# Bastrop County, Texas Wildfire Mitigation Study

**The National Cohesive Wildland Fire Management Strategy** is a national collaborative effort to bring a broad cross-section of stakeholders together to address wildland fire management challenges. The Strategy directs wildland fire planning activities and has three primary goals: restore and maintain landscapes, develop Fire-Adapted Communities, and improve wildfire response.

| Activity | Impact |
|---|---|
| 2011 Bastrop Complex Fire losses | 2 lives, 1,645 homes |
| # acres affectd by fire | 34,068 |
| Cost of wildfire mitigation study | $250,000 |
| # acres receiving mitigation treatment | Approximately 5,000 |
| # county residents who benefit | 75,825 |

The Bastrop County, Texas commissioner court approved $250,000 to conduct a countywide wildfire mitigation study in December 2014.  This decision followed the destructive 2011 Bastrop Complex Fire where 2 lives, 1,645 homes, and 34,068 acres of land were lost. Funded through disaster recovery funds, the goal of the study was to analyze current wildfire risks to minimize future wildfires. The study developed a risk assessment map covering both natural and human habitation areas. Data from the study can be used to prioritize mitigation efforts based on where people live, predict fire behavior and develop fire risk levels.

Multiple assessments were conducted to derive the data necessary to predict fire behavior and risk levels for different areas of the county. For fire behavior, remote sensing techniques were used to generate detailed fuels models. This was accomplished by processing weather data, collected from local, Remote Automated Weather Stations (RAWS), with data from the federal FlamMap program, a fire behavior mapping and analysis program that computes potential fire behavior characteristics (spread rate, flame length, fireline intensity, etc.). Measurements and analysis began from the first day of the Bastrop Complex fire and were also used to generate an average weather scenario. This produced two distinct fire behavior maps that enabled comparisons between a worst case and an average scenario. Once fire behavior was calculated, additional analysis was conducted including:

- Distance from a community to potential crown fire (Fig. 1)

- Distance from  communities to the nearest fire station (Fig. 2)

