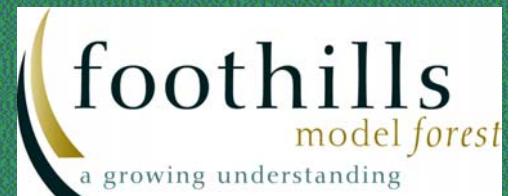# Natural Resource/Fish and Wildlife Research Data Management: The Foothills Model Forest Approach

Christian Weik
Foothills Model Forest

February, 2003

Outline (Presentation)

- Foothills Model Forest (FMF) overview
- Nature of the FMF business
- Issues with traditional data management
- FMF approach to better data management
- Benefits, successes
- Future plans

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FMF Overview

- The FMF is dedicated to conducting research and implementing results on the ecological, economic and social values of the forest.

- Unique partnership of Industry and Government.

- Many other partners and collaborators.

- One of 11 Model Forests across Canada.

- Year 1 of Phase III.

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Program Sponsors
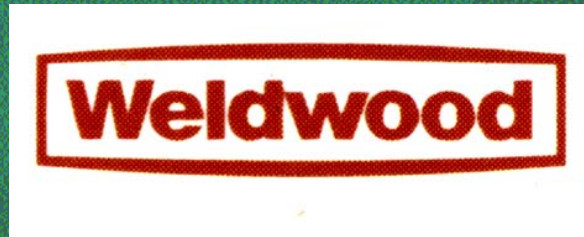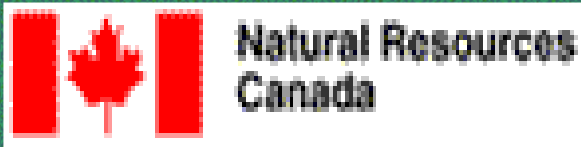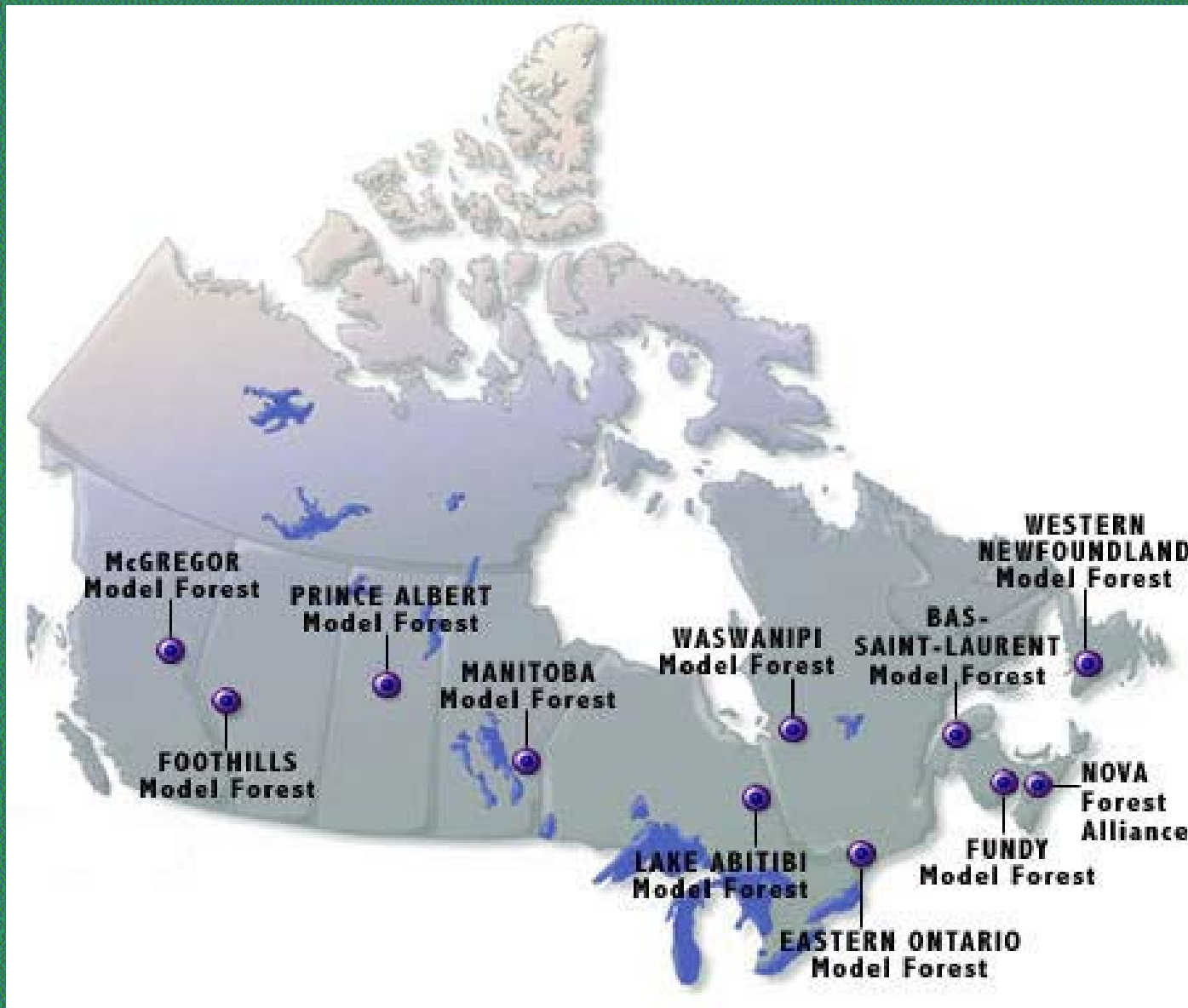
Legend
— Highways
■ Cities/Towns
▉ Protected/Crown/Lease
▉ Jasper National Park
▉ Weldwood FMA
▉ Willmore Wilderness Park

