Flint Hills Smoke Management Plan

May 9, 2012
NACAA Meeting
Denver, Colorado

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Kansas Department of Health and Environment

Flint Hills Burning Background

- Flint Hills is last large intact remnant of tall grass prairie ecosystem.
- 2 to 3 million acres are burned each spring in the Flint Hills.
- Burning helps reduce intrusion of invasive woody species and improves cattle weight gain.
- Land is privately held.
- Fires up to 10,000 acres.

Flint Hills Burning Background

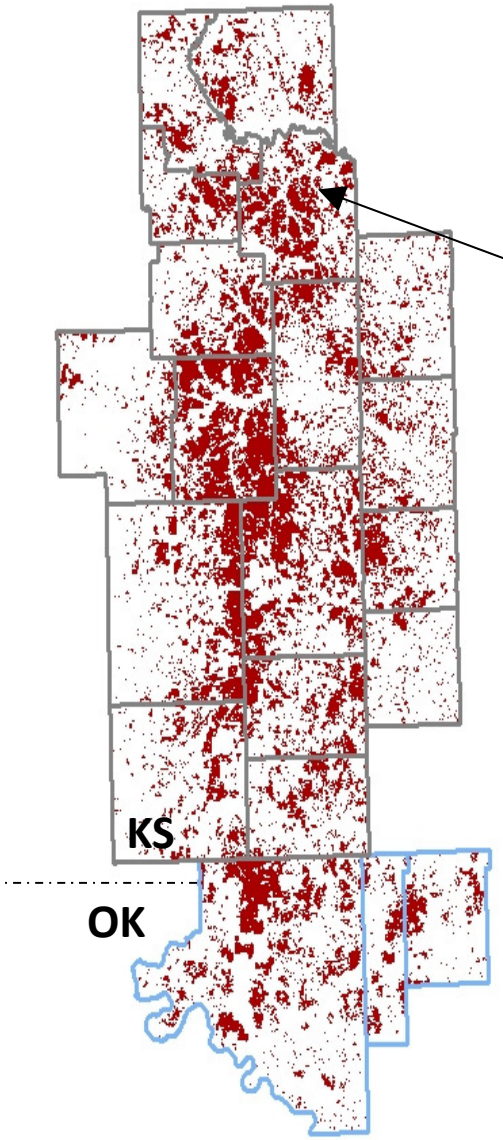
- Under certain weather patterns, smoke impacts downwind cities
- Smoke has caused exceedances of the ozone and PM NAAQS in KC, Wichita and far beyond.
- KDHE met with ag reps from 2004 through 2009 to negotiate solutions.
- Commitment to develop Smoke Management Plan in 2010.
- Multiple meetings with multiple stakeholders during 2010 to develop SMP.
- Plan adopted by KDHE in December 2010.

Safety Is a Primary Concern

The Smoke Management Plan

- Describes the Tall Grass Prairie ecosystem
- Reviews the balance between air quality concerns and the Flint Hills ag economy
- Is voluntary for prescribed burns of rangeland
- Includes restrictions on certain types of April burning
- Includes guidance and a modeling tool to assist land managers and fire officials in making burn decisions
- Spurred outreach activities by a host of state and federal agencies
- Included a voluntary burn data collection effort

