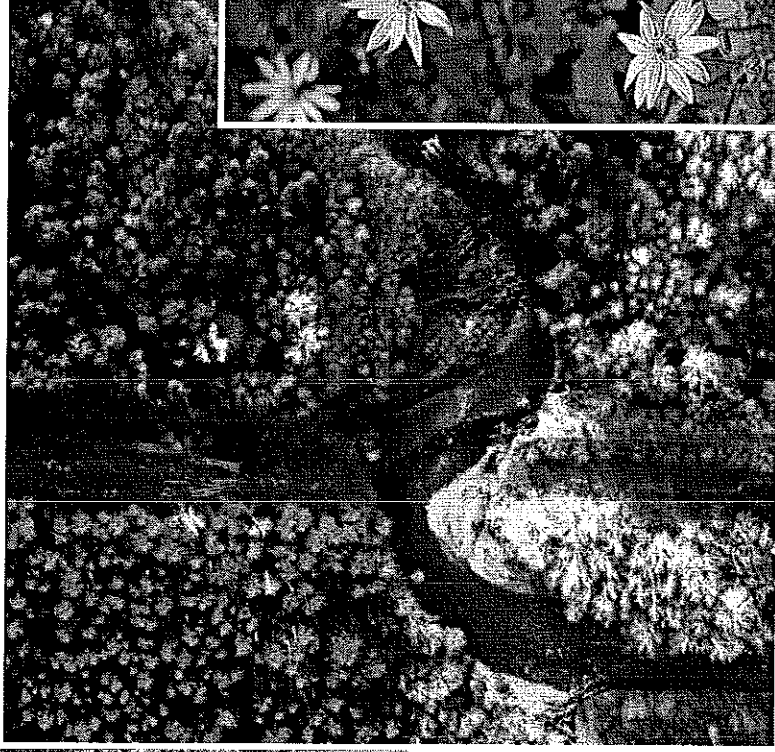
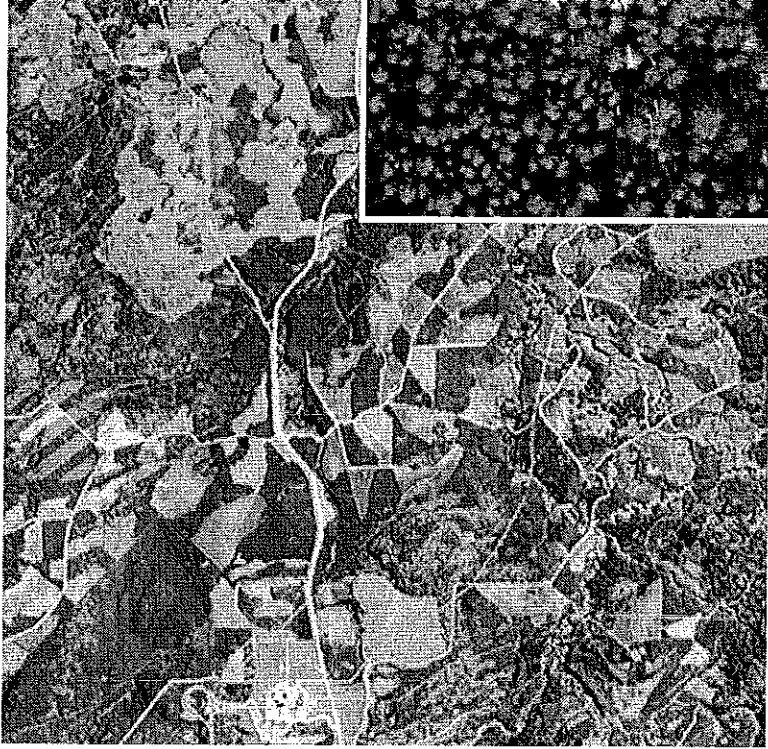
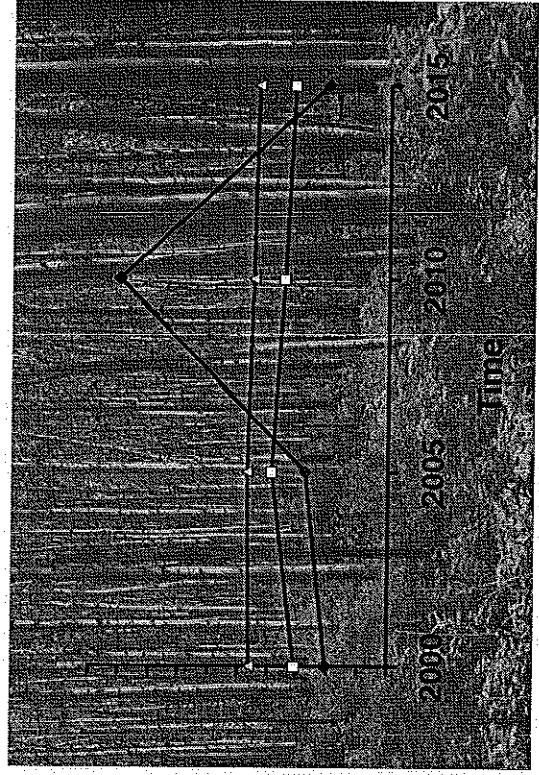


