Fish and Watershed Program
Richard McCleary

June 17, 2009

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Presentation Outline

1. Partnership review
2. Review of water conservation challenges
    - Inherited vs. contemporary
3. New tools for integrating water and land management

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1. 2008/2009 Partnership Review

A.FRI Sponsoring Partners and Activity Team Members

- Alberta Sustainable Resource Development – John Diiwu
- Canadian Natural Resources Ltd.
- ConocoPhillips Canada
- Encana Corporation
- Jasper National Park of Canada
- Petro-Canada
- Talisman Energy Inc. – Rob Gibb
- West Fraser Mills Ltd. – Rick Bonar & Mark Schoenberger

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1. 2008/2009 Partnership Review

B. Project Partners and Activity Team Members

- Alberta Stewardship Network
- FRIAA Open Funds
- NSERC
- Trout Unlimited Canada
- UBC Department of Geography – Marwan Hassan

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2. Review of Water Conservation Challenges

A.Inherited

1.Crossings installed before 1982 that obstruct fish passage (most have changed owners) – candidates for replacement.

2. Review of Water Conservation Challenges

A. Inherited

2. Steep crossing approaches on gravel roads with traffic levels that exceed initial design are candidates for paving.

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phone: 216.371.8600 / email: ft@funnytimes.com

2. Review of Water Conservation Challenges

A. Inherited

- Could lobby for a **funding program to address inherited outages** and create greener roads (within terms of Softwood Lumber Agreement).
- Could use a funding structure similar to **Orphan Well Program**, partners would need to include CN, AB Transportation, industries in area.

3. New tools for integrating water and land management

Two Main Categories

1. Compliance at watercourse crossings and in riparian areas.
    - Where are streams and what type are they?
2. Shift to risk/results-based from rule-based approach.
    - Is present state outside of NRV?
    - Are we being effective?

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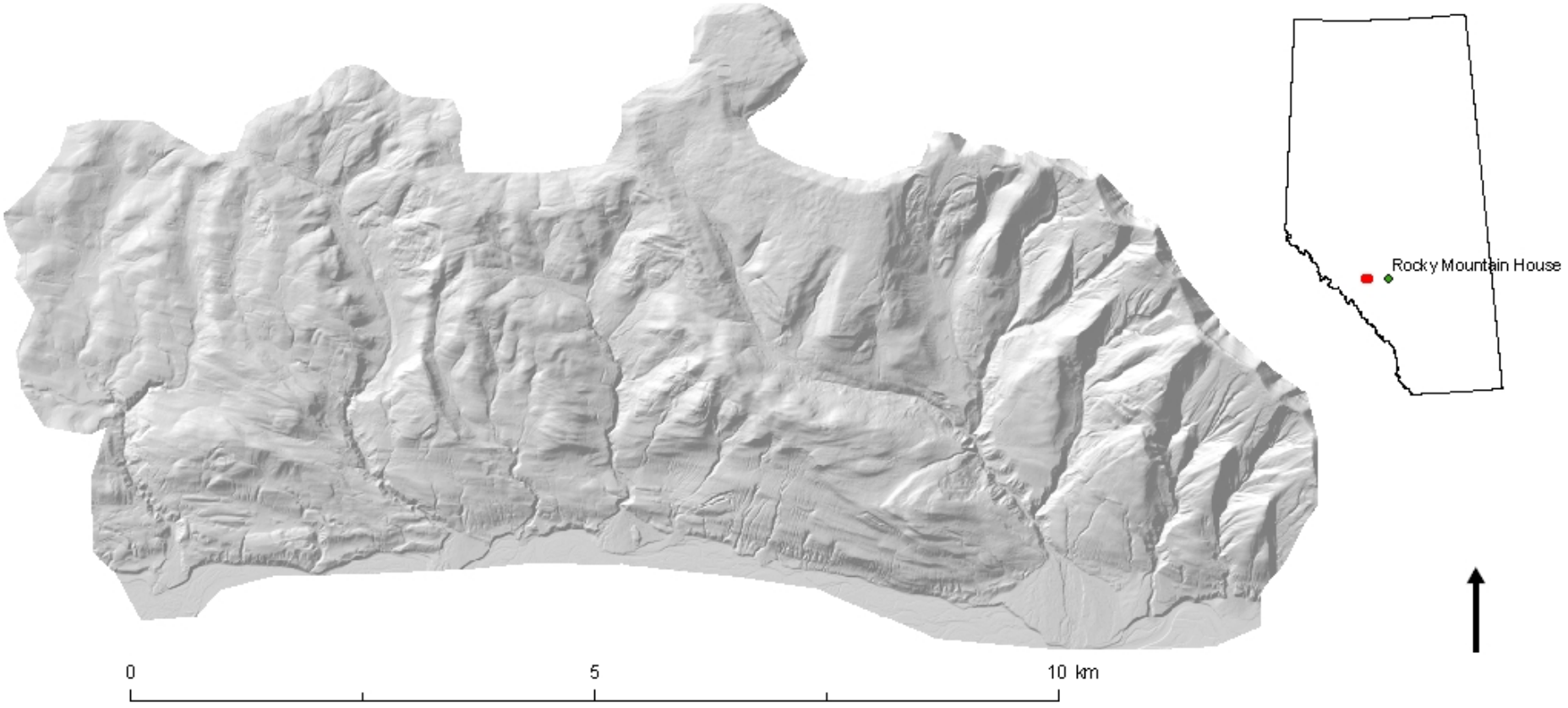
3. New tools for integrating water and land management

1. Compliance - Where are streams and what type are they?

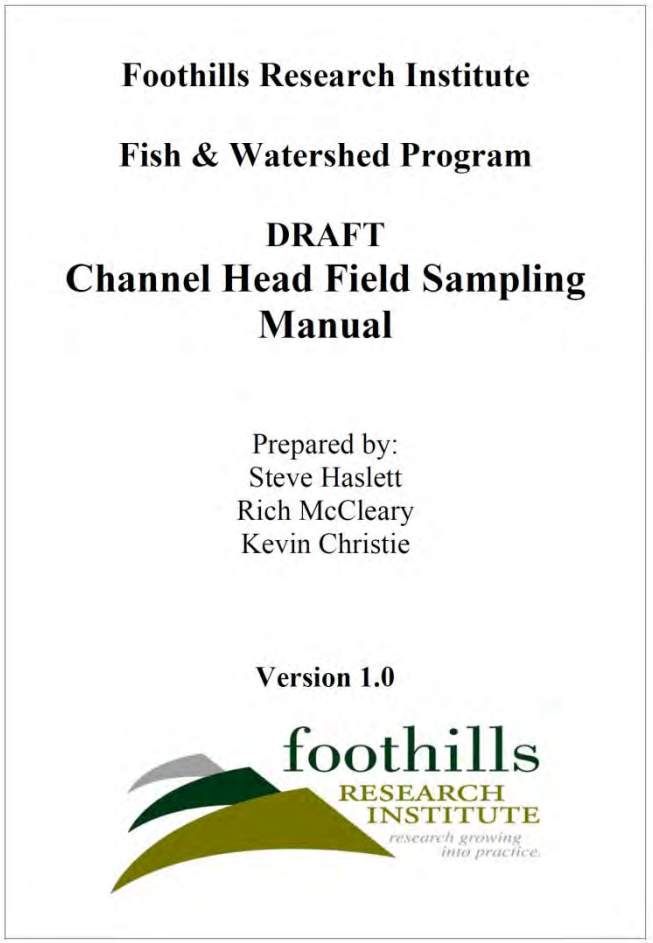
a. Dutch Creek pilot LIDAR project



3. New tools for integrating water and land management

1. Compliance - Where are streams and what type are they?

Channel Classes in High Relief Terrain
NA - hillslope
1. Swale
2. Discontinuous channel
3. Non-fluvial channel
4. Fluvial channel




Hillslope


1. Swale


2. Discontinuous channel

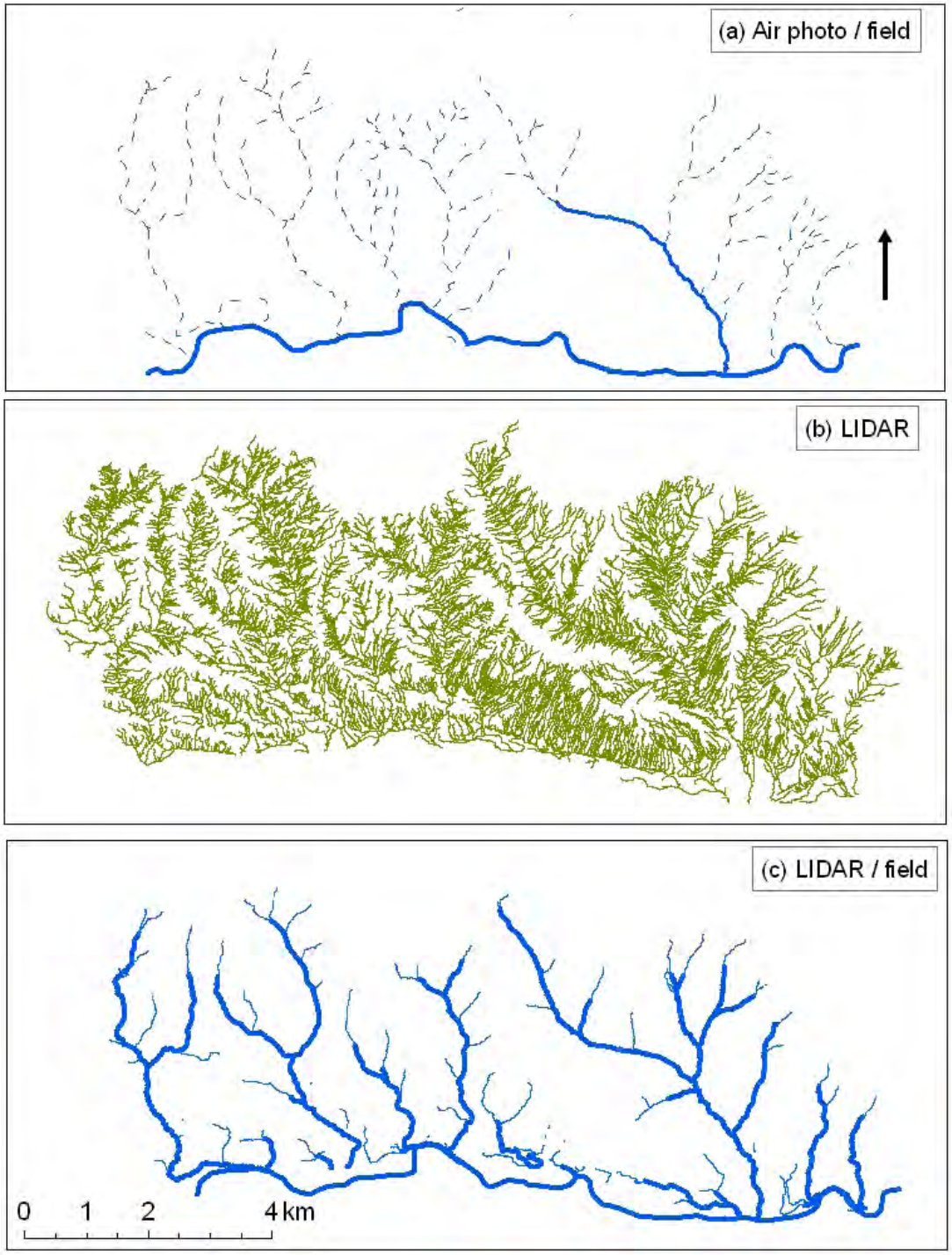

3. Non-fluvial channel


4. Fluvial channel

(a) Air photo / field over-predicts extent of intermittent channels

(b) LIDAR with published model for channel origin over-predicts extent of network

(c) LIDAR / field model has predicted channel origin within 100m of actual



3. New tools for integrating water and land management

B. Hinton Region LIDAR Project: Process-based channel classification

1. Scaled approach.
2. Based on LIDAR data.
3. Uses NetMap design to route processes / information upstream or downstream.
4. Extensive ground truthing of models modeling to define true stream network.
5. Complex plateau / benchland landscape is different from Dutch Creek.
6. Framework for applying knowledge from process-based research projects (woody debris and sediment).

