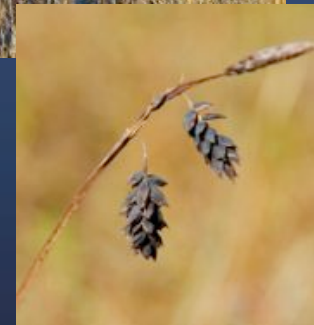


Wetland Classification & Climate Change

Embracing Complexity to Face Uncertainty

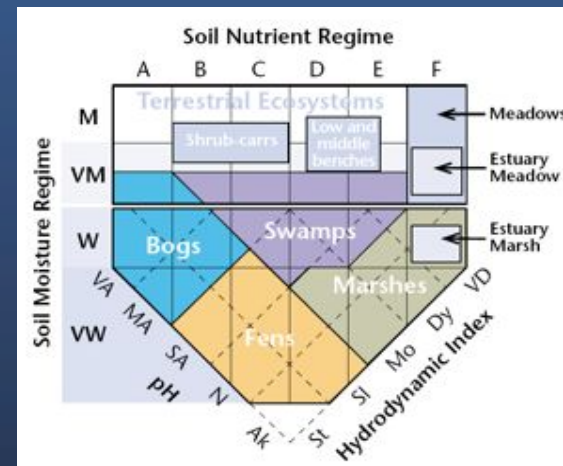


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Why Classify?

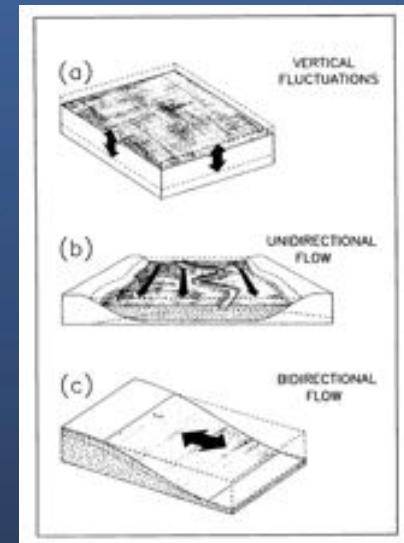
- Logical framework for mapping, research, protection, restoration, & management
 - Standardize terminology ; reduce natural variability
- Which ecological factors are important?
 - Climate
 - Landscape position & hydrology
 - Soils (mineral/organic)
 - Vegetation (composition/structure)
- Classification Objectives
 - Habitat characteristics
 - Floristic variation
 - Ecological functions
 - **Climate sensitivity**



Source: 2004. MacKenzie and Moran.
Wetlands of British Columbia.

Classification Criteria for Understanding Wetland Vulnerability

- Regional Climate / Elevation
- Landscape Position / Water Source
- Hydrodynamics
- Vegetation composition/structure
- Biogeochemistry



Source: Brinson 1993.
Hydrogeomorphic Classification
of Wetlands

Existing Wetland Classification Schemes

- Cowardin (Cowardin et al. 1979) –
 - U.S. Fish and Wildlife Service
 - most commonly used wetland classification for national use
 - Broad landscape types, vegetation physiognomy, hydrological regime
 - Most useful for mapping; habitat assessment
 - Doesn't adequately account for hydrogeomorphic variability
- HGM (Brinson 1993)
 - Landscape position, water source, hydrodynamics
 - Used for assessment of wetland function
 - Biotic variability must be added locally
- Vegetation
 - local vegetation classification often used (highly variable)
 - U.S. National Vegetation Classification

WANHP Integrated Wetland Classification

Primary Programmatic Objective: “maintain a classification and inventory of WA’s natural heritage resources and prioritize those resources for conservation action”

Past Classifications:

- Natural Community types: abiotic and biotic variability explicit;
- Plant Associations: fine-scale; biotic variability explicit; abiotic variability implicit

Current Revision

- Ensure conservation priorities explicitly incorporate complete range of variability
- Ecological Systems: meso-scale; abiotic and biotic variability explicit
- HGM and biogeochemistry
- Integrate these with previous classifications into hierarchy

WANHP Integrated Wetland Classification

Classification Scheme	Definition
Ecological System	NatureServe (Comer et al. 1993); Nationally standardized; regional climate; similar ecological processes and composition
Sub-Systems	primarily HGM; peatlands are based on water-source; some based on physiognomy in which case they = the "natural community" type
Peatland Type	landscape position and/or water chemistry
Natural Community Type	mostly physiognomy and/or elevation
Plant Associations	USNVC associations; internationally standardized

Temperate Pacific Freshwater Emergent Marsh

Depressional Marsh

Lowland Depressional Marsh

Subalpine-Montane Depressional Marsh

Lacustrine-Fringe Marsh

Lacustrine-Fringe Lowland Marsh

Lacustrine-Fringe Subalpine-Montane Marsh

Lowland Seep, Spring, & Flush

Lowland Geothermal Spring & Flush

Lowland Spring & Flush

Lowland Seepage Meadow

Riverine Marsh

Lowland Riverine Streamside Marsh

Lowland Riverine Impounded Marsh

Montane Riverine Streamside Marsh

North Pacific Bog and Fen

Ombrotrophic Bog

Raised Bog

Open Bog

Bog Woodland

Bog Forest

Soligenous Fen

Poor Sloping Fen

Maritime Poor Sloping Fen

Lowland Poor Sloping Fen

Subalpine-Montane Poor Sloping Fen

Moderately Rich Sloping Fen

Lowland Moderately Rich Sloping Fen

Subalpine-Montane Moderately Rich Sloping Fen

Topogenous Fen

Limnogenous Fen

North Pacific Bog & Fen

Ombrotrophic Bog

Raised Bog

Open Bog

Cowardin:
Palustrine
scrub-shrub

HGM:
Organic Flat



North Pacific Bog & Fen

Limnogenous Fen

Lentic Limnogenous Fen

Lowland Lentic Floating Sphagnum Mat

Cowardin:
Palustrine
emergent / moss-
lichen

HGM:
Lacustrine-fringe



North Pacific Bog & Fen

Soligenous Fen

Poor Sloping Fen

Maritime Poor Sloping Fen

Cowardin:
Palustrine
emergent

HGM:
Slope



Temperate Pacific Seep & Spring

Alpine-Subalpine Seep, Spring & Flush

Alpine-Subalpine Spring & Flush

Cowardin: Palustrine emergent

HGM: Slope



North Pacific Hardpan Vernal Pool

Vernal Pool

Vernal Pool

Cowardin:
Palustrine
emergent

HGM:
Depression



Conclusion

- Expected climate change impacts
 - Hydrological alterations
 - Shift in species composition
 - Conversion of wetland types
 - Degradation in ecological integrity
- Classification matters
 - Constrain noise; increase signal
 - Provides communication framework
- Recommended Classification
 - Minimally a combination of Cowardin & HGM
 - WANHP Wetland Classification

