- **Current Science and Understanding**
- **Applied River Management and Rehabilitation**
- **Governance, Asset Management and Education**
- **What We Have Learned / Knowledge Sharing**

To assist in selecting the appropriate category, below are examples of sub-topics that may apply to each.

A. Current Science and Understanding

1. FLOW IN THE URBAN CONTEXT

Advancing the understanding of flooding and flood risk management *in the context of urbanization and associated land use changes. Examples include:*

 a. Urban systems challenges – floodplain encroachment
 b. Headwater system protection / rehabilitation
 c. Landowner expectations
 d. Urban system connectivity and planning
 e. Revising historical trends – is expropriation needed?

2. RIVER HYDRODYNAMICS AND SEDIMENT TRANSPORT

Science and applied research into river mechanics and response mechanisms to known disruptors of the balance between flow and sediment.

 a. Sediment transport in response to hydromodification
 b. Time scale for rivers
 c. Restoring for sediment supply deficiencies
 d. Understanding erosion thresholds
 e. Understanding channel forming flow
 f. Impact of surrounding land use on sediment and erosion
 g. Laboratory study of the complex flow and sediment interactions
 h. Water quality considerations
 i. Technological advances

3. **ECOLOGICAL INTEGRATION**

Integration of floodplain dynamics, specific to ecological function and the interactions between flow stage and ecological productivity.

a. Riparian zone interactions
b. Effects of riparian vegetation on channel form and function
c. Hyporheic zone exchange
d. Designing to enhance stability
e. Post construction monitoring of riparian vegetation
f. Importance of choosing the right vegetation for the right spot at the right time
g. Management of invasive species
h. Effects of riparian areas on water quality

B. Applied River Management and Rehabilitation

1. **CONSTRUCTION**

Insights and innovation from the perspective of the construction industry. Methods, lessons learned, opportunities and challenges that promote the successful implementation of construction projects in valley corridor settings.

a. Construction practices. Construction limitations
b. Mitigating impacts during construction.
c. Oil and gas – challenges working in / around watercourses
d. Working in remote areas
e. Erosion and sediment control BMPs
f. Technological advances

2. **NATURAL CHANNEL DESIGN**

Design tools, techniques and insights that advance the science and understanding of natural channel systems in the context of stream and river rehabilitation.

a. Technological advances
b. Detailed design of aquatic habitat creation and enhancement
c. Pre-design data requirements (biological, geomorphic, etc.) to suit NCD
d. Cost comparisons integrating natural channel design (C/B analysis or value added approach)
e. Maximizing what we can accomplish on a small budget
f. Rural natural channel design challenges and opportunities
g. Innovations in rehabilitation techniques
h. Field methods
i. Remote sensing for geomorphological purposes
j. Flow training tools

    k.   Precision technology for data collection
    l.   Main channel and floodplain linkages

3. **AGRICULTURAL DRAINS**
Advancing the understanding of landuse, hydrology, sediment supply, and the regulatory environment as it pertains to agricultural settings.
    a.   Challenges and opportunities in applying NCD principles to agricultural drains
    b.   The economic case
    c.   Impact of agricultural practices on the resiliency of agricultural drains
    d.   Demonstration site promotion

4. **DAM REMOVAL**
Dam removal examples and research into the evolutionary response of streams to dam construction and dam removal.
    a.   Stream response to low head dam removal
    b.   New opportunities for Natural Channel Design in Dam removal
    c.   Processes and permitting challenges specific to dam removal

5. **DESIGNING FOR FISH HABITAT (ECO-HYDRAULICS)**
The integration of habitat-based design criteria into natural channel design projects
    a.   Technological advances
    b.   Interrelation between hydraulics and fluvial geomorphology in natural channel design
    c.   Water crossing design for fish passage
    d.   Eco-hydraulic modeling
    e.   Hydrology, water quality and habitat usage
    f.   Using natural materials in construction and design

C.   Governance, Asset Management and Education

1. GOVERNANCE AND ADVOCACY

Challenges and opportunities generated by legislative and funding mechanisms in support of (or as a roadblock to) improvements natural channel science and application.

   a.   Innovative legislative drivers for successful projects
   b.   Innovations in funding models benefiting natural systems
   c.   Advocacy opportunities – NCI and beyond
   d.   Permitting process
   e.   Education and Awareness

2. ASSET MANAGEMENT / ECONOMIC ANALYSIS

Insight into risk management surrounding waterways, as it applies to the built environment

   a.   Risk management
   b.   Issues of liability
   c.   What design storm is a new project supposed to withstand without damage. What is damage
   d.   Changes to the insurance industry

D.   What We Have Learned / Knowledge Sharing

1. MONITORING

Telling the story of restoration failure or success though post construction monitoring.

   a.   What's been learned. Are we making a difference in urban systems
   b.   What's been learned. Are we making a difference in rural systems
   c.   Geomorphic, biological, water quality
   d.   Meta-analysis – will it be helpful?
   e.   Remote sensing and precision data

2. MOVING FORWARD

Knowledge gaps and opportunities for advancing knowledge of river science, ecology, engineering, land use planning as it pertains to successful project implementation.

   a.   Engineering for biologists 101
   b.   Biology for engineers 101
   c.   Remote sensing