



FIRE ENVIRONMENT MAPPING SYSTEM

FEMS Change Log

A summary of changes made to the FEMS application since its initial release in 2023.

Version 3.5: December 11, 2025

Maps

Weather

- A limited number of Mesonet stations are now available on the Weather map display when zoomed into level 4.
- A limited number of Mesonet stations are now available in the Search Station field on the Weather map.
- You can now filter the icons on the Weather map based on whether historic data is available for that station.
- You can now filter the icons on the Weather map based on the Network for the station RAWS, ASOS, or Mesonet.

Fire Danger

- A limited number of Mesonet stations are now available on the Fire Danger map and display when zoomed into level 4.
- A limited number of Mesonet stations are now available in the Search Station field on the Fire Danger map.
- You can now filter the icons on the Fire Danger map based on whether historic data is available for that station.
- You can now filter the icons on the Fire Danger map based on the Network for the station RAWS, ASOS, or Mesonet.

Tables

Stations

- A limited number of Mesonet stations are now included in the Stations table. Click a Mesonet station to view detailed data for that station (i.e., Fire Danger, Station Metadata, Catalogs, and Seasonal Trend Charts) .

NFDRS Catalogs

- FEMS Admin users can now add, edit, and delete Fuel Model Catalogs.
- FEMS Admin users can now add, edit, and delete Dead Fuel Catalogs.
- FEMS Admin users can now add, edit, and delete Drought Catalogs.
- FEMS Admin users can now add, edit, and delete Live Fuel Catalogs.
- FEMS Admin users can manage stations assigned to existing Fuel Model catalogs.

Downloads

- A limited number of Mesonet stations are now available when downloading Weather or Fire Danger data.
- When downloading Daily Weather or Fire Danger Forecast data, the system will prevent the user from selecting a date range that does not have forecast data.

Field Samples

- When adding a new site, the system will no longer allow you to enter a duplicate site name for the selected group.

API (Application Programming Interface) Changes

- New GetDroughtCatalog query to load drought catalog data into the Drought Catalog table.
- CreateUpdateDroughtCatalog query to create or update drought catalog data.
- DeleteDroughtCatalog query to delete drought catalog data.
- New GetDeadFuelCatalog query to load dead fuel catalog data into the Dead Fuel Catalog table.
- CreateUpdateDeadFuelCatalog query to create or update dead fuel catalog data.
- DeleteDeadFuelCatalog query to delete dead fuel catalog data.
- New GetLiveFuelCatalog query to load live fuel catalog data into the Live Fuel Catalog table.
- CreateUpdateLiveFuelCatalog query to create or update live fuel catalog data.
- DeleteLiveFuelCatalog query to delete live fuel catalog data.
- New GetFuelModelCatalogs query to load catalog data into the Fuel Model Catalog table.
- CreateUpdateFireDangerCatalog query to create or update fuel model catalog data.
- DeleteFireDangerCatalog query to delete fuel model catalog data.
- GetFuelModelCatalog query updated to include an optional parameter for “All, V, W, X, Y, or Z,” which will filter the response that is returned.

Database Changes

- New fire_danger.gap_station table.
- Added catalog_name column to the fire_danger.fire_danger_model_catalog table.
- New Cron Job for Processing the queue for recalc.
- New Cron Job for Modifying NFDRS Min Max.
- Read-Only Databases removed from Dev, QA, and Staging.
- Updated Cron Job for ingesting data to reduce ingesting for Dev and QA (dev only as needed, QA 1xhr).
- Reduced size of database for QA and Dev.
- Deleted old database snapshots.

WXx Data Ingestion

- FEMS is compatible with both the NESS ID and the NESDIS ID.

NFDRS Recalculation

- The NFDRS Recalculation process was adjusted to throttle the number of station batches that run at any given time.
 - Parameter store “batch_ssm” item controls the batch size.
 - Event bridge rules control the execution timing.
 - The number of observations per job is set with “fems.nfdrs.calculator.batch.years”：“2”.
 - The number of jobs to process at a given time is set with “fems.nfdrs.calculator.list.size”：“20”
 - The process consists of two Batch factory strategies:
 - First Strategy: “recalc” to create jobs for the stations that have been identified for the recalculation. This occurs once daily at 5 minutes after midnight utc cron (5 0 **?*)
 - Second Strategy: “runjobs” runs the recalculation jobs. This occurs every 20 minutes cron (0/20 ***?*)
- When a station is assigned to a new catalog, the system schedules the catalog for the NFDRS recalc process in the nfdr_recalc_affected_station table, and the NFDRS is recalculated for the station based on the catalog change.

