2014 State of Indiana
Fire Weather Area Operating Plan

Last Updated: March 28, 2014

INTRODUCTION:

This Fire Weather Annual Operating Plan (FWAOP) was developed to enhance the communication and organization between the National Weather Service offices and various local, state and federal agencies across the state of Indiana. The following National Weather Service offices will provide Fire Weather Planning Forecasts, Spot Fire Weather Forecasts and Red Flag event support to the agencies also listed below. Contact information can be found in Appendix F.

National Weather Service Offices

Office Name (Site ID)	***Local NWS Fire Weather Website***
Indianapolis (IND)	http://www.crh.noaa.gov/ind/?n=fireweather
Northern Indiana (IWX)	http://www.crh.noaa.gov/iwx/?n=firewx
Louisville, KY (LMK)	http://www.crh.noaa.gov/lmk/?n=fireweather
Chicago, IL (LOT)	http://www.crh.noaa.gov/lot/?n=firewx
Wilmington, OH (ILN)	http://www.erh.noaa.gov/iln/fireweather.php
Paducah, KY (PAH)	http://www.crh.noaa.gov/pah/?n=firewx
NWS Fire Weather Site	http://www.srh.noaa.gov/ridge2/fire/

Land Management Agencies

Land Mgmt Agency	***Agency Website***
State of Indiana DNR	*http://www.in.gov/dnr/index.htm*
U.S. Fish and Wildlife	*http://www.fws.gov/midwest/*
Eastern Area Coordination Center (EACC)	*http://gacc.nifc.gov/eacc/*
U.S. Forest Service	*http://www.fws.gov/*
National Park Service	*http://www.nps.gov/*

Appendices Referenced in this AOP:

- Appendix A: Points of Contact
- Appendix B: NWS Office Coverage for State of Indiana
- Appendix C: NWS National (Experimental) Fire Weather Page and Spot Forecasts
- Appendix D: Experimental Smoke Particle Trajectories
- Appendix E: Examples of Products Issued
- Appendix F: Fire Weather Indices

Definition of Fire Weather Season:

The Fire Weather Season across much of the state of Indiana can vary greatly from north to south. Climatologically, the greatest threat for wildfires and other related fires can occur from late February (southern sections) through April and October through early December (southern sections). However, these are by no means strict starting and ending periods. Throughout the year, land management and National Weather Service officials will evaluate fuel conditions and determine the most favorable time periods for the Fire Weather Season. Additional details on local NWS Fire Weather programs will follow in this plan.

Routine Services provided by the National Weather Service:

Several products are issued by the National Weather Service to aid land management and local fire officials. The formats of the fire weather products will comply with standards set forth in NWS Instruction 10-401 and are standardized in an effort to better serve transient fire fighters.

The following sections will outline the general content and requirements for each product and their issuance. For the sake of brevity, more specific details can be found in NWS Instruction 10-401. Examples of each product can be found in Appendix E.

Fire Weather Planning Forecast (FWF)

The Fire Weather Planning Forecast is issued to provide an overview of expected weather conditions and parameters related to fire weather operations. The product may be broken down on a fire zone by fire zone basis, or may be provided in groups of zones with similar land conditions. Issuance times and frequency of the product varies from north to south and season.

WFO	***Frequency During Fire Seasons***	***Frequency during remainder of the year***
Indianapolis	2x daily (morning and afternoon)	Every morning
Northern Indiana	2x daily (morning and afternoon)	Every morning between Spring and Fall seasons. No issuance between Fall and Spring seasons
Louisville, KY	2x daily (morning and afternoon)	Every morning outside Spring and Fall fire seasons.
Chicago, IL	~ 6 am, 1030 am and 4 pm	As requested between Spring and Fall seasons. No issuance between Fall and Spring seasons
Wilmington, OH	2x daily (morning and afternoon)	Every Morning and as needed
Paducah, KY	2x daily (morning and afternoon) Year Round	

The morning forecast will contain three periods and an extended portion, while the afternoon forecast will contain four periods and an extended forecast.

The forecasts will contain the following elements:

- **Headline -** If a Red Flag Warning or Fire Weather Watch is in effect, a headline is mandatory. Outside of these conditions, headlines may be used to convey concerns about significant trends, but are not required.
- **Discussion** – This is a short paragraph outlining the synoptic features affecting the forecast area during the next 24 to 36 hours.
- **Forecast elements** will include: cloud cover, chance and type of precipitation, precipitation amount, max and min temperatures and its trend, max and min relative humidity and its trend, 20-foot winds in MPH, mixing height in 1000's of feet, and transport winds in knots.
- **Extended forecast** will be appended to the end of the tabular part of the product and will include the winds through day 7.

The following optional forecast elements may be included in gridded data and transmitted in text products at the request of local users. Detailed descriptions of these elements are located in Appendix F.

- **Haines Index**
- **Ventilation Index (VI)**
- **Davis Stability Index (DSI)**
- **Superfog Indicator (LVORI)**
- **Atmospheric Dispersion (ADI)**

This forecast will be updated whenever the following conditions are warranted.

- A Fire Weather Watch is issued, cancelled or expired
- A Red Flag Warning is issued, cancelled or expired
- When forecast elements are deemed unrepresentative

NFDRS (Point) Forecast

The Point Forecast is issued for a specific point within the fire weather area of responsibility (see stations below) and is valid for a twenty-four (24) hour period after issuance. The format for NFDRS forecast is found in NWS Instruction 10-401.