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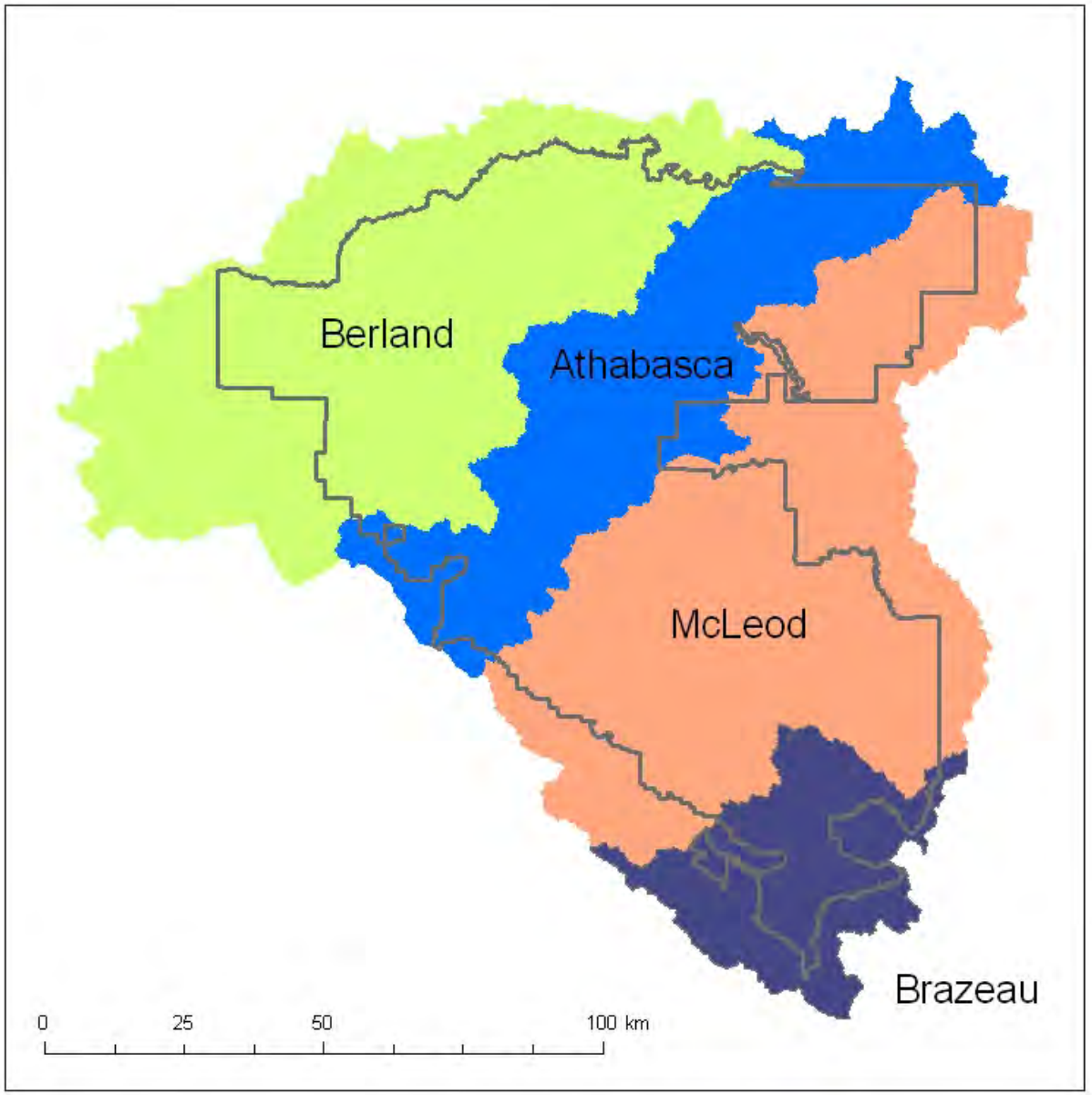
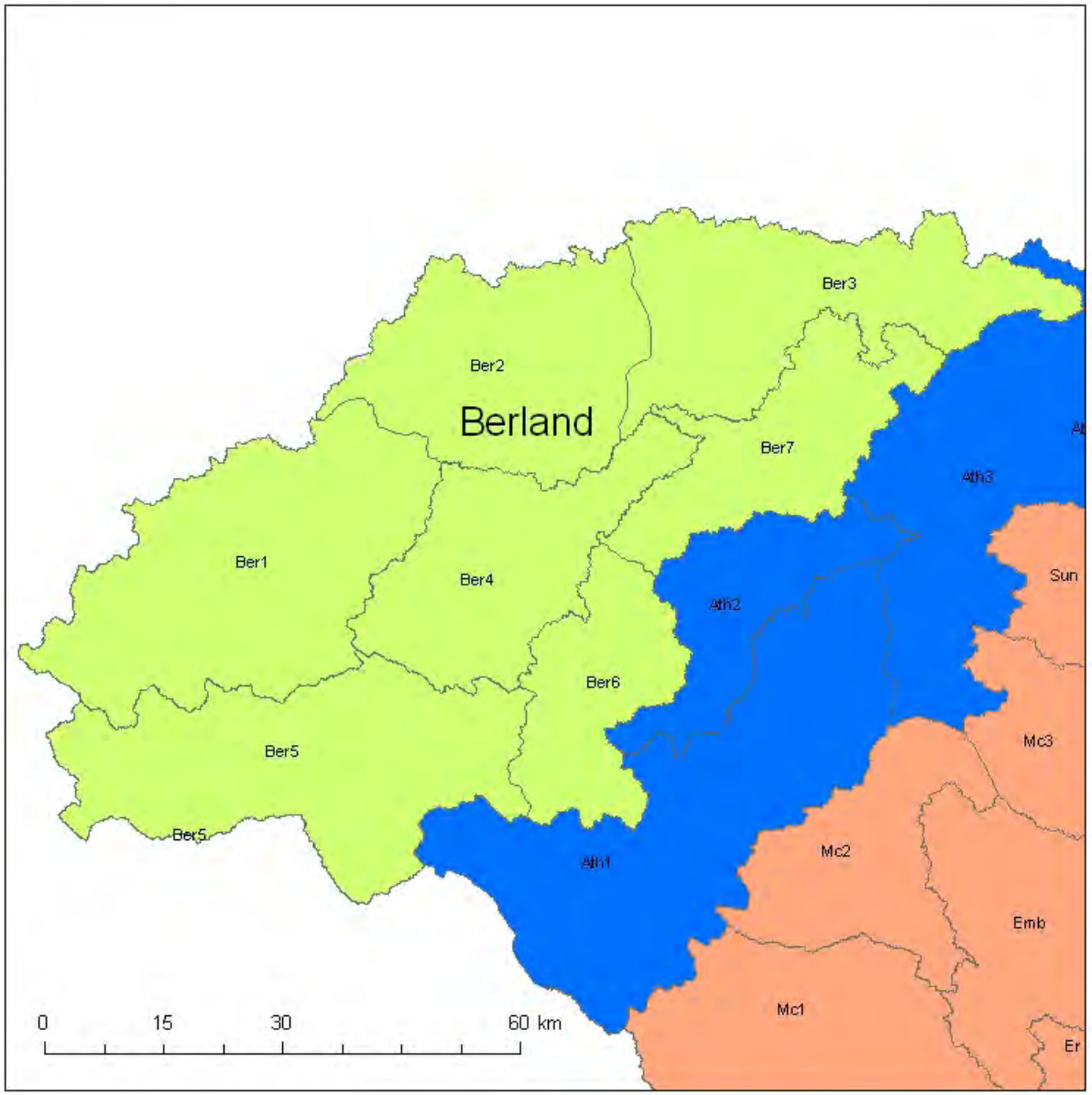
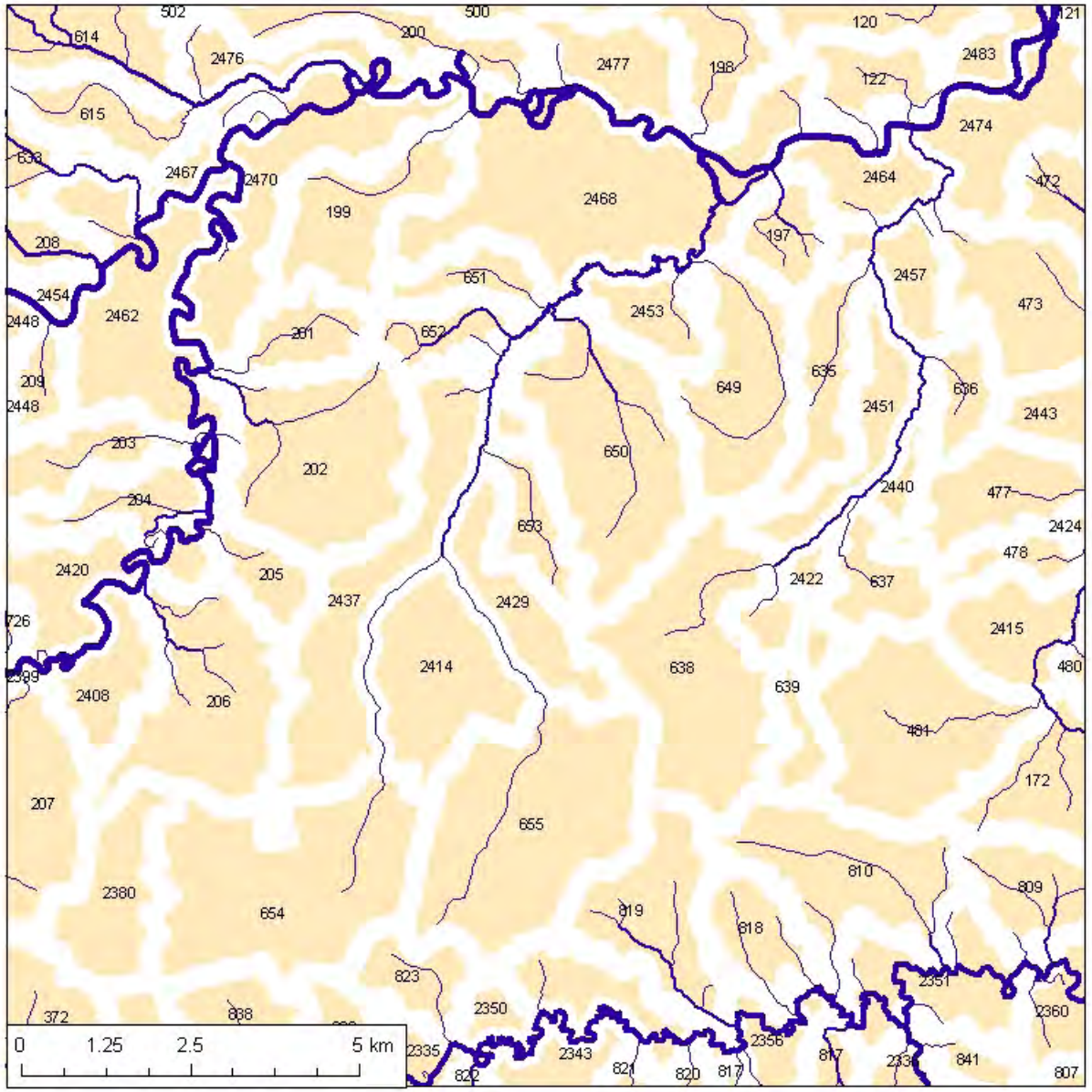
3. Scaled Approach to Watershed Classification and Analysis

