National Weather Service

Annual Operating Plan

for Fire Weather Services for the Commonwealth of Pennsylvania

2018

This operating plan will be a semi-permanent document, specifying Fire Weather services provided by National Weather Service (NWS) offices serving Pennsylvania. The plan incorporates procedures detailed in the Interagency Agreement for Meteorological Services.

I. Introduction

Purpose of the Annual Operating Plan (AOP)

This AOP for Fire Weather Services serves as the official document that governs and defines the interaction and relationship between the National Weather Service (NWS) and their partners in wildfire suppression and natural resource and land management agencies at the federal, state and local levels throughout the state of Pennsylvania (PA). These include, but are not limited to the following agencies:

United States Department of Commerce (DOC) /National Oceanic and Atmospheric Administration (NOAA) /National Weather Service (NWS)
National Interagency Coordination Center (NICC) - Eastern Area Coordination Center (EACC)
Pennsylvania Department of Conservation and Natural Resources - Bureau of Forestry (BOF)
United State Department of Agriculture (USDA)/Forest Service - Allegheny National Forest (ANF)
Pennsylvania Game Commission (PGC)
Pennsylvania Army National Guard - Fort Indiantown Gap (FIG)

The NWS Fire Weather program aims to provide forecast and warning services to the fire, land management and emergency response community to support the effective prevention and suppression of wildfires and management of forests. The major objective of the fire weather program is to provide a service which will meet the meteorological requirements of government and government associated agencies in the protection of life and property, promotion of firefighter and emergency responder safety, and stewardship of America's public lands.

Explanation of relationship between the AOP and Memorandum of Understanding (MOU)

The EACC will use this AOP with regards to its MOU for Meteorological Services contained in chapter 40 of its Geographic Area Mobilization Guide for use in Pennsylvania. The Eastern Area Mobilization Guide and the National Mobilization Guide further define the relationship between the natural resource agencies and the NWS Incident Meteorologist (IMET).

This AOP will be reviewed at the beginning of each year by all concerned parties for accuracy and continued relevance. Any changes will be noted, and an updated AOP will be made available to all partner agencies noted within the document before the onset of the Spring fire weather season.

This Operating Plan is issued in lieu of a formal MOU between the NWS, federal, state, and other agencies that rely on fire weather support. The plan will outline forecast operations and services available to users. This includes products and formats, dissemination and coordination, and the responsibilities of the partners.

This Operating Plan for Fire Weather Services conforms to the Interagency Agreement for Meteorological Services.

II. Pennsylvania Fire Weather Seasons

Climatologically, early Spring (March - May) is the most active time of year for wildfires in Pennsylvania, with a secondary maximum of occurrence in the Fall (October - December).

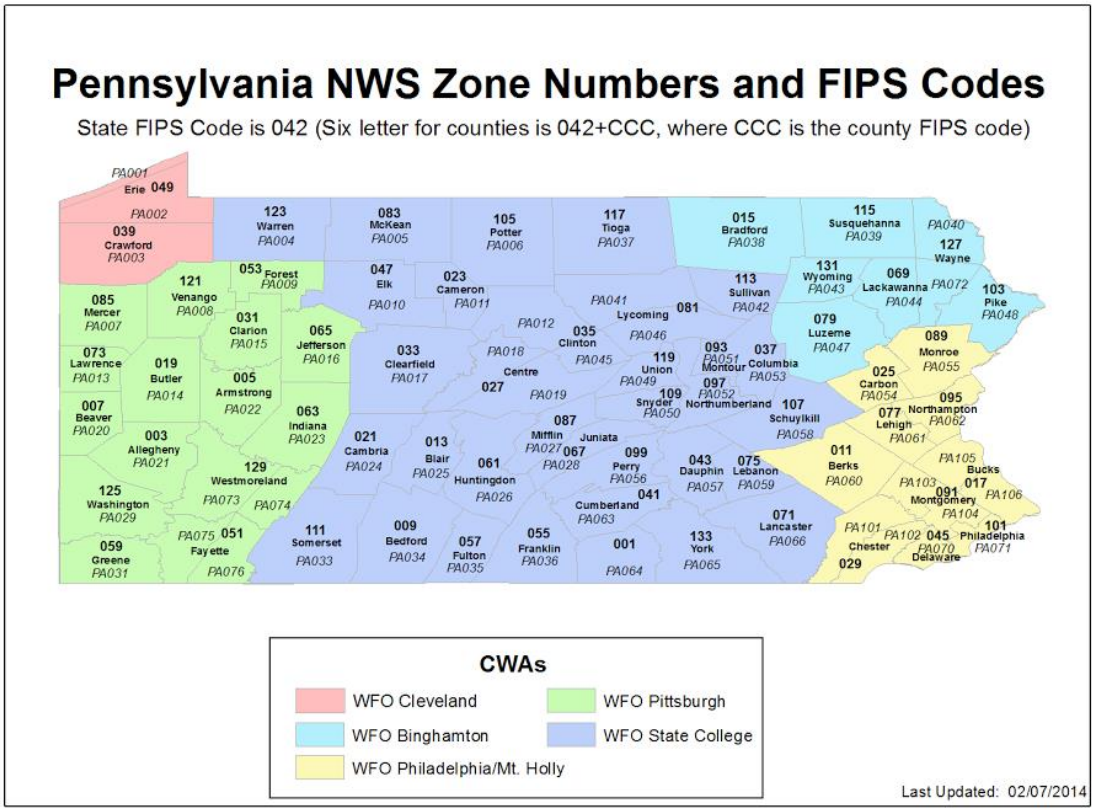
Prior to March 2007, the Pennsylvania fire weather forecast program was routinely activated in the Spring and Fall seasons. The exact dates for the beginning and ending of the issuance of fire weather product were determined by collaboration among the PA Bureau of Forestry, the Allegheny National Forest and NWS State College. NWS State College then notified the other NWS offices providing fire weather services to Pennsylvania of the dates to begin and end the fire seasons.

In March of 2007, fire managers from the Pennsylvania Bureau of Forestry and Allegheny National Forest requested that the daily Fire Weather Forecast (FWF) be issued year-round, citing less seasonality to wildfire activity and the usefulness of the product in all months of the year. Therefore, the FWF product is now issued at least once daily year–round by all offices serving Pennsylvania.

III. Service Area and NWS Organizational Structure

Service Area

Fire weather products and services are issued by the five NWS Weather Forecast Offices (WFOs) serving Pennsylvania. These include WFO Binghamton, NY - BGM, WFO Cleveland, OH - CLE, WFO Mt. Holly, NJ – PHI, WFO Pittsburgh, PA - PBZ, and WFO State College, PA – CTP. For their respective county warning and forecast areas see the map below and Appendix A.



The forecast area for which each NWS office is responsible is generally tied to the "radar umbrella" of the WSR-88D Doppler Radar associated with each WFO. The “umbrella” is the area which is covered by the radar volume scan. This means that forecasts are not necessarily bound by state political borders, but county borders are observed. As a result of this configuration, the Allegheny National Forest, for example, is covered by more than one NWS Forecast Office.

WFO State College is the NWS designated state liaison office (SLO) for Pennsylvania and serves as the NWS state-level representative with the Pennsylvania Bureau of Forestry, Allegheny National Forest and Pennsylvania Game Commission and other fire weather partners. However, all NWS offices are encouraged to communicate and collaborate as needed with partners and other customers to ensure adequate and appropriate provision of fire weather services.

NWS Organizational Structure

National Weather Service Headquarters

NWS Headquarters, located in Silver Spring, Maryland, establishes policies and coordinates the national Fire Weather program. The national program manager coordinates the program with the regional program managers. The national program manager also works with the national headquarters of the Federal forestry and other natural resource management agencies and the Association of State Foresters in determining overall requirements for meteorological support. The national program manager coordinates national training in forestry and fire weather for NWS forecasters.

National Weather Service Regional Headquarters

Regional Headquarters manage the technical operational aspects of the Fire Weather program within each region. They also provide guidance and assistance to meteorologists-in-charge on program operations and developing issues through Supplements to the National Directives System and conferences. Regional Headquarters advise National Headquarters on matters pertaining to technical planning and operations. The regional program managers coordinate the regions' Fire Weather programs and advise the Regional Directors on the operational and administrative aspects of the regions' programs. Pennsylvania is located within the National Weather Service's Eastern Region. Eastern Region headquarters is located on Long Island, NY.

Weather Forecast Offices (WFO)

Meteorologists at WFOs prepare and disseminate forecast products for all sectors of the population, including those for the Fire Weather program. WFOs are responsible for providing forecasts, watches and warnings for user agencies within their County Warning Area (CWA) 24-hour a day, 365 days a year. Most offices have a designated Fire Weather Program Leader or Focal Point.

Fire Weather Program Leaders (or Focal Points)

The Fire Weather Program Leader (FWPL), or Focal Point, is the "customer service representative" for the Fire Weather program at each WFO. Program leaders, as representatives of the MIC's, should be in regular contact with the partner agencies, helping them assess their meteorological needs, informing them of NWS products and services available to meet these needs, and educating them in the most effective use of the various NWS products and resources, including NOAA Weather Radio (NWR). Program leaders will work with users to utilize existing NWS products and services produced for other programs that could meet the requirements of natural resource management. Program leaders are also tasked with ensuring NWS staff meteorologists are trained and remain proficient in preparing forecast products for support of the fire weather program. Fire Weather program leaders can be reached via e-mail or through contact with their respective office. See APPENDIX B

Meteorologists-in-Charge

The Meteorologist-in-Charge (MIC) of each WFO is responsible for the provision of adequate weather services for the offices' assigned areas of program responsibility. The MIC will ensure that the focal points or program leaders are provided adequate time for user liaison and assistance activities. MICs can be reached via email or through contact with their respective office. See APPENDIX B

Warning Coordination Meteorologists

The Warning Coordination Meteorologist (WCM) assists the MIC and serves as the "customer service representatives" for all forecast programs of each WFO. They can serve as another Fire Weather customer/partner point-of-contact, especially during weekday hours as FWPLs generally work rotating shifts and are not always in the office during 'regular' business hours. See APPENDIX B

IV. Services Provided by the National Weather Service

NWS Directives

Details of NWS products and programs are specified within chapter 10 of the NWS Policy Directives. The structure of this chapter and associated links are as noted below: NDS 10-4 Fire Weather Services.

