



Revisions to the Carbon Budget Model of the Canadian Forest Sector in Support of National Reporting Requirements

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Natural Resources
Canada

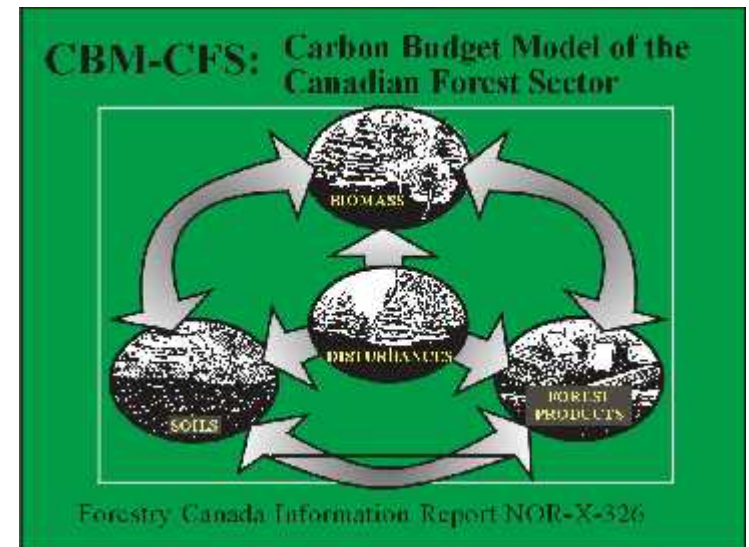
Ressources naturelles
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Outline

- overview of the CBM-CFS
- research tool → operational tool
- spatial representation in the CBM-CFS2





CBM-CFS

- **Research tool first developed in the late 1980s**
 - CBM-CFS1 : static model
 - CBM-CFS2 : dynamic model
 - CBM-FPS : forest product sector sub-model
- **Biophysical model**
 - forest biomass and dead organic matter (DOM) carbon dynamics
- **Key component of Canada's National Forest Carbon Monitoring, Accounting, and Reporting System**

References:

- 1) Kurz et al. (1992) Forestry Canada, Information Report NOR-X-326
- 2) Kurz and Apps (1999) Ecological Applications, 9(2):526-547
- 3) Apps et al. (1999) Environmental Science & Policy, 2:25-41