The following are the points forecasted for during the regular fire weather season.

Station Name	Station Number	Issuance Time and Frequency	NWS Office Issuing
Tipsaw	128905	~ 330 pm EST year round	Louisville
Hardin Ridge	125701	~ 330 pm EST during Fire Season	Indianapolis
Big Oaks	127301	Upon request during Fire Season	Wilmington, OH
Bailley	120201	~ 1 pm LST during Fire Season	Chicago, IL

No NFDRS Sites in the State of Indiana		Paducah Northern Indiana

Spot Forecasts (FWS)-
Site-specific forecasts (Spot) are issued by an NWS office in support of wildfire and natural resource management. These forecasts aid the land management and fire control agencies in protecting life and property during wildfires, fuel reduction burns, and rehabilitation and restoration of natural resources. Spot forecasts may also be issued for a threat to public safety, including but not limited to hazardous materials incidents, marine incidents, and search and rescue response. However, this plan will focus primarily on forecasts in support of land management agencies.

The forecast elements will typically consist of the highest or lowest temperature during the period, the highest or lowest relative humidity, wind direction and speed, chances and duration of precipitation. Directions for requesting Spot Forecasts can be found in Appendix C.

Experimental Model Particle Trajectories
Land management agencies that have a wildfire of 100 acres or greater, or are conducting a prescribed burn of 100 acres or greater, may request that the National Weather Service run the NOAA Air Resources Laboratory dispersion model, HYSPLIT, to model particle trajectory. This model is a combination of the U.S. Forest Service's Blue Sky Model and meteorological models used by NWS Forecasters. This data is output in a graphical form and is considered experimental since it is relatively new, and only limited testing has been conducted thus far. This data can be used in addition to a typical spot forecast that is used for Prescribed Burns and Wildfires. More information on the procedures for requesting this and how to interpret the data can be found in Appendix D at the end of this AOP.

Urgent Fire Weather Messages

Fire Weather Watches and Red Flag Warnings (RFW)-
A Fire Weather Watch or Red Flag Warning event occurs whenever extremely dry fuels combine with critical weather parameters to create an atmosphere that could contribute to extensive wildfires with the potential to threaten life and property. Any watch or warning should be coordinated with the affected land management agency for the zone(s) where the watch or warning is being considered. A watch is issued typically within 24 to 48 hours of an event and a warning within 24 hours. A Red Flag warning may also be requested by a land management agency, if they feel that due to extreme dryness in the forest, that wildfires are likely. The Fire Weather Watch or Red Flag Warning can be issued on a county by county basis. The land management agencies and the NWS offices will discuss the area that will be contained within the urgent fire weather message.

Fire Weather Watch/Red Flag Warning Criteria:

Criterion 1 should be met (for at least 2 days, except in drought situations and at discretion of land

management officials) before proceeding to Criterions 2 and 3

(1) Ten hour fuels at 8% or less (9% or less for Paducah forecast area)
(2) Sustained wind averaging >=15 mph (10m ASOS winds) for at least 3 hours (>= 20 mph for Northern/Northwestern Indiana-IWX/LOT)
(3) Relative humidity <= 25 percent for at least 3 hours

Non-routine services:

The National Weather Service will assist any Federal or State agency in training purposes. Typically, the National Weather Service has served as instructors for the weather portions of the S-290 and S-190 hosted by the USFS or DNR. On different occasions, the National Weather Service has also agreed to supply training/instruction support for state and federal agencies in more general purposes, such as seasonal outlooks during late winter staff meetings or regional gatherings. This type of service will continue in the future.

Incident Meteorologists (IMETs)/On Site Support

On site forecast service is a non-routine service available from National Weather Service offices. The NWS will provide IMET services upon request of federal, state, tribal, or local government fire agencies in support of wildfire. The support typically includes dispatches to Incident Command Posts, but may also include dispatches to land management coordination and dispatch centers. IMET support will also be considered for non-wildfire situations, if resources permit. Such uses will be limited to public safety officials who represent such support as essential to public safety (see section 4 of NWS Instruction 10-401. Procedures to request the services of an IMET are detailed in NWS Instruction 10-402.

Wildland Fire Agency Responsibilities:

Agreements and reimbursement between fire agencies and the National Weather Service are outlined at http://www.srh.noaa.gov/ridge2/fire/, under the Admin section.

Effective Date of the AOP:

The AOP will be reviewed by federal and state agencies in coordination with the National Weather Service Fire Weather Program Leader at the respective weather forecast offices every year prior to the start of the spring fire weather season.