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Grande Cache

Weldwood FMA

Willmore Wilderness Park

Eds

Hinton

Brule

Robb

Jasper National Park

Cadomin

Jasper

umbia   Alberta   Saskatch
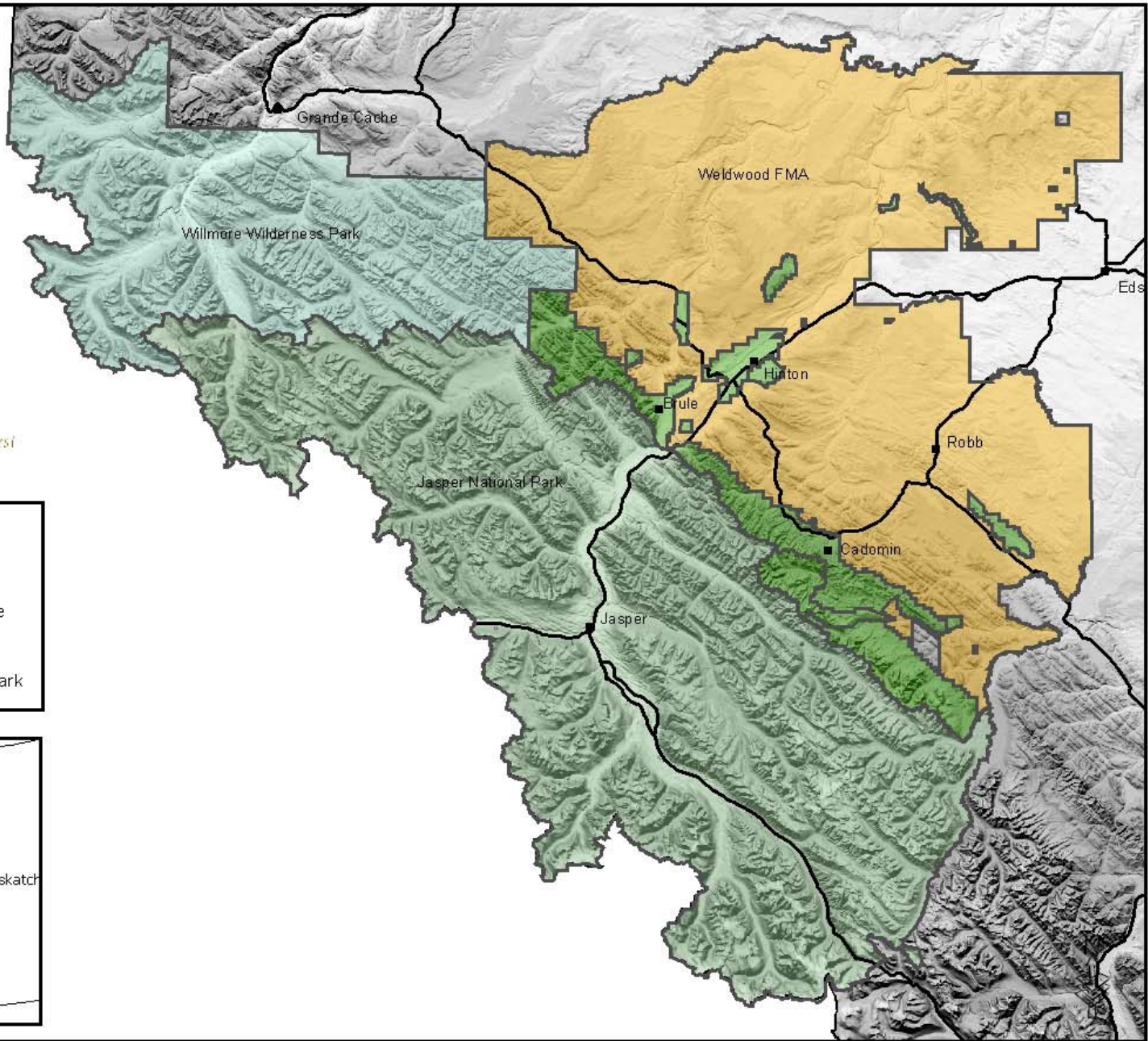
Why Data Management?

- "…15 percent to greater than 20 percent of a companies operating revenue is spent doing things to get around or fix data quality issues."

- "…Data quality issues cost US businesses $600 billion per year."

- FMF fish and watershed crew spent 4 man months in the last two years fixing data problems.

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Nature of the FMF Business

- Several individual research programs areas
- Projects include:
  - Grizzly bear
  - Natural disturbance
  - Growth and yield
  - Fish and watershed
- Little sharing of data between projects
- Projects range from 1 to 6 years
- High turnover of researchers
- Very fluid, difficult to identify future needs
- Territorial attitudes

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Issues With Traditional Data Management

- Little or no vision beyond the end of the short term objectives

- Few standards

- No metadata

- No awareness of the advantages to data management

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Issues With Traditional Data Management...

- Examples.
    - Local level indicators (LLI) example.
        - Inability to report at a landscape scale.
        - Different information, captured with poor documentation and very different formats.
    - Enormous amount of time spent to compile relatively simple data.

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FMF Approach to Better Data Management

- Identify data management specialist(s)
  - GIS personnel is a good fit and is mutually beneficial to the organization and the individual
  - Provide data management training
- Must sell the change
  - Documented erroneous data
  - Documented time/cost to repair errors
  - Emphasize the amount of money spent to collect the data
    - GBP in excess of $2M
    - FGYA in excess of $750k

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FMF Approach to Better Data Management...

- Relatively easy sell at the FMF after eight years
- Foster collaboration between researchers and data managers
  - GIS team should be engaged anyway at the project planning stage
  - Promote proactive vs. reactive approach
  - Include data management in the planning objectives
  - Training of users in fundamental database skills
    - Provides more understanding to those impacted by change
    - Can be provided in-house

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FMF Approach to Better Data Management...

- Apply traditional database design processes to meet user needs
  - Identify database objective(s)
  - Needs assessment
  - Database design, documentation
  - Data validity checks (integrity)
  - Efficient data storage (normalization)
  - Ability to use data after initial objectives have been met
  - Metadata capture
  - Testing, acceptance, modification

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# FMF Approach to Better Data Management...

