbance scenarios, landscape conditions, and biological consequences. This requires some modeling and linkages with other values / FRI programs. The ND Program began venturing into FRV with the Healthy Landscapes project.

Although the contents of the boxes for NRV, CRV, and FRV are identical, the CRV and FRV boxes include all forms of natural, naturally modified (such as with fire control), and cultural disturbances. And while it is important and necessary to understand the specifics of each disturbance vector, it is this package of activities – the *cumulative disturbance regimes* - that create the landscape conditions, biological consequences, and value-based consequences. Thus, the thick vertical arrow representing the logical flow within CRV also reflects how *cumulative effects* occur (see Figure 3). Although not shown, note that this same logic applies to the FRV box.

**Figure 3. CRV has the same components as NRV, although now we have cumulative effects.**

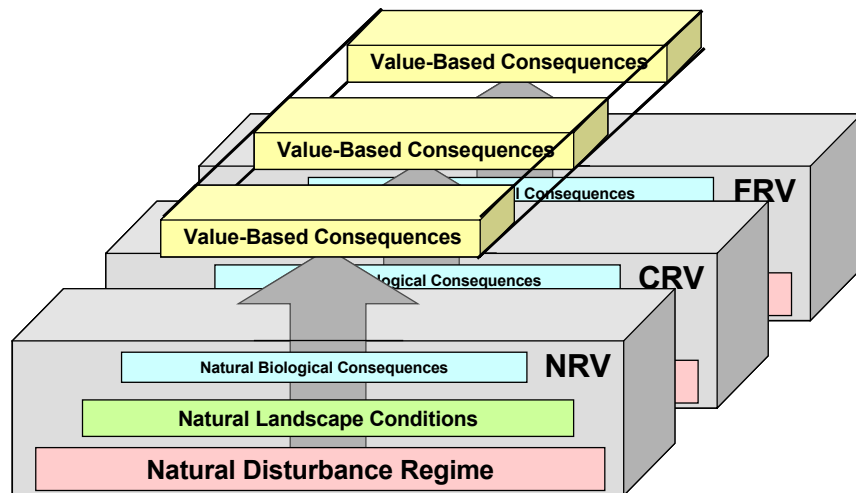


The relationship between the three RV boxes in Figure 4 provides valuable information on several levels. Consider that the red boxes represent policy choices (harvesting levels, energy sector development, access restrictions, fire control policies, etc) and the green, blue and yellow boxes are the results of

those policy choices. The relative distance between NRV and the other RV scenarios (which is measurable) reflects ecosystem diversity and resilience. Note also that the value-based consequences from each scenario are not necessarily mutually exclusive – in fact, there can be considerably overlap. The diagram also takes into account landscapes that are already culturally modified. Once it has been determined that a landscape has, or is deviating from the desired conditions, the necessary changes to the (future) disturbance regime are not necessarily based on NRV. In fact, blindly emulating NRV disturbance regimes may not create the desired consequences, and may even make things worse.

If nothing else, Figure 4 demonstrates that our management goals are almost always in the yellow, blue, and sometimes the green boxes. The red box (*i.e.*, the disturbance regime) is just a means to an end. However, it is our only means.

**Figure 4. The relationship between NRV, CRV, and FRV.**



**3. What is a Natural Pattern Approach (NPA)?**: If a) NRV includes more than disturbance patterns, and b) natural patterns includes NRV + values-based consequences, then there are a number of different ways of interpreting this mental model. One of the most important lessons we learned as a team is that the perspectives of under what circumstances, at what (planning) level(s), and to what degree knowledge of natural patterns should be applied to the management of forest landscape ecosystems vary widely. *In other words, to what degree do we acknowledge, acquire understanding of, and use Figure 4?*

At one extreme, to many, an NP approach is a *natural disturbance emulation strategy* – which entails defining a series of coarse decision-making filters to help forest management (and forest management alone) evaluate ecosystem health (*i.e.*, the red NRV box in Figure 4). The coarse filter interpretation manifests itself as a series of disturbance pattern indicators and thresholds (Franklin 1993, Hunter 1993, Bergeron et al. 2007, DeLong 2007, Vaillancourt et al. 2009). A coarse-filter interpretation is intended to fit within all of the existing forest management systems, frameworks, and policies, and there is little risk of associated philosophical or institutional pushback

The other extreme interprets a natural pattern approach not just as part of, but inseparable from, an ecosystem-based management (EBM) approach to natural resource management (*i.e.*, all of Figure 4). This version of an NPA assumes that the single common focus of all (cumulative) management activities is the overall health of the ecosystem, which is philosophically and technically very different from our approach to natural resource management today.

Furthermore, it involves substantial changes to management tools and systems, and institutional frameworks and cultures (Leopold 1949, Agee and Johnson 1988, Pickett et al. 1992, Grumbine 1994, Lotz 2004, Granek et al. 2010). Note that the goal in this case is not to bring landscapes back within NRV, but rather to use NRV as the foundation for planning and monitoring decisions. Some of the consequences of the EBM version of an NP approach include:

- a) All land management partners are involved, regardless of tenure, jurisdiction, or resource value. This includes regulatory agencies.
- b) All cultural and natural disturbance activities are included (which would include wildfire management, access, salvaging policies, etc).
- c) All parts of the landscape are involved, including (forested and non-forested) terrestrial, soils, and aquatic components.
- d) All space and time scales are relevant – up to the biome scale.
- e) All decisions are linked with outcome predictions. This means linking disturbance patterns with landscape consequences, biological consequences, and ultimately, value-based consequences. This is *true* (*i.e.*, active) adaptive management.
- f) Using natural patterns as a common language as a universal method of evaluating risks (to ecosystem health).
- g) Collaborative decision-making, planning, and monitoring.
- h) Joint responsibility for decisions and outcomes.