- 10-401 Fire Weather Services Product Specification
- 10-402 Fire Weather Services On-Site Support
- 10-403 Fire Weather Services Coordination and Outreach
- 10-404 Fire Weather Services Annual Operating Plan and Report
- 10-405 Fire Weather Services Training and Professional Development
- 10-407 Fire Weather Services Zone Change Process

Basic Services and Forecast Products

Fire Weather Planning Forecast (FWF)

The *Fire Weather Planning Forecast* (FWF) is a zone-type product used by fire control and natural resource management personnel for decision-making related to pre-suppression and other planning or resource management activities, as well as for determining general weather trends that might impact burning conditions and thereby fire behavior of wildfires and prescribed fires. Their decisions impact firefighter safety, public safety, public and private property, natural resources, and resource allocation.

Product Overview, Issuance and Update Criteria

The FWF is issued between 4 and 6 AM ET every day of the year by all five WFOs serving Pennsylvania. This morning FWF issuance provides a 36- hour period of detailed forecast information accompanied by a general extended forecast out to 7 days. An 8 to 14 day outlook of whether general temperature and precipitation trends will be above, at, or below normal is also included. The 36 hour forecast consists of three 12-hour periods (Today, Tonight, and Tomorrow).

The FWF should be updated at forecaster discretion if the forecast actual weather conditi

The FWF should be updated to include the issuance and ending of Fire Weather Watches and Red Flag Warnings.

Routine updates

A daily afternoon update of the FWF is issued by all five WFOs, generally between 2PM and 4PM ET.

Each WFO serving Pennsylvania issues updates to the FWF and varying times through the day, season and year.

WFO CLE only provides this afternoon update during Daylight Savings Time. The afternoon FWF consists of four periods: "Tonight", "Tomorrow", "Tomorrow Night", and "the Next Day". This afternoon update is provided at the request of our partners citing its usefulness to fire managers as they 1) deal with ongoing fire activity at the end of regular daytime shifts and determine the need to keep personnel into the evening hours and 2) plan for personnel and equipment for the following day.

WFO BGM also issues an update in the late morning.

Non-routine updates

*Per NWS Directive 10-401, the FWF will be updated anytime the current forecast is not representative of current conditions, and when Fire Weather Watches or Red Flag Warnings are issued or canceled.

Content and Format of the FWF

See Appendix C

Fire Weather Watch and Red Flag Warning Program

Fire Weather Watches and Red Flag Warnings are the official NWS products used to inform firefighters and fire control agencies of the possibility of severe or critical fire weather conditions. The issuance of said watches or warnings normally require the combination of very high to extreme fire danger and critical weather conditions, see below, such as significantly increased winds and wind shifts, thunderstorm activity containing little or no rain, and significantly decreased humidity. More so than other NWS products, these issuances are coordinated with our fire weather partners and, generally, these Red Flag Warning criteria require advance coordination.

Note: Meeting or exceeding the necessary criteria for Red Flag warnings is considered a *rare event* in Pennsylvania.

Fire Weather Watch

A Fire Weather Watch will be issued, after coordination with the appropriate natural resource agencies, to advise of the possible development of a Red Flag event in the near future. It will be issued for all or part of the forecast area. A Fire Weather Watch is issued when the forecaster and appropriate natural resource agencies are reasonably confident that a Red Flag event will occur. A watch should be issued 12 to 48 hours in advance of, but not more 72 hours in advance of, the expected onset of the critical weather conditions. The watch will remain in effect until either it is determined the Red Flag event will not develop, or that the watch should be upgraded to a warning. If conditions are not expected to occur as forecast, the watch will be canceled. The format of the Fire Weather Watch is specified in National Weather Service Directive 10-401.

Red Flag Warning

A Red Flag Warning will be issued, after coordination with the appropriate natural resource agencies, when a Red Flag event is occurring or is imminent. The warning will be issued for all or a portion of the forecast area. It will be issued immediately once the forecaster and the appropriate natural resource agency have determined that a Red Flag event is ongoing. Otherwise, it shall be issued for impending Red Flag conditions when there is a high degree of confidence that conditions will develop within 24 hours. The warning will continue until the conditions cease to exist or fail to develop as forecast. At such time, the warning will be canceled. The format of the Red Flag Warning is specified in National Weather Service Directive 10-401.

Definition of a Red Flag Event

A Red Flag event occurs when critical weather conditions develop which could lead to extreme wildfire behavior or to extensive wildfire occurrence. Red Flag events represent a threat to life and property, and may adversely impact firefighting personnel and resources. Critical weather conditions include combinations of the following: strong, gusty winds; very low relative humidity; high to extreme fire danger, very low fuel moisture. Historically, the highest risk of significant fire starts and blow-ups occur when fuels are sufficiently dry and dry cold fronts pass over the region. Dry cold fronts typically cause lower humidity levels and produce shifting and increasing wind.

In an effort to simplify the Red Flag Warning process, forecasters at the NWS offices in PA will mainly be concerned with the specific weather conditions and critical weather patterns necessary to produce Red Flag conditions. Tracking fuel moisture will be the responsibility of the PA Bureau of Forestry (BOF).

Generally, a Red Flag Warning will be issued when:

CRITERIA (must meet all 3)

1) 10-Hour fuel moisture is 10% or less…

2) Minimum relative humidity (RH) levels are expected to fall to 30% or lower…

AND

3) Surface winds sustained or frequently gusting at or above 20 mph for 2 or more hours.

Fuel Moisture collaboration procedure

When a NWS forecaster at any office serving Pennsylvania notices that 10 hour fuel moisture values are observed or forecast to equal or fall below 10%, and is concerned about other factors influencing fine fuel capacity to burn (e.g. elevated Fire Danger, lack of recent rainfall, etc.), and is forecasting significant winds and low relative humidity in the next 24 to 48 hours, they should initiate contact with WFO CTP regarding such concerns. WFO CTP as SLO will contact the officials with the BOF and/or ANF to obtain assessment of the fuel moisture status across the state. This fuel moisture assessment will then be communicated to all NWS offices serving PA. A first guess of 10 hour fuel moisture values from the WFAS website is available at this link: http://www.wfas.net/images/firedanger/fm_10.png.

WFO CTP will keep in contact with BOF and ANF as often as needed to adequately assess the fuel moisture situation.

To ensure adequate lead time of Fire Weather Watches and Red Flag Warnings, the preferred collaboration time is during the daytime administrative hours Monday through Friday, the day before a Fire Weather Watch or Red Flag Warning is expected to be needed.

Content and Format of the RFW

See Appendix D

Call-To-Action Statements

NWS warning products typically conclude with a Call-To-Action statement (CTA) to summarize the nature of the warning and provide concise, potentially life-saving action oriented information. CTAs approved for use in Red Flag Warnings by NWS offices in Eastern Region can be found in Appendix E.

Site-Specific (Spot) Forecasts

Criteria

Spot forecasts are non-routine, site - specific weather forecasts prepared upon request and issued by the National Weather Service in support of wildfire suppression and natural resource management (eg. prescribed burns). Spot forecasts are also issued for other emergency situations where public safety is involved, such as, but not limited to, hazardous materials incidents and search and rescue operations. These forecasts aid the land management and fire control agencies in protecting life and property during wildland fires, hazardous fuels reduction, and rehabilitation and restoration of natural resources. In the event of an emergency which threatens life and/or property, Spot forecasts can also be provided to any federal, state, or local agency.

Spot forecast requests for wildfires and hazardous material emergencies are considered high priority and can be obtained at any time. The response for Spots forecasts for prescribed burns, however, may be delayed due to higher priority responsibilities related to ongoing weather. Spot forecasts are available anytime of the day, week or season and are considered one-time requests which are not routinely updated.

Content

Spot forecasts are highly detailed forecasts for a specific location within a WFOs area of responsibility. The format of the Spot forecast (see Appendix F) is specified in National Weather Service Directive 10-401. The forecasts will be headlined for a Red Flag Warning or Fire Weather Watch. The forecasts will begin with a discussion, and may contain any or all of the following weather elements: sky conditions; maximum and minimum temperatures, minimum and maximum relative humidity values, wind speed and direction; probability of precipitation; precipitation type, duration and amount; mixing heights; transport wind; inversion height; inversion onset and burn-off times or temperatures; ventilation and

smoke management levels; wind profiles; stability indices (ie., Haines Index), and lightning activity levels (LAL).

Procedures for Requesting a Spot Forecast

Requests for and retrieval of completed Spot forecasts for any location should be made through the NWS National Spot Forecast Request web page http://www.weather.gov/spot.

The NWS will prepare and transmit a Spot Forecast when requested by a user agency. Due to the detailed and specific nature of this forecast product, it is imperative that the requesting official/entity provide the NWS with necessary and sufficient information so that a reliable forecast can be prepared.

The web-based request form should be filled out as completely as possible (required parameters are listed in red) by the requesting agency prior to submitting the request. Use the Latitude/Longitude for the incident location, and this should be entered in either decimal degrees, or degrees/minutes/seconds. If you are using decimal degrees enter as standard (e.g. 37.52). If degrees/minutes/seconds, use a second decimal (e.g. 37.31.12), or leave a space between each number (e.g. 37 31 12).

Alternate procedures

At times when internet access is not available, Spot forecasts may be requested and disseminated via fax or phone. If faxing a request, users should use the Fire Weather Special Forecast Request Form, WS Form D-1 (Appendix G). Section I of WS Form D-1 should be filled out as completely as possible by the user agency prior to submitting the request by fax to the forecast office. If the request is made by phone, all information in Section I should be provided to the forecast office.