Appendix A
Points of Contact

STATE AGENCIES

Department of Natural Resources (http://www.in.gov/dnr/forestry/)
6220 Forest Road Martinsville, IN 46151
Office Number for all Contacts (765) 342-4701. Fax (765) 342-4760

Name	Title
Crystal Hunt	Program Coordinator, Forestry Division-Fire Headquarters
Darren Bridges	Assistant State Fire Coordinator

FEDERAL AGENCIES

Eastern Area Coordination Center (National Park Service) (http://gacc.nifc.gov/eacc/)
626 E. Wisconsin Avenue
Suite 500
Milwaukee, WI 53202

Name	Title
Stephen Marien	Eastern Area Fire Weather Program Manager

US Fish and Wildlife Office (http://www.fws.gov/)
620 S Walker St
Bloomington, IN 47403
Fax (812) 334-4273

Name	Title
Jeff Kiefer	Indiana Private Lands Coordinator.
Brian Winters	Fire Management Officer Big Oaks NWR **http://www.fws.gov/midwest/bigoaks/**

Indiana Dunes National Lake Shore (http://www.nps.gov/indu/index.htm) –Laporte, Porter and Lake Counties
1100 N Mineral Springs Road Porter, IN 46304 FAX: (219) 983-9758

Name	Title
Dan Morford	Fire Management Officer
Mary Lothschutz	Assistant Fire Management Officer

Neal Mulconrey	Fire Program Assistant

US Forest Service-Hoosier National Forest
Tell City Ranger District
248 15th St.
Tell City, IN 47586

Brownstown Ranger District
811 Constitution Ave
Bedford, IN 47421

FAX : (812) 547-9260

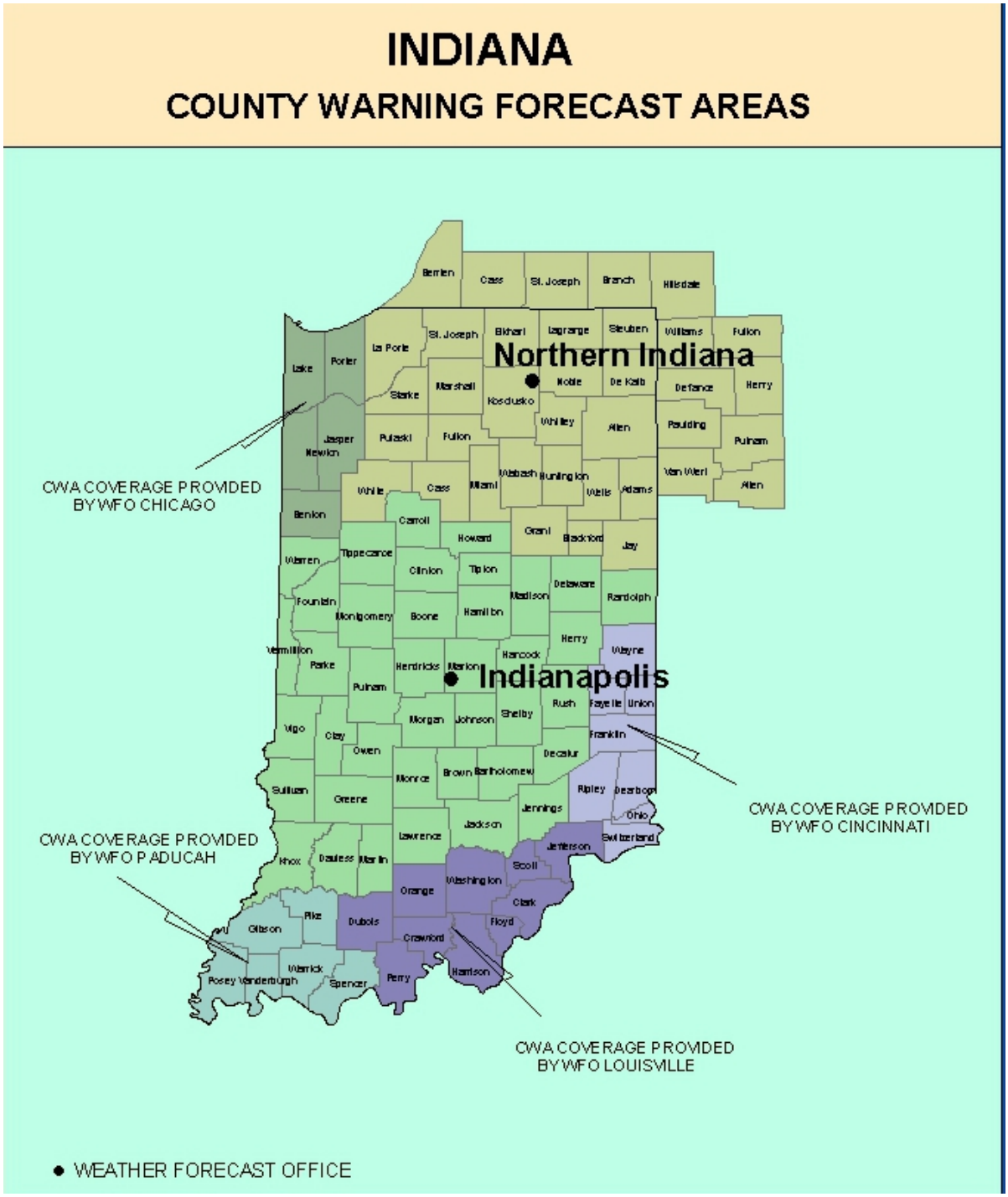
Name	Title
Terry Severson	Fire Management Officer
Maggie Schuetter	IICC Center Manager
Ryan Otto	Engine Captain
Cory Henry	Engine Captain Brownstown
Dave Nugent	Dispatch
Jeremy Kolaks	Fuels Technician

NATIONAL WEATHER SERVICE REPRESENTATIVES
Phone Numbers A is Administrative (Public)