Scaled item:	Example map
1. **Basin:** WPAC applications	
2. **Sub-basin**	
3. **Catchment**	
4. **Reach**	

3. Scaled Approach to Watershed Classification and Analysis

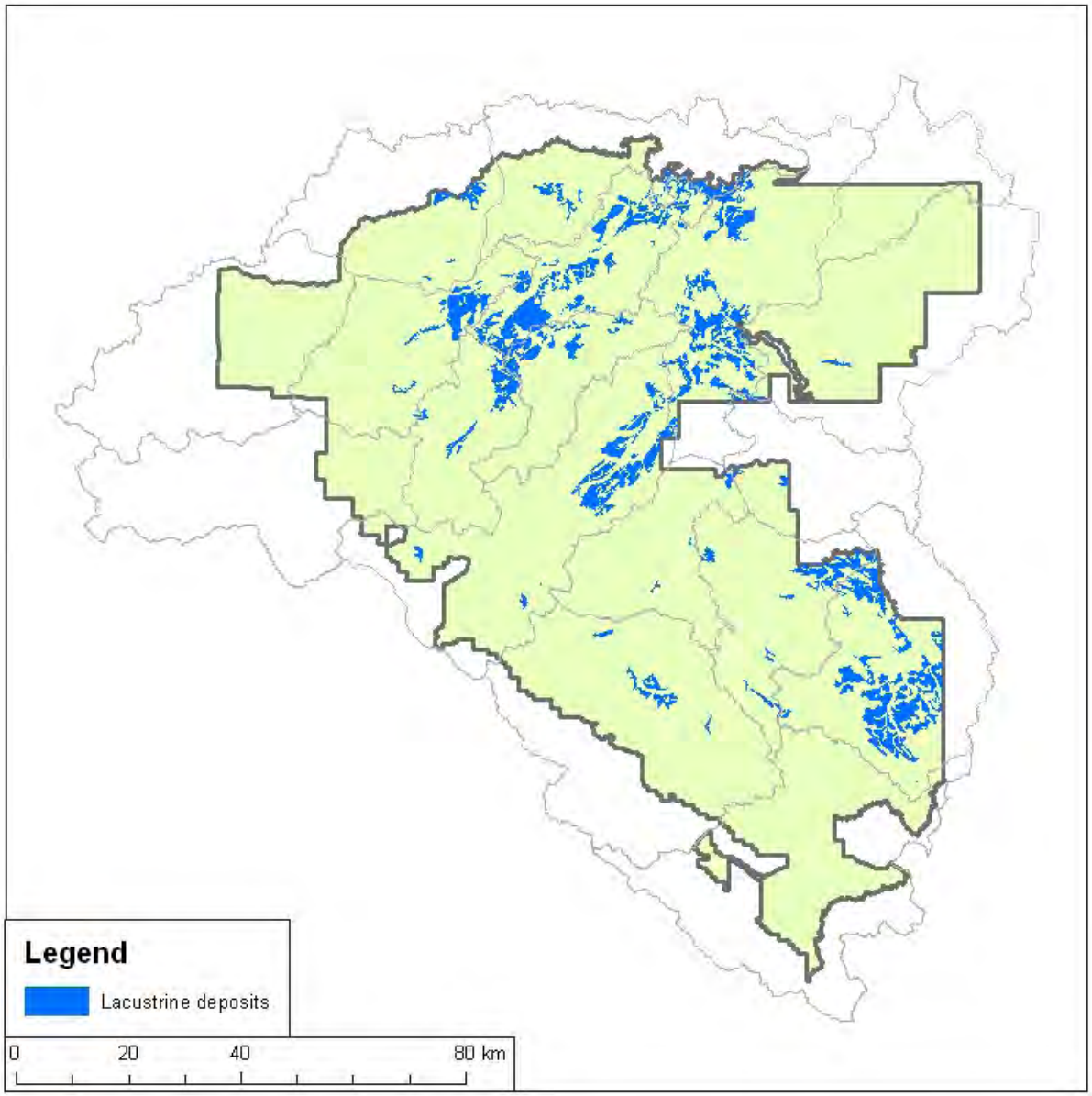
Scaled item:	Example map
1. Basin	
2. Berland 5 **Sub-basin**. Applications include DFMP.	
3. **Catchment**	
4. **Reach**	

3. Scaled Approach to Watershed Classification and Analysis

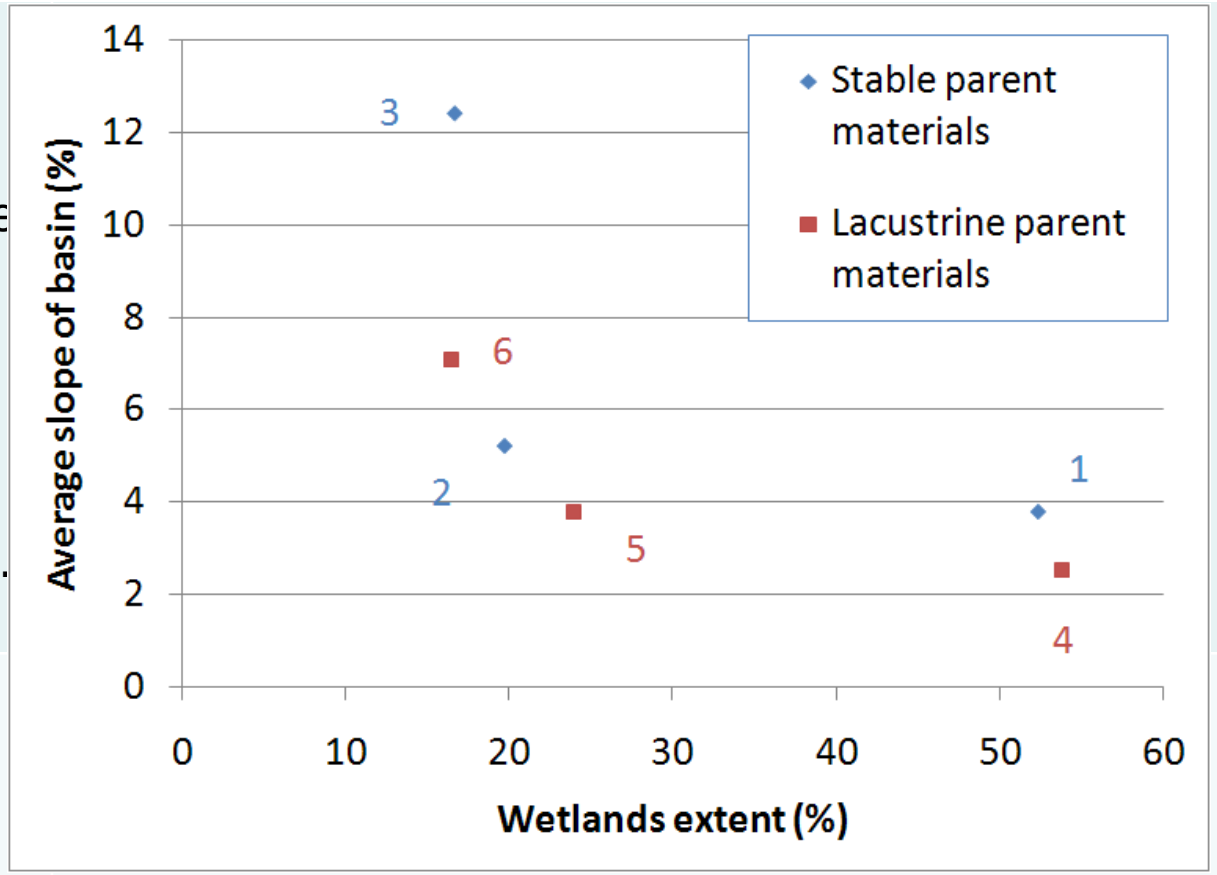
Scaled item:	Example map
1. Basin	
2. Sub-basin	
3. **Catchment** type: divided landscape into runoff units between 1 and 10 km² (n = 2,584)	
4. **Reach**	

3. Scaled Approach to Watershed Classification and Analysis

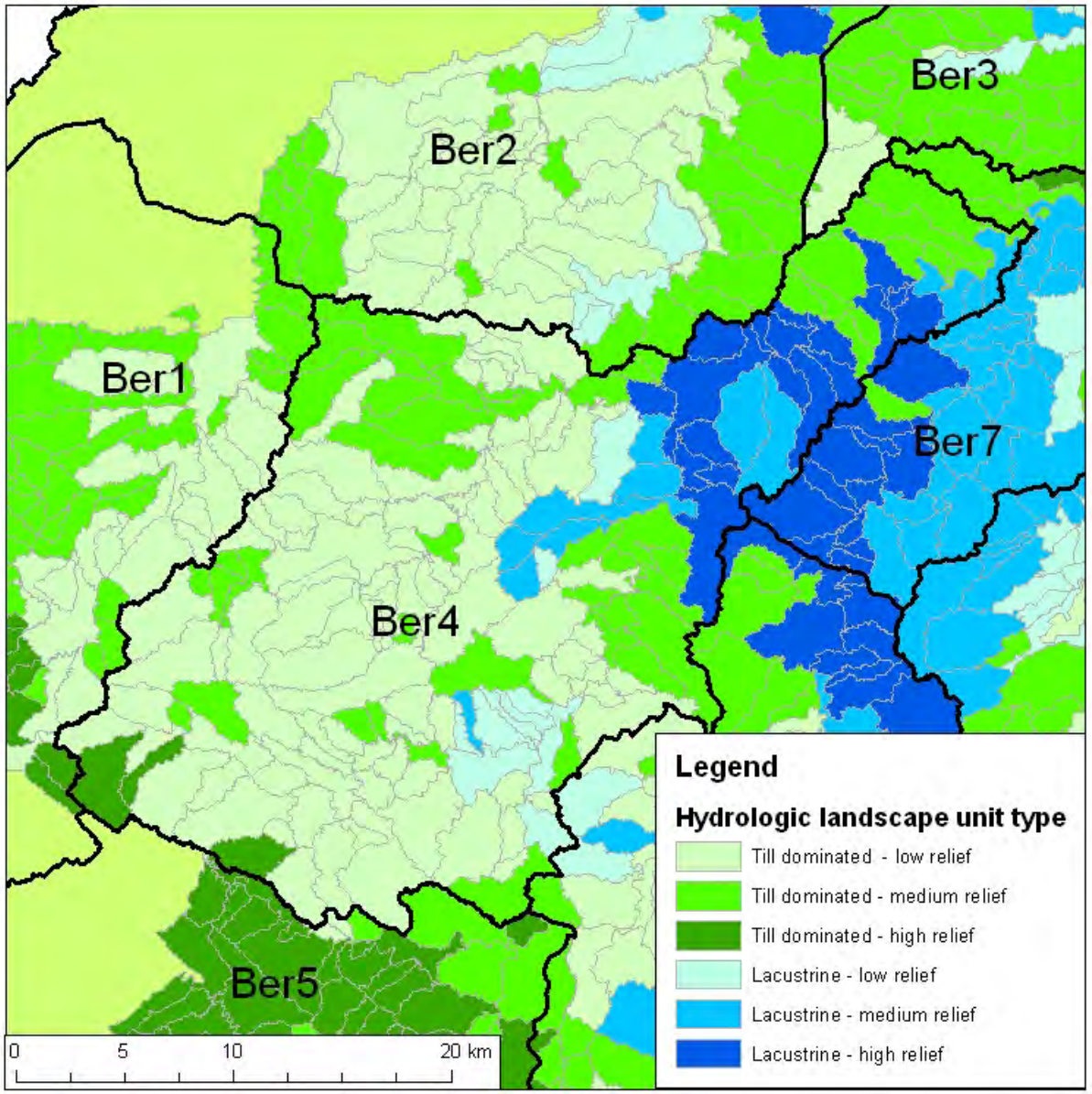
Scaled item:	Example map
1. Basin	
2. Sub-basin	
3. **Catchment** type (based on Buttle 2007): 1.basin slope. 2.lacustrine parent materials present. 3.wetlands extent.	
4. **Reach**	



