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Resource Roads and Wetlands: Practical Applications to Maintain Hydrologic Connectivity

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Outline

Opportunities to promote continued hydrologic function of wetlands

- Avoid
- Construction methods
- Education

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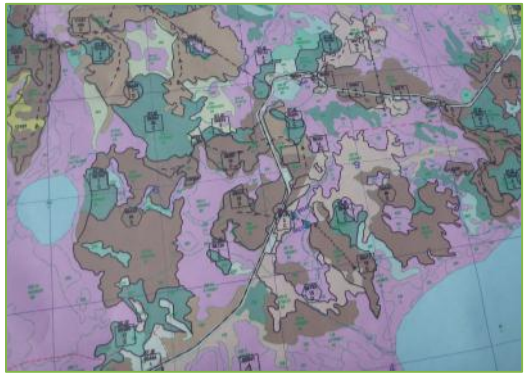
Plan to avoid crossings

- Avoid crossing wetlands where practical
- Extensive landscape planning
  - minimize number of crossings
  - Identify control points
- Utilize maps/images, and inventory data to aid in the planning process
- Reconnaissance flights and ground truthing of planned routes



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Protection of wetland during clearing

- Careful operating techniques
- Care taken to preserve forest floor / peat surface

- Choice of equipment
- Operating techniques
- Seasonal timing

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Seasonal considerations

- Building access across wetlands during frozen conditions
- Surface material remains relatively intact when frozen
- Subsurface organics frozen to various depths
  - Techniques to promote frost penetration

Surface applications

- Matting and light-weight fill
- Used for temp access and removed after use
- Provides wide load distribution which eliminates rutting of travel surface
- Reduced compaction and settlement of underlying organic material

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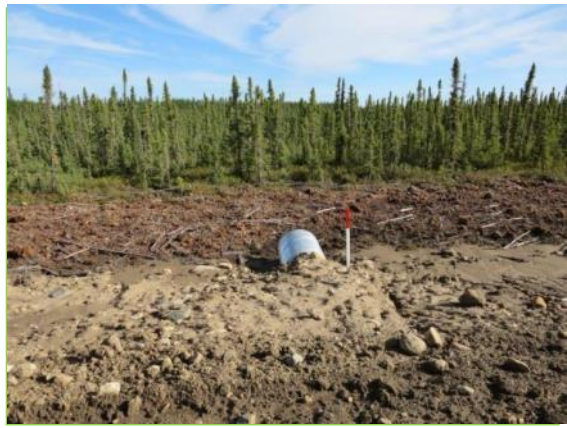
Culverts

- Commonly used for water management
- Number and spacing of culverts need to provide adequate flow (challenge is to meet the hydrologic needs of the wetland)
- Large diameter culverts provide a wider entrance for flow and deeper embedment opportunities
- Embedded culverts will cater to shallow subsurface flows



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Culverts with logs

- Logs provide additional flow capacity
  - Wider flow path at low flows
  - Seasonal high flow passage
  - Temporary structure

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Culverts

- Location and spacing need to be considered
  - Survey to locate low areas
  - Set spacing
  - Best approximation

Culvert spacing

	Stagnant	Moving – Slow Lateral Flow	Moving – Seasonal / Fluctuating
Culvert spacing range	Widely spaced	Mid – widely spaced	Closely spaced
Minimum culvert spacing - Permanent road	200 m	150 m	100 m
Minimum culvert spacing - Temporary road	250 m	150 m	150 m
Culvert diameter range	250 – 500 mm	500 – 800 mm	>800 mm

[a] Where culverts are the chosen conduit, the length of the wetland crossing will help determine the number of recommended culverts. A minimum of 1 culvert should be placed regardless of crossing length.

[b] The suggested range in spacing may be further influenced by site specific wetland characteristics. For example, where the crossing is located at a narrow area of the wetland, closer spacing of culverts may be required to accommodate the concentrated / funneled flow through this area. Edges of wetland crossings adjacent to upland dryer soils could provide better bearing with respect to culvert installation and potential settlement over time.