- Parcel density within a community

- Distance from community to nearest water source

- The % of burnable fuel within a community

- The average slope and aspect and elevation of each community

- Predicted frequency of fire

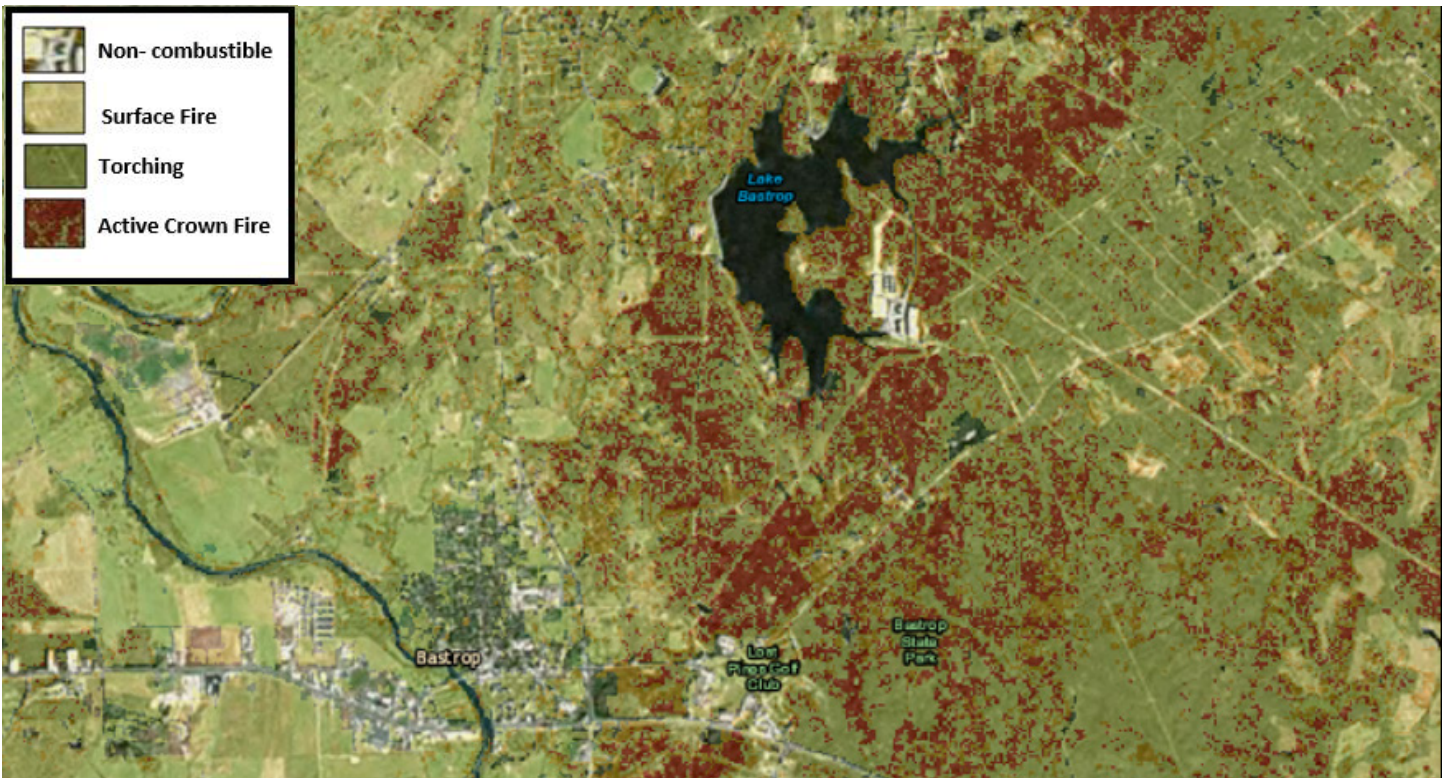- Eber zones for areas adjacent to burnable fuels.