Alberta Forest Biodiversity Monitoring Program

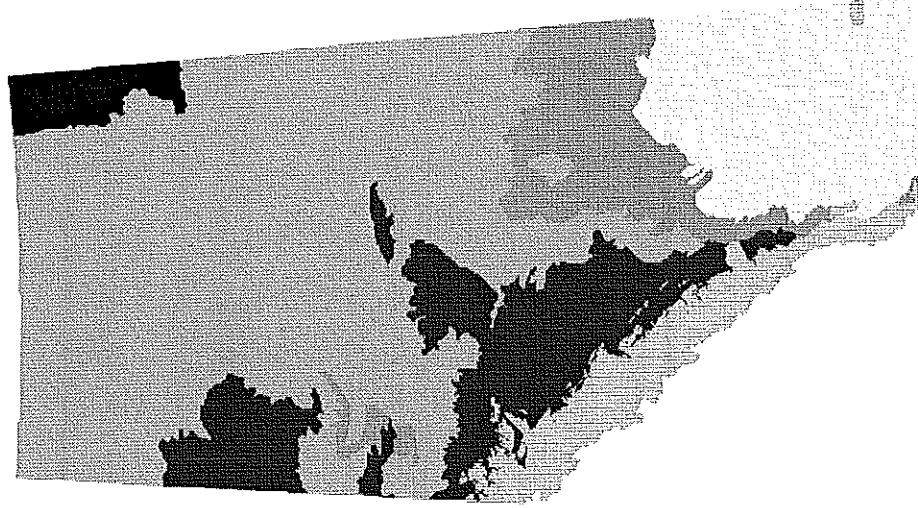


Goal

- Develop a system to monitor changes in forest biodiversity



Alberta Forest Biodiversity Monitoring Program



Steering Committee

- Alberta Conservation Association
- Alberta-Pacific Forest Industries
- Foothills Model Forest
- Land and Forest Service
- Millar-Western Industries
- Natural Resources Service
- Parks Canada
- Provincial Museum of Alberta
- Weldwood of Canada Ltd. (Hinton Division)



Technical Committee

- Mark Bradley (*Wood Buffalo National Park*)
- Beth Dickson, Steven Franklin (*Univ. of Calgary*)
- Bert Finnamore (*Provincial Museum of Alberta*)
- Michelle Hiltz, Phil Lee, Garry Scrimgeour (*ARC*)
- Dave Prescott (*Alberta Conservation Association*)
- Jim Schieck (*Natural Resources Service / ARC*)
- Chris Shank (*Natural Resources Service*)
- Brad Stelfox (*FOREM Consulting*)
- Mike Willoughby (*Land and Forest Service*)
- Neville Winchester (*Univ. of Victoria*)



Sponsors

- Ainsworth Lumber
- Alberta Conservation Association
- Alberta Environmental Protection
- Alberta Science and Research Authority
- Alberta - Pacific Forest Industries Ltd.
- Alberta Research Council
- Canadian Forest Products Ltd.
- Daishowa - Marubeni International Ltd.
- Foothills Model Forest
- Manning Diversified Forest Products Research Trust
- Prince Albert Model Forest
- Weyerhaeuser Canada Ltd.



Alberta Forest Biodiversity Monitoring Program

Why?

- Evaluate success of provincial goal to maintain species diversity
- Support forestry & energy industry
 - *test coarse-filter approach*
 - *criteria & indicators*
 - *certification*
 - *public relations, consumer relations*
- Evaluate success of national park management

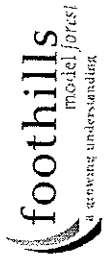


Alberta's Forest Industry

- 209,000 km², 17 FMA's
- 40% of forested regions
- 9 pulp mills, 29 saw mills, 12 other mills
- 23.3 million m³ / wood yr
- 25,000 direct employment
- \$ 8.4 billion total revenue
- \$ 2.4 billion in exports
- \$ 560 million in taxes



Alberta Forest Biodiversity Monitoring Program



Alberta's Energy

Energy Industry
Energy Industry
Energy Industry

Energy Industry

Energy Industry

Energy Industry

Energy Industry

Energy Industry

Energy Industry

Energy Industry

Energy Industry

Forest Industry

Alberta Forest Biodiversity Monitoring Program



Why a provincial program?