Helpful hints:

While there is generally no dedicated fire weather forecaster, each forecast office will give a high priority to Spot forecasts in the absence of weather phenomena in the CWA that pose a threat to life and property. To ensure that the request for a Spot forecast is handled properly and appropriately, users should adhere to the following guidelines:

1) Allow adequate time for the forecaster to prepare the forecast. This will normally be within 30 minutes. On particularly busy fire weather days, Spot forecasts will be handled on a first-come, first-serve basis, with wildfires or other life threatening events taking the highest priority.

2) Requesting agencies should provide as much on-site or near-site weather information as possible. At a minimum, the user should provide at least one observation within an hour of the request. This observation should contain the following: location of the observation; elevation at the observation site; time of the observation; wind direction, speed, and level (eye or 20 foot); dry and wet bulb temperatures; any remarks about the state of the weather, particularly anything that may affect fire behavior. If possible, include some observations from the previous day that might give the forecaster an indication of daily trends.

3) As much as possible, specify the time period for which the forecast is needed.

4) As much as possible, specify the weather elements of most importance for which a forecast is needed, and/or critical values of these elements.

5) Provide a contact point name and phone number where the forecaster can call back, if necessary. (Also include an email address or fax number for returning completed forecasts if the web-based Spot forecast form is not used).

6) In order to receive prompt attention for a fax request, please phone the office to let the forecaster know the request is on the way.

7) Natural resource agency personnel should contact the NWS forecast office for a Spot update if the forecast conditions appear unrepresentative of the actual weather conditions. Whenever possible, users should provide feedback, positive or negative, to the NWS forecast office concerning the performance of the Spot forecast during or shortly after an event. This will assist forecasters in subsequent forecasts for the same location/incident or similar weather conditions.

National Fire Danger Rating System (NFDRS) Forecasts

Issuance

NFDRS forecasts will be issued for any predetermined site from which an NFDRS observation is received provided the observation is received on time, is complete, and is deemed accurate. The natural resource agencies will determine which observation sites (normally RAWS sites) will be NFDRS sites. Initiation of NFDRS forecasts for a new site will be coordinated with the NWS, and the agency requesting new NFDRS service will provide the NWS with information about the site location. Forecasts will not be provided for sites with bad data. The NWS will notify the owner agency when bad data is received from a RAWS station.

Content

The NFDRS forecast will be a forecast of the next day observation at 1300 local time (LT). The format of the NFDRS forecast is specified in National Weather Service Directive 10-401.

Procedures

The land management agencies are responsible for taking, quality controlling, transmitting and archiving the NFDRS observations. Observations must be received at the NWS in a timely manner. Forecasts will only be prepared for predetermined sites, and only from those sites for which an observation has been received. The deadline for the land management agency for transmitting the observation is 1900 GMT (2:00 PM EST or 3:00 PM EDT). The NWS will prepare and transmit the NFDRS forecasts no later than 1945 GMT (2:45 PM EST or 3:45 PM EDT). Although the data cutoff time for ingest into the NFDRS software is 7 PM, preliminary calculations based on the forecast are used by the land managers to make staffing decisions at shift briefing time (4 PM).

Examples of these forecasts can be found in Appendix H.

Other WFO Fire Weather Forecasts Information

A variety of other NWS fire weather forecasts (graphical maps, hourly weather graphs, tabular forecasts, etc.) are available via the internet in several formats, generally graphical or a combination of graphical and worded. They are user-generated depending on time-frame, forecast parameter, and location desired. Forecasts are generated from the same database used to produce the FWF and Spot forecasts. Examples of these forecasts can be found in Appendix I.

Fire Weather Outlooks

The NWS's Storm Prediction Center (SPC) in Norman, OK issues forecasts of areas of significant threats for wildfires in the next eight (8) days. These forecasts can be found here:

http://www.spc.noaa.gov/products/fire_wx/

Other Fire Weather Services

Other fire weather services are those services that are uniquely required by our partners and go beyond routine weather forecast operations. Special services include but are not limited to

- Decision Support Services such as
    - Special briefings or coordination calls
    - Limited On-site Support
    - Incident Meteorologist (IMET) Deployment

- Fire Weather Training Service
- Support to Interagency Groups and Meetings

Decision Support Services

Special briefings or Coordination calls

Wild fire briefings: In cases where a spot forecast may not be enough, Incident Commander, EM or State Official may request phone briefings and updates. A call back number should be provided and threshold triggers set for when to call such as lightning, wind, low RH, etc.

Situational awareness briefings: In situations where a Fire Weather Watch or Red Flag Warning criteria is anticipated, the NWS may send a special weather briefing to partners via email highlighting potential risks.

Limited On-site Support

Initial Attack: Incident Commander, EM or State Official may request NWS to provide immediate onsite support from a PA NWS office to an EOC or Incident Command Post. This would likely be for high risk situations where rapid fire growth or rapidly changing weather conditions could put people and property at risk. Trained local NWS Meteorologist could respond to the scene within hours to provide local support. NWS would absorb overtime and local travel costs.

Extended Attack: In this case, wild fire support is needed for multiple days including overnight. Lodging, meals and overtime expenses would be required to maintain someone on site. A yearly signed State Agreement would allow State Officials to make this request and cover these expenses. If the fire is not contained by the end of the morning of the second day, it is highly recommended that an NWS IMET be requested.

Incident Meteorologist (IMET) Deployment

IMETs are specially trained and certified meteorologist to provide onsite fire support. The procedure for requesting IMETs is similar to that of requesting other fire equipment and resources through ROSS (Resource Ordering and Status System). It follows the guidelines outlined in the national MOA, the National Mobilization Guide, and the Eastern Area Interagency Mobilization Guide.

Typically, the IMET nearest the incident will be deployed and there are two such IMETs in Binghamton, NY and others within a day drive. NWS covers the IMET salary and IMETs arrive with their own resources including if necessary, tent and sleeping bag. Reimbursement costs for IMETs cover travel, overtime, meals and lodging as necessary.

Fire Weather Training Service

NWS meteorologists are available to assist in user-oriented training. This includes fire behavior courses, such as S-190, S-290 and S-390, where the meteorologist will serve as part of the cadre for that course. Requests for training assistance should be made through the WFO's FWPL or MIC.

Sufficient advance notice should be given to allow for scheduling and proper preparation. Costs incurred by the NWS in providing training assistance will generally be borne by the requesting agency.

Participation in Interagency Groups

An NWS representative will make every effort to attend the State Interagency meetings or working groups where fire weather or smoke management policy is discussed as an integral part of the meeting. Usually the representative will be the State Liaison WFO Fire Weather Program Leader or MIC. However, all NWS offices with fire weather responsibility are recommended to attend the meetings to ensure uniform representation and best possible services.

V. Partner Agency Responsibilities

Operational Support and Predictive Services

Program Management

The partner agencies will oversee the fire weather observation program, including the siting and maintenance of the observing equipment, fire weather training of their personnel, and the proficiency of their personnel in the use of the NWS Spot software.

Monitoring, Feedback and Improvement

Natural resource agencies will monitor the quality and timeliness of NWS fire weather products, and provide feedback to the NWS in order to improve services to the agencies.

Technology Transfer

The natural resource agencies may, from time to time, advise the NWS of new technologies being implemented to monitor meteorological or fuel parameters, or to improve communication, coordination, training or reference. Natural resource agency personnel may, with prior arrangement, visit an NWS office to acquire knowledge of NWS technologies used in the monitoring of weather, or the preparation of products.

Agency Computer Resources

The Internet appears to be the primary method that customers use to obtain Fire Weather forecast and warning products and for both requesting and receiving Spot forecasts. As a backup method, a request can be made to the NWS for a product to be faxed to the customer agency. NFDRS observations will be entered into WIMS, and forecasts and calculations based on these observations will be received by WIMS, or by internet via a WIMS website.

Fire Weather Observations

Fire weather observation stations provide the specialized weather observations for fire weather forecasts, wildfire control and suppression, and various other land management operations. These stations were selected carefully in each state and federal district. Sites were chosen to represent homogeneous weather conditions across a district. Stations may either be manned sites operated by land management agencies, or un-manned, Remote Automatic Weather Stations (RAWS) maintained by any of the federal or state land management agencies in the area.

As of the effective date of this AOP:

- There are eighteen (18) operational RAWS sites in Pennsylvania. See APPENDIX J for station location and information.

- The PGC operates four (4) mobile weather stations in Pennsylvania. See APPENDIX K for links to the station web sites.

Sensor failure will often result in erroneous or, at best, suspicious values. If the NWS becomes aware of such a situation, it is prudent to contact the station owner. Similarly, if a station owner becomes aware of a sensor failure, they should relay that information to the appropriate NWS office. It is that station owner's responsibility to make sure that their station is and remains in good working order and repairs are made in a timely manner. Owners of NFDRS stations can still (and should) correct any errors in their respective observations.

It is important to note, observations are the most important single effort the control agencies put into the fire weather program. Potential fire danger is derived from these observations. The Fire Danger Rating System is the guidance tool that, together with the weather forecast, is used to make a variety of management decisions. It is important that observers be well trained and informed of the necessity for accurate, timely, and representative observations.

On - Site Support

The user agencies are also responsible for maintaining observation site equipment. NWS personnel may accompany the user on maintenance trips or for annual inspection visits, which could also serve as liaison with the users.

Training

The responsibility of training natural resource agency employees will be that of the agencies themselves. However, the NWS will be available to assist when requested to do so. Any expenses incurred by the NWS will normally be charged to the user agency, unless other arrangements have been made.

VI. Miscellaneous

Joint Responsibilities

Joint responsibilities include the following:

Meetings between the NWS and our partner agencies

Fire weather program leaders from WFO State College, WFO Pittsburgh or both have attended the annual BOF-ANF COOP meeting held in northwest Pennsylvania for each of at least the last ten years. They have provided a review of changes to the NWS Fire Weather program, Spring weather outlooks and participated in the training program.

WFO State College, with the support of all other PA WFOS has hosted several Pennsylvania Fire Weather workshops at WFO State College, most recently in October of 2012. Fire management officials from all primary partners were in attendance and have played a key role in determining changes in NWS Red Flag Warning criteria, and NWS forecast products through discussion and direct customer feedback.

It is the desire of the NWS to continue to participate in these workshops.

