# Stream Restoration Forum: Science and Regulatory Connections

**June 8, 2016**

Agenda

- 9 am to 9:30 am - Introduction presentations that set the stage for the issues and potential solutions
- 9:30 am to 12:15 pm - Presentation of the most recent stream restoration research applicable to regulatory and practitioner efforts
- 12 :15 pm to 1:00 pm - Lunch (provided)
- 1:00 pm to 2:30 pm - Facilitated break out groups
- 2:30 pm to 3:00 pm - Break
- 3:00 pm to 3:45 pm - Group discussion
- 3:45 pm to 4:00 pm - What next?

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We are looking forward to a productive discussion with you!

Denise Keehner, Wetlands and Waterways Program, MDE

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# REMARKS FOR STREAM RESTORATION FORUM

# 4 lessons (in 36 years) about science and regulatory connections

- Science informs but does not make policy; public policy is made with or w/o adequate science;
- What is unknown scientifically is often more than what is know; science policy judgments by scientists fill the gaps but scientists are not always good at fully disclosing uncertainties to regulatory policymakers;
- Precision in language matters—both in the asking of science questions by the regulator and in the answering of science questions by the scientist; and
- Context really matters.

# Stream Ecological Restoration vs. Stream Environmental "Interventions" (terminology borrowed from Margaret Palmer)

- In the Wetlands and Waterways Permitting Program, work to improve streams comes up in at least 2 ***contexts***
  - Work undertaken by Counties to address, for example, significantly incised stream banks & floodplain disconnection, and, downstream transport of sediment and nutrients in the context of the implementation of the Bay TMDL. (I would call these "Interventions")
  - Work undertaken in the context of compensatory mitigation, to ecologically restore a stream/wetland system in order to recover a self-sustaining living system, both the organisms and the environmental factors that support them. (I would call these Ecological Restorations)

# My Immediate Goal: Bring the best available science to bear in the review of TMDL-related Stream "interventions"

- TMDL changed the game; we have targets and dates to meet ("and many miles to go before we sleep")
- Counties have projects that need permits to implement and we have to make permitting decisions
- We have to accept the context and the reality and make the best decisions we can in light of where the science is (and isn't)

# My questions to scientists about these projects include.....

- What are the scientific/technical pros and cons of optional methods for reducing stream erosion in a particular location? How certain are you in your conclusions? What are the key and most significant uncertainties? What are appropriate metrics for measuring success in this location? Will there be any adverse impacts to adjacent wetlands? What are the uncertainties associated with your analysis of adverse impacts? What is the probability of such impacts? What are the options for reducing adverse impacts to adjacent wetlands while still achieving the same stream and downstream benefits at the same or similar cost?

- Can you build me a tool (model) that will allow me to reliably predict the environmental outcomes of various types of stream intervention projects in various locations?

# Closing thoughts to my opening remarks....

- Excited about this Workshop ever since Bill Seiger and Ginny told me about the work underway to improve the science
- More excited today than 2 months ago—because these decisions are on my mind a lot
- Kudos to organizers and those who saw this need a few years ago and took action
- We need tools, sooner rather than later, that will allow us to make better decisions—tools that will allow us to more reliably and accurately predict the environmental outcomes of these projects so that over time we ensure **better and better environmental outcomes**

# Translation Slides

# Hilderbrand Translation Slides

# What does this mean for me?

- Monitoring is expensive
- We have to make sure that what we're monitoring is getting us at the right question
- There is the question of whether THIS restoration project worked, then there is the question of whether this TYPE of restoration WORKS in general; i.e., should we do it again elsewhere
- For the latter question, we need to measure at +1 site to capture trends (replication →spatial variability) and we need to compare to static places given that other things change (control sites →temporal variability)
- Variability is a big issue – it's what makes us say when we only measure something at one site "well, it only happened here this way because x, y, z"

# What does this mean for me?

- What might I take from this if I am a practitioner:

Let's make sure we frame our questions and get them over to the scientists to answer

- What might I take from this if I am a regulator:

Let's make sure we are asking folks to monitor where it makes sense for an individual project to be monitoring (did the structure stay in place, does it need to be fixed), and let's get our major questions that we need replication and control sites over to the scientists to answer.

# Wilcox
# Translation Slides

# What does this mean for me?

- Understanding sediment supply and transport is critical in the overall success of a stream restoration project.
- Vertical Stability – flood plain connectivity is critical to the overall success of a stream restoration project.
- Lateral Stability – maintaining lateral stability until vegetation establishes is critical to the overall success of a stream restoration project. Use of wood is best since it will decompose over time and allow for natural channel movement.
- Little research information exists regarding best stream restoration practices, structures or design approaches to achieve quasi-equilibrium. Regardless of how restoration occurs, success will always be compromised if sediment balance is not addressed.
- Modelling – 1D v.s. 2D modelling. 1D less effort and less detail than 2D modelling. Which model is best depends on objectives of project. However, 2D modelling is becoming easier and less expensive to use.

# What does this mean for me?

- What might I take from this if I am a practitioner:

Let's make sure to address sediment budget in design process and use wood for structures as much as possible and when appropriate

- What might I take from this if I am a regulator:

Let's make sure sediment analysis is addressed as part of design process and that an appropriate level of stability analyses and/or modelling are conduct to demonstrate design quasi-equilibrium.

# Filoso
# Translation Slides

# What does this mean for me?

- Function versus technique
- Different factors influence the outcomes (e.g., if you are aiming for floodplain connection, success will depend on how long water hangs around)
- If you are aiming for N removal, then you have to create spaces for denitrification, no matter what you call your practice (a rose by any other name…)
- Must think about watershed – the loads coming in. There are some watersheds where this can "work" and some where not, and we need to find out what factors control this

# What does this mean for me?

- What do I take from this if I am a practitioner:

Design attenuation to create hot spots for denitrification.

- What do I take from this if I am a regulator:

If purpose and need of a project is to decrease P and N, then the design should lead to attenuation and inundation of the flood plain. If the design doesn't include these elements, ask whether outcomes can be maximized.

# Williams
# Translation Slides

# What does this mean for me?

- Iron in streams:
  - comes from both natural soils and may come from construction materials (ironstone and sand)
  - is higher when there is organic matter and anoxic conditions
- Iron flocculate:
  - can occur in some, but not all, RSCs

# What does this mean for me?

- What do I take from this if I am a practitioner:

No action yet

- What do I take from this if I am a regulator:

No action yet

# Penrose Translation Slides

# What does this mean for me?

- Watershed and water quality condition are important in determining the success of local habitat improvements if conducting stream restoration focused on benthic invertebrates.
- Retention of organic material (primarily leaves) may be important in determining the success of stream restoration focused on benthic invertebrates.
- Connecting surface waters with the hyporheic zone may be important for restoring benthic invertebrates.
- When setting goals for stream restoration, feasibility of attaining the goals should be considered.
- Determining the reasons why some projects are successful and others not is important in follow-up research.

# Hilderbrand Translation Slides

# What does this mean for me?

- Watershed and water quality condition are important in determining the success of local habitat improvements if conducting stream restoration focused on fish.
- Understanding detailed stressor thresholds (and how they can or cannot be addressed) for many water quality and physical habitat factors and specific species is important in determining realistic expectations (more science is needed on this).
- Factors such as blockages to re-colonization, the extent of areas available to species, and the species available for re-colonization in the watershed are also important in determining fish recovery potential.
- Biological improvements appear to be extremely challenging (probably unrealistic) in most highly urbanized watersheds.

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