Step by Step Guide to the Population of DAMCAT input files

Introduction:

This document is intended to guide the user through the steps used by the CBRFC in populating the DamCat files. The user is assumed to have some knowledge of ArcView as well as basic familiarity with statistical manipulation packages. The CBRFC has found that JMP (jump) provides many useful tools such as joining and sorting.

1) NID files:

- The NID (National Inventory of Dams Files) are first downloaded from the NID website. [http://crunch.tec.army.mil/nid/webpages/nid.cfm]
- Select all states in the area of responsibility. Download the file and unzip with the compression software of choice.
- Open the file in JMP choosing a comma as the delimiter and remove all quotes (automatic.)
- Add the fields 58 through 72 as defined in Appendix 1: Input Table.
- Save the File as "state_1"

2) GNIS files

The Geographic Names and Information Server (GNIS) provides coordinates and elevation of every major feature in the United States. This dataset serves as a rough source of information for populating the downstream latitude, longitude and elevation. Ultimately, the user should obtain the exact coordinates of each point where property or lives may be impacted by a dam failure.

- The Geographic Names and Information tables are first downloaded from the GNIS website. [http://geonames.usgs.gov/gnisftp.html]. Make sure that the Decimal Degree data is downloaded not Degrees, Minutes and Seconds.
- Select all states in the area of responsibility. Download the file and unzip with the compression software of choice.
- Open the file in JMP choosing a comma as the delimiter and remove all quotes (automatic.)
- Under the "row" menu select "row selection", "select where..." , select all rows where type equals ppl.
- Create a new column. Define the formula as uppercase(name).

- Delete all extraneous columns. (all except elev, and lat/lon.)
- Save the File as "state_deci_1"

3) Downstream City Matching (Done for each State).

The NID file often provides a downstream city name. This name can be matched with the data from the GNIS file providing a rough latitude and longitude for each downstream point that matches.

- Create a new column in the "state_1" file. Again, set the formula to "uppercase(city)."
- Using the Join command under the "tables" menu, join the two tables by matching the uppercase(city), from the NID table, with the uppercase(name) from the GNIS.
- Paste the Longitude, Latitude and Elevation information (from GNIS) into the appropriate columns in the NID table.
- Save the file.

4) Create the RFC file

- Concatenate the state files into one file.
- Save the file as a "|" delimited text file and export it to the workstation containing the polygon programs.
- Run the rfc_poly.tcl program (defining the polygon as a polygon file defining the shape of the AOR) to populate the rfc field and remove dams that are not within the AOR for the RFC.
- Run the hsa_poly.tcl program to populate the hsa field.
- Run the flood_poly.tcl program to populate the flood_region field.
- Import the output back to JMP – Save as "rfcabbreviation_1" i.e. "CBRFC_1" Note: Subsequent updates should be named sequentially rather than saving over the file.

Addition) Position Verification

Note: Currently, the Army Corp of Engineers stores the Latitude and Longitude information with only two decimal places of accuracy. This places the dam with an approximate square mile. In order to obtain accurate coordinates, the input table creator should verify the location from 7 ½ minute topographic Maps (or digital line graphics in

Arcview.) There are many commercial applications that can assist in this procedure such as Delorme's TopoUSA, Igage's All Topo, etc.

Positions should be recorded to 5 decimal places of accuracy to ensure proper elevational data.

The following is one method of sorting the dams and verifying their positions using the All Topo Program from Igage.:

- Sort the dams by state (The topo maps are provided as a package per state.)
- Sort each list of dams by Latitude and Longitude.
- Hide all columns except dam_latitude, dam_longitude, dam_elevation, city_latitude and city_longitude. [If the 10-meter DEM, in gridded ASCII form, is not available, then the elevations should be read from the map as well.]
- If desired, print a paper copy from which to work.
- Click the location button, and enter the coordinates from the NID catalog. (In many instances, this is sufficient to put the dam on the view screen.)
- Identify the coordinates of the center of Dam if shown. The proper latitude and longitude of the dam can then be recorded.
- If the dam structure is no show (as is the case for many small dams), the proper position of the dam is immediately downstream of the impounded reservoir, centered on the river channel.
- Make sure to enter the position data in Decimal degrees to 5 decimal places.
- Verification of the forecast point may also be completed during this process. In these instances, there is no need to proceed with Step 5.
- Re-record the locations in the master dam catalog file. ("rfc_version")

5) Downstream cities for dams without city data in NID

For dams not containing a downstream city in the original NID file, the user must establish a downstream point for the dam. This process is applicable to RFC's whose NID dam locations are accurate to, <u>at least</u>, 4 decimal places.

