DUC Enhanced Wetland Classification & Mapping

Al Richard – Ducks Unlimited Canada
Wetlands Best Management Practices Workshop
January 21, 2016
Concurrent Sessions #3 & 4 – Table 1

Ducks Unlimited Canada
Conserving Canada's Wetlands

RESCUE OUR
WETLANDS
WATER—WILDLIFE—YOU

Outline – Wetland Inventories

- Inventories – Why the Need?

- Boreal Wetlands Overview

- Wetland Classification Systems

- History of DUC's Boreal Mapping Initiatives

- DUC's Enhanced Wetland Classification

- Inferred / Added Value Products

- Linkage to BMP's

Why the Need?

- Difficult to Manage What You Don't Know
- Poorly understood systems
- Key components of the boreal landscape and a wide range of EG&S
- Profiles the type, location & spatial extent of wetlands
- Forms a baseline for reporting with ability to monitor change
- Important tool for the development & implementation
  of BMP's (Planning & Operational) – **Avoid & Minimize Impacts**

Boreal Wetlands Overview
What is a wetland?

Definitions:

- A wetland is land where the water table is at, near or above the surface or which is saturated for a long enough period to promote such features as wet-altered soils and water-tolerant vegetation (NWWG, 1988)
- Wetlands are land saturated with water long enough to promote formation of water altered soils, growth of water tolerant vegetation, and various kinds of biological activity that are adapted to a wet environment (GOA – AB Wetland Classification System, June 2015)

- **areas which are seasonally or permanently waterlogged**

- **characterized by vegetation that is adapted for life in saturated / flooded soil conditions**

- **wetlands can be treed, shrubby or open**

Ducks Unlimited Canada
Conserving Canada's Wetlands

RESCUE OUR WETLANDS
WATER—WILDLIFE—YOU

Diversity of Boreal Wetlands

Great diversity of wetlands

How are Wetlands Classified /Mapped?

Variables forming wetlands
- Hydrology (water movement, water table, etc.)
- Water chemistry / geochemistry
- Soils (mineral / organic)
- Topography
- Surficial Geology

Vegetation – species, vigor, abundance, height – respond to the above variables

Therefore, vegetation is used in classifying wetlands via remote sensing technologies

Wetland Classification Systems

- Classification is the first step and critical component to the development of an inventory
- Establishes a framework for inventory and provides a common language
- Reference outlining the wetland types & how they're defined (e.g. indicators, height, percentile, etc.)

  Examples
  - Stewart and Kantrud 1971
  - Cowardin et al. 1979
  - Canadian Wetland Classification System – NWWG 1987
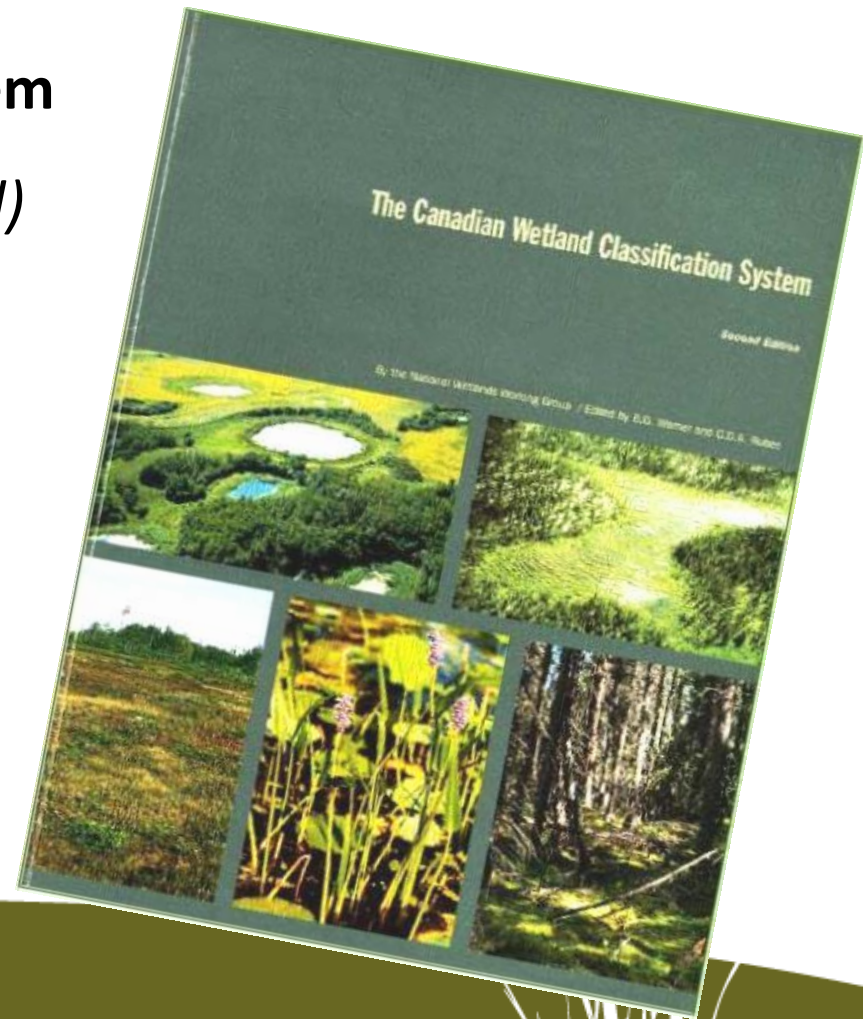 - Alberta Wetland Classification System – AEP 2015