Office	Contacts	Phone #
Indianapolis (IND)	Daniel McCarthy-MIC Sonia Mark Flechtner-Fire Weather FP	317-856-0360 A
Northern Indiana (IWX)	Mark Frazier-MIC Lonnie Fisher-Fire Weather FP	574-834-1104 A
Louisville, KY (LMK)	John Gordon-MIC Brian Schoettmer-Fire Weather FP	502-969-8842 A
Chicago, IL (LOT)	Edward Fenelon-MIC Casey Sullivan-Fire Weather FP	815-834-0673 A
Wilmington, OH (ILN)	Kenneth Haydu-MIC John Franks-Fire Weather FP	937-383-0031 A
Paducah, KY (PAH)	Bev Poole-MIC Kelly Hooper-Fire Weather FP	270-744-6440 A
Jennifer Zeltwanger (CRH)	CRH Fire Weather FP	(816) 268-3143
Harvey Thurm (ERH)	ERH Fire Weather FP	(631) 224-0124
Heath Hockenberry (WSH)	NWSHQ Fire Weather Program Manager	(208) 334-9862

Appendix B

NWS Office Coverage for the State of Indiana



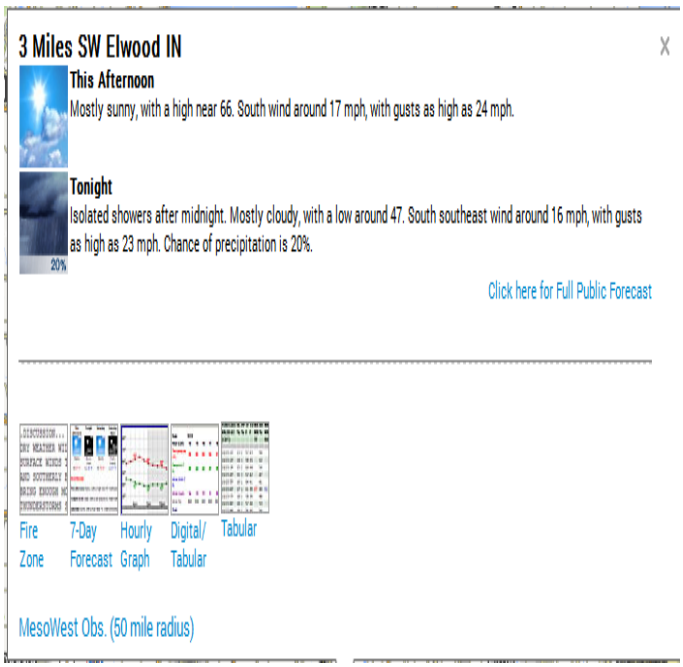
Appendix C

NWS National (Experimental) Fire Weather Page and Spot Forecasts

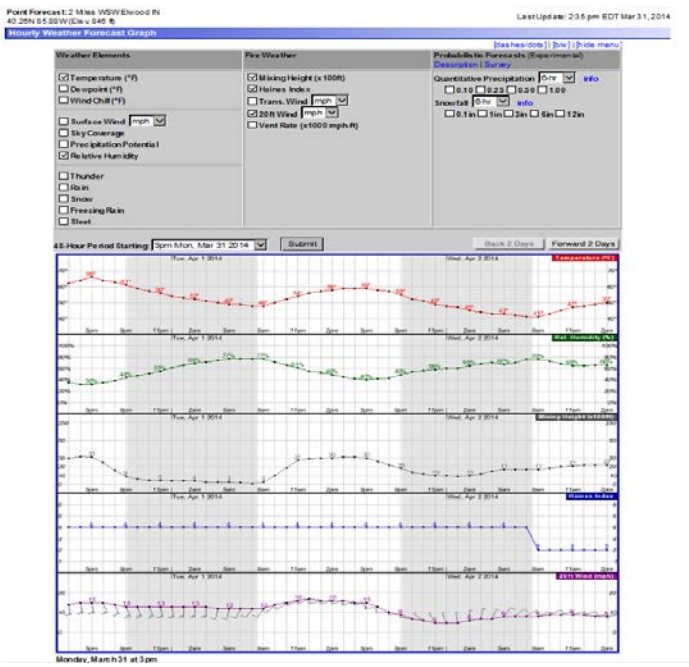
The ability of the National Weather Service (NWS) to provide digital and graphic fire weather products and services over the internet continues to increase. Concurrently, the need for improved fire weather information on the internet by land management and fire suppression agencies also continues to increase. Multiple federal fire weather user agencies have expressed a need for an improved national fire weather web page that includes more interactive graphics. While all NWS offices provide basic hourly weather graph data, such as temperature, humidity and chance of precipitation, several of the offices As a result, land management agencies in the following NWS coverage areas can find fire weather parameters added to the Hourly Weather Graph for specific lat/lon locations at http://www.weather.gov/fire.

- Chicago
- Northern Indiana
- Indianapolis
- Lousiville

Your forecast can be found by zooming in on the map to your point of interest. Left click on the location and a pop-up window will appear



Point and Click Pop Up



Hourly Weather Graph

A variety of choices are available from this point. To see the hourly weather graph, simply click the "Hourly Graph" link and the page will load.

Spot Forecast Request Instructions

A spot forecast request can be started using one of 2 methods (both get you to the same spot).

