

Applications of airborne remote sensing : *Assessing physical and ecological impacts of dams along the Kananaskis River, Alberta*

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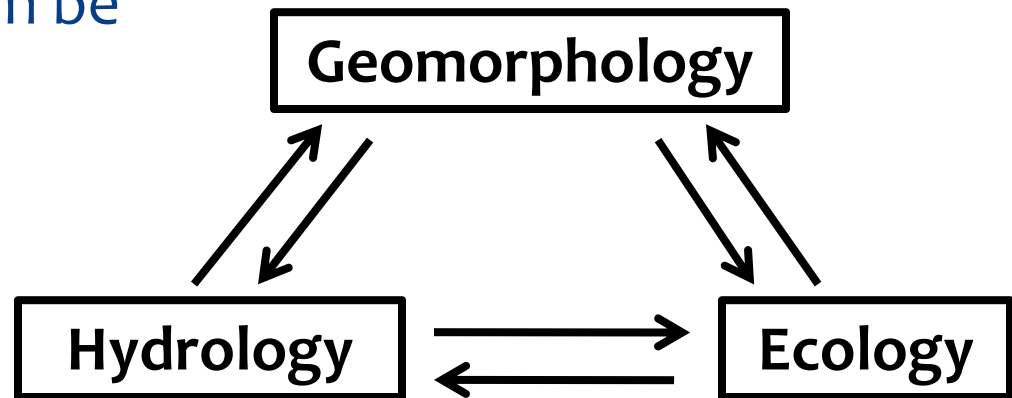
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NSERC Hydronet Symposium, March 29-30 2011

Motivation

- * Hydrology, geomorphology, and ecology feedbacks
- * Inability to fully predict alterations by dams may relate to riparian vegetation changes
- * Geomorphic changes can be better understood in the framework of vegetation dynamics

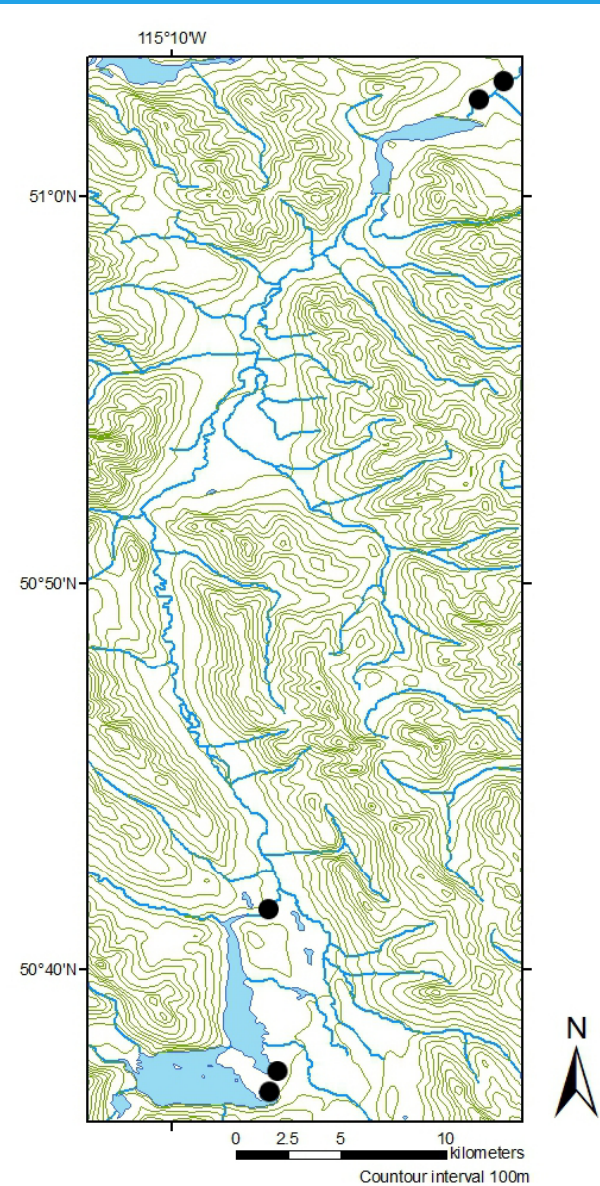


Research question

- * How has the Kananaskis River adjusted to the 1955 damming?
 - * Geomorphic
 - * Ecological
 - * Propagations downstream