Culvert spacing

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Corduroy

- Traditionally used to improve bearing requirements for weak soils; logs aid in distributing load resulting in reduced compaction
- Built on carefully cleared forest floor / peat surface
- Separation layer to prevent water passing voids from being infilled
- Water passing capabilities along entire length of structure

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Corduroy

- Additional conduits easily incorporated
- Can be built more than one log high
  - Additional stability and bearing
  - Additional water passage capabilities

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Log bundle

- Logs placed in a trench act as a conduit
- Two rows high provides greater flow capacity through lineal voids
- Separation layer
- Number and spacing considerations to match wetland flow characteristics

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Permeable fill

- Permeable road base can be built to allow for water passage
- Angularity of aggregate is key to provide a stable interlocked base
- Need to manage the fines within the base and from above
- Water passing capabilities along entire length of structure

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Raised access

- Designs have been developed and used to build raised access structures, and raised drill platforms and their associated access roads.
- Surface flow able to pass below structure between piers

Photo courtesy of Canadian Mat Systems and Composite Advantage

Photo courtesy of Landmark Solutions & Cenovus Energy

Education- field workshops

- Provide training and learning opportunities for forest workers
- Better understanding of wetland types
- Exposure to practical water management solutions and construction techniques
- Interaction amongst participants

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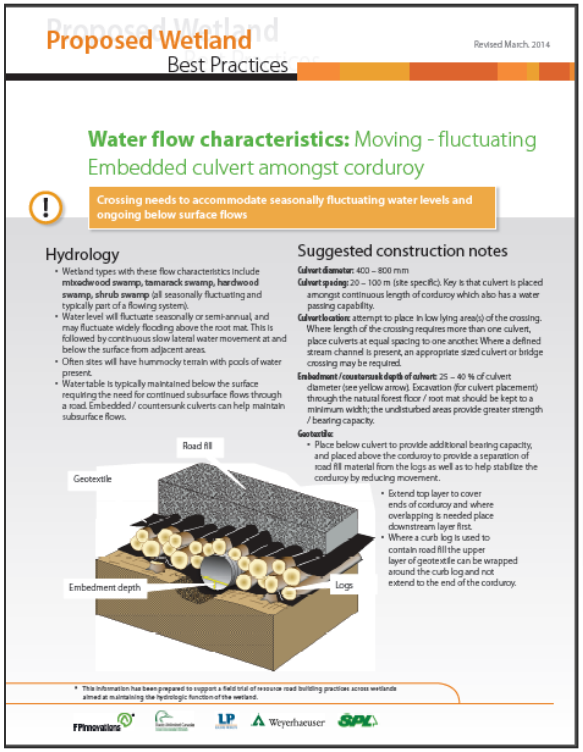
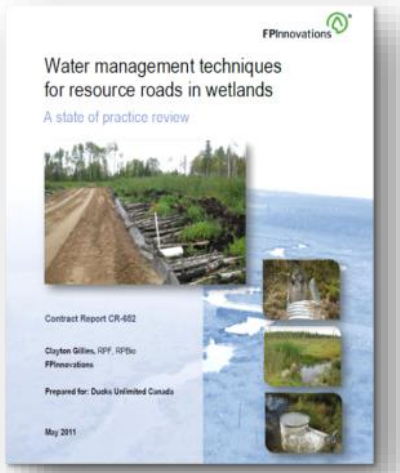
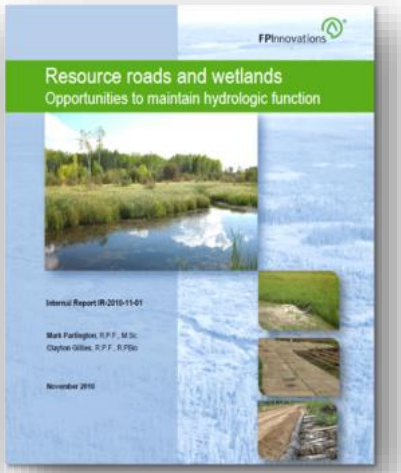
Education- resources

- Use of guides and design / schematics aid in the use and construction of appropriate water management options for wetlands
- Continued development of guides to be used as SOP's







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Education- continued efforts

- FPInnovations has ongoing research in the field of wetland crossings
- Partnerships help to further the knowledge and resources available
- FPInnovations has an MOU with Ducks Unlimited Canada
- Forest industry in Canada will benefit from such cooperative efforts

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Thank you

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