# Soil Management Protocols for for Greenhouse Gas Offset Projects

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4th USDA GHG Conference
February 6 - 8, 2007
Baltimore, MD

# Overall Goal

Create opportunities for farmers to generate carbon credits

Economic feasibility versus environmental integrity

# Outline

1. PERRL Initiative
2. Canada's GHG Offset System Development

   **-Soil Management Protocols**

3. Industry Initiatives

# Pilot Emission, Reductions, Removals and Learnings Initiative (PERRL)

1. Program Lead:  Environment Canada, other fed depts.
2. Funding:  $15 million, Action Plan 2000, 2003-2007, emission credits purchased by program
3. Two agricultural projects

   -no till and conversion of annual cropland to perennial forage

   -$1.1 million, 250 producers, 2500 ha

Skeleton protocol, ongoing collaboration between program authority and project proponent to improve quantification, monitoring, and verification.

# Canada's GHG Offset System Development 2003 - 2006

1. Led by Environment Canada in consultation with provinces, industry, NGO's, & other fed depts.
2. Domestic market, plus purchases from federal Climate Fund.
3. Offsets recognized as Kyoto reductions
4. Guidance builds upon ISO 14064 part 2
5. Desire to develop standardized protocols to improve efficiency
6. **Put on hold or cancelled in 2006**

# ISO 14064 – Part 2

1. Principles: relevance, completeness, consistency, accuracy, transparency, conservativeness
2. Elements: quantification, monitoring, verification
3. Sub elements: baseline scenarios; sources, sinks, and removals (SSR's); data management
4. Other guidance: good practice guidance (eg. IPCC)