Study site

- * Kananaskis River between Pocaterra Dam and Barrier Dam



Research Plan

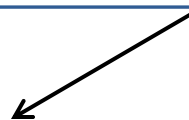
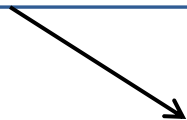
Reconstruct Pre-dam
conditions

Assess post dam
adjustments

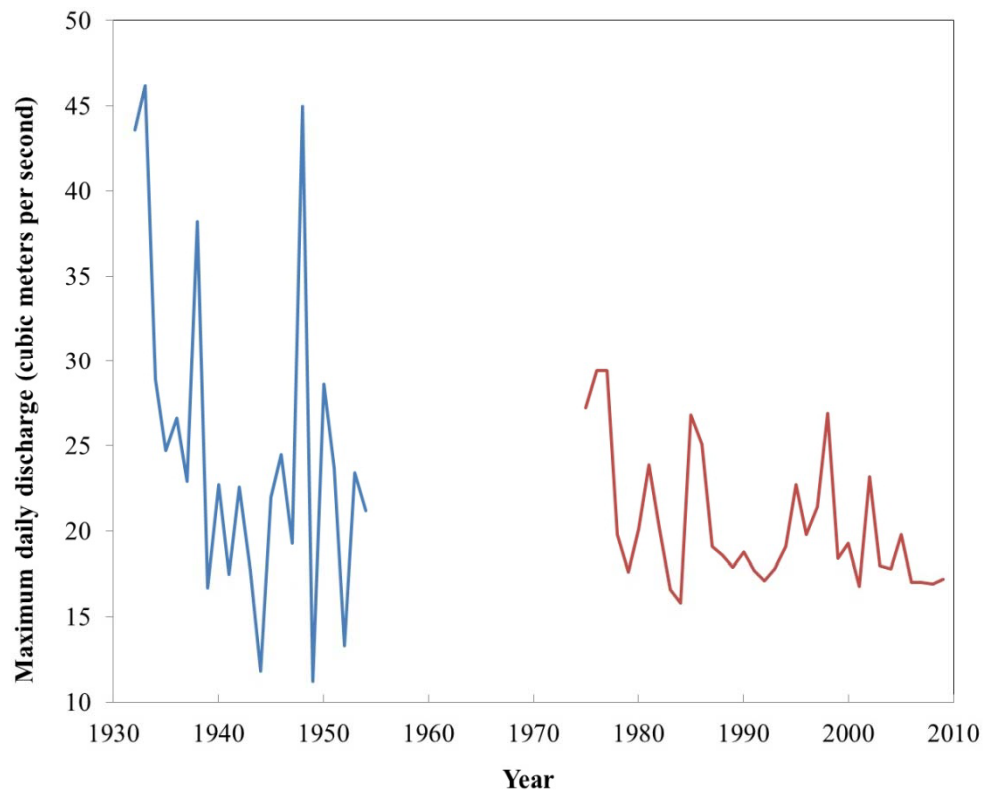
Regime model as
predictive tool

Compare predictions with
observed changes

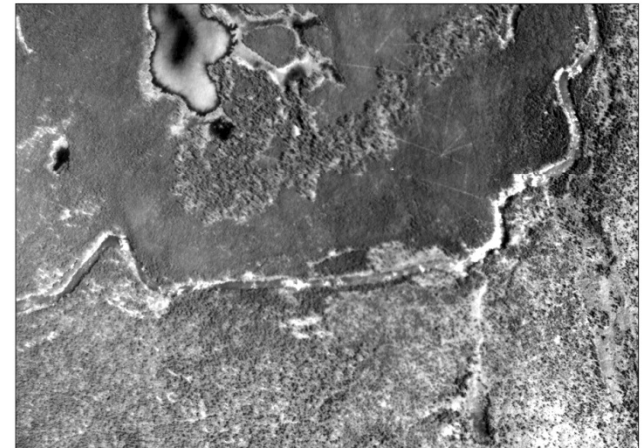
Assess riparian vegetation
influence



Reconstruct Pre-dam conditions



Historic flow data