Operationalizing CBM-CFS2

Research tool → Operational tool

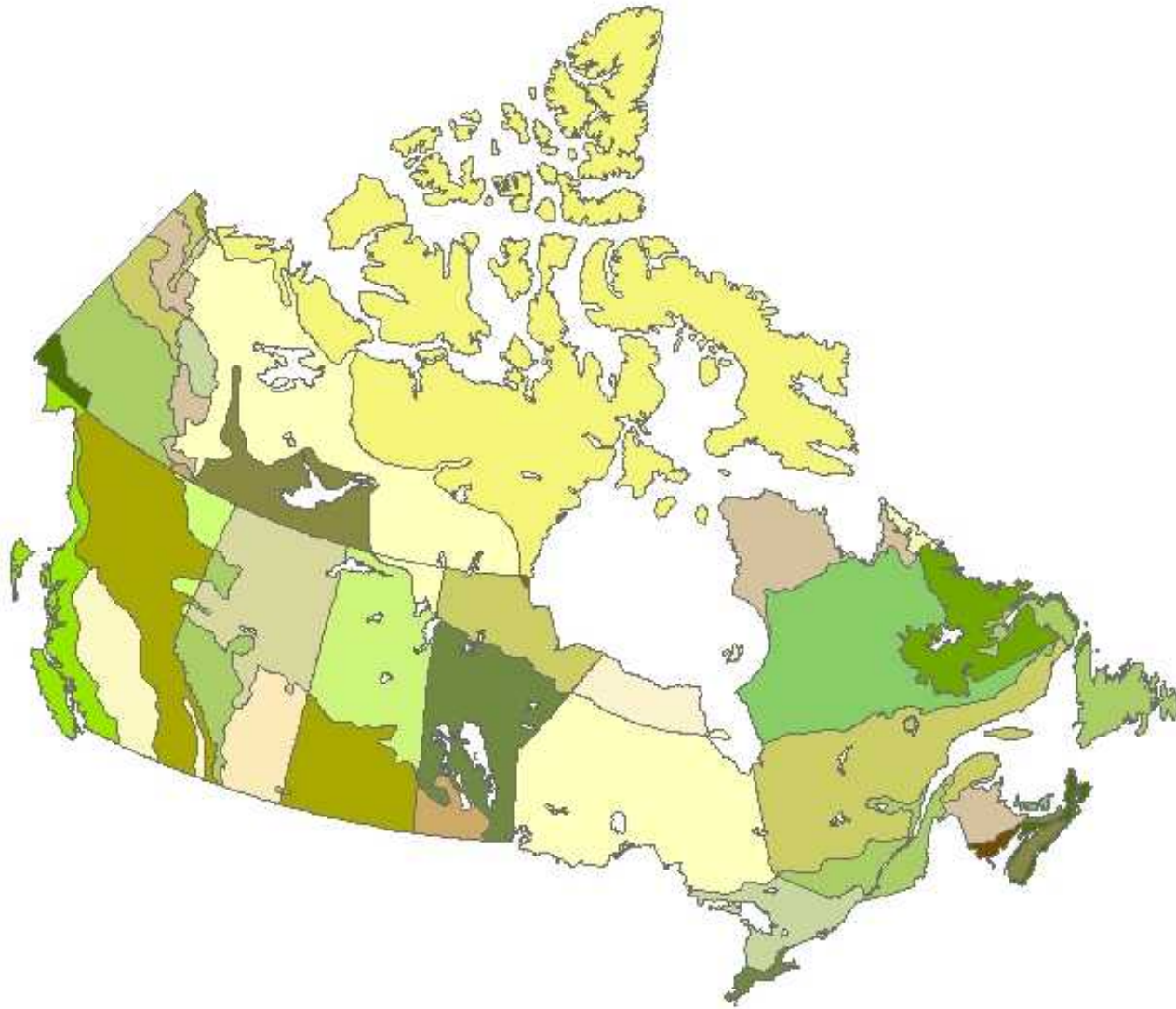
- **Enhanced Graphical User Interfaces**
- **Integrated pre- and post-processing tools for data handling**
- **Tools for scenario building and run management**
- **Enhanced capabilities to make use of available data**
 - provincial and corporate forest inventory formats
 - provincial and corporate growth & yield formats
- **Improved representation of dead organic matter dynamics**
- **Increased spatial resolution**



Improvements to spatial representation in the CBM-CFS2

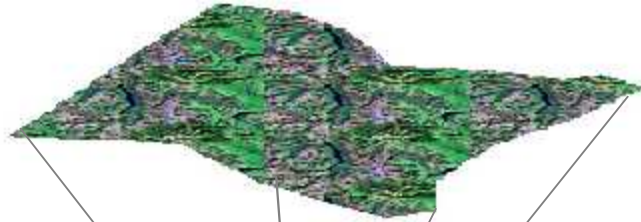


Original 42 spatial units

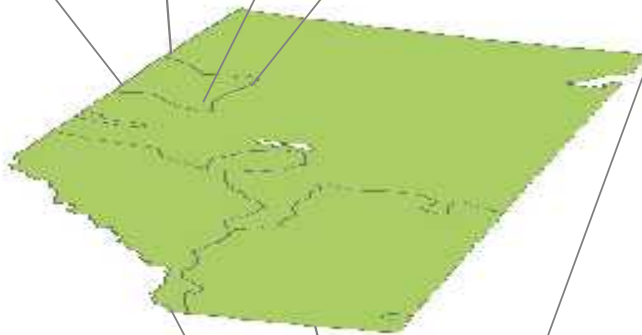




Multiple levels of inventory detail



Forest Management Unit



Provincial



National

Incorporation of the best available data into the national scale analyses



NFI

- Planned **National Forest Inventory** will be plot-based
- **Statistically-based inventory**
- **First round of measurements is under way**
- **First complete sample expected to be ready in 2005**
- **Complete repeat measurements will not be available before the first commitment period of the Kyoto Protocol**

