

# Development of Recommended Best Practices Forestry Road Development Around Wetlands SFI ANNUAL CONFERENCE SEPT 12, 2012



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Western Boreal Program  
Ducks Unlimited Canada

# Ducks Unlimited Canada

- Private, not-for-profit
  - Incorporated in 1938
  - Hunting Heritage
- Grassroots Support
  - 700 + fundraising events
  - >6500 volunteers
  - > 140,000 supporters
- Combined with the U.S. close to 1million supporters



# Ducks Unlimited Conservation Programs

- Guided by science-based information
- Focused on areas with high wetland and waterfowl habitat values
- Undertaken where these habitats are at risk to being lost or degraded
- In Canada – Prairies and Western Boreal Forest top conservation priorities



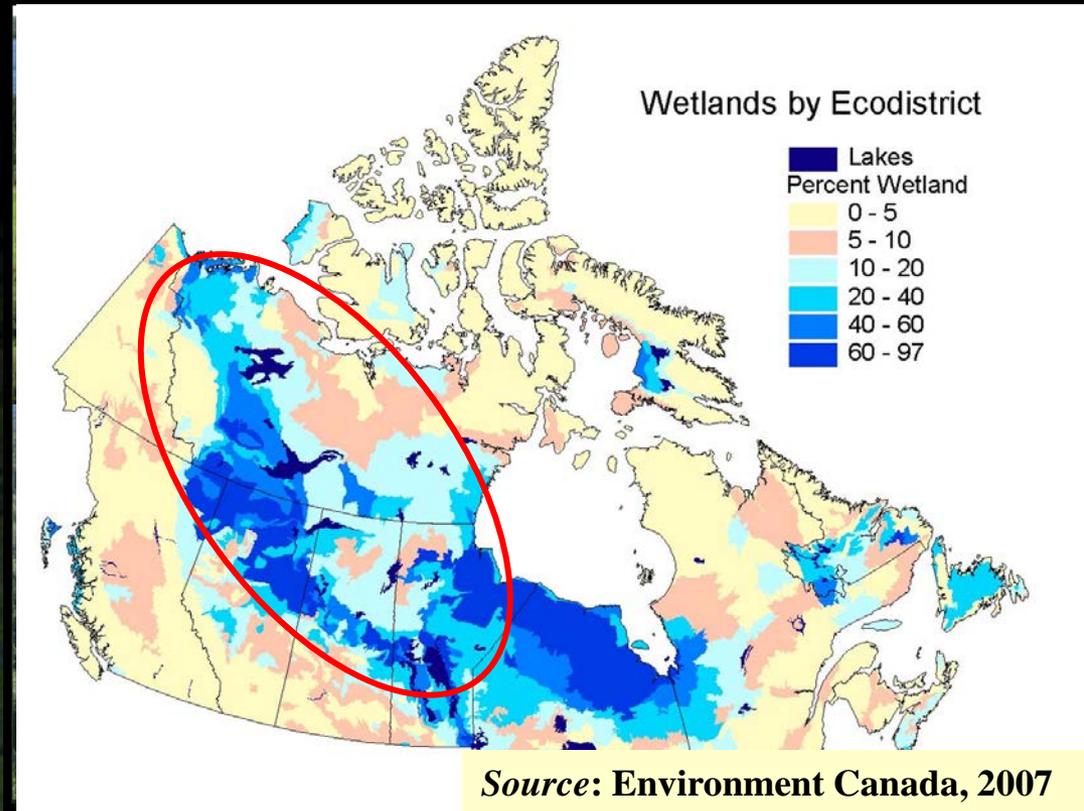
# What % of the Western Boreal forests is wetland?