3. Scaled Approach to Watershed Classification and Analysis

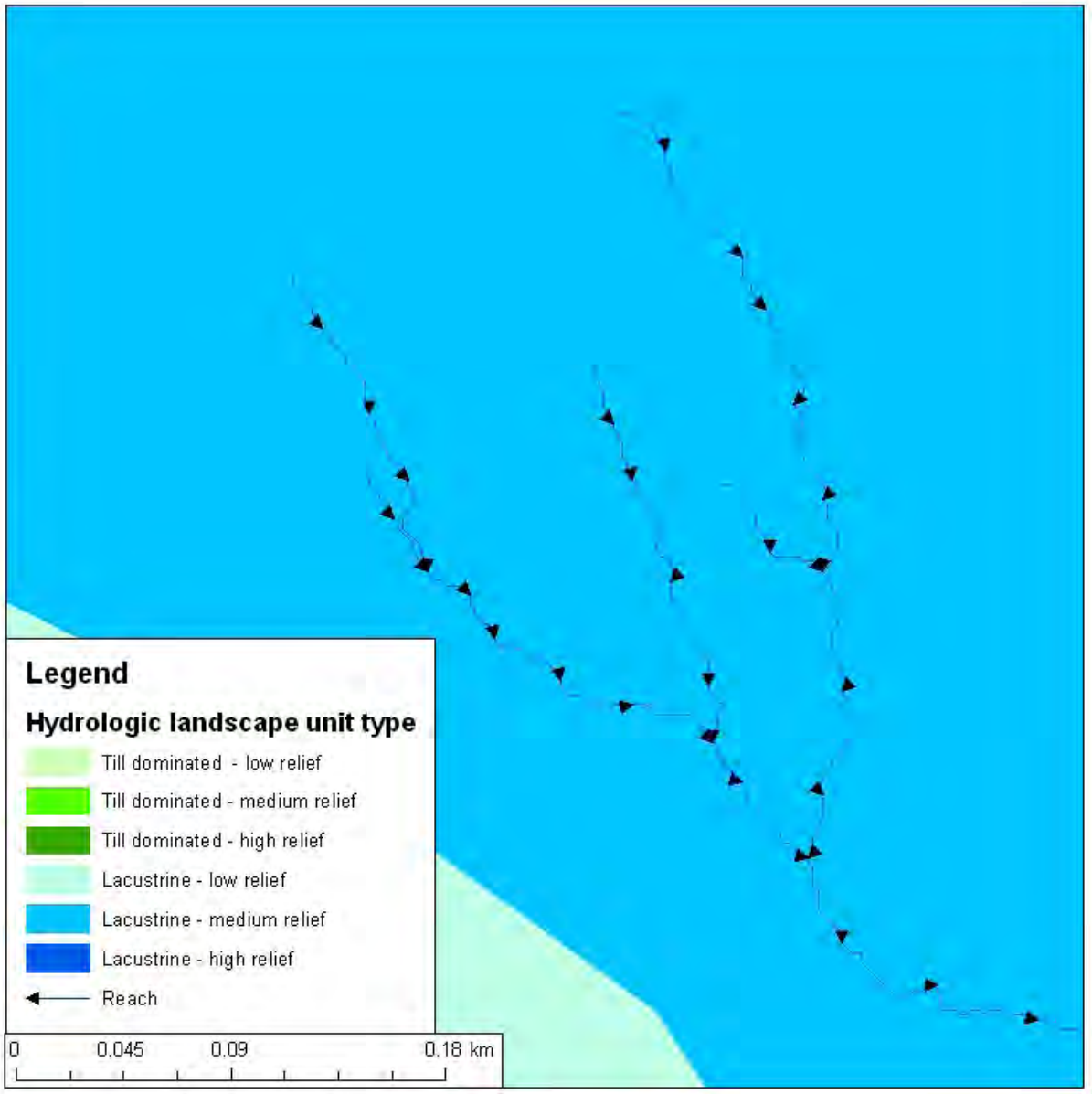
Scaled item:	Chart of catchment types
1. Basin	
2. Sub-basin	
3. **Catchment** Example: •Type 2 (Medium relief, medium wetlands, stable parent material). •ID #23. •Applications include compartment scale plans, research site selection / extrapolation.	
4. Reach	

3. Scaled Approach to Watershed Classification and Analysis

Scaled item:	Example map
1. Basin	
2. Sub-basin	
3. **Catchment** = Type 2 (Medium relief, medium wetlands, stable till). ID #23. Applications include compartment scale plans, research site selection / extrapolation.	
4. **Reach**	

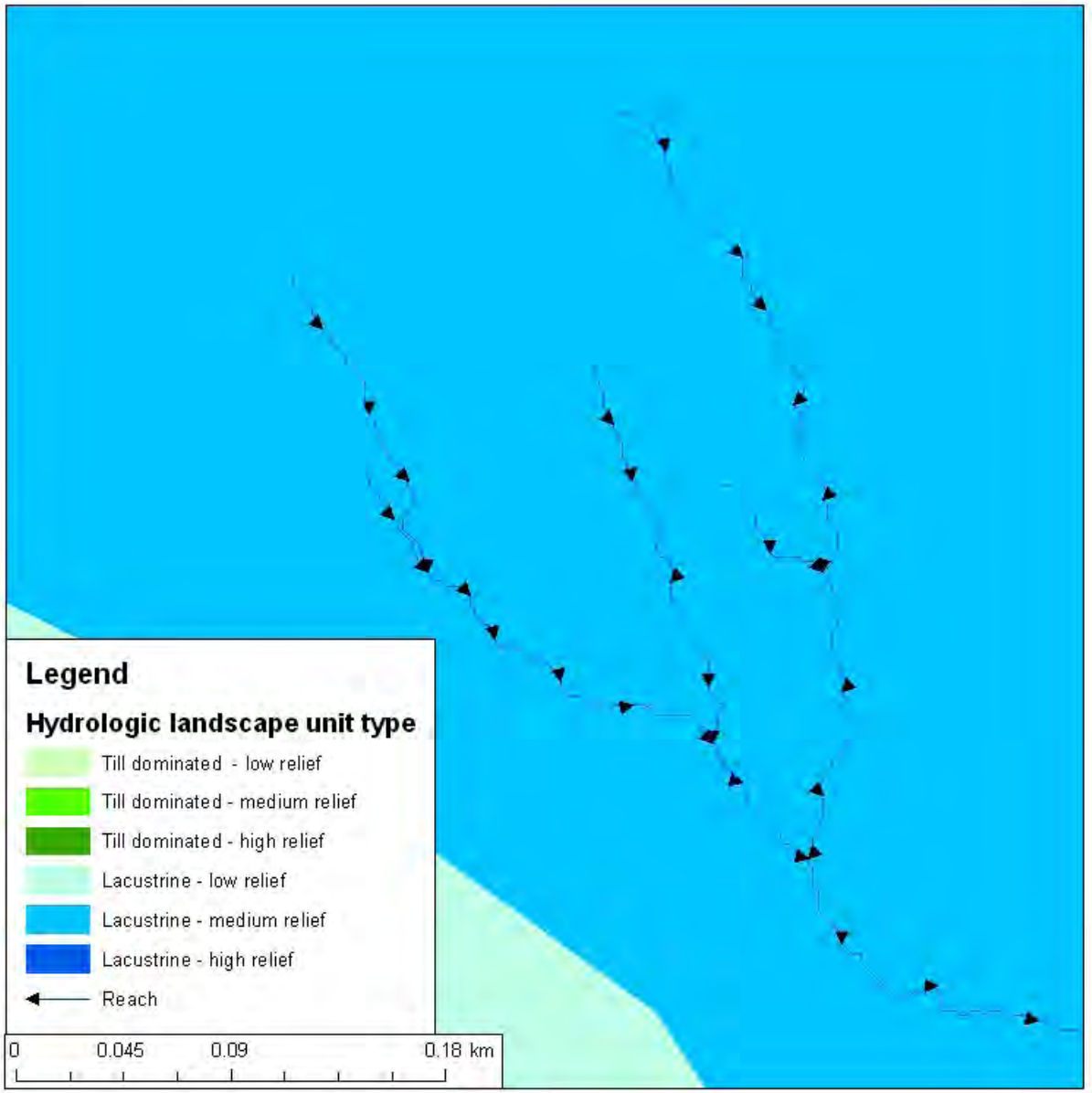
3. Scaled Approach to Watershed Classification and Analysis

Scaled item:	Example map
1. Basin	
2. Sub-basin	
3. Catchment	
4. **Reach** Sections of channel with uniform slope and drainage area: • average length = 33 m • >2 000 000 reaches • drain den. = 4 km/km^2	



