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Wetlands in the National GHG Inventory: science-based knowledge needs

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Outline

- GHG inventory: purpose, policy relevance, institutional linkages
- Land-based sectors or LULUCF
 - The case of wetlands
- Summary



Canada's inventory of GHG sources and sinks

Purpose and Policy Relevance

- Development, maintenance and submission of a National Inventory of GHG Sources and Sinks is a key obligation of parties to the UN Framework Convention on Climate Change and Kyoto Protocol signatories
- Inventory submissions have important policy features
 - The authoritative indicator and basis of comparison of national performance
 - A core data source for the emissions projections that underlie national targets and mitigation policy scenarios
 - An annual communications opportunity (or challenge)

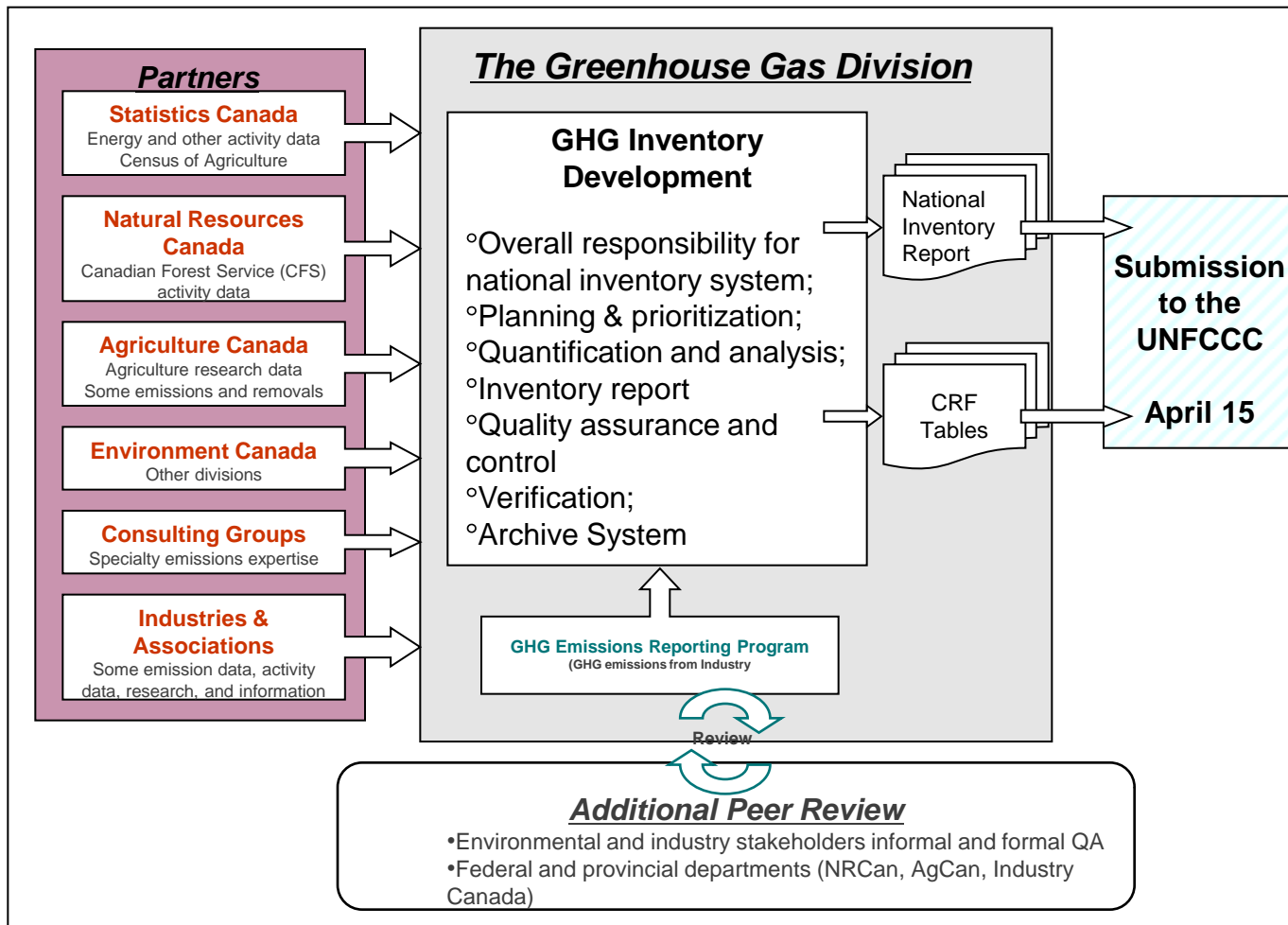


IPCC Guidelines & Good Practice Guidance: Methodological Framework and Standards

- **Defines methodological framework and scope**, general approaches, use of statistical tools (uncertainty analysis)
- **Provides guidance** on ensuring quality on all steps of the inventory compilation – from data collection to reporting and archiving
- **Requirement:** use as default, unless there is more accurate and more detailed country-specific information



Institutional Arrangements



LULUCF: land-based sector

- Forest land
- Cropland
- Grassland
- Wetlands
- Settlements
- Other lands



Photo: R. Redman

LULUCF: IPCC Methodological Framework

- All sources and sinks from « managed » lands
- All major greenhouse gases: CO₂, CH₄, N₂O
- Consistent land category definitions, including min area
- Balanced approach: known sources and sinks within each category

Currently for wetlands:

- Flooding
- Drainage (often but not always associated to land-use change)
- Peat extraction

! Wetlands restoration alone unbalanced



LULUCF: land-based sector

Anthropogenic emissions and removals

- **Managed** Forest land
- Cropland
- **Managed** Grassland
- **Managed** Wetlands
- Settlements
- Other lands



Managed Wetlands

- IPCC 2003, 2006: managed peatlands, flooded lands
- Post-2012: wetlands drainage and restoration?
- Future: all managed wetlands?



Wetlands Carbon Budget