1. 20%
2. 40%
3. 50%
4. 70%

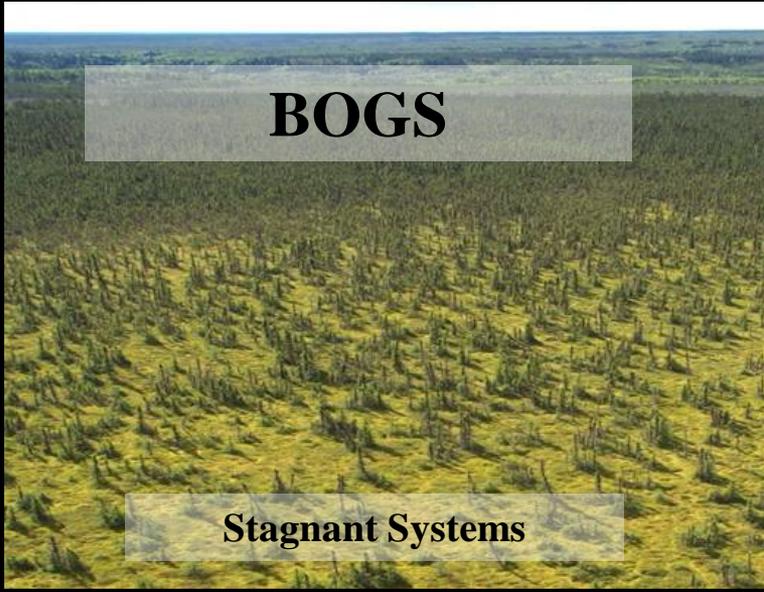


# Western Boreal Forest

- Over 50% of landscape is wetland
- Millions of breeding waterbirds
- Some species in long term decline
- Area of significant development – primary industries are forestry and oil and gas