Acres Burned in Flint Hills in April 2011

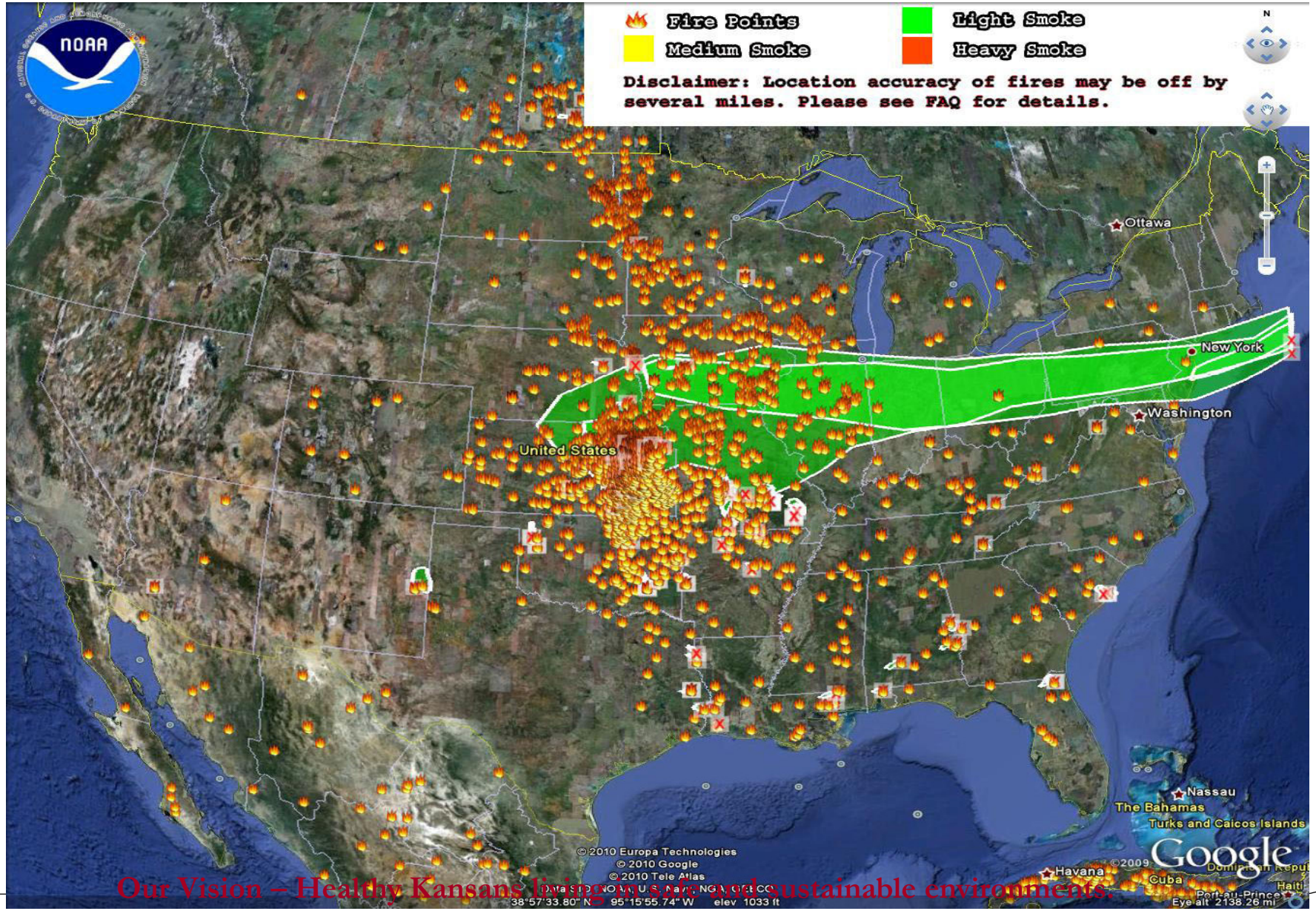


2,673,000 Acres Burned

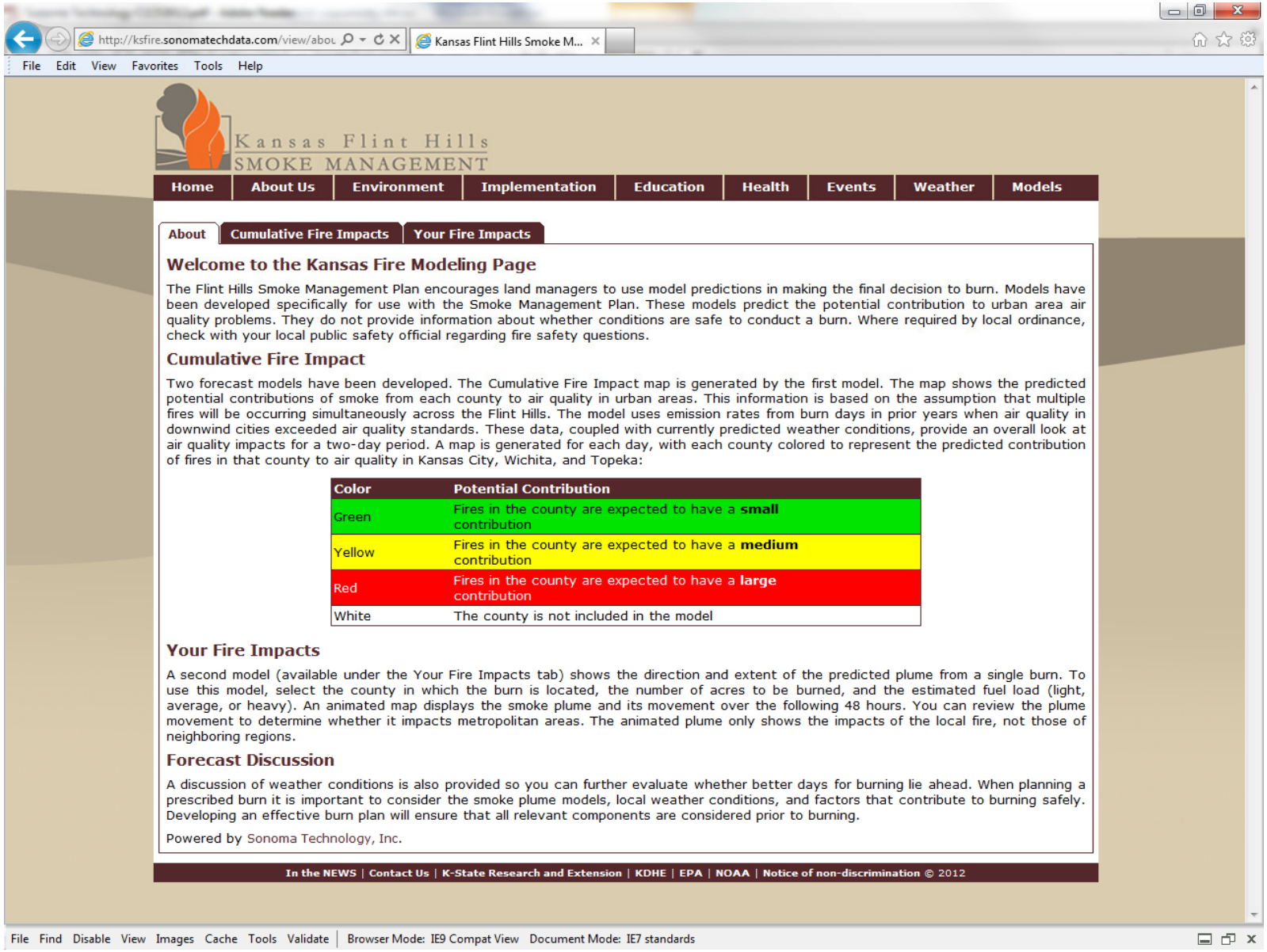
Map generated using MODIS data downloaded from NASA website at https://wist.echo.nasa.gov/api/

