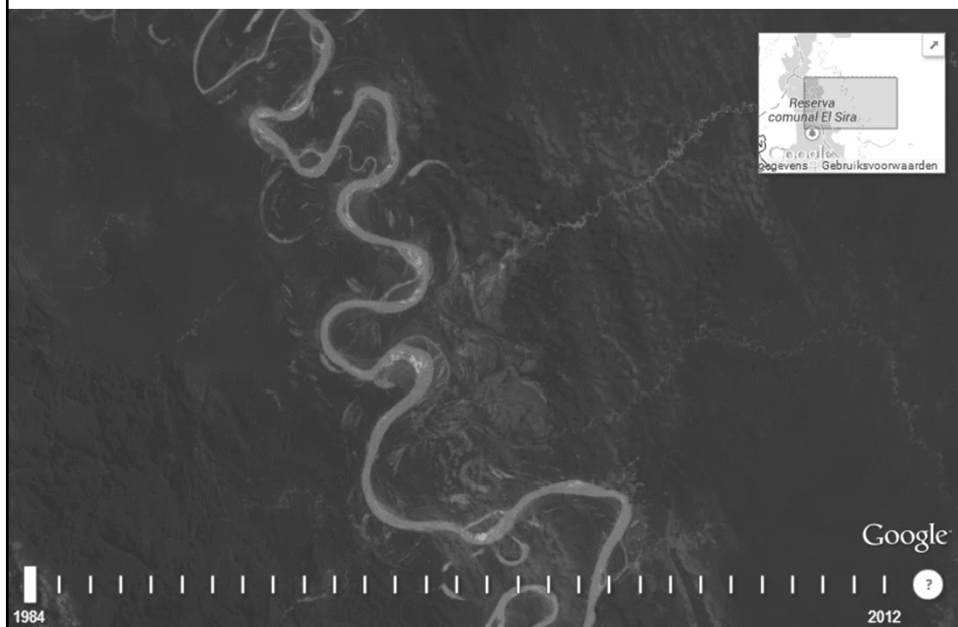
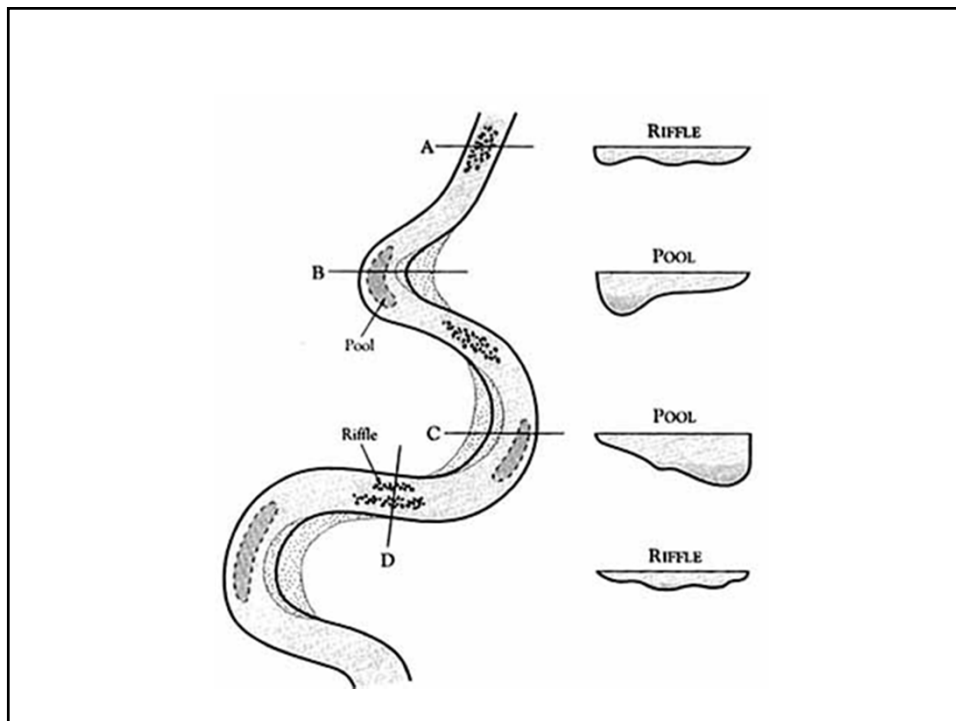
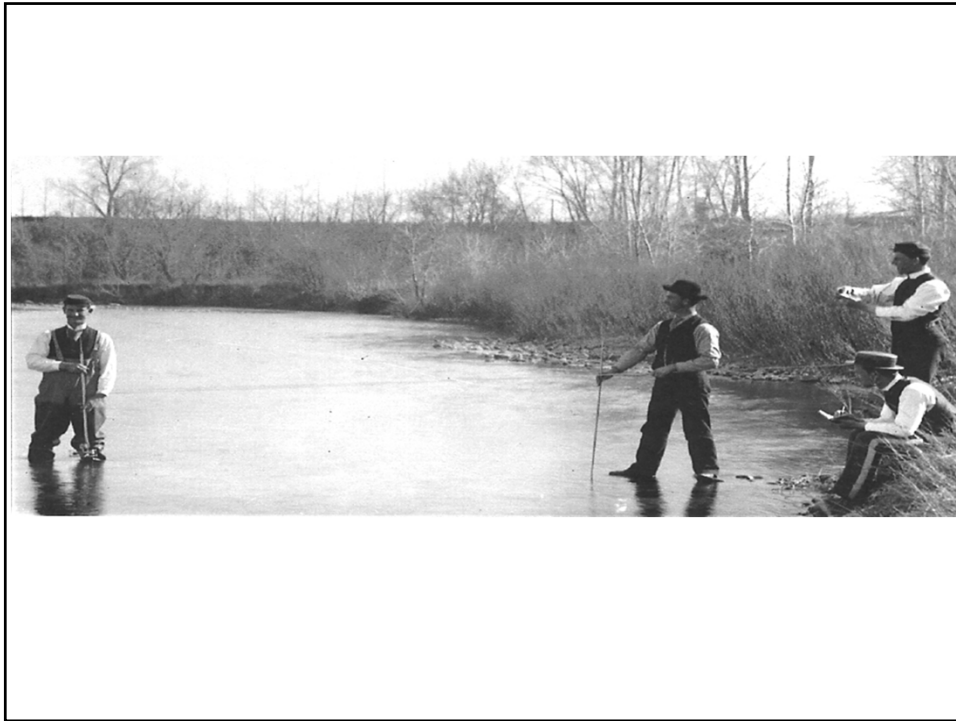