National Fire Weather Page Method

- Select or enter your location for the burn from the National Fire Weather page (Figure 1).
- Click the “Request Spot Forecast” on the bottom of the dialog window.
- You will arrive at the standard NWSSpot request page.

Local NWS Office Fire Weather Page Method

- Determine the office which covers your forecast location (Appendix Ref Needed)
- Go to the appropriate fire weather page (Links can be found at the start of this AOP).
- Click the “Spot Forecast Request” link on the page.

Once at the NWSSpot Interface

- Click on Submit a New Spot Request
- Enter data into the request form (red means a mandatory entry). Unfortunately at this time, the data will not automatically populate from the graphical interface.
- Click submit request at the bottom of the form
- Allow up to 30 minutes for the creation and issuance of the request (if time critical, please note in the request or contact the NWS office)
- Monitor the status of your request from the Spot Forecast page. Once your request status is listed as complete (color in red on the map), then click on your request, to see the forecast.
- Feedback on the forecast is greatly appreciated. If you have feedback on the forecast, at the bottom of the completed forecast is a space to type in feedback, then push the button <Send Feedback>.

If the user does not have access to the internet, contact the appropriate NWS offices covering your area to have them enter the request and supply the forecast through other means.

Appendix D

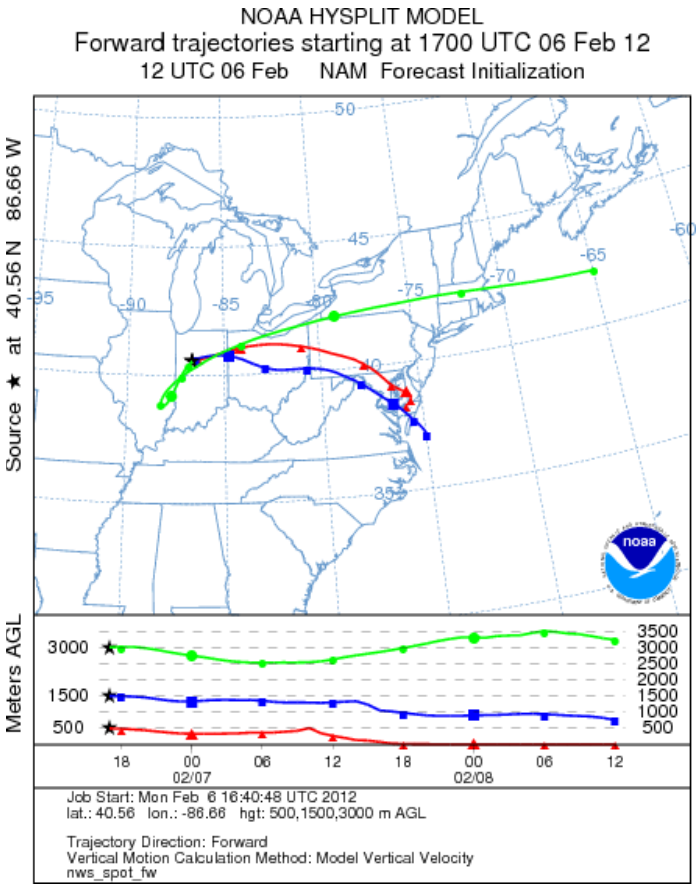
Two types of experimental modeling data are available to aid land management officials during prescribed burns and wild/forecast fires.

Experimental Smoke Particle Trajectories

This type of run is designed for longer term effects of large fires.

How to request:
To request a HYSPLIT trajectory run for your prescribed burn or incident,

1. Request a Spot Forecast through the NWSSpot link for the appropriate NWS office.
2. To request HYSPLIT trajectories from WFO NWS Spot forecast request webpages, the authorized user must enter the phrase in quotes "hysplit to (enter email-No Parenthesis)" in the remarks section of the spot forecast request form. The HYSPLIT trajectory raw data, as well as ".gif" and ".kml" files, will be sent to the specified email address.



How to interpret the result:
The HYSPLIT Trajectories Request Function gives a model depiction of where an air parcel would travel from a given longitude and latitude, starting at a specific elevation. The model output provides users with HYSPLIT trajectory runs at 500, 1500, and 3000 meters above the ground. Model runs will start at the place and ignition time provided in the spot forecast request.