Between these two extremes exist many possibilities. For example, Figure 5 demonstrates how as the number and complexity of critical NP elements increases (from the list above for example), the NP approach shifts from being more of a coarse filter version (A) towards more of an EBM version (F). As the element list progresses from top to bottom, the policy and practices implications become more acute. So which NP approach is correct?

**Figure 5. Relationship between NP elements and different NPA approaches.**

NP Element	NP Approach					
	A	B	C	D	E	F
NRV knowledge	X	X	X	X		X
Pattern breadth		X	X	X	X	X
Suitable landscape size	X	X	X		X	X
Plan across borders			X	X		X
Use of prescribed fire				X	X	
Whole landscape planning			X	X	X	X
FM disturbance plan				X	X	X
Link pattern with process				X	X	
Active adaptive mgmt.					X	X
Full joint planning					X	X
Revisit salvaging						X
Joint monitoring						X
NP land use baseline						X
Etc...						X

*(From Andison et al. 2009, Healthy Landscapes FRI report)*

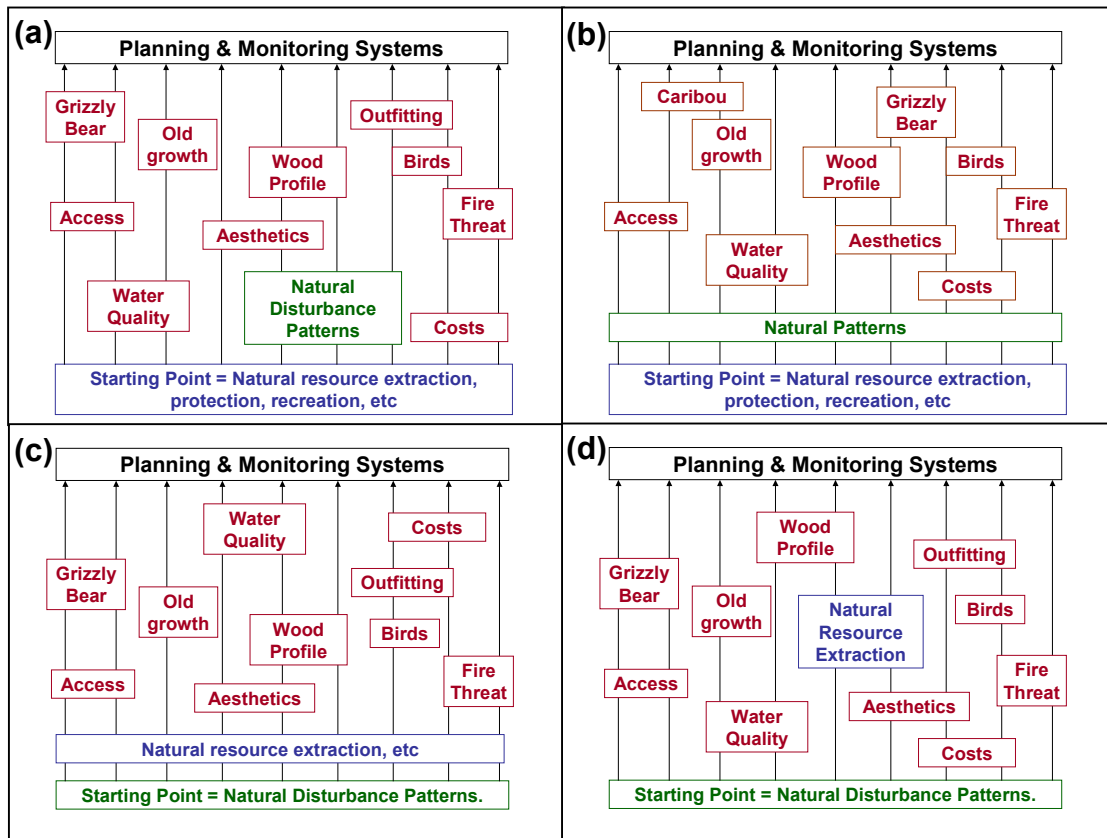
Consider that within the geographic scope of the ND Program today, there are not as of yet any provincial guidelines for forest (or other) management based on NRV knowledge. The advantage of this strategy is that it allows the natural dynamics of this new concept to evolve, and to continue to learn as we go via research, demonstrations, communication, and integration. It also allows the FRI partnership to focus discussions, debates, and potential solutions on making specific elements (from Figure 5 for instance) a reality. However, it also means that over the short term there will exist many different realities of an NP approach - all of which are equally valid in the absence of any guiding policy. The problem is not whether one version is more appropriate than another, or even the existence of multiple versions - but rather the lack of articulation of which version is being assumed or pursued.

***Herein lies an emerging challenge of the ND Program; how to reconcile conflicting perspectives on how, or to what degree to use NP knowledge?***

The problem can, and has already, become significant enough to talk about. To demonstrate, Figure 6a depicts a simplified model of how we make decisions today. The bottom (blue) box is the starting point, which is the primary management goal (such as wood fibre production, recreation, etc), the top (black) box represents the decision-making systems, and the boxes in the middle are all decision-making filters – other values that must be considered. Figure 6a shows natural patterns as a new class of these decision-making filters. This represents the simplest possible (or coarse filter) interpretation of an NP approach since there are very few policy and process changes required.



**Figure 6. Four Different Policy and Process Scenarios for Integrating Natural Patterns Within Forest Land Management.**



(from Andison et al. 2009).