- Match scales, monitoring & management
 - *widespread changes, not specific responses*
- Many actions affect biodiversity
- Analysis requires consistency
 - *time & space*
- Cost-effective



Definition

Biodiversity = Species diversity

Measure:

Species richness of target groups

e.g.

ground nesting birds

carabid beetles

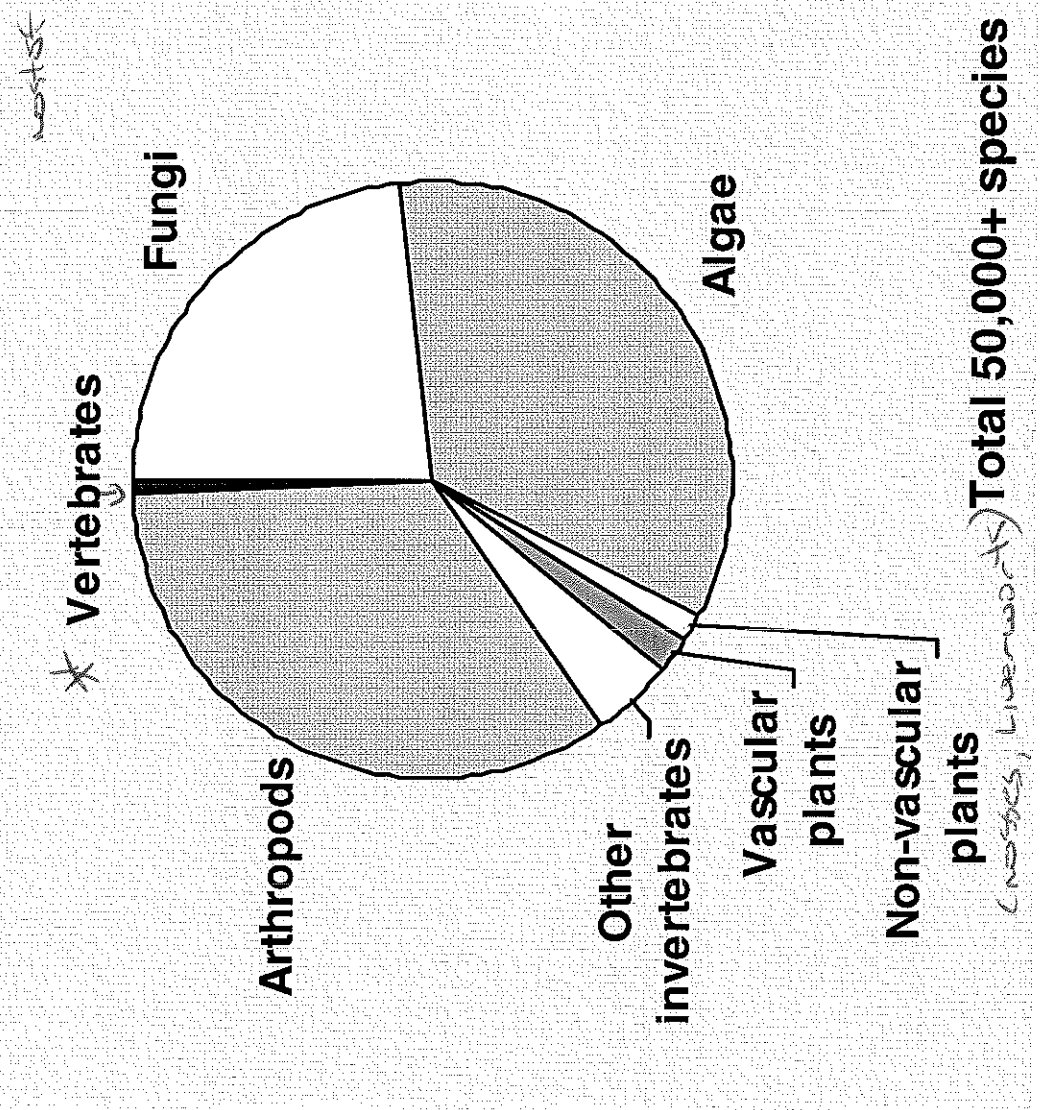
exotic plants

etc.