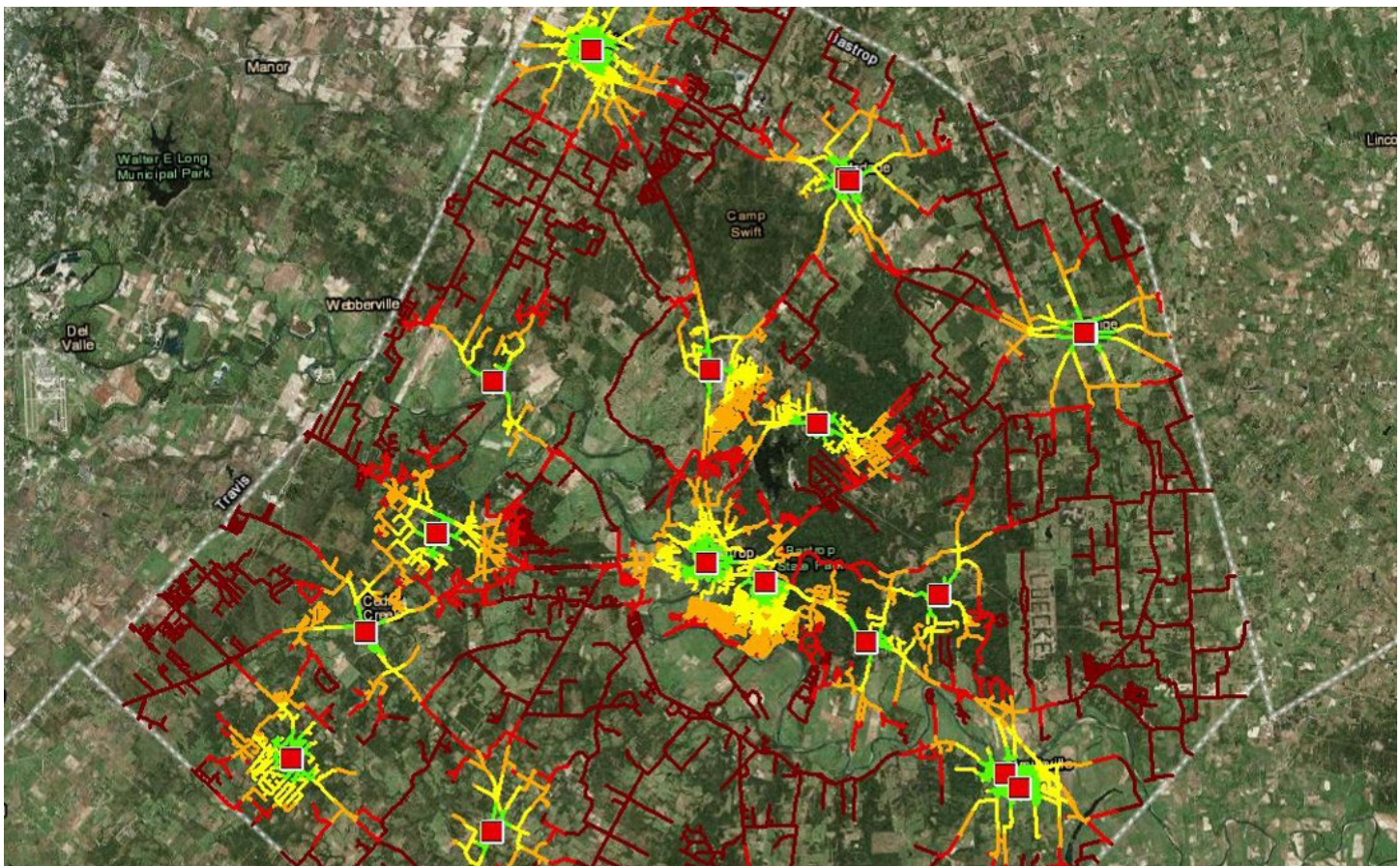*Figure 1: Calculated crown fire activity for Bastrop County.  Map created by: Anchor Point, Boulder, CO*



*Figure 2: Map displays fire station distance, an element that factors into the overall wildfire hazard and risk map layer. Map created by: Anchor Point, Boulder, CO*