National Classification Standard

Canadian Wetland Classification System

Five wetland classes *(Major Class Level)*

❖ *Bogs*
❖ *Fens*
❖ *Swamps*
❖ *Marshes*
❖ *Shallow Water*

The Canadian Wetland Classification System

Second Edition

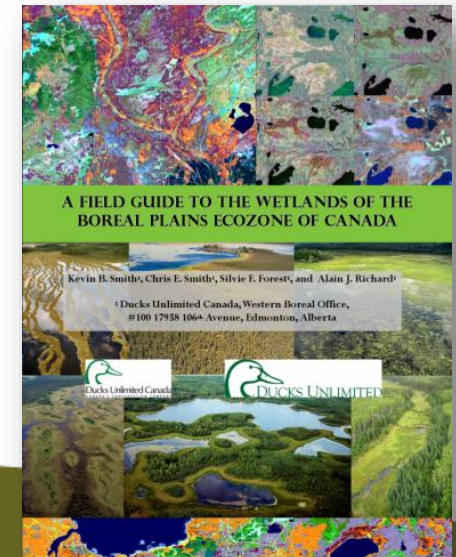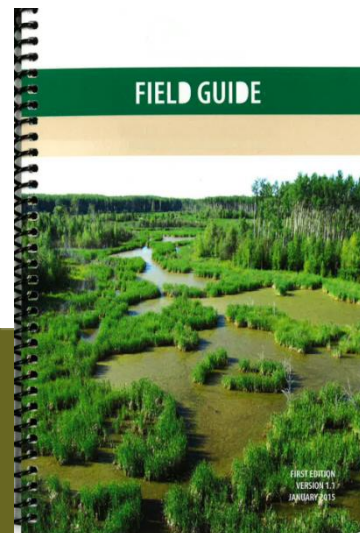By the National Wetlands Working Group / Edited by B.G. Warner and C.D.A. Rubec

History of DUC's Boreal Mapping Initiatives

- Earth Cover Mapping work since the early '90s
  (Alaska & initial years of Western Boreal Forest Initiative – Verick et al)
- Canadian Wetland Inventory (2002)
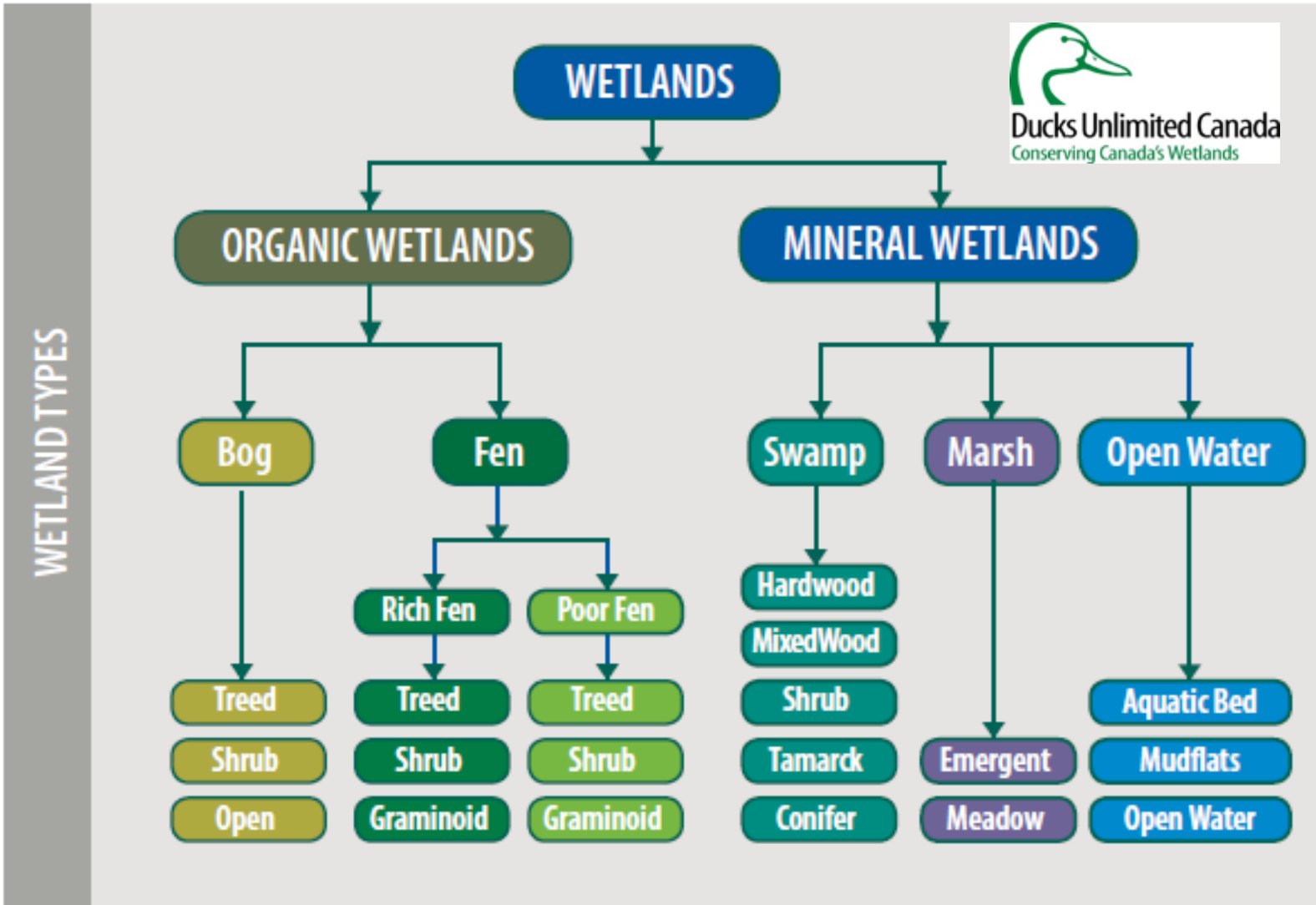- Enhanced Wetland Inventory (~ mid 2000s)