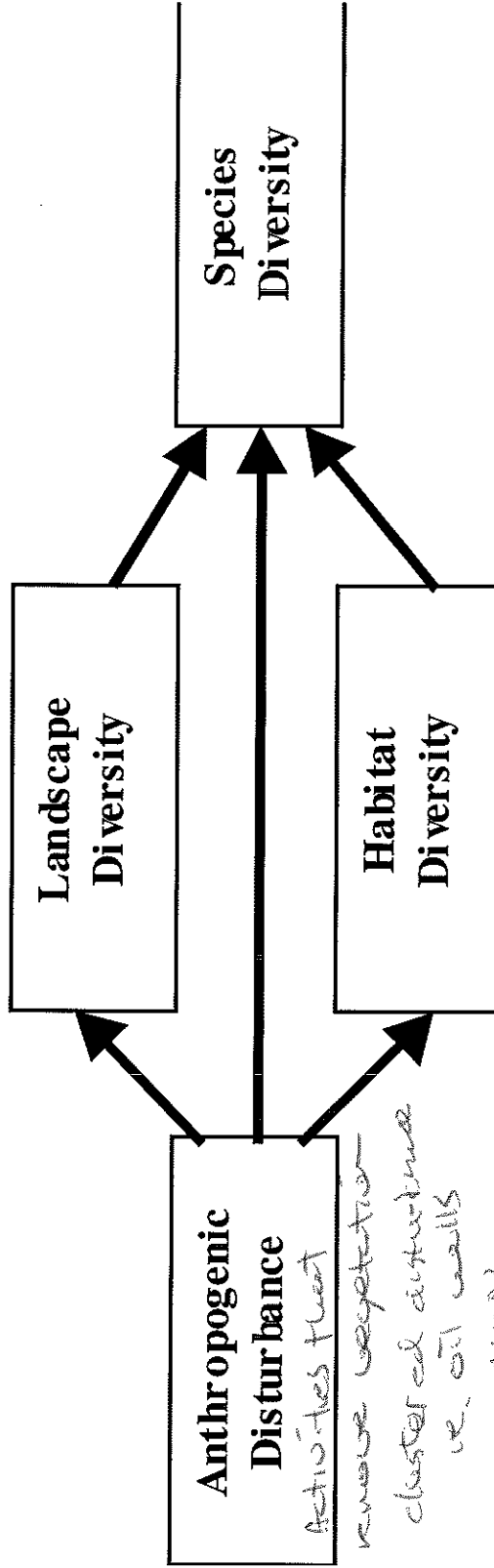


Alberta's Biodiversity*

* excluding lichens



Ecological context

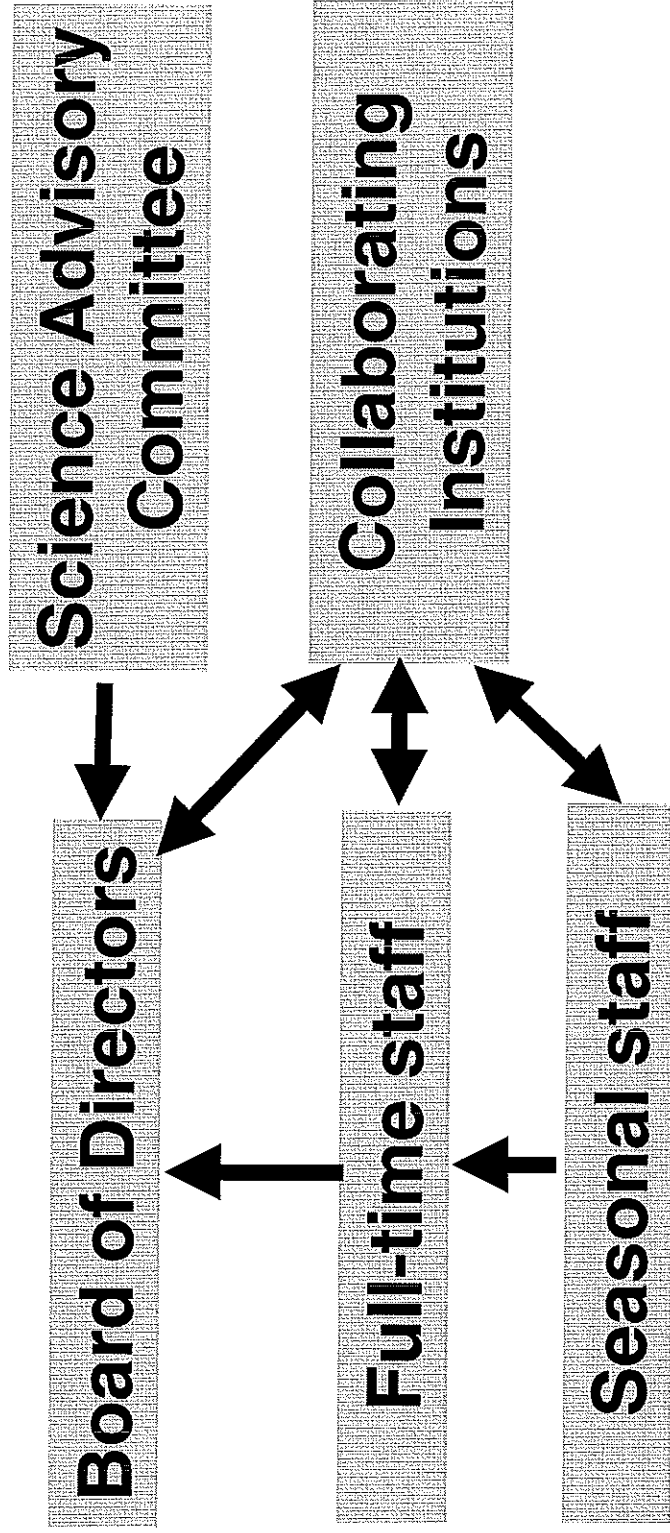


Monitoring objectives

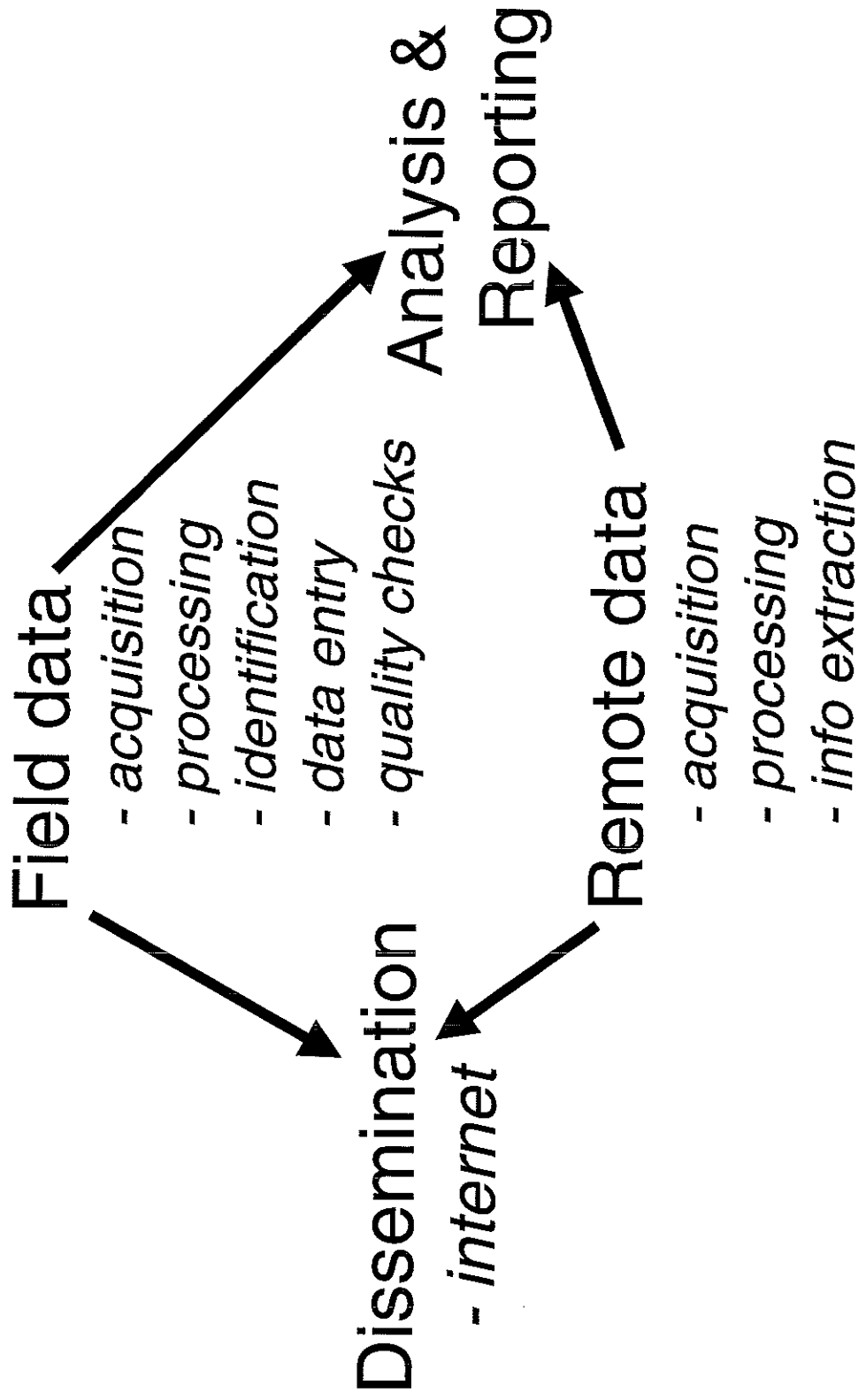
1. Provincial assessment *- provincial grids*
Detect provincial-level changes in species diversity of target groups
2. Early warning *- regional grids*
Quantify geographic variation in species diversity change
3. Correlates of species diversity change
Habitat diversity, landscape diversity, anthropogenic disturbance
4. Local monitoring *- oil patch*
Objectives 2 & 3 on smaller scale