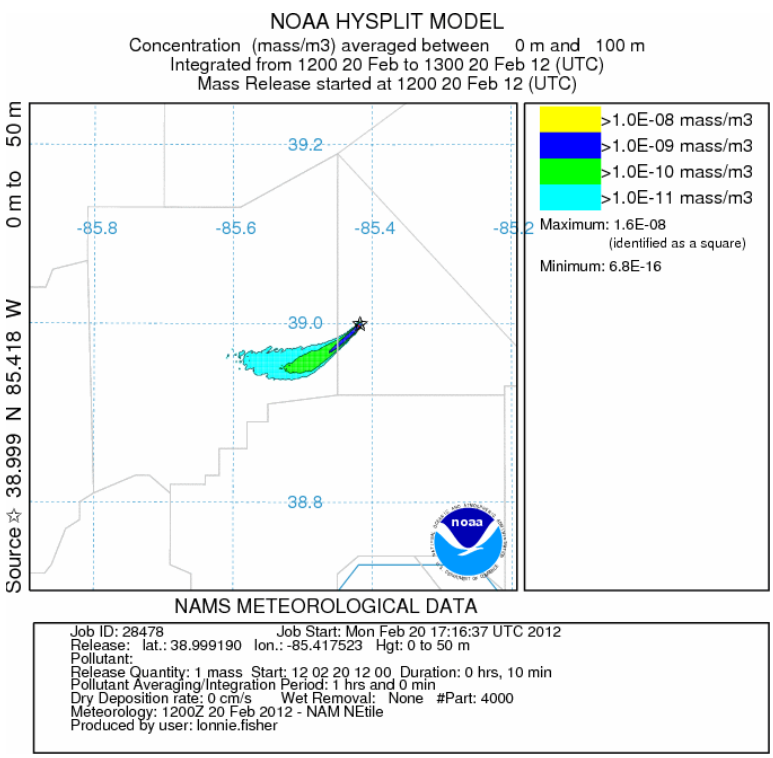
Experimental Smoke Particle Dispersion

This version of the same model provides general concentration information on particulates and their anticipated movement based on model data for the period of time selected. The data can be downloaded in a KMZ format to view on Google Earth.

How to request a HYSPLIT Dispersion run:

Method 1: Place a Spot Forecast request through normal means. Contact the respective NWS office and request a dispersion run, giving the duration of the burn. The request and data can also be submitted in the remarks section of the Spot Forecast Request.

Method 2: Contact NWS office directly and request a dispersion run.



How to interpret the results:
Plotted output concentrations (the output graphics) are calculated using a default concentration and a default emission rate. These two parameters tell the model how much

smoke to release, and how fast to release it. The default concentration rate will always be 1 unit of mass per cubic meter (for example, 1 g/m^3). The default emission rate will always be one mass unit per hour (for example, 1g/hour).

Since the output graphics use a default concentration and a default emission rate, the raw HYSPLIT smoke concentrations shown on the output graphics do not represent actual concentrations and cannot be used to estimate health impacts. If the actual emission rate of smoke per hour is known, you can perform a simple calculation to obtain actual concentrations:
Actual concentrations = actual emission rate x output concentrations

Appendix E

Examples of Fire Weather Products:

Fire Weather Planning Forecast (morning) – ARBFWFxxx (The afternoon format is similar)-

```
FNUS5i KNNN DDHHMM
FWFNNN
FIRE WEATHER PLANNING FORECAST
NATIONAL WEATHER SERVICE CITY STATE
TIME-DATE

...HEADLINE...

.DISCUSSION...

SSZXXX-XXX>XXX-DDHHMM-
GEOGRAPHICAL DESCRIPTORS
TIME-DATE

...RED FLAG WARNING/FIRE WEATHER WATCH HEADLINE...

.TODAY...
SKY/WEATHER.........
MAX TEMPERATURE.....
24 HR TREND......
MIN HUMIDITY........
24 HR TREND......
WIND.(20 FT/10-MIN AVG)...
HAINES INDEX...
MIXING HEIGHT...
TRANSPORT WINDS.(MPH)...
VENTILATION INDEX...

.TONIGHT...
SKY/WEATHER.........
MIN TEMPERATURE.....
24 HR TREND......
MAX HUMIDITY........
24 HR TREND......
WIND.(20 FT/10-min avg)...
HAINES INDEX...
MIXING HEIGHT...
TRANSPORT WINDS.(MPH)...
VENTILATION INDEX...

.TOMORROW...
SKY/WEATHER.........
MAX TEMPERATURE.....
MIN HUMIDITY........
WIND.( 20 FT/10-min avg)....
HAINES INDEX...
MIXING HEIGHT...
TRANSPORT WINDS.(MPH)...
VENTILATION INDEX...
$$
[forecast for next geographical descriptor and fire weather zone group]
$$
.FORECAST DAYS 3 THROUGH 7...
.DAY3...
```

.DAY4...
.DAY5...
.DAY6...
.DAY7...

Fire Weather Watch/Red Flag Warning (RFW).

Multiple Segments RFW with Overview Section (Format for Single Segment Similar)

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WWUS85 KLOX 050820
RFWLOX
URGENT - FIRE WEATHER MESSAGE
NATIONAL WEATHER SERVICE LOS ANGELES/OXNARD CA
400 PM MDT MON OCT 10 2011

...RED FLAG WARNING AND FIRE WEATHER WATCH ACROSS PORTIONS OF
VENTURA AND LOS ANGELES COUNTIES THROUGH THURSDAY...

THE NATIONAL WEATHER SERVICE IN LOS ANGELES/OXNARD HAS ISSUED A
RED FLAG WARNING AND FIRE WEATHER WATCH FROM 6 PM THIS EVENING
TO MIDNIGHT THURSDAY EVENING.

STRONG SANTA ANA WINDS WILL BRING HOT TEMPERATURES...SINGLE
DIGIT HUMIDITY AND 45 MPH WINDS TO THE VENTURA COUNTY VALLEYS.
SIMILAR CONDITIONS MAY SHIFT SOUTH INTO PORTIONS OF LOS ANGELES
COUNTY TUESDAY NIGHT.

