National Weather Service
Annual Operating Plan
for Fire Weather Services for the
Commonwealth of Pennsylvania

2024

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.

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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
    - National Park Service (NPS)
- 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.

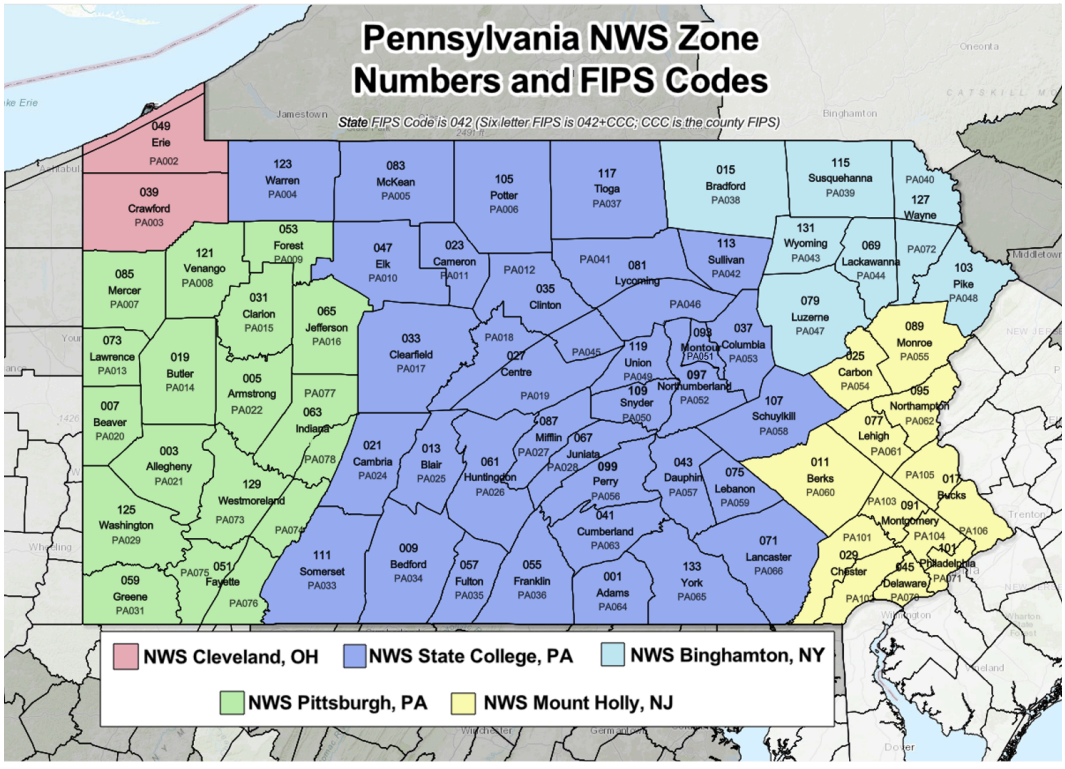
Pennsylvania Fire Weather Seasons

- 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 products 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.

Service Area and NWS Organizational Structure

<u>Service Area</u>

- 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

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 IMET Services to Support Fire and other Incidents
- 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

Basic Services and Forecast Products

Fire Weather Planning Forecast (FWF): 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. The 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 deviates significantly from actual weather conditions.
- The FWF should be updated to include the issuance and ending of Fire Weather Watches and Red Flag Warnings.

Routine updates
- A late morning update of the FWF is issued by WFOs BGM, CTP, and PHI during the active fire seasons in the spring and fall.
- A daily afternoon update of the FWF is issued by all five WFOs, by 3:30 PM throughout the year for inclusion in the Mid Atlantic Coordination Center daily report.
    - 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.

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 product 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 - generally 1 to 2 times per year.

- **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 than 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 (RFW):** 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)**
        - **10-Hour fuel moisture is 10% or less…**
        - **Minimum relative humidity (RH) levels are expected to fall to 30% or lower… AND**
        - **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 state liaison office 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.

Special Weather Statements (SPS) for Fire Weather*:* Issued in collaboration with the Pennsylvania Bureau of Forestry on days with an elevated risk of rapid fire spread. The intended audience is the general public. These should be issued the day of the event when the following criteria are met:

- Fuels sufficiently dry (12% or less) and ½ weather RFW criteria are met.
- All 3 RFW criteria are close: RH<35%, Winds sustained 15+ mph, and fuel moisture 12% or lower (coordinate with BoF)

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 (e.g. 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:

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

- Wildfire 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 will send a single-slide weather briefing to partners via email highlighting potential risks. This briefing will be updated once daily for multi-day events.

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 Meteorologists could respond to the scene within hours to provide local support. NWS would absorb overtime and local travel costs.
- Extended Attack: In this case, wildfire 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.

NWSChat: www.slack.com

- NWS forecasters can coordinate fuel moisture considerations with partners in the #state-pa-fire room in NWSChat prior to issuance of Fire Weather Watches, Red Flag Warnings, and Special Weather Statements.
- NWS State College conducts a weekly check-in in the state-pa-fire room to discuss fire weather concerns with PA NWS offices and fire weather partners during the spring and fall.
- NWSChat will be used to communicate real-time trends as an event unfolds.

Social Media

- Although the RFW products are designed for fire weather partners, it is important to communicate with and educate the public about fire spread concerns. Forecasters should use Fire templates to craft social media posts related to avoiding outdoor burning, properly disposing of cigarettes, and building campfires safely.
- NWS offices may also share posts from PA Department of Forestry, PEMA and other partner agencies on related topics.

Messaging Considerations

- Use “wildfire” in place of “brush fire”.
- Don’t use “Fire Danger” but instead use “risk of wildfire”.
- Be sure to include “spread” after the phrase “increased risk of wildfire” because we are forecasting spread, not ignition. 99% of wildfires in Pennsylvania are human-caused.

Incident Meteorologist (IMET) Deployment

- IMETs are specially trained and certified meteorologists 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, a 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.

Partner Agency Responsibilities

<u>Operational Support and Predictive Services</u>

- **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 unmanned, 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 twenty eight (28) operational RAWS sites in Pennsylvania and 1 portable RAWS site. See APPENDIX I for station location and information.
    - 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 the 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.

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 January 2021. 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.