Figure 6b illustrates a planning system similar to 6a, but with two layers of filtering: primary and secondary. In 6b natural patterns are the *primary* decision-making filters whereby NRV (and the relative distance to CRV) is applied as a first-cut filter, after which all of the traditional fine filters are considered. Subsequent analyses may include generating scenarios to predict the impact of FRV on value-based consequences. An example of this would be a comparative analysis of NRV and CRV as part of a land use planning exercise, similar to that which the ND Program completed for the North Saskatchewan land use zone.

Planning option 6c represents a more fundamental shift in how decisions are made. This version proposes using natural patterns as the starting point for decision-making, and the original foundation becomes the primary filter. At this point we begin to see far more integrated planning and monitoring activities. The Hwy40 North Demonstration project is an example of this strategy.

The final planning option shown is to use natural patterns as the foundation, and the original foundation(s) becomes just one of many filters (Figure 6d). This is close to an EBM version of an NP approach, which is something we demonstrated in the Healthy Landscapes project.

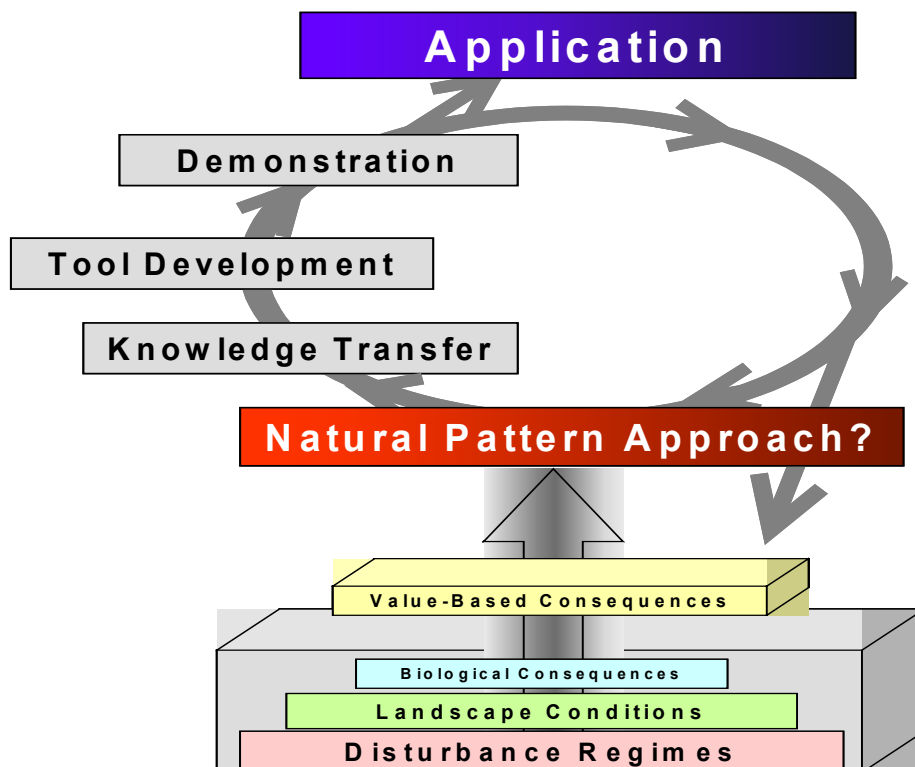
Not only is there no “right” answer to the question of an NP approach, but the exploration of the possibilities, and how they might align (or not) with existing resource management needs, should be a critical part of any new Program.

**4. Program Emphasis:** The ND Program has long recognized several focal areas for investment beyond basic research activities associated with understanding patterns as in Sections 1 and 2 above.

1. **Knowledge Transfer.** This includes all forms of written, verbal, and digital communication, professional short courses, and providing ongoing advice and expertise to partners on an ad-hoc basis.
2. **Tool Development.** Specific products that provide decision-support services. Two examples of ND tools include the online research database OnFire, and the spatially explicit disturbance event pattern planning tool, NEPTUNE.
3. **Demonstration.** Projects that explore the veracity of new methods, tools, practices, policies, and partnerships. Examples of our projects that reflect this focus include the Hwy40 North Demo project, and the Upper Athabasca Healthy Landscapes project.

These three elements also correspond to the integration of NP knowledge into planning and management (Figure 7).

Figure 7. A Conceptual Model of the ND Program Flow.



The bridge between research activities (on the bottom of Figure 7) and management needs and activities (on the top of Figure 7) is notoriously challenging to bridge. Unlike research, these activities require active and ongoing participation from a partnership. In the case of the ND Program, communication and education must address specific needs for information. The success of our two most prominent DSS tools is largely due to ongoing critical input from partners. Furthermore, one of the more valuable lessons we learned about demonstrations is that while the ND Program can develop, propose, facilitate and/or support them, these should ultimately be led by one or more of our partners.

Another key ingredient of the success of the integration components is clarity of needs. Developing management needs is the shared responsibility of both the researchers (to identify the possibilities) and the managers (to provide clear direction on expectations). The best results are usually associated with a highly iterative process that progresses from concept to design.

The transition from research to application for the ND Program is particularly challenging because of the issue of multiple interpretations of an NP approach. Thus the prominent role of the *natural pattern approach* box in Figure 7. Now that we understand its importance, we recognize that this transition is the key to the success of the next iteration of the Program. For example, tools and demonstrations developed under the assumption that model 6b (in Figure 6) as the goal will almost certainly fail if the actual need was to support the management model represented in 6c. Similarly, a demonstration of approach F in Figure 5 will almost certainly lead to confusion and frustration on the part of partners if the expectation was simply to support approach A.

## Part II: Workshop Results (by Dr. D.W. Andison)

The workshop was open-ended, and the feedback was understandably wide ranging in both breadth and depth. I have organized the comments and suggestions into four major themes; 1) Credibility, 2) Integration, 3) Translating theory into practice, and 4) Research.