CAZ244>246-288-547-102200-
/O.NEW.KLOX.FW.W.0015.111011T0000Z-111013T0600Z/
VENTURA COUNTY INTERIOR VALLEYS-VENTURA COUNTY COASTAL VALLEYS-
SANTA MONICA MOUNTAINS RECREATION AREA-SANTA CLARITA VALLEY-
LOS ANGELES COUNTY SAN FERNANDO VALLEY

...A RED FLAG WARNING IS IN EFFECT FROM 6 PM MONDAY EVENING THROUGH
THURSDAY EVENING FOR STRONG WINDS AND LOW HUMIDITY ACROSS FIRE
ZONES 244...245...246...288...547

* AFFECTED AREA: VENTURA COUNTY COASTAL AND INTERIOR VALLEYS...
SANA CLARITA VALLEY...SANTA MONICA VALLEY RECREATION AREA...
LOS ANGELES COUNTY SAN FERNANDO VALLEY

* TIMING: 6 PM MONDAY EVENING TO MIDNIGHT THURSDAY EVENING.

* WIND: NORTHEAST 20 TO 30 MPH GUSTING TO OVER 45 MPH. WINDS
ARE EXPECTED TO DROP BELOW RED FLAG CRITERIA EACH MORNING BETWEEN
4 AM AND 9 AM.

* HUMIDITY: RELATIVE HUMIDITY VALUES WILL RANGE BETWEEN 5 AND 15
PERCENT...WITH SLIGHT RECOVERY TO BETWEEN 25 AND 35 PERCENT EACH
MORNING BETWEEN 4 AM AND 9 AM.

* TEMPERATURES: AFTERNOON TEMPERATURES BETWEEN 90 AND 100 ARE EXPECTED.

* IMPACTS: THE COMBINATION OF STRONG NORTHEAST WINDS AND LOW
HUMIDITY WILL CREATE CRITICAL FIRE WEATHER CONDITIONS THROUGH
THURSDAY.

PRECAUTIONARY/PREPAREDNESS ACTIONS...
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A RED FLAG WARNING MEANS THAT CRITICAL FIRE WEATHER CONDITIONS
WILL OCCUR. A COMBINATION OF STRONG WINDS...LOW RELATIVE
HUMIDITY...AND WARM TEMPERATURES WILL CREATE EXPLOSIVE FIRE GROWTH POTENTIAL.

&&

$$

CAZ241-548-102200-
/O.NEW.KLOX.FW.A.0019.111011T2200Z-111013T0600Z/
LOS ANGELES COUNTY COAST INCLUDING DOWNTOWN LOS ANGELES-
LOS ANGELES COUNTY SAN GABRIEL VALLEY-
400 PM MDT MON OCT 10 2011

...A FIRE WEATHER WATCH IS IN EFFECT FROM 4 PM TUESDAY THROUGH
MIDNIGHT THURSDAY EVENING FOR FIRE ZONES 241 AND 548...

* AFFECTED AREA: LOS ANGELES COUNTY COAST INCLUDING DOWNTOWN
LOS ANGELES AND LOS ANGELES COUNTY SAN GABRIEL VALLEY

* TIMING: 4 PM TUESDAY EVENING TO MIDNIGHT THURSDAY EVENING

* WIND: NORTHEAST WINDS 25 TO 35 MPH WITH STRONGER GUSTS
ARE POSSIBLE.

* HUMIDITY: RELATIVE HUMIDITY WILL VARY BETWEEN 10 AND 20 PERCENT.

* TEMPERATURES: AFTERNOON TEMPERATURES BETWEEN 90 AND 100 ARE EXPECTED.

* IMPACTS: THE COMBINATION OF STRONG NORTHWEST WINDS AND LOW
HUMIDITY MAY CREATE CRITICAL FIRE WEATHER CONDITIONS LATE TUESDAY
THROUGH THURSDAY.
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Appendix F

Explanation of Common Fire Weather indices:

Haines Index (Low elevations):

The Haines index is an Atmospheric severity Index used to determine fire severity due to the stability of the lower atmosphere, typically used for days when plume dominated fires are likely. The terms in the index are the lapse rate between 950mb and 850mb (F1) and the moisture availability at 850mb by calculating the dewpoint depression (F2). Once the lapse rate and dewpoint depressions have been calculated, look up the appropriate value for each term (A and B) and add the numbers together (A+B). The lowest the index will be is 2 and the highest is 6.

Haines Index = A + B

F1 = T950 - T850

F1 = 3 deg C or less then	A = 1
F1 = 4-7 C then	A = 2

F1 = 8 deg C or more then A = 3

F2 = T850 - Td850

F2 = 3 deg C or less then B = 1
F2 = 4-7 C then B = 2
F2 = 8 deg C or more then B = 3

Ventilation Index:
This index is found by multiplying the mixing height (feet) with the transport wind speed (mph), then dividing by 100.

Example...
Mixing height = 14,000 feet
Transport wind = 15 mph
VI = 14,000 * 15 / 100 = 2100(no units)
Example...
Mixing height = 5,000 feet
Transport wind = 10 mph
VI = 5,000 * 10 / 100 = 500 (no units)

VI scale...
Less than 130 = POOR dispersal
130 – 299 = FAIR dispersal
300 – 599 = GOOD dispersal
600 and greater = EXCELLENT dispersal

A ventilation index of zero implies no ability for the atmosphere to disperse smoke or pollutants, while a value of 600 or greater implies an excellent ability to disperse smoke or pollutants. The United States Forest Service and Department of Natural Resources has requested that when the VI is "fair", that we include a number value along with the term.