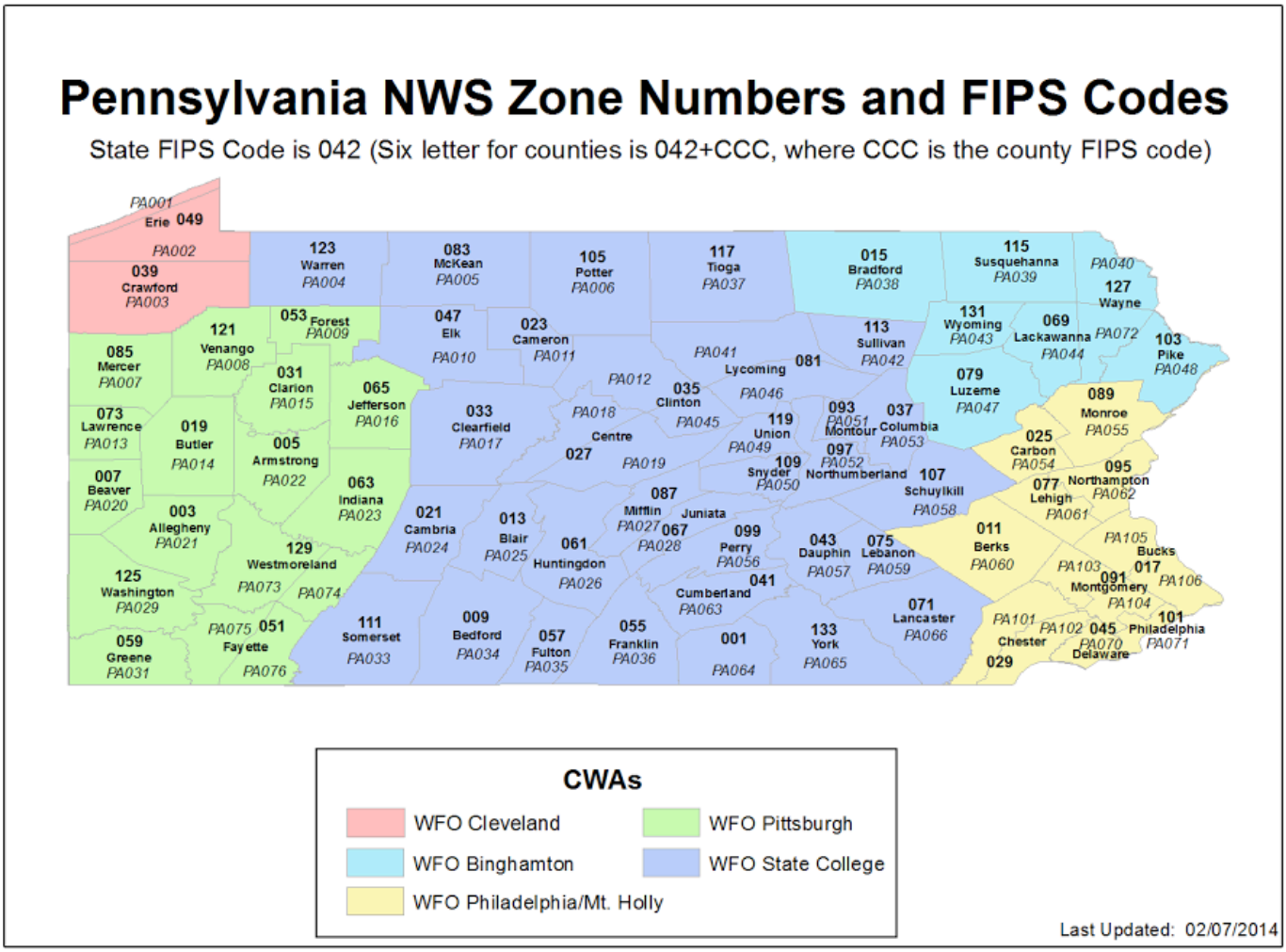
    - It is the desire of the NWS to continue to participate in these workshops.
- **Maintenance and Revision of the Annual Operating Plan:** The AOP should be revised each year by the end of February, with cooperation and participation from each NWS office and each partner agency. The NWS Office in State 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 with 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 March 31 of the current year. Eastern Region Headquarters will forward a copy of the plan to NIFC and NWS Headquarters.

Appendix A: NWS office areas of responsibility for Pennsylvania



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 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
Washington	PAZ029	9 - Southwest Plateau
Westmoreland	PAZ073	9 - Southwest Plateau
Westmoreland Ridges	PAZ074	9 - Southwest Plateau
Indiana	PAZ077	9 - Southwest Plateau

Higher Elevations of Indiana	PAZ078	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 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 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
Lackawanna	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

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
Northampton	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

Appendix B: PA Fire Weather Program Contact Information

PA Bureau of Forestry
Division of Forest Fire Protection (FFP), Department of Environmental Resources
Bureau of Forestry
400 Market Street, Rachel Carson Office Building
P.O. BOX 8552
Harrisburg, PA
17105-8552

To get in touch with the PA Bureau of Forestry for an update on fuel moisture considerations, call in the following order:
NOTE: Calls may be made 7 days per week, 6AM - 10PM

1. Mike Kern 717-877-8972 mikern@pa.gov
2. Matt Reed 717-418-8769 mattreed@pa.gov
3. Leave a message at the two numbers, if no response relatively quickly, then call 717-787-2925, select option #1 and you will be transferred to our duty officer for the day. Explain the situation and ask that they have Reed or Kern call the NWS office.

Allegheny National Forest (ANF) (Northwest PA CTP and PBZ)

Name	Position	Office Phone	Work Cell
PA-MACC (Harrisburg)	Dispatch		
John Fry	FFMO		
Craig Kostrzewski	FAFMO		

NOTE: ANF dispatching is now being handled by the PA-MACC collocated at PEMA. They are available 24/7 for emergencies and communications and have further protocols for contacting ANF.

Pennsylvania Game Commission (PGC)
2001 Elmerton Avenue
Harrisburg, PA 17110

Scott Bearer Habitat Division Chief

PA NWS Office Fire Weather Program Contacts

FWPL: Fire Weather Program Leader **MIC:** Meteorologist-In-Charge
WCM: Warning Coordination Meteorologist **IMET:** Incident Meteorologist
**Please note: Phone numbers listed are for Fire Weather purposes only and are not to be given to the general public.*

WFO State College, PA (CTP)
328 Innovation Blvd, Suite 330
State College, PA 16803

Bill Gartner, FWPL
John Banghoff, assistant FWPL
Ashley Evans, MIC
Jonathan Guseman, WCM

WFO Mt. Holly, NJ (PHI)
732 Woodlane Road
Mt. Holly, NJ 08060

Alex Dodd, FWPL
Lee Robertson, Assistant FWPL
Jason Franklin, MIC
Sarah Johnson, WCM

WFO Pittsburgh, PA (PBZ)
192 Shafer Road
Coraopolis, PA 15108

David Shallenberger, FWPL, IMET
Colton Milcarek, assistant FWPL, IMET (T)
Jeff Craven, MIC
Fred McMullen, WCM

WFO Binghamton, NY (BGM)
32 Dawes Drive
Johnson City, NY 13790

Michael Kistner, IMET, FWPL
Adam Gill, Assistant FWPL, IMET (T)
Dave Nicosia, MIC
Mark Pellerito, WCM

WFO Cleveland, OH (CLE)
925 Keynote Circle Suite 314
Brooklyn Heights, OH 44131

Doug Kahn, FWPL
Gary Garnet, MIC
Freddie Zeigler, WCM

The following National Weather Service Forecast Offices border Pennsylvania but are not responsible for providing Fire Weather forecasts for PA:

WFO Sterling, VA (Washington, DC) (LWX)
43858 Weather Service Rd
Sterling, VA 20166

Brendon Rubin-Oster, FWPL
James Lee, MIC
Christopher Strong, WCM

WFO Buffalo, NY (BUF)
587 Aero Drive
Cheektowaga, NY 14225

Aaron Reynolds, FWPL
Michael Fries, MIC
vacant, WCM

Other NWS offices

NWS Eastern Region Fire Weather Program Manager
John Guiney

630 Johnson Ave
Bohemia, NY 11716

Storm Prediction Center
Evan Bentley, FWPL

NWS National Fire Weather Program Office
Heath Hockenberry, National Program Manager

Larry Van Bussum, NFWOC
Robyn Heffernan, Science/Dissemination Met.