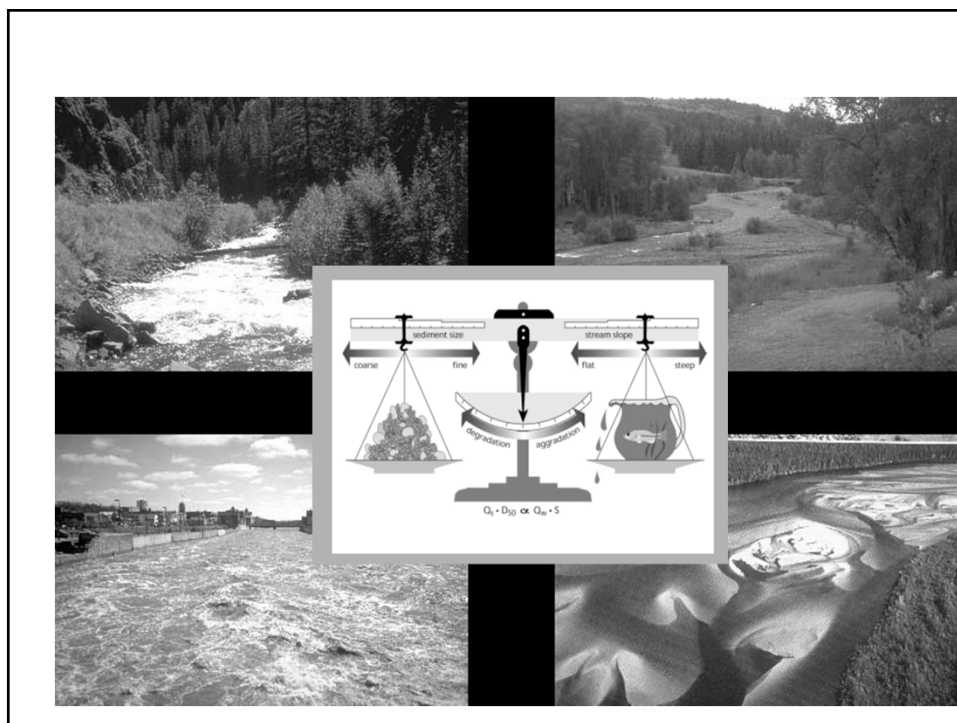
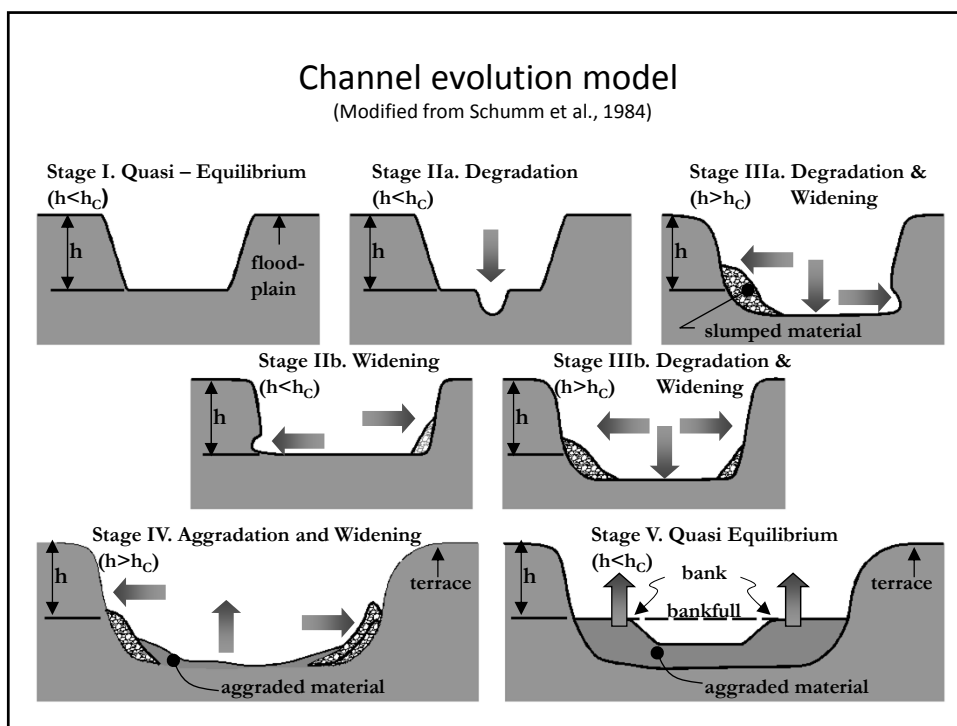