### Theme #1: Credibility

Although linked, there were two issues related to this theme; a) credibility of the concept of NRV, and b) credibility of the ND Program. There was agreement that a “*Mother Nature knows best*” premise is unevenly accepted. The participants had experienced everything from a) rigid opposition, to b) cautious support in principle, to c) unequivocal support. The group observed that the wide range of opinions on the value and role of using natural patterns as management guides – and thus the goals and objectives of the ND Program - creates confusion, frustration, and sometimes barriers to acceptance, support, and implementation.

Specific comments from participants:

- More exposure to the conceptual underpinnings of the use and value of natural patterns.
- More active links with FRI Board members (continuity of messaging).
- Strong emphasis on peer-reviewed publications.
- Better communication of Program goals and objectives
- Clarity around products.
- Better articulation of where the Program is heading.
- Focus on project completion.
- (Ensure there is) relevance to management objectives.
- Increase capacity (within the program).
- Clearly define what we want to do for management, and how to achieve it.
- Effective management structure (of the program).
- What is the relevance of NRV to existing management objectives?
- What are the (potential) ways in which NRV might (or not) coincide with other objectives? (high level discussion, not the details).
- High profile, and highly experiential examples and demonstrations of ND integration exercises in various forms.

### Theme #2: Integration

The group talked at length about integration, but in different ways. I have classified the comments into four different levels.

1. **Integrated disturbance activities.** The ND Program has been focusing largely on the fire versus harvesting comparison. In general, the group agreed that we could be expanding on that, although the specifics varied.
  - Potential new link between prescribed burning and harvesting.

- We should also be thinking in terms of integrating the activities of the energy, mining, parks, and the forestry sector.
- Shift towards cumulative effects of all disturbance vectors, natural and cultural, within and across jurisdictional boundaries.

**2. Integrated management approach.** To what degree, and in what role is a NPA a part of a more integrated approach to managing forest landscape ecosystems? The group discussed this in various forms throughout the day. The comments suggest there is a desire for the ND Program to not just be a part of this, but also take a leadership role. Still, the specific comments are highly variable.

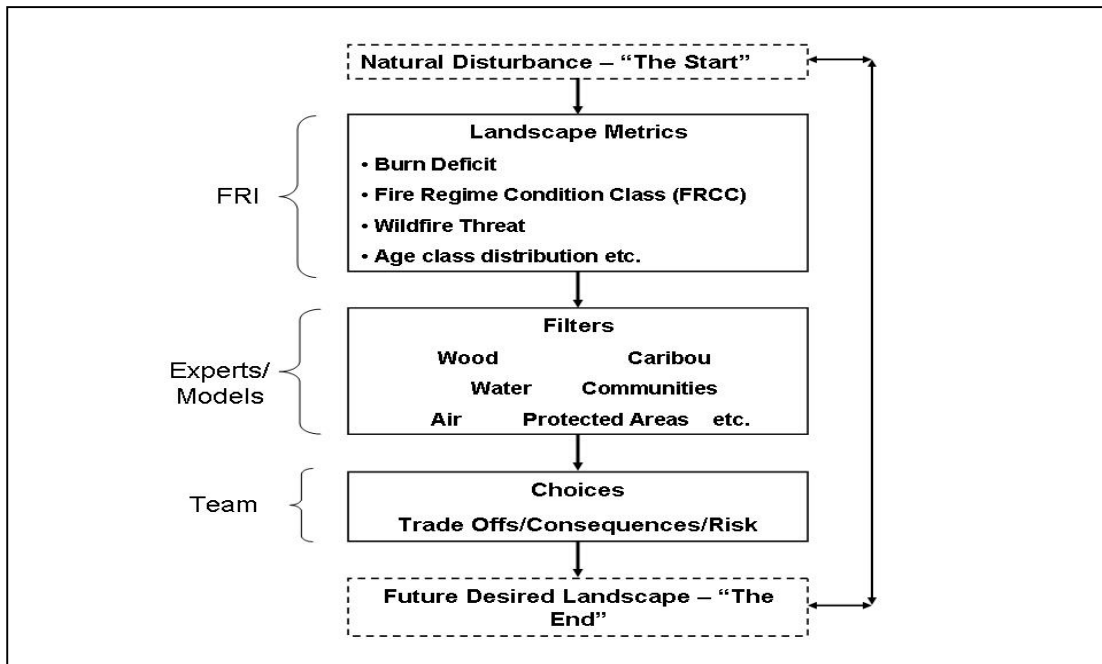
- ND can't be everything (so we should be careful with respect to expectations).
- More integration demonstration projects like Hwy40.
- Build on Healthy Landscapes demonstration idea.
- Move towards ND as a management framework.
- ND as the common language between all land resource managers (forestry, energy sector, parks, mining, bio-energy, etc).
- Interested in (knowing more about) how NDP work will / could fit with actual management practices between agencies.
- Need a more integrated approach to planning that involves ND with land use planning, species at risk, and recovery planning.
- (Develop) opportunities to apply and integrate ND research into cumulative effects management and an integrated mgt framework.
- Need to apply integrated approach (based on ND); not manage to single value but to multiple values; try to apply this integration
- Full integration such that Energy, Recreation, Parks all work through and across administrative boundaries (using ND).
- Consider (ND) as a foundation for land resource management.
- (ND to) Create the foundation for the “paradigm shift”

One of the workshop groups took these ideas a step further and generated the diagram below based (Figure 8) on Figure 6. They were particularly interested in the involvement of a larger partnership, with FRI contributing to the top box, other experts in the middle box, and the partnership responsible for the lower boxes.

**3. Integrated Program.** This specifically refers to how the ND Program functions both in terms of doing research, as well as integration and demonstration projects.