Version 3.4: September 16, 2025

General

- A new Hamburger menu on the top, right side of the FEMS pages replaces the navigation buttons and . . . Settings and More menu in FEMS.
- The initials of the user logged into the system now display in place of the user name. When you click the user initials, a list of roles associated with the user account displays and a Log-Out option is available.
- A notification message will now display at the top of the page in FEMS when there are upcoming updates to the FEMS system that may interrupt use of the FEMS system.
- The “Go To Chart” option on the Fire Danger Map pop-up window is now disabled for stations that do not have historical data (i.e., ASOS and new RAWS stations).

Reports

- A new Reports option is available in the hamburger menu.
- When you select the new Reports option in the hamburger menu, a Reports page displays with the following tab areas:
 - Fire Danger
 - Weather
 - Station Information
 - Field Sample
 - Advanced Analytics (Only available for FEMS Admin users)
- You can view reports on each Report tab by clicking the Title of a report.
- FEMS Admin users can Add, Edit, and Delete links to Microsoft PowerBI reports.

Maps

Weather Map

- When you hover your mouse over an icon on the map, the Station ID is included in the station information that displays.
- When you click an icon on the map, the Station ID is now included in the station information that displays on the pop-up window.
- When you use the “Search Station” option, the Station ID is now included in the station information.
- When viewing Hourly Weather data on the popup window on the Weather map page, the system now displays the correct hour and minutes for any hours that have missing data.
- When viewing forecast Weather data on the popup window on the Weather map page, the system now only displays up to the last forecast data that was ingested.

Field Sample Map

- When using the Go to Site link to navigate from the Field Sample Map to the Field Sample page, the system no longer displays a blank screen when you view Fuel Moisture data.

Fire Danger Map

- When you hover your mouse over an icon on the map, the Station ID is included in the station information that displays.
- When you click an icon on the map, the Station ID is now included in the station information that displays on the pop-up window.
- When you use the Search Station option, the Station ID is now included in the station information.
- When viewing Hourly Fire Danger data on the popup window on the Fire Danger map page, the system now displays the correct hour and minutes for any hours that have missing data.
- When viewing forecast Fire Danger data on the popup window on the Weather map page, the system now only displays up to the last forecast data that was ingested.

Tables

Stations

Station Metadata

- The system now includes the following sections on the Station Metadata tab:
 - Location Data
 - Site Characteristics
 - NFDRS Settings (Visible or Not Visible).
- When logged into FEMS with the FEMS Admin role, you can now toggle NFDRS station visibility on or off on the Station Metadata tab.

Catalog

- The headers on the Catalog tab are now larger than they were previously and display bold.
- The Live Fuels area on the Catalog tab was updated to include Herbaceous and Woody tables, which include an appropriate header above the tables.
- Alternate colors display for each row in the Herbaceous and Woody tables.

Downloads

- When downloading Weather or Fire Danger data the “Copy Data Link” will now be pulling data from the FEMS Read-Only API.

- When downloading an FW21 file for Weather, the system will only create a zip file if there are multiple stations. If there is only one station selected, the zip file will not be created.

Field Samples

- When adding a new site, the system will automatically insert - at the beginning of the field. This character can be removed, as needed.
- When adding a new site, if the Latitude and Longitude are not valid, the error message that displays is more descriptive of the issue:

“Please verify Latitude and Longitude. A negative value may be required for the Longitude.”

- When a FEMS Admin views Audit Logs for a Field Sample, the system will now include log information for deleting or archiving samples and subsamples. It will also include information about sites that were created or updated.

API (Application Programming Interface) Changes

- New UpdateStationMetadata call for changing NFDRS station visibility.
- New GetAuditTrailItems call for viewing PowerBI Report audit data.
- New CreateUpdatePowerBIReport call for creating and updating links to Microsoft PowerBI Reports in FEMS.
- New DeletePowerBIReport call for deleting links to Microsoft PowerBI Reports in FEMS.
- New GetPowerBIReports call for displaying links to Microsoft PowerBI Reports in FEMS.