Maintenance and Revision of the Annual Operating Plan

The AOP should be revised each year by the end of February, with cooperation and participation from each NWS office and each partner agency. The NWS Office in State College, as the SLO, will be the custodian of the plan.

Notification of NWS Changes in Operating Procedures

From time to time, NWS headquarters, or NWS Eastern Region Headquarters, will send draft versions of future directives to their forecast offices for review and comment. To ensure that the partner agencies have an opportunity to review and comment on proposed changes, the NWS State Liaison Office in State College will forward a copy of draft directives to partner agencies when they are received. Comments and suggestions can be forwarded to the NWS State Liaison Office in State College, which will forward them to NWS Eastern Region Headquarters.

Agreements on Services Provided

Agreements on services and standards are normally reached at statewide meetings, but may be achieved at by a series of local meetings or by other means such as telephone or e-mail. NWS offices and land managers should be aware of the ripple effect an agreement might have on other NWS offices and their customers, particularly when service areas cross state lines.

Workplace Visits

Partner agencies and the NWS collaborate on familiarization of personnel in each other's fields of expertise, operations and equipment. Visits to offices and work centers, as well as field job sites can meet part of these requirements.

Service Evaluation

Services provided by the NWS and delivery of observations and information from the partner agencies to the NWS in support of these services shall be under constant evaluation by both parties.

Effective Dates on the AOP

The effective dates of this Annual Operating Plan will be from January 1 through December 31 of the current calendar year. This plan will be subject to review and revision by all signatory parties each year, or more frequently as operations warrant.

This plan will be available on the fire weather web page of each WFO. A copy of this plan will be sent to NWS Eastern Region Headquarters by January 31 of the current year. Eastern Region Headquarters will forward a copy of the plan to NIFC and NWS Headquarters.

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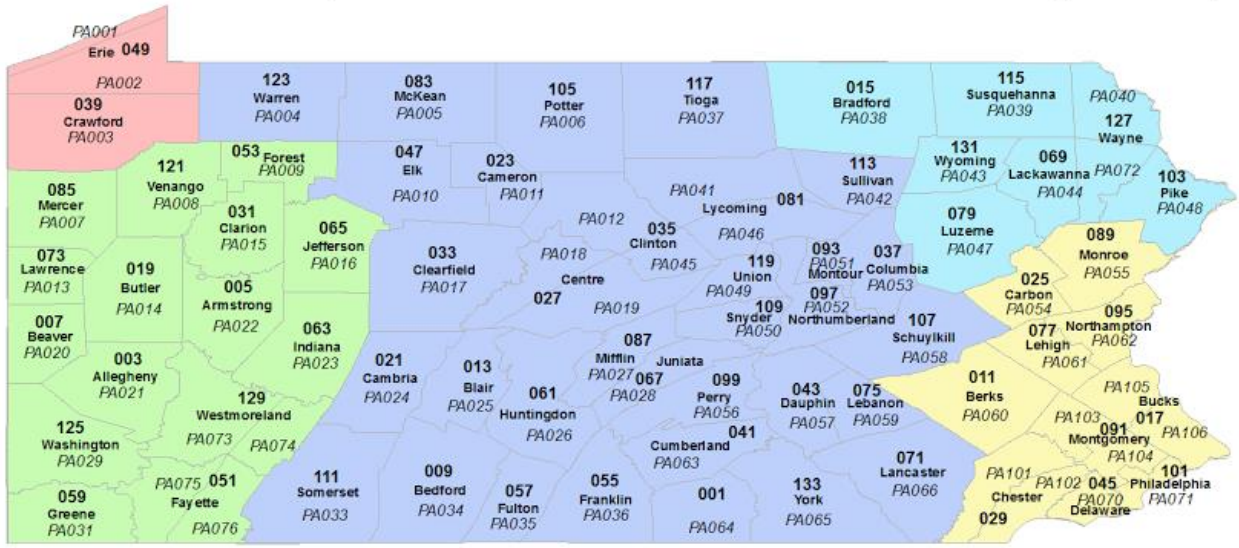
APPENDICES

Appendix A: NWS office areas of responsibility for Pennsylvania

Pennsylvania NWS Zone Numbers and FIPS Codes

State FIPS Code is 042 (Six letter for counties is 042+CCC, where CCC is the county FIPS code)



PENNSYLVANIA FIRE WEATHER FORECAST RESPONSIBILITY
by National Weather Service County Warning and Forecast Area

The **Binghamton, NY, (BGM)** forecast office covers the following seven (7) counties in Northeastern Pennsylvania, highlighted in teal in the map above: Bradford, Lackawanna, Luzerne, Pike, Susquehanna, Wayne and Wyoming.

The **Cleveland, OH (CLE)** forecast office covers the following two (2) counties in Northwestern Pennsylvania, highlighted in pink on the map above: Crawford and Erie.

The **Mount Holly, NJ/Philadelphia, PA (PHI)** forecast office covers the following ten (10) counties in Southeastern and East Central Pennsylvania, highlighted in yellow on the map above: Berks, Bucks, Carbon, Chester, Delaware, Lehigh, Monroe, Montgomery, Northampton, Philadelphia.

The **Pittsburgh, PA, (PBZ)** forecast office covers the following fifteen (15) counties in Western Pennsylvania, highlighted in green on the map above: Allegheny, Armstrong, Beaver, Butler, Clarion, Fayette, Forest, Greene, Indiana, Jefferson, Lawrence, Mercer, Venango, Washington, Westmoreland.

The **State College, PA, (CTP)** forecast office covers the following thirty three (33) counties in Central Pennsylvania, highlighted in blue on the map above: Adams, Bedford, Blair, Centre, Cambria, Cameron, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Elk, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Lycoming, McKean, Mifflin, Montour, Northumberland, Perry, Potter, Schuylkill, Snyder, Somerset, Sullivan, Tioga, Union, Warren, York.

NWS OFFICE- WFO Cleveland, OH (CLE) - Northwest PA

County	Zone Code	Metafire zone
Northern Erie	PAZ001	10 - Northwest Plateau
Southern Erie	PAZ002	10 - Northwest Plateau
Crawford	PAZ003	10 - Northwest Plateau

NWS OFFICE- WFO Mt. Holly, NJ (PHI) - Southeast PA

County	Zone Code	Metafire zone
Monroe	PAZ055	1 - Pocono/E. Central Mtns
Carbon	PAZ054	1 - Pocono/E. Central Mtns
Northhampton	PAZ062	1 - Pocono/E. Central Mtns
Lehigh	PAZ061	1 - Pocono/E. Central Mtns
Berks	PAZ060	3 - Southeast Piedmont
Eastern Chester	PAZ102	3 - Southeast Piedmont
Western Chester	PAZ101	3 - Southeast Piedmont
Eastern Montgomery	PAZ104	3 - Southeast Piedmont
Western Montgomery	PAZ103	3 - Southeast Piedmont

Upper Bucks	PAZ105	3 - Southeast Piedmont
Lower Bucks	PAZ106	3 - Southeast Piedmont
Delaware	PAZ070	3 - Southeast Piedmont
Philadelphia	PAZ071	3 - Southeast Piedmont

NWS OFFICE- WFO State College, PA (CTP) - Central PA

County	Zone Code	Metafire zone
Schuylkill	PAZ058	1 - Pocono Mountains
Dauphin	PAZ057	3 - Southeast Piedmont
Lebanon	PAZ059	3 - Southeast Piedmont
Lancaster	PAZ066	3 - Southeast Piedmont
Franklin	PAZ036	4 - Lower Susquehanna
Cumberland	PAZ063	4 - Lower Susquehanna
Adams	PAZ064	4 - Lower Susquehanna
York	PAZ065	4 - Lower Susquehanna
Mifflin	PAZ027	5- Middle Susquehanna
Juniata	PAZ028	5- Middle Susquehanna
Northern Lycoming	PAZ041	5- Middle Susquehanna
Southern Lycoming	PAZ046	5- Middle Susquehanna
Union	PAZ049	5- Middle Susquehanna
Snyder	PAZ050	5- Middle Susquehanna
Montour	PAZ051	5- Middle Susquehanna
Northumberland	PAZ052	5- Middle Susquehanna
Columbia	PAZ053	5- Middle Susquehanna
Perry	PAZ056	5 - Middle Susquehanna
Sullivan	PAZ042	6 - Upper Susquehanna
Tioga	PAZ037	6 - Upper Susquehanna
Elk	PAZ010	7 - Central Mountains
Cameron	PAZ011	7 - Central Mountains
Northern Clinton	PAZ012	7 - Central Mountains
Southern Clinton	PAZ045	7 - Central Mountains
Clearfield	PAZ017	7 - Central Mountains
Northern Centre	PAZ018	7 - Central Mountains
Southern Centre	PAZ019	7 - Central Mountains
Cambria	PAZ024	8 - South Central Mountains
Blair	PAZ025	8 - South Central Mountains
Huntingdon	PAZ026	8 - South Central Mountains
Bedford	PAZ034	8 - South Central Mountains
Fulton	PAZ035	8 - South Central Mountains
Somerset	PAZ033	9 - Southwest Plateau
Warren	PAZ004	10 - Northwest Plateau
McKean	PAZ005	10 - Northwest Plateau
Potter	PAZ006	10 - Northwest Plateau

NWS OFFICE- WFO Pittsburgh, PA (PBZ) - Southwest PA

County	Zone Code	Metafire zone
Lawrence	PAZ013	9 - Southwest Plateau
Butler	PAZ014	9 - Southwest Plateau
Beaver	PAZ020	9 - Southwest Plateau
Allegheny	PAZ021	9 - Southwest Plateau
Armstrong	PAZ022	9 - Southwest Plateau
Indiana	PAZ023	9 - Southwest Plateau
Washington	PAZ029	9 - Southwest Plateau
Westmoreland	PAZ073	9 - Southwest Plateau
Westmoreland Ridges	PAZ074	9 - Southwest Plateau
Greene	PAZ031	9 - Southwest Plateau
Fayette	PAZ075	9 - Southwest Plateau
Fayette Ridges	PAZ076	9 - Southwest Plateau
Mercer	PAZ007	10 - Northwest Plateau
Venango	PAZ008	10 - Northwest Plateau
Forest	PAZ009	10 - Northwest Plateau
Clarion	PAZ015	10 - Northwest Plateau
Jefferson	PAZ016	10 - Northwest Plateau

NWS OFFICE- WFO Binghamton, NY (BGM) - Northeast PA

County/Zone	Zone Code	Metafire zone
Bradford	PAZ038	6 - Upper Susquehanna
Susquehanna	PAZ039	6 - Upper Susquehanna
Wyoming	PAZ043	6 - Upper Susquehanna
Luzerne	PAZ047	1 - Pocono/E. Central Mtns
Lackawana	PAZ044	1 - Pocono/E. Central Mtns
Northern Wayne	PAZ040	1 - Pocono/E. Central Mtns
Southern Wayne	PAZ072	1 - Pocono/E. Central Mtns
Pike	PAZ048	1 - Pocono/E. Central Mtns

Appendix B: PA Fire Weather Program Contact Information

Contact your local National Weather Service office for more information.