NWS Boise, ID
3833 S. Development Ave
Bldg 3807
Boise, ID 83705

NWS Headquarters/Fire and Public Weather Service Branch
Paul Stokols, W/OM12

1325 East West Highway
Silver Spring, MD 20910-3233

National Interagency Coordination Center (NICC)
Eastern Area (EACC)
Steve Marien, (NPS)

111 East Kellogg Blvd, Suite 105
St. Paul, MN 55101

National Interagency Fire Center (NIFC)
Nick Nausler, Manager
Asst. Manager, Jim Wallman

3833 S. Development Ave
Boise, ID 83705-5354

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

FIRE WEATHER FORECAST

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

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

000
FNUS51 KCTP 181913
FWFCTP

Fire Weather Planning Forecast for Central Pennsylvania
National Weather Service State College PA
313 PM EDT Thu Mar 18 2021

.DISCUSSION...
A moisture laden storm system will bring an average of 1 to 1.5
inches of rain to much of Central Pennsylvania today through
tonight. The rain will overspread the region during the mid
morning and continue through early tonight.
The rain will change to wet snow Thursday afternoon and evening
across Northern PA.
A gusty northerly wind and sharply colder temperatures will
follow for late Thursday night and Friday.
An extended period of dry weather (with minimum RHs in the 20-40%
range and light winds) is expected over the upcoming weekend
weekend into the middle of next week.

PAZ004>006-037-190915-
Warren-McKean-Potter-Tioga-
Including the cities of Warren, Bradford, Coudersport, Mansfield,
and Wellsboro
313 PM EDT Thu Mar 18 2021

	Tonight	Fri	Fri Night	Sat
Cloud Cover	Mcldy	Mclear	Clear	Clear
Precip Type	Snow/Rain	None	None	None
Chance Precip (%)	90	0	0	0

Temp (24h trend)	16 (-19)	38 (-3)	19	53
RH % (24h trend)	100 (0)	20 (-10)	64	24
20ft Wnd-Val/AM(mph)	N 13 G32	Lgt/Var		
20ft Wnd-Rdg/PM(mph)	NE 13 G32	N 11 G26	N 6 G17	Lgt/Var
Precip Amount	0.07	0.00	0.00	0.00
Precip Duration	5			
Precip Begin	6 PM			
Precip End	2 AM			
Mixing Hgt(ft-agl)	1450	2790	250	4240
Transport Wnd (mph)	NE 25	NE 20	N 5	N 6
Vent Rate (kt-ft)	26150	52650	410	28960
Dispersion	5	5	1	5
DSI	1	2		
Sunshine Hours	10	12		
LAL	No Tstms	No Tstms	No Tstms	No Tstms
Haines Index	3	4	5	5
ADI early	37 Fair	52 Gen Good	11 Poor	19 Gen Poor
ADI late	37 Fair	54 Gen Good	4 Very Poor	24 Fair
Max LVORI early	4	1	2	3
Max LVORI late	3	1	2	2

Remarks: ADI is Atmospheric Dispersion Index by Lavdas.
LVORI is Low Visibility Occurrence Risk Index.

.FORECAST FOR DAYS 3 THROUGH 7...

.SUNDAY...Clear. Lows in the upper 20s. Highs in the upper 50s. Minimum RH 31 percent. Southeast winds 5 to 10 mph.
.MONDAY...Mostly clear. Lows around 30. Highs in the upper 50s. Minimum RH 37 percent. South winds 5 to 10 mph.
.TUESDAY...Mostly clear. Lows in the lower 30s. Highs in the upper 50s. Minimum RH 43 percent. Southeast winds 5 to 10 mph.
.WEDNESDAY...Mostly cloudy. Lows in the upper 30s. Highs in the mid 50s. Minimum RH 61 percent. South winds 5 to 10 mph.
.THURSDAY...Mostly cloudy with a chance of showers. Lows in the lower 40s. Highs in the upper 50s. Minimum RH 62 percent. South winds 10 to 15 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:** 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%.
- **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 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.
- **Temp (24h trend):** Refers to the forecasted maximum and minimum temperature for the zone, in °F, as measured at a standard 4.5 feet above the ground level. In parenthesis is the forecast temperature change from the previous 24 hours.
- **RH % (24h trend):** 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 ("20ft Wnd-Val/AM(mph)" and "20ft Wnd-Rdg/PM(mph)"):** 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 "AM" 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".
- **Precip Amount:** Refers to the forecasted precipitation amount (in hundredths of an inch)
- **Precip Duration:** Refers to the duration of the measurable precipitation (in hours).
- **Precip Begin/End:** Refers to the time measurable precipitation begins or ends.
- **Mixing Hgt (ft-agl):** 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 to which 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 feet above the ground.

- **Transport Wnd (mph):** 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.
- **Vent Rate (kt-ft):** Refers to a multiplication of the mixing height and transport wind., with units in knots-feet. 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:** 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.
- **Davis Stability Index (DSI):** The maximum surface temperature (in deg C) minus the 850 mb temperature (in deg C). If the difference is <10 deg C, it is considered a Category 1 (stable); between 10 deg C and 14 deg C, it is considered a Category 2 (conditionally unstable); between 15 deg C and 17 deg C, it is considered a Category 3 (unstable); and >17 deg C, it is considered a Category 4 (absolutely unstable). Note that DSI is only computed for the daytime period.
- **Sunshine Hours:** Number of hours of sunshine at a site for a given day.
- **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:** 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.
- **Atmospheric Dispersion Index (ADI) early:** A measure of dispersions based on mixing height, stability, and wind. Typical burning values are in the range 40-60. Hazardous conditions may exist for ADI > 100. Computed for the morning.
- **ADI late:** A measure of dispersions based on mixing height, stability, and wind. Typical burning values are in the range 40-60. Hazardous conditions may exist for ADI > 100. Computed for the evening.
- **Max Low Visibility Occurrence Risk Index (LVORI) early:** A measure of the potential for thick fog based on dispersion and relative humidity. Values range from 1 (low chance of low visibility) - 10 (high chance of low visibility). Computed for the morning.
- **Max LVORI late:** A measure of the potential for thick fog based on dispersion and relative humidity. Values range from 1 (low chance of low visibility) - 10 (high chance of low visibility). Computed for the evening.
- **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:

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

867
WWUS81 KCTP 140819
RFWCTP

URGENT - FIRE WEATHER MESSAGE
National Weather Service State College PA
419 AM EDT Sun Mar 14 2021

PAZ026>028-034>036-049>053-056-057-059-063>066-150200-
/O.UPG.KCTP.FW.A.0001.210314T1200Z-210315T0200Z/
/O.NEW.KCTP.FW.W.0001.210314T1500Z-210315T0200Z/
Huntingdon-Mifflin-Juniata-Bedford-Fulton-Franklin-Union-Snyder-
Montour-Northumberland-Columbia-Perry-Dauphin-Lebanon-Cumberland-
Adams-York-Lancaster-
419 AM EDT Sun Mar 14 2021

...RED FLAG WARNING IN EFFECT FROM 11 AM THIS MORNING TO 10 PM EDT THIS EVENING FOR THE SOUTH CENTRAL MOUNTAINS AND SUSQUEHANNA VALLEY...