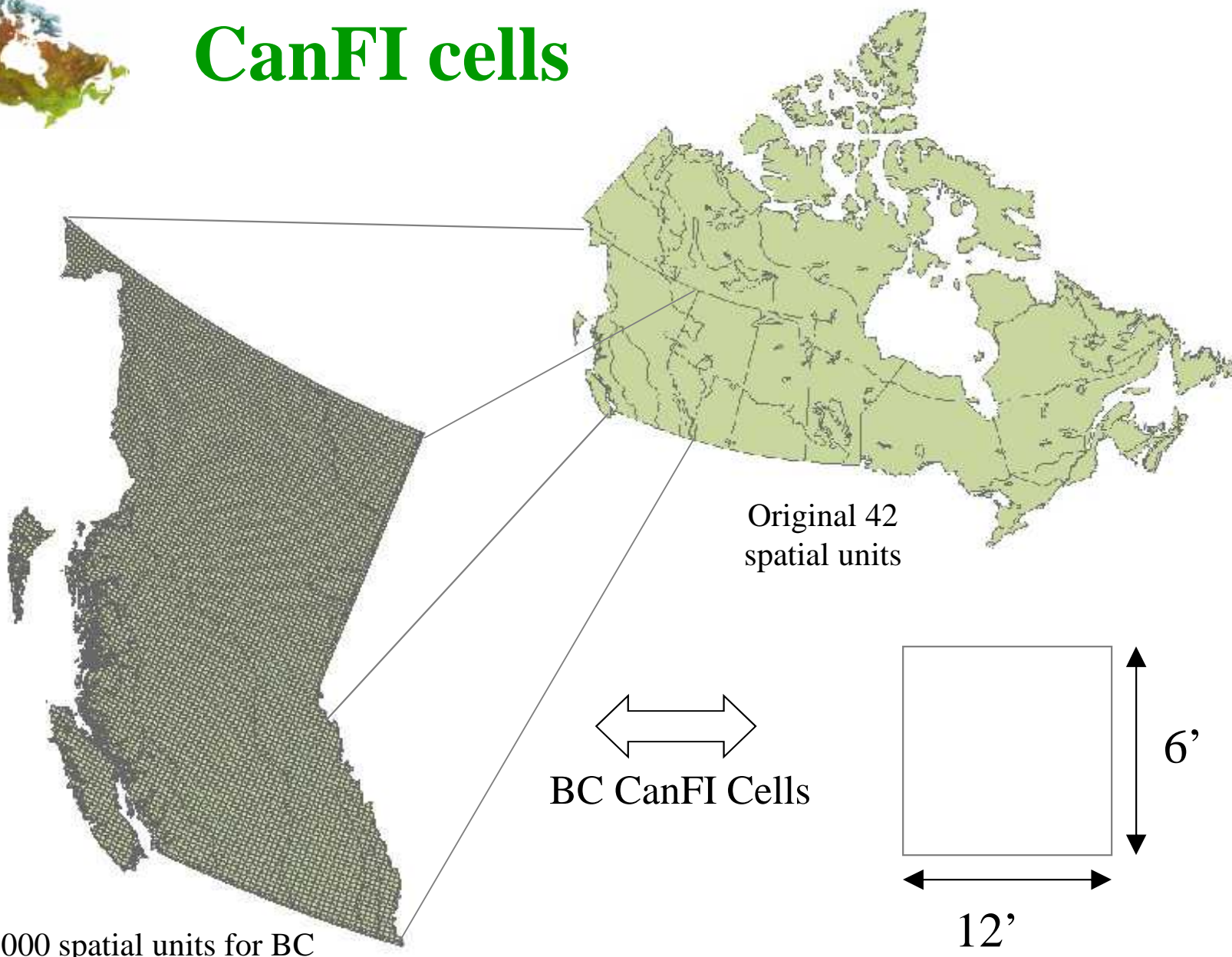


CanFI

- **Compilation of existing Provincial & Territorial forest inventories into **Canada's Forest Inventory****
 - 1981, 1986, 1991, 1996, 2001
- **Area-based inventory**
- **Aggregation of inventory data into 50 000 “CanFI cells”**
- **Detailed but non-spatial distributions within CanFI cells**
- **Common inventory platform for national-scale analyses until NFI completion**