Ducks Unlimited Canada
Conserving Canada's Wetlands

RESCUE OUR
WETLANDS
WATER—WILDLIFE—YOU

DUC's Enhanced Wetland Classification

- Ecological Based & Hierarchical Classification
- Conforms to the CWCS at the five major class level
- 19 detailed classes mapped
- Field Guides (Technical and Field Versions) developed for the boreal plains ecozone
- Comprehensive description of each wetland
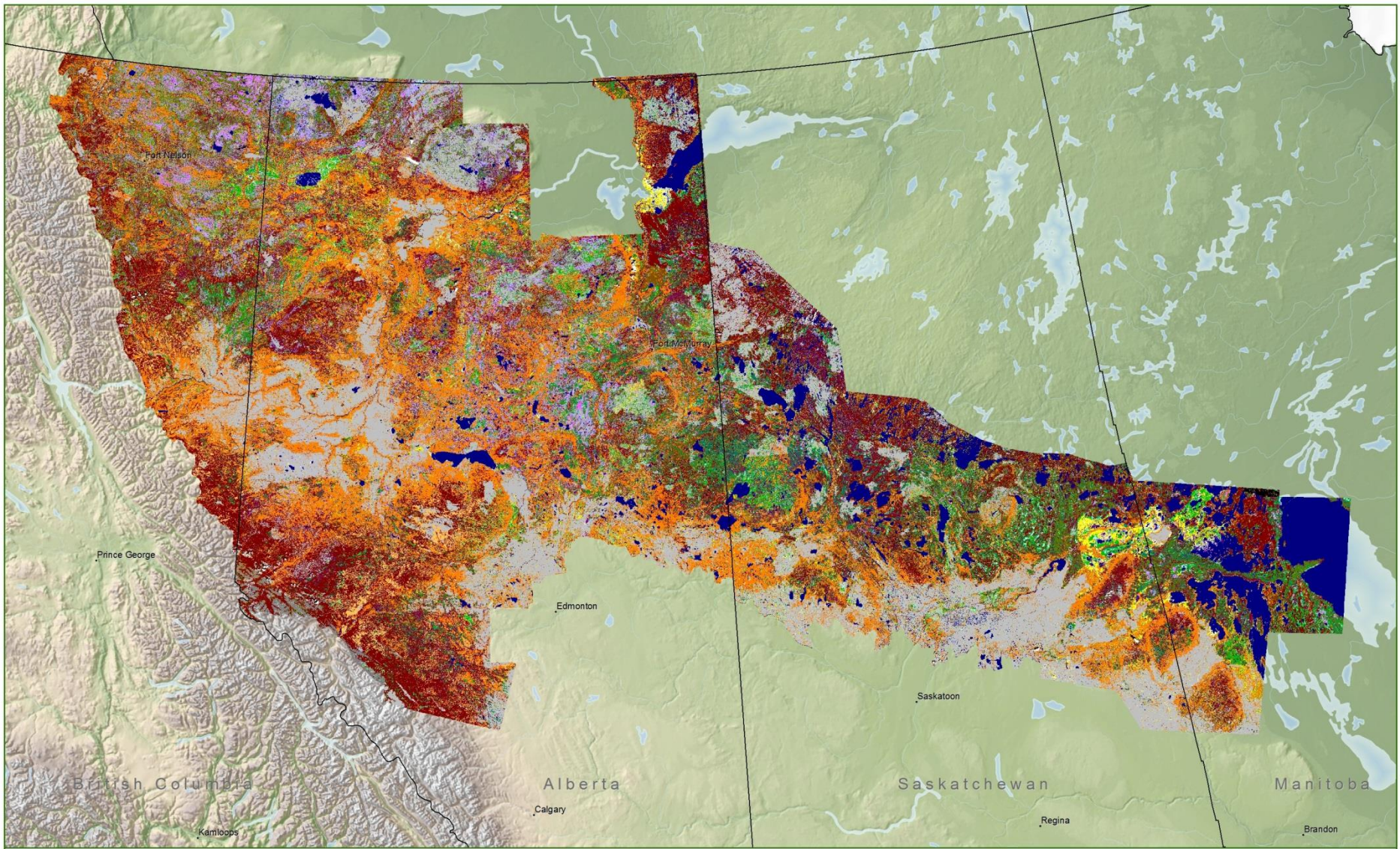- Available online at www.borealforest.

FIELD GUIDE

A FIELD GUIDE TO THE WETLANDS OF THE BOREAL PLAINS ECOZONE OF CANADA

Kevin B. Smith, Chris E. Smith, Silvie E. Forest, and Alain J. Richard

Ducks Unlimited Canada, Western Boreal Office,
#100 17958 106A Avenue, Edmonton, Alberta

Ducks Unlimited Canada   DUCKS UNLIMITED

Ducks Unlimited Canada
Conserving Canada's Wetlands

RESCUE OUR
WETLANDS
WATER—WILDLIFE—YOU

DUC Enhanced Wetland Classification (Data Model)
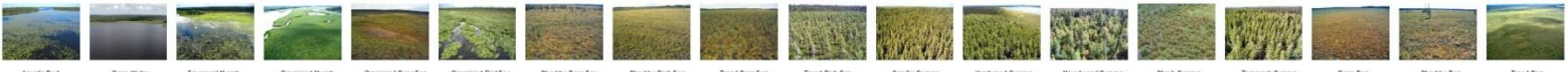
Enhanced Wetland Classification

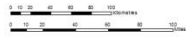![Ducks Unlimited Canada logo - Conserving Canada's Wetlands]

Fort Nelson

Prince George

Fort McMurray

Edmonton

Saskatoon

Kamloops

Calgary

Regina

Brandon

British Columbia

Alberta

Saskatchewan

Manitoba

Photo labels across the bottom strip:

Aquatic Bed | Open Water | Emergent Marsh | Graminoid Marsh | Graminoid Poor Fen | Graminoid RichFen | Shrubby Poor Fen | Shrubby Rich Fen | Treed Poor Fen | Treed Rich Fen | Conifer Swamp | Hardwood Swamp | Mixedwood Swamp | Shrub Swamp | Tamarack Swamp | Open Bog | Shrubby Bog | Treed Bog

EWC Classes

Unclassified	Shrubby Rich Fen	Hardwood (Birch) Swamp	Agriculture
Open Water	Shrubby Poor Fen	Mixedwood Swamp	Anthropogenic
Aquatic Bed	Treed Rich Fen	Tamarack Swamp	Cloud
Mudflats	Treed Poor Fen	Conifer Swamp	Cloud Shadow
Emergent Marsh	Open Bog	Upland Conifer	Burn
Meadow Marsh	Shrubby Bog	Upland Deciduous	
Graminoid Rich Fen	Treed Bog	Upland Other	
Graminoid Poor Fen	Thicket (Shrub) Swamp	Cutblock	