The fire behavior predictions were then brought together with these additional analysis within the framework of Anchor Point's National Wildfire Hazard and Risk Assessment (No-HARM) modeling tool. No-HARM is a nationwide data set that provides a composite risk rating for every area of the U.S. This geospatial modeling tool is used to lead and support cities, counties and communities to effectively engage in risk-based mitigation planning. No-HARM provides an easy to understand data layer (Fig.1). Additionally, the model provides an overall wildfire hazard and risk layer which can be visualized in colors representing low, moderate, high and very high (Fig. 3).
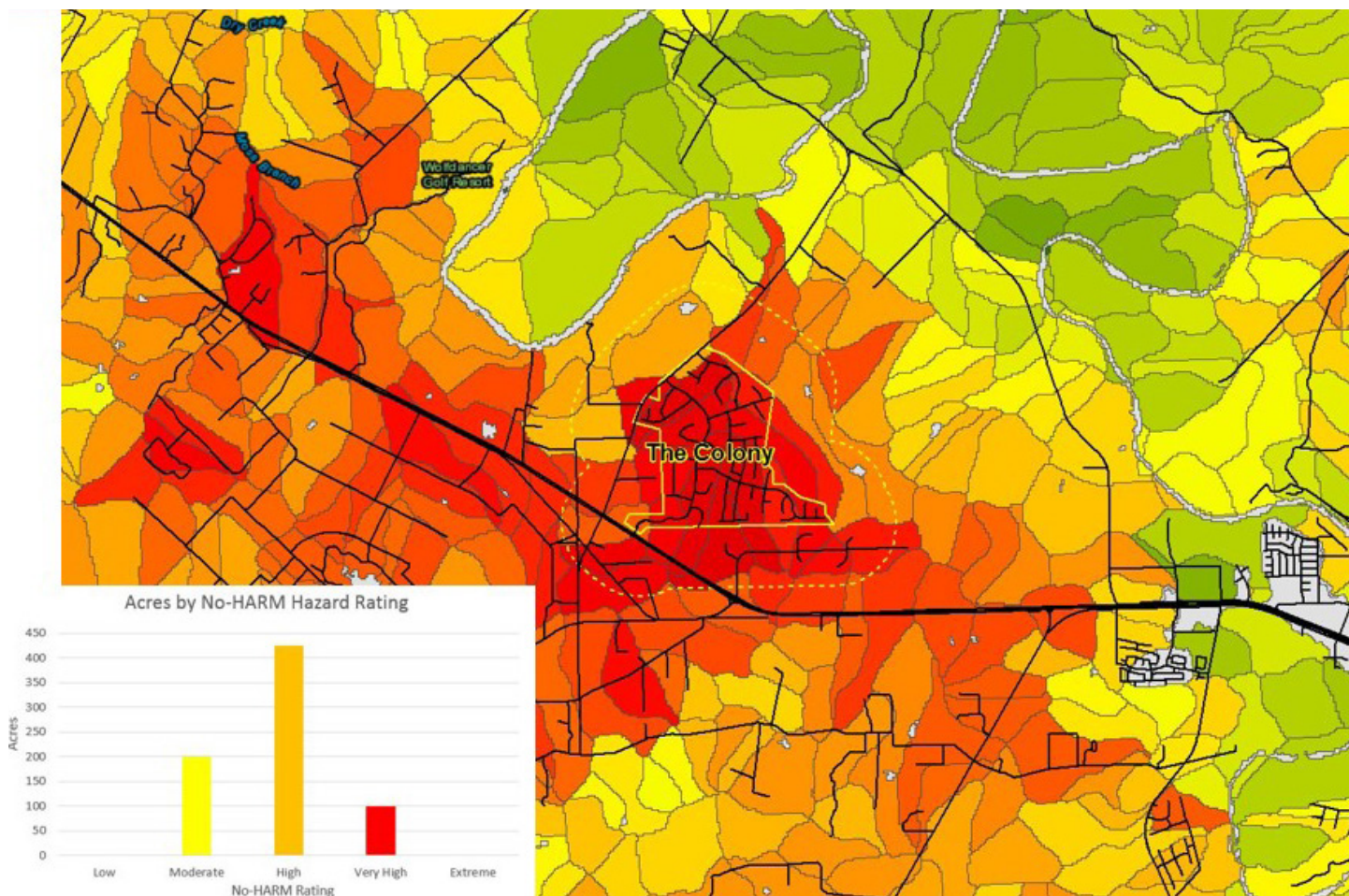


*Figure 3: The overall No-HARM hazard and risk ratings are calculated for a 1/2 mile radius around the Colony Community in Bastrop, TX. Map created by: Anchor Point, Boulder, CO*

After the analysis and modeling were complete, the county was divided into Fire Plain and Fire Shed management units (Fig. 4 and 5). Fire Plains are areas with the same slope, aspect and anticipated fire behavior and can be thought of as very small-scale (approximately 150 acre) watersheds. Each Fire Plain was given a composite hazard and risk rating. Fire Sheds, on the other hand, are meso-scale planning units that divide the county into larger planning areas. Analyzing these two areas together allows data to be queried at multiple scales, thus yielding landscape-level prioritization information. The end No-HARM ratings were then used to rank and analyze high priority areas throughout the county.