The National Weather Service in State College has issued a Red Flag Warning, which is in effect from 11 AM this morning to 10 PM EDT this evening. The Fire Weather Watch is no longer in effect.

* AFFECTED AREA...Fire Weather Zones 026 Huntingdon, 027 Mifflin, 028 Juniata, 034 Bedford, 035 Fulton, 036 Franklin, 049 Union, 050 Snyder, 051 Montour, 052 Northumberland, 053 Columbia, 056 Perry, 057 Dauphin, 059 Lebanon, 063 Cumberland, 064 Adams, 065 York and 066 Lancaster.

* TIMING...Late this morning through this evening.

* WINDS...Northwest 10 to 20 mph with gusts up to 35 mph.

* RELATIVE HUMIDITY...As low as 20 percent.

* TEMPERATURES...Reaching the low to mid 50s by early afternoon, then falling through the 40s this evening.

* IMPACTS...Critical fire weather conditions possible. Any fires that develop will likely spread rapidly. Prescribed burns may get out of control. Outdoor burning is not recommended.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

A Red Flag Warning means that critical fire weather conditions are either occurring or are imminent due to a combination of strong winds, low relative humidity and dry fuels. Any fires that develop may quickly get out of control and become difficult to contain.

For more information about wildfire danger, burn restrictions, and wildfire prevention and education, please visit the Pennsylvania Department of Conservation and Natural Resources website at http://dcnr.pa.gov/Communities/Wildfire.

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Visit http://www.weather.gov/ctp for more information from the National Weather Service office in State College.

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 critical fire weather conditions are either occurring or are imminent due to a combination of strong winds, low relative humidity and dry fuels. Any fires that develop may quickly get out of control and become difficult to contain.

Appendix E: Content of Spot forecasts

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FNUS71 KCTP 111239
FWSCTP

Spot Forecast for Izenbrown Unit 3...USFS
National Weather Service State College PA
839 AM EDT Thu May 11 2023

Forecast is based on ignition time of 0900 EDT on May 11.

If conditions become unrepresentative, or if you have questions or concerns with this forecast, contact the National Weather Service in State College.

.DISCUSSION...
High pressure over the region will result in fair and warm weather today and Friday. MinRH will range between 25-30% with light winds. Clouds will increase on Friday with a shower possible into Friday night.

.REST OF TODAY...

Sky/Weather..... Sunny (15-25 percent).
LAL..... No Tstms.
Max Temperature.....Around 77.
Min Humidity..... 28 percent.
Wind (20 ft)..... Light winds becoming west-northwest around 5 mph.
Mixing Height..... 7500 ft AGL.
Transport Winds..... Northwest 5 mph increasing to 5 to 10 mph in the afternoon.
Haines Index..... 4 to 5 or low to moderate potential for large plume dominated fire growth.
LVORI..... 3.
ADI..... 22 to 29.

TIME (EDT)	9AM	10A	11A	12P	1PM	2PM	3PM	4PM	5PM
Sky (%).....	10	21	31	34	31	34	25	15	6
Weather Cov.....									
Weather Type.....									
Tstm Cov.....									
LAL.....	1	1	1	1	1	1	1	1	1
Temp.....	56	63	68	70	73	75	76	76	77
RH.....	57	44	37	35	33	31	30	30	28
20 FT Wind Dir....	SW	W	W	W	W	W	W	W	NW
20 FT Wind Spd....	1	2	3	4	4	5	4	5	6
20 FT Wind Gust...	2	5	5	6	6	6	6	6	
Mix Hgt (kft).....	0.8	1.6	2.9	4.0	5.4	6.5	7.2	7.4	7.5
Transp Wind Dir...	W	W	NW	NW	NW	NW	NW	NW	NW

Transp Wind Spd...	3	5	7	7	8	7	8	8	8
LVORI.....	3	2	2	2	2	2	2	2	2
ADI.....	22	22	22	26	26	26	29	29	29
Haines Index.....	4	4	4	4	4	5	5	5	5

.TONIGHT...

Sky/Weather.....	.Mostly clear (10-20 percent).
LAL.....	No Tstms.
Min Temperature.....	Around 50.
Max Humidity.....	77 percent.
Wind (20 ft).....	Northwest winds around 5 mph early in the evening becoming light.
Mixing Height.....	300 ft AGL.
Transport Winds.....	Northwest 5 to 10 mph shifting to the north around 5 mph late in the evening, then shifting to the south 3 to 5 mph overnight.
Haines Index.....	4 to 5 or low to moderate potential for large plume dominated fire growth.
LVORI.....	3.
ADI.....	2 to 4.

TIME (EDT)	6PM	7PM	8PM	9PM	10P	11P	MID	1AM	2AM	3AM	4AM	5AM
Sky (%).....	5	5	4	4	4	4	12	20	27	27	26	25
Weather Cov.....												
Weather Type.....												
Tstm Cov.....												
LAL.....	1	1	1	1	1	1	1	1	1	1	1	1
Temp.....	76	73	69	65	60	57	55	54	52	51	51	50
RH.....	30	35	44	52	62	67	72	71	74	77	77	77
20 FT Wind Dir....	NW	NW	N	N	N	NE	E	SE	SE	SE	SE	SE
20 FT Wind Spd....	5	4	2	1	1	0	0	0	1	1	2	2
20 FT Wind Gust...	6	6	5	4	2	1	1	1	2	2		
Mix Hgt (kft).....	6.8	1.8	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3
Transp Wind Dir...	W	NW	N	NW	NW	N	NW	N	SE	S	S	S
Transp Wind Spd...	8	7	8	6	6	5	5	5	5	3	3	5
LVORI.....	2	2	2	2	3	3	3	3	3	4	4	4
ADI.....	4	4	4	3	3	3	2	2	2	2	2	2
Haines Index.....	5	5	5	5	5	5	5	5	4	4	4	4

$$
Forecaster...Steinbugl
Requested by...Christina Clemons
Type of request...PRESCRIBED
.TAG 2312617.0/CTP
.DELDT 05/11/23
.FormatterVersion 2.0.0
.EMAIL christina.t.clemons@odf.oregon.gov

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

WS FORM D-1 (1-2005) (Supersedes Previous Editions)

U.S. Department of Commerce
NOAA
National Weather Service

SPOT REQUEST

(See reverse for instructions)

Please call the NWS Weather Forecast Office (WFO) when submitting a request and also after you receive a forecast to ensure request and forecast were received.
Please provide feedback to WFO on forecast.