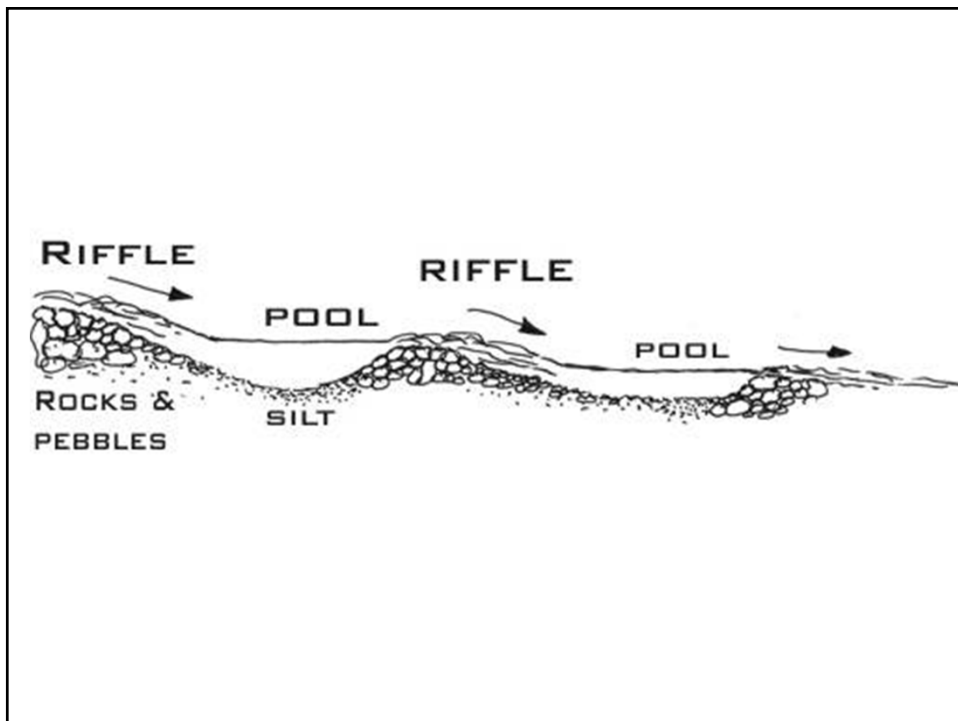


Rivers tendencies are persistent

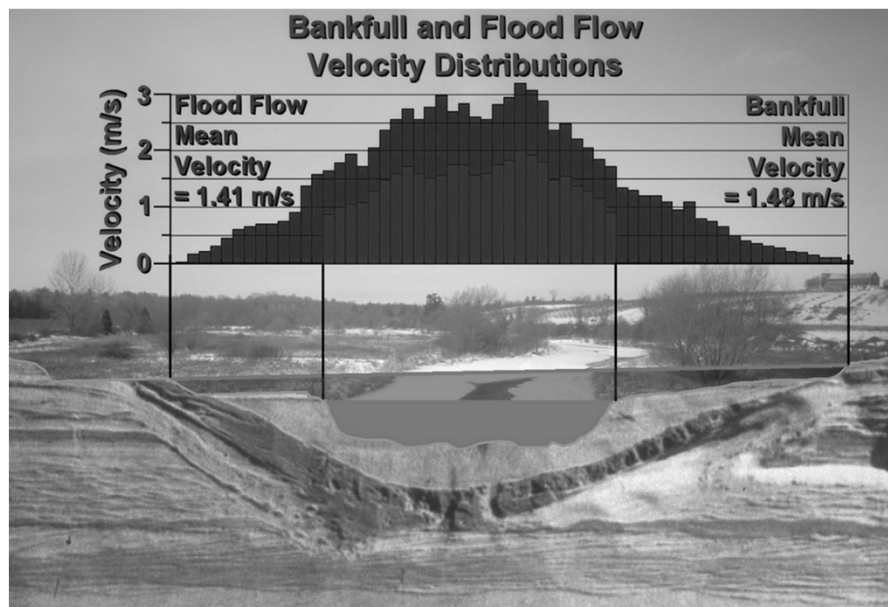
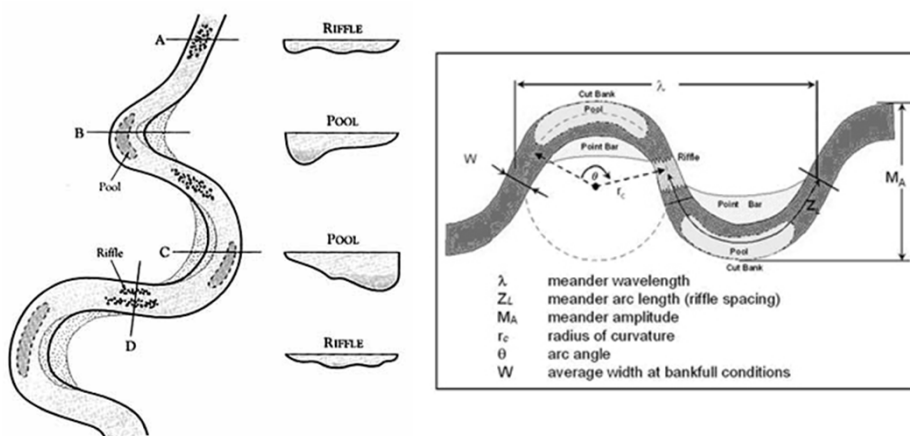


