Building Better Crossings: incorporating wetland knowledge into road planning and construction

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Introduction

- Ducks Unlimited Canada’s (DUC) Boreal wetlands may be isolated with minor water table fluctuations. However, no reported operational flooding.
- Wetlands are diverse aquatic systems that should not be classified as wetlands.
- Development of an operational guide for forest road wetland crossings.1
- By understanding these potential effects and the tools available, we can better incorporate wetland knowledge into road planning and construction.

Effects of roads on wetlands

- Resource roads are known to affect the ecosystem functions of wetlands and can lead to increased greenhouse gas emissions.
- Wetlands pose environmental, economic, and safety challenges for resource road planners, for construction and maintenance crews and for users.

Effects of wetlands on roads

- Additional information such as season of inundation can lead to increased greenhouse gas emissions.
- Resource roads designed to incorporate wetlands may increase road and operator safety, reduce maintenance, and save costs.

Inventories for informed decision making

- Knowledge of wetland presence and type can be used to avoid wetlands or mitigate potential impacts.
- Remotely sensed wetland inventories, such as DUC’s Enhanced Wetland Classification (EWC) can be used to incorporate wetlands into road planning.2
- Photo imagery, other GIS information, and field reconnaissance can also assist with planning.

Understanding wetland flow

- When planning and constructing resource roads through wetlands, consider:
  - Wetland presence and type determined using wetland inventories and/ or field identification.
  - Avoiding wetlands where feasible.
  - Hydrologic regime based on wetland type or assessed in the field.
  - The amount of water expected to move through the wetland, inferred from the hydrological regime, taking into account the season and climate cycle.
  - Designing the road to accommodate the expected flow. For example, culvert size, number, and spacing and/ or other water passage structures (e.g., geogrid, aggregate, or corduroy).
  - Additional information such as season of construction and proposed lifespan.
  - Approaches to minimize other associated impacts to wetlands. For example, using erosion and sediment control structures and procedures and equipment to avoid rutting and compaction.

A case study

- In 2011, a collaborative project was undertaken to develop wetland road crossings that maintain water quality and flow through wetlands.
- The project team developed a wetland road crossing guide to maintain water quality and flow of three different wetlands:
  - Shrub swamps (seasonally fluctuating)
  - Treed fen (slow lateral movement)
  - Conifer swamp (stagnant)
- Crossing designs considered the type of wetland, flow characteristics, and infrastructure needed to accommodate water passage requirements.
- Project team conducted two years of post-construction monitoring.

Key outcomes:
- Crossings did not significantly impede water flow.
- Sedimentation occurred; crossings would benefit from additional erosion control structures.
- No reported operational issues.
- Ancillary evidence that crossings are the driest parts of the road and allow access sooner after wet weather.
- Development of an operational guide for forest road wetland crossings.

Conclusions

- Wetlands are diverse aquatic systems that should be considered in all stages of road construction to minimize impacts to the wetland and the road.
- Wetland inventories and/ or field reconnaissance provide information about wetland presence, type, and expected flow regime.
- There are a variety of tools and approaches available to aid in planning a wetland road crossing.
- Resource roads designed to incorporate wetlands may increase road and operator safety, reduce maintenance, and save costs.

References