ENVI and ArcGIS software used for image analysis.

April 11, 2010 Fire and Smoke Plumes



KsFire Website Modeling Home Page



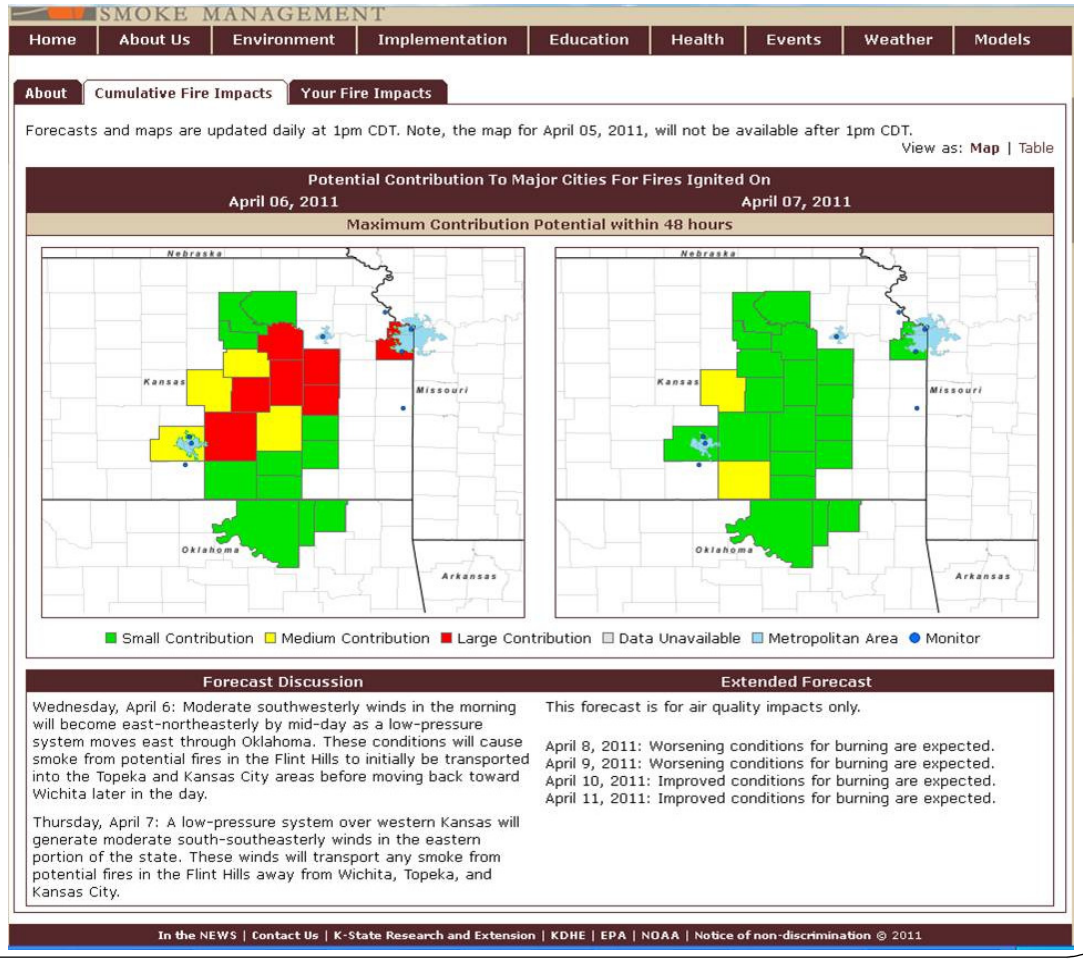
Burn Guidance Tools

Sonoma Technologies Inc. and KDHE developed tools to provide land managers daily information on when to burn to reduce air quality impacts.