Dispersion Index:

The Dispersion Index is a number that gives a relative indication of how well smoke will disperse in the atmosphere. It is calculated by taking the Mixing Height divided by 1000 and then multiplying the result by the transport winds in knots. See the table below for an interpretation for a given Dispersion Index value.

Dispersion Index
Interpretation
> 100
Very Good
60-100
Good
41-60

Fair to Good
21-40
Fair
13-20
Poor to Fair
7-12
Poor
1-6
Very Poor

Dispersion:

Dispersion indicates the forecast smoke dispersion category for the overnight periods only. (4 knots = 4.6 mph; 8 knots = 9.2 mph; 12 knots = 13.8 mph)
Value
Interpretation
Wind Speed
1
Very Poor
≥ 4 knots
2
Poor
> 4 and ≤ 8 knots
3
Good
> 8 and ≤ 12 knots
4
Excellent
> 12 knots

Davis Stability Index (DSI) (WFO Paducah only):

The Davis Stability Index is a common fire stability index parameter utilized primarily in the southeast United States. The formula for the Davis Stability Index is as follows:

Davis Stability Index (DSI) = Max Temp (deg C) - 850mb Temp (deg C)

- If the difference is less than 10 deg C, it is considered a Category 1 or stable.
- If the difference is 10 deg C to 14 deg C, it is considered a Category 2 or conditionally unstable.
- If the difference is 15 deg C to 17 deg C, it is considered a Category 3 or unstable.
- If the difference is greater than 17 deg C, it is considered a Category 4 or absolutely unstable.

LIGHTNING ACTIVITY LEVEL (LAL):

A single digit (1 through 6) will be used. The meaning of each number is as follows:

- **1** No thunderstorms.
- **2** Few building cumulus with isolated thunderstorms. Occasional light rain reaching the ground.
- **3** Widely scattered thunderstorms with much building cumulus. Light to moderate rain reaching the ground.
- **4** Scattered thunderstorms, not obscuring the sky. Moderate rain reaching the ground.
- **5** Numerous thunderstorms, occasionally obscuring the sky. Moderate to heavy rain reaching the ground.
- **6** Same as **3** above, but dry, no rain.

Ventilation Rate (Vent Rate)/Smoke Dispersal:

The Vent Rate is a number that gives a relative indication of how well smoke will disperse in the atmosphere. It is calculated by taking the Mixing Height (in FT AGL) multiplied by the transport winds in knots. Units are in KNOT-FT.
The table below gives and interpretation for a given value of Vent Rate used by NWS Louisville:

Vent Rate
Interpretation
< 29,000
Poor
≥ 29,000 & < 38,000
Marginal
≥ 38,000 & < 50,000
Fair
≥ 50,000 & < 95,000
Good
≥ 95,000
Excellent (Burn with caution)

The table below gives and interpretation for a given value of Vent Rate used by NWS Paducah:
Vent Rate (kt-ft) = Mixing Height (ft) * Average Transport Winds (kt)
Interpretation
Interpretation
Vent Rate (kt-ft)
Vent Rate (m/s-m
Excellent
>= 150,000
>= 23445
Very Good
>= 100,000 and < 150,000

>= 15630 and <23445
Good
>= 60,000 and < 100,000
>=9378 and <15630
Fair
>= 40,000 and < 60,000
>=6252 and <9378
Poor
<= 40,000
<=6252

Lavdas Atmospheric Dispersion Index (ADI)

Atmospheric dispersion is the process by which the atmosphere mixes and transports particulates, such as smoke, away from their source. The Atmospheric Dispersion Index (ADI) was developed by the U.S. Forest Service to assess the impact of prescribed burning activity on atmospheric smoke concentrations and air quality. The same processes responsible for good smoke dispersion also contribute to erratic fire behavior and may present very hazardous conditions. A more in depth description can be found in the technical publication posted at http://www.srs.fs.usda.gov/pubs/rp/rp_se256.pdf.

Interpretation of Daytime ADI Values

ADI	DESCRIPTION
0-20	Poor dispersion, stagnant if persistent.
21-40	Poor to fair, stagnation may be indicated if accompanied by low wind speeds.
41-60	Generally Good
61-80	Very good dispersion. 75 and above, Control problems likely.
80 +	Excellent dispersion, Control problems expected.

Interpretation of Nighttime ADI Values

ADI	DESCRIPTION
0-2	Poor
3-4	Poor to Fair
5-8	Good
8 +	Very Good

LVORI

(Also known as the superfog indicator) Stands for Low Visibility Occurrence Risk Index (LVORI) is derived from the Lavdas ADI and the relative humidity, which gages the probability of visibility restrictions in fog or smoke. There are 10 LVORI categories; ranging from 1 (indicating the lowest probability of visibility restrictions) to 10 (indicating the highest probability of visibility restrictions). Technical details can be found at http://www.nwas.org/digest/papers/1995/Vol20-Issue1-Oct1995/Pg26-Lavdas.pdf

2014 Signatory Page

Indiana Department of Natural Resources	3-26-2014 Date
U.S. Fish and Wildlife	3/27/2014 Date
National Park Service (Indiana Dunes)	3/27/2014 Date
U.S. Forest Service	3/27/14 Date
National Weather Service On behalf of all NWS Offices covering Indiana	3/28/2014 Date