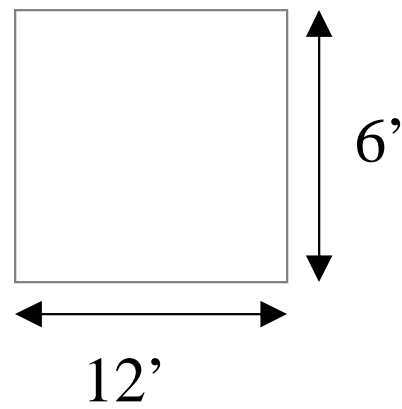
CanFI cells



Original 42 spatial units

BC CanFI Cells

7000 spatial units for BC





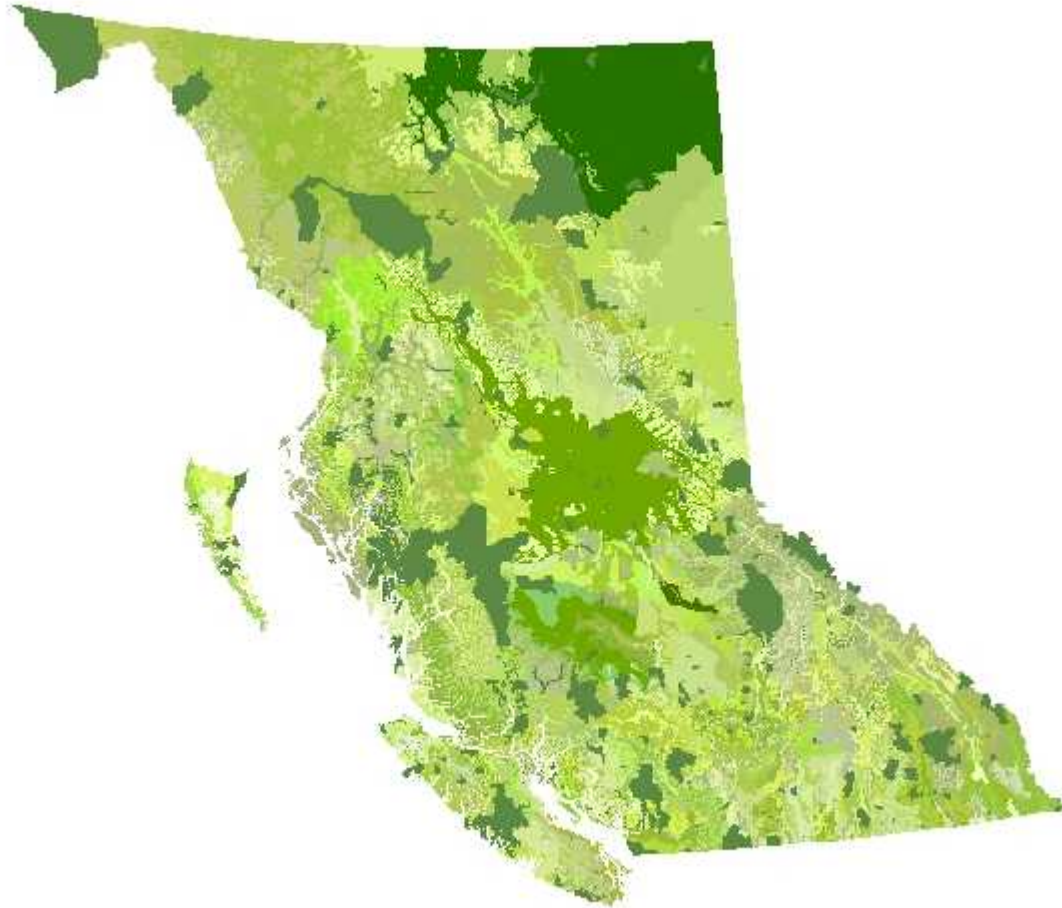
Provincial & Corporate inventories

- **Detailed inventory and growth & yield data**
 - **B.C. Analysis (769 spatial units)**