Appendix C: Content and format of the Fire Weather Forecast (FWF)

The communication headers for the fire weather forecasts for PA are as follows:

FIRE WEATHER FORECAST

OFFICE	9-letter ID	AWIPS	WMO	AREA
WFO BGM –	ALBFWFBGM	FWFBGM	FNUS51 KBGM	Northeast PA
WFO CLE -	CLEFWFCLE	FWFCLE	FNUS51 KCLE	Northwest PA
WFO CTP -	PHLFWFCTP	FWFCTP	FNUS51 KCTP	Central PA
WFO PBZ -	PITFWFPIT	FWFPIT	FNUS51 KPBZ	Western PA
WFO PHI -	PHLFWFPHL	FWFPHL	FNUS51 KPHI	Southeast PA

```
119
FNUS51 KCTP 031100
FWFCTP

FIRE WEATHER PLANNING FORECAST FOR CENTRAL PENNSYLVANIA
NATIONAL WEATHER SERVICE STATE COLLEGE PA
600 AM EST SUN NOV 3 2013

.DISCUSSION...
COLD NORTHWESTERLY FLOW WILL CONTINUE TODAY. MOIST FLOW WILL
ALLOW FOR SNOW SHOWERS OVER THE NORTHWEST MOUNTAINS THIS MORNING.
THESE SNOW SHOWERS WILL END BY MID MORNING...AS HIGH PRESSURE
BUILDS INTO THE REGION. THIS WILL LEADING TO MOSTLY SUNNY SKIES
AFTER MORNING CLOUDS. NORTHWEST WINDS WILL AGAIN BECOME GUSTY IN
THE AFTERNOON...ESPECIALLY OVER THE SOUTHEAST. HOWEVER WIND GUSTS
WILL BE WEAKER THAN YESTERDAY...WITH GUSTS UP TO 20 MPH POSSIBLE.
RELATIVE HUMIDITIES ARE FORECAST TO BE IN THE UPPER 30 TO UPPER 40
PERCENT RANGE.

PAZ004>006-010-011-032200-
WARREN-MCKEAN-POTTER-ELK-CAMERON-
INCLUDING THE CITIES OF...WARREN...BRADFORD...COUDERSPORT...
ST. MARYS...RIDGWAY...EMPORIUM
600 AM EST SUN NOV 3 2013

                              TODAY      TONIGHT          MON

CLOUD COVER                   PCLDY        CLEAR       MCLEAR
PRECIP TYPE                    NONE         NONE         NONE
CHANCE PRECIP (%)                 0            0            0
TEMP (24H TREND)           40 (-7)      17 (-12)           42
RH % (24H TREND)           41 (-17)      91 (-7)           32
20FTWND-VAL/AM(MPH)            N  8                    LGT/VAR
20FTWND-RDG/PM(MPH)            N  7         N  6         SE  5
PRECIP AMOUNT                 0.00         0.00         0.00
PRECIP DURATION
```

PRECIP BEGIN			
PRECIP END			
MIXING HGT(FT-AGL/MSL)	6140	10	3780
TRANSPORT WND (KTS)	NW 15	NE 9	SE 8
VENT RATE (KT-FT)	112110	40	43220
DISPERSION	5	1	5
DSI	2	0	1
LAL	NO TSTMS	NO TSTMS	NO TSTMS
HAINES INDEX	4	5	5
RH RECOVERY	EXCELLENT	EXCELLENT	EXCELLENT

REMARKS...NONE.

.FORECAST FOR DAYS 3 THROUGH 7...
.MONDAY NIGHT...PARTLY CLOUDY. LOWS IN THE UPPER 20S. SOUTHEAST WINDS 5 TO 10 MPH.
.TUESDAY...PARTLY SUNNY. HIGHS AROUND 50. SOUTHEAST WINDS 5 TO 10 MPH.
.TUESDAY NIGHT...MOSTLY CLOUDY. LOWS IN THE UPPER 30S. SOUTH WINDS 5 TO 10 MPH.
.WEDNESDAY...MOSTLY CLOUDY. HIGHS IN THE UPPER 50S. SOUTH WINDS 10 TO 15 MPH.
.WEDNESDAY NIGHT...MOSTLY CLOUDY WITH A CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS IN THE MID 40S. SOUTH WINDS 10 TO 15 MPH.
.THURSDAY...CLOUDY WITH SHOWERS AND THUNDERSTORMS LIKELY. HIGHS IN THE LOWER 50S. SOUTHWEST WINDS 10 TO 15 MPH.
.THURSDAY NIGHT...MOSTLY CLOUDY WITH A CHANCE OF RAIN SHOWERS. COLDER. LOWS IN THE MID 30S. WEST WINDS 10 TO 15 MPH.
.FRIDAY...PARTLY SUNNY WITH A CHANCE OF RAIN SHOWERS. COLDER. HIGHS IN THE LOWER 40S. NORTHWEST WINDS 10 TO 15 MPH.
.FRIDAY NIGHT...PARTLY CLOUDY. LOWS IN THE LOWER 30S. WEST WINDS 10 TO 15 MPH.
.SATURDAY...MOSTLY SUNNY. HIGHS IN THE UPPER 40S. WEST WINDS 5 TO 10 MPH.

$$

.OUTLOOK 8 TO 14 DAYS...
TEMPERATURES ABOVE NORMAL. PRECIPITATION ABOVE NORMAL.

$$

FWF content explanation

*Format - The format of the Fire Weather Forecast is specified in National Weather Service Directive 10-401. Some forecast elements are optional and are not included by all WFOs or may vary by WFO.

*Headlines - A headline is **required** when Red Flag Warnings and/or Fire Weather Watches are in effect. The headline will include the warning type, location, reason for issuance (e.g., high winds and low humidity), and effective time period(s). The headline is also included in the body of the FWF, in each appropriate zone grouping. Other headlines may be requested since the natural resource agencies are also considered "all risk agencies." When significant weather trends of locally-defined critical weather elements are forecast or observed during non-watch/warning periods, they will be identified in the headline.

Discussion - The discussion should be a brief, clear, non-technical description of the weather patterns that influence the weather in the forecast area.

Cloud Cover ("CLOUD COVER") - This is an indication of the expected sky condition. "Clear" or "Sunny" descriptors are designated when the forecast cloud cover is < 10%; "Mostly Clear" or "Mostly Sunny" are used when cloud cover is forecast to be >= 10% and < 30%; "Partly Cloudy" or "Partly Sunny" are used when cloud cover is forecast to be >= 30% and < 60%; "Mostly Cloudy" is used when cloud cover is >= 60% and < 80%; "Cloudy" is used when cloud cover is forecast to be >= 80%.

Precipitation Type ("PRECIP TYPE") - This refers to the predominant precipitation type during the forecast period, with an exception. When both "showers" and "thunderstorms" are included in the public forecast, "thunderstorms" will be designated as the precipitation type in the FWF.

Chance of Precipitation ("CHANCE PRECIP") - Refers to the probability of measurable precipitation (0.01 inches or more) during the forecast period. This will be rounded to the nearest 10%. Note: Drizzle and snow flurries are not considered measurable precipitation and thus will not be given a probability.

Temperature ("TEMP") - Refers to the forecasted maximum and minimum temperature for the zone, in degrees F, as measured at a standard 4.5 feet above the ground level.

Relative Humidity ("MAX/MIN RH") - Forecasted minimum relative humidity is provided during the daytime periods, while maximum RH is included at night. Relative humidity is highly variable from site to site, but for the purpose of the zone forecast will be the maximum or minimum relative humidity within the zone. In general, relative humidity values below 25 percent should deter a prescribed burn and cause a call to the National Weather Service to obtain a site specific forecast.

Note: The lowest average humidity typically occurs during the warmest part of the day. However, if it is expected to occur at a different time of the day, this will be noted in the "Remarks" portion of the forecast.

Surface Winds ("WND20FT2MIN/EARLY and WND20FT2MIN/LATE") - Surface wind speed and direction represent a two-minute average at 20 feet above the vegetative ground cover. Wind direction is the

direction the wind blows from, to eight points of the compass. The "EARLY" designation refers to morning hours (before noon) during daytime periods, and also the evening hours (before midnight) during nighttime periods. "LATE" refers to the afternoon hours during the daytime periods, and also the pre-dawn hours (after midnight) during the nighttime periods. Wind gusts, which are rapid fluctuations in wind speed of usually less than 30 seconds in duration, are indicated in the forecast if gustiness is expected. Forecasts for highest probable gust will be preceded by "G".

Precipitation Amount ("PRECIP AMOUNT") - Refers to the forecasted precipitation amount (in hundredths of an inch) whenever the chance of precipitation is 25% or greater.

Precipitation Duration ("PRECIP DURATION") - Refers to the duration of the measurable precipitation (in hours) when the probability of measurable precipitation is greater than or equal to 25%. A precipitation duration forecast of "1" is used for "1 hour or less" duration.

Precipitation Begin/End ("PRECIP BEGIN/END") - Refers to the time measurable precipitation begins or ends.

