Classifying Complexity: Mapping Meaning in Fluvial Geomorphology

River Classification, Interpretation, and Resilient River Corridors

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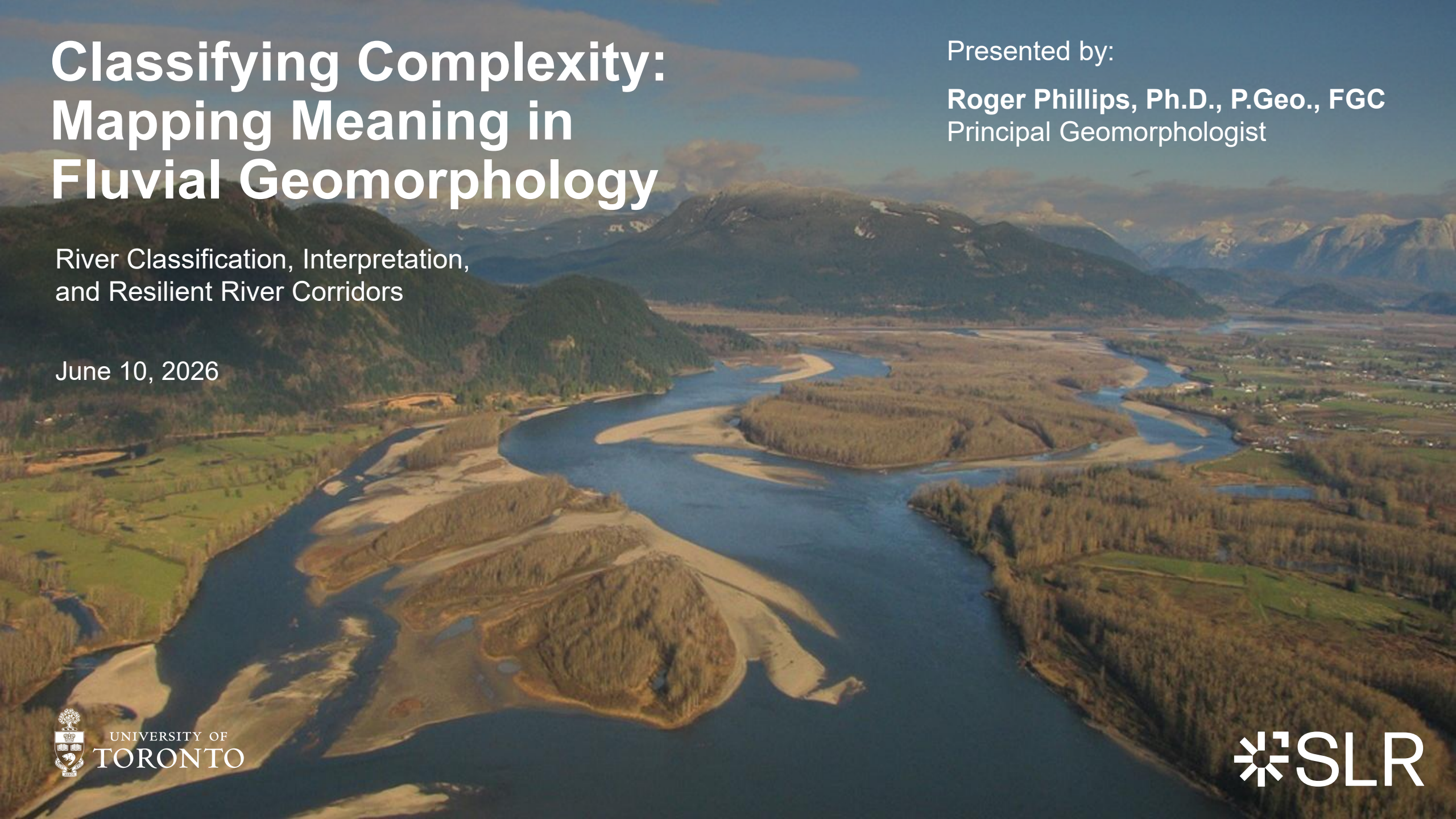

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Why Classify Rivers?