Database Changes

- New fire_danger.audit_trail_item table was added.
- New fire_danger.powerbi_report_link table was added.
- An AWS FEMS database gateway was created for the Microsoft PowerBI Reports.
- The NFDRS QA flag for all stations was set to 0, indicating that there are no QA issues for any stations at this time.
- Notification table was updated to include a message for notifying users about possible outages or interruptions in service.

Pipeline/Parameter Store Changes

- The Maven version for the lower environments was updated to match the Production environment for ingestion, output, batchfactory, fuel, and weather.

- The rules for automatically turning off NFDR visibility when changes are received for a station were turned off.
- Parameter store values are now stored for:
 - ingestion_ssm
 - batch_ssm
 - weather_ssm
 - fuel_ssm
 - climatology_ssm
- The following S3 parameters were removed from services and are now retrieved from the parameter store:
 - spring.datasource.url
 - spring.datasource.username
 - spring.datasource.password
 - weather.wxx_url
- The NFDRS QA Flag rules were turned off.

Log Changes

- Service logs will now contain error messages that include:
 - The error message
 - Description of the code location of the error (module name)
 - Description of the inputs that failed in the operation
 - A stacktrace of the operation that failed

FAMAuth Authentication

- Updates were made to the FAMAuth call to support updates made to the FAMAuth system.

Version 3.3: July 31, 2025

General Updates

- When changes are made to a station in the Production system, e-mail notifications are now sent to authorized users.

Read-Only API

- A new Read-Only API is available for use with external applications.
- A new FEMS API Role is available in FEMS that allows users to use the Read-Only API.
- A new API Key option is available in either the . . . or hamburger menu that allows users to generate a key for use with the new Read-Only API.

Maps

General

- When you hover the mouse over an icon on the map, the data no longer covers the icon on the map.
- The spacing was adjusted on the map pop-up window when viewing graph data. Additional space was added at the bottom of the graph to make it easier to read the data.

Weather

- Instead of truncating the weather data numbers on the Weather Map page, the system rounds the numbers.

Field Sample Map

- Instead of truncating the field sample data numbers on the Field Sample Map page, the system rounds the numbers.

Fire Danger

- When viewing Fire Danger graphs, the space between observations and forecasts was removed to make it easier to read the graph data.

Tables

- The Tables Catalog page was updated with the following changes:
 - All catalogs are identified with a title.
 - Drought Catalog was changed to National Drought Catalog.
 - Default National Live Fuel Moisture Catalog was renamed National Live Fuel Moisture Catalog.
 - Herbaceous and Wood data now displays in separate tables under the National Live Fuel Moisture Catalog.
- When viewing Daily Min Max Average data on the Table/Seasonal Trend Charts tab, the data displays from 01/01.
- When hovering the mouse over the lines on the Tables/Seasonal Trend Charts tab, the system only displays one set of percentiles when moving between models.
- When viewing Daily NFDRS data, the system displays the time when the daily Min/Max data was generated for the listed dates.

Downloads

- When downloading Fire Danger data, the name of the download files include NFDRS, rather than NFDR.
- The instructions under the Data Subject Area field were removed on the Station Metadata Download page. NOTE: The instructions were not correct and needed to be removed.
- The NFDRS Hourly data for the Rattlesnake Mountain Station in Wyoming now includes the appropriate data in the download file.

Field Samples

- Changes were made to prevent users from updating an Archived Field Sample.
- A new Salal Fuel Type is now available when adding a new Field Sample.
- A new Disturbance Sub-Category is available when adding a new Field Sample.
- When adding a new sample, the system will display a vertical scroll-bar, as needed, regardless of the screen's resolution.
- When a FEMS Admin user changes the primary contact for a Group or Area and adds the previous primary contact as an additional contact, the system saves the change without any errors.
- When a user uses the Search option to select different sites in Field Samples, the system is now correctly loading the metadata for the selected site.