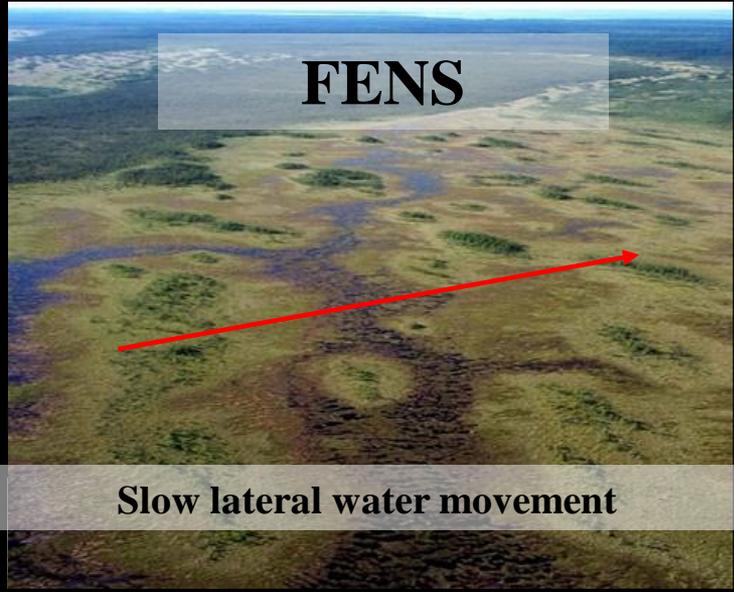


# Boreal Wetlands



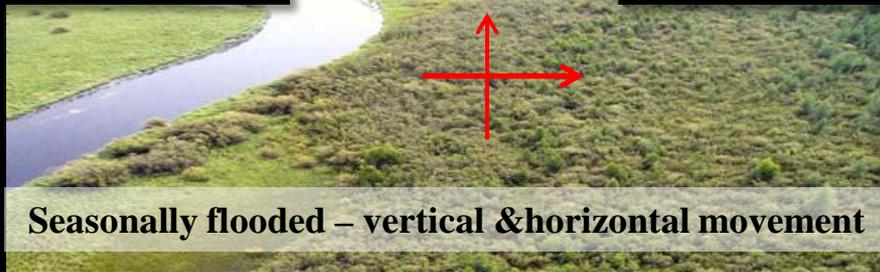
**BOGS**

Stagnant Systems



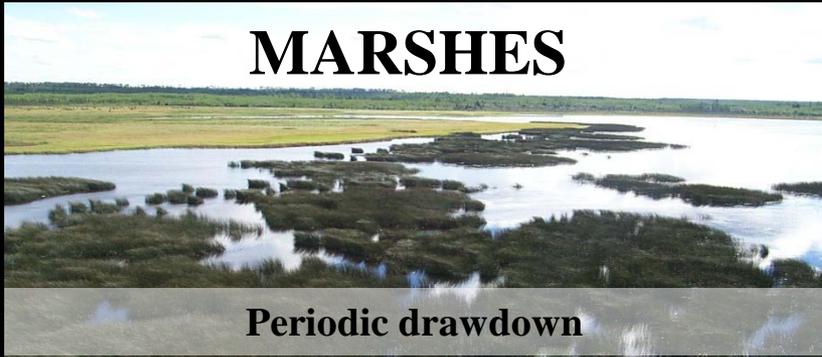
**FENS**

Slow lateral water movement



**SWAMPS**

Seasonally flooded – vertical & horizontal movement



**MARSHES**

Periodic drawdown



**SHALLOW WATER**

Surface waters fluctuate seasonally

# Boreal Wetlands and Development

- Implications of resource developments on boreal wetlands and associated biodiversity is largely unknown
- Roads have been identified as a common activity of primary concern



# Road Impacts on Boreal Wetlands

- Roads can alter wetland hydrology by creating a damming effect
- Potential to alter nutrient and moisture regimes for connected wetlands
- Possible negative ecological consequences





# CHALLENGES FOR INDUSTRY

## Road Settlement

## Sinking Culverts



# CHALLENGES FOR INDUSTRY

## Habitat Alteration



## Beaver Problems



Photo Credit – Weyerhaeuser Canada

# SFI Conservation Grant

## Road Best Management Practices Project



Ducks Unlimited Canada  
Conserving Canada's Wetlands

LP<sup>®</sup>

BUILDING PRODUCTS



Weyerhaeuser



FPInnovations



SUSTAINABLE FORESTRY INITIATIVE

*Good for you. Good for our forests.<sup>®</sup>*

SFI-00001

# SFI Road Best Management Practices Project

## Goal

- **Develop recommended planning and operating practices for forestry roads that serve to protect wetland ecosystems**
  - ✓ **economically and operationally feasible**

## Objectives

- **Use knowledge of wetlands to inform road planning and construction**
- **Combine with expertise of forestry professionals who plan and build roads**
- **Evaluate current/identify enhanced crossing techniques**
- **Monitor effectiveness of constructed crossings**
- **Recommendations**