- Back-loading historical data
  - Potential for huge cost/time overruns
  - Cannot be underestimated
  - Must engage personnel knowledgeable of the data
- Training
  - Effective in-house training using researcher's own data
- Maintain, adapt, monitor
  - Database design
  - Interface
  - Data

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FMF Approach to Better Data Management...

- FMF strategy is at the users level and very specialized in scope
- Data collection agencies will be responsible for providing good data to larger corporate databases
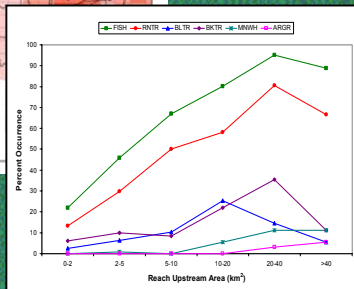
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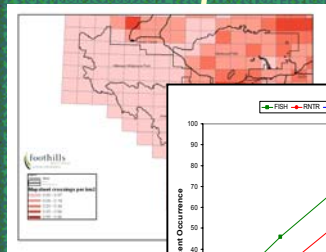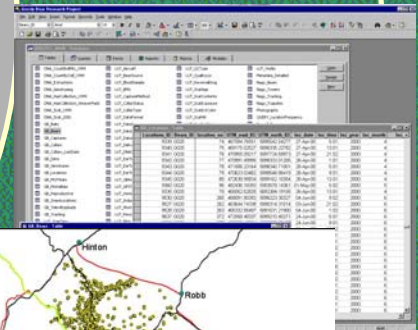model *forest*
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Collection
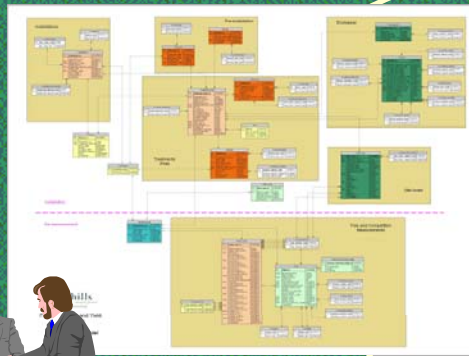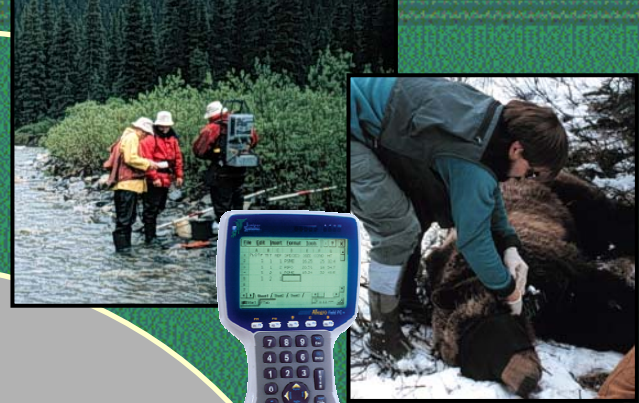
Design

Loading, filtering
Metadata

GIS/
Data Management

Reports,
Results

Analysis

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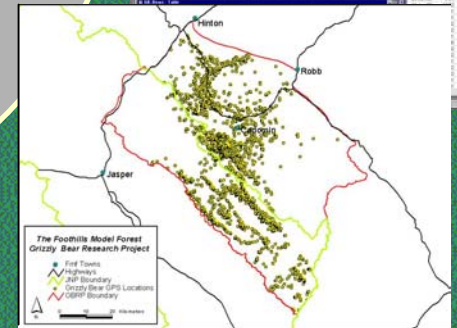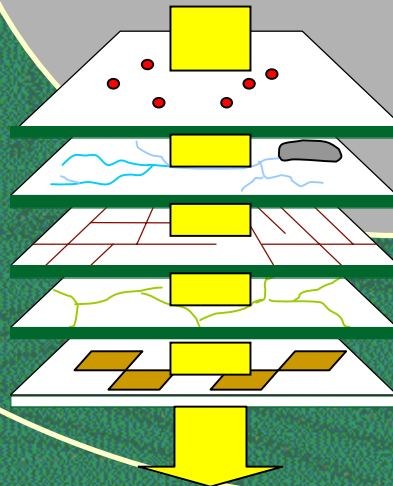
Roles and Responsibilities