API (Application Programming Interface) Changes

- GetNfdrMinMaxWithTime query updated for 30-30 rule change.
- NfdrCatalog query updated to display catalog names correctly in the Tables/Catalog tab.
- GetNfdrHourly query updated to allow for multiple stations.
- New CreateUpdateAPIKey query to create an API key for the new read-only API.

Database Changes

- New Read-Only Databases were created for Dev, QA, Staging, and Production.
- New api_key and api_user tables were added to the database.
- New Salal Fuel Type was added.
- New Disturbance sub-category was added.
- The Boulder Creek 1, Boulder Creek 2, Boulder Creek 3, and Boulder Creek 4 sites were removed.

FAMAuth Authentication

- Climatology connects to FAMAuth to determine users credentials for the read-only database.

Pipeline/Parameter Store Changes

- Parameter store values defined for climatology duplicated for the external read-only API.
- Updated so there is one object with all the parameters to make it easier for updates. Included task definition environment variables int the new object.
- Customer Service ID was added to the parameters sent to the WXx service when data is pulled from the service.

- Climatology deployment pipeline updated to allow second instance of the application.

Log Changes

- Updated the catch error log message in the following locations:

```
public static final String ERROR_CLIENT_ERROR_EXCEPTION = "Error in Client  
Exception: ";
```

```
public static final String ERROR_REST_ERROR_EXCEPTION = "Error in Rest  
Exception: "; that displays for Error_client_error_Exception and  
Error_rest_error_exception
```

Version 3.2: June 12, 2025

General Updates

- The Time Zone field at the top of the FEMS pages defaults to UTC. The user can change this time zone, as needed. NOTE: Changing the time zone only affects the time as it displays in the toolbar. It does not affect the observation times, which will display the local time for the station.
- NFDR data is now being calculated in FEMS.
- Station IDs have been removed from all filters, searches, pop-ups, and screens in FEMS. The metadata for a station will instead include the Station Name, Network, and State.
- Improvements were made to the WXx ingest process to reduce gaps in observation data.
- The Important Information button was removed from FEMS.

Updates to Help Page

- The videos were updated on the Help page for FEMS.
- The Frequently Asked questions section was removed from the Help page.

Updates to About Page

- The About page was updated to include a link to the FEMs overview page on the Wildland Fire Application Information Portal.

Station Updates

- When metadata changes to a station are received by the FEMS system, the system will automatically update the station information, notify authorized administrators of the changes, and turn off the NFDR calculator based on the following rules:
 - If the delta changes + or - .01 or greater for the latitude, then the authorized administrators will receive a notification of the change and the NFDR will not display.
 - If the delta changes + or - .01 or greater for the longitude, then the authorized administrators will receive a notification of the change and the NFDR will not display.
 - If the state changes, then the authorized administrators will receive a notification of the change and the NFDR will not display.
 - If the County changes, then the authorized administrators will receive a notification of the change and the NFDR will not display.
 - If the Class changes, then the authorized administrators will receive a notification of the change and the NFDR will not display.
 - If the Status changes for the station (Active to Deactivated or Deactivated to Active), send a notification of the change to the authorized administrators.
- A limited number of ASOS stations from across the eastern half of the country are now included in FEMS.
- Forecast data for the stations will be ingested once a day at 3:00 UTC.

Updates to Maps Page

- The FEMS map page now includes a Fire Danger Data Type.
 - Select the Fire Danger Data Type on the Map page to view stations with Fire Danger data.
 - When you select the Fire Danger Data Type, the map toolbar on the left side of the map includes options for filtering the Fire Danger data on the map. Filters include:
 - Date – When you are logged out of FEMS, you can view up to three weeks of data. When you are logged into FEMS, you can view past years of observations and seven days of forecasts.
 - Fuel Models – You can select any of the following fuel models: V, W, X, Y, Z. Fuel Models default to Y.
 - Hourly Data or Daily Max/Min data.
 - NFDR Output:
 - Hourly options are: 1 Hr FM, 10 HR FM, 100 Hr FM, 1000 Hr FM, IC, SC, ERC, BI.
 - Daily options are: 1 Hr FM Min, 10 Hr FM Min, 100 Hr FM Min, 1000 Hr FM Min, KBDI, Herb FM, Woody FM, GSI, IC Max, SC Max, ERC Max, and BI Max
 - A legend for the Fire Danger map is available that identifies the icons that you will see on the map.