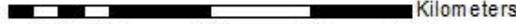


# Linkage to the SFI Standard

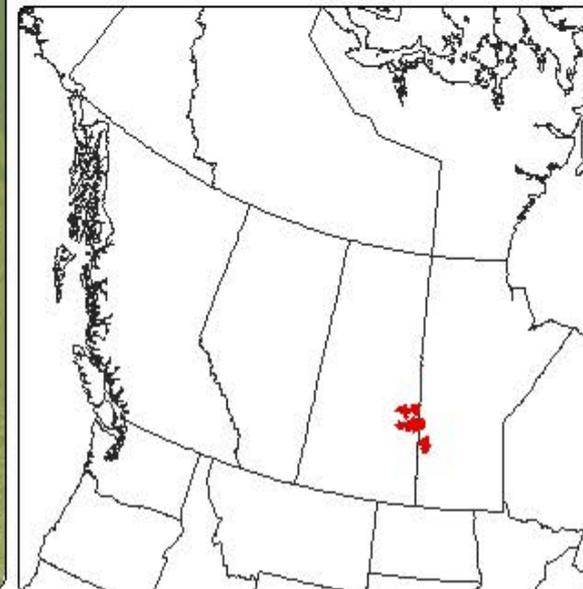
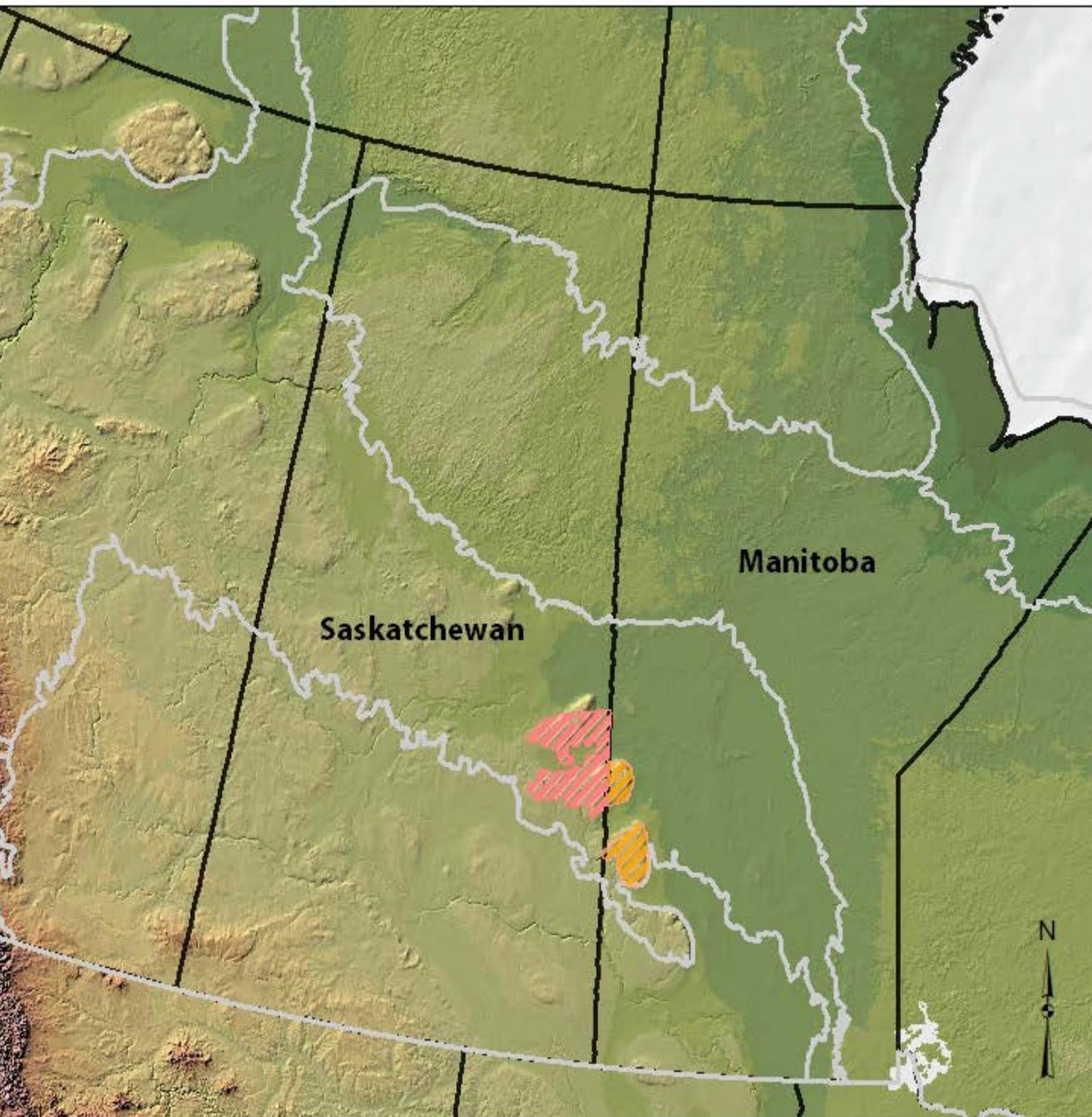
- **Obj1. Forest Management Planning**
  - **Obj3. Protection and Maintenance of Water Resources**
  - **Obj4. Conservation of Biological Diversity**
  - **Obj10. Adherence to Best Management Practices**
  - **Obj15. Forestry Research Science and Technology**
  - **Obj16. Training and Education**
  - **Obj20. Management Review and Continual Improvement**
- 