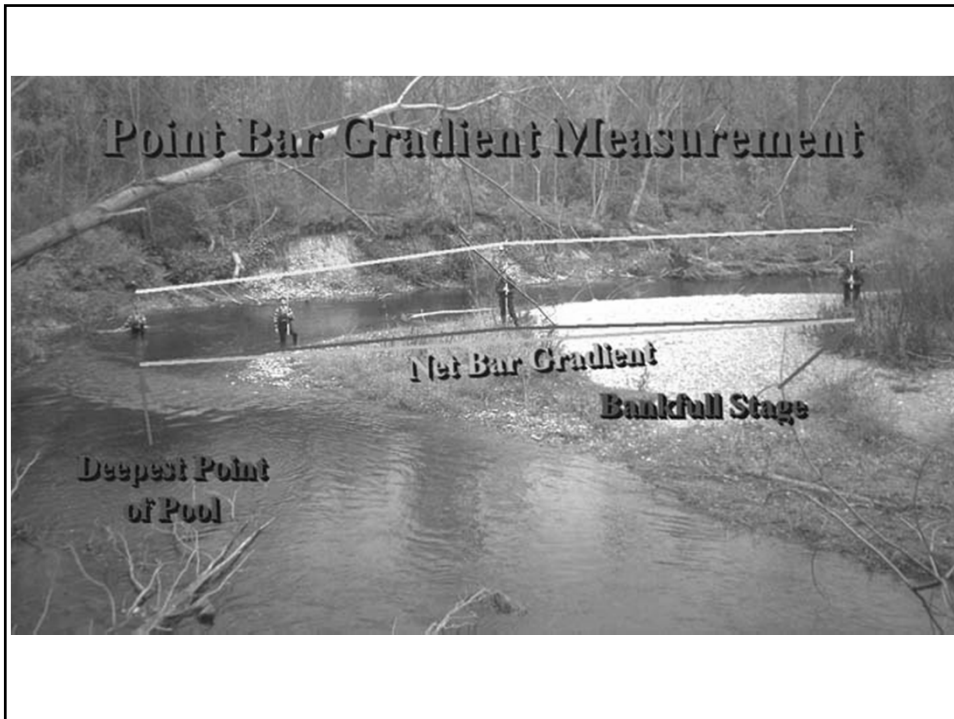






Planform Relationships

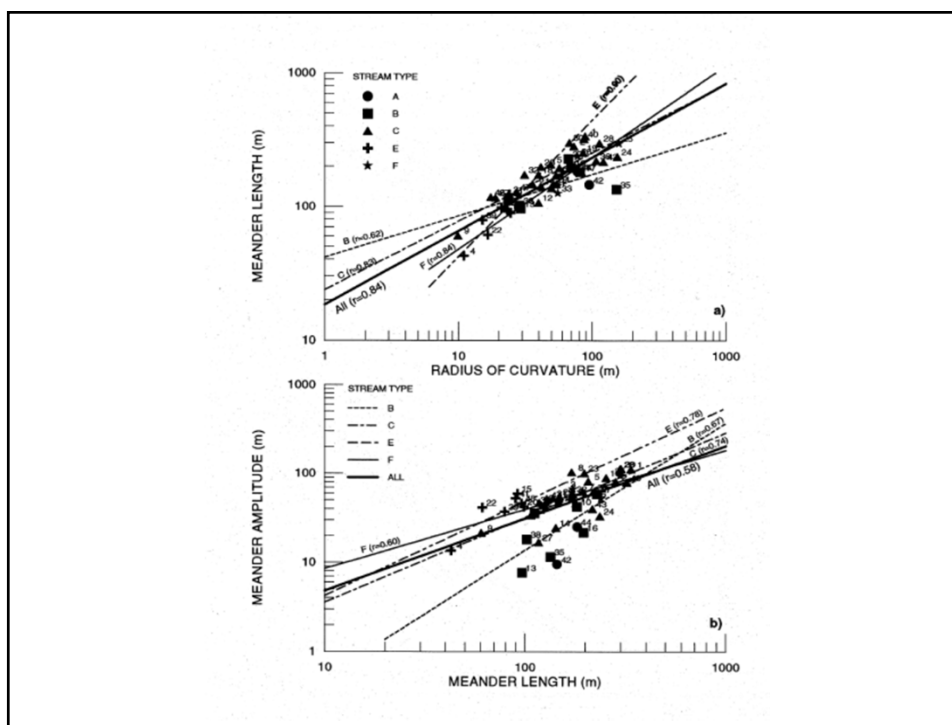
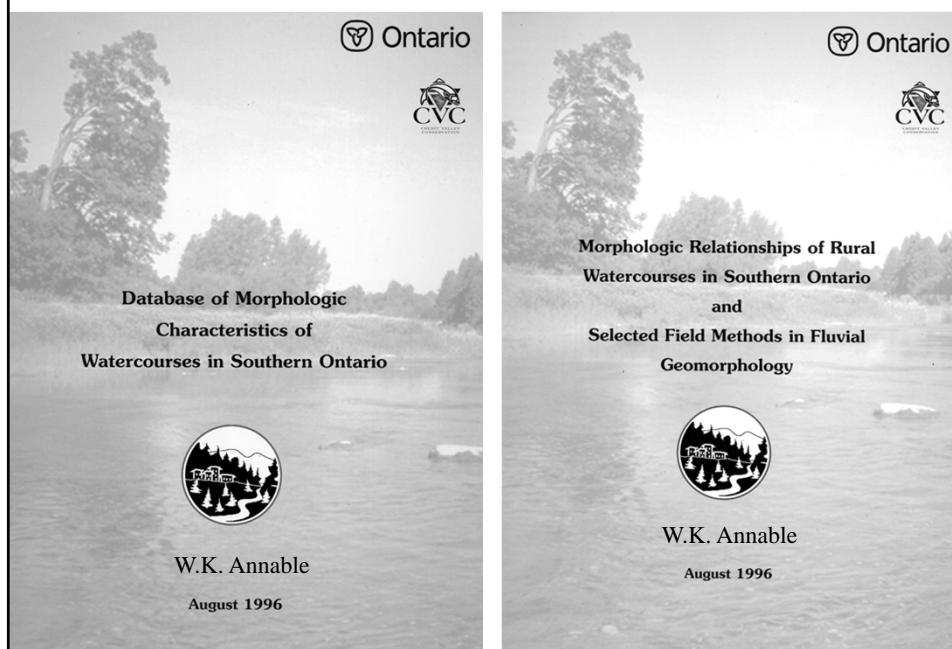


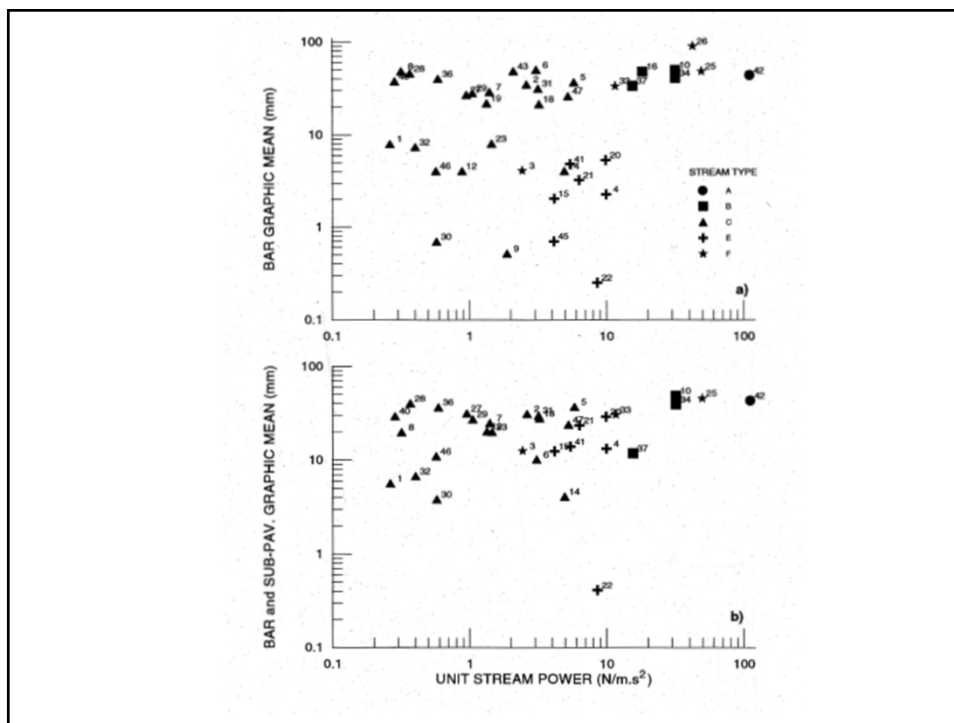
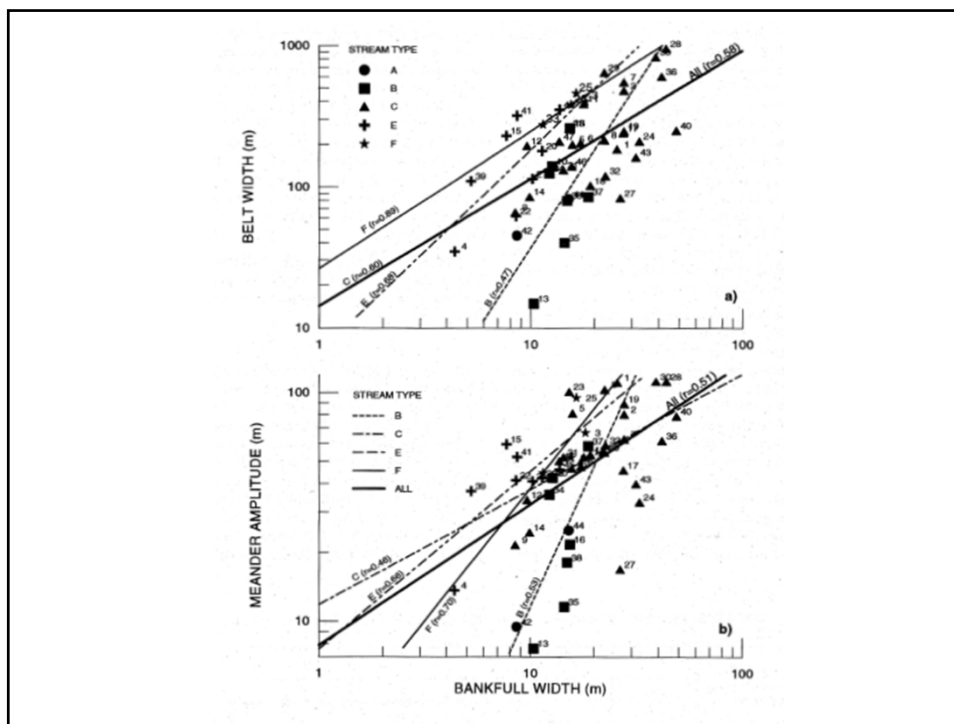