- **Spatially-explicit C budget modelling**
 - **Prince George Pilot**



B.C. Provincial Analysis: 769 spatial units





Prince George Pilot: objectives

1) Build spatially-explicit modelling capabilities into the CBM-CFS2

- Forest cover polygons represented inside CBM-CFS2

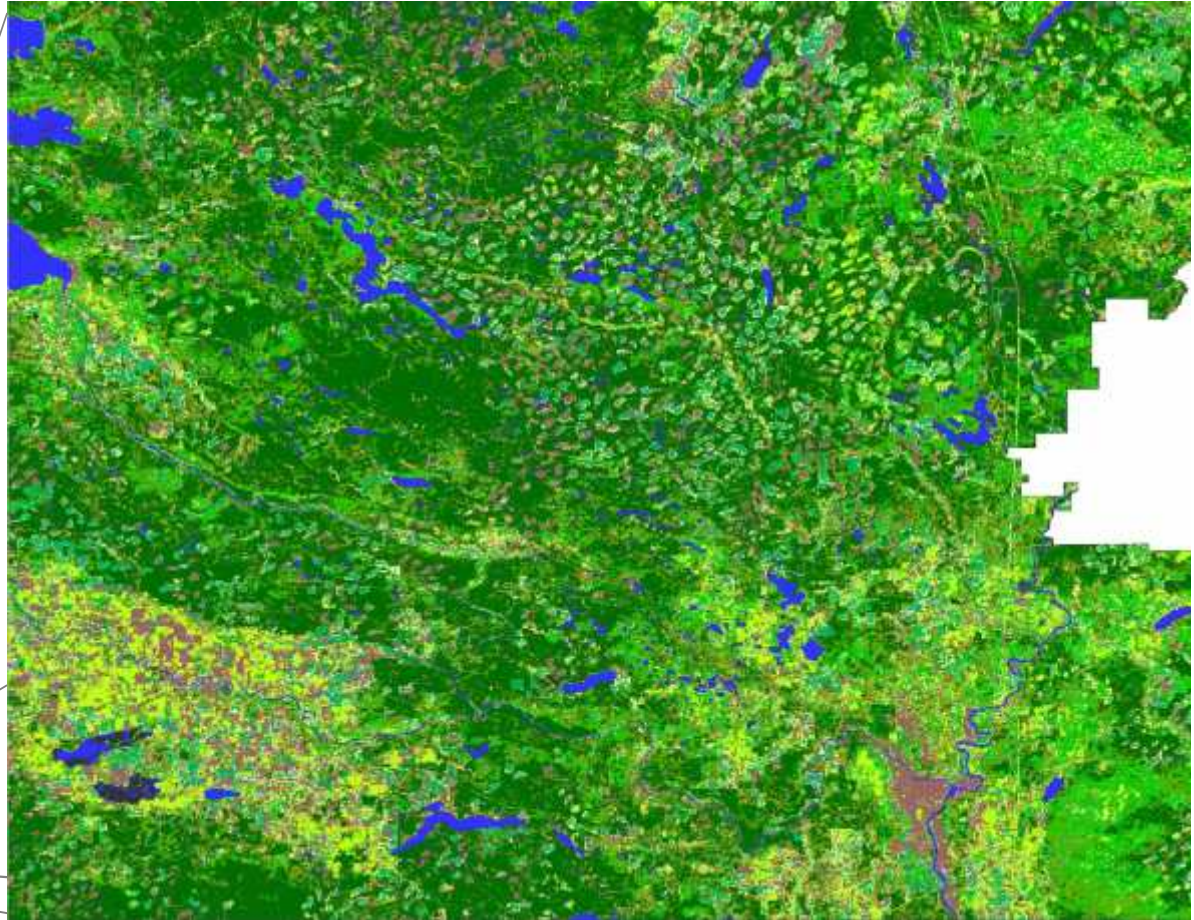
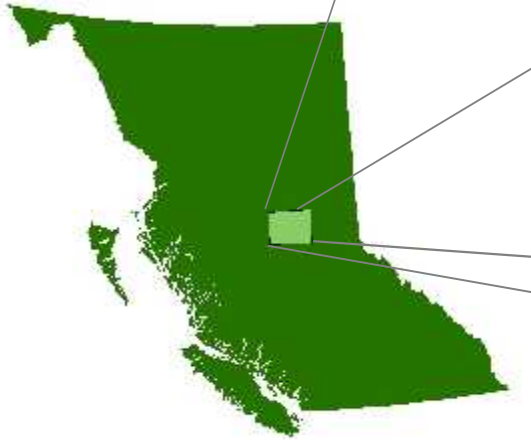
2) Establish and test operational linkages between carbon accounting framework and remote sensing data (forest cover mapping, change detection)