1. Time†	2. Date	3. Name of Incident or Project	4. Requesting Agency

5. Requesting Official	6. Phone Number	7. Fax Number	8. Contact Person

9. Ignition/Incident Time and Date

10. Size (Acres)

11. Type of Incident
- ○ Wildfire
- ○ Prescribed Fire
- ○ Wildland Fire Use (WFU)
- ○ --HAZMAT
- ○ Search And Rescue (SAR)

12. Reason for Spot Request (choose one only)
- ○ **Wildfire**
- ○ **Non-Wildfire** Under the Interagency Agreement for Meteorological Services (USFS, BLM, NPS, USFWS, BIA)
- ○ **Non-Wildfire** State, tribal or local fire agency working in coordination with a federal participant in the Interagency Agreement for Meteorological Services
- ○ **Non-Wildfire** Essential to public safety, e.g. due to the proximity of population centers or critical infrastructure.

13. Latitude/Longitude:

14. Elevation (ft, Mean Sea Level)
Top: **Bottom:**

15. Drainage

16. Aspect

17. Sheltering
- ○ Full
- ○ Partial
- ○ Unsheltered

18. Fuel Type: __Grass __Brush __Timber __Slash __Grass/Timber Understorey __Other_____
Fuel Model: 1,2,3 4,5,6,7 8,9,10 11,12,13 2,5,8

19. Location and name of nearest weather observing station (distance & direction from project):

20. Weather Observations from project or nearby station(s): (Winds should be in compass direction e.g. N, NW, etc.)

Place	Elevation	†Ob Time	20 ft. Wind Dir	20 ft. Wind Speed	Eye Level Wind. Dir	Eye Level Wind. Speed	Temp. Dry	Temp. Wet	Moisture RH	Moisture DP	Remarks (Relevant Weather, etc)

21. Requested Forecast Period
Date
Start _____
End _____

Forecast needed for:
- ○ Today
- ○ Tonight
- ○ Day
- ○ Extended

22. Primary Forecast Elements (Check all that are needed) *(for management ignited wildland fires, provide prescription parameters):*

Needed:

Sky/Weather __
Temperature __
Humidity __
20 ft Wind __
Valley __
Ridge Top __
Other (Specify in #23) __

23. Remarks (other needed forecast elements, forecast needed for specific time, etc.)

24. Send Forecast to:
ATTN:

25. Location:

26. Phone Number:
Fax Number:

27. Remarks (Special requests, incident details, Smoke Dispersion elements needed, etc.):

EXPLANATION OF SYMBOLS: † Use 24-hour clock to indicate time. Example: 10:15 p.m. = 2215; 10:15 a.m. = 1015
Indicate local standard time or local daylight time

Appendix G: NFDRS forecasts (associated with the FWM)

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:
    a. 0 = clear
    b. 1 = scattered clouds (1/8 to 4/8)
    c. 2 = broken clouds (5/8 to 7/8)
    d. 3 = overcast clouds (more than 7/8)
    e. 4 = fog
    f. 5 = drizzle
    g. 6 = rain
    h. 7 = snow or sleet
    i. 8 = showers (in sight or at the station)
    j. 9 = thunderstorm
    k. (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 time lag 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!).

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

000
FNUS81 KCTP 111855
FWMCTP

FCST,360131,230512,13,2,82,31,1,1,SSW,02,,82,52,77,23,0,0,N
FCST,360131,230513,13,2,74,51,1,1,NNE,03,,84,62,87,29,0,0,N
FCST,360131,230514,13,1,71,34,1,1,N,05,,75,51,77,34,0,0,N
FCST,360131,230515,13,1,70,32,1,1,W,07,,73,47,65,29,0,0,N
FCST,360131,230516,13,1,74,32,1,1,W,12,,74,48,66,29,0,0,N
FCST,360131,230517,13,1,65,35,1,1,NW,11,,74,47,77,32,0,0,N
FCST,360131,230518,13,1,70,33,1,1,SSW,08,,70,41,79,32,0,0,N

FCST,360231,230512,13,2,79,30,1,1,WSW,03,,79,50,77,28,0,0,N
FCST,360231,230513,13,2,73,44,1,1,N,05,,80,57,78,29,0,0,N
FCST,360231,230514,13,2,64,31,1,1,N,08,,74,46,73,31,0,0,N
FCST,360231,230515,13,1,69,27,1,1,WNW,08,,69,42,67,27,0,0,N
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…….……BREAK……..…….……..

FCST,361231,230512,13,2,81,27,1,1,W,03,,81,49,77,27,0,0,N
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FCST,361231,230518,13,1,69,30,1,1,WSW,09,,69,37,82,30,0,0,N

&&

...STATION LOCATIONS...
360131 - Blair Helibase in Blair County
360231 - Doll Hill in Cameron County

……BREAK……..…….

361231 - Kinzua in Warren County

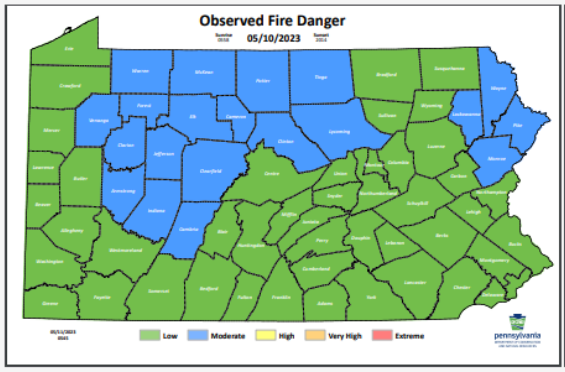
Appendix H: Other NWS Fire Weather forecast products

Fire Weather Page: www.weather.gov/ctp/FireWeather

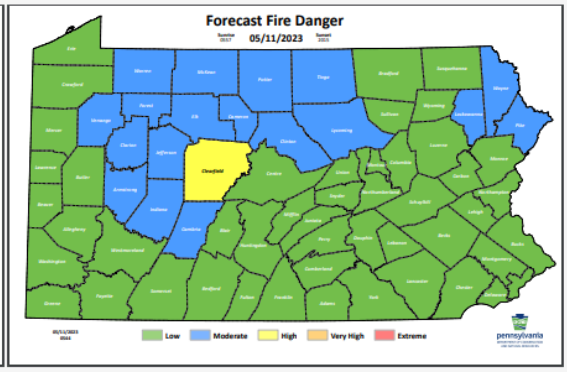
Spot Forecasts

Submit Spot Forecast Request | Map View of Active Requests | Calendar View of Active Requests

PA Bureau of Forestry Fire Danger Maps



Click to view map on PA DCNR website



Click to view map on PA DCNR website

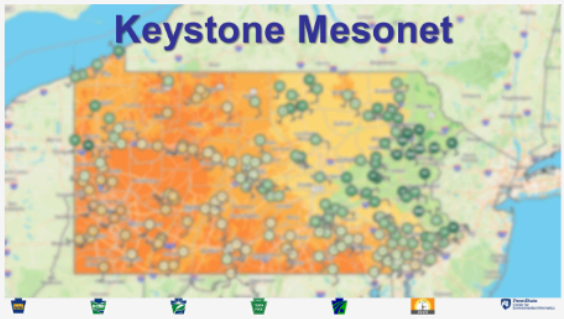
Fire Weather Forecasts

NWS Cleveland, OH
NWS Pittsburgh

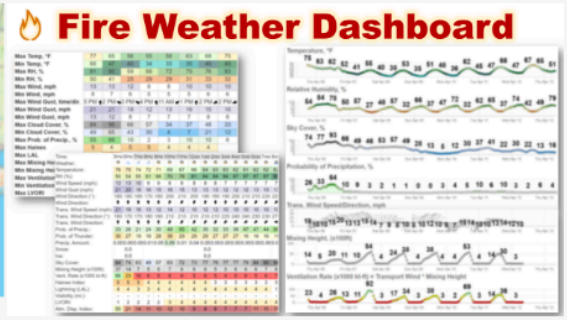
Allegheny National Forest
NWS State College