Key note address by Dr. Luna Leopold.
1st Natural Channels Conference, 1994.
Niagara Falls, Ontario.

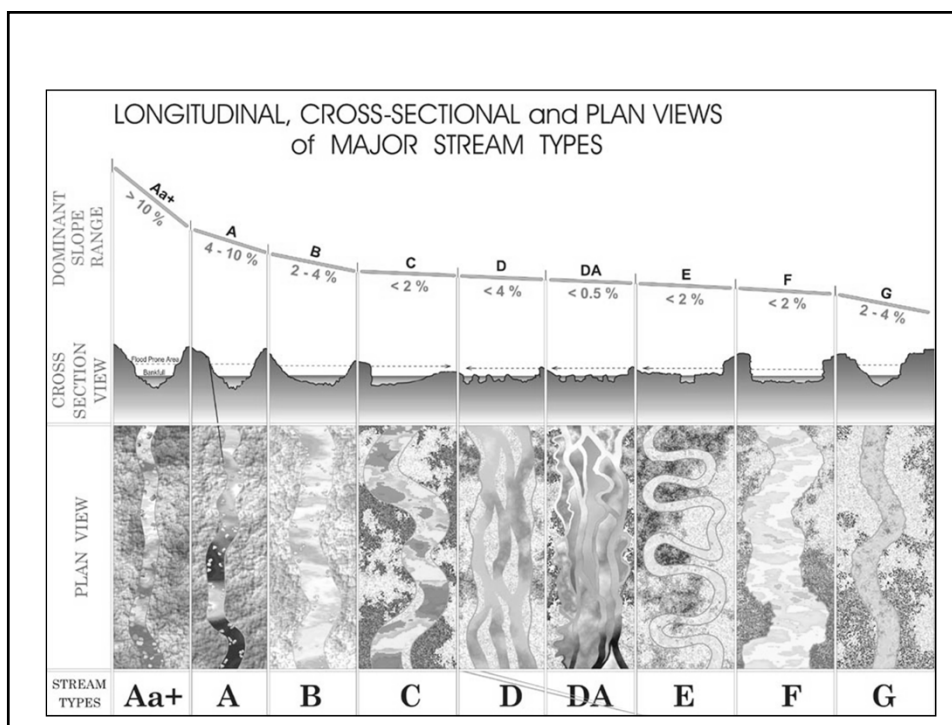
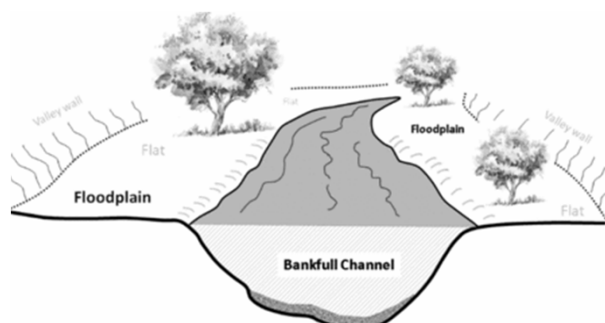


Field investigation of stable watercourses (1992 – 1996)





Lacked stressing the fundamental importance of floodplain connectivity



Other methods were also found to be applicable

- Hack (1957)
- Kellerhals, Church, Bray (1976)
- Schumm (1977)
- Montgomery & Buffington (1997)
- Parker (2007)
- Milner (2011)
- Others

Classifying observations and data into “classes” or taxonomies reduces error of conceptualization and interpretation of a given model

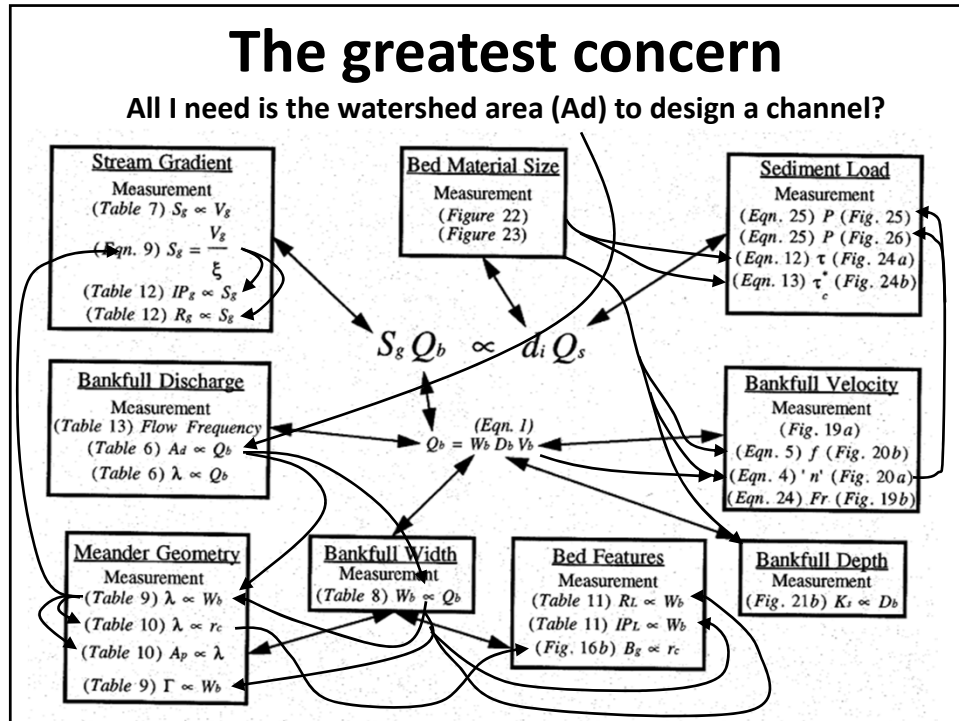
Communication tool between different communities of people/ interests to platform a common reference context

Misused or limited understanding and poor application of classifications or methods beyond their intended limits (or boundary conditions) is usually central to poor interpretations and analyses.