Organization

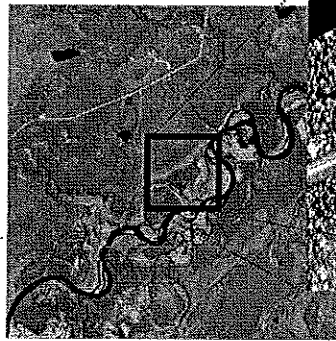


Operation

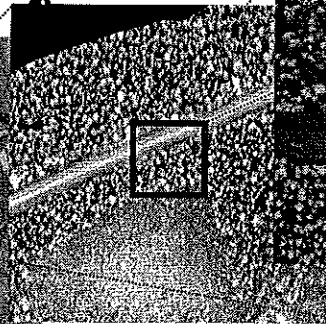


Sampling methods

Remote Sensing



Low resolution
- Landsat, 30 m



Medium resolution
- *casí*, 2 m



High resolution
- *casí*, 0.6 m

Field Sampling



aquatic

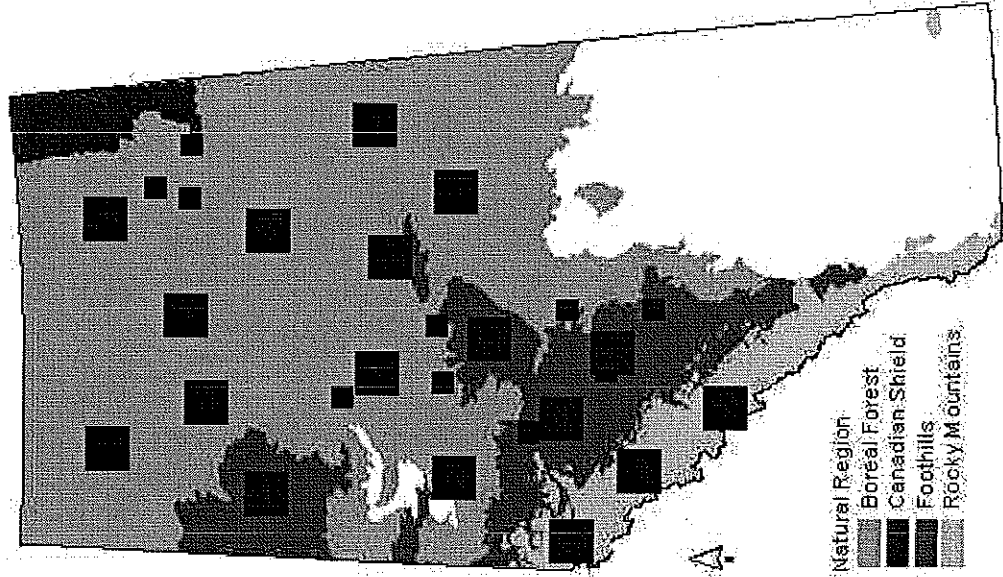


terrestrial



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Sampling design: 3 scales

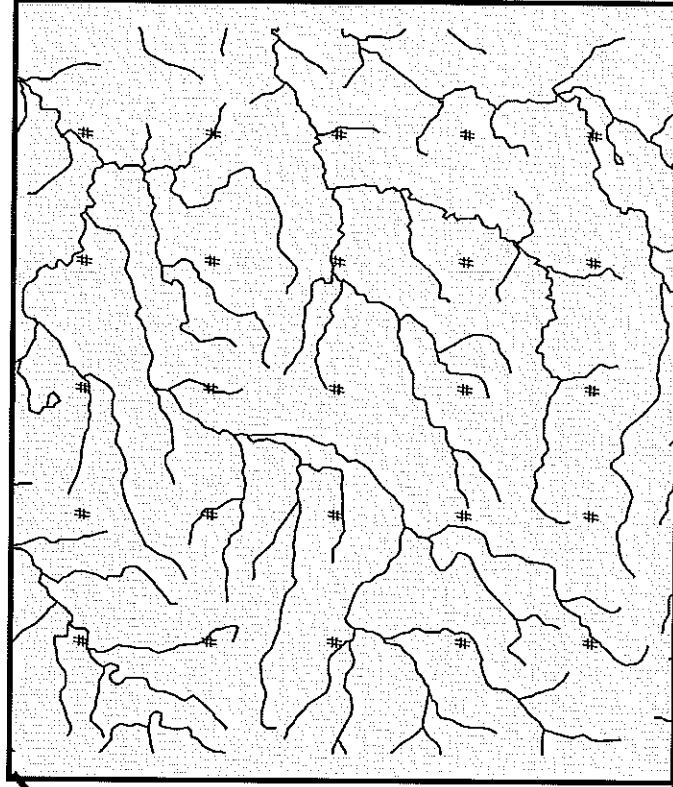
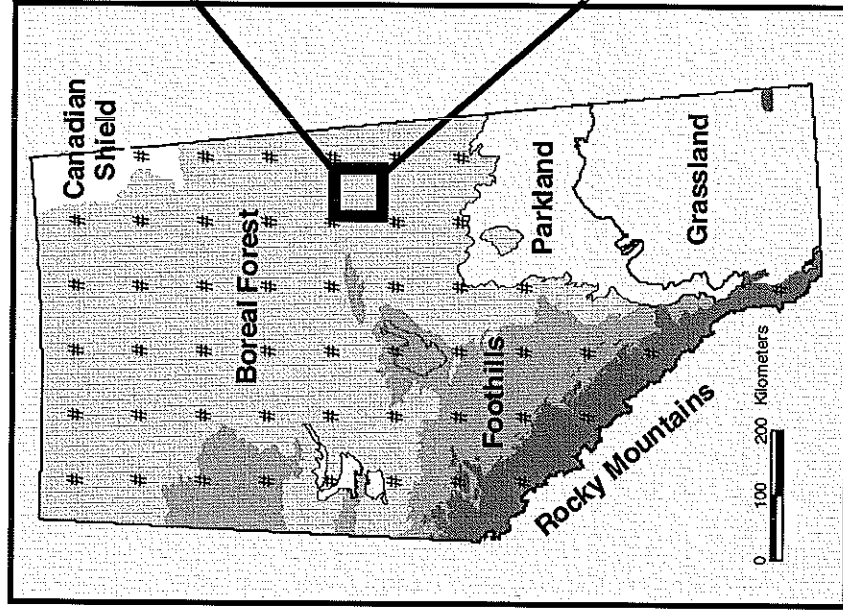