An in-house, geospatial map interface was then created to house and visualize the data from the study. The web map provides a visual format for emergency managers to run multiple "what if" scenarios and for educational purposes. The study's final products also provide developers the potential hazard of a proposed development site and suggest appropriate mitigation techniques based on modeled fire behavior.
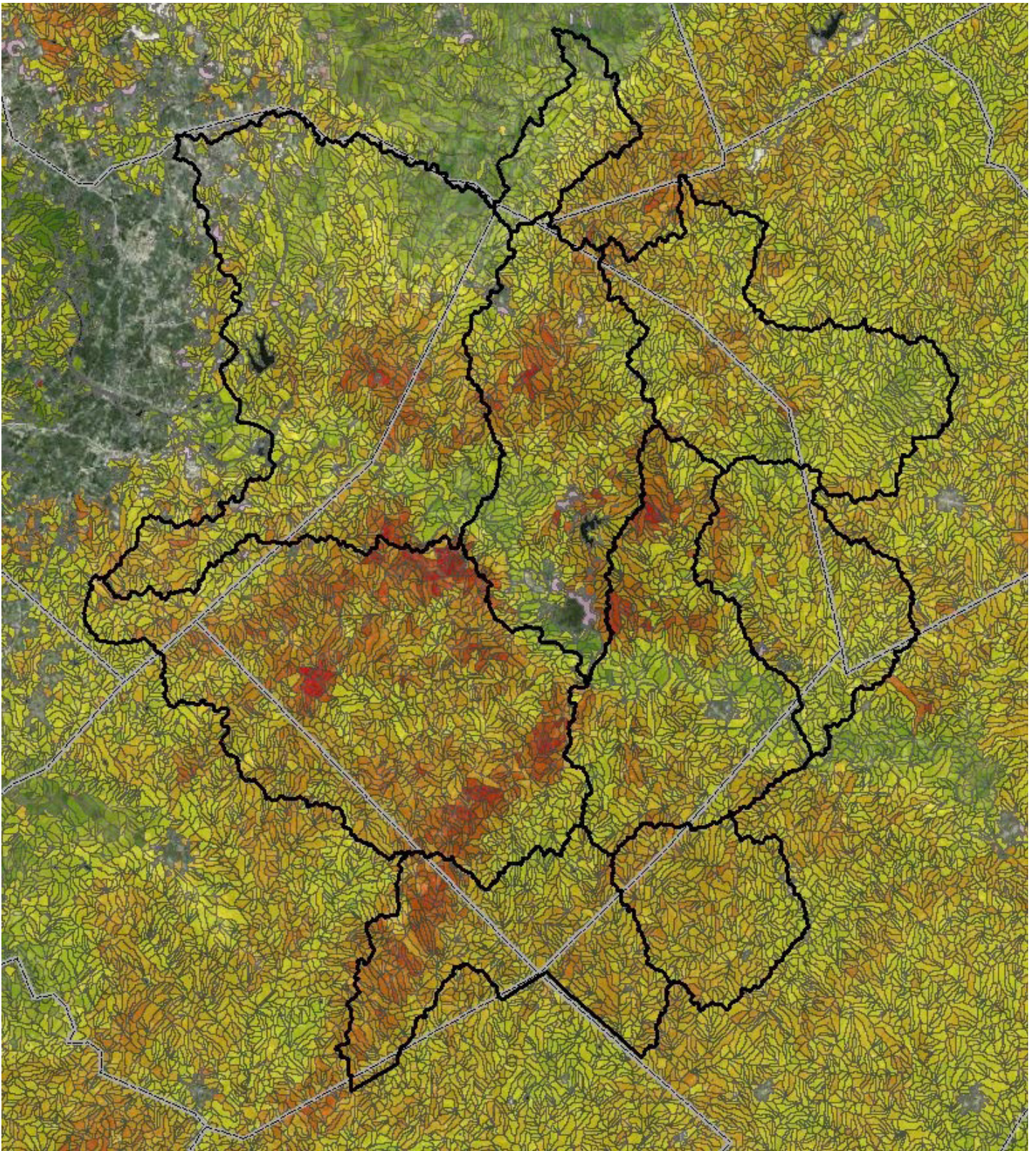