Ducks Unlimited Canada
Western Boreal
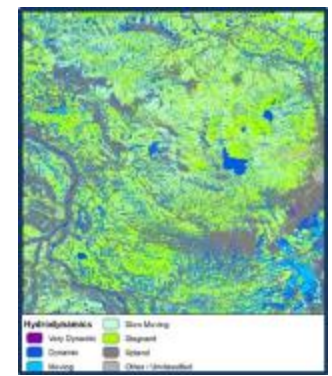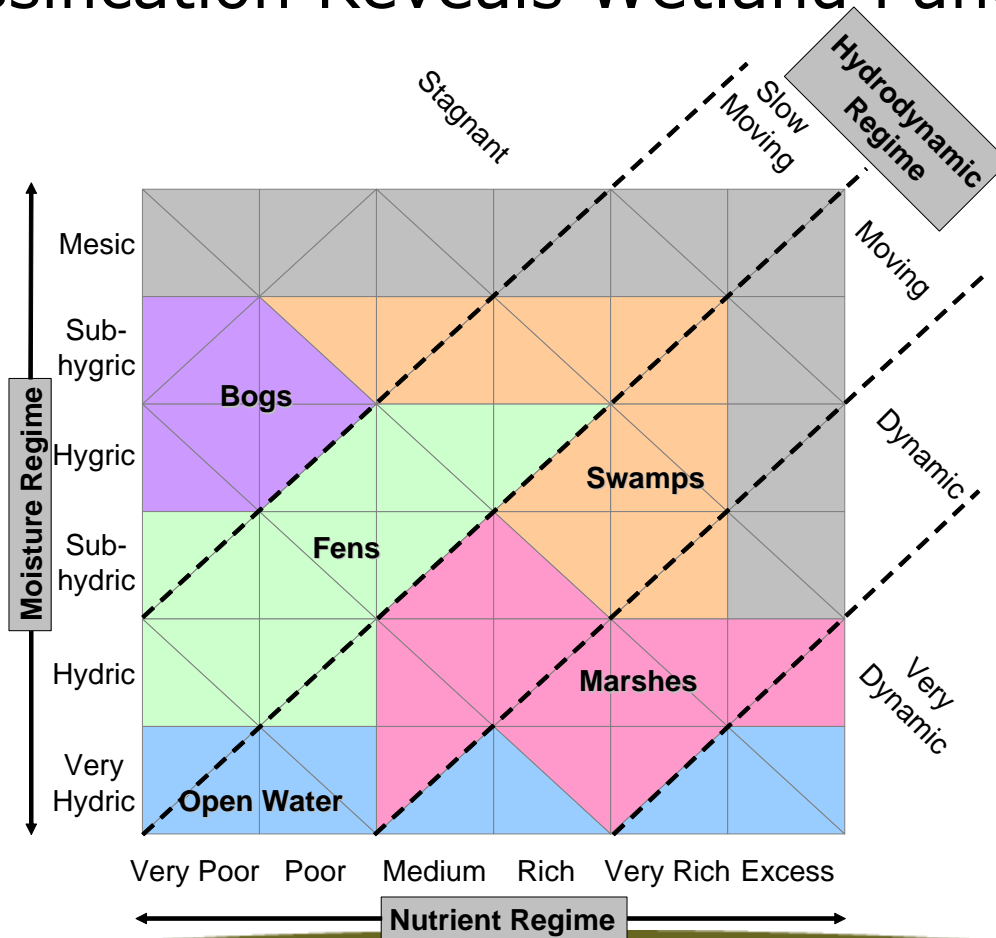# Enhanced Wetland Classification

January 2016

Map Projection: NAD 1983 10TM AEP Forest
Spheroid: GRS 1980
Datum: North American 1983
False Easting: 500,000
False Northing: 0
Central Meridian: -115°
Scale Factor: 0.9992
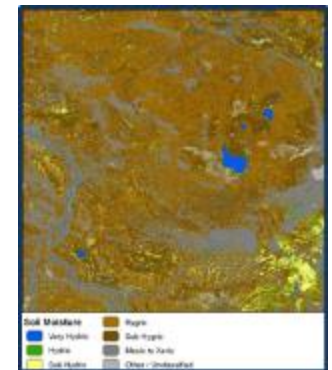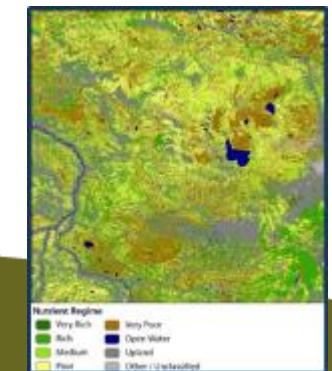Latitude of Origin: 0°

Partners and Supporters

Ducks Unlimited | Government of Alberta | Government of Saskatchewan | U.S. | North American Waterfowl Management Plan

PEW | Shell | LP | MISTIK | EnCana

devon | Weyerhaeuser | SCEK Science and Community Environmental Knowledge

Imperial | SUNCOR | Suncor Energy Foundation | ALBERTA PACIFIC | TICA

Inferred / Added Value Products
Classification Reveals Wetland Function

Hydrodynamic Regime

Moisture Regime — Mesic, Sub-hygric, Hygric, Sub-hydric, Hydric, Very Hydric

Hydrodynamic Regime — Stagnant, Slow Moving, Moving, Dynamic, Very Dynamic

Bogs

Fens

Swamps

Marshes

Open Water

Nutrient Regime — Very Poor, Poor, Medium, Rich, Very Rich, Excess

Hydrodynamics

Moisture

Nutrient

Ducks Unlimited Canada
Conserving Canada's Wetlands

RESCUE OUR WETLANDS
WATER—WILDLIFE—YOU

Flow Characteristics of Wetlands

1 Stagnant

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

2 Moving

Moving - Lateral

Graminoid Poor Fen
Graminoid Rich Fen
Shrubby Poor Fen
Shrubby Rich Fen
Treed Rich Fen

Seasonally Fluctuating

Mixedwood Swamp
Hardwood Swamp
Shrub Swamp
Tamarack Swamp

3 Inundated*

Emergent Marsh
Meadow Marsh
Open Water
Aquatic Bed

(may have significant water level fluctuations)

*often associated with flowing water systems in which case can increased water movement and fluctuations are expected