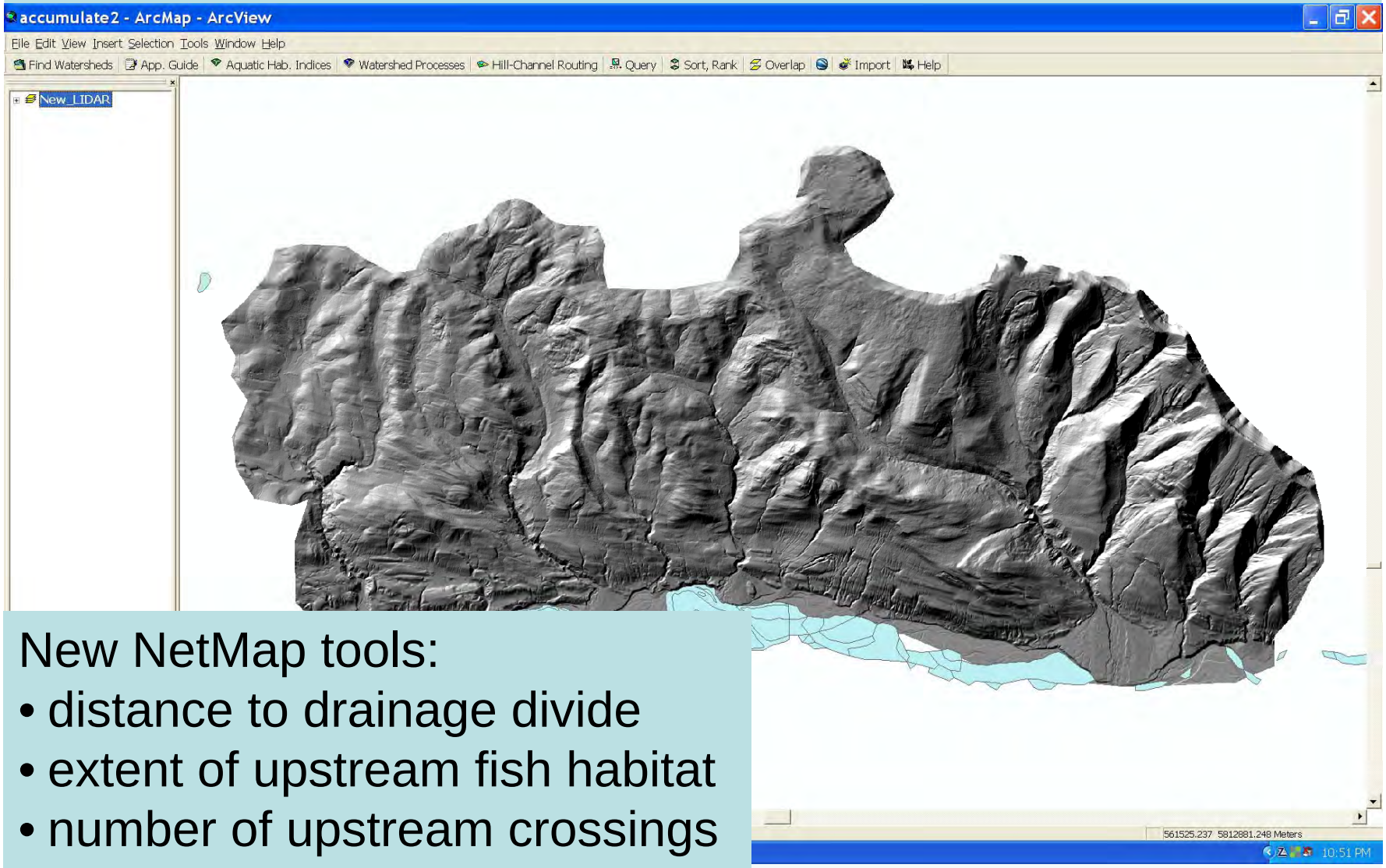
3. Scaled Approach to Watershed Classification and Analysis

Scaled item:	Example map
1. Basin	
2. Sub-basin	
3. Catchment	
4. **Reach** Descriptors include: •channel class •fish bearing status •Navigable waters status •# of downstream or upstream fish migration barriers by type. •ID # •applications include linear feature and riparian management.	



3. Scaled Approach to Watershed Classification and Analysis

NetMap Tools for Watershed Analysis



New NetMap tools:

- distance to drainage divide
- extent of upstream fish habitat
- number of upstream crossings

http://www.earthsystems.net/

3. New tools for integrating water and land management

Mapping fish-bearing status in Muskuta

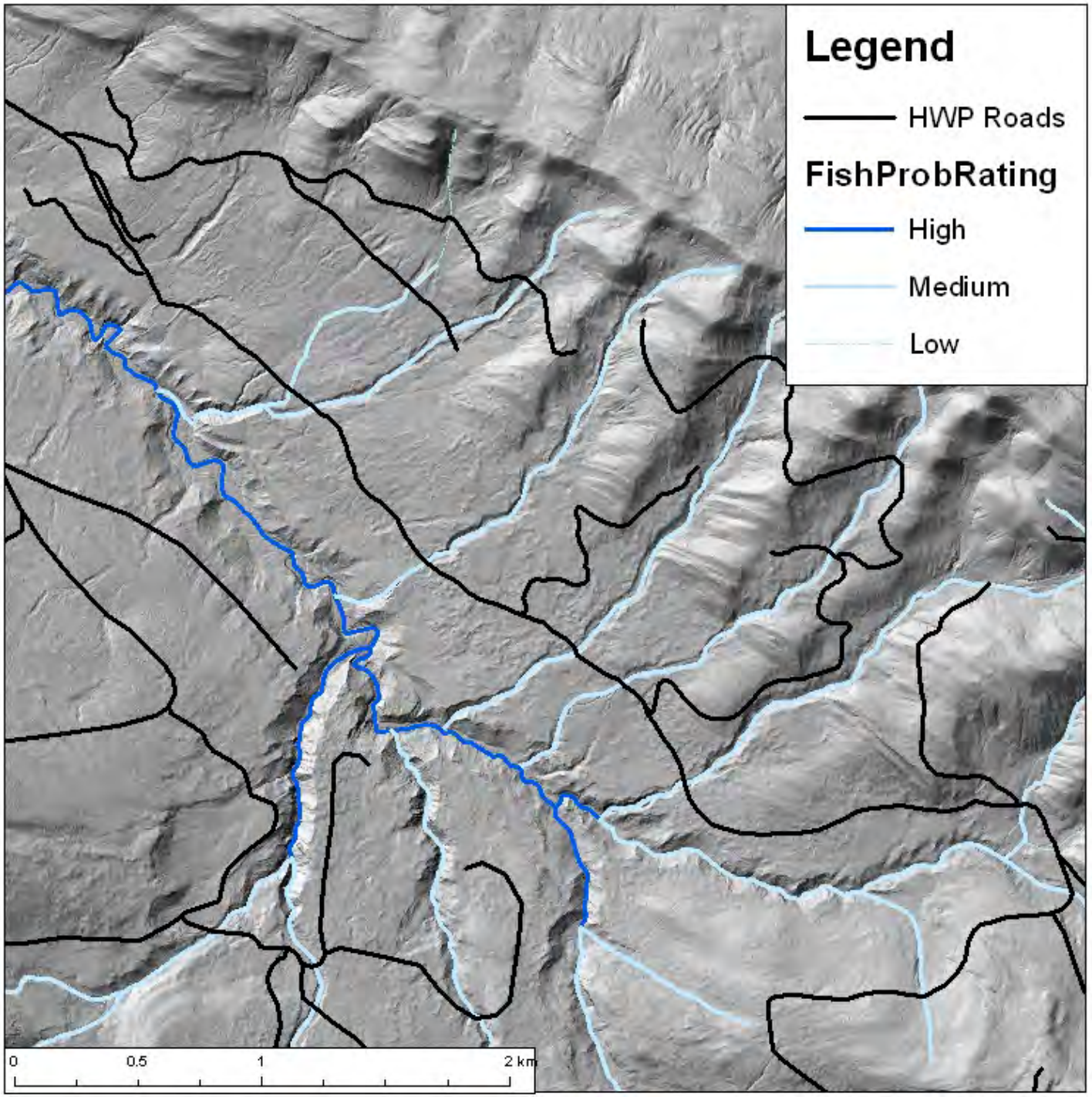
Non-fish bearing because:

a)Channel type = non-fluvial.

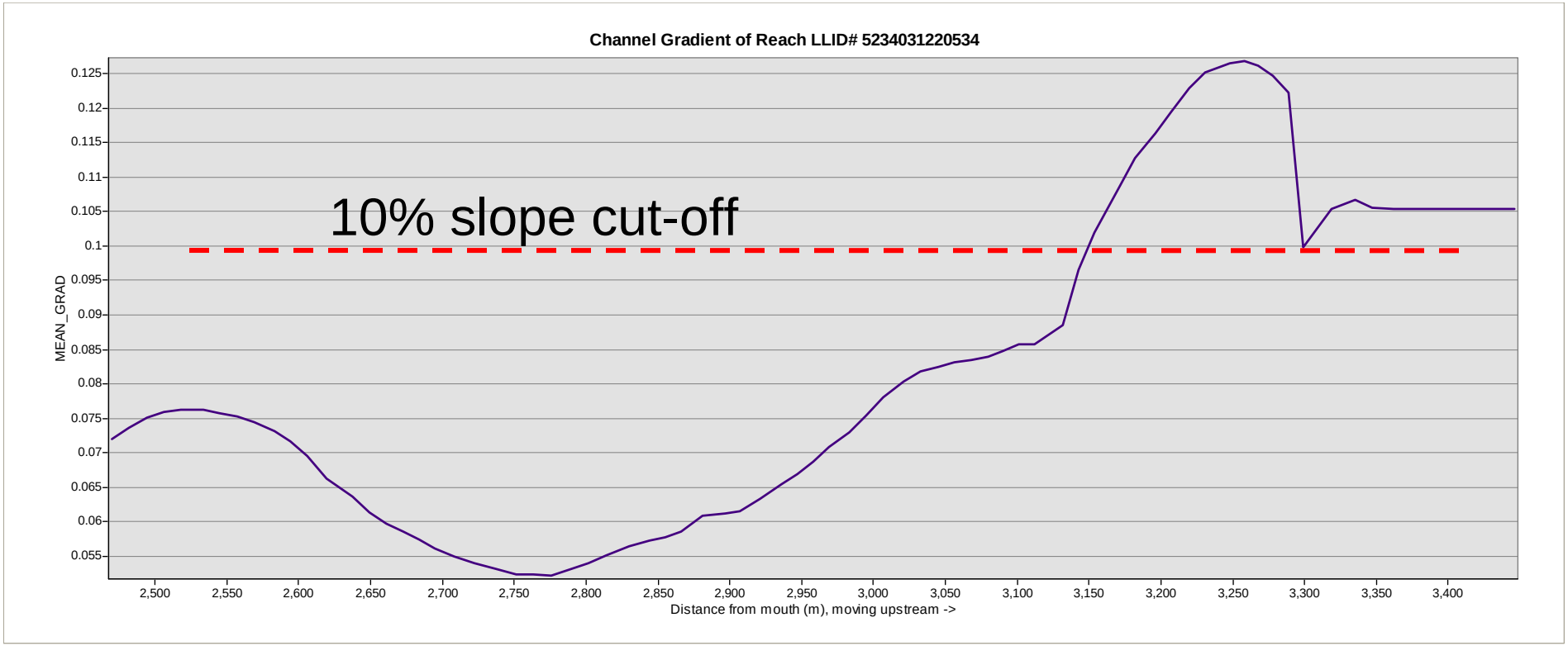
b)Natural gradient barriers.

c)Electro-fishing.

Submit to DFO for review.



Determine upstream fish limit based on regional stream slope criteria



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3. New tools for integrating water and land management

2. Shift to risk/results-based approach

a. Is present state outside NRV?
   - Long-term and short-term sedimentation rates.
   - Large woody debris inputs in riparian areas.

b. Are we being effective?
   - Hardisty Creek fish population and water quality monitoring project.