$$\Delta C_{\text{org}} = \text{NEE} - F_{\text{net CH}_4\text{-C}} - F_{\text{net DOC}} + C_{\text{ppt}}$$

$$\text{NEE} = \text{GEP} - \text{ER}$$



Photo: Doyle Wells, Canadian Wetlands Classification System, 2nd ed.



Wetlands/Peatlands Carbon Budget: findings

1. Peatland type not an effective predictor of NEE

Humphreys et al. 2006

2. Controls of CH₄ emissions: depth of water table, plant functional type

Pelletier et al., 2007; Bubier et al., 2005

3. ΔC not a good indicator of current climate forcing (at least for peatlands)

Derived from Lafleur, 2009

4. Interannual variability very significant

Roulet et al., 2007



Complete Annual C Balance (gCm⁻² yr⁻¹) vs net GHG flux

	Net CO₂e	ΔC
Upland peat catchment	13	14
Mer Bleue bog	-24	21
Restored Ag peat meadow	-339	311
Oligotropic fen	120	24

Net CO₂e > 0 : emissions

Net CO₂e < 0 : removals



Interannual Variability

Longest Study: Mer Bleue – 6 years

« Using 5 of the 6 years, either individually or in combination, ... the conclusions could have ranged from a contemporary sink three to four times greater than the past accumulation rates (e.g. 70–90 gC m⁻² yr⁻¹) to a net source of C (e.g. 10–20 gC m⁻² yr⁻¹). »



Wetlands: the forgotten carbon?

- Where are the wetlands?
- How are our wetlands affected by current or past human activities on the landscape?
 - Forest management
 - Agricultural expansion
 - Infrastructure development
 - Fossil fuel extraction
- What are the mitigation and restoration potentials of disturbed wetlands?



Conclusion (1)

- The National GHG inventory is about anthropogenic emissions and removals
- It plays a number of important policy roles:
 - An element of UNFCCC compliance
 - A basis for international comparisons
 - Identifying key trends and mitigation potential for specific sources, sectors and regions
 - A baseline for establishing future domestic and international policy goals



Conclusion (2)

Important knowledge gaps on anthropogenic emissions and removals in Canadian wetlands:

- Prevent Canada from expressing its views while quantification rules are being developed
- Allow incomplete statements to remain unchallenged
- Leave mitigation opportunities unexplored

A balanced approach, including both sources and sinks, is mandatory

Long-term monitoring will be required to support science development