Data managers

Users

Design

Data entry

Creation

Data correctness

Document

Shared, complex queries and reports

Forms

Data maintenance

Data back-load

Personal queries

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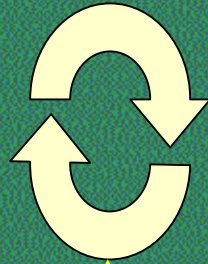
GBP   FGYA   Fish and Aquatics   Natural Disturbance
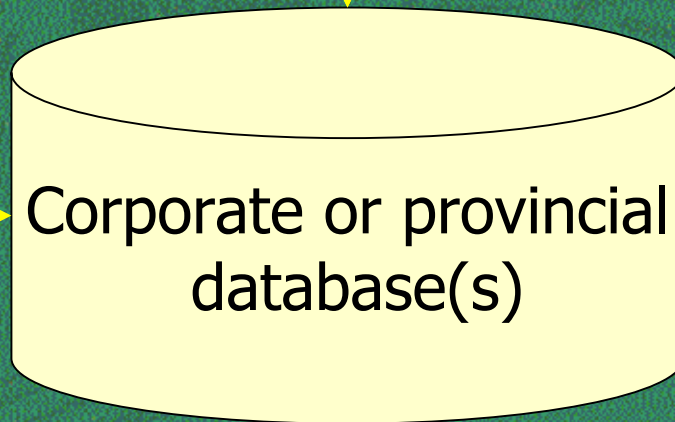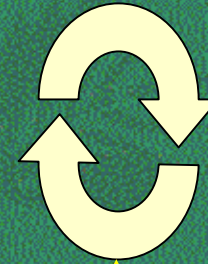
Corporate or provincial database(s)

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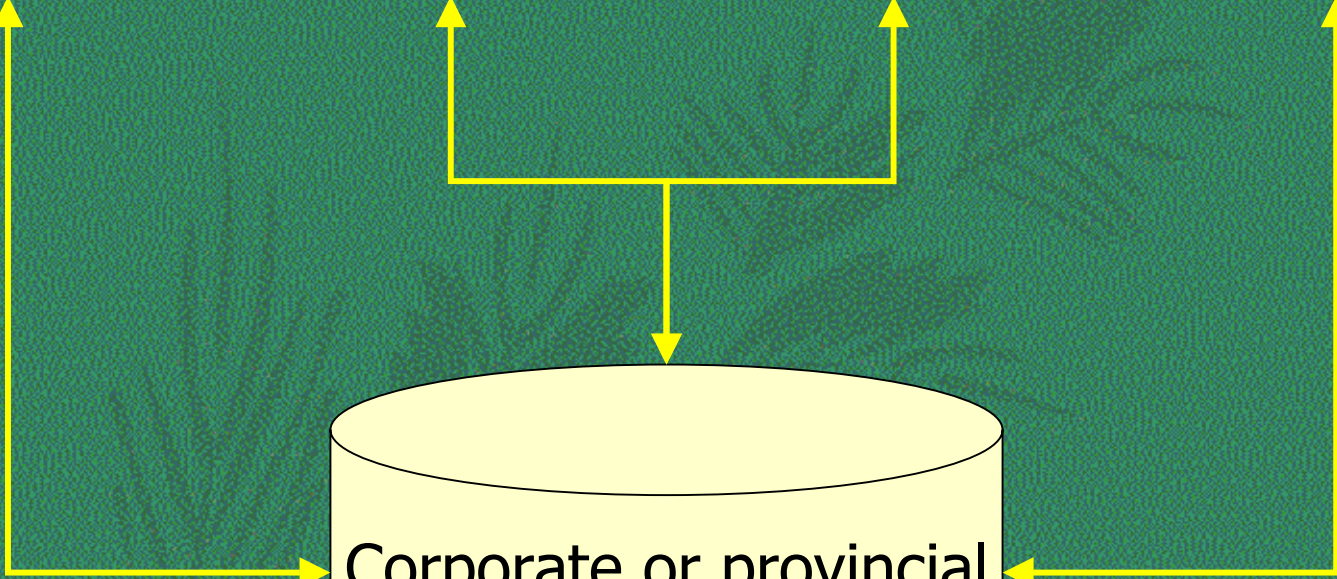
FMF Approach to Better Data Management...

