

A Prototype for a Spatial Decision Support System to Locate Firebreaks in San Diego County

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Who is NRCS?

- An agency of the US Department of Agriculture (USDA)



- NRCS's Mission:



Provide leadership in a partnership effort to help people conserve, maintain and improve our natural resources and environment

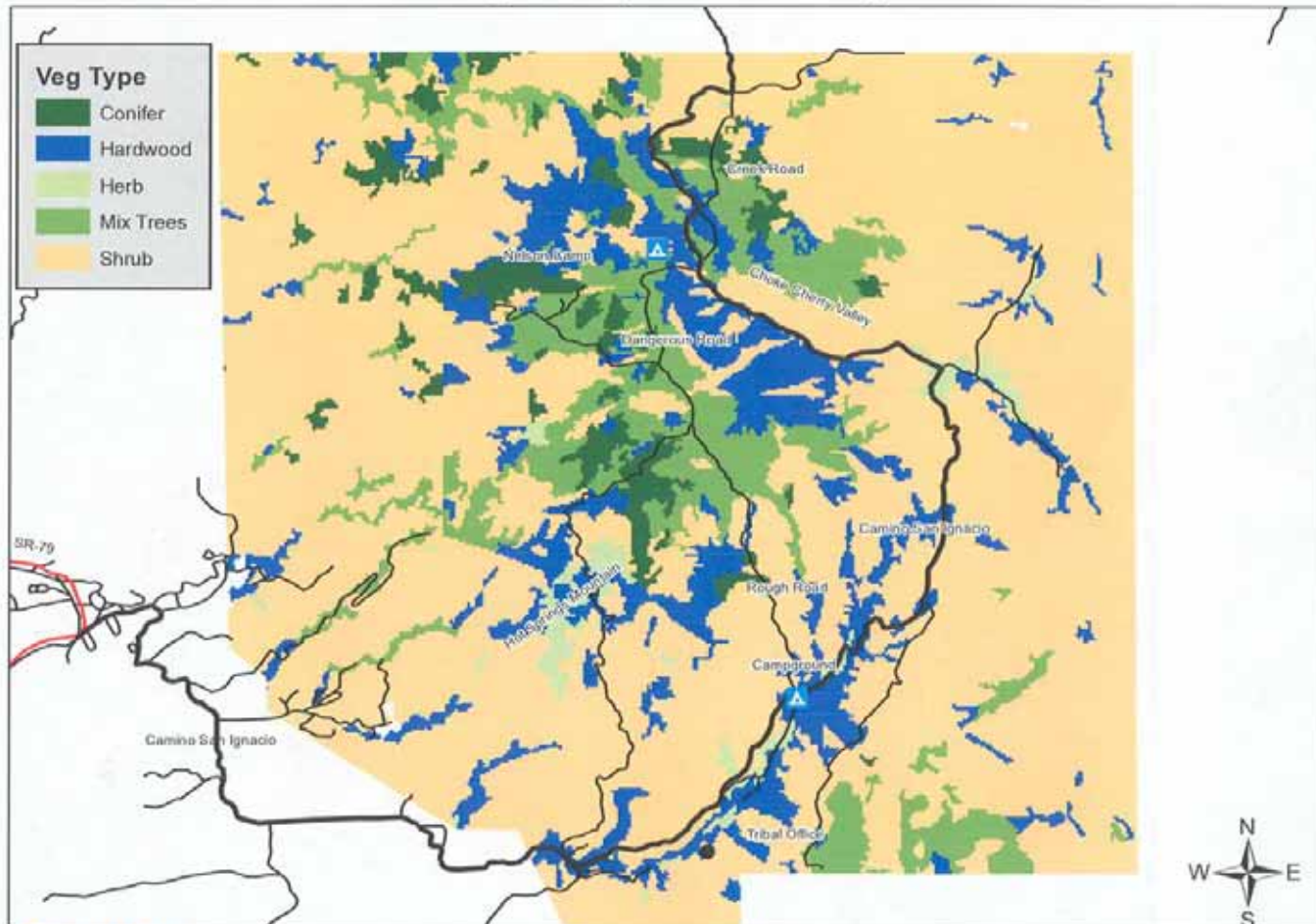
Los Coyotes Project

- Vegetation Treatment
- Tree Removal
- Road Work

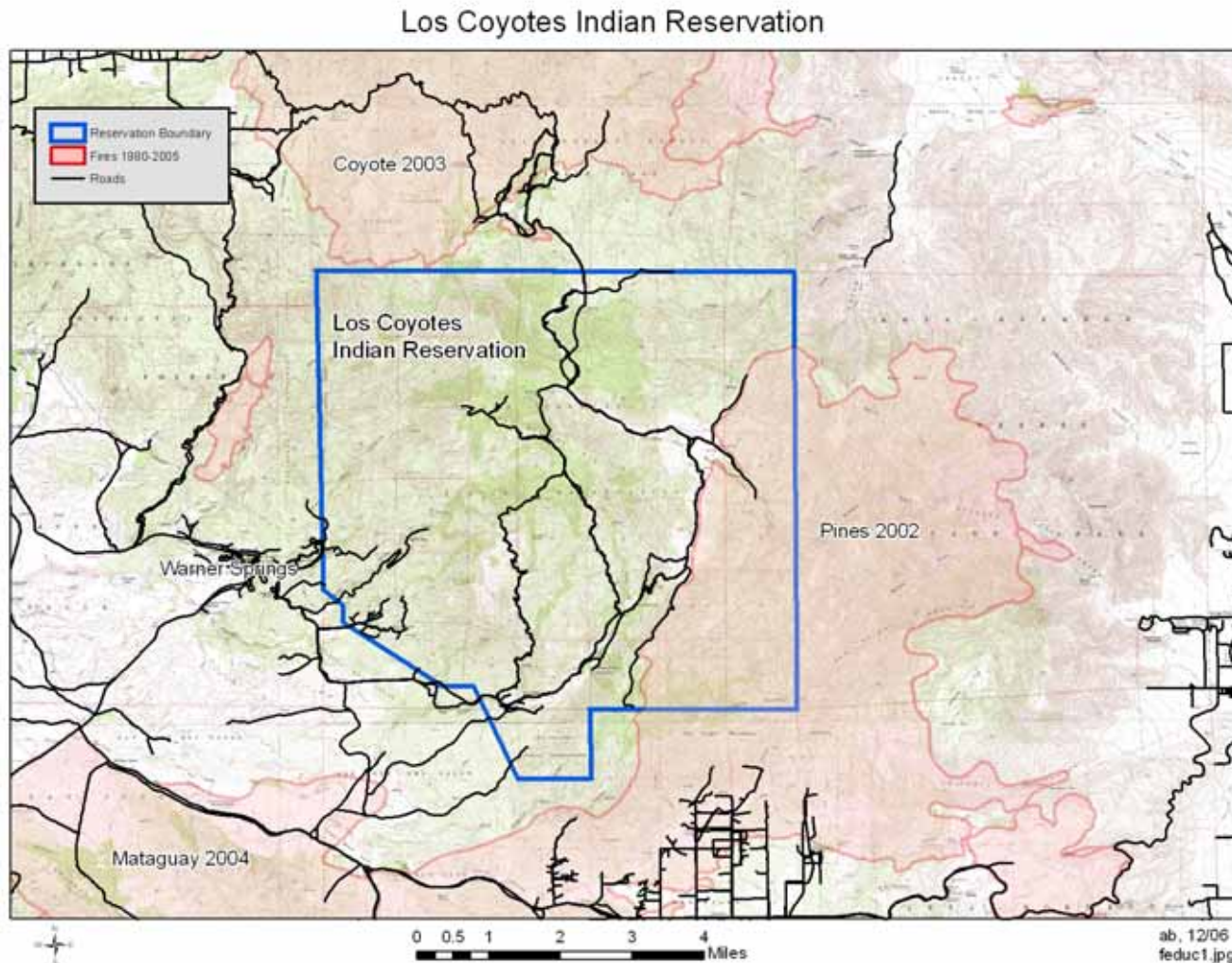


Vegetation Treatment

Los Coyotes Vegetation Cover Types



Lost Valley Fire History Map



- ❖ Protect structures
- ❖ Secure Evacuation Routes
- ❖ Shelter Warner Springs

Proposed Treatment

- What is a firebreak?