- A Dot displays for observations.
- A Diamond displays for forecasts.
- A gray dot with “. . .” displays with a red border when there are missing observations.
- A square with a red border displays for an observation with the NFDR quality flag.
- A triangle with a red border displays for a forecast with the NFDR quality flag.

NOTE: The NFDR quality flag indicates that the NFDR calculated data has quality issues due to missing observation data.

- A Search Bar is available to search for a specific station on the Fire Danger map.
- Hover your mouse over a station’s icon on the map to view the Station Name, Network, and State.
- Click a station’s icon on the map to view the following Fire Danger data:
 - Station Metadata:
 - Network
 - Network ID
 - Owner
 - Latitude
 - Longitude
 - Elevation
 - Grass Type
 - Aspect/Slope
 - Average Annual Precipitation
 - A “Go To Catalog” hyperlink is available that will open the Catalog on the Tables page.
 - Expand to View Chart:
 - A chart displays for each NFDR output available. The NFDR Options that are available are based on whether Hourly or Daily is selected.
 - A “Go To Charts” hyperlink is available that will open the Seasonal Trend Charts on the Tables page.
 - Expand to View Observation Table:
 - Fire Danger data for three days in the past, the current date, and three days in the future display.
 - The data that is included is based on the filters selected in the toolbar.
 - A “Go To Table” hyperlink is available that will open the Fire Danger data table on the Tables page.
- Weather Map

- When the Daily Summary option is selected on the Weather Map, data with dates prior to 2023 now displays appropriately. Previously, weather data with dates prior to 2023 displayed as missing data on the Weather Map, even though the data existed.
- When you select a dot for the hourly Weather Map and there is a missing observation in the weather data, the SF (Snow Flag) will be populated with a value. Previously, the SF data did not display.
- Field Sample Map
 - All data now displays in the hover-over pop-up without being cut-off.

Updates to Tables

- The Tables page now includes two tabs: Stations and Field Sample Sites.
- Stations
 - The new Stations tab includes a list of station hyperlinks.
 - When you click a station hyperlink on the Stations tab, you can view Fire Danger data, Station Metadata, Catalog data, and Seasonal Trend Charts for the selected station.
- Field Sample Sites
 - The Data Type filter was removed from the Field Sample Sites tab on the Tables page.

Updates to Downloads Page

- Fire Danger Downloads
 - When downloading Hourly Fire Danger data, you can now download the data with either a CSV (UTC) Data Format or a CSV (LST – Local Standard Time) data format.
 - When downloading Daily Fire Danger data, a new Average Fire Danger Outputs option is available. This option will calculate the average fire danger data for one or more selected stations.
 - When downloading Fire Danger data, the Station Name column is now populated with Station Names. Previously, the Station Names were not downloading into this column.
 - The Fire Danger download for hourly and daily were updated to include the NFDRQFlag (0 = Good Quality, 2 = QA Issue)
 - The Fire Danger Daily Summary download now includes the following data:
 - StationId
 - StationName
 - ObservationTime (local station time in MM/DD/YYYY format)
 - NFDRType
 - FuelModel
 - 1HrFM
 - Min1HrFMTTime (local station time)
 - 10HrFM

- Min10HrFMTIME (local station time)
- 100HrFM
- Min100HrFMTIME (local station time)
- 1000HrFM
- Min1000HrFMTIME (local station time)
- KBDI
- GSI
- WoodyFM
- HerbFM
- IC
- MaxICTIME (local station time)
- ERC
- MaxERCTIME (local station time)
- SC
- MaxSCTIME (local station time)
- BI
- MaxBITIME (local station time)
- Weather Downloads
 - When downloading weather forecast data, the Wind Gust Azimuth has been updated to include the correct data. Previously, the cloud cover data was downloading instead of the Wind Gust Azimuth.

Updates to Field Samples

- Authorized users can now save site data when adding or editing sites for the Northern Rockies area. Previously, an error message displayed, and the system would not save the site data for the Northern Rockies area.
- A new Pine, Jeffery Fuel Type is now available when adding a new Field Sample.