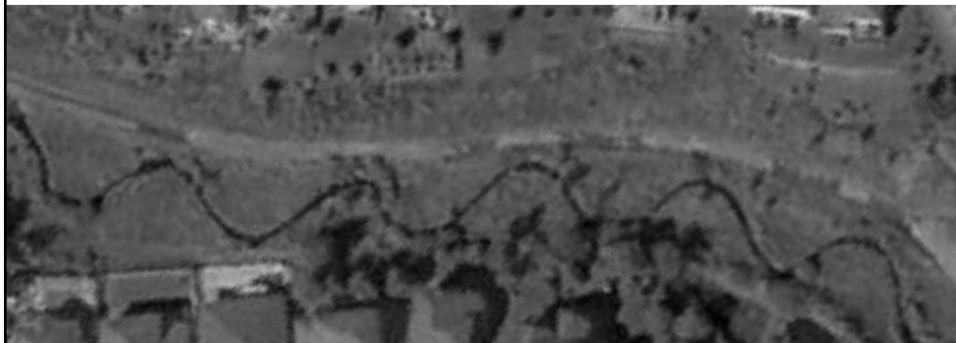
We should be adding to our collective tool box of knowledge (old and new tools). Not excluding some techniques over others out of prejudice or bias.

The more techniques we use, and find convergence upon the same range in answers, the stronger our assurances become that we may be closer to a reasonable answer.





Tadah!



- This is not a wise design approach! It is not based upon sufficient knowledge of the valley characteristics, landuse, geology, hydrology and sediment transport.
- It might work but such an approach is more likely based upon luck than design knowledge. The best likely outcomes using this approach are those with channels less than 3m - 4m in width and where landuse change has not occurred nor is likely to occur in the foreseeable future.

Tadah - NOT!



- This was never the intention of the database or the relationship publications
- Many sleepless night occurred worry about people using the database and relationships in this regard.
- It should be used as a validation design tool to ensure a proposed design falls within the observed ranges of other studied rivers

What is difficult to substantiate:

**Are designs without or limited data quantifying
the current and stable conditions:**

Regime relationships (and the like) are based upon observations of who is holding the yard stick (i.e. the observer, and the amount of experience they have) and are hydrophysiographically and landuse dependent

And...

The belief that taking a short course or two leaves people with the false impression that they are sufficiently experienced and qualified to undertake restoration projects



RIVER RESEARCH AND APPLICATIONS

River Res. Applic. **27**: 738–753 (2011)

Published online 11 May 2010 in Wiley Online Library
(wileyonlinelibrary.com) DOI: 10.1002/rra.1391

ESTIMATING CHANNEL-FORMING DISCHARGE IN URBAN WATERCOURSES

W. K. ANNABLE,^{a,b*} V. G. LOUNDER^a and C. C. WATSON^b

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^b Department of Civil and Environmental Engineering, Colorado State University, Fort Collins, Colorado 80523-1372, USA

RIVER RESEARCH AND APPLICATIONS

River Res. Applic. **28**: 302–325 (2012)

Published online 26 September 2010 in Wiley Online Library
(wileyonlinelibrary.com) DOI: 10.1002/rra.1457

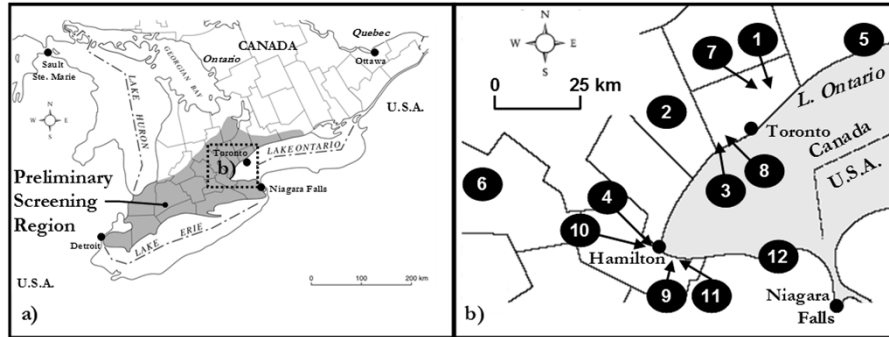
QUASI-EQUILIBRIUM CONDITIONS OF URBAN GRAVEL-BED STREAM CHANNELS IN SOUTHERN ONTARIO, CANADA

W. K. ANNABLE,^{a,b*} C. C. WATSON^b and P. J. THOMPSON^a

^a Department of Civil and Environmental Engineering, University of Waterloo, Waterloo, Ontario, Canada

^b Department of Civil and Environmental Engineering, Colorado State University, Fort Collins, Colorado, USA

Site Locations



* Approximately a population of 7,800,000 of the greater Toronto and surrounding areas

- Bankfull \neq 1.5-yr recurrence interval
- Bankfull = 1.01 – 32 yr recurrence interval
- A maximum instantaneous annual series return analyses is not applicable in urban stream channels (i.e. non-stationarity).

This is not a new concept



Guidelines For Determining

Flood Flow Frequency

Bulletin # 17B
of the
Hydrology Subcommittee

Revised September 1981
Editorial Corrections March 1982

INTERAGENCY ADVISORY COMMITTEE
ON WATER DATA

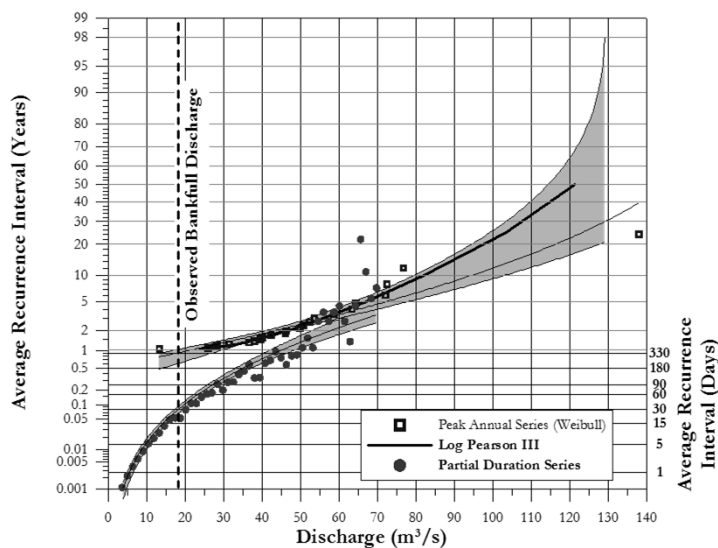


U.S. Department of the Interior
Geological Survey
Office of Water Data Coordination
Reston, Virginia 22092