Mixing Height ("MIXING HGT") - Mixing height is defined as the atmospheric limit above which vigorous vertical mixing does not take place. It provides the potential for the atmosphere to disperse smoke. Mixing height will vary from site to site, but for the purpose of the zone forecast will be the maximum height mixing is expected to occur within the zone. In general, a mixing height of 1650 feet or less should deter a prescribed burn and result in a call to the National Weather Service to obtain a site specific forecast. Routine upper air soundings are available after 0900 and may give a better indication of mixing heights than those in the forecast. Mixing height forecasts are given in either feet above the ground ("FT-AGL"), or feet above mean sea level (“FT-MSL”). Note: If forecast units are provided in FT-MSL, you must subtract your elevation height (terrain height above mean sea level) in order to obtain forecast units in FT-AGL.

Transport Wind ("TRANSPORT WND") - Defined as the average wind direction and speed from the surface to the top of the mixed layer. Direction of the transport wind (where the wind is blowing from) and speed will be given. The speed will be in MPH.

Ventilation Rate ("VENT RATE") - Refers to a multiplication of the mixing height and transport wind., with units in ft MPH. Ventilation rates, forecasted during the daytime, are used to calculate the Burn Category for each day. The ventilation rate gives the potential for the atmosphere to disperse smoke. Refer to the appendix for further details regarding the correlation of the Ventilation Rate and Burn Category.

Dispersion ("DISPERSION") - Refers to the forecasted smoke dispersion category at night, based on the surface wind speed. The dispersion category gives a general indication of the state of the atmosphere with respect to its ability to disperse smoke. The dispersion forecast (nighttime) is analogous to the daytime Ventilation Rate, though only a forecast during the evening hours is provided as a large majority of controlled/prescribed fire operations are completed before midnight. A spot forecast is

recommended for critical operations that might involve smoke drift towards a populated area. Refer to the appendix for further details on Dispersion categories.

Lightning Activity Level ("LAL") - A numerical value which is used to describe the expected lightning activity for that day. Refer to the appendix for further details on the LAL.

Haines Index ("HAINES INDEX or LASI")- The index infers the stability of the atmosphere. It utilizes the atmospheric temperature at 950 MB and 850 MB as well as taking into account the moisture levels (dew point depression) at 850 MB. Haines Index values range from 2 through 6.

3 through 7 Day Forecast - The outlook period is an extended forecast for the zone, or the entire forecast area, provided in narrative form (non-digital, non-tabular), and appended at the bottom of each zone grouping (for just that zone).

Outlook 8 to 14 Days - This section will only include temperature and precipitation forecasts and will provide forecasts with respect to seasonal normal values for the specific time of year.

Appendix D: Fire Weather Watches/Red Flag Warning content and format example

The communication headers for Fire Weather Watches/Red Flag Warnings for PA are as follows:

FIRE WEATHER WATCH/ RED FLAG WARNING

OFFICE	9 -letter ID	AWIPS	WMO	AREA
WFO BGM -	ALBRFWBGM	RFWBGM	WWUS81 KBGM	Northeast PA
WFO CLE -	CLERFWCLE	RFWCLE	WWUS81 KCLE	Northwest PA
WFO CTP -	PHLRFWCTP	RFWCTP	WWUS81 KCTP	Central PA
WFO PBZ -	PITRFWPIT	RFWPIT	WWUS81 KPBZ	Western PA
WFO PHI -	PHLRFWPHL	RFWPHL	WWUS81 KPHI	Southeast PA

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615
WWUS81 KCTP 052043
RFWCTP

URGENT - FIRE WEATHER MESSAGE
NATIONAL WEATHER SERVICE STATE COLLEGE PA
443 PM EDT FRI APR 5 2013

...GUSTY WINDS AND VERY DRY CONDITIONS ARE EXPECTED TO CONTINUE
THROUGH EARLY THIS EVENING...RAISING THE DANGER OF RAPID WILD FIRE
SPREAD...

PAZ004>006-010>012-017>019-024>028-033>037-041-042-045-046-
049>053-056>059-063>066-060000-
/O.CON.KCTP.FW.W.0002.000000T0000Z-130406T0000Z/
WARREN-MCKEAN-POTTER-ELK-CAMERON-NORTHERN CLINTON-CLEARFIELD-
NORTHERN CENTRE-SOUTHERN CENTRE-CAMBRIA-BLAIR-HUNTINGDON-MIFFLIN-
JUNIATA-SOMERSET-BEDFORD-FULTON-FRANKLIN-TIOGA-NORTHERN LYCOMING-
SULLIVAN-SOUTHERN CLINTON-SOUTHERN LYCOMING-UNION-SNYDER-MONTOUR-
NORTHUMBERLAND-COLUMBIA-PERRY-DAUPHIN-SCHUYLKILL-LEBANON-
CUMBERLAND-ADAMS-YORK-LANCASTER-
443 PM EDT FRI APR 5 2013

...A RED FLAG WARNING REMAINS IN EFFECT UNTIL 8 PM EDT THIS
EVENING FOR ALL OF CENTRAL PENNSYLVANIA...

* AFFECTED AREA...ALL OF CENTRAL PENNSYLVANIA.

* WINDS...NORTHWEST 15 TO 20 MPH...WITH FREQUENT GUSTS AROUND 25
  MPH.

* TIMING...LATE THIS AFTERNOON INTO THE EARLY EVENING HOURS.

* RELATIVE HUMIDITY...AS LOW AS 20 TO 25 PERCENT.

* TEMPERATURES...RANGING FROM THE MID TO UPPER 40S ACROSS THE
  NORTHERN AND WESTERN MOUNTAINS...TO NEAR 60 ACROSS THE LOWER AND
  MIDDLE SUSQUEHANNA VALLEY.
```

* LIGHTNING...NONE EXPECTED.

* IMPACTS...THE POTENTIAL EXISTS FOR RAPID FIRE SPREAD IF
  UNCONTROLLED FIRES DEVELOP...OR FOR PRESCRIBED BURNS TO GET
  OUT OF CONTROL.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

CRITICAL FIRE WEATHER CONDITIONS ARE EXPECTED OR OCCURRING. ANY
FIRES THAT DEVELOP MAY QUICKLY GET OUT OF CONTROL AND BECOME
DIFFICULT TO CONTAIN.

&&

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Appendix E: Red Flag Warning Call-To-Action statements

The following wording was suggested by NWS Eastern Region Headquarters as the standard Call-To-Action statement for Red Flag Warnings for all NWS offices in Eastern Region.

"A RED FLAG WARNING MEANS THAT DANGEROUS FIRE WEATHER CONDITIONS ARE EXPECTED DUE TO THE COMBINATION OF GUSTY WINDS…LOW RELATIVE HUMIDITIES AND DRY FUELS. ANY FIRES THAT DEVELOP MAY QUICKLY GET OUT OF CONTROL AND BECOME DIFFICULT TO CONTAIN."

Appendix F: Content of Spot forecasts

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979
FNUS71 KCTP 292137
FWSCTP

SPOT FORECAST FOR SNYDER 1...NPS
NATIONAL WEATHER SERVICE STATE COLLEGE PA
537 PM EDT TUE OCT 29 2013

FORECAST IS BASED ON IGNITION TIME OF 1130 EDT ON OCTOBER 30.
IF CONDITIONS BECOME UNREPRESENTATIVE...CONTACT THE
NATIONAL WEATHER SERVICE IN STATE COLLEGE.

.DISCUSSION...
HIGH PRESSURE...LOCATED OVER NEW ENGLAND THIS EVENING...WILL TRACK
SOUTHEAST OFF THE EAST COAST DURING THE NEXT TWO DAYS. THIS WILL BRING
A RELATIVELY MOIST SOUTHERLY FLOW TO THE AREA. WINDS WILL REMAIN LIGHT
THROUGH WEDNESDAY...BUT INCREASE ON THURSDAY. WEDNESDAY SHOULD BE DRY...BUT
SHOWERS WILL LIKELY AFFECT AT LEAST NORTHERN PENNSYLVANIA ON THURSDAY...AS A
WARM FRONT LIFTS THROUGH THE AREA.

.WEDNESDAY...

SKY/WEATHER.........PARTLY SUNNY.
TEMPERATURE.........58 AT IGNITION...MAX 65.
RH..................70 PERCENT AT IGNITION...MIN 61 PERCENT.
WIND (20 FT)........WINDS SOUTH AT 6 MPH AT IGNITION...OTHERWISE
                    SOUTH WINDS 5 TO 6 MPH.
LAL.................NO TSTMS.
MIXING HEIGHT.......3200 FT AGL AT IGNITION...OTHERWISE 3100-4600
                    FT AGL.
TRANSPORT WINDS.....SOUTH 6 TO 9 MPH.
HAINES INDEX........4 OR LOW POTENTIAL FOR LARGE PLUME DOMINATED
                    FIRE GROWTH.

TIME (EDT)          12P 1PM 2PM 3PM 4PM 5PM
SKY (%).............63  57  54  56  59  62
WEATHER COV.........
WEATHER TYPE........
TSTM COV............
TEMP................58  60  63  63  63  64
RH..................70  65  62  62  62  61
20 FT WIND DIR......S   SW  SW  S   S   S
20 FT WIND SPD......6   5   5   5   6   6
20 FT WIND GUST.....10  10
MIX HGT (KFT).......3.2 4.1 4.6 4.5 3.9 3.1
TRANSP WIND DIR.....SW  SW  SW  SW  S   S
TRANSP WIND SPD.....9   7   6   6   6   6
LAL.................1   1   1   1   1   1
HAINES INDEX........3   3   4   4   4   3
$$
FORECASTER...FITZGERALD
REQUESTED BY...CLIFF LIVELY
TYPE OF REQUEST...PRESCRIBED
.TAG 20131030.SNYDE.01/CTP
```

Appendix G: Spot forecast request form (WS FORM D-1)

SPOT AND PRESUPPRESSION FIRE WEATHER FORECAST

REQUESTING AGENCY WILL FURNISH:

NAME OF AGENCY:	LOCATION AND SIZE OF FIRE:	TIME:	DATE:

ELEVATION/GEOGRAPHY/TOPOGRAPHY

RECENT WEATHER OBSERVATION:

PLACE	ELEVATION	OB TIME	20 FT. WIND	TEMP DEG F	RELATIVE HUMIDITY	REMARKS

ADDITIONAL INFORMATION:

FIRE WEATHER FORECASTER WILL FURNISH:

TIME PERIOD (USUALLY 12 HRS)

FORECAST AND OUTLOOK:
(SHOULD INCLUDE: BRIEF SYNOPSIS.....RH FORECAST (MIN DURING DAY AND MAX VALUE AT NIGHT).....20 FT. FORECAST WIND DIRECTION AND SPEED.....PROBABILITY OF PRECIPITATION.....MESOSCALE FEATURES (THUNDERSTORMS AND FRONTS).....OTHER WEATHER PHENOMENA.....)