Web site: http://www.ksfire.org

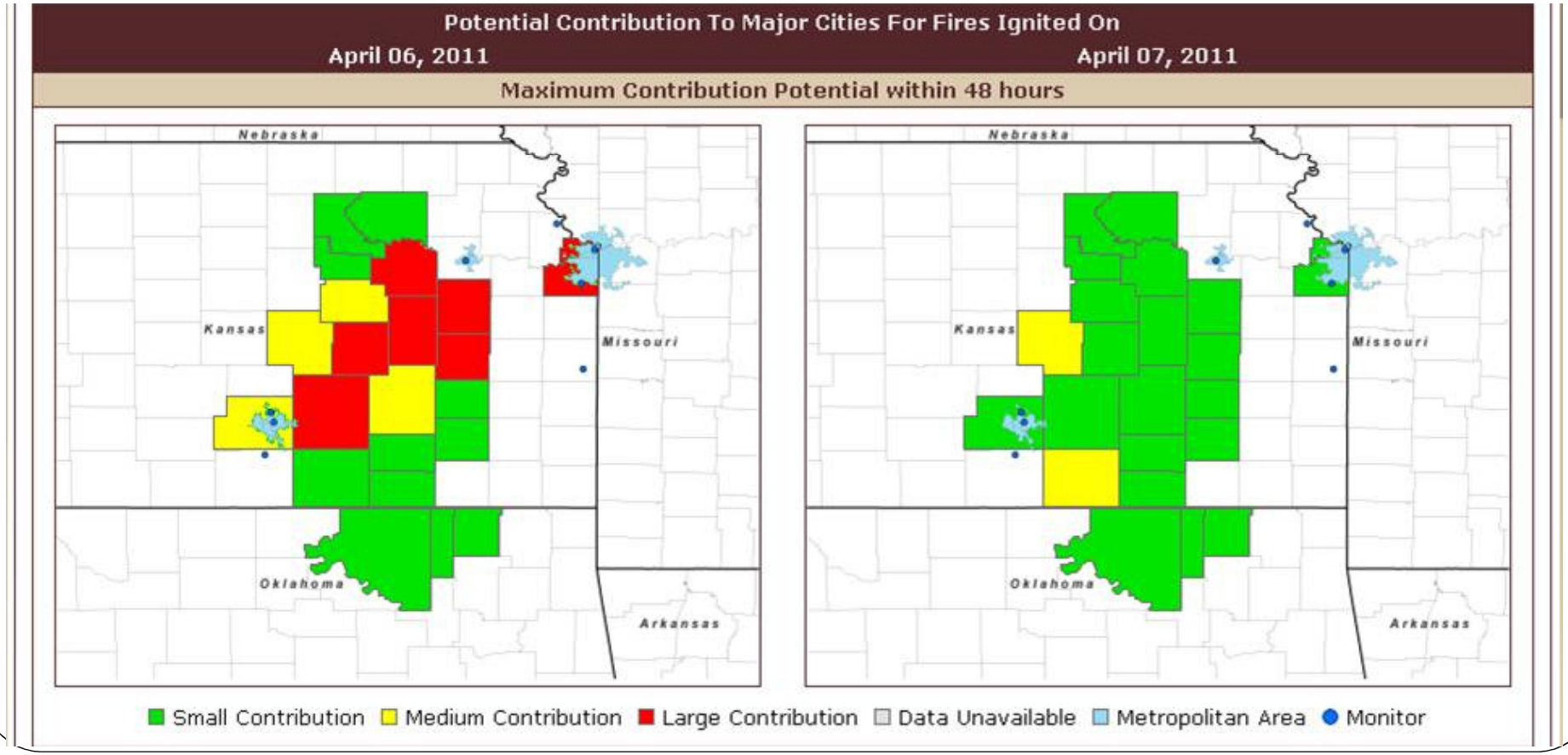
Tools provide daily:

- Burn guidance by county for the "next" two days
- Forecast discussions
- Extended outlooks
- County-level burning scenario playground