- Where should we construct it?

Definitions

- Decision Support Systems (DSS) are “Interactive computer-based systems, which help decision-makers utilize data and models to solve unstructured problems.” (Sprague, 1980)
- Spatial Decision Support System (SDSS) “is a DSS that is explicitly designed to support a decision-research process for complex spatial problems.” (Densham, 1993)

Is GIS an SDSS?

- GIS software out-of-the-box is not an SDSS; however, some may consider GIS to be a DSS.
- For GIS to be considered a SDSS, there needs to be some sort of analytical or statistical modeling involved.

List of Data to be Used in the SDSS

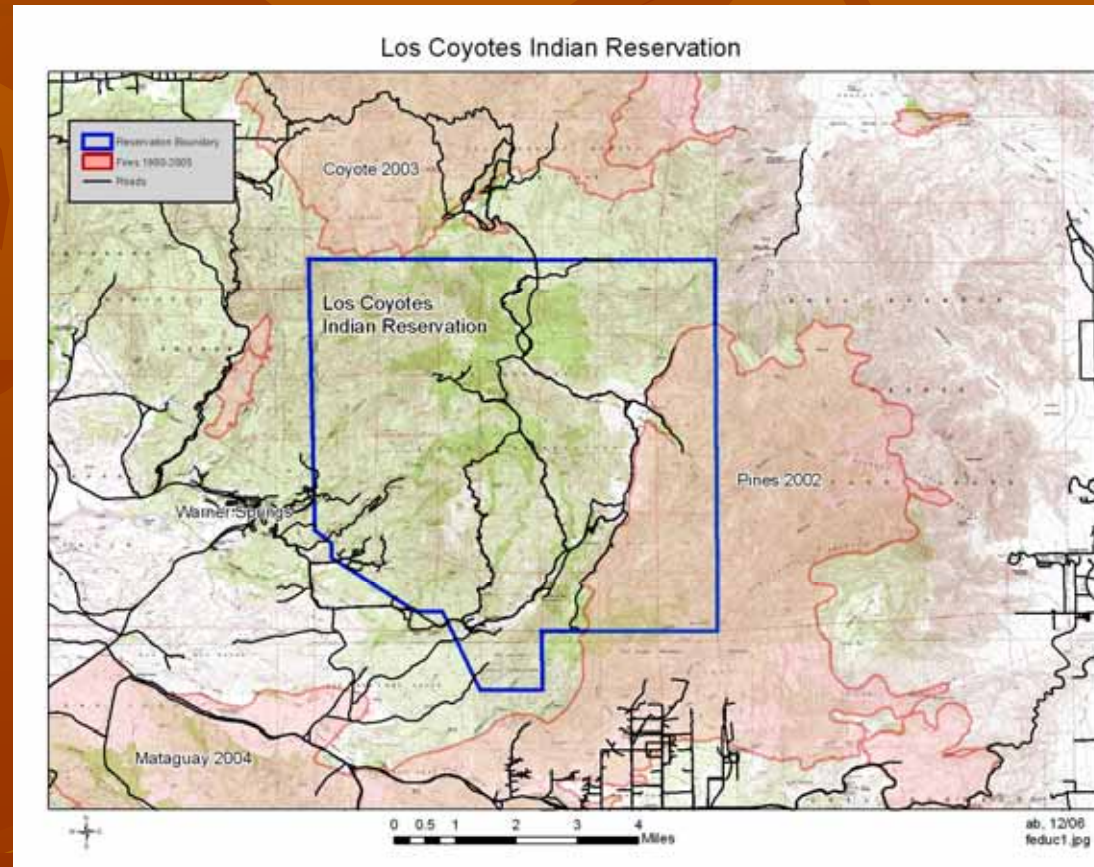
- Fire History (1990-2005)
- Aerial Photography (1-ft resolution)
- Digital Elevation Model (10 Meters)
- Road network
- Topographic DRG

Step 1

- All of the following steps will be analyzed using Modelbuilder.[™]
- Convert the study-area polygon into a raster.
- Reclassify the raster with 1 = study area and 0 = non-study area.
- 1 means yes, and 0 means no.