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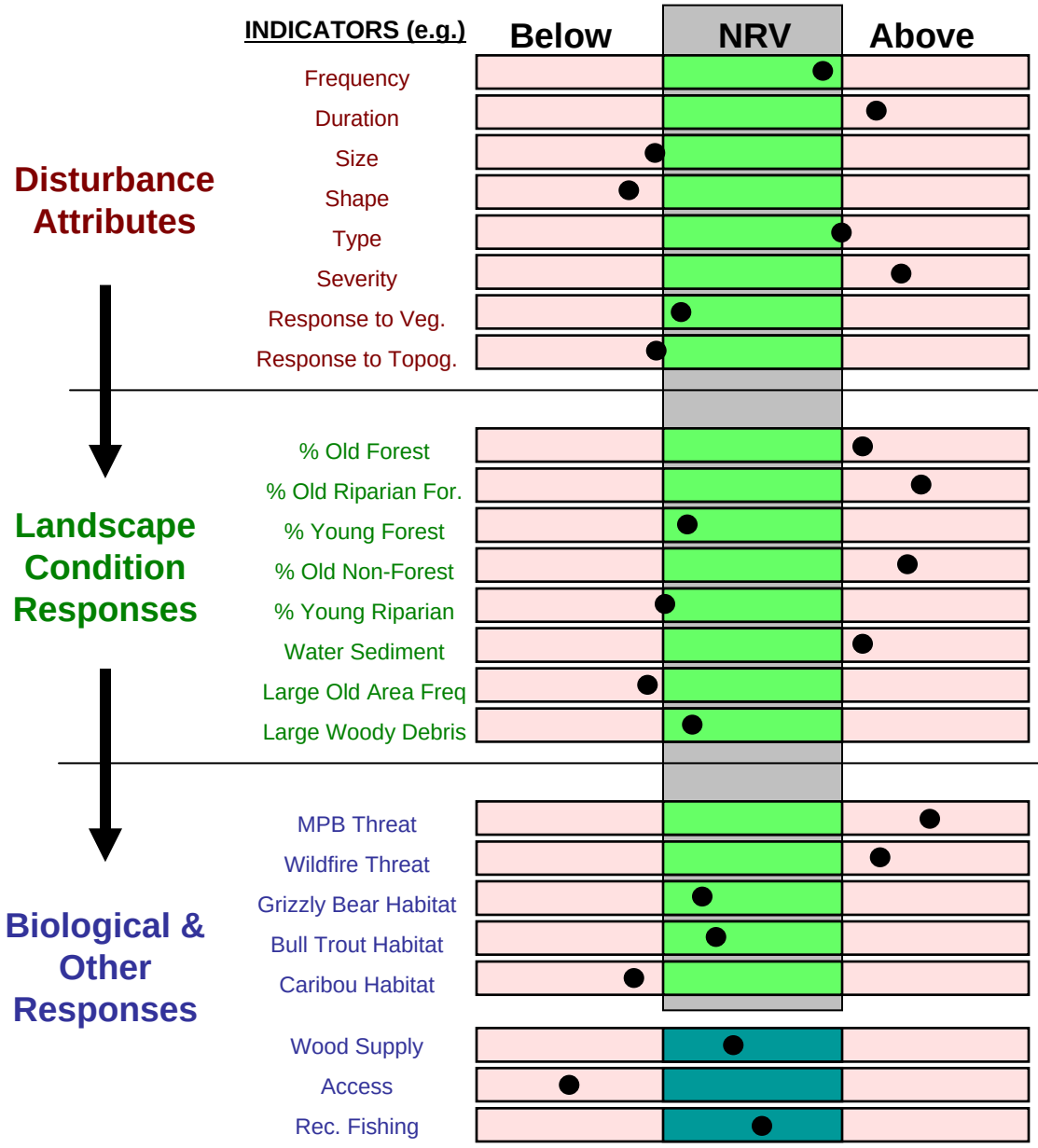
The Three Box HL Model



These are all management controls; the "Levers".

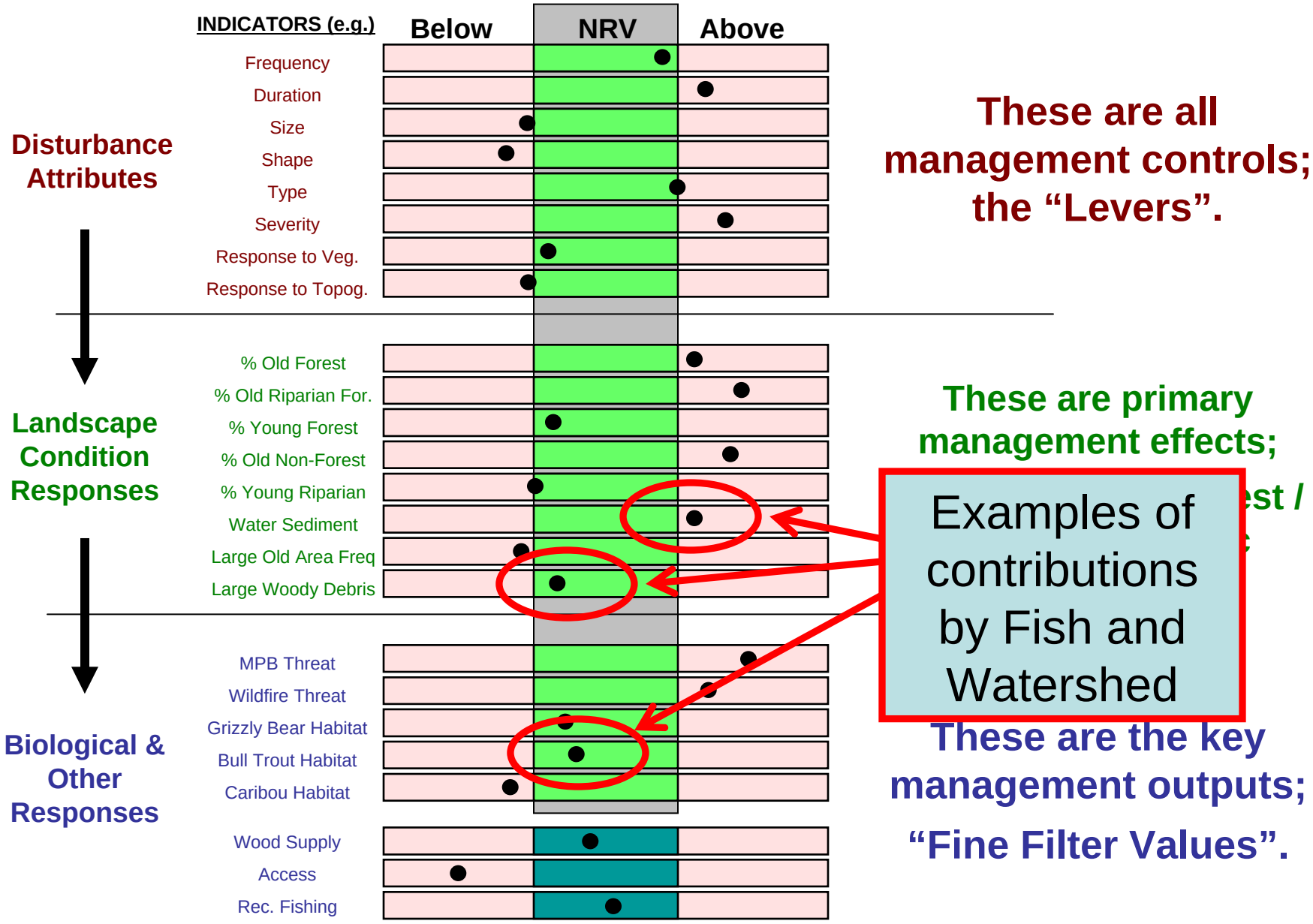
These are primary management effects;

"Desired Future Forest / Water / Land", etc

These are the key management outputs;

"Fine Filter Values".

The Three Box HL Model



3. New tools for integrating water and land management

2. Shift to risk/results-based approach

a. Are present landscape conditions outside NRV?
   - Long-term sedimentation rates.
   - Short-term sedimentation rates.
   - Large woody debris recruitment.

b. Are present biological responses outside NRV?
   - Hardisty Creek fish population monitoring project.

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3. Are present landscape conditions outside NRV?

1. Long-term sedimentation rates

- Sediment core from Fairfax Lake indicated that water quality has increased and sedimentation rates have decreased since 11,200 BP. High rates were initially due to low ground cover after glaciation (Hickman 1991).
- Measurements of sedimentation rates over the last 120 years in several FRI lakes are ongoing (Schiefer 2009).
- Have not yet established a link between water quality and fire occurrence. Flood years are very important.
- NRV of sediment quality may have management applications (organic to inorganic ratio).

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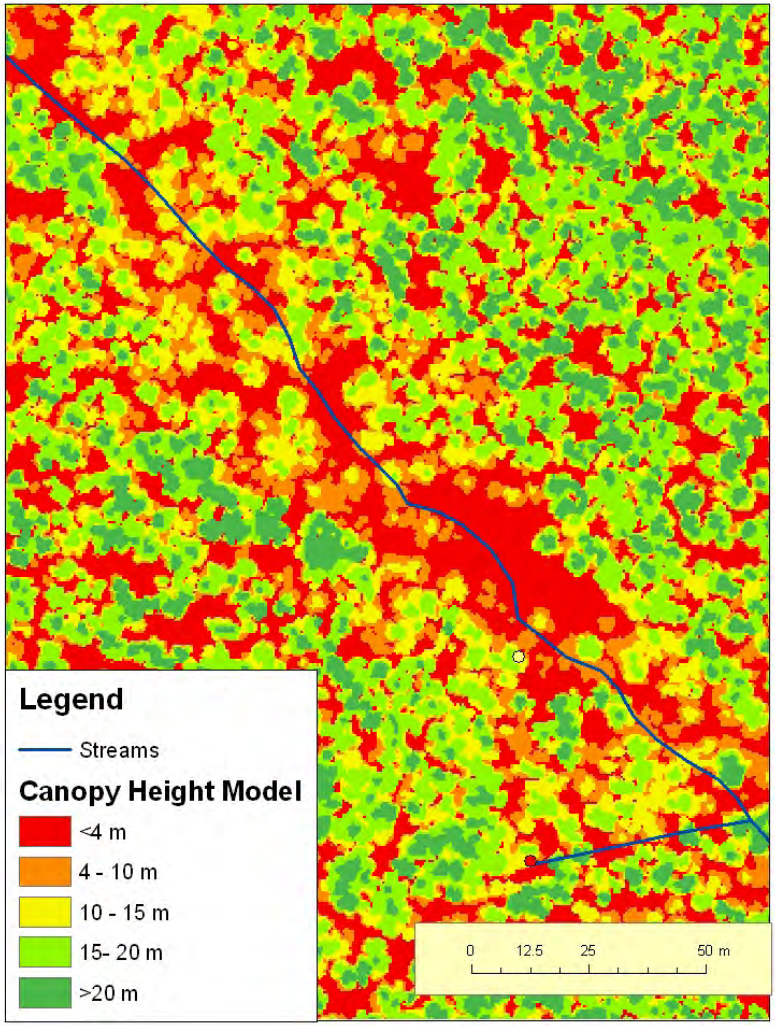
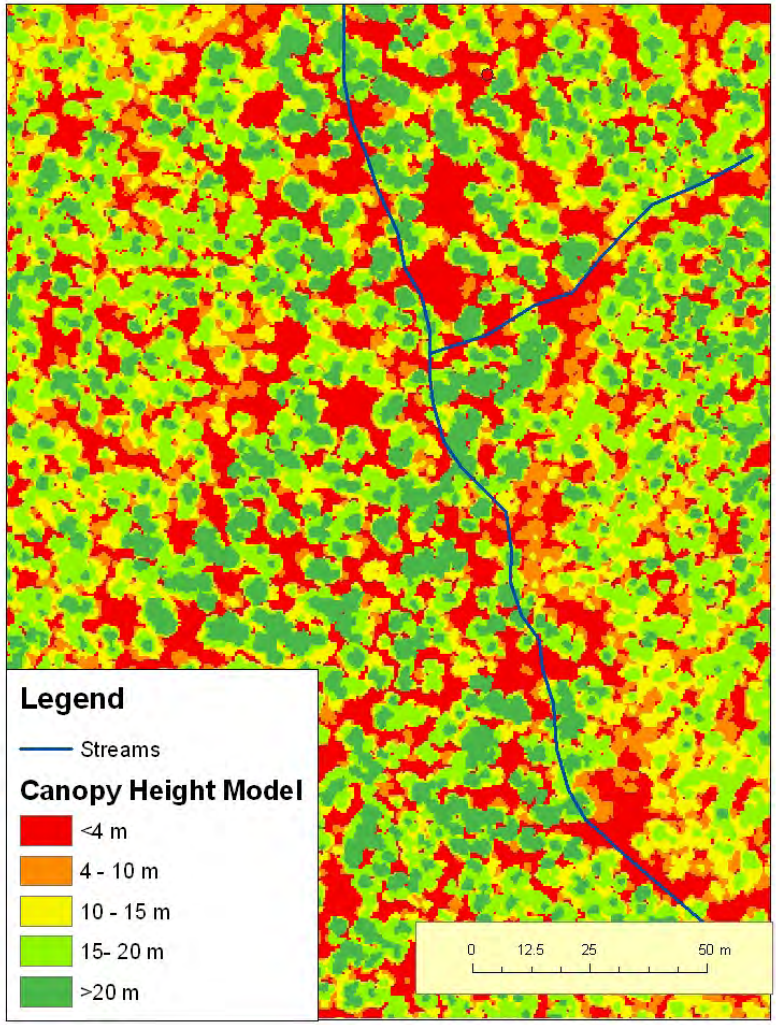
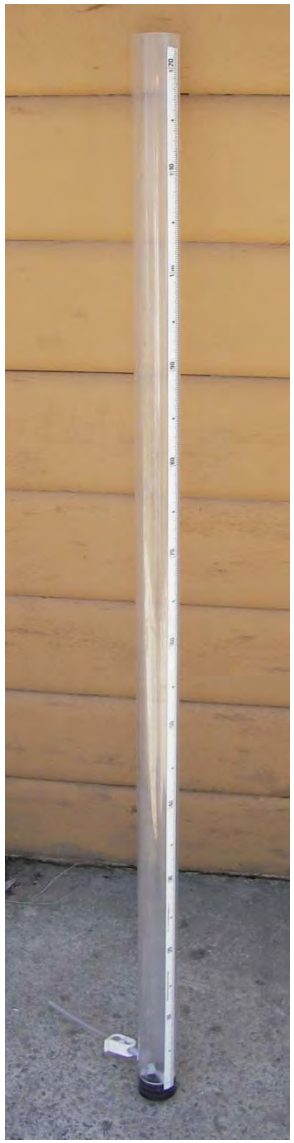
3. Large woody debris recruitment considering spatial variation in riparian stand density and height