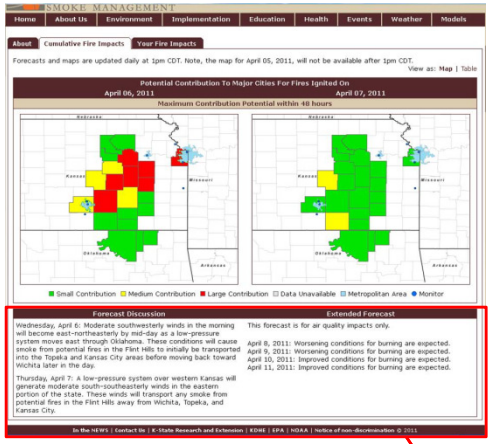


April 5, 2011 Model Guidance

- Maximum contribution to major cities based on cumulative impact from fires that could be ignited each day (e.g., April 6 and 7, 2011)
- County designated red, yellow or green based on county's contribution
- Uses forecasted meteorology and expected emissions for large burns



Example Guidance – Discussion



Meteorologists provide additional information on possible smoke impacts and extended outlooks.

Forecast Discussion	Extended Forecast
Wednesday, April 6: Moderate southwesterly winds in the morning will become east-northeasterly by mid-day as a low-pressure system moves east through Oklahoma. These conditions will cause smoke from potential fires in the Flint Hills to initially be transported into the Topeka and Kansas City areas before moving back toward Wichita later in the day. Thursday, April 7: A low-pressure system over western Kansas will generate moderate south-southeasterly winds in the eastern portion of the state. These winds will transport any smoke from potential fires in the Flint Hills away from Wichita, Topeka, and Kansas City.	This forecast is for air quality impacts only. April 8, 2011: Worsening conditions for burning are expected. April 9, 2011: Worsening conditions for burning are expected. April 10, 2011: Improved conditions for burning are expected. April 11, 2011: Improved conditions for burning are expected.

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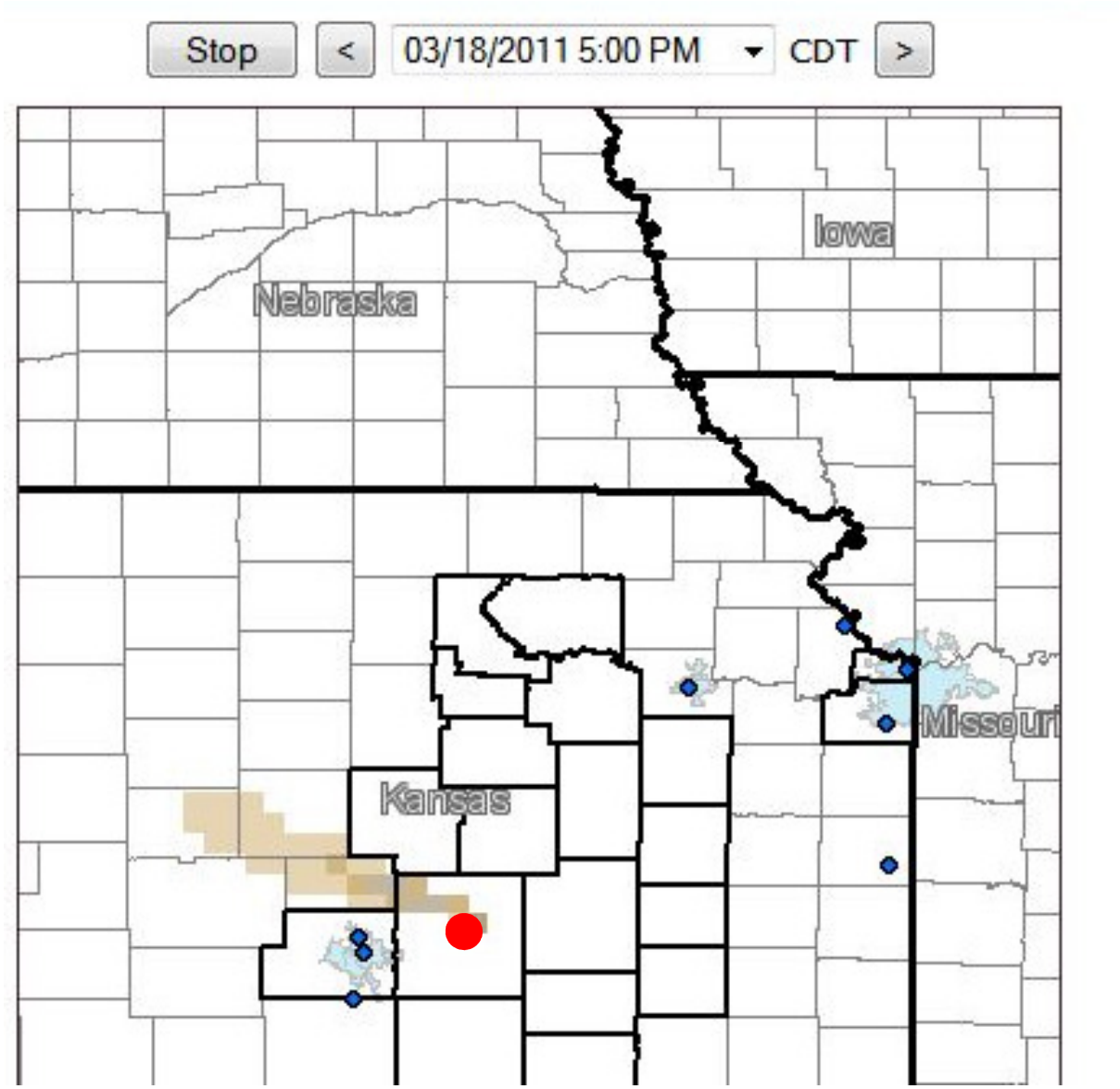
Example Guidance – Individual Plumes

