Spatial Analysis of Hazardous Fuels

and Ecological Decadence

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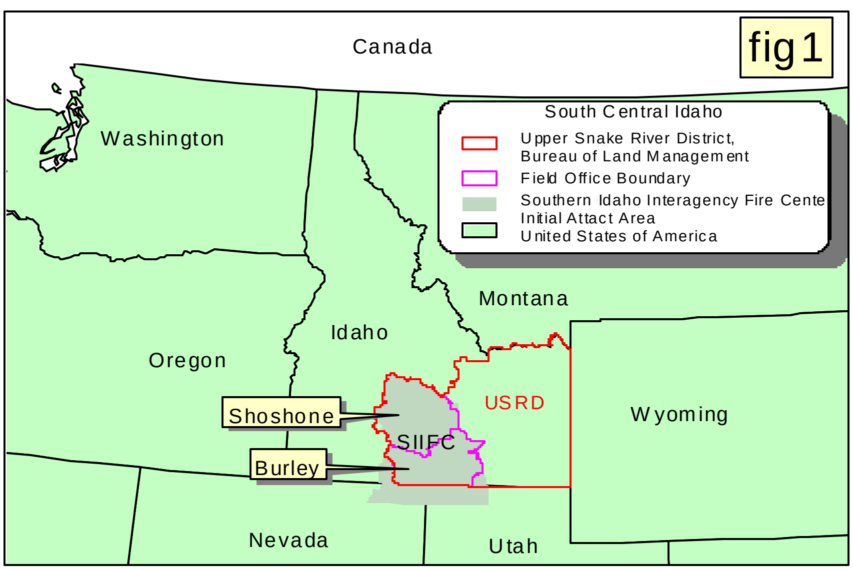
Background

On August 8, 2000, President Clinton, of the United States, asked Interior Secretary Bruce Babbitt and Agriculture Secretary Dan Glickman to prepare a report that would recommend how best to respond to the severe fires of 2000, specifically how to reduce the impacts of these wildland fires on rural communities. The President also asked for short-term actions that federal agencies in cooperation with states, local communities, and tribes could take to reduce immediate hazards to communities in the wildland-urban interface and use to ensure land managers and firefighters are prepared for extreme fire conditions expected in the future. A key point was the investment in projects to reduce fire risk (hazardous fuels reduction programs). Addressing fire risk and wildland fire issues will require significant investments in time, manpower and money. It is through multiple treatment types including chemical applications, mechanical thinning, seeding efforts and prescribed fire that this is to be accomplished. Since 1994, the Forest Service and the Bureau of Land Management (BLM) have increased the number of acres treated to reduce fuel buildup from fewer than 500,000 acres in 1994 to more than 2.4 million acres in 2002 (Executive Summary, 2000).



The BLM Upper Snake River District (USRD) manages approximately 5.4 million acres of public land in southern Idaho of which the Southern Idaho Interagency Fire Center (SIIFC) is responsible for fire suppression and fuels reduction for approximately 3.3 million of those acres in the Shoshone and Burley Field Offices (see fig1). The region offers a wide diversity of landscapes from the Basin and Range topography and the grotesque, eroded granite formations of the City of Rocks in the south, the sagebrush-grasslands of the Snake River Plains, through the volcanic Craters of the Moon and Great Rift area, and finally northward into the forested mountains of Sun Valley. Such a large region composed of a diversity of landscapes can pose unique problems for an effective hazardous fuels reduction program. The SIIFC Fuels Program has been aggressively working on a hazardous fuels reduction project since 1999 in an effort to assess fuel loading, vegetation characteristics, and fire hazard assisting with proper land management needs.

Scope of Project

Primarily the goal of the fuels reduction project is to target the reduction of hazardous fire conditions within the BLM administered lands. A secondary effect of the project is to achieve ecological balance of the land through the reintroduction of fire on the landscape. Some additional achievements include Quaking Aspen (*Populus Tremuloides*) regeneration, Cheatgrass (*Bromus Tectorum*) and noxious weed eradication, a return to native perennial vegetation, and the "ground-truthing", or verification of multispectral imagery that has been used to create a District vegetation classification scheme. Geographical Information Systems (GIS) technology is being utilized to gather, correct and project future sites for fuels reduction projects throughout the USRD.