- Organize complexity
- Compare systems
- Support decisions

> *Classification is how geomorphologists turn landscapes into knowledge."*

One river.
Many interpretations.

Saugeen River, Ontario

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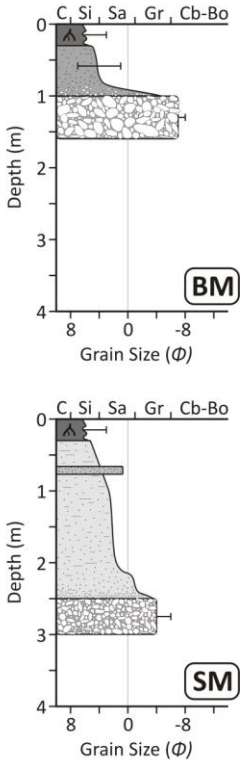
Every Classification Makes Choices

River → Select variables → Classification → Interpretation

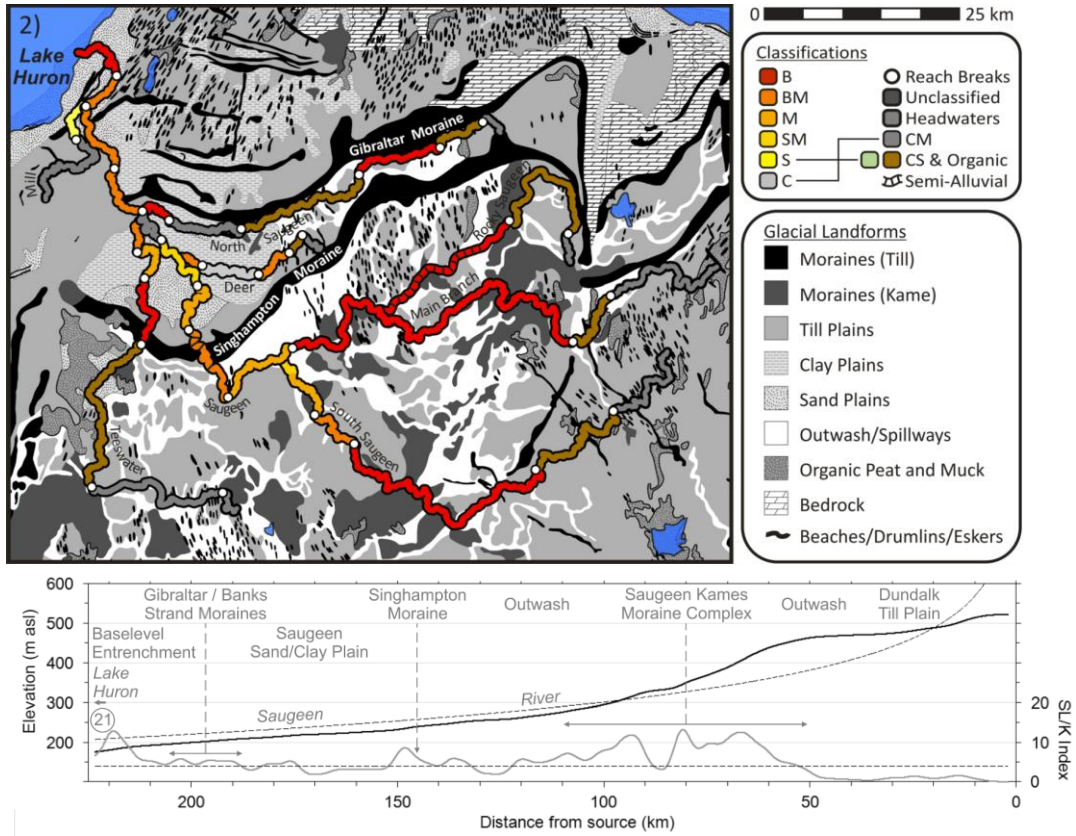
Channel Pattern

Saugeen River, Ontario

Floodplain Sediments



Landscape Context



Phillips and Desloges (2015[a,b])

Classification begins with choosing what matters.