Provides hourly plume movement and concentration to assess a burn.

Users enter:

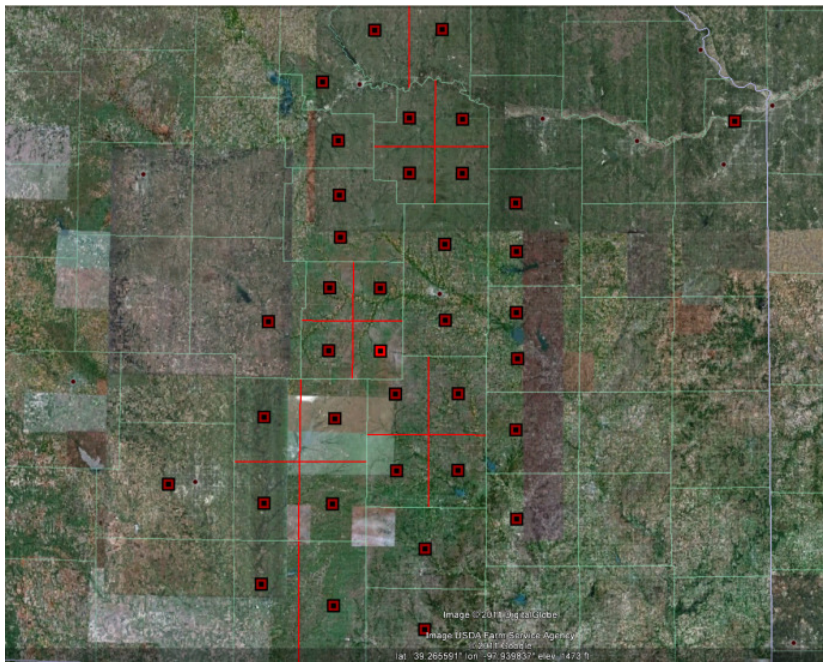
- County
- Fire size
- Fuel load

Plume is brown
Fire location is red
Monitors are blue



Generating the Guidance

- STI created a system that runs BlueSky with HYSPLIT each day to predict smoke plume movement and dispersion
- Smoke plumes are derived from hypothetical burns
  - For individual plumes, burn characteristics are provided by users
  - For cumulative impact, burn characteristics are fixed
- Smoke emission estimates are generated from BlueSky Framework
- Weather inputs used by BlueSky are prepared from NCEP North American Model (NAM) 40 km forecast data



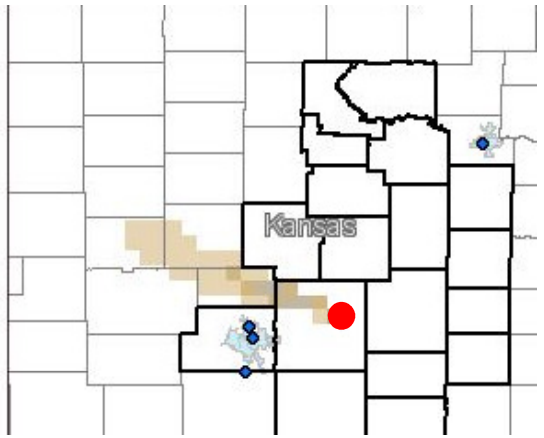
Hypothetical fire locations

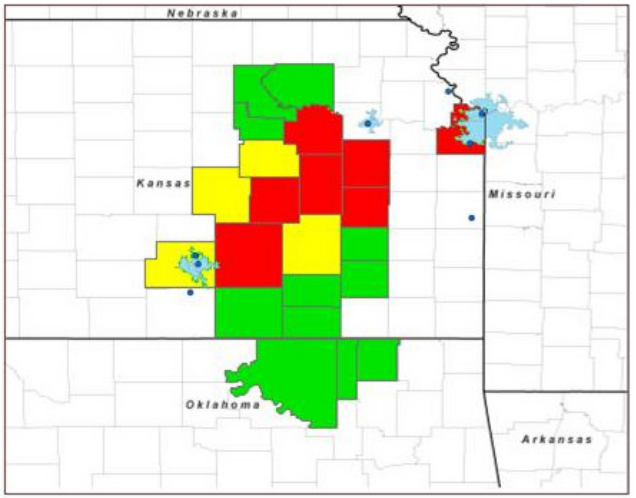
The USDA Forest Service BlueSky Framework enables the use of state-of-the-science algorithms for simulating smoke impacts, air quality, and emissions from fires.