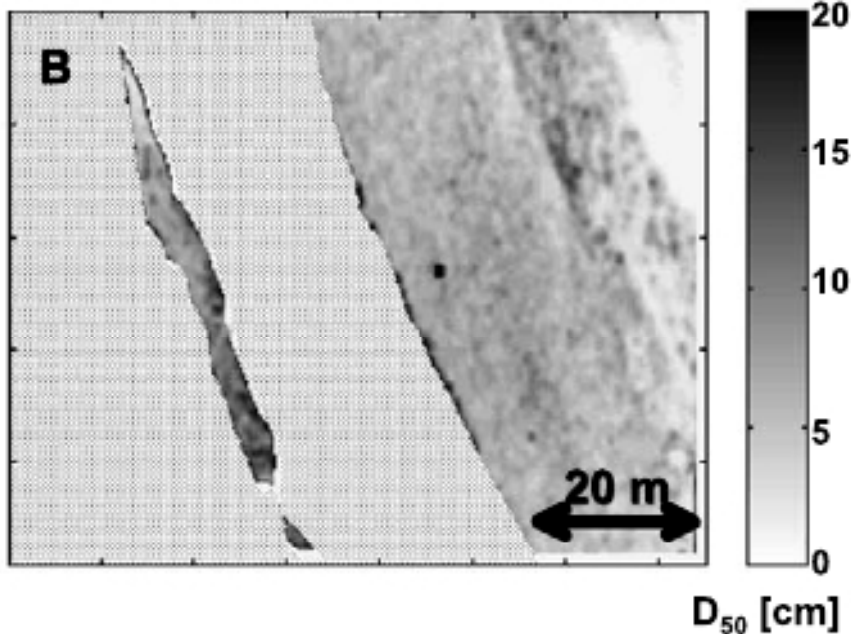
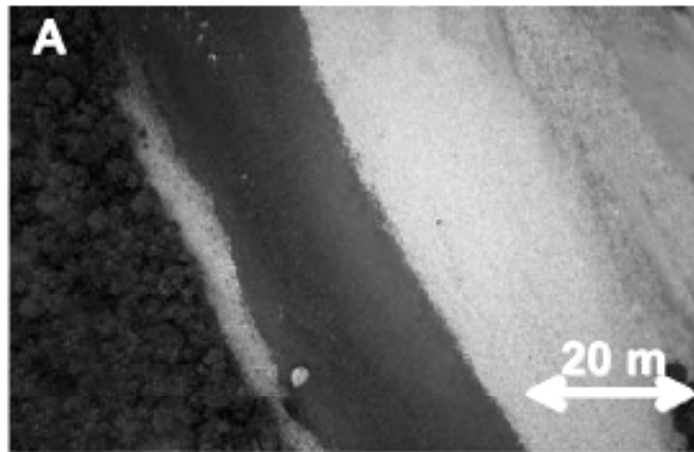
1948



1958

Aerial Photography

Assessment of post dam conditions



- * Use for grain size analysis
- * Pilot new techniques for riparian vegetation

From: Carboneau, P. E. and Bergeron, N. 2005. Automated grain size measurements from airborne remote sensing for long profile measurements of fluvial grain sizes. *Water Resources*, 41: W11246.

UBC Regime Model (UBCRM)



From Eaton et al, 2004

Sample output

Enter input valu...