# SFI Project Study Area

-  Weyerhaeuser
-  Louisiana Pacific
-  Ecozones
-  Provincial Boundaries

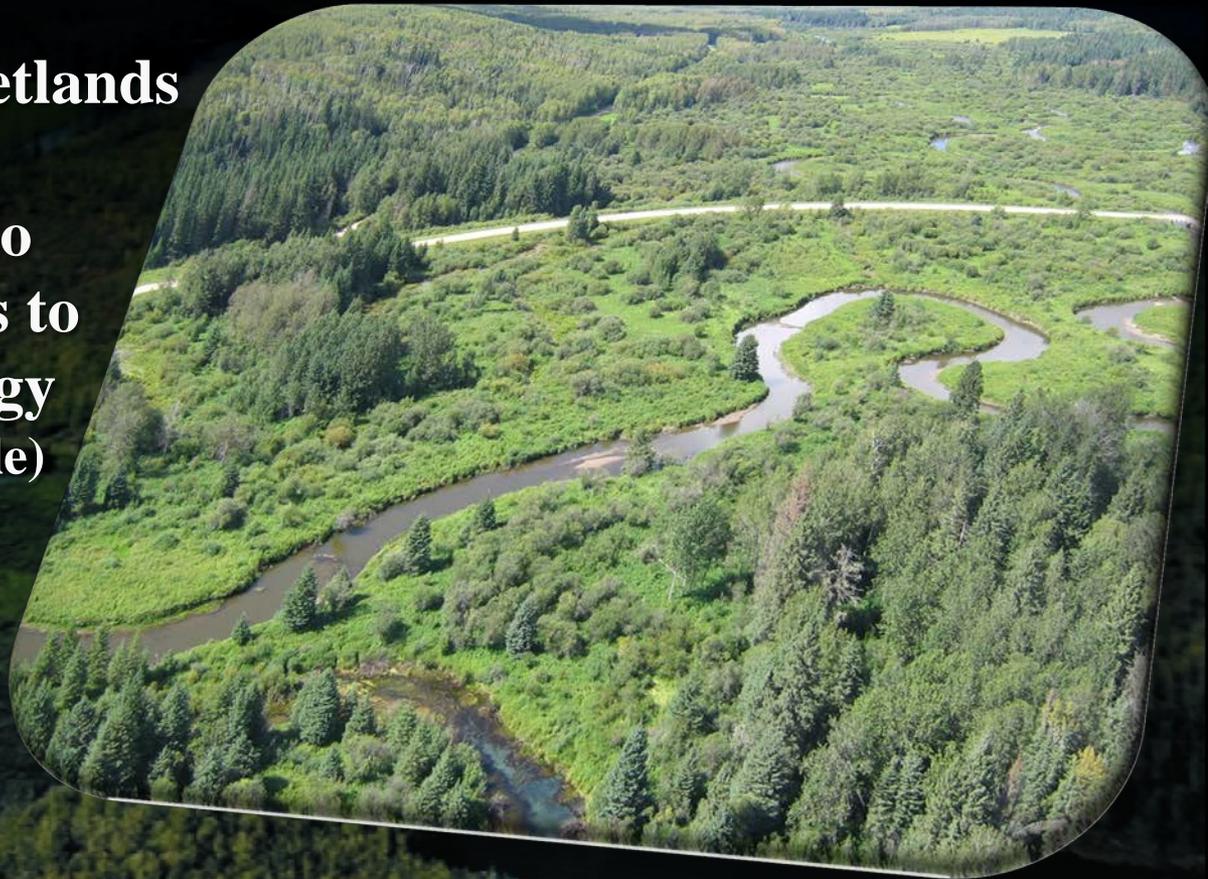
 Kilometers  
0 62.5 125 250 375 500

 Miles  
0 40 80 160 240 320



# Using Knowledge of Wetlands and Mapping As Decision Support Tools

- Wetland mapping to identify type and location of wetlands
- Planning tool to avoid wetlands where possible
- Use wetland knowledge to enhance crossing methods to maintain natural hydrology (where avoidance is not possible)