HYSPLIT is the Hybrid Single-Particle Lagrangian Integrated Trajectory Model, developed by the National Oceanic and Atmospheric Administration's Air Resources Laboratory.

Generating the Guidance

- Hypothetical fires burn each day from 10 AM to 6 PM
- Concentrations are tracked for 48 hours
- For individual fires, hourly smoke plumes from each burn are mapped at 15 km resolution
- For cumulative impact
  - 24-hr surface PM concentrations from all fires are summed by grid cell
  - If contribution is large and downwind concentration is high in city of concern, then the county is colored red





On Target

SMOKE MANAGEMENT

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About | Cumulative Fire Impacts | Your Fire Impacts

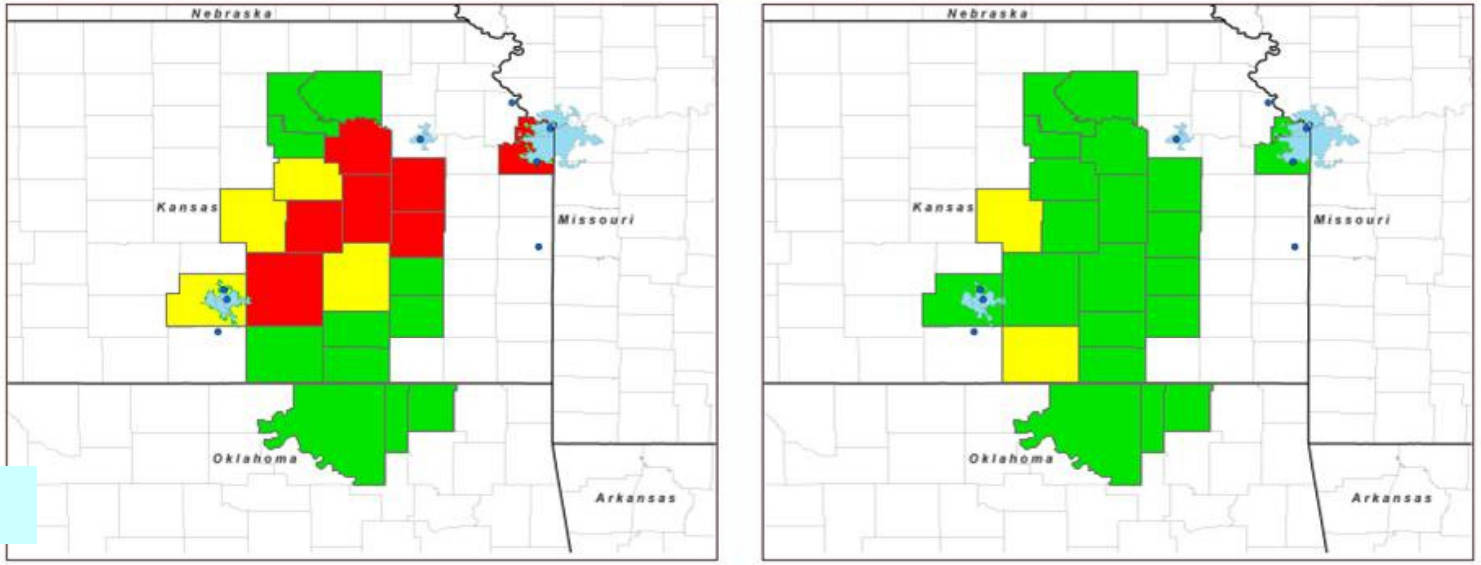
Forecasts and maps are updated daily at 1pm CDT. Note, the map for April 05, 2011, will not be available after 1pm CDT.