Flow Characteristics of Wetlands

1	Stagnant Lowest Risk	2	Moving - Seasonally Fluctuating Medium Risk	3	Moving - Slow Lateral Flow Higher Risk	4	Inundated/ Flooded Highest Risk
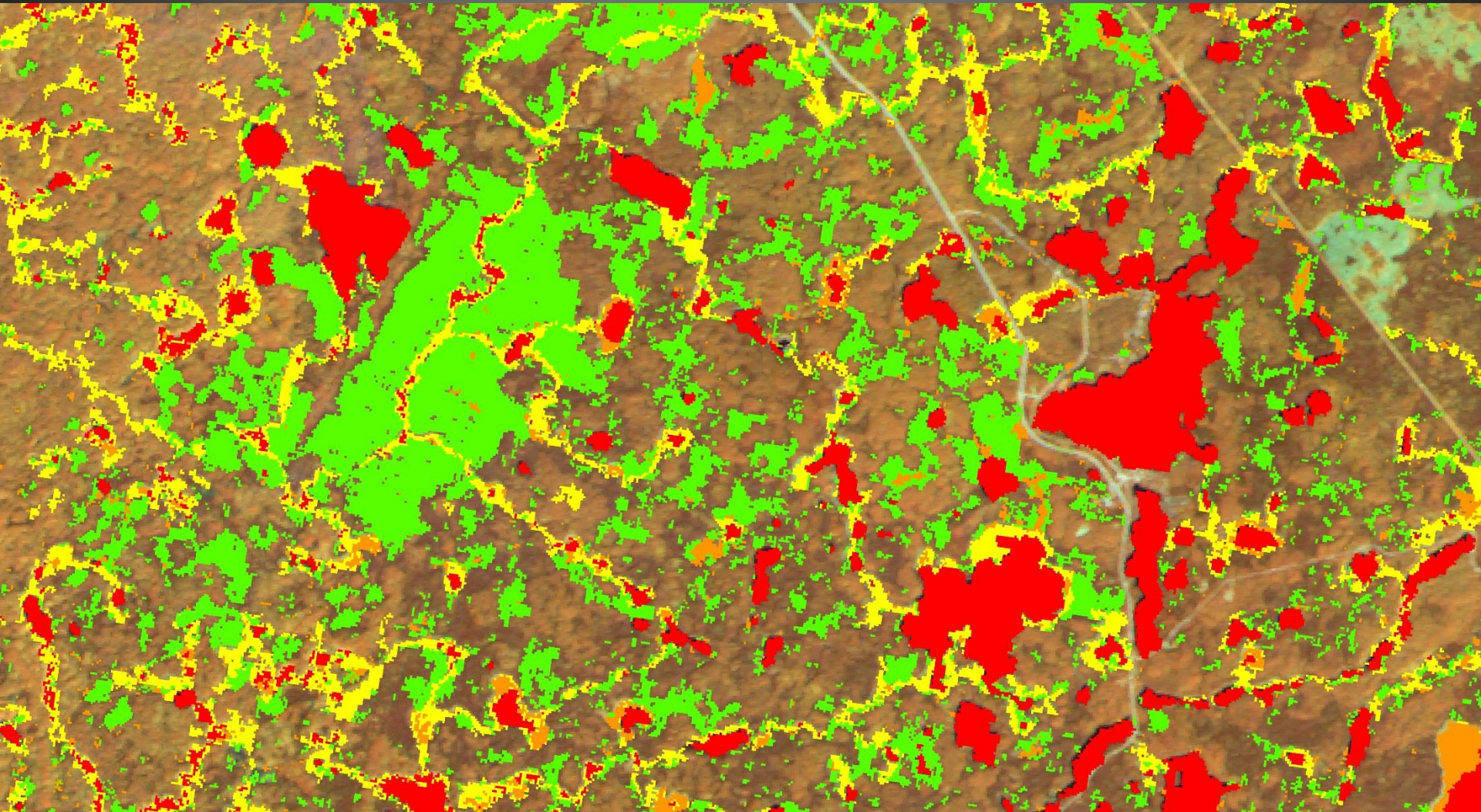
Current Work

- **Flow Characteristics**
- **Wetland Connectivity**
- **Stream Flow Direction**
- **Watershed Catchment Position**
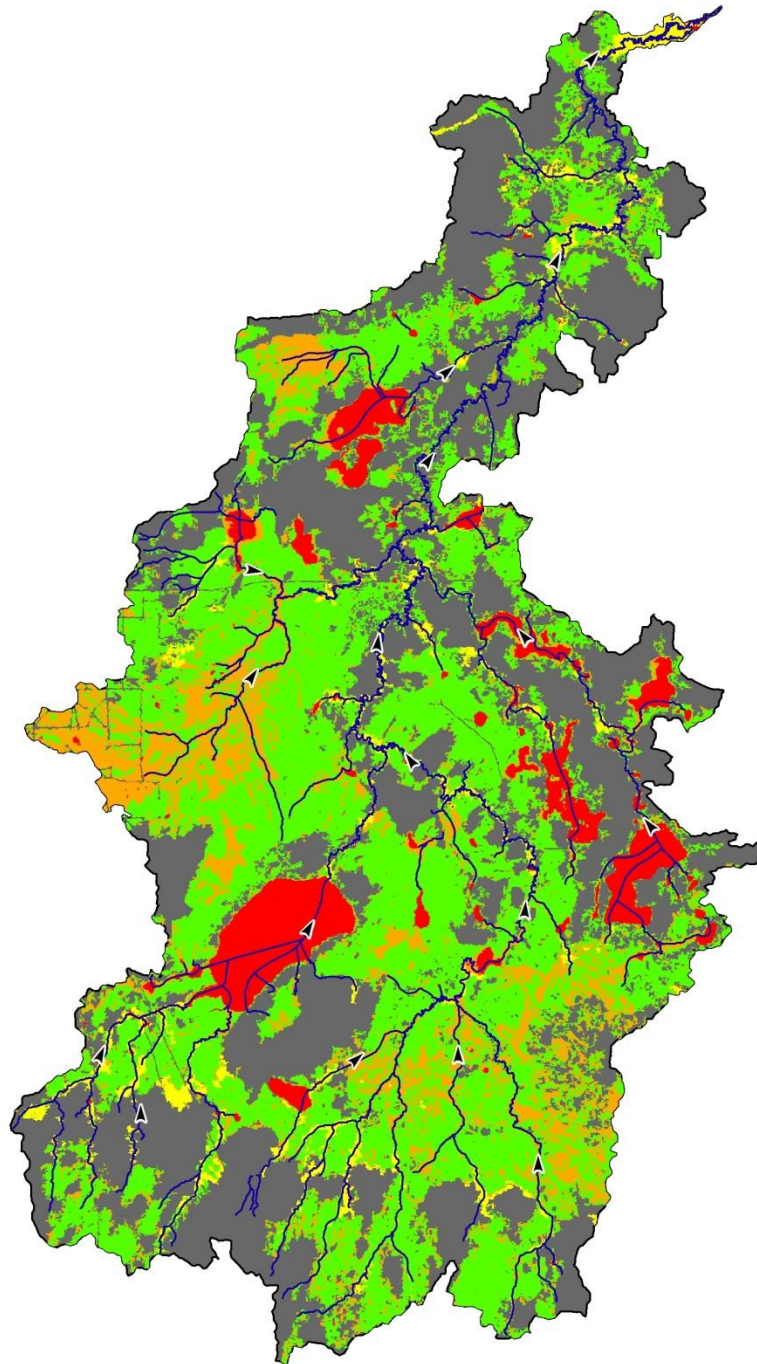
Flow Characteristics
Wetland Connectivity
Stream Flow Direction
Watershed Catchment Position