Methods

Digital Spatial Data was gathered - To accomplish the GIS side of the project; standards, processes, guides, data dictionaries as well as the datasets needed to be acquired and/or created/converted before anything else could be done digitally or spatially. Coverages were acquired and converted where they existed in other agencies. Where data was missing resource specialists' field maps were digitized, scanned and attributed. Over a year was put into the initial effort to develop GIS layers that are consistent on an interagency, interstate, and statewide basis. Thus providing the baseline information for evaluation and the fire/fuels planning process

Field data – Field data collection involves large polygon project areas being designated using the knowledge and expertise of the Fuels Specialists. Field crews then navigate to random survey plots within the polygon project perimeter and conduct a field vegetation survey. The survey plot is a circle with a radius of 1 chain (66 feet). The number of plots surveyed varies depending on the number and areas with different vegetation types within designated polygons. The vegetation types are determined using maps from a modified version of the Utah GAP database (Edwards & Homer). Two transects are run off the diameter of the survey plot. Transects run 50 feet up slope and 50 feet down slope. Along these transects species identification and canopy coverage type and amount are collected at 10 foot intervals and logged into the survey forms. On average approximately 500 surveys can be taken across the SIIFC within one field season.

Post processing the field data – The collected data is downloaded, differentially corrected and exported to a GIS format. The GIS coverage for the points are hotlinked to the images and placed in a usable format for the Fuels Specialists and resource managers.

Modeling – Specific fields in the field data gathered were assigned ranks to allow for mathematical computations. Attribute values were ranked between the range of 0 to 200. Assigning a range of ranking values between 0 and 200 within each desirable field created a series of consistent ordinal scales (Zar 10) which could then be used to perform various further functions(fig2 & fig3).