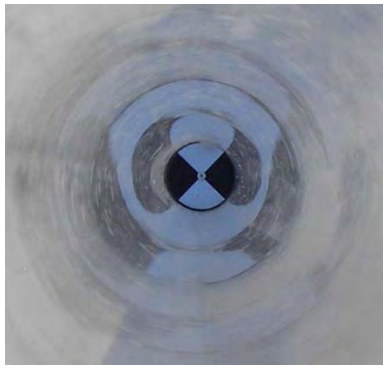


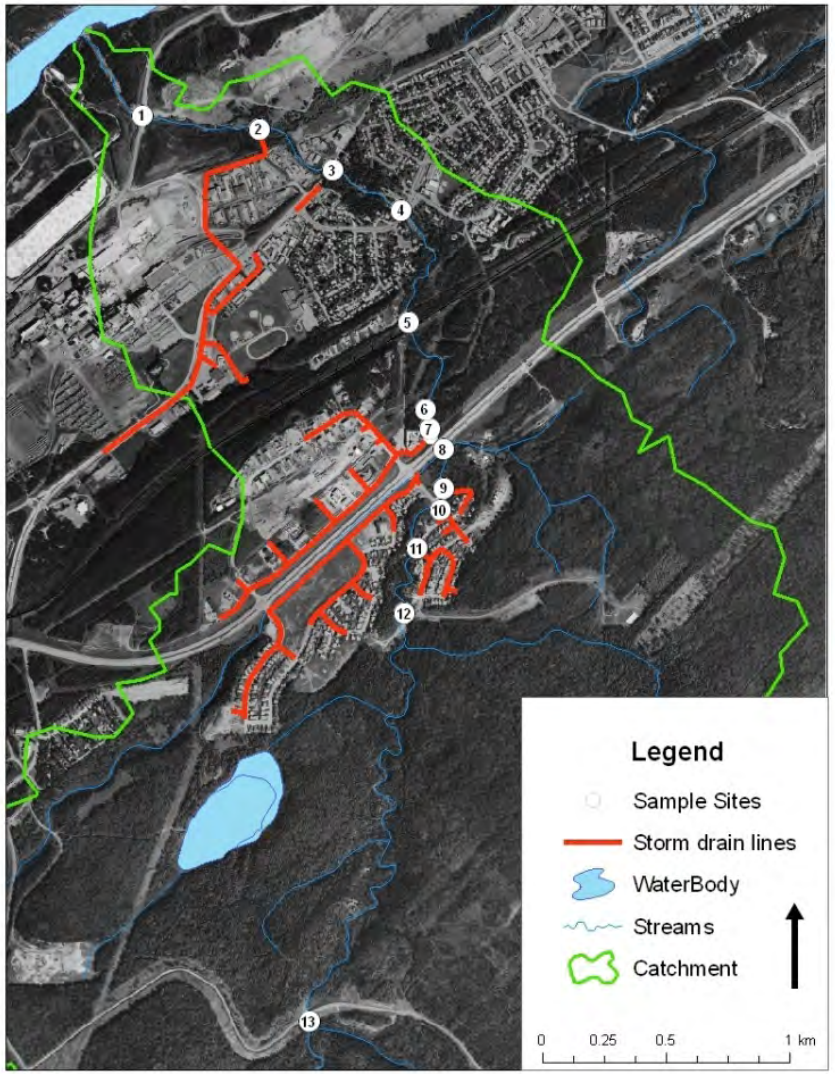


3. Are present landscape conditions outside NRV?

2. Short-term sedimentation rates in Hardisty Creek

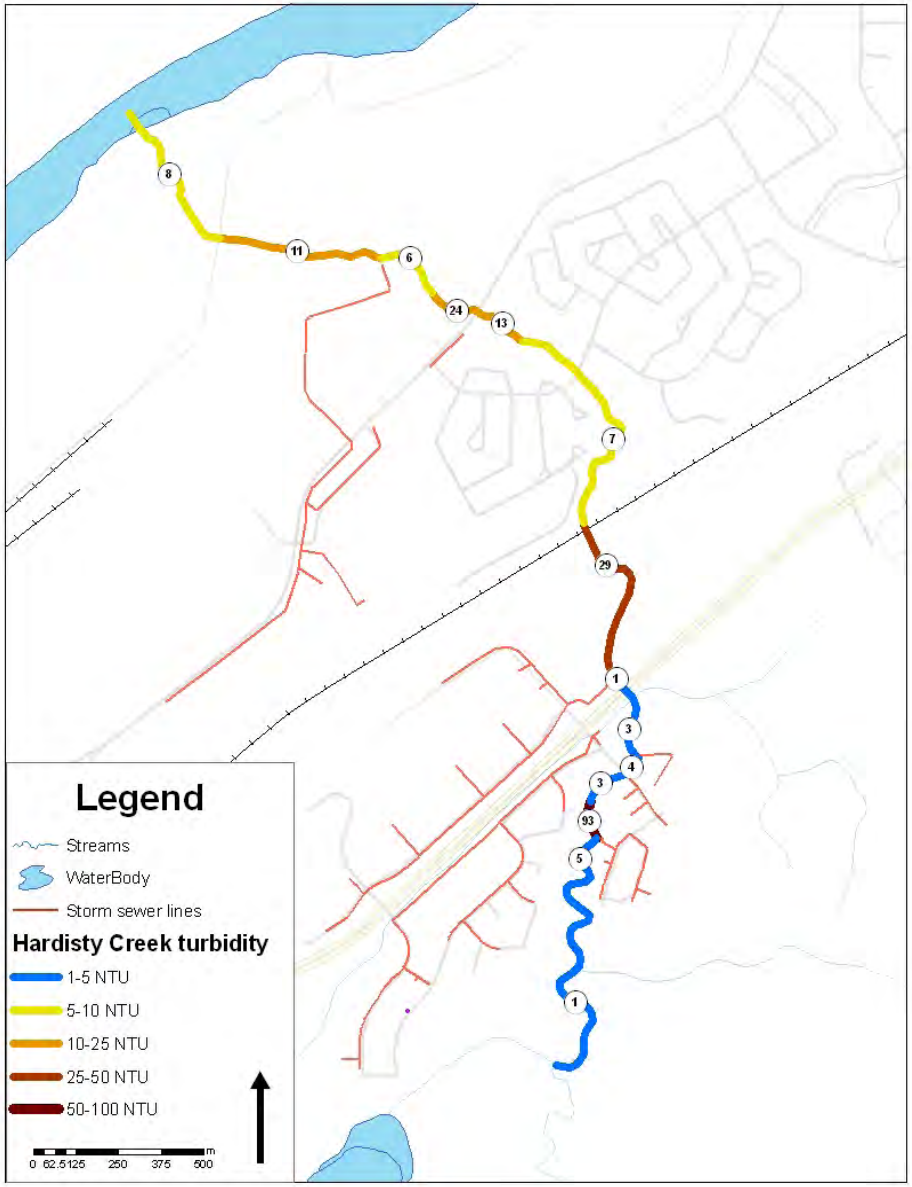






3. Are present landscape conditions outside NRV?

2. Short-term sedimentation rates in Hardisty Creek



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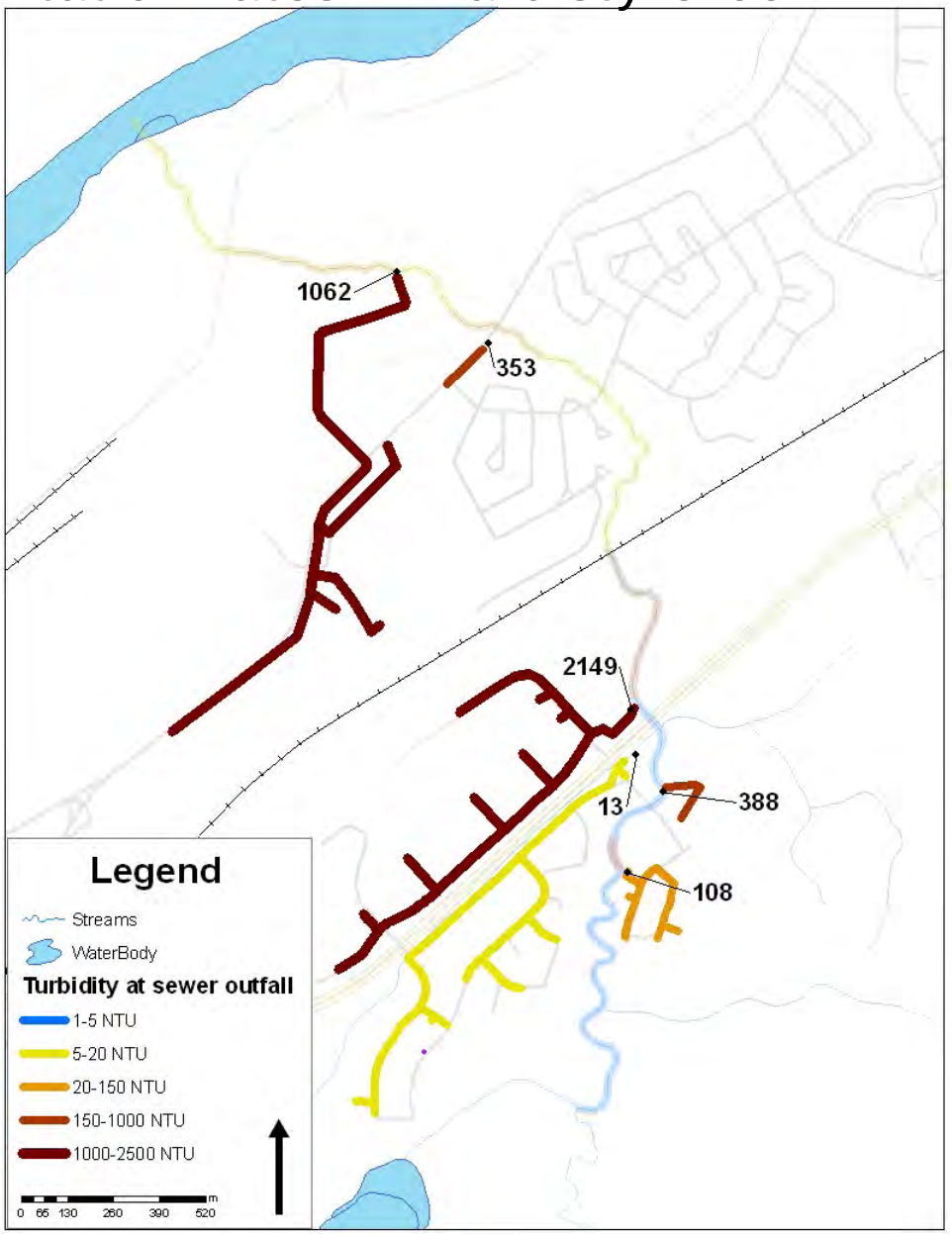
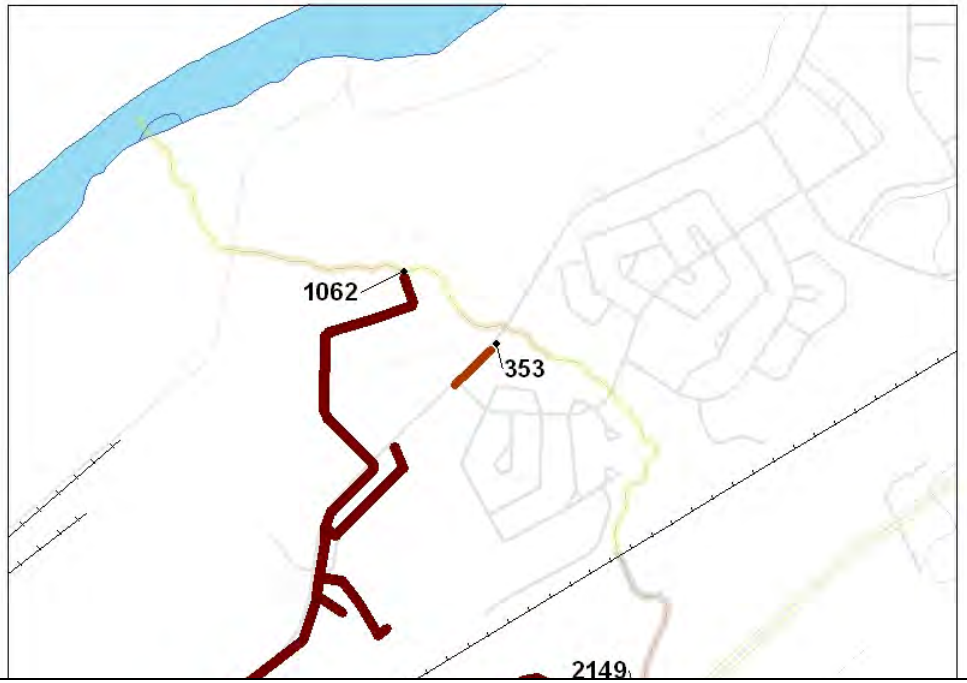


3. Are present landscape conditions outside NRV?

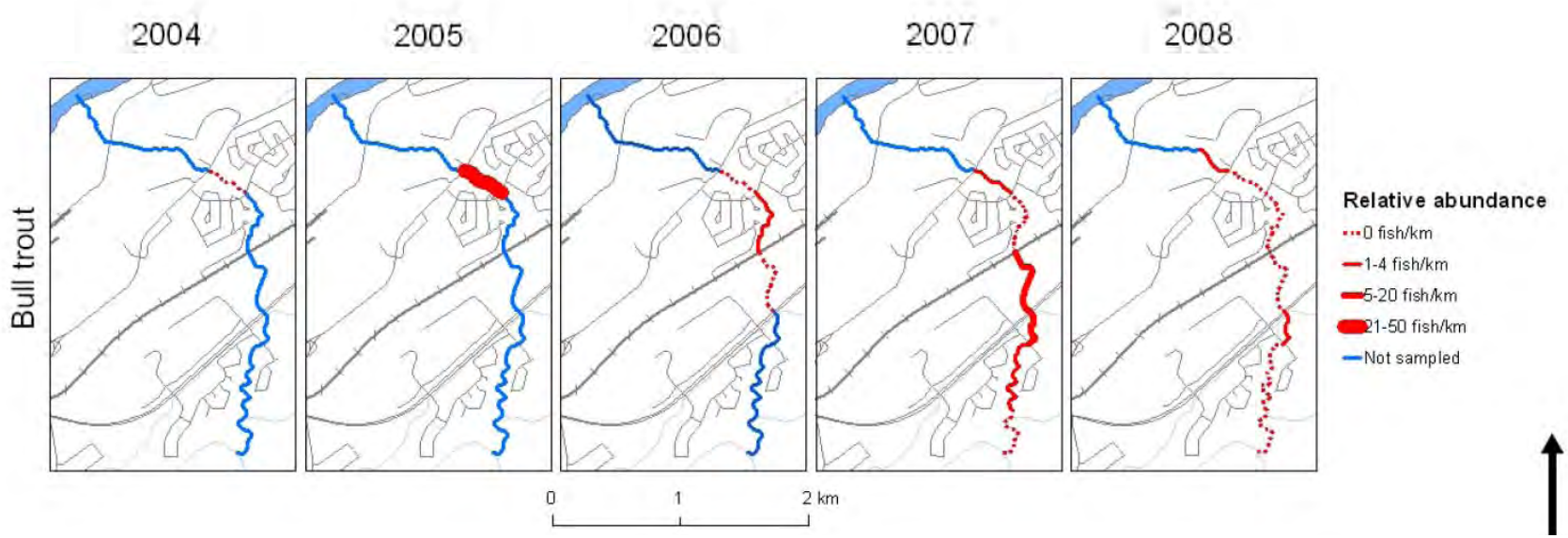
2. Short-term sedimentation rates in Hardisty Creek



Earth Systems Institute is developing an add-in to NetMap that will predict road erosion and sediment inputs rates based on best available models.

3. Are present biological responses outside NRV?