Formative discharge (cumecs)

Energy gradient (m/m)

Surface D50 (mm)

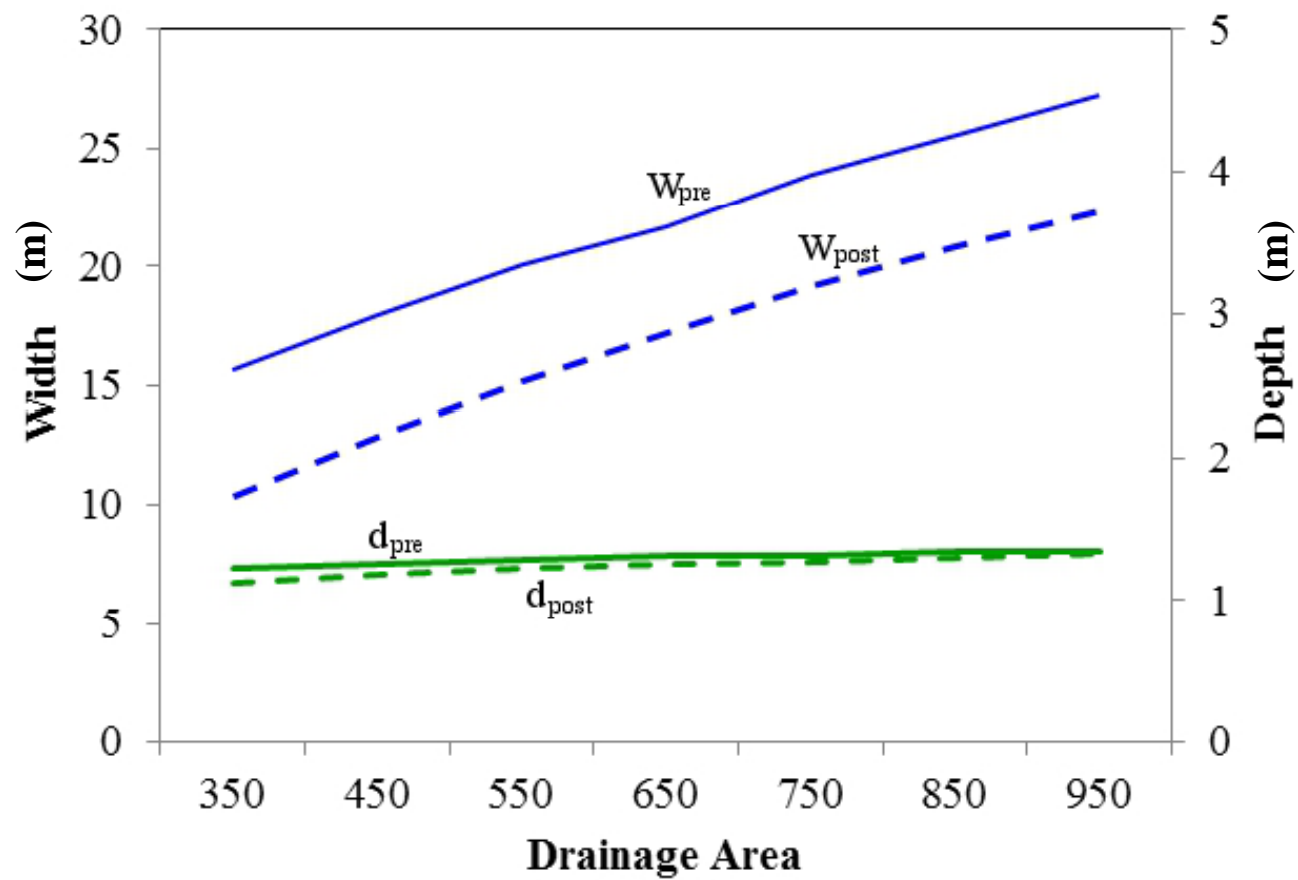
Surface D84 (mm)

Effective Rooting Depth (m)