Mapping Meaning

What we classify influences what we understand, ***and ultimately what we manage***.

- Observation
- **Classification**
- Interpretation
- Management Action

Interpretation becomes management when boundaries are placed on maps.

Erosion Hazard Mapping, Goulais River, Ontario

> *Classification is not simply description. It is interpretation."*

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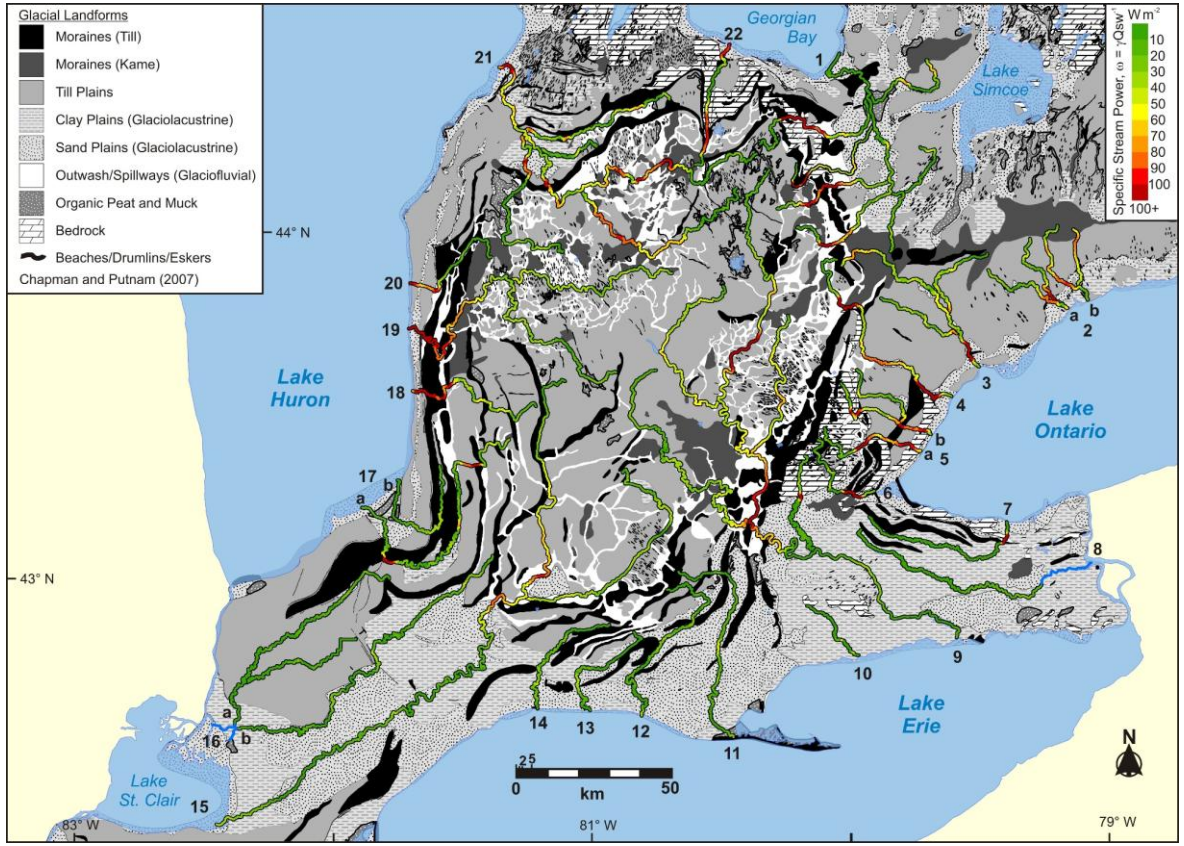
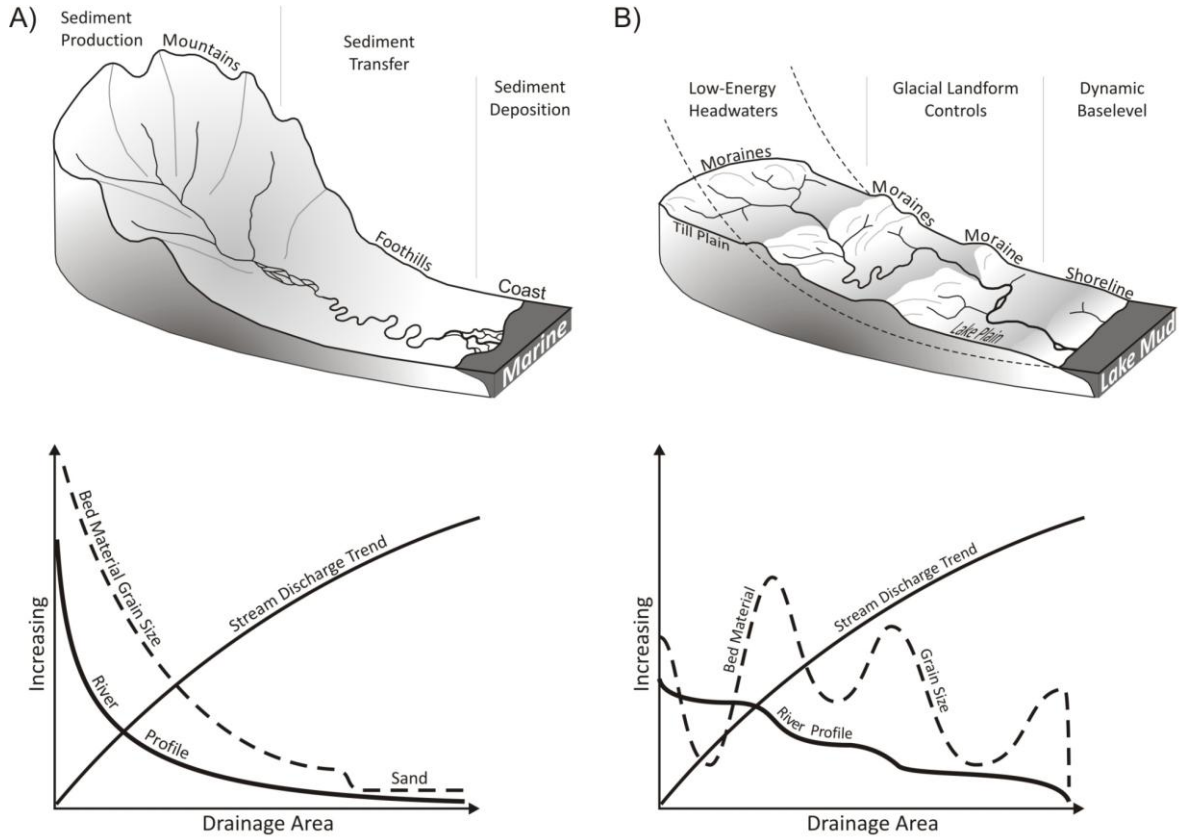
A Classification Challenge