NWS Binghamton, NY
NWS Philadelphia/Mount Holly, NJ

Observations and Forecast Graphics



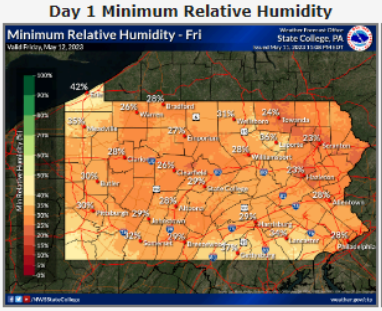
Click to view Keystone Mesonet Observations



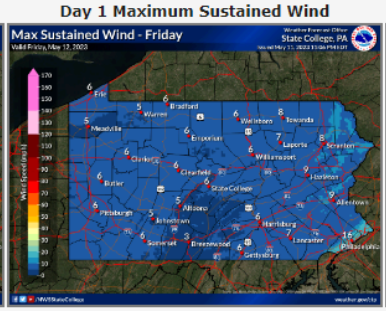
Click to view Dashboard & Enter Location in Search Bar

NWS State College Forecast Maps

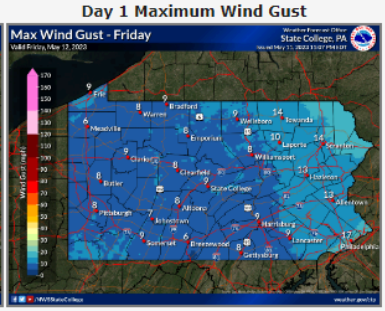
Day 1 Minimum Relative Humidity



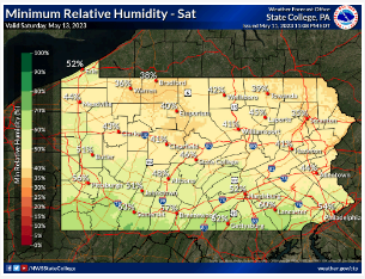
Day 1 Maximum Sustained Wind



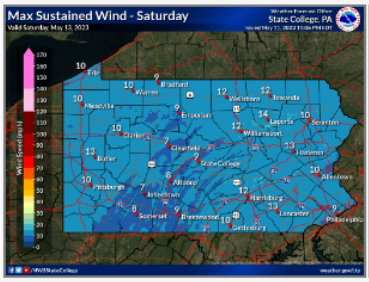
Day 1 Maximum Wind Gust



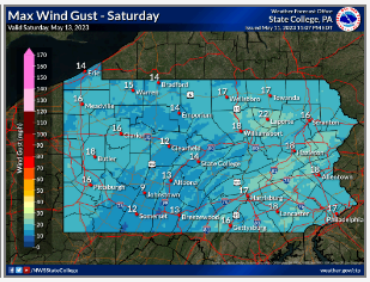
Tomorrow's Minimum Relative Humidity



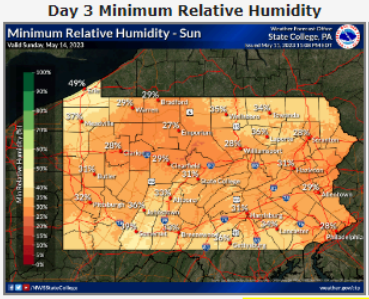
Tomorrow's Maximum Sustained Wind



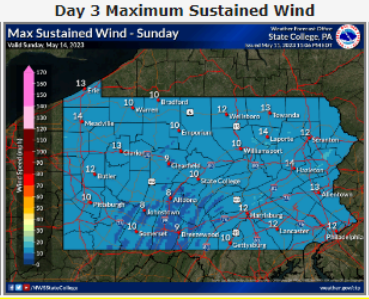
Tomorrow's Maximum Wind Gust



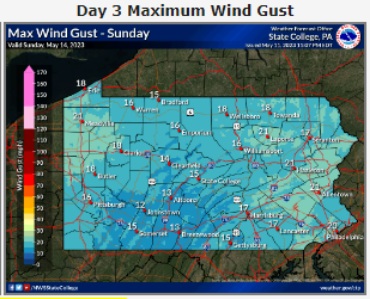
Day 3 Minimum Relative Humidity



Day 3 Maximum Sustained Wind



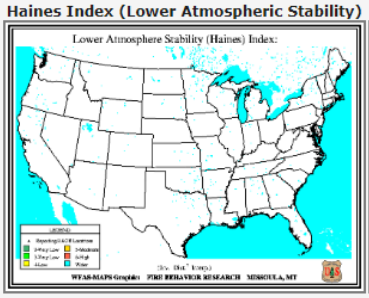
Day 3 Maximum Wind Gust



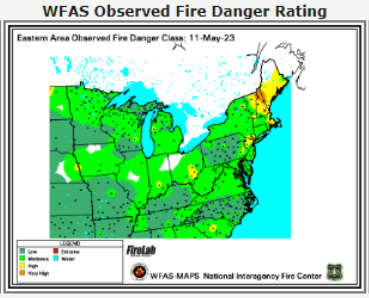
Click here for RH, Wind, and Wind Gust forecasts for the next 7 days

Wildland Fire Assessment System Maps

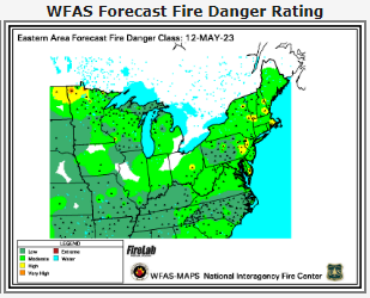
Haines Index (Lower Atmospheric Stability)