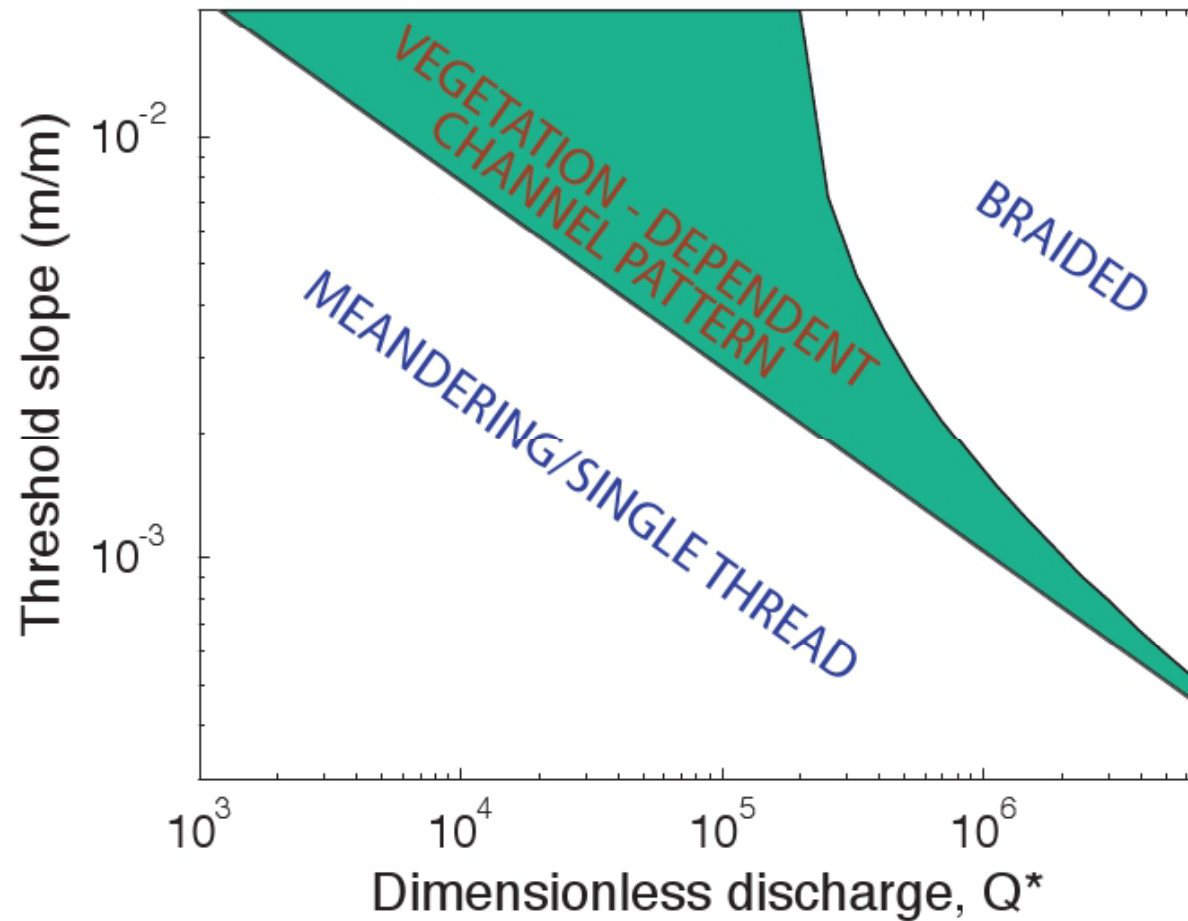
RESULTS OF THE ANALYSIS

0.3437	Time required for calculation [s]
10.80	Channel width [m]
1.17	Mean depth [m]
1.58	Mean velocity [m/s]
3.935e-006	transport rate [kg/s]
12.13	Wetted perimeter [m]
1.04	Hydraulic radius [m]
0.82	Trapezoid depth [m]
22.5	Bank side angle [degrees]
6.8	Trapezoid bottom width [m]
29.17	Stress on the bed [Pa]
20.79	Stress on the banks [kg/s]