1. Provincial Grid:
500,000 km²

2. Regional Grids:
1,000 km²

3. Local Grids: 50 km²

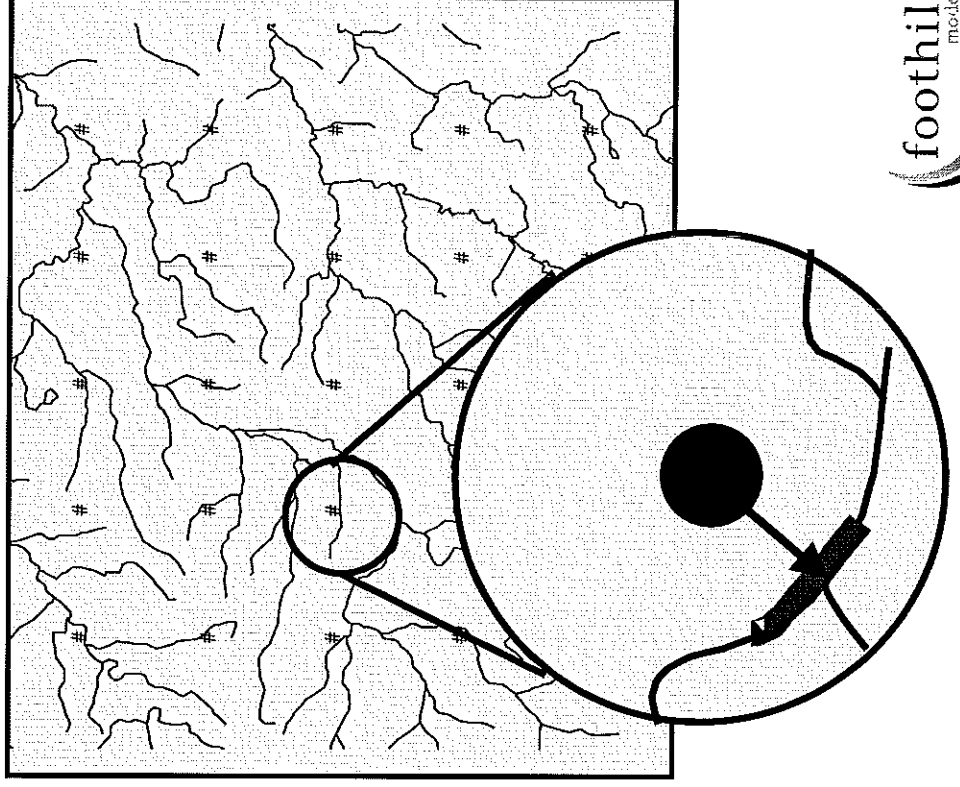
Systematically arranged sites



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Lotic sites

- Nearest to terrestrial / wetland site



Implementation example

- Site design
- Network design
- Cost analysis



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Site design

- Remote sensing: aerial & Landsat
- 5 terrestrial/wetland protocols
- 3 lotic protocols
- 6 visits per site in a year
- 45 available field days, June 1 - August 31
- 2 person crew
- 10 sites / crew / year
- helicopter support required for some sites



Network design

- Effort per grid guided by power, e.g.:
 - number of sites = 50 (25 t/w, 25 lotic)
 - monitoring frequency = 1 yr or 5 yr
- 21 Regional Grids
 - 17 in FMA areas
 - 4 in large protected areas
- 10 Local Grids
 - 5 in small energy developments
 - 5 in small protected areas



Network design

Provincial - Alberta

Provincial

Grid

Regional

Grid

Local

Grid

Number of grids

1

22-FMA
+ LACKS
+ LIMITED
+ AREAS
+ VARIANCE
+ TIME

50M FORTS
50M SPECIAL
50M PLANS

Number of sites per grid

10

10

10

Monitoring duration

10 years

5 yr

5 yr

Grids covered by

1

6 or 5

2

Sites covered by

10

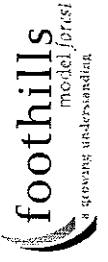
100 (10x10)

100

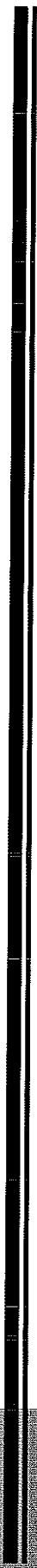
(Grid) - plots = 1 ha



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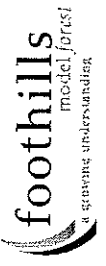
Cost: One Regional Grid



Item	Quantity	Unit Price	Total Price
1. Regional Grid	1	\$100,000	\$100,000
2. Installation	1	\$50,000	\$50,000
3. Maintenance	1	\$20,000	\$20,000
4. Training	1	\$10,000	\$10,000
5. Reporting	1	\$10,000	\$10,000
6. Contingency	1	\$10,000	\$10,000
Total			\$200,000



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Cost: Overall

Phase	Monitoring Frequency	Duration	Cost
Phase 1: Initial	Quarterly	1 year	\$10,000
Phase 2: Regular	Quarterly	3 years	\$30,000
Phase 3: Annual	Annual	5 years	\$50,000
Phase 4: Long-term	Annual	10 years	\$100,000
Phase 5: Final	Annual	1 year	\$10,000
Total			\$200,000

over 20 years to start



Potential cost allocation



Category	Item	Value	Value	Value
Plant & Equipment	Plant	100,000	100,000	100,000
	Equipment	50,000	50,000	50,000
Construction	Construction	200,000	200,000	200,000
	Construction	100,000	100,000	100,000
Inventory	Inventory	50,000	50,000	50,000
	Inventory	50,000	50,000	50,000
Debt	Debt	100,000	100,000	100,000
	Debt	100,000	100,000	100,000
Total	Total	500,000	500,000	500,000
	Total	500,000	500,000	500,000



Alberta Forest Biodiversity Monitoring Program



Key tasks ahead

- Compare alternative implementations
 - *cost*
 - *power to detect trends*
- Recommend program design
- Communication - high gear
 - *establish capital fund*



More info...

www.fmf.ab.ca/bm.html



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