# Functional Groupings of Wetlands

**1**

**Stagnant**

**Treed Bog  
Shrubby Bog  
Open Bog  
Conifer Swamp  
Treed Poor Fen**

**2**

**Moving**

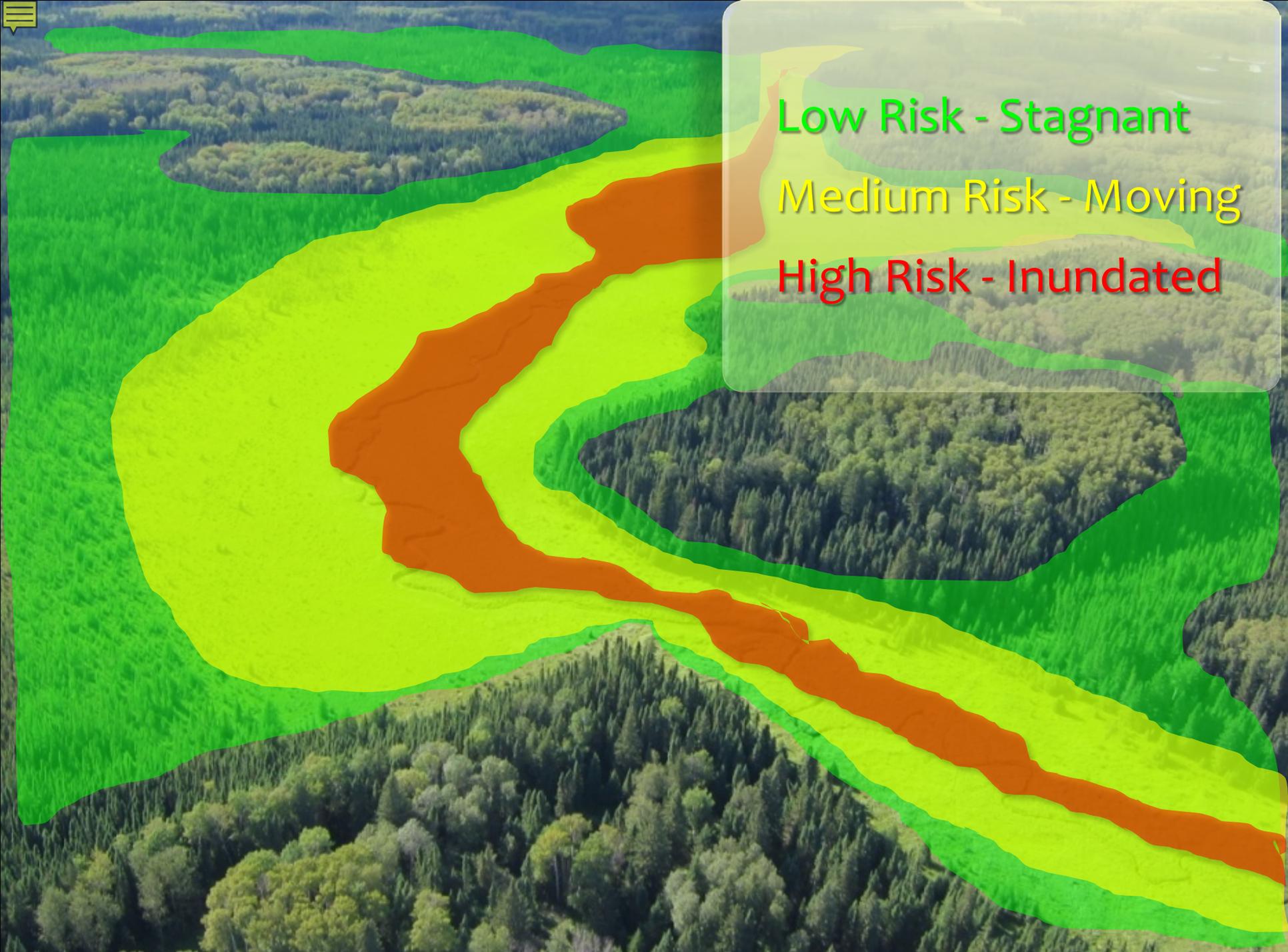
**Moving - Lateral  
Treed Rich Fen  
Shrubby Rich Fen  
Graminoid Rich Fen  
Shrubby Poor Fen  
Graminoid Poor Fen  
Moving - Vertical  
Mixedwood Swamp  
Hardwood Swamp  
Shrub Swamp  
Tamarack Swamp**