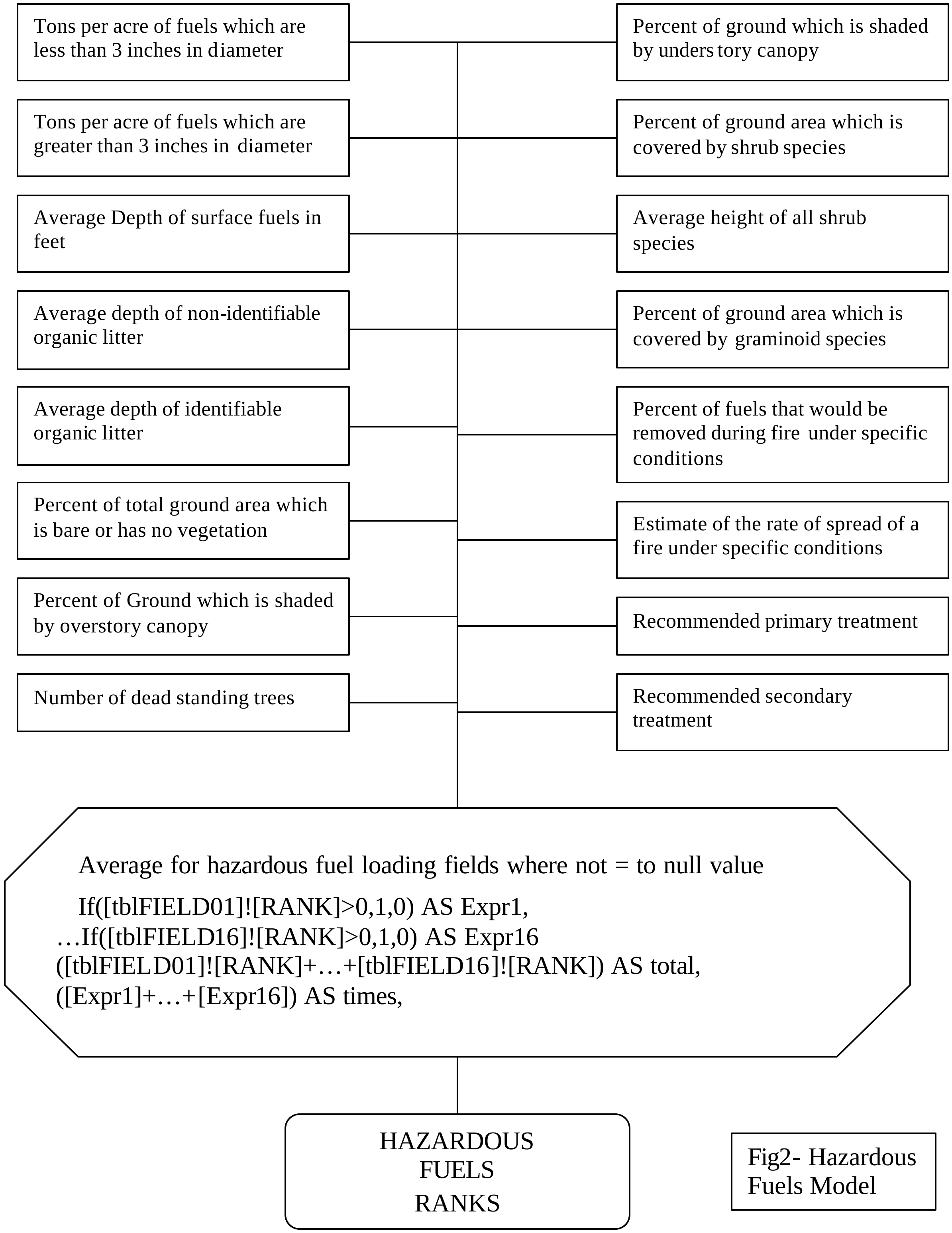


Fig2- Hazardous Fuels Model

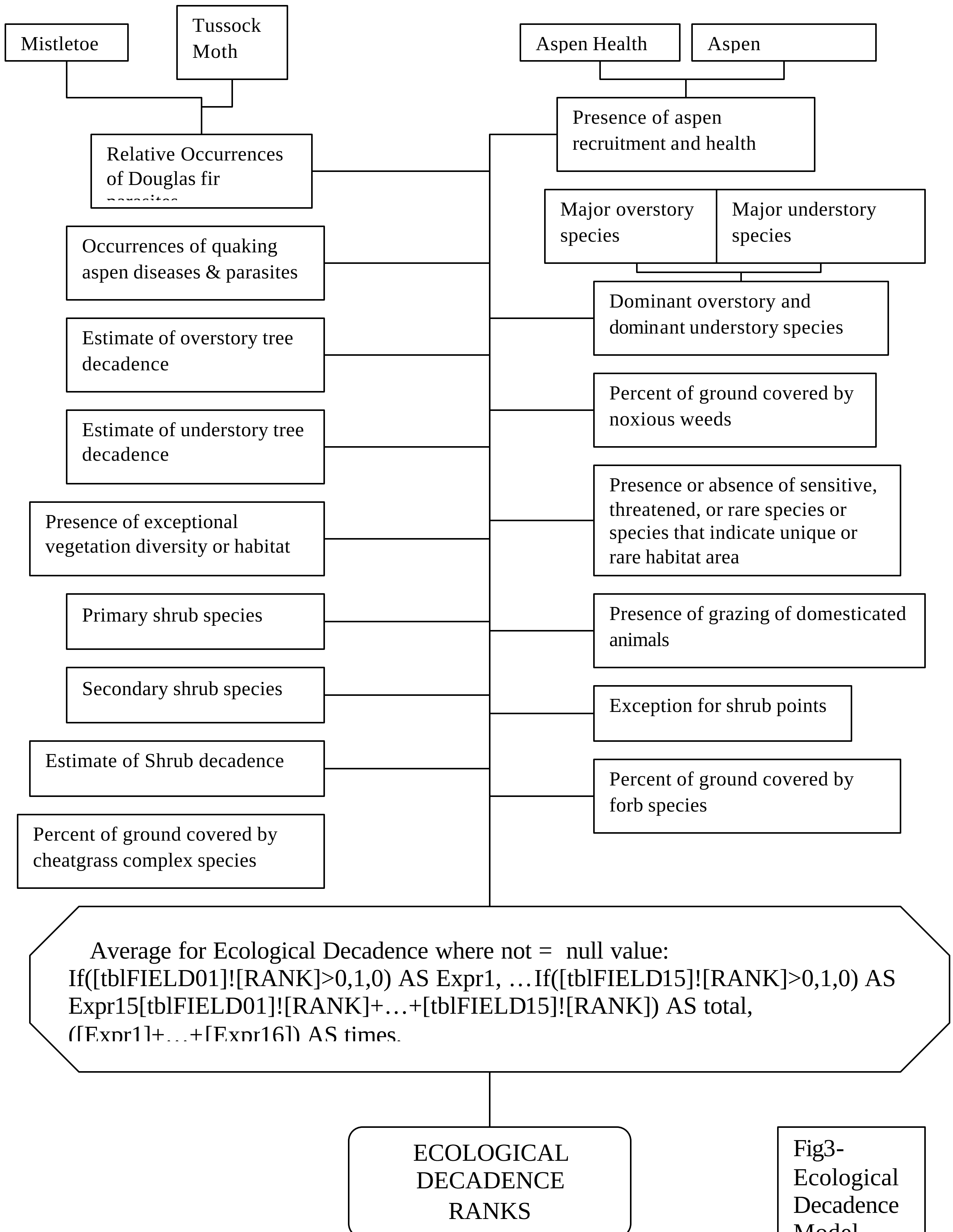


Fig3- Ecological Decadence Model

Why??

In a natural Fire Regime fires will generally burn quickly through underbrush or grass and shrubs. The fuel load will remain low because periodic fires clean house regularly and prevent the fuel build up. Therefore fires do not burn with great heat or intensity and established plants are not adversely affected and those species dependant upon fire retain their natural cycles. However due to the continued fire suppression efforts of the last 50 years ecosystems that have formerly adapted to fire's frequent occurrence now are ecosystems with high hazardous fuel density (Varga). It is the communities adjacent to such hazardous fuels that are at the greatest risk due to wildfires. Most of the Communities in Idaho fall within the Federal Registers definition of a Community at Risk or Wildland Urban interface area, leaving Land Managers with the problem of where to start. Modeling of hazardous fuels rankings for known areas of concern allows a risk factor to be assigned to the adjacent communities. So even though most of Idaho is at risk of wildfire those with the highest fuel buildups can be targeted for immediate action.

Idaho has been in a drought like conditions for over three years now. Cheatgrass invasion is a big problem in many of the western states including Idaho. Cheatgrass allows for the fire to move quickly and with higher heat intensity then native grasses. Cheatgrass is an invasive grass that is more aggressive then most of the native grass species and often takes over in areas after wildfires have occurred. Thus when Cheatgrass moves into an area and a wildfire occurs the result is a hot, fast and large fire. Unlike wildfires prescription fires can be done at times when weather conditions are good and maximum control of the fire is the result. Through the efforts of the vegetation surveys and monitoring sound management decisions can be made as to the type of treatments being used. Often the result is multiple treatments over the same piece of ground. For example, in the summer a project area is surveyed and it is determined to be in a degraded state of mostly Cheatgrass. The following spring a prescription fire is done to remove the invasive species from the project area. In the fall a chemical application is applied to slow the Cheatgrass reinvasion. That winter a seeding is applied to the