Southern Ontario Rivers Don't Behave as Expected



Stream power mapping and the inherited glacial landscape template

Phillips and Desloges (2014)



Classic fluvial model

Glacially conditioned model

Phillips and Desloges (2015[b])

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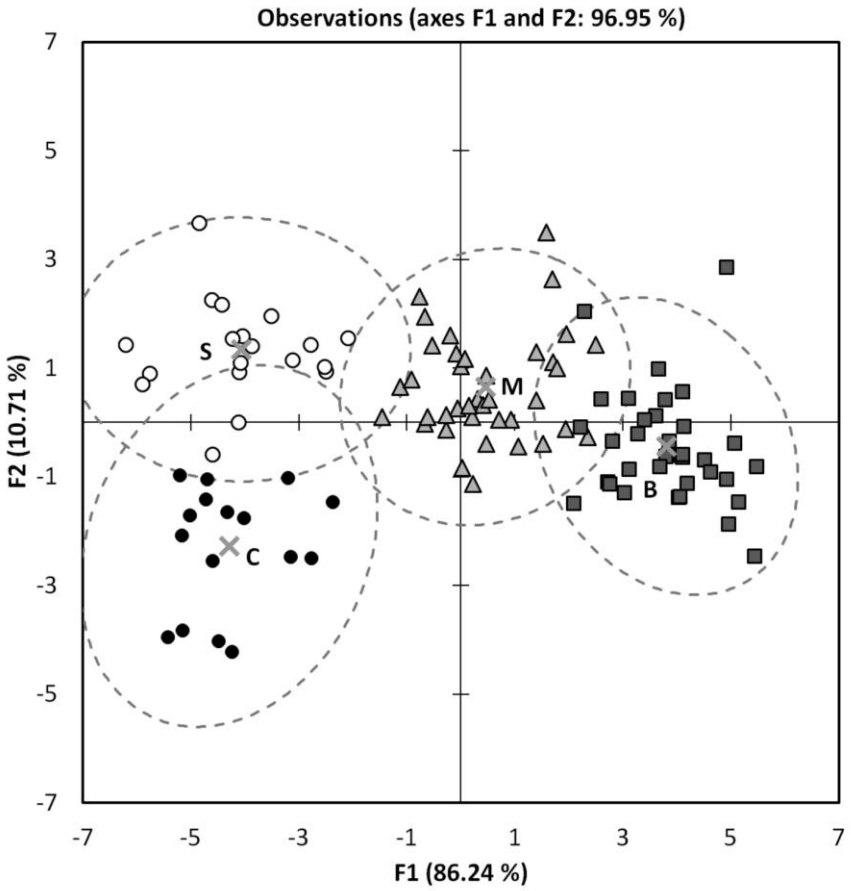
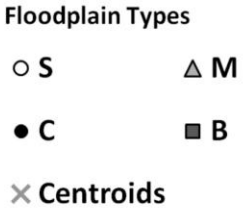
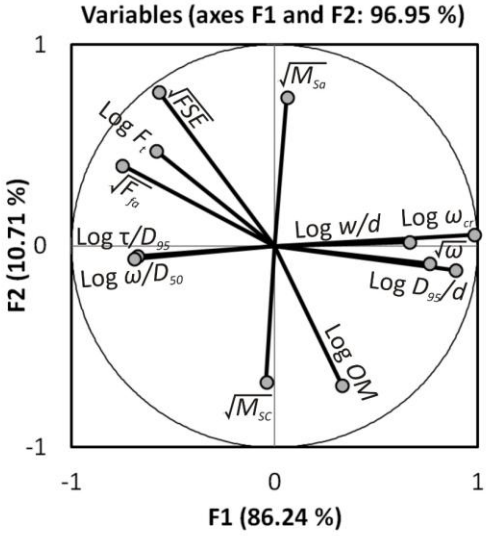
Geological history remains visible in modern river form and process.