OPTIONAL INFORMATION:

TRANSPORT WINDS (5000 FT, 10000 FT)	INVERSION(YES/NO)

NAME OF FORECASTER:

Appendix H: NFDRS forecasts

The NFDRS forecast will include the following elements:

a. ZONE/FCST: Shows whether this forecast is for an NFDRS zone or individual station. Zone average trends are forecast when enough observations are available for the zone area. Individual site forecasts are done where only a few observations are available.

b. NO: NFDRS Zone Number (or individual NFDRS site number).

c. YYMMDD: Year, month and day of valid forecast time.

d. 13: Valid forecast time. Always 1300 LST.

e. WX: Weather valid at 1300 LST tomorrow. Valid entries are:

0 = clear

1 = scattered clouds (1/8 to 4/8)

2 = broken clouds (5/8 to 7/8)

3 = overcast clouds (more than 7/8)

4 = fog

19

5 = drizzle

6 = rain

7 = snow or sleet

8 = showers (in sight or at the station)

9 = thunderstorm

(Categories 5, 6 or 7 sets NFDRS index to 0)

f. TEMP: Temperature in degrees F valid at 1300 LST (or temperature trend + or - degrees F).

g. RH: Relative Humidity in percent valid at 1300 LST (or RH trend + or - percent).

h. LAL1: Lightning Activity Level 1400 LST to 2300 LST.

i. LAL2: Lightning Activity Level 2300 LST to 2300 LST.

j. WDIR: Wind Direction. Used only for point forecast (FCST) version. Enter direction using sixteen point compass (N, NNE, NE, ENE, etc.) valid at 1300 LST (20 ft level, 10 minute average).

k. WSPD: Wind Speed. Enter wind speed in mph (or wind speed trend + or - mph) valid at 1300 LST (20 ft, 10 minute average).

l. 10HR: 10 hour timelag fuel moisture in percent valid at 1300 LST (or trend + or - percent).

m. Tx: Maximum temperature from 1300 LST to 1300 LST tomorrow.

n. Tn: Minimum temperature from 1300 LST to 1300 LST tomorrow.

o. RHx: Maximum relative humidity from 1300 LST to 1300 LST tomorrow.

p. RHn: Minimum relative humidity from 1300 LST to 1300 LST tomorrow.

q. PD1: Precipitation duration in hours 1300 LST to 0500 LST.

r. PD 2: Precipitation duration in hours 0500 LST to 1300 LST.

s. WETFLAG: Y or N. Indicates whether liquid water will be on the fuels at 1300 LST tomorrow. (Use with caution. A "Y" will set all the NFDRS indices to zero!).

20

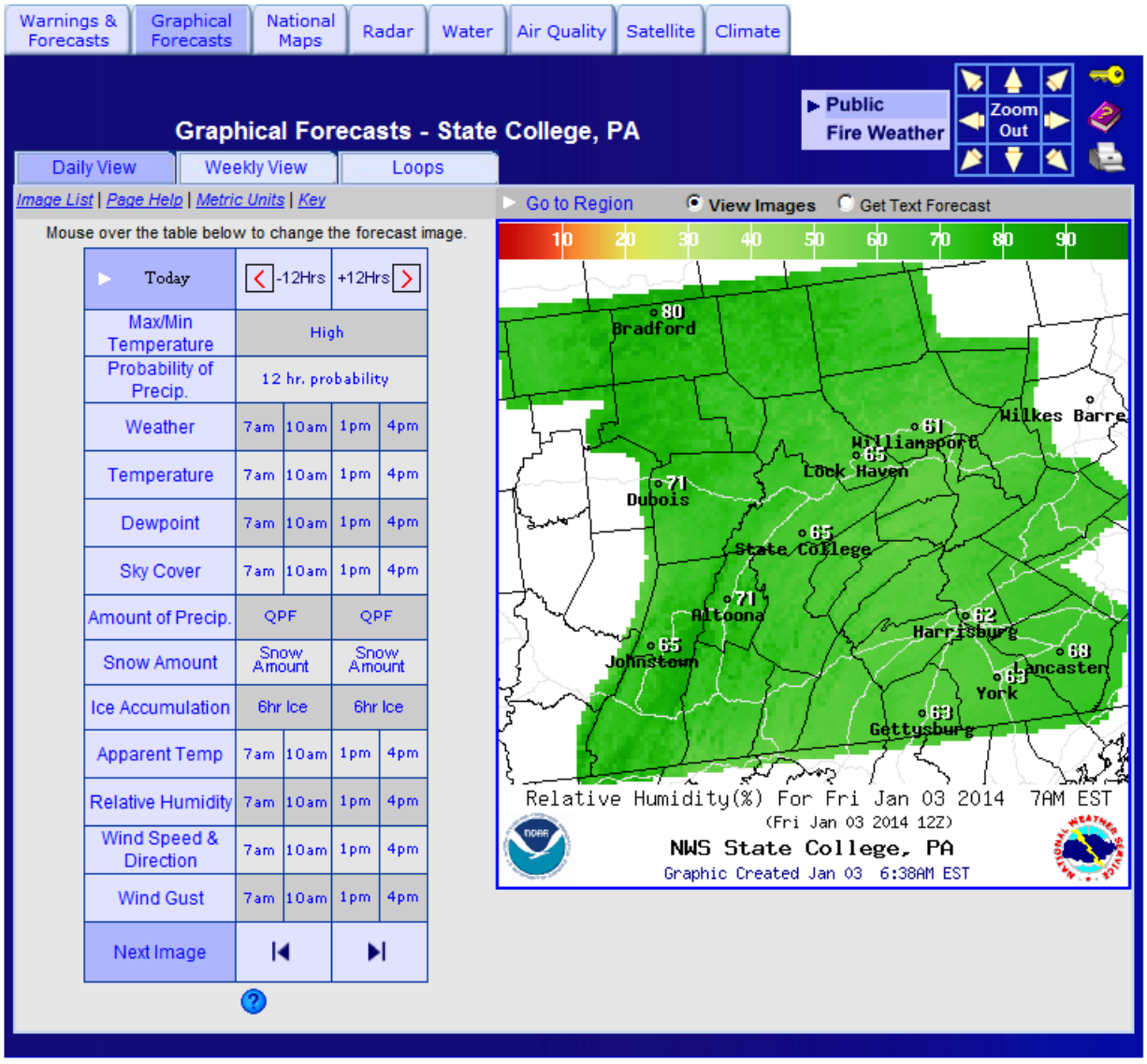
Format. The NFDRS Forecast will follow the comma delimited format as shown:

ZONE,NO,YYMMDD,13,WX,TEMP,RH,LAL1,LAL2,WSPD,10HR,TX,TN,RHx,RHn,PD1,PD2,WETFLAG

FCST,NO,YYMMDD,13,WX,TEMP,RH,LAL1,LAL2,WDIR,WSPD,10HR,TX,TN,RHx,RHn,PD1,PD2,WETFLAG

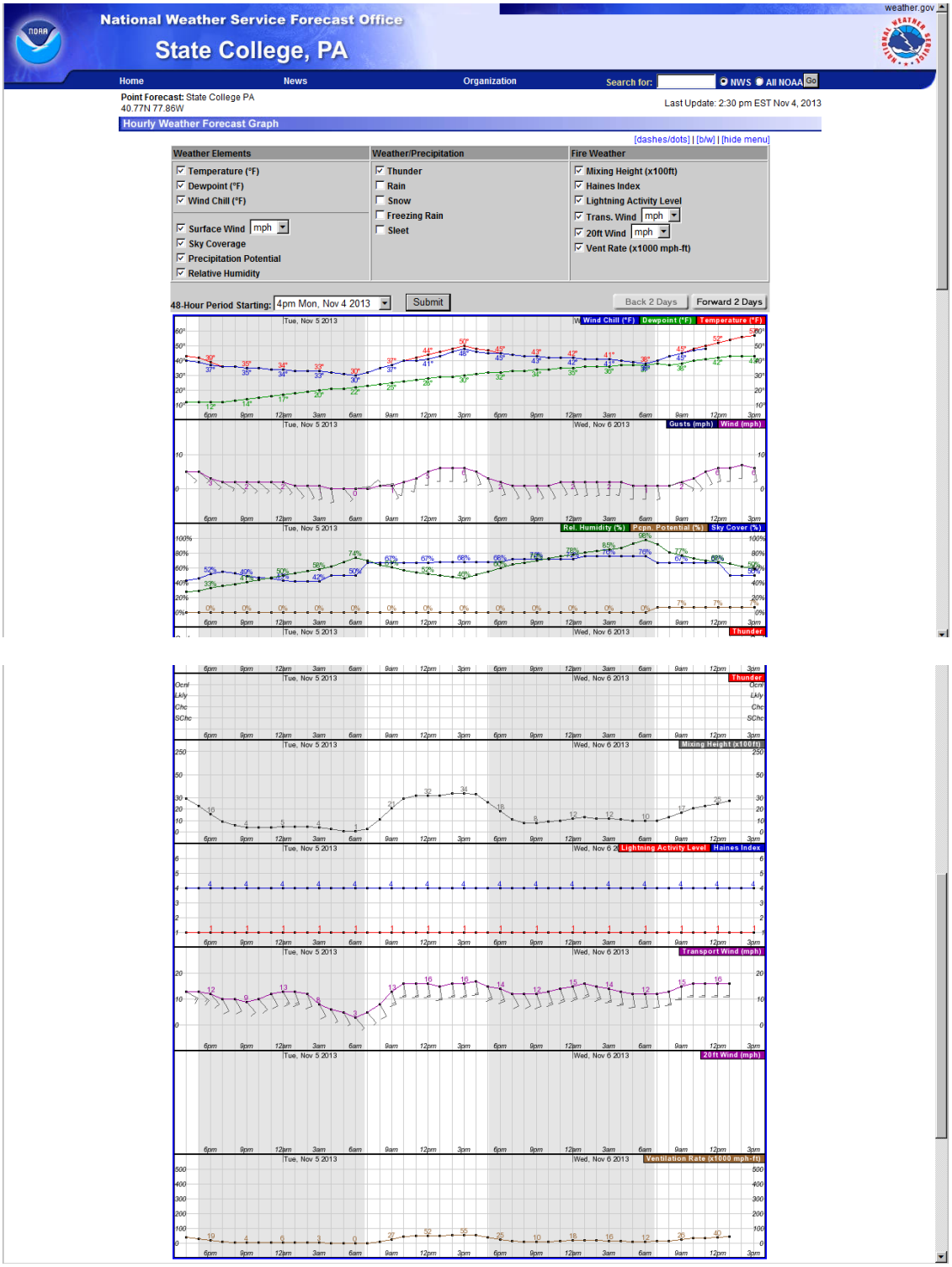
Appendix I: Other NWS Fire Weather forecast products