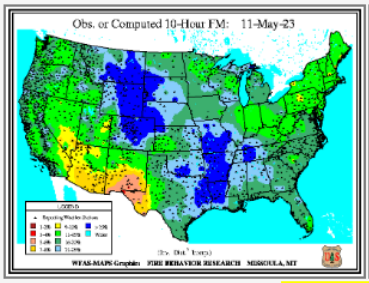
WFAS Observed Fire Danger Rating



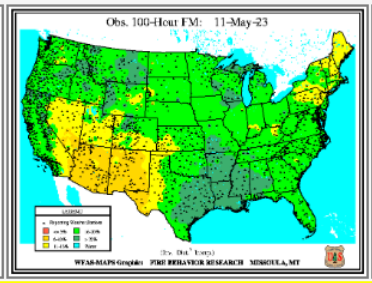
WFAS Forecast Fire Danger Rating



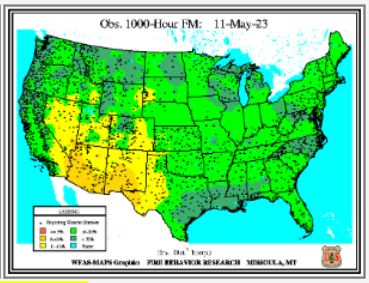
Observed 10 Hour Fuels



Observed 100 Hour Fuels

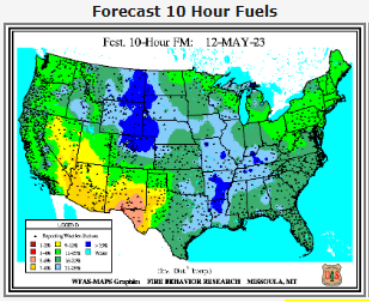


Observed 1000 Hour Fuels

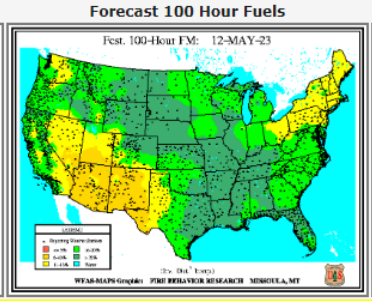


Click here for a map of Observed Fire Danger from PA DCNR

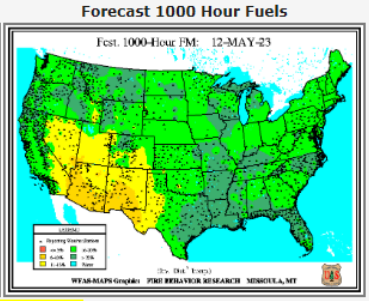
Forecast 10 Hour Fuels



Forecast 100 Hour Fuels



Forecast 1000 Hour Fuels



Click here for a map of Forecast Fire Danger from PA DCNR

Fire Weather Dashboard: www.weather.gov/dlh/fwd

State College, PA Weekly Summary	Fri May 12	Sat May 13	Sun May 14	Mon May 15	Tue May 16	Wed May 17	Thu May 18
Max Temp, °F	82	75	69	69	74	68	71
Min Temp, °F	52	58	50	46	49	48	41
Max RH, %	75	67	71	65	63	74	70
Min RH, %	27	45	31	31	32	27	33
Max Wind, mph	6	9	10	12	17	14	12
Min Wind, mph	1	2	6	5	9	8	5
Max Wind Gust, time/dir.	5 PM ↗	10 PM ↓	8 PM ↓	5 PM ↘	3 PM →	2 PM ↘	3 PM ↑
Max Wind Gust, mph	9	14	15	18	26	22	17
Min Wind Gust, mph	3	3	8	6	14	13	8
Max Cloud Cover, %	90	93	59	60	52	48	26
Min Cloud Cover, %	35	39	38	16	23	10	11
Max Prob. of Precip., %	8	54	12	13	19	19	21
Max Haines	5	5	5	5	5	5	4
Max LAL	1	1	1	1	1	1	1
Max Mixing Height, ft	6926	3963	5491	5652	7610	7768	5160
Min Mixing Height, ft	323	371	449	433	479	491	364
Max Ventilation Rate, kt-ft	42	31	54	51	129	109	52
Min Ventilation Rate, kt-ft	1	2	3	3	3	3	2
Max LVORI	3	4	3				

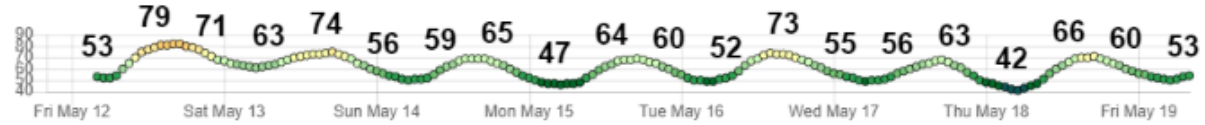
Hourly Table

Day of week:	Friday 5/12															
Time:	3AM	4AM	5AM	6AM	7AM	8AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM	6PM
Weather:																
Temperature:	55	53	52	52	54	60	65	70	75	77	79	81	81	82	82	80
RH (%):	63	69	74	75	71	58	50	42	36	33	31	29	29	27	27	30
Wind Speed (mph):	2	2	2	2	1	1	1	2	2	3	3	3	5	5	6	6
Wind Gust (mph):	5	5	3	3	3	3	3	3	5	5	6	6	7	8	9	8
Wind Direction (°):	240	250	250	260	280	290	290	300	300	280	260	240	240	230	230	220
Wind Direction:																
Trans. Wind Speed (mph):	7	6	5	6	6	3	3	5	3	5	6	6	7	7	7	8
Trans. Wind Direction (°):	260	280	280	280	280	310	300	320	310	290	270	260	270	260	250	250
Trans. Wind Direction:																
Prob. of Precip.:	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	3
Prob. of Thunder:	0	0	0	0	0	0	0	0	1	1	1	0	1	1	3	3
Precip. Amount:						0.00								0.00		
Snow:									0.0							
Ice:									0.0							
Sky Cover:	35	45	50	48	59	58	59	50	64	52	58	54	49	47	55	62
Mixing Height (x100ft):	4	4	4	4	4	3	9	17	40	52	59	62	66	69	65	40
Vent. Rate (x1000 kt-ft):	2	2	2	2	2	1	3	7	12	21	30	31	40	42	39	28
Haines Index:	4	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5
Lightning (LAL):	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Visibility (mi.):	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LVORI:	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2
Atm. Disp. Index:	3	3	2	4	4	3	3	10	13	19	26	19	24	24	23	5

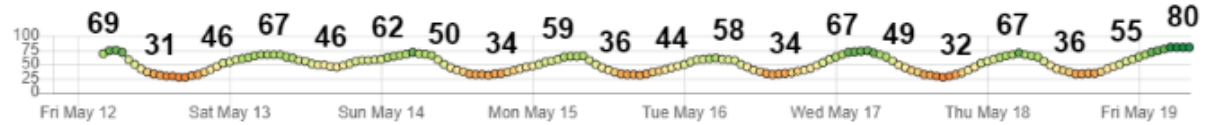
Configure Plot Order | Configure Plot Look