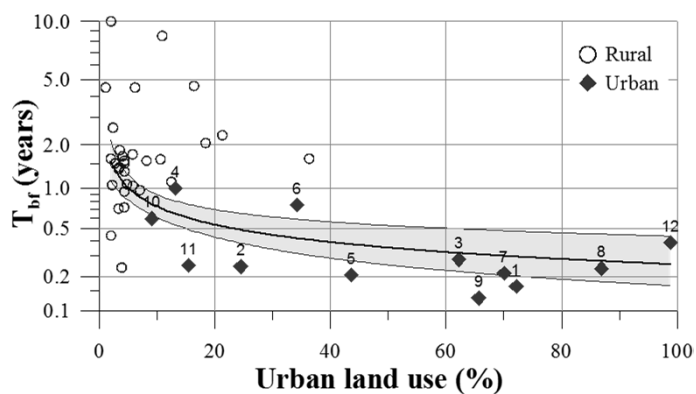
“Watershed history and flood records should be carefully examined to assure that no major watershed changes have occurred during the period of record.....

Special effort should be made to identify those records which are not homogeneous. Only records which represent relatively constant watershed conditions should be used for frequency analysis.”

Difference in flow series prediction methods and the frequency return estimate of bankfull discharge (with 95% confidence intervals)

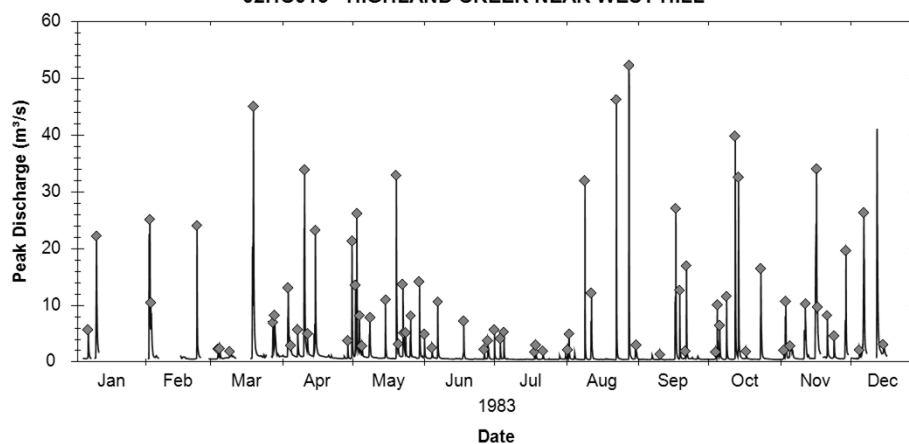


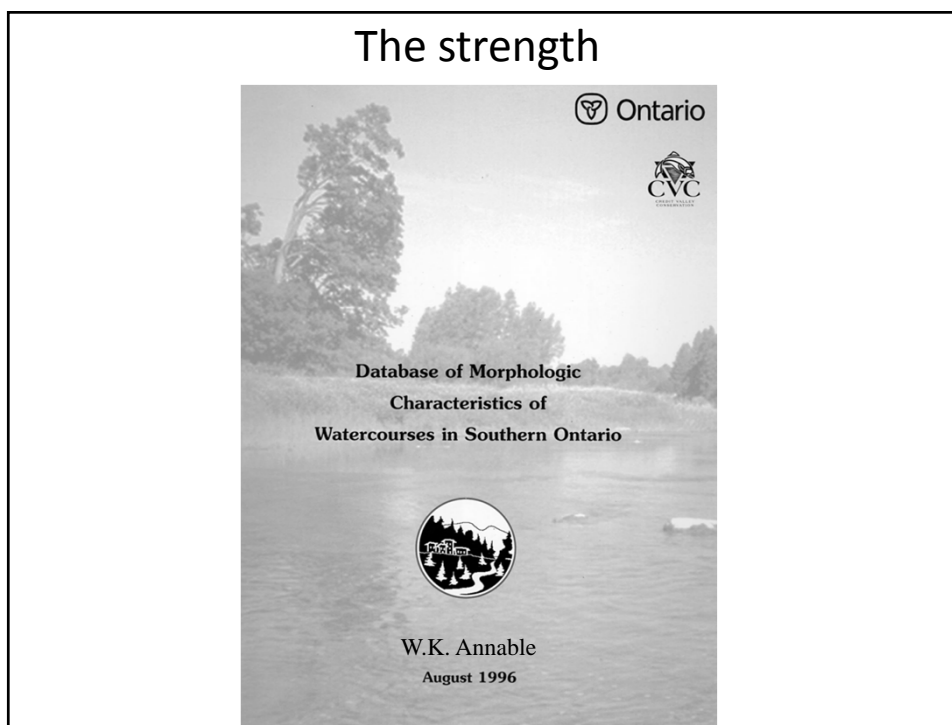
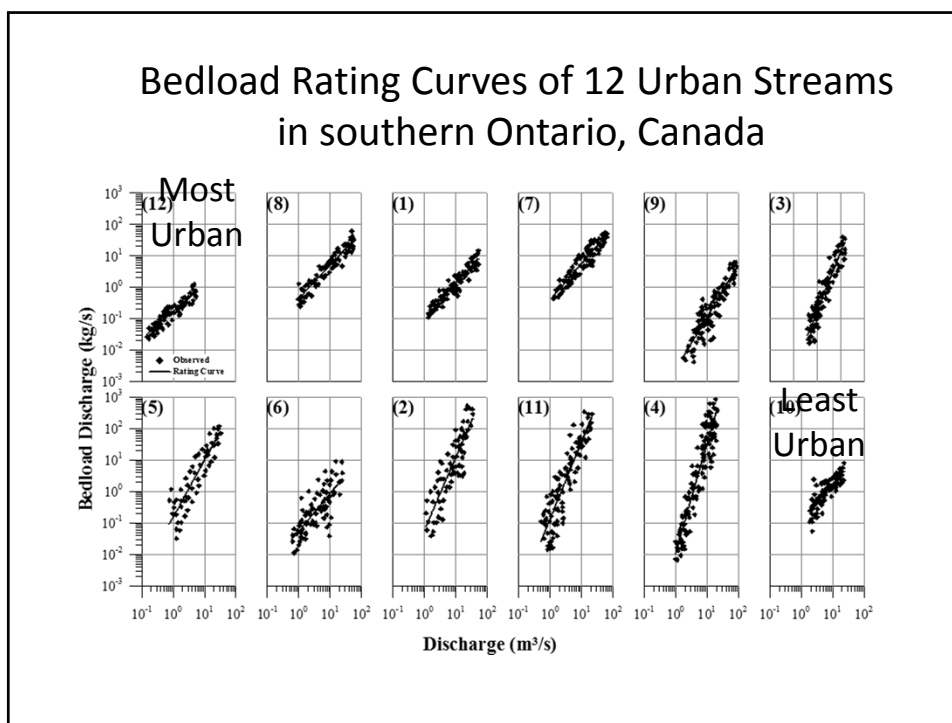
Bankfull return period versus watershed urban land use

