Managing Grizzly Bear Data

ESRI 2009 International User Conference, San Diego, California
Presented by: Julie Duval, July 15, 2009
1) Overview of the Foothills Research Institute
2) Grizzly Bear Program Overview
3) Data Management
   - Database design changes
   - Including genetic data
4) Handling Telemetry Data
   - Transition from AML to python
Our Mission:

The Foothills Research Institute is a unique community of partners tied to the land and its people through a common concern for the welfare of the land and its resources.
Foothills Research Institute Landbase
What We Do...

• Applied research

• Generate knowledge and develop management tools

• Communications and Extension
Research Programs

- Grizzly Bear
- Natural Disturbance
- Fish & Watershed
- Aboriginal Involvement
- Social Sciences
- Adaptive Forest Management
- Mountain Pine Beetle Ecology
- Foothills Stream Crossing
- Local Level Indicators
Grizzly Bear Program

Overview
To provide resource managers with the necessary knowledge and planning tools to ensure the long-term conservation of grizzly bears in Alberta.

The Grizzly Bear Program (GBP) was initiated in 1998 as an outcome of environmental hearings on the proposed Cheviot coal mine southwest of Hinton.

The GBP began tracking grizzly bears in 1999 using GPS radio-telemetry collars, to increase our understanding of how grizzly bears respond to human use on the landscape.
Research for the GBP is the work of a multidisciplinary team in the following areas:

- Habitat Mapping and Landscape Change
- Graph Theory Modeling
- Statistical Analysis and Modeling
- Camera Collars
- Bear Capture/Ecology
- DNA – Status and Trends
- Wildlife Health
- GIS Applications

http://foothillsresearchinstitute.ca
Legend

FRI Boundary
Research Boundaries

Foothills Research Institute
Grizzly Bear Program

Legend

- □ FRI Boundary
- ▲ Research Boundaries
## GPS Locations

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Grizzly Bear GPS Locations 1999-2008
Since 1999, 147 grizzly bears have been captured by the program’s researchers and fitted with GPS collars (a few with cameras).
Since spring of 1999:

334 grizzly bear capture events
@ $6,000 per capture

131 collars have been used
@ $4,000 (avg) per collar
(96 collars available for use --> ~25 currently on bears)

$75,000 to $90,000 per year spent on flying
(for capture efforts, tracking and telemetry ‘uploads’)

Program Total: $14 Million (2008)

On 210,000 valid GPS locations:
~ $16 per location

Compare to $60/location in the early 1980s
Grizzly Bear Program

Data Management
Old Database Structure

- Reproductive
- Captures
- Sightings
- Tracking
- Uploads
- Mortalities
- Relocations

- Bears
  - GPS / Telemetry
  - DNA
  - Health
New Database Structure

EVENTS
- Captures
- Conflicts
- DNA Studies
- Mortalities
- Relocations
- Sightings
- Tracking
- Uploads

FIELD DATA
- Locations
- Measurements
- Tags Telemetry
- Photos
- Reproductive
- Biosamples

BEAR DATA
- DNA

GPS/Telemetry
- Bears
- Events X-Link
- Health
The Grizzly Bear Research Database is designed to be used by managers, researchers, and field staff/officers. Portions of the database have been password protected due to the sensitive nature of the data.

Do not copy any portion of this database.
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Grizzly Bear Program

Handling Telemetry Data
Raw GPS Data Processing

Pre-processing of raw data

Data preview, checking & cleaning

Add new GPS data

Personal Geodatabase
Processing Tools

Collar Data Processing
1. Pre-processing
   a. Flip Data File
   b. process Argos Direct Data
   c. process Tellus Raw Data
   c. process Tellus Temperatures
2. Preview data
   a. preview ATS Data
   b. preview Televilt/Argos Data
3. Add to GeoDatabase
   a. Delete Selected Features
   b. add GPS Locations to GDB
   c. Compact GeoDatabase
   d. Make a COPY of GB_Locations
4. Data Checking
   a. Check for Errors in GB_Locations

b. add GPS Locations to GDB
   - Text file to process
   - Year of data
   - Collar Source
   - Data Status
   - Is this a Simplex collar with a camera attached?
   - Is this a PC Simplex collar?
   - Data Ownership
   - FRU

Check for Errors in GB_Locations
   - Output file name
   - Enter minimum year criteria
   - Enter maximum year criteria
   - Criteria for Extreme movement rate (m/hr)
   - Criteria for Very Fast movement rate (m/hr)
   - Criteria for Fast movement rate (m/hr)
   - Criteria for a bear in movement (m/hr)
   - Small time interval, in minutes

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research growing into practice.
GPS Data Management

- Originally used aml code and menus to process the raw data. Data was appended to MS Access database using DBMScursor.

- Converted aml code to python in summer 2007 and added as tools in the toolbox. Data is now appended to a Feature Class in a Personal Geodatabase.

Benefits:
- No longer require ArcInfo license to process data - ArcView license is sufficient.
- The task of processing incoming raw data is now done by the wildlife biologist.
Summary

• As the Grizzly Bear Program continues to grow, spatial and non-spatial datasets are continually evolving to meet research requirements. These multi-user datasets are managed to be flexible and functional and to allow efficient GIS analysis.

• The database design changes will be beneficial in supporting multiple types of users, ensuring that everyone has the most recent information available.

• The tools for loading the raw GPS telemetry locations enable the researchers to process their own data and move on to their analyses quickly.
Thank You!