- Stronger links with other researchers, universities, networks.
- Stronger links other FRI Programs – Water in particular.
- Stronger links to the FRI Board of Directors.
- Links to biodiversity monitoring programs and groups.

Figure 8. Adapted version of an NP approach from one workshop group.



**4. Integrated Tools.** – The ND Program is generating some stand-alone decision-support tools. General agreement that we should be expanding this in general in terms of breadth, although again, specifics varied:

- Tool(s) that allows us to evaluate choices and tradeoffs.
- Disturbance effects on hydrology; link to Water Program via CEM; how to link up and produce tools.
- (We need the) ability to evaluate management choices against conflicting objectives.

### Theme #3: Translating Theory Into Practice

Many comments focused on how the concept of an ND approach translates into practice: how it might look like on the ground, and what implications it might have for policy. The comments related to this topic spanned from operational scales to land use planning. The comments also spanned many different versions of an NP approach (Element #2 from above).

- Operationally, what does ‘it’ (i.e., an NP approach) look like, how does it happen, and what are the outcomes?
- What do the possible future scenarios of disturbance look like (over time and space)?
- How does it happen, and what and who does it involve?
- How does an ND-based plan relate (or not) to other management objectives?
- What are the types and significance of the barriers to making (any number of ND related) changes a reality?

- Why is there not more (consistent) buy-in to the concept?
- What policies, practices, regulations, institutions, etc., are barriers to potential ND implementation?
- What are the alternatives & approaches that could overcome barriers?
- What policies, practices, regulations, institutions, etc., are barriers to potential ND implementation & what are the alternatives & approaches that could overcome *barriers*?
- The questions related to policy, practice and outcomes that are raised by managers (as they relate to ND) should be investigated, and the knowledge transferred.
- More demonstrations of integrated projects like Hwy40.
- How will ND fit with existing management practices?
- How do we apply knowledge, and evaluate success?
- Focus should be on operational applications and linkages.
- What is the level of support for implementation?
- (Can we) Use ND to provide guidance for dealing with (existing) footprint mitigation?

#### **Theme #4: Research**

The group spent less time discussing specific research needs than they did more strategic issues. Having said, that the group made it clear that they expect high quality, published research that focuses on the relevant questions. More specifically:

- Help us to identify where to put fire on the landscape from both a) ecological, and b) burn deficit perspectives.
- Continue to explore the question of mixed-fire regimes as it relates to the foothills area – and potentially beyond.
- Expand the mandate to include biological impacts research on natural patterns, potentially aligned with the efforts of EMEND and others.
- Merge existing pattern research with process research.
- Comparisons of the patterns, and effects of an ND-based disturbance, and that of others (including fire) 0-30 years after disturbance. What is the efficacy of emulating (which) natural patterns?
- Research on processes that affect natural disturbance patterns.
- Expand beyond fire research to other natural disturbance agents. (ie, flooding & beavers in riparian zones).
- How does disturbance footprint alter biological consequences?
- Understand mixed-severity fires.

## Part III: Moving Forward (by the HL Activity Team)

The Program has for years been involved with projects in various parts of Figure 7 – beyond research, beyond NRV, and beyond disturbance. The project diversity occurred because a) we had no preconceived idea of what a natural pattern strategy was, and b) we were opportunistic. This diversity has been a benefit because it has allowed us the freedom to fully explore the many possible interpretations of an NP approach. The wisdom of hindsight at the visioning workshop (for example) would not have been possible without the benefit of this experience. On the other hand, this diversity has created some difficulties because the perception is that we were a) not focused, and b) not clearly articulating the Program goals and objectives. Being opportunistic also meant that some projects were not completed and not all of the results were published in a timely manner, both of which negatively impacted our credibility.

Thus, the new Program must - at the very least - embrace and clearly articulate what we are doing, which we recognize is already well beyond the original mandate. At the same time, we need to limit opportunism of the past in favour of consistency and follow-through. Furthermore, we need to ensure our new vision aligns with the newly minted FRI business strategy, which emphasizes expanded partnerships, supporting partners needs, expanded geographic scope, knowledge transfer, and more integration (FRI 2011).

The following are a series of recommendations by the current activity team concerning the future of The Program:

**Recommendation #1: Name change.** Changing a program name after 15 years is a big decision. On one hand, the “Natural Disturbance Program” has become a brand, but on the other hand, the name is misleading, and is in part the source of some of our issues. After careful consideration, we have chosen to change the name to the *Healthy Landscapes Program*. This name reflects an expanded vision of the Program (see ahead). Furthermore, *healthy landscapes* is one of the FRI values in the recent business strategy (FRI 2011), and ultimately captures what we now refer to as ‘cumulative effects’. We also feel this name is more representative of the more specific associated program changes, as per recommendations 2-11.

**Recommendation #2: New Program Mandate.** We agree that the current program mandate is not only too narrow, but no longer fully captures the needs of our partners. In fact, our current projects span most of the elements in Figure 9 (see Section 1 of this document for a full explanation of the elements in this diagram). The alignment of the Program vision and mission with project choices, objectives, and their outcomes, is a critical indicator of Program credibility. Expectations must be consistent with outcomes.