*Figure 4: Thin gray lines outline Fire Plains (smaller areas of various shapes containing colors from yellow to red) and black lines outline Fire Sheds. Map created by: Anchor Point, Boulder, CO*
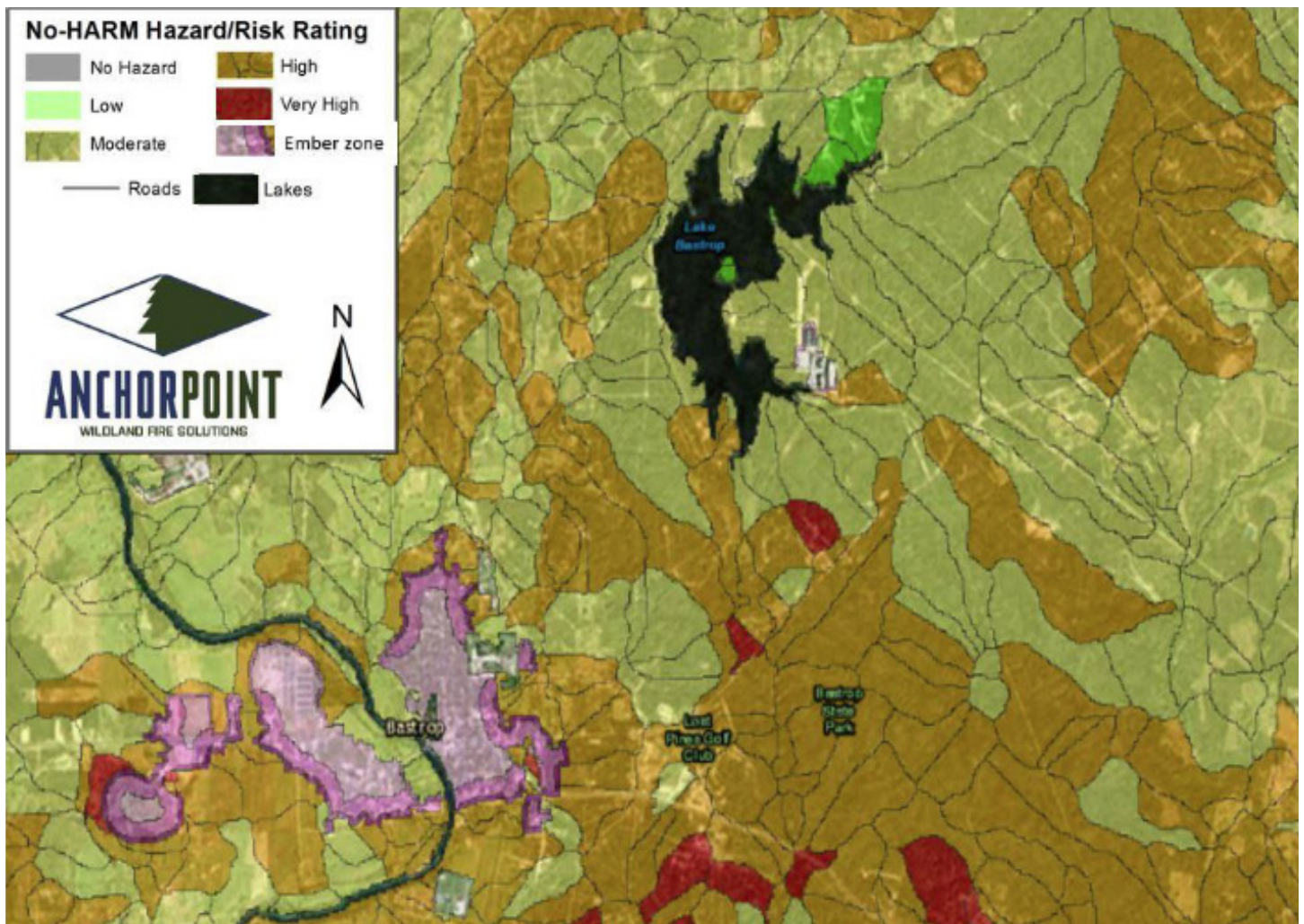
*Figure 5: Map displays Fire Plain (areas outlined in black have the same slope, aspect and anticipated fire behavior) ratings across Bastrop County. Map created by: Anchor Point, Boulder, CO*