1. Hardisty Creek fish population monitoring project



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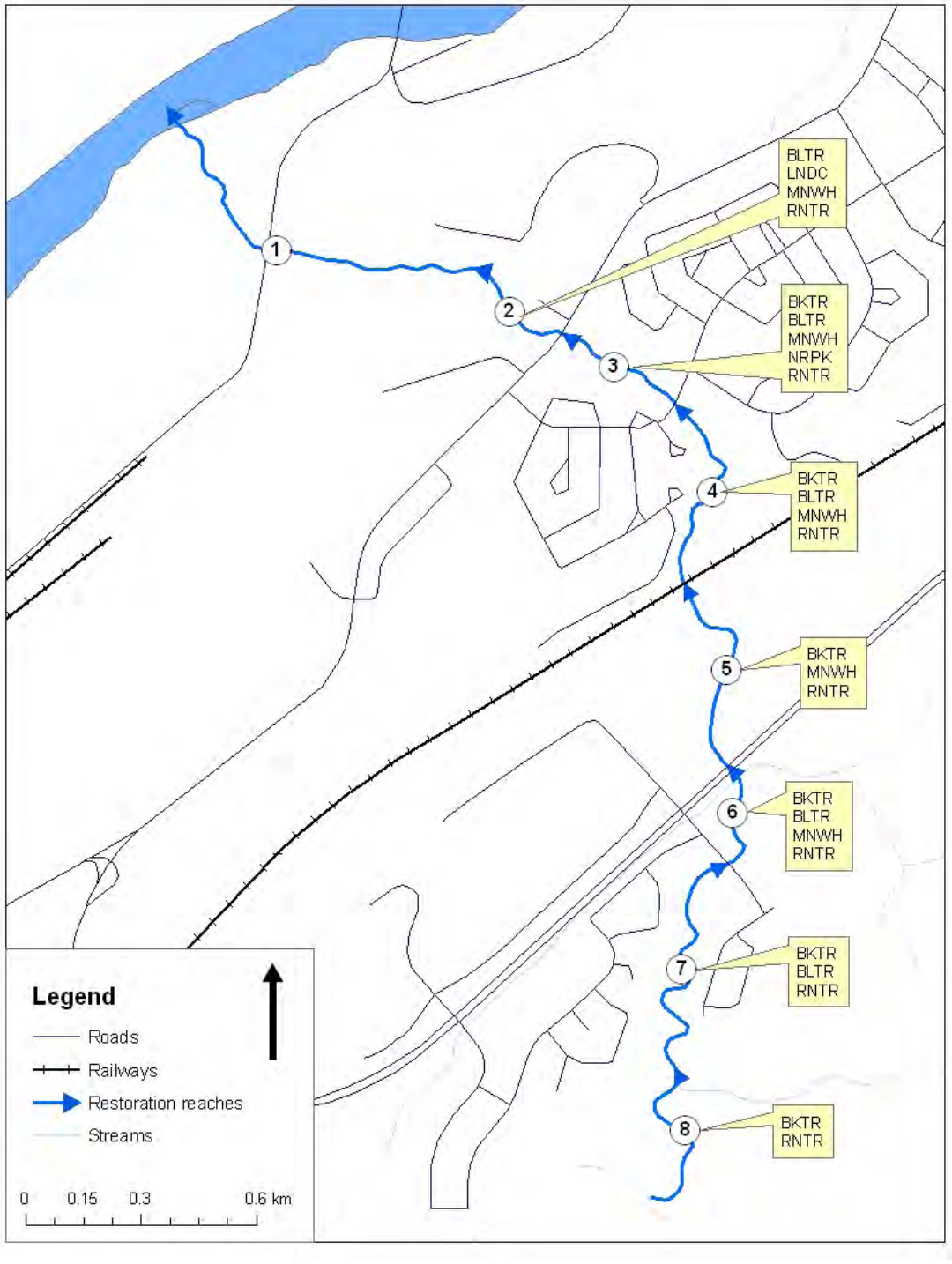

3. Are present biological responses outside NRV?

2. Pilot project for 2009: Arctic grayling population status in mid-sized streams

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Conclusions:

1.An incentive program could get things moving with inherited road problems in many watersheds.

2.Tool development has focused on streamlining planning and compliance.

3.FWP can contribute NRV indicators for Healthy Landscapes (Landscape Condition and Biological Response).

Acknowledgements:

Thanks to FRI Sponsors and Project Partners

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A Partnership That Produces Results!

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