Ranking Vertebrate Biodiversity Potential in Alberta Boreal Wetland Habitats
using the Enhanced Wetland Classification System
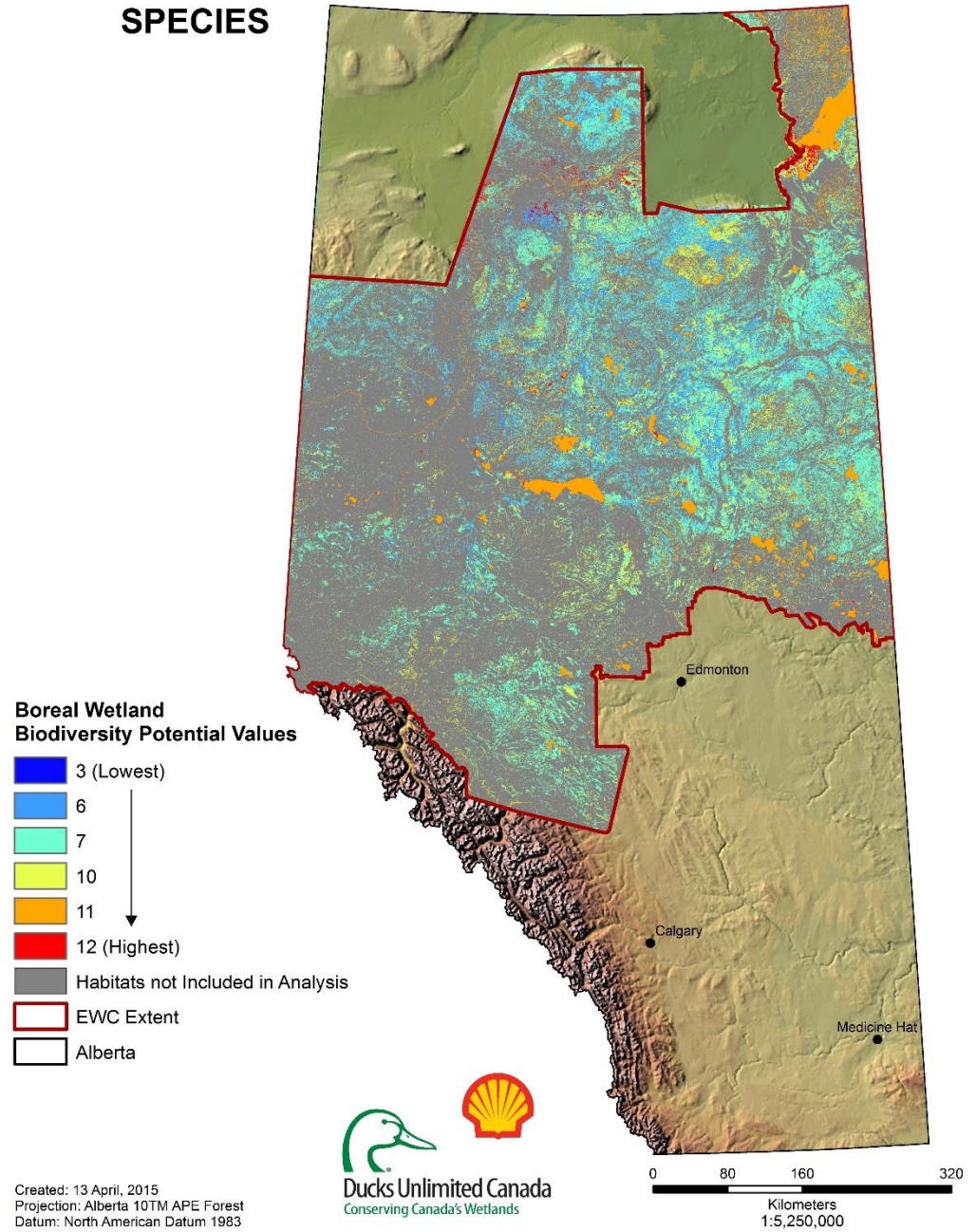
DUCKS UNLIMITED CANADA