Graphical Forecast Maps



| About NDFD Graphics | FAQ | Product Description Documents | Survey/Comments | Details |

Hourly Weather Grids



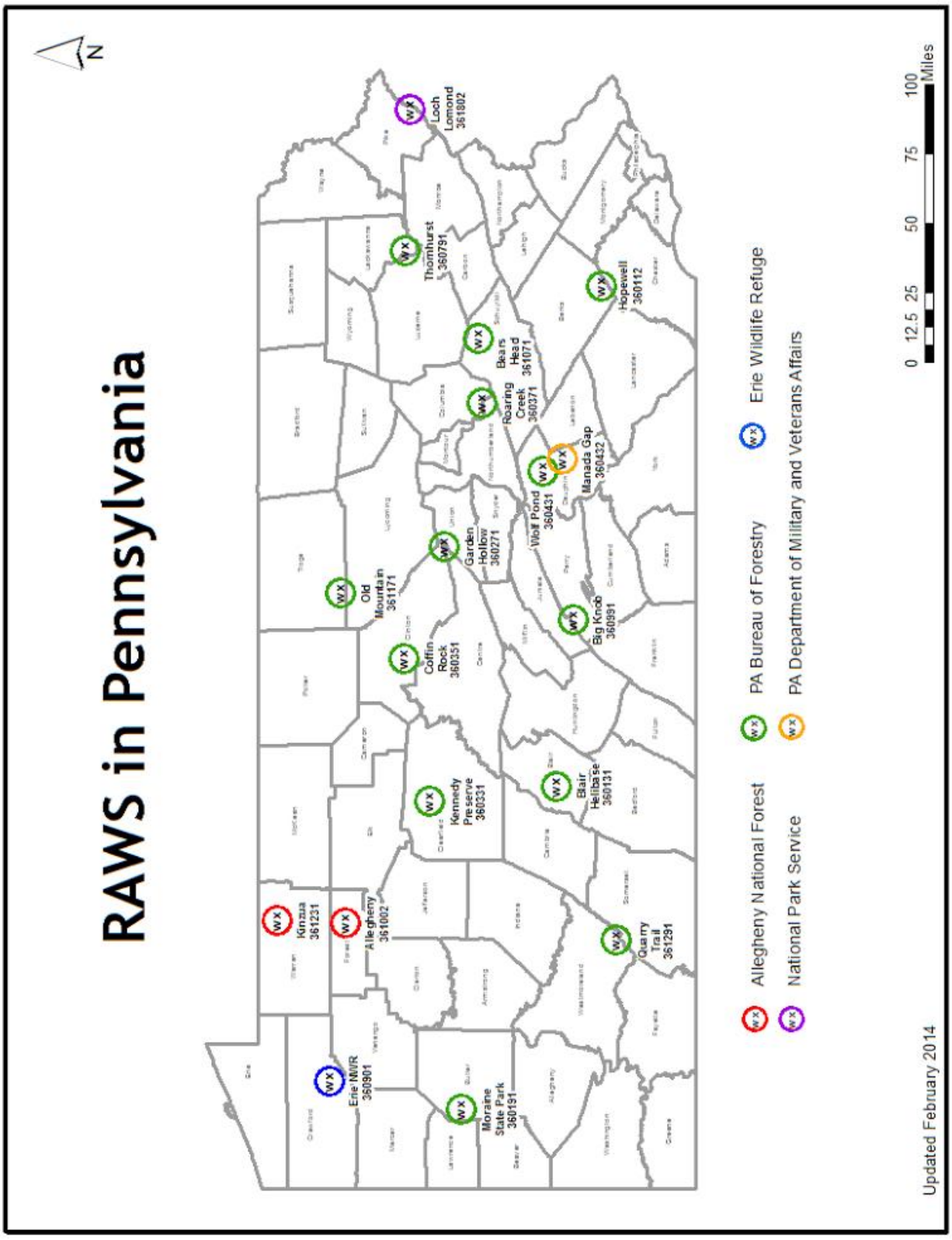
Tabular Forecast

48-Hour Period Starting: 1pm Fri, Jan 3 2014 | Submit | Back 2 Days | Forward 2 Days

Date	01/03											01/04											
Hour (EST)	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12
Temperature (°F)	10	10	11	11	10	9	8	8	7	7	7	7	7	7	7	7	7	7	7	9	12	15	18	21
Dewpoint (° F)	-2	-2	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1	0	0	0	1	1	3	4	5	7	9
Wind Chill (° F)	-6	-5	-4	-3	-3	-2	-2	-2	0	0	0	-1	-1	-2	-2	-1	-2	-2	-3	-1	1	3	6	10
Wind (mph)	14	13	11	10	9	7	6	5	3	3	3	3	5	5	5	5	5	5	5	6	8	9	10	10
Wind Dir	NW	NW	NW	NW	NW	W	W	W	W	W	W	SW	SW	SW	SW	S	S	S	S	S	S	S	S	S
Gust																								
Sky Cover (%)	18	17	16	15	13	10	9	9	11	12	16	20	22	21	19	17	14	12	11	10	9	8	8	7
Pcpn. Potential (%)	3	2	1	0	0	1	1	1	1	1	1	2	2	1	0	0	0	0	1	1	1	1	1	2
Rel. Humidity (%)	58	57	56	56	59	61	63	66	68	68	69	70	70	70	71	73	74	76	78	74	70	66	63	60
Thunder	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Rain	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Freezing Rain	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sleet	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Date	01/05																							
Hour (EST)	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12
Temperature (°F)	24	25	26	27	26	25	24	23	22	21	20	19	19	18	18	18	18	18	17	21	24	27	29	31
Dewpoint (° F)	11	13	14	15	14	14	13	14	14	14	14	14	14	13	13	13	13	13	13	14	15	16	18	19
Wind Chill (° F)	13	15	16	17	16	16	15	15	14	14	13	13	13	13	18	18	18	18	17	21	24	23	24	25
Wind (mph)	11	11	10	10	9	9	8	7	6	6	5	5	3	3	2	2	1	1	1	2	2	3	5	6
Wind Dir	S	S	S	S	S	S	S	SW	SW	SW	SW	W	W	SW	S	S	SE	E	E	E	E	E	SE	SE
Gust																								
Sky Cover (%)	6	8	12	16	21	25	27	26	23	20	18	15	14	16	19	23	27	31	33	38	47	57	66	76
Pcpn. Potential (%)	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	11	11	11
Rel. Humidity (%)	57	58	59	59	61	62	64	68	71	74	76	79	80	81	81	81	81	81	81	74	69	63	63	62
Thunder	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Rain	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Snow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Freezing Rain	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sleet	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Appendix J: RAWS sites in PA (map and table)



Station #	Name	Agency	CWA	Lat	Long	County
360112	Hopewell	BOF	PHI	40 13	75 49	Berks
360131	Blair Helibase	BOF	CTP	40 26	78 25	Blair
360191	Moraine State Park	BOF	PBZ	40 58	80 07	Butler
360271	Garden Hollow	BOF	CTP	41 01	77 10	Centre
360331	Kennedy Preserve	BOF	CTP	41 06	78 29	Clearfield
360351	Coffin Rock	BOF	CTP	41 14	77 45	Clinton
360371	Roaring Creek	BOF	CTP	40 50	76 25	Columbia
360431	Wolf Pond	BOF	CTP	40 31	76 46	Dauphin
360432	Manada Gap	DMVA	CTP	40 41	76 71	Dauphin
360791	Thornhurst	BOF	BGM	41 23	75 62	Luzerne
360901	Erie NWR	EWR	CLE	41 37	79 57	Crawford
360991	Big Knob	BOF	CTP	40 21	77 33	Perry
361002	Allegheny	ANF	PBZ	41 26	79 04	Forest
361071	Bears Head	BOF	CTP	40 51	76 05	Schuylkill
361171	Old Mountain	BOF	CTP	41 36	77 24	Tioga
361231	Kinzua	ANF	CTP	41 29	79 06	Warren
361291	Quarry Trail	BOF	PBZ	40 08	79 13	Westmoreland
361802	Loch Lomond	NPS	BGM	41 12	74 53	Pike

Appendix J: PA Game Commission mobile weather station links

PGC 1
URL: https://www.hobolink.com/p/0490fe4a47c747e4afc0dae82dcd7934

PGC 2
URL: https://www.hobolink.com/p/0f9b34d5ba2a2fb36f0c326f38dda2f0

PGC 3
URL: https://www.hobolink.com/p/b2358082351e7847f5552c45d4475b29

PGC 4
URL: https://www.hobolink.com/p/c29e1ad127ec320180f3bfd9606d1c17