Searching for Structure in Complexity



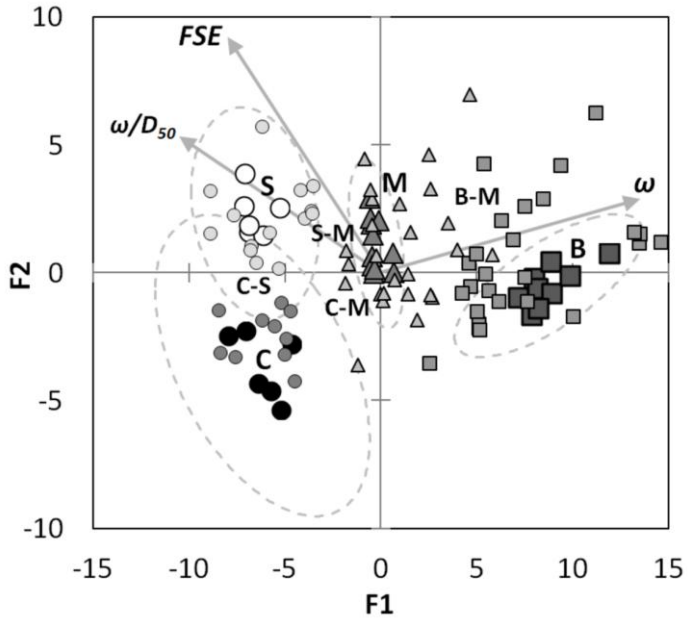




F1: Stream power F2: Sedimentology F3: Sediment transport

Phillips and Desloges (2015[a])

- Sampled 109 floodplains in Ontario
- Reduced to 12 geomorphic variables
- Multivariate clustering (K-means)
- Principal component analysis (PCA)
- Four primary floodplain types