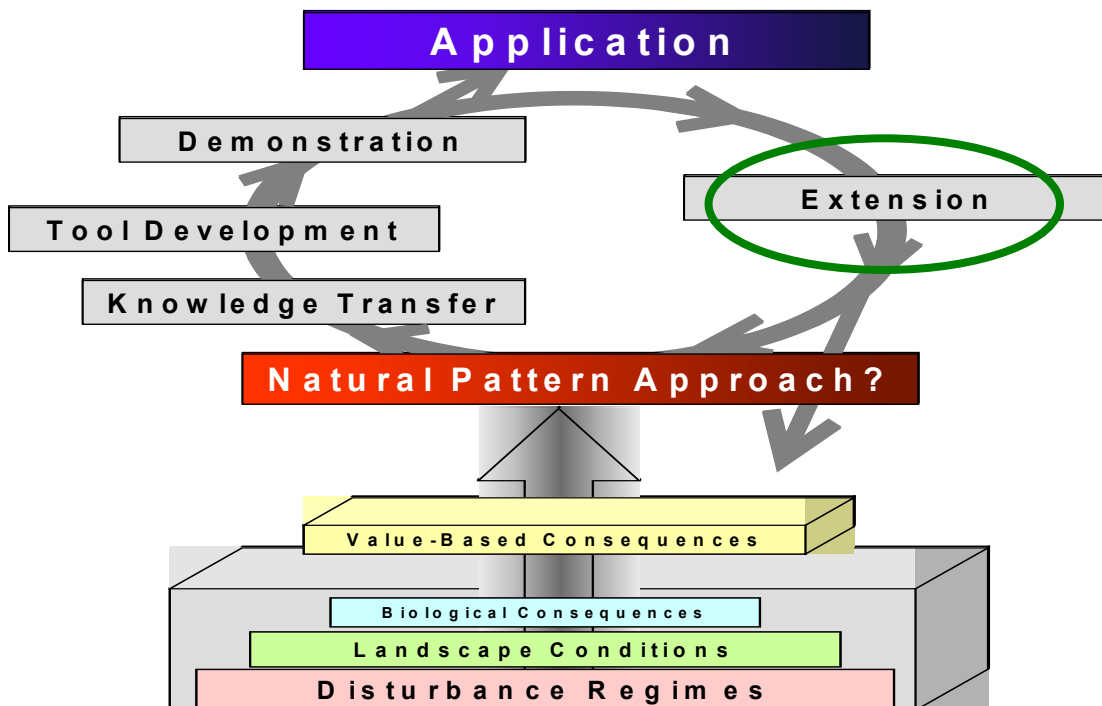
The new vision for the Healthy Landscapes Program is as follows:

*The Healthy Landscapes Program is a leader in natural pattern strategies.*

The HL Activity Team also agreed to a new Program mission statement as follows:

*The Healthy Landscapes Program seeks to understand natural and cultural patterns, and explore and demonstrate how natural pattern approaches can contribute to sustainable resource management solutions.*

Figure 9. Proposed Healthy Landscape Program Structure.



**Recommendation #3: Understand *cumulative effects* by recognizing and quantifying *discrete effects*.** *Cumulative effects* are a human construct created by compartmentalized geo-political systems and policies, aided by reductionist scientific methods that necessarily compartmentalize the study of patterns and processes. Disturbance patterns on natural landscapes are generated by the cumulative impacts of wildfires, flooding, landslides, insects, disease, and more. As much as we would prefer it otherwise, we must study each in turn because we can only hope to understand their cumulative impacts by understanding them first individually.

NRV (*i.e.*, Figure 1) by definition includes all natural disturbance agents. However, Figure 4 is somewhat misleading because when you shift from NRV to CRV and FRV, disturbance patterns, and their consequences, become considerably more complex. Not only does one need to consider all of the classic natural disturbance vectors, but also that, a) humans have almost

certainly influenced their regimes beyond the natural range (see Part 1, Section 1), and b) there is a host of new cultural disturbance vectors to consider (such as wildfire control, harvesting, exploration, surface mining, and so on).

The ultimate value of a natural pattern based program is to inform our partners as regards how individual management choices contribute to outcomes and values. Thus, the Healthy Landscapes Program will continue to study key natural and cultural disturbance patterns in isolation, but with the greater goal in mind of understanding the cumulative effects of all disturbance vectors – and their cumulative condition, biological, and value-based consequences (*i.e.*, the green, blue, and yellow boxes in Figure 9).

**Recommendation #4: Focus more on landscape as the ecosystem.** Similar to Rec. #3, although out of necessity, we tend to study individual components of the landscape (trees, water, habitat, species, soil, etc), our ultimate goal is to understand the landscape dynamics as a whole. The HL Program will encourage, and where possible facilitate, the integration of landscape elements within our research projects, but particularly so for tool development and demonstration projects. For example, our Fire, Water and Climate project specifically looks at the interaction between fire regimes, water quality, and climate change.

**Recommendation #5: Provide integration leadership.** As one moves up the NP approach scale from A to F in Figure 5, the expectation is that other values become integrated. This next version of the Program should be emphasizing the exploration of the relationship(s) between natural patterns and other values. Furthermore, the Program should be playing a leadership role in developing the appropriate partnerships across Canada. For example, we could be looking at if and how to link NEPTUNE with one or more of the FRI Grizzly Bear Program, Foothills Land Management Forum, and FRI Stream-Crossing tools, and including existing indicators of MPB and wildfire threat, and climate change possibilities into future landscape modelling projects.

**Recommendation #6: Expanded emphasis on knowledge transfer.** The HL Program currently invests approximately 15% of its funding towards communication and education. Most of those efforts are aimed at presenting and interpreting the science. The Program should be expanding the breadth of communication and extension messages and tools to specifically focus on 1) NRV theory, 2) NP approaches, and 3) lessons learned from demonstrations. We also need to expand our audience to those more likely to influence policy. We might consider collapsing the current 3-day NRV concepts short course into a ½-day executive version, on-line games, expanded use of Quicknote “quick hits”, moderated debates, workshops, “canned” presentations for activity team members, and a broader speaking engagement list.

There also needs to be better communication around the various activities of the Program itself, linked to a clearly articulated strategic plan and conceptual model such as Figure 9 to explain why and how our work is relevant to partner’s needs.