View as: **Map** | Table

Potential Contribution To Major Cities For Fires Ignited On

April 06, 2011 **April 07, 2011**

Maximum Contribution Potential within 48 hours



Small Contribution | Medium Contribution | Large Contribution | Data Unavailable | Metropolitan Area | Monitor

Forecast Discussion

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Extended Forecast

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April 2011 Monitoring Results

Current Ozone Standard = 75 ppb

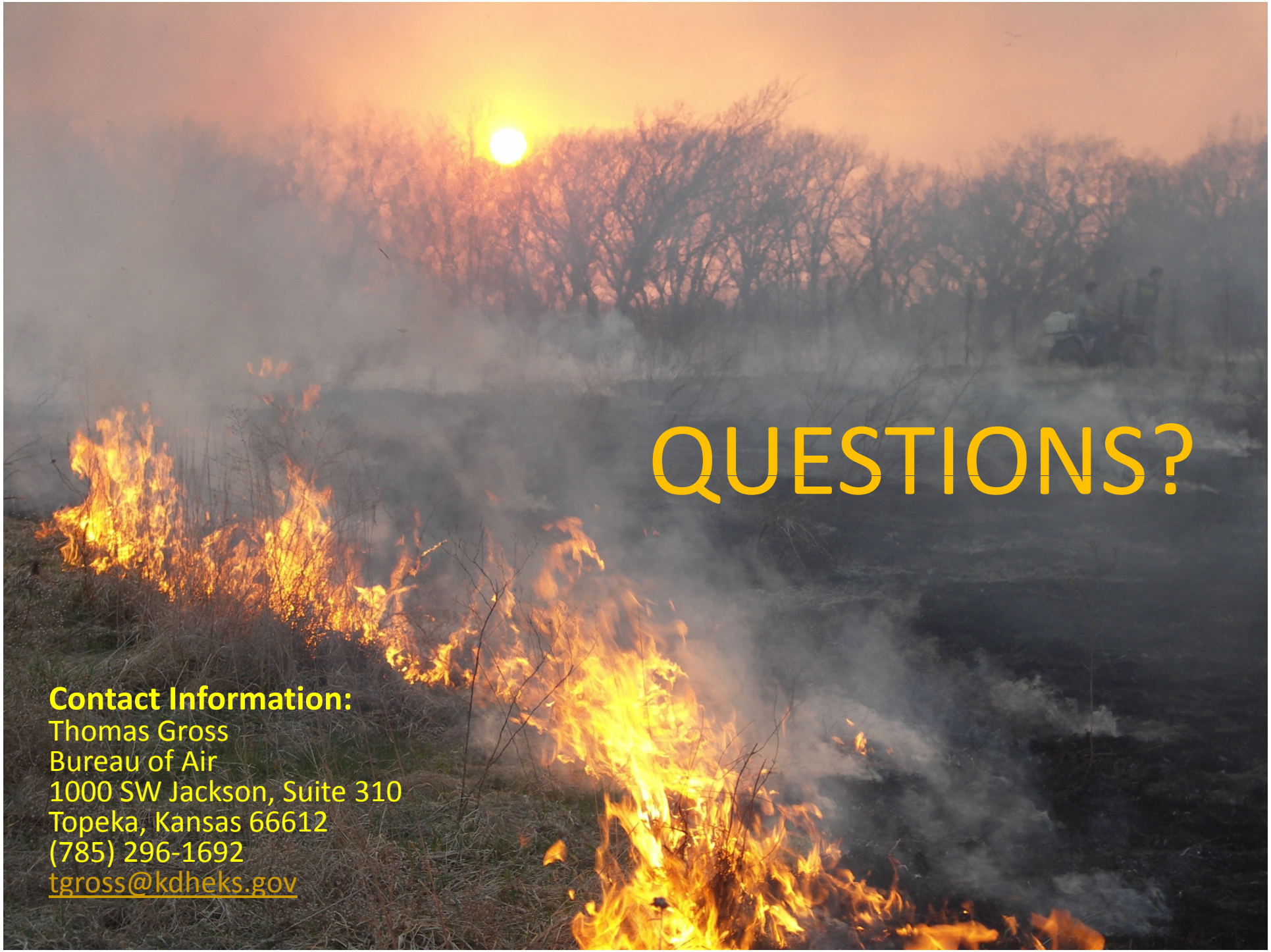
Date	Location	Pollutant	Concentration
April 6, 2011	Mine Creek	Ozone	76 ppb
April 6, 2011	Wichita - HD	Ozone	79 ppb
April 6, 2011	Wichita - Peck	Ozone	82 ppb
April 12, 2011	Konza Prairie	Ozone	78 ppb*
April 12, 2011	Topeka - KNI	Ozone	84 ppb
April 13, 2011	KC, Mo	Ozone	76 ppb
April 13, 2011	Konza Prairie	Ozone	79 ppb*
April 29, 2011	Peck	Ozone	77 ppb

*- CASTNET site that is not run by KDHE BOA

So……. What Now?

- April 2012 had least acres burned in decades.
- No exceedances of ozone or PM standards in 2012.
- Poor year to evaluate plan and model.
- Forecasting model improved for 2012 to
  - Provide sub-county-level information
  - Improve the display of individual plumes
  - Provide information to help users determine fuel load
- Continue and expand outreach efforts.
  - County officials, fire officials, more counties
- KDHE in final stages of completing 2011 exceptional event request.


Lessons Learned……..Don’t Bite Off More Than You Can Chew!!!



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