same area to reintroduce the native grasses and shrubs. Other treatment methods are being used where fire is deemed inappropriate due to safety, animal habitat endangerment, etc. A targeted area surrounding a community is designated for a prescription burn. When the time comes for the planned burn it is deemed unfeasible due to weather constraints. As time goes by it is determined other methods must be taken and a fire break is bulldozed in to slow/stop future wildfire spread. Green strips of native grasses and shrubs were also planted to slow the Cheatgrass reinvasion. Finally continual monitoring efforts are done to determine effectiveness of results and future treatments if necessary.

Some plant species are dependent on fire for reproductive success. For example, Quaking Aspen needs a disturbance (i.e. fire, mechanical or natural) to promote regeneration by suckering of the clone. Identification of areas of Aspen that are ecologically decadent result in planned treatment projects. Through the use of mechanical thinning and prescription fires these areas are being regenerated. Whereas areas that are found to be degraded can be fenced off allowing for a time of rest. However, over such a large expanse of land it is impossible to visit all the areas of Aspen. Therefore through the modeling techniques discussed above conditions of areas not visited can be inferred based on similar surrounding areas.

Results

The Fuels Specialists and resource managers use the gathered information to assess fuel loading, vegetation characteristics, and fire hazard. These surveys help to identify areas of fire exclusion, changed fire regimes, plan priorities and develop a baseline inventory data set. With a good and current baseline inventory managers can compare post-treatment monitoring data to determine community change after natural disturbance, changes over the years, pretreatment and post treatment achievements, and failures. Using database software to maintain the massive fuels data dictionary and tabular data is essential to allow for specialized queries, models and weights of measure to be placed on categories within the data that was collected. It also allows ease of use for the non-GIS user when spatial information is not necessary. The final result is a series of management tools that are easy to use, updateable, modifiable, and demonstrate the dynamics of an ever changing landscape.

Project Contributors

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