- Data management tools
    - Microsoft access 2000
    - Microsoft Visio enterprise
    - Oracle (if necessary, not currently)

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Successes, Benefits

- Individual (or several linked) Microsoft Access databases for each project
- Users know how their data are stored
- Users know how to mine data from their databases
  - Still more training required
- Realizing less time spent on data management, and more confidence in the data quality
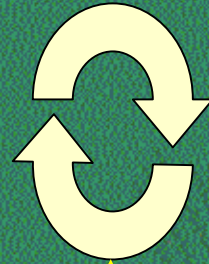- Grizzly bear research project database
  - Includes GPS locations to blood work to DNA analysis results
  - 30k+ GPS locations from collars
  - Spatial analysis performed using direct connection to database through ArcInfo

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Grizzly Bear Research Project Database Model
Draft Version

DRAFTED: May 8, 2001

RUSSEL

NAGY

DNA DATA

POPULATION

COLLARS

SPATIAL DATA

BEARS

CAPTURE

TABLE METADATA

VET DATA

TRACKING

Captures Input Form

Capture Date
17-May-00

☐ Record Review Needed

[New Record]

Capture Team
Goski/Urquhart/Munro/Sorenson/Caulket/Stenhouse

Bears ID	Age	Age Class
G027	11	adult

LOCATION DATA:

General Location
Gravel Pitt

BMU	UTM Easting (NAD83)	UTM Northing (NAD83)
Pembina	531846.5	5871505.5

MARKINGS:

Collar Frequency	Collar Type	ATS Initialisation time
150.070	TEL	

Ear Frequency	Ear Transmitter Type	Ear Transmitter Initialisation time
150.073	ATS	

CAPTURE:

Capture Method	Snare Site	Delivery System
snare	Gravel Pit	pneu dart rifle

BODY MEASUREMENTS:

Estimated Weight (kg)	Actual Weight (kg)
9999	93.4

Straight Line Length (cm)	Zoological Length (cm)	Chest Girth (cm)
156	9999	96

Testical Size (cm)

LL	LW	RL	RW
9999	9999	9999	9999

SAMPLES COLLECTED:

Tooth	ear_plug	blood-red (I)	blood-purple (I)	feces	hair	clawtip
LLPm1	Yes	Yes	Yes	No	Yes	Yes
		blood-red (F)	blood-purple (F)			
		No	No			