7 Key Biodiversity Categories

❖ **Rare Species**

❖ **Hunted and Trapped Species**

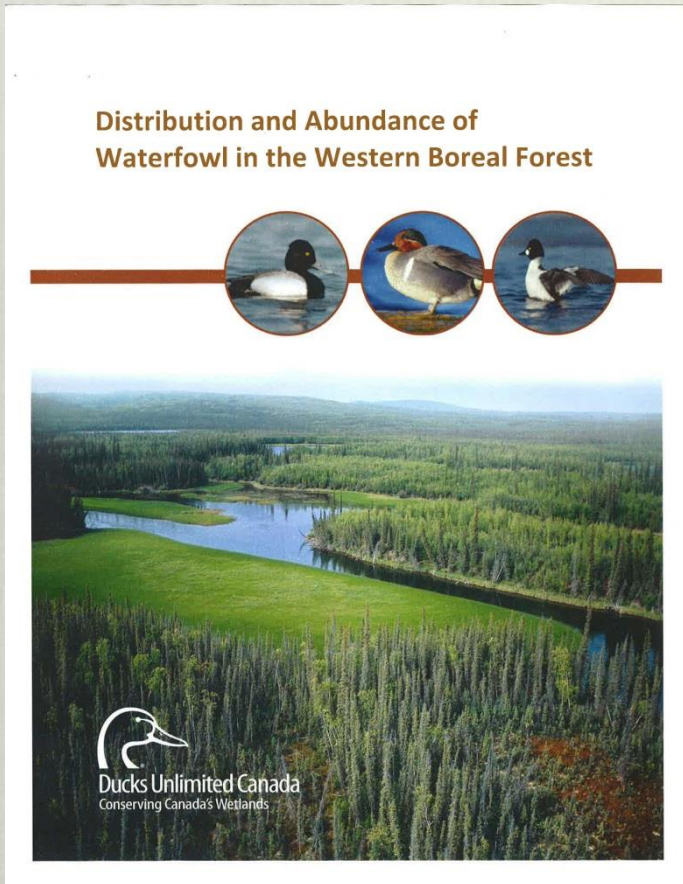❖ **Key Waterfowl and Waterbird Species**

❖ **Ecological Indicator Species**

❖ **Migratory Bird Species**

❖ **Wetland Indicator Species**

❖ **Combined Species**

Biodiversity (Fauna) Potential Values – Boreal Wetlands
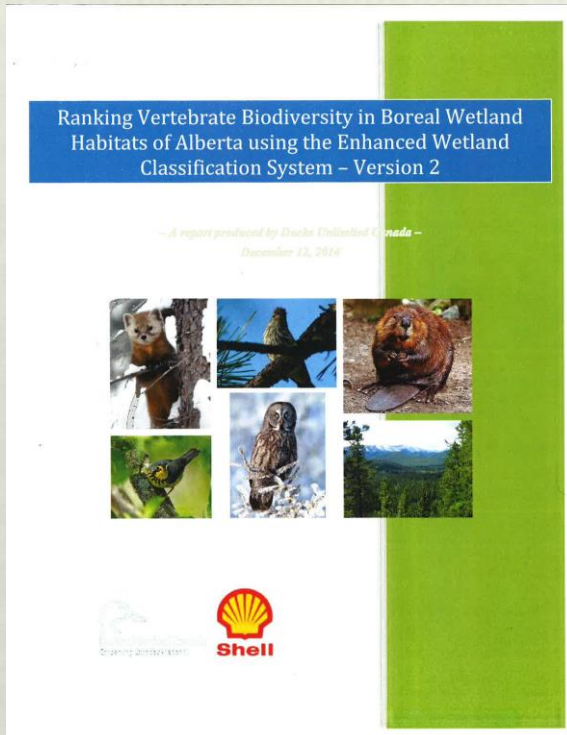
WETLAND INDICATOR SPECIES

Boreal Wetland Biodiversity Potential Values

- 3 (Lowest)
- 6
- 7
- 10
- 11
- 12 (Highest)
- Habitats not Included in Analysis
- EWC Extent
- Alberta

Created: 13 April, 2015
Projection: Alberta 10TM APE Forest
Datum: North American Datum 1983

Ducks Unlimited Canada
Conserving Canada's Wetlands

0   80   160   320
Kilometers
1:5,250,000

Waterfowl Distribution Modeling Products (3 Nesting Guilds & All Guilds Combined)

Distribution and Abundance of Waterfowl in the Western Boreal Forest

Ducks Unlimited Canada
Conserving Canada's Wetlands

WATERFOWL MODELING

Total Ducks

- High Desntiy (all guilds)
- High Density (any guild)
- Medium Density
- Low Density
- Very Low Density
- Communities
- Alberta

Edmonton

Calgary

Medicine Hat

Created: 13 April, 2015
Projection: Alberta 10TM APE Forest
Datum: North American Datum 1983

Ducks Unlimited Canada
Conserving Canada's Wetlands
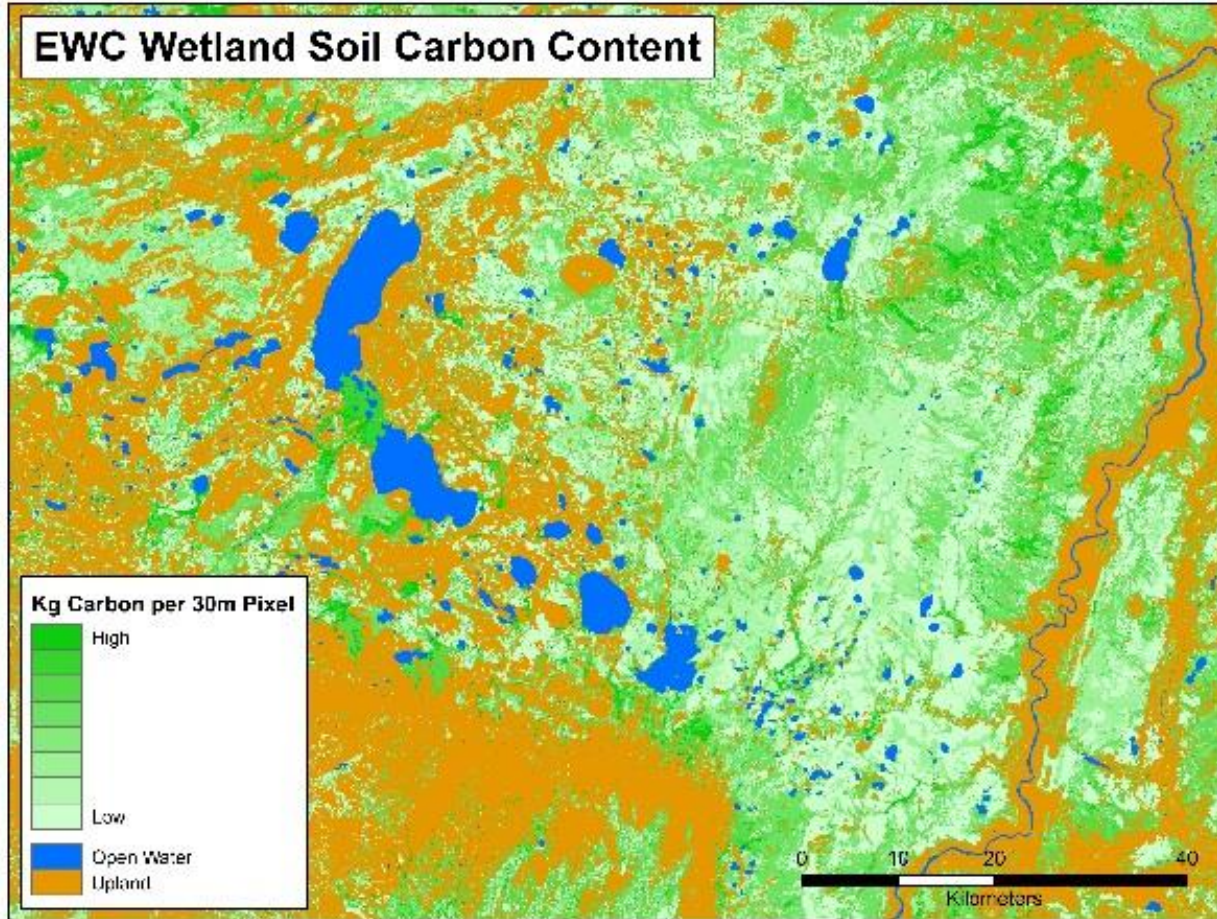
0   80   160   320