Step 2

- Convert Fire History data from vector to raster.
- Reclassify the raster with 1 = no fires and 0 = fires.
- We do this because we don't want the firebreak to be located in recently burnt areas.



Step 3

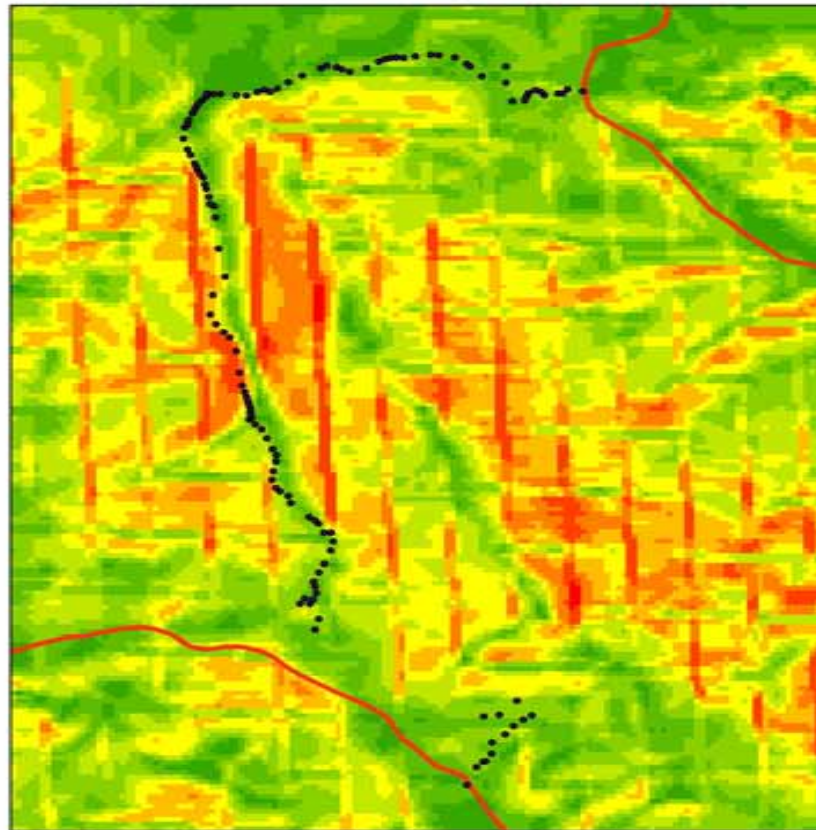
- Convert the DEM into slope.
- Reclassify the raster with slopes less than 50% equaling 1, & slopes greater than 50% equaling 0.
- We do not want to build the firebreak on slopes greater than 50% due to the operational limits of heavy machinery.

Step 4

- Locate watercourses within the study area using the DEM.
- Reclassify the data with No watercourse = 1 and yes = 0
- While ridgelines make effective firebreaks, streamcourses traditionally do not make effective firebreaks because of the vegetation upslope from them.

Slope map

Lost Coyotes Slop Analysis for Road
b/w Hot Springs & San Ignacio for Fuelbreak



Legend



Step 5

- Use the raster calculator to add up the data from the first 4 steps.
- Areas with a value of 4 would be considered for a firebreak.
- Any value less than 4 would be disqualified.

The Fire Manager

- The Fire Manager would take a look at the results and visually decided where to locate the firebreak.
- The fire manager will consider which firebreaks connect with natural firebreaks.
- The fire manager will offset the actual on-the-ground firebreak approximately 50 feet to either side of the ridge, depending on which direction from which a wildfire will likely come.

To Take This Process One Step Further

- Incorporate fire ignition models into the SDSS.
- Create a script which locates ridgelines and then correlates the result with the fire models and existing roads to locate the optimal placement of the firebreak.
- Create a simple to use interface whereby GIS novices can use the SDSS to locate firebreaks.

Results

Proposed Firebreak Road
Los Coyotes Indian Reservaton