5a --Create the Project

- Create Point coverages of all dams in the AOR. (Point coverage is created by two individual files. One, the Position file contains only the identifier and the coordinates. Two, the attribute file may contain other data you wish to have

present in the attribute table in ArcView.) Include the NIDID, River name, City, and any other information in the attribute file that will facilitate the identification of the dam.

- Create similar point coverage for the cities (from the GNIS file.)
- Convert these point text files to point coverages, and then shape files using either Arctool box, or at the ArcInfo command line.
- Create a project layout with the DEM of the area.
- Add another layer containing the stream traces for the region.
- Add the Two-point coverage (cities and dams for the AOR).

If possible, create a Hillshade from the DEM data. This will greatly aid the user in the data acquisition process.

5b – Identifying which Dams do not have downstream data.

- Applying the same process used to select the rows with "ppl" in the GNIS catalog, select the rows (dams) that do not have city latitudes and longitudes.
- Select the NIDID field, the city, distance, latitude_city, longitude_city and elevation_city columns. Create a subset. (under the tables menu.)
- Enlarge the columns so that they can easily be written in by hand.
- Print the file (portrait works best) and save it as "rfc_dams_wo_cities".

5c – Data Acquisition.

- With the "dams_wo_cities" printout in hand, bring up the ArcView Project.
- Select the Nidid of the first dam on the "dams_wo_city" list from the dams attribute table.
- Click the "zoom to Select button" [] button.
- Now, the user must identify if there is a city downstream from the dam site.
- Assuming that the user can identify a suitable forecast point, the user should then record the latitude and longitude of this site as well as the name.

- Select the "measurement tool" [] button and measure the distance from the dam to the point. Make sure that you record the total distance not the segment distance.
- Select the layer containing the DEM data. Left click on the forecast point to obtain the elevation data. Record the value.
- When no city is present, select a suitable point such as a roadway, railway or other structure. Lacking even this data, forecast for an arbitrary point, record the distance and elevation of the point. Aerial photographs available from, http:\\terraserver.msn.com, 7 ½ minute topographic maps, and other source may be of great assistance in this step.
- Enter the data into the spreadsheet in the appropriate columns. Save the file.

5d – Dam Elevation

- Elevations for the dams are given by the damelev.tcl program. This program reads the latitude and longitude from an input file, and pulls the elevations from the gridded ASCII 10 meter-DEM files.
- elevation Data is entered into the table by using the match command in JMP between the nidid in each file.
- NOTE: The damelev.tcl program references the ll2elev75 code written by Cass S. Goodman. Questions on implementation should be directed to him.

5e – City Elevation

- Repeat Step 5d for the city elevations.

6 – Regression Equations Components.

Many variables in WRIR-94-4002, Nationwide Summary of the U.S.G.S. Regional Regression Equations for Estimating Magnitude and Frequency of Floods for Ungaged Sites, 1993, are not part of the data in the NID catalog. These variables include the Mean annual precipitation, lengths of channel, mean minimum January temperature, and percent forest cover. Data for these fields may be obtained from various GIS sources (PRISM) or from 7 ½ minute topomaps (channel length.) An RFC employee familiar with the region should estimate other variables, such as the % lake and pond.

The CBRFC has provided percent forest cover, mean annual precipitation, and mean minimum January temperature to NWRFC and CNRFC.

7 – Other necessary Data requirements

Some dams in the NID file do not have the data necessary to run the model. These missing values include, but are not limited to; storage, dam length, dam height, and drainage area. Before the input table is fed to the model, each RFC should populate these missing fields. Source of Data may include IHABS, Bureau of Reclamation, and the individual dam operator/owner. Be creative.