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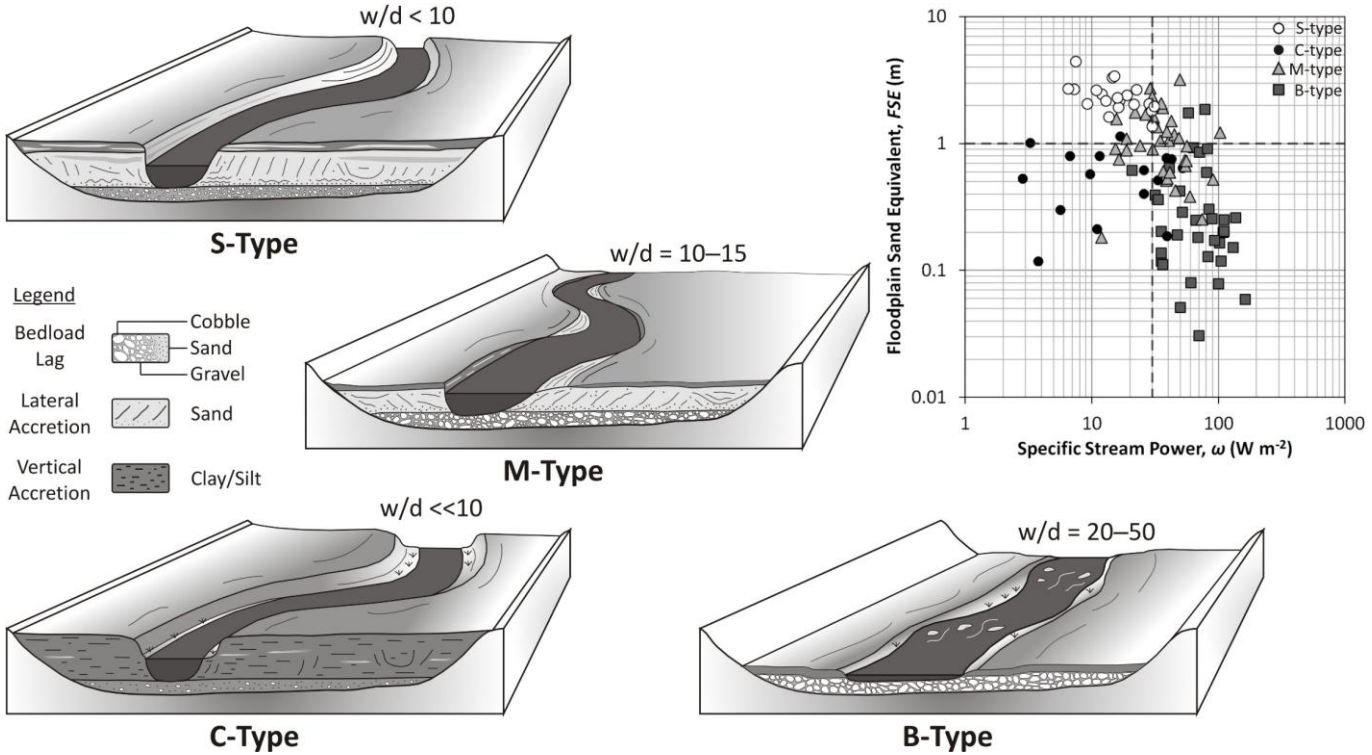
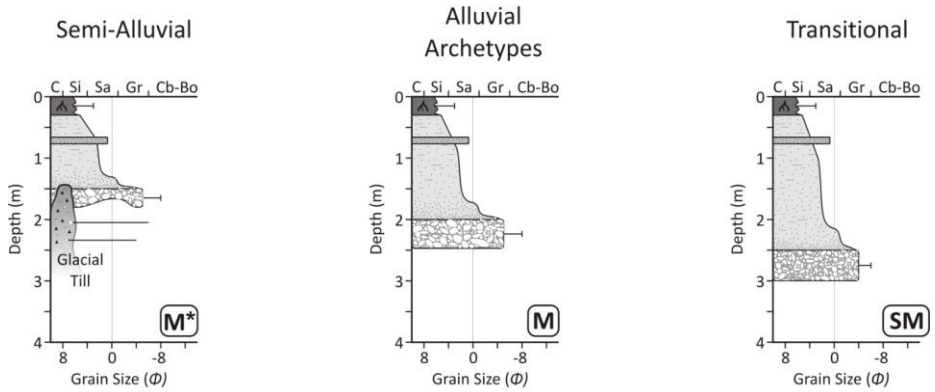
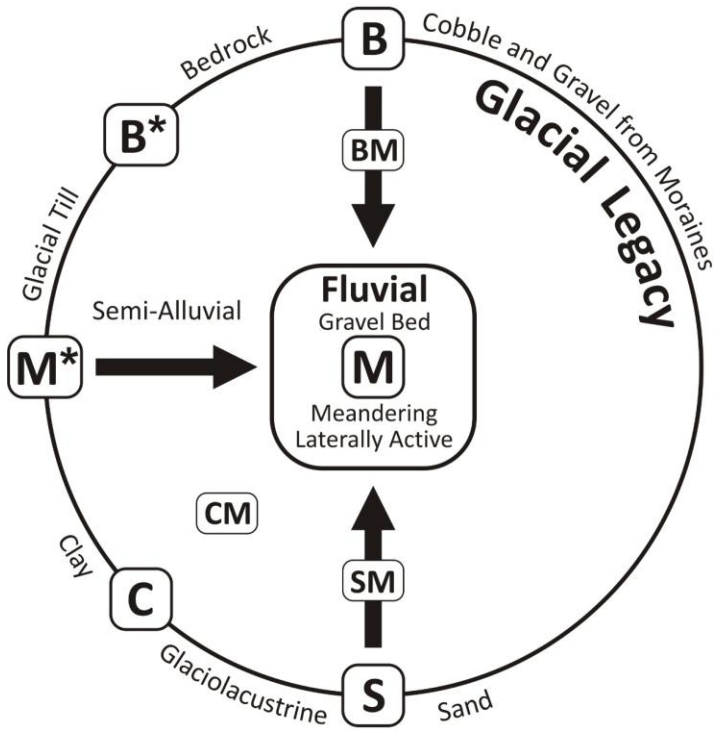
Discovery, Invention, and Transitional Landscapes





Phillips and Desloges (2015b); Desloges et al. (2020)

We discovered patterns. We invented categories.