notes
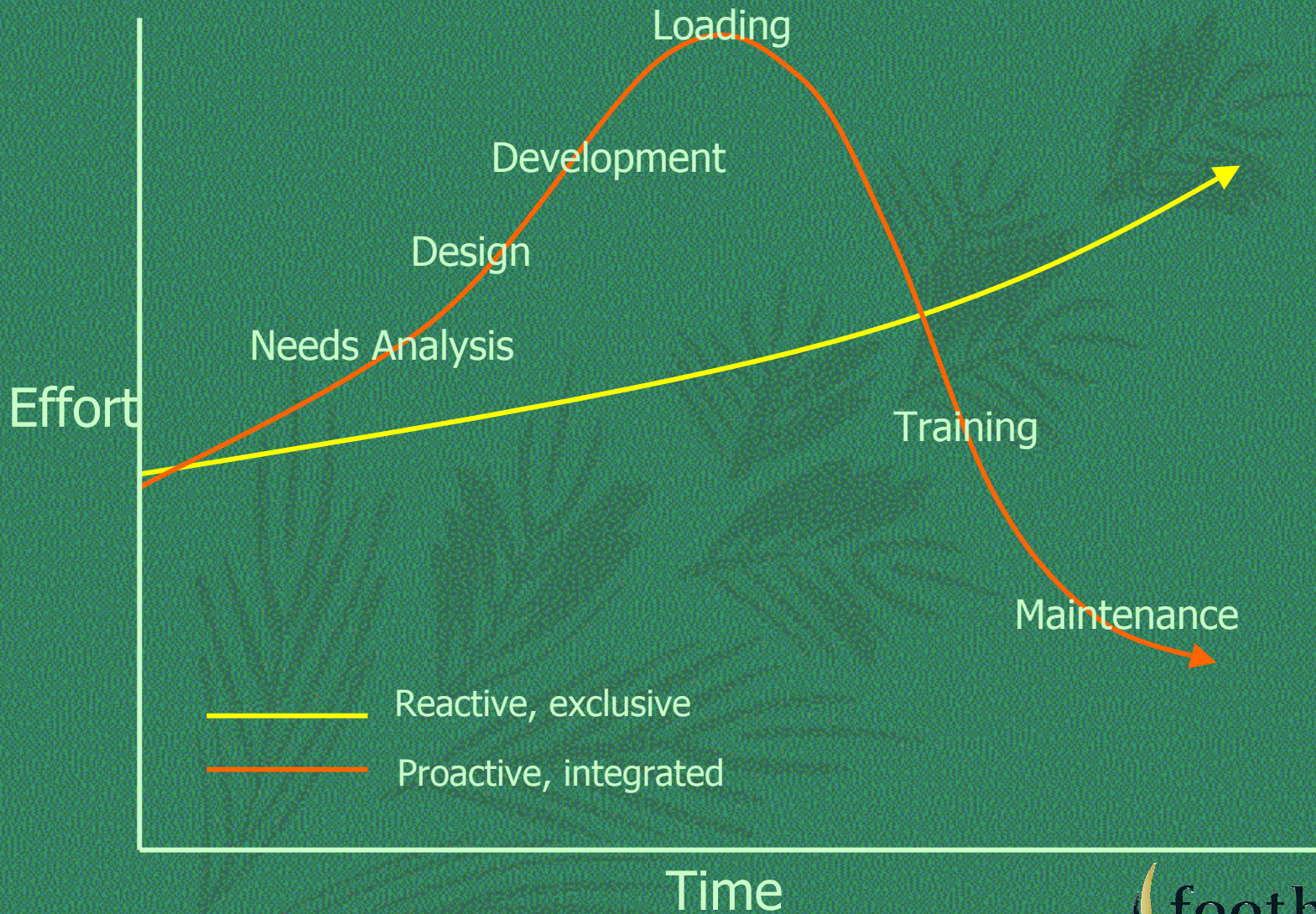captured with 2 yearling cubs

Record: 9 of 125

Successes, Benefits...

- Foothills Growth and Yield database
  - 102 permanent sample plot locations in the Alberta foothills
  - Includes ecological, competition, tree and photos
  - 130k tree measurements in 2 years
  - Uncovering many data collection issues using more complex queries

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Installations

Pre-installation

Ecological

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Foothills Growth and Yield Association

*PhysicalData Model
22-Jan-2003
Version 1.4*

Legend:
- Ecological/Site/Competion Indicators
- Treatments
- Tree measurements
- Physical Installation
- Domain/Look-up list

Tree and Competition Measurements

Future Plans

- Completion of a fish and aquatics database

- Storage of spatial data in DBMS
  - Realize true integration with spatial and non-spatial data

- Improve integration with field data-logger technology

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Closing

- Why take this additional work on?

  80% of GIS effort spent on data management.

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