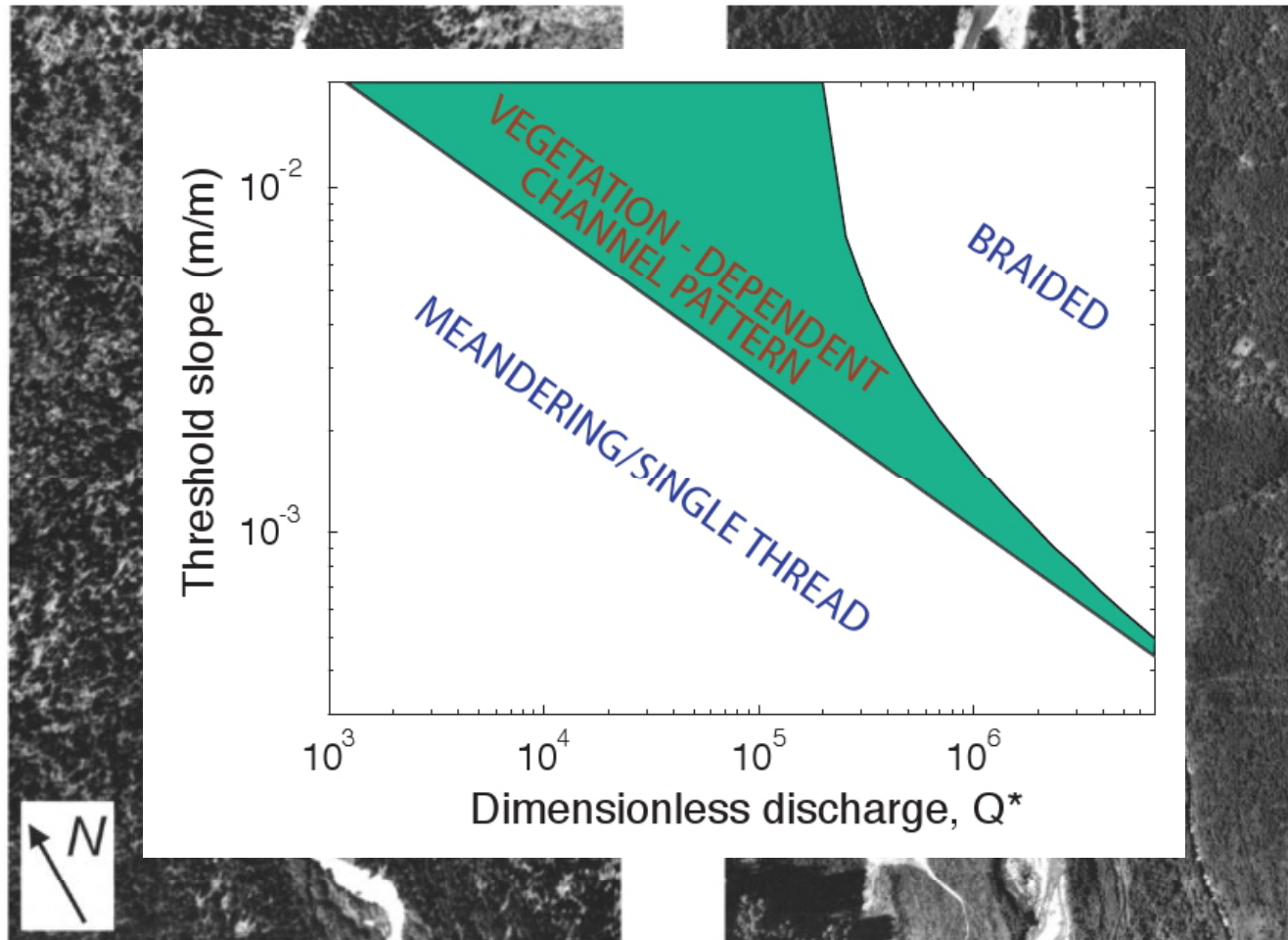
Hypothesis



Vegetation and channel form



Example: Slesse Creek



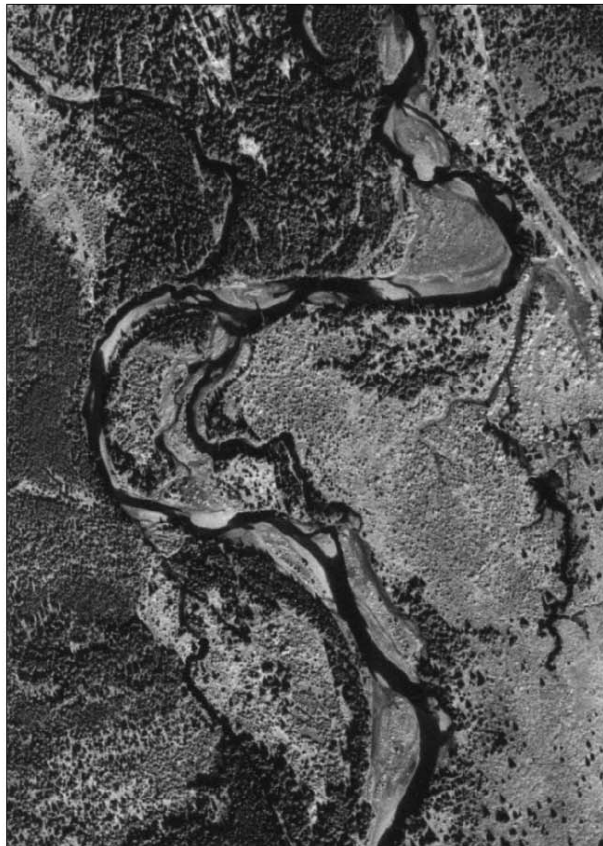
1940 Pre logging

1993 Post logging

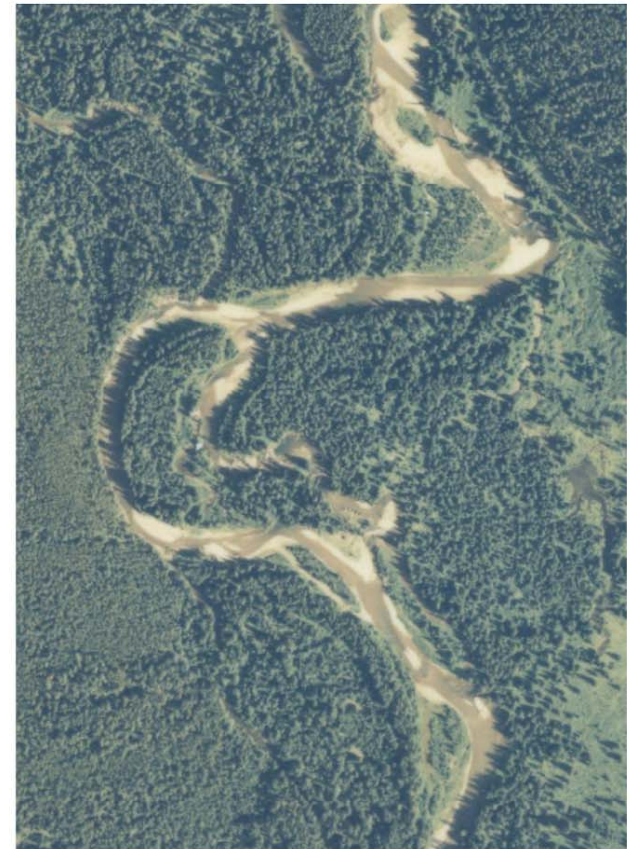
From Millar, 2000

Vegetation at Kananaskis

- * Alters regime model parameter H



1958



2008

Implications

UBC Regime
Model 1

- Prediction of channel shape

UBC Regime
Model 2

- Model reach scale habitat quality

Influence of
vegetation change