**Recommendation #7: Acknowledge and fully explore the tension that exists between NP theory and reality.** The existence of different versions of a natural pattern (NP) approach (the red box in Figure 9) is both a threat and an opportunity. For example, it is tempting to ask the existing partnership to reconcile a collective vision of an NP approach as input to the ND Program. However, in the end, it will still just one of many possible versions of a natural pattern approach that already exist philosophically. If nothing else, we have learned that organizations and people need to find their own level of comfort with the use of natural patterns through sustained and objective communication, education, and demonstration opportunities to explore this very question. We have an opportunity to highlight these differences, and facilitate the associated discussions and debates. We can do this by providing an objective environment in which partners can respect and explore NP approach questions in an open, low-risk, and non-threatening fashion. *Strong, broad, and sustained partnership engagement is required for this element.*

**Recommendation #8: Develop, initiate and/or facilitate demonstrations.**

We interpret a “demonstration” here liberally to include the following::

1. **On-the-ground applications.** The ND Program has initiated two demonstrations so far: the Hwy40 North (operational scale), and the Upper Athabasca Healthy Landscapes (land use scale). Both projects were highly successful based on the discussions and debates they precipitated. Through these experiences, we learned that the most effective way of learning about NP approaches is to get partners involved – at all levels. We also gained valuable experience regarding the mechanics of demonstration projects, and are well positioned with a very large, multi-jurisdictional western Canada partnership to build on that.
2. **Empirically based comparisons and/or trials.** This refers to more immediate (*i.e.*, shorter term) consequences of the implications of applying one or more versions of an NP approach, relative to a “business as usual” scenario under traditional practices and policies. Such questions might focus on relative costs, regulatory conflicts, unintended consequences, or social feedback. Many of these questions would be at the operational-scale, but could extend to strategic short-term options (associated with dealing with second-pass landscapes, or old forest retention options, or access, for example).
3. **Simulation exercises.** Although the least empirical of the group, the long-term - and cumulative - consequences of various NP-based policy approaches are best demonstrated through computer simulation modelling exercises over time and space. This is the true test of policy change over the long-term. Other values can be involved, or not, as desired.

**Recommendation #9: Recognize “Extension” as another key emphasis area (see the green circle in Figure 9).** If we are going to focus more on understanding and developing the top half of Figure 9, then we need to emphasize the development of a critical feedback mechanism through which we can not only integrate what we have learned into knowledge transfer activities, but also into the next round of demonstrations and tool development. Right now, demonstration projects simply end; there is no plan for generating feedback beyond the final report(s). Nor do we have any formal mechanisms for user-feedback for any of our tools.

**Recommendation #10: Commit to build on research.** It is important to ask and address relevant research questions via the needs of partners, and follow through with peer-reviewed publications. Towards that, expanding academic partnerships, funding avenues, and the partnership base is a priority as they relate to partner-identified knowledge needs. However, there is no desire to expand the relative research capacity of the Program at this time in favour of Recommendations 1-9. Internal peer-reviewed publication issues notwithstanding, there are no shortage of high quality research results within and beyond the FRI with which to work. The Program has committed to submitting no less than 12 publications on various topics over the next two years.

**Recommendation #11: Offer Partners An Open Process.** The ways in which partners participate in the Program and the process by which the activity team makes decisions on project funding have been continually evolving. While we have only five Program partners, we now have almost 25 Project partners. The process by which strategic funding decisions occur has also never been fully documented until now (see Appendix A). This is an ideal time to evaluate these structures, and initiate discussions with our existing partners on how they see themselves being involved in the HL Program. Certainly the expanded Program mandate is more likely to meet the needs of a wider partnership involvement, perhaps culminating in the expansion of the Program activity team. A broader perspective from the Activity Team in turn will be more likely to deliver the expanded mandate.

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# Appendix A: FRI HL Activity Team Governance

By: Dr. D.W. Andison

Below is a brief description of how the Foothills Research Institute Healthy Landscapes Program operates, divided into three sections; 1) Project Modes, 2) Project Leads and Management, and 3) the Planning Process.

## 1.0 Project Modes

The projects within the HL Program operate under many different modes. These developed organically to suit needs and opportunities as they occurred. I'm not suggesting these are all equally "good" models to use – this just documents those we have used in the past.

- a) **Core Project.** The HL activity team partners agree to spend core HL funds (usually 177k) to support a project. *We have never spent money from these core funds without unanimous agreement.* Examples: Short course development, riparian research.
- b) **Extended Core Project.** Core funds from the HL Team are supplemented with additional partners and funding. Examples: Wildfire patterns phase I (Weyco provided funds).
- c) **Directed Core Project.** A HL partner requests to have their portion of the HL core funds directed towards one or more projects. Example: PB monitoring in JNP.
- d) **Partial Team Project.** One, or more (but not all) HL activity team partners agree to support a project, but all funding is above and beyond core HL contributions. Examples: LWD, OnFire.
- e) **Extended Team Project.** Any number and combination of HL team and non-team members supporting a project independent of HL core funds. Often initiated by a research request directly to Andison, who was the one who suggested running the project through FRI. Example: Healthy Landscapes - Upper Athabasca pilot.
- f) **Non-Team Project.** Clients not affiliated with the FRI or the HL team that requested work directly to Andison. Andison has run most of these through FRI. Examples, Healthy Landscapes N. Sask, Wildfire Patterns phase III.
- g) **Non-FRI Project.** Any research or tool development done by others, but associated with similar techniques as FRI HL work. May or may not combine data for analyses in the future. Examples: Wildfire patterns (Saskatchewan), Seral-stage simulations (Alpac, Sundre, Tolko, CEMA).