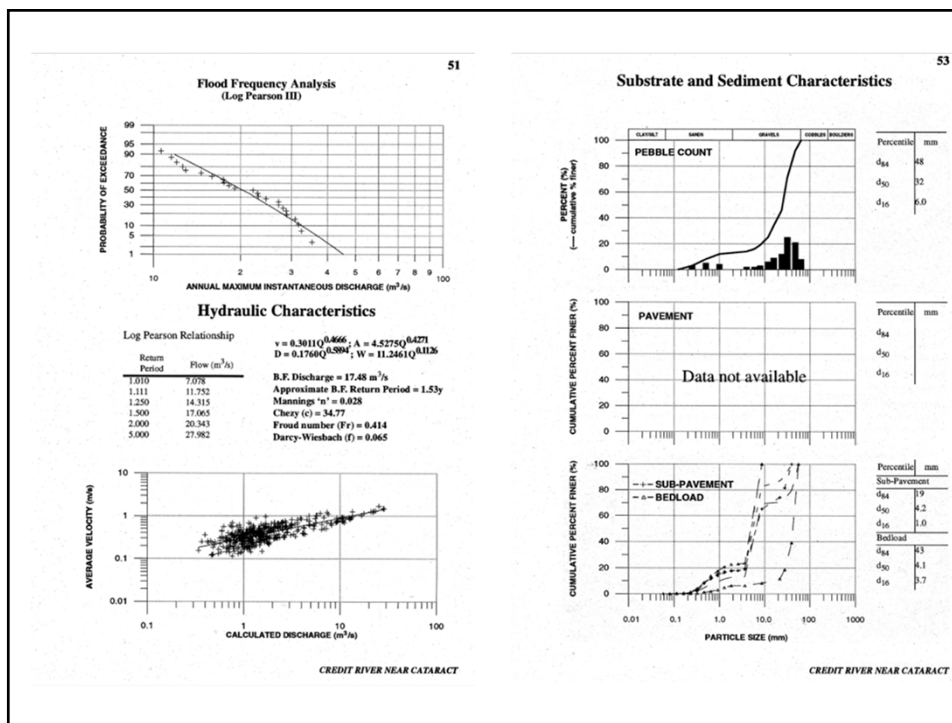
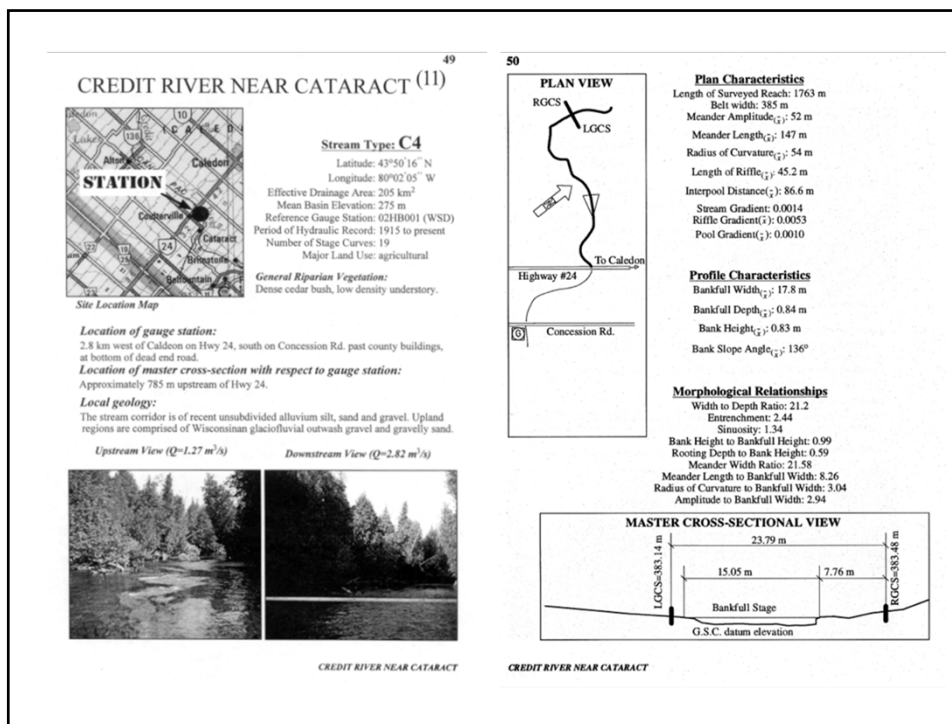


Peak Event Discharge

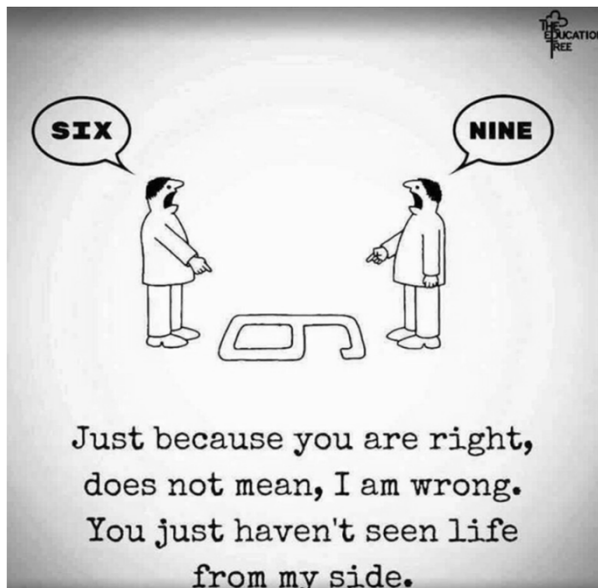
02HC013 - HIGHLAND CREEK NEAR WEST HILL







One River. Many different views



Speaking a common language



River Specialists



We have engineers-in-training programs in many countries. Why do we not have the same approach for river specialists?

Mentoring programs are essential to help develop strong and integrated understandings to junior specialists and dispel fact from myth and scientific folklore.

Also, to teach in-depth knowledge of the watersheds one works in, an appreciation for time and the duration which knowledge and data need to be collected over and to appreciate what the meaning of negative impacts are and their magnitude.

Questions ?