   - regional or local peer reviewed science

   - characteristics of program, market, legislation

   - stakeholder consultation

   **Bottom Line: high degree of rigor and detail**

   **specific soil protocols - 70+ pages each**

# Agricultural Protocols led by Technical Working Groups

1. Pork

   -feeding strategies, manure storage & land application

2. Beef – feeding strategies
3. Manure Treatment – anaerobic digestion
4. Agroforestry
5. Soil Management

   -no till default

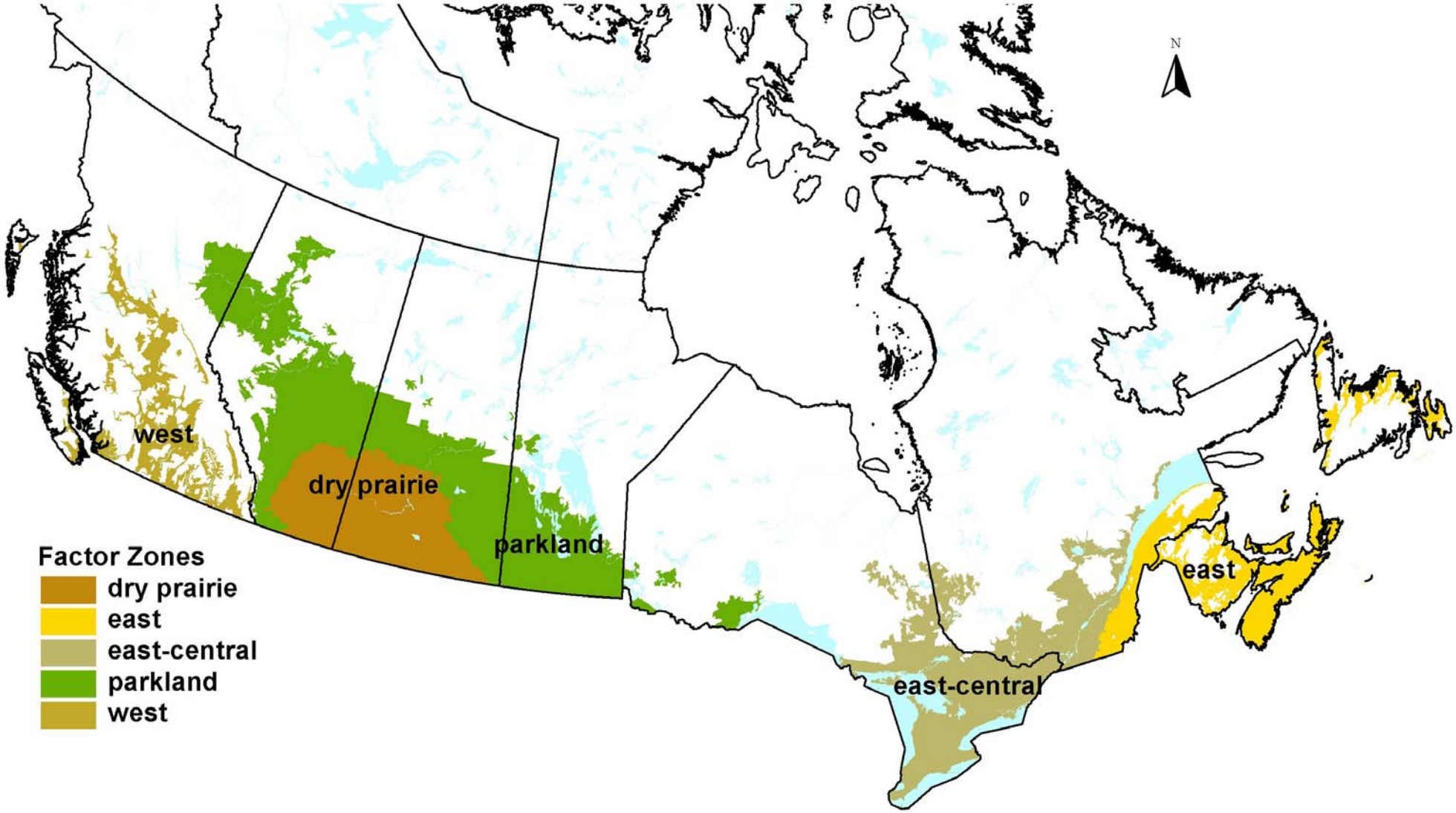
   -other soil carbon approaches

   -nutrient management:  N reduction in corn

# No Till Default Protocol - Quantification

1. Used NCGAVS regional coefficients based on Century
2. Regional baseline deduction based on no till and reduced till adoption in baseline year (Census data)
3. Activity Definition Criteria
   - consistent with definitions used to generate coefficients & baseline adoption rates, for each region
   - provide sufficient guidance for farmers
   - enable efficient monitoring and verification

# Agricultural Regions for No Till



# Prairie Regions Tillage Definitions

## No Till

< 30% soil disturbance / operation

up to 2 operations

## Reduced Till

> 30% soil disturbance / operation

no fall tillage

# Activity Definition Issues

1. Crop Types (rotations, fall seeded crops, perennial forages)
2. Nutrient Management (fertilizer and manure application)
3. Irrigation
4. Crop Utilization (grain, hay, silage)
5. Crop Residue Management (spreading, harvesting, grazing, burning)
6. Crop Failures, Unseeded Land, Cover Crops

**Goal: maintain accuracy, yet provide flexibility**

# Monitoring & Verification Issues

Critical Data: project size, location, adherence to activities

1. Farmer contract, sworn affidavit
2. Farmer generated field records, GPS
3. Proponent Monitoring
   a) Remote Sensing ?
   b) Site Inspection
      - equipment (seeding, tillage, nutrient applicator)
      - field assessment (standing stubble, residue, row spacing, seed spread, packing system)
4. Third Party Verification

# Other Challenges

1. Long Term Soil Carbon Maintenance
   - Reversal coefficients
   - Liability period extends beyond crediting period
   - Permanent versus temporary credits

2. Baseline Reassessment
   - Crediting period and project feasibility
   - Coefficients adjusted for crediting period

# No Till Protocol - Coefficients

| | No Till Coefficients | | | | | Full Till Coefficients | |
|---|---|---|---|---|---|---|---|
| | SOC 10 yr | $N_2O$ | Energy | Total | Net | Net | Stored SOC Reversal |
| Region | tonnes $CO_{2\ equiv}$ / ha / year | | | | | | |
| East | 0.25 | | 0.16 | 0.42 | 0.34 | -0.08 | -0.21 |
| East/Central | 0.41 | | 0.16 | 0.58 | 0.41 | -0.16 | -0.30 |
| Parkland | 0.59 | 0.05 | 0.11 | 0.74 | 0.49 | -0.24 | -0.39 |
| Dry Prairie | 0.41 | 0.01 | 0.06 | 0.48 | 0.26 | -0.20 | -0.22 |
| West | 0.20 | | 0.11 | 0.31 | 0.26 | -0.05 | -0.17 |

# Other Soil Carbon Approaches

1. Motivation: reward individual producer performance
2. On Farm Methods

   -measurement: high variability & small SOC lead to high cost

   -modelling: uncertainty of starting SOC for various C pools
3. Recommendations

   - use measurement to develop custom coefficients for pools of producers with similar soil/landscapes and management.

   - use a regional baseline coefficient deduction similar to default

   - need to include other SOC practices such as reduced fallow and perennial forages in baseline.

# Industry Led Initiatives

1. Large Final Emitters interested in purchasing offset credits from agricultural producers
2. Agriculturally based aggregators eager to represent farmers in pooled projects (contract signups)
3. Some project methodology development and pilot studies, but difficult in policy vacuum.
4. Only one agricultural project actively generating and trading carbon credits.

# Lessons Learned

1. Currently activity / coefficient based approach more workable than soil carbon measurement
2. Low value: @$4/tonne, No Till earns $1–2 / ha / yr for 5-10 yrs
3. Options to Increase Value

   -higher price for Kyoto recognized offsets

   -bundle additional practices (reduced fallow, perennial forages, improved nutrient management)

   -pool producers with similar practices and soil / landscapes

   -add other EG&S (water quality, biodiversity)
4. Clearer Policy and Consistent Interpretation

   -will ISO 14064 or similar guidance be accepted internationally

   -baseline deductions and soil carbon maintenance / liability


# Thank you