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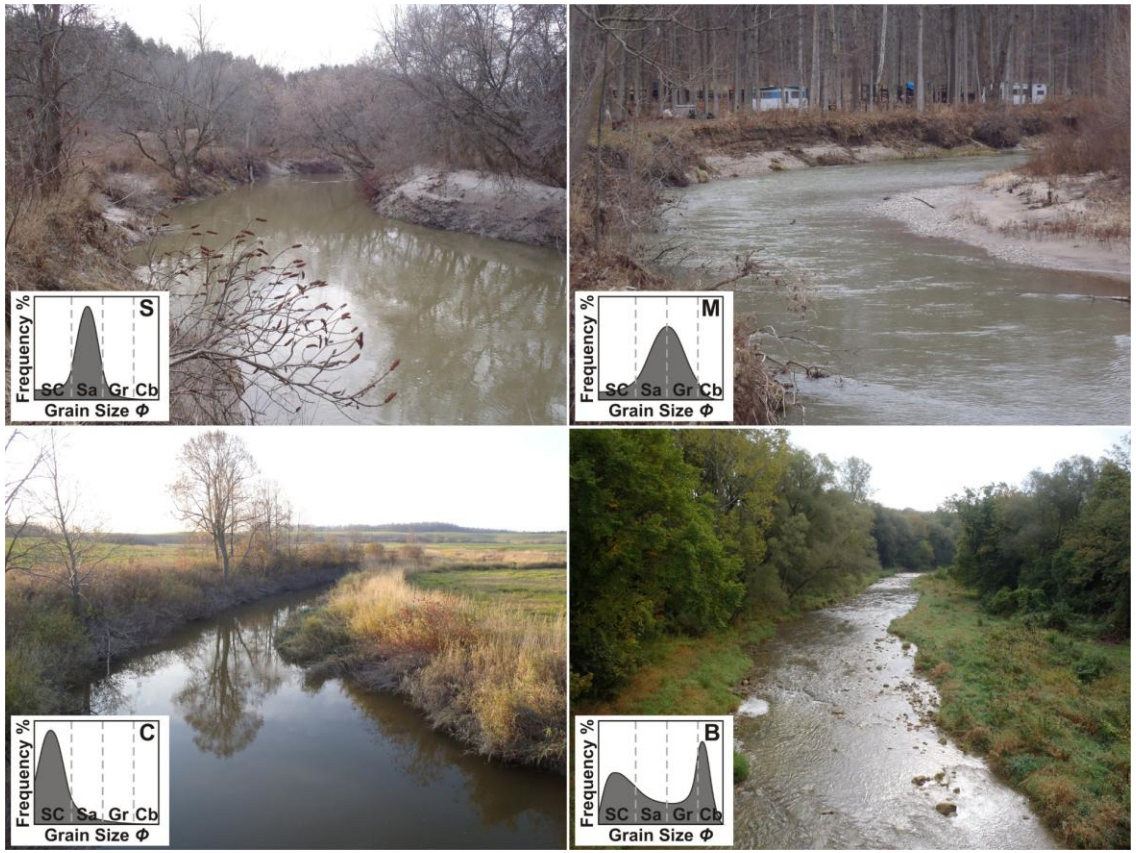
Ten Years Later: What Did I Learn?

Classification Simplifies

- Emphasizes some variables
- Simplifies complexity
- Leaves some things out

Classification Endures

- Frameworks become familiar
- Methods become routine
- Assumptions become less visible



Epistemic Capture

When a useful framework becomes the default way of seeing.

The greatest risk is forgetting that classifications are classifications."

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Resilient Rivers Require Classification and Judgement

Classification

Necessary because:

- Simplification
- Communication
- Decisions

Judgement

Required because:

- History matters
- Context matters
- Alternative interpretations matter

> *Better classifications do not eliminate judgement. They make judgement more transparent."*

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Interpreting River Complexity and Meaning

An Interpretive Hierarchy of River Science

Why classify?
Roger Phillips

What is a watercourse?
John McDonald

How are rivers organized?
Michael Brierley

How are rivers assessed?
Robin McKillop

How does process understanding inform interpretation?
Michael Chislett

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The talks that follow are not competing approaches.
They operate at different levels of the same interpretive hierarchy.

Continuing the Conversation

Classifications are tools, not ends in themselves.

Fitness for purpose matters.

Different frameworks may reveal different aspects of the same river system.

Multiple interpretations can be scientifically defensible.

Resilient river management depends on both frameworks and judgement.

The balance between standardization, flexibility, and expertise remains an ongoing challenge.

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References

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