**3**

**Inundated\***

**Emergent Marsh  
Meadow Marsh  
Open Water  
Aquatic Bed**

**\*can have significant  
water level fluctuations**



Low Risk - Stagnant

Medium Risk - Moving

High Risk - Inundated

# Functional Groupings of Wetlands

1

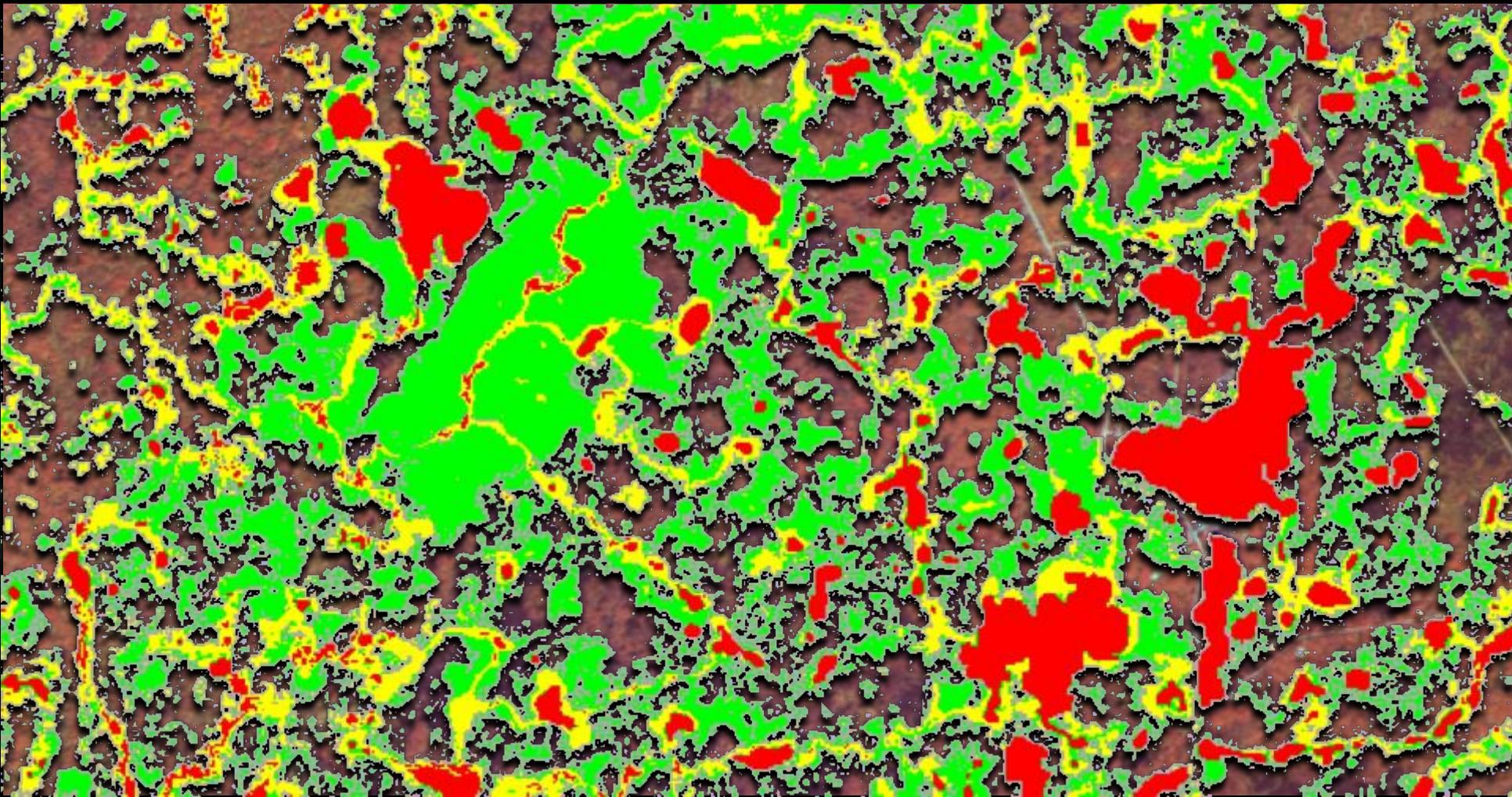
Low Risk

2

Medium Risk

3

High Risk



# Using Expert Knowledge

- **Evaluation of literature and existing practices**
- **Workshops**
  - **Wetlands Training**
  - **Field assessments of current techniques**
  - **Discussion on challenges solutions**

Industrial Impacts on Wetlands of the Boreal Plains Ecozone

Prepared for: Ducks Unlimited Canada  
Prepared by: Watertight Solutions Ltd.