## 2.0 Project Leads and Management

Dave functions as the coordinator for all of the HL projects, but the effort required for each varies significantly. The Project Lead or Principle Investigator (PI) also varies from project to project, and includes:

- a) Program lead (NDPL)
- b) Academic partner(s) (AP)
- c) 3<sup>rd</sup> party consultant (Con)
- d) Other. (O)

The table below gives an overview of how current, potential future, and some past projects fall out wrt project modes and PI's.

Project	Phase	Project Mode							Status
		Core	Extended Core	Directed Core	Partial Team	Extended Team	Non-Team	Non-FRI	
Wildfire Patterns	Foothills ('99-'02)		PL						Done
	Saskatchewan ('03-05)								Done
	N. Alberta ('08-'11)						PL	PL	Done
Healthy Landscapes U. Atha.	Concept devel.						PL	PL	Done
	Pilot					PL			Done
Healthy Landscapes N.Sask.							Con / PL		Done
NEPTUNE						Con			
OnFire					PL				
Short Course		Con / PL							
Large Woody Debris	Research				AP				
	DSS devel.	Con							
Historical Paterns						AP			
Remnant Succession		AP							
Mixed Fire Regimes	Pilot				AP				Done
	Expanded	AP							
Montane Fire Regimes		AP / Con							
FireSmart Monitoring?				AP					Future?
Landscape Patterns (seral)	HWP, ANC				PL				
	Alpac, Sundre, Tolko							PL	

PL = ND Program Lead  
 AP = Academic Partner  
 Con = Consultant

## 3.0 The FRI HL Planning Process

As it stands, there are two main routes for a project to be included in the HL workplan; 1) the formal annual planning process, and 2) responding to ad-hoc needs and opportunities. The two may or may not overlap.

### Formal Planning Process:

- 1) Update Long-Term plan with current activities, new projects and distribute to the HL Activity Team in April / May. Hold an Activity Team meeting at the same time for updates.
- 2) Andison distributes to the team members a preliminary "shopping list" of projects based on input throughout the year and project updates. Not intended to be inclusive – just to get ideas flowing.
- 3) At the same time, Andison usually (but not always depending on opportunities) distributes the long-term plan, and a summary of this list to



existing and potential collaborators at UofA, UofS, UBC, UNBC, UofT, and CFS asking for any input.

- 4) Second Activity Team meeting in Oct / Nov for updates, gather project proposals together, and jointly identify partner priorities for the next fiscal year. Each team member is expected to represent their respective agency's priorities.
  - a. Discussion and agreement on the distribution of "Program Core" funds, a portion of which each year is ear-marked for program coordination.
  - b. For those projects for which agreement was not reached, one or more partners (within or beyond the HL Team) may choose to fund / support a project separately – above and beyond Core funds (see above).
  - c. For any project not associated with the HL team, permission is requested to run that project through the HL program for the next fiscal year (note that this tends to occur more often mid-year).
- 5) First draft of the workplan distributed to the team for feedback, changes in November.
- 6) Final workplan approved by the Activity Team submitted to the FRI Board in December.
- 7) Upon approval of any new projects, Andison identifies and approaches potential collaborators and funding agencies as required. Working relationships established, funding applications completed, etc etc.

#### **Ad-hoc Planning Process:**

- 1) Andison is approached by an existing or potential HL client about a new project need / idea. It is often associated with existing funding. The client is usually not concerned about whether the project is run through FRI or Bandaloop – they just want it done. I do my best to bring such projects under the wing of the FRI HL Program.
- 2) Andison identifies and approaches the most likely individuals / collaborators with the relevant expertise (and time) to complete the project.
- 3) Andison *et al.* develop both an abbreviated, and a detailed proposal as required for approval and/or funding, filtered through the original client(s) to ensure the original question(s) are being addressed.
- 4) Andison determines whether the project would be appropriate under the auspices of the FRI (*e.g.*, objective, no direct links to management, relevance to existing HL program vision, agreement with the Team's vision of the annual workplan, etc).
  - a. The project passes this FRI stress test,

- i. Andison asks the client if they would be willing to run the project through FRI.
    - 1. If the answer is “yes”, Andison determines whether the client can wait until the new planning cycle to initiate the project.
      - a. If the answer is “no”, Bandaloop takes over as project manager.
      - b. If the answer is “yes”, the project goes into the queue for consideration as per 4a or 4b above.
        - i. The may be rejected, in which case it moves into the queue for next fiscal year.
        - ii. The project may be accepted, either with or without supplementary funding from the original client.
    - 2. If the answer is “no”, Bandaloop takes over as project manager.
  - b. If the project does not pass the FRI stress test, Bandaloop takes over as the project manager.
- 5) If the proposed project start date is mid-year, Andison asks the HL Activity Team, and as of now the BoD, for approval for an addition. Such a request also includes any trade-offs for taking on the new project mid-year.

The fate of mid-year requests goes in one of two directions. Some end up being approved with little or no debate. These tend to originate from prominent persons or agencies for which the FRI is intended to serve. Examples include the original Healthy Landscapes project (Minister Morton), the subsequent N. Sask. Healthy Landscapes project (the Land Use Secretariat), and the third phase of the Wildfire Patterns project (a group of five of the largest FM companies in Alberta).

Agreement on mid-year additions to the HL workplan can result in a compromise on the HL Program deliverables as per the submitted workplan. Andison communicates changes to, and asks for approval from, the HL Team via email.

The alternative fate of mid-year project requests is that they are not immediately approved by either/or the BoD or the HL Team, but are included in the annual workplan projects list for consideration from the Formal Annual Planning Process detailed above. This usually happens with project requests that do not come with guaranteed funding, and are thus at the mercy of the desires of the collective HL team member. If the HL Team agrees it is a priority, it becomes a class (a) project as per section 1 above and the appropriate core funding is allocated.