Kilometers
1:5,250,000
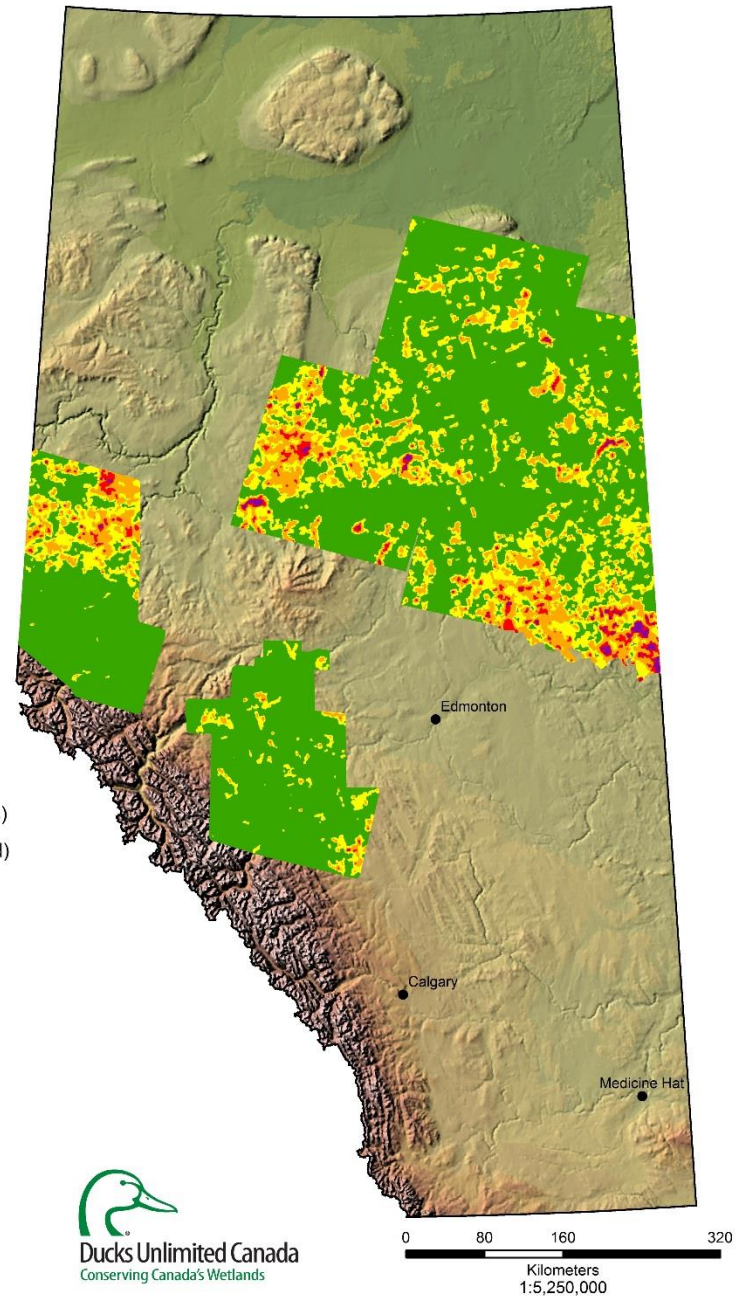
Subsurface Wetland Carbon Storage Values

EWC Wetland Soil Carbon Content

Kg Carbon per 30m Pixel
- High
- Low
- Open Water
- Upland

- EG&S
- Climate Change
- Carbon Accounting
- Forest Health and Productivity: helping ensure long-term forest productivity, carbon storage and conservation of forest resources (in both uplands and wetlands).

EWC Use & Linkage to BMP's

❖ Wildlife Habitat Modeling

    ❖ Ronald Lake Bison Herd Modeling (Scott Neilson & MCFN)

    ❖ LARP/EMCLA Projects (e.g. Yellow Rail   Baynes – UofA)

    ❖ Caribou Modeling -CBFA / NE BC (REMB) / Caribou Ecosite Mapping (GOS-Forestry) / RICC (NE AB)

    ❖ Caribou Calving Modeling NE BC (Craig DeMars)

    ❖ Waterfowl Distribution Models

❖ Supporting elements of the AB Wetland Policy (e.g. ABWRET-Estimator)

❖ AB NAMWP – Updating the Key Wetlands List of Alberta

❖ Road Planning and Development

Summary
Using Wetland Knowledge and Mapping to Enhance Management Practices

- Wetlands represent a key component of the boreal landscape
- Wetland Inventories profile these important features
- EWC provide insights into wetland ecological characteristics and inferences can be made
- Industry Partners (Strategic and Operational Planning Support)
  - ➤ Planning tool to avoid and minimize impacts to wetlands

Ducks Unlimited Canada
Conserving Canada's Wetlands

Thanks!

Questions?

Working with partners to advance sustainable development and protect key wetland systems.