- Spatially-explicit disturbance events input to CBM-CFS2



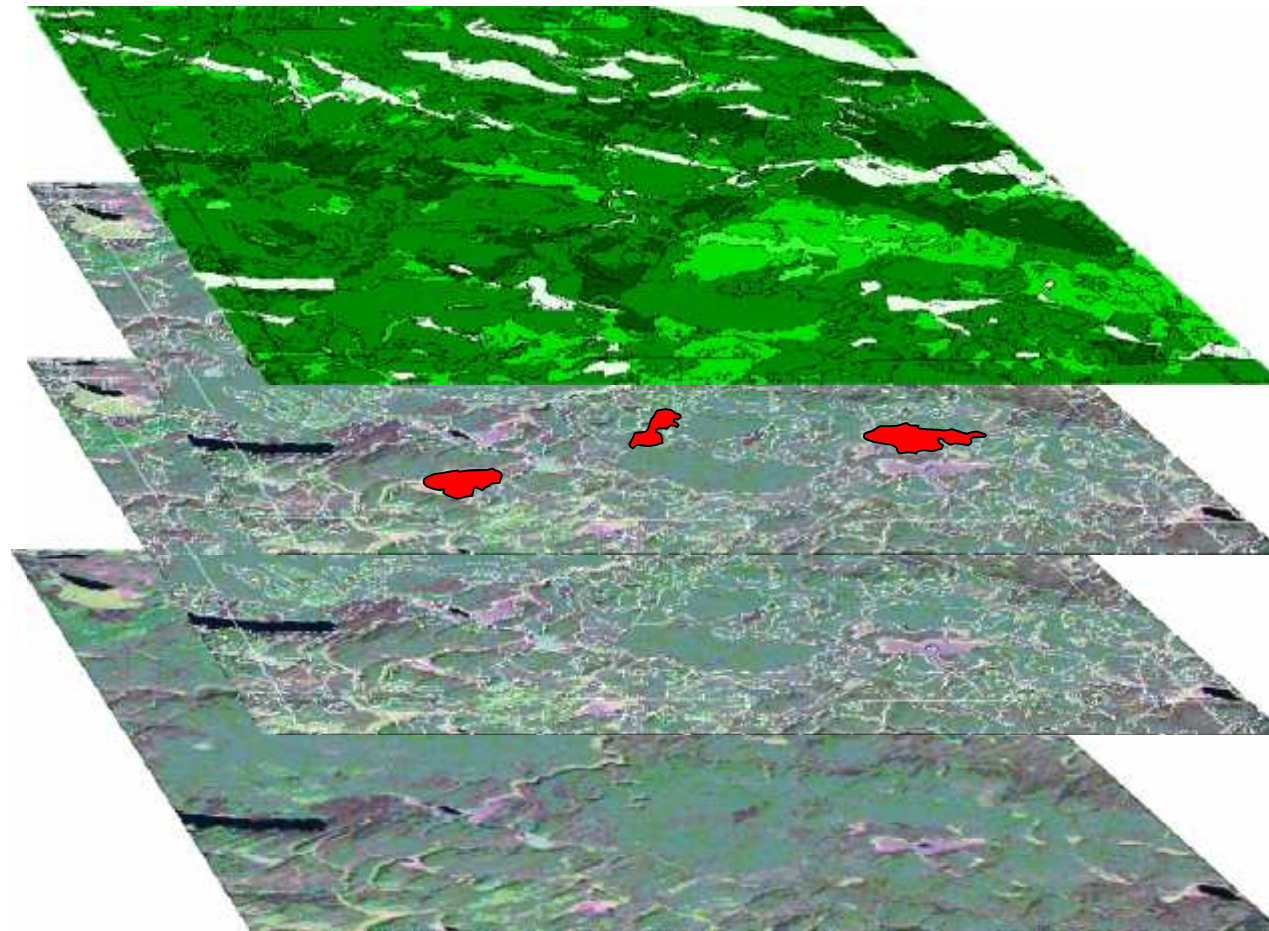


Prince George Pilot: study area





Prince George Pilot: data layers



Growth & Yield

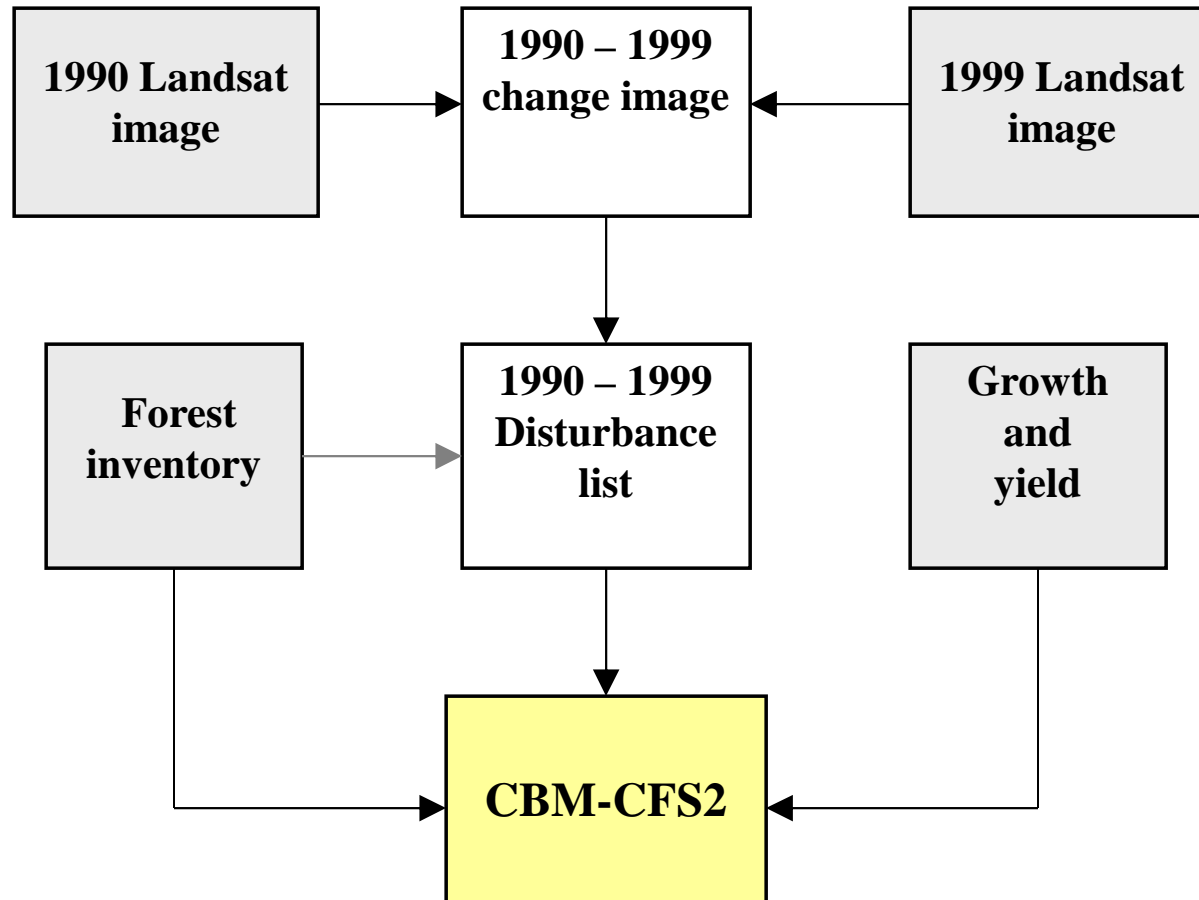
Change
Detection

Inventory
Polygons

Forest Cover
(Landsat)



Prince George Pilot: methodology





Prince George Pilot: results

CBM-CFS2



- Carbon stocks in 1990 and in 1999
- Carbon stock changes
- Estimate of the area subject to Kyoto Protocol Article 3.3 and Article 3.4 accounting



Spatial Resolution: Conclusions

- **Original spatial representation:**
 - national runs with 42 spatial units
 - detailed, but not spatially-explicit distributions within spatial units
- **Enhanced spatial representation (work in progress):**
 - national runs with $> 50,000$ spatial units
 - incorporation of multiple inventory data sources
 - capability to perform spatially-explicit analyses where the data is available.
- **So What?**
 - estimation of forest C stock changes using spatially explicit land use change information
 - meeting Kyoto Protocol requirements



Conclusions

- **Work is under way to operationalize the Carbon Budget Model of the Canadian Forest Sector (CBM-CFS2)**
- **CBM-CFS2 will be a key component of Canada's National Forest Carbon Monitoring, Accounting, and Reporting Framework.**
- **Additional activities are ongoing as part of the National Forest Carbon Accounting Program that are beyond the scope of this presentation.**



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CFS Bookstore

<http://bookstore.cfs.nrcan.gc.ca/index.htm>



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