### Project Supports Cohesive Strategy Goals

The Bastrop County Wildfire Mitigation Study directly or indirectly addresses all three national goals of the National Cohesive Wildland Fire Management Strategy. The analysis defines areas of most significant fire behavior. This leads to a prioritization of the entire landscape and facilitates the utilization of fuel reduction and prescribed fire to create a resilient landscape. Secondly, by clearly understanding hazard and risk associated with each community, appropriate and cost effective mitigation can be determined, based on scientifically based analytics to move toward fire adapted communities. Lastly, although the main focus of the study was not on response, the data layers derived through this project will be used to provide situational awareness to first responders and may be leveraged in future projects to create geospatial Incident Response Plans.

### Key to Project Success

A key to the project's success was engagement with multiple stakeholders. Collaboration with local fire managers and Anchor Point was one of the primary partnerships instrumental in this project. Additionally, collaboration between Anchor Point and local and state-level fire and emergency managers ensured that local knowledge was integrated into the fire modeling. Multiple draft models were produced and refined in collaboration with local and state mangers. County emergency management, state forestry and parks agencies were fully engaged with the project. The project was presented and feedback obtained from a regional County Emergency Managers organization, the Capital Area Homeland Security Task Force, as well as the Bastrop County Lost Pines Recovery Team (LPRT). The LPRT is a diverse group of ecology subject matter experts formed to advise the project on ecosystem recovery and other forestry and environmental matters. This group works closely with the federally endangered, Houston toad (Bufo houstonensis) that exists in

the county. Significant consultation with the US Fish and Wildlife Service and area specialists must occur before fuels reduction projects are approved. A Houston toad habitat layer was provided for this project and was integrated into the web map interface as an overlay zone of concern when considering the feasibility of fuels projects. Practical collaboration, with functional application, such as this data sharing, was the norm throughout the project.

## A Model for Other Communities

The methodology utilized for the Bastrop County Mitigation study is scalable to a regional level and can be utilized by other communities and landscapes. The ability to prioritize on a regional scale, utilizing equivalent assessment methodology is essential in ensuring that budgets and grants are appropriated in a scientifically based and logical manner. The primary challenge to other jurisdictions conducting such work is access to grants before a disaster; much of the Bastrop funding is post-disaster.

## Outreach

Local, state and national news coverage has highlighted the Bastrop Mitigation study and other on-going projects in Bastrop County. FEMA also covered the projects under its "Nontraditional Wildfire Mitigation in Bastrop County, Texas" article in the *Best Practices Portfolio.*

**Additional Information:**

Anchor Point: *www.Anchorpointgroup.com*

FEMA Best Practices Portfolio article, Nontraditional Wildfire Mitigation in Bastrop County, Texas: *http://www.fema.gov/media-library/assets/documents/108818*

FlamMap: *http://www.firelab.org/project/flammap*

National Wildfire Hazard and Risk Assessment (NoHARM): *http://anchorpointgroup.com/_wordpress/services/national-hazard-risk-assessment/*

Bastrop County Lost Pines Recovery Team: *https://www.arborday.org/takeaction/community-tree-recovery/campaigns/texas.cfm*

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**Partners:** Bastrop County, Texas Commissioners, Anchor Point Group (Consulting Firm), Bastrop County Emergency Management, Texas A&M Forest Service, Texas Parks and Wildlife Department, Sanborn Map Company, US Fish and Wildlife Service, Capital Area Homeland Security Task Force, Bastrop County Lost Pines Recovery Team, local and state level fire managers



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