May 19, 2011

FPIinnovations 

Water management techniques  
for resource roads in wetlands

A state of practice review



Contract Report CR-652

Clayton Gillies, RPF, RPBio  
FPIinnovations

Prepared for: Ducks Unlimited Canada

May 2011



# Wetlands / Road Workshops



# Wetland Crossing Designs

- Proposed Wetland Crossing Best Practices to match wetland hydrology
- Three draft designs
  - Stagnant systems
  - Slow lateral movement
  - Seasonal vertical and horizontal movement

## Proposed Wetland Best Practices

October, 2011

### Shrub Swamp: Embedded culvert amongst corduroy



Crossing needs to accommodate seasonally fluctuating water levels and ongoing below surface flows

#### Hydrology

- Water level will fluctuate seasonally or semi-annual, and may fluctuate widely flooding above the root mat. Slow lateral water movement at and below the surface from adjacent areas.
- Often sites will have hummocky terrain with pools of water present.
- Water table is typically maintained below the surface requiring the need for continued subsurface flows through a road. Embedded / countersunk culverts can help maintain subsurface flows.

#### Suggested construction notes

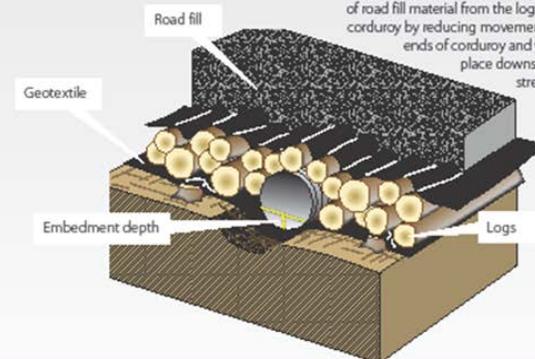
**Culvert diameter:** 400 – 800 mm

**Culvert spacing:** 20 – 100 m (site specific). Key is that culvert is placed amongst continuous length of corduroy which also has a water passing capability.

**Culvert location:** attempt to place in low lying area(s) of the crossing. Where length of the Swamp crossing requires more than one culvert, place culverts at equal spacing to one another. Where a defined stream channel is present, an appropriate sized culvert or bridge crossing may be required.

**Embedment / countersunk depth of culvert:** 25 – 40 % of culvert diameter (see yellow arrow). Excavation (for culvert placement) through the natural forest floor / root mat should be kept to a minimum width; the undisturbed areas provide greater strength / bearing capacity.

**Geotextile:** placed below culvert to provide additional bearing capacity, and placed above the corduroy to provide a separation of road fill material from the logs as well as to help stabilize the corduroy by reducing movement; extend top layer to cover ends of corduroy and where overlapping is needed place downstream layer first. Where a defined stream channel is present, an appropriate sized culvert or bridge crossing may be required.



\* This information has been prepared to support a field trial of resource road building practices across wetlands aimed at maintaining the hydrologic function of the wetland.

# Crossing Constructed – Fall 2011



# Crossing – Aug 2012



Photo Credit Louisiana Pacific Canada

# Effectiveness Monitoring

Hypothetical  
wetland road  
crossing

Hypothetical  
wetland  
boundary

Water Table Monitoring Well - digital

Water Table Monitoring Well - manual

# Installing Monitoring Equipment

Spring 2012



## **Next Steps**

- **Additional Wetland Crossings being built fall 2012**
- **Monitoring Ongoing through 2013**
- **Project Wrap-up**

## **Deliverables**

- **Management Recommendations**
  - **Planning**
  - **Operations**
- **Tool Development**
  - **Wetland Risk Mapping**
  - **Operational Wetland Field Guide**
  - **Wetland Crossing Handbook**

# Acknowledgements

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Thank You



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Conserving Canada's Wetlands