Hourly Graphs

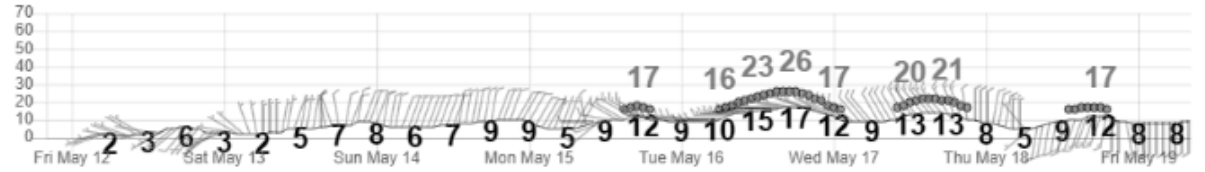
Temperature, °F



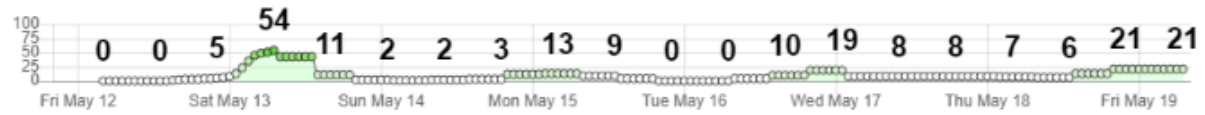
Relative Humidity, %



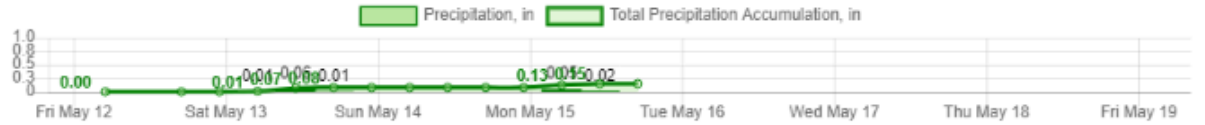
Wind Speed/Direction/Gust, mph



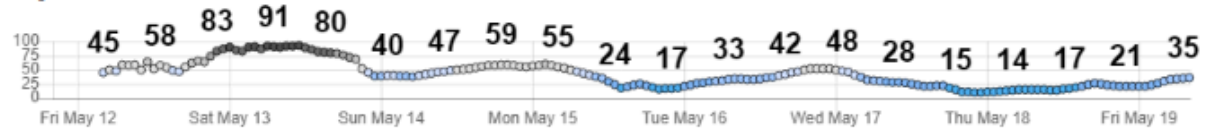
Probability of Precipitation, %



Precip. Amount, in

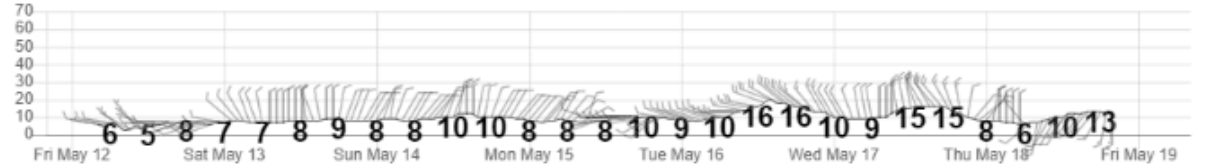


Sky Cover, %

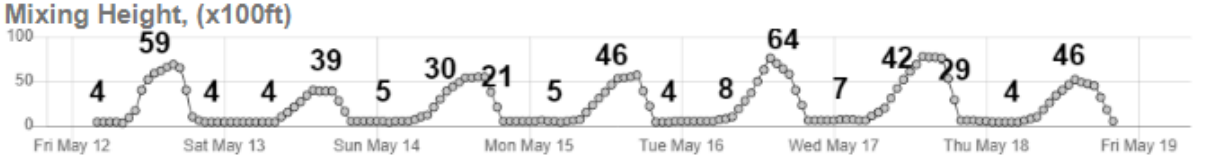


Probability of Thunder, %

Trans. Wind Speed/Direction, mph



Mixing Height, (x100ft)



Appendix I: RAWS sites in PA

Station Name	District	WIMS ID	Agency	CWA	LAT	LON	County	Elev	NESD ID	MesoWest
Allegheny	Dist 14	361002	ALF	PBZ	41.542222	-79.126667	Forest	1766	328982EA	ANFP1
Ashley	Dist 11	360792	BOF	BGM	41.200056	-75.888667	Luzerne	1402	32B13D60	TT608
Bear Gap	Dist 18	360431	BOF	CTP	40.835949	-76.544694	Northumberland	859	D680125A	WLFP1
Bear Knob	Dist 09	360272	BOF	CTP	40.931574	-77.94656	Centre	2178	32B0AAF8	BKBP1
Bears Head	Dist 18	361071	BOF	CTP	40.809405	-76.010972	Schuylkill	1179	D68027C0	BHDP1
Big Knob	Dist 03	360991	BOF	CTP	40.303312	-77.589749	Perry	808	D680012C	BGNP1
Blair Helibase	Dist 06	360131	BOF	CTP	40.439704	-78.418384	Blair	1032	32A0962E	BLHP1
Camp William Penn	Dist 19	361031	BOF	BGM	41.15208	-75.151081	Pike	1137	32B14BF0	TT602
Chestnut Springs	Dist 05	360871	BOF	CTP	40.691389	-77.702585	Mifflin	1700	32B15886	CNUP1
Coffin Rock	Dist 10	360351	BOF	CTP	41.237732	-77.751548	Clinton	2332	32A08558	COFP1
Distant	Dist 08	360051	BOF	PBZ	40.983306	-79.33975	Armstrong	1420	32B8FE22	TT688
Doll Hill	Dist 13	360231	BOF	CTP	41.60585	-78.236532	Cameron	2024	32B0CF1E	DOLP1
Forney Trail	Dist 02	360571	BOF	CTP	39.993371	-77.95872	Fulton	1005	32A2A892	TT575
Garden Hollow	Dist 07	360271	BOF	CTP	41.025569	-77.167257	Centre	1618	D68034B6	GDHP1
Hopewell	Dist 17	360112	BOF	PHI	40.247953	-75.786944	Berks	458	32D7F450	TT136
Indiantown Run	Dist 18	360751	DMVA	CTP	40.459	-76.617	Lebanon	710	32A0FD1A	RUNP1
Kennedy Preserve	Dist 09	360331	BOF	CTP	41.104722	-78.491667	Clearfield	2242	D6804226	KYPP1
Kinzua	Dist 14	361231	ALF	CTP	41.900556	-79.118611	Warren	1408	3289919C	KZAP1
Loch Lomond	Dist 19	361802	NPS	BGM	41.20417	-74.88972	Pike	886	FA63A7C0	LOLP1
Manada Gap	Dist 18	360432	DMVA	CTP	40.411	-76.711	Dauphin	625	3333E634	MNGP1
Moraine State Park	Dist 08	360191	BOF	PBZ	40.935216	-80.100424	Butler	1222	32D81130	TT138
Old Mountain	Dist 16	361171	BOF	CTP	41.564436	-77.409183	Tioga	1885	3294430C	OLDP1
Quarry Trail	Dist 04	361291	BOF	PBZ	40.131066	-79.216035	Westmoreland	2720	D6805150	QTRP1
Rienze	Dist 20	360151	BOF	BGM	41.647222	-76.330389	Bradford	1224	3265E31A	ROAP1
Thornhurst	Dist 11	360791	BOF	BGM	41.231739	-75.624633	Lackawanna	2049	32D80246	TT137
Trexler	Dist 17	360771	BOF	PHI	40.658504	-75.616332	Lehigh	613	32B4ECC8	TT618
Tumbling Run	Dist 01	360411	BOF	CTP	40.023308	-77.347194	Cumberland	1180	32A2B536	TT576
Yellow Creek SP	Dist 06	360631	BOF	PBZ	40.567083	-79.022528	Indiana	1347	32B4CA24	TT613