System Changes/Issues

- Validated Input Adapter for NFDR Calculation
- Addressed sonarqube issues for the 3.2 release (reliability, security, etc.)
- Added unit test coverage run to pipelines.

API (Application Programming Interface) Changes:

- Added a call in Climatology for code tables to return:
 - Fuel model type
 - Observation Type - forecast / Observation
 - Station Status
 - Network Name
 - Station Agency
 - FuelModel.GrassType

- nfdr outputs (erc,kbdi, ...etc)
 - Weather elements (temperature,relative humidity,... etc)
- The NfdrCatalog call was updated to populate the Catalog fields.
- The nfdrObs call was updated to include the nfdrType.
- The nfdrObs call was updated to include an optional NFDRQAF flag in the response.
- If a call to nfdrsObs is executed, the response will exclude NFDR values when the NFDR visibility flag is false.
- The stationMetaData call will have an optional request that can be returned in the response called nfdr_visibility.
- If a call to nfdrObs download is executed, the response will exclude NFDR values when the visibility flag is false.
- The nfdrMinMax call was updated to include an optional NFDRQAF flag in the response.
- If a call to nfdrMinMax is executed, the response will exclude NFDR values when the NFDR visibility flag is false.
- If a call to nfdrdaily download is executed, the response will exclude NFDR values when the visibility flag is false.
- The percentileAvgMinMax call was updated to return the actual total_count.
- The percentileAvgMinMax call was updated to include gsi as an indici to calculate.
- The station_MetaData call was updated to pad period_of_record_start and period_of_record_end fields to keep consistent dateTimes.
- The station_meta_Data call was updated to include the slope from the fire danger model view.
- The percentileAvgMinMax call in the climatology params now includes an optional boolean in the request call utc for true or false. The default will be true to not disrupt WFDSS.
- The nfdrsPercentileAvgMinMax in the climatology params now includes an optional boolean in the request call utc for true or false. The default will be true to not disrupt WFDSS.
- The nfdrsPercentileAvgMinMax call was updated to include the following optional response variables:
 - one_hr_tl_fuel_moisture_min {StatsCalc}
 - ten_hr_tl_fuel_moisture_min {StatsCalc}
 - hun_hr_tl_fuel_moisture_min {StatsCalc}
 - thou_hr_tl_fuel_moisture_min {StatsCalc}
 - ignition_component_max {StatsCalc}
 - spread_component_max {StatsCalc}

- energy_component_max {StatsCalc}
 - burning_index_max {StatsCalc}
 - kbdi_max {StatsCalc}
 - gsi_max {StatsCalc}
 - woody_lfi_fuel_moisture_max {StatsCalc}
 - herbaceous_lfi_fuel_moisture_max {StatsCalc}
- The percentileLevels in the climatology params now includes an optional boolean in the request call utc for true or false. The default will be true to not disrupt WFDSS.
- The percentileLevels in the climatology params now includes an optional response variable gsi.
- The percentileLevels call was updated to include the following optional response variables:
 - one_hr_tl_fuel_moisture_min {JSON}
 - ten_hr_tl_fuel_moisture_min {JSON}
 - hun_hr_tl_fuel_moisture_min {JSON}
 - thou_hr_tl_fuel_moisture_min {JSON}
 - ignition_component_max {JSON}
 - spread_component_max {JSON}
 - energy_component_max {JSON}
 - burning_index_max {JSON}
 - kbdi_max {JSON}
 - gsi_max {JSON}
- woody_lfi_fuel_moisture_max {JSON}
- herbaceous_lfi_fuel_moisture_max {JSON}
- The GetStationPagination call was updated to return what request has in the per_page parameter, rather than always returning per_page of 300000.
- The GetNFDRMinMaxWithoutTime call was updated to return what request has in the per_page parameter, rather than always returning per_page of 300000.
- The GetNFDRHourly call was updated to return what request has in the per_page parameter, rather than always returning per_page of 300000.
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Version 3.1: March 06, 2025

Updates to Maps Page

- The FEMS map now includes a Field Sample Data Type.
 - Select the Field Sample Data Type to view sites with field sample data on the map.

- When you select the Field Sample Data Type, the map toolbar on the left side of the map includes options for filtering the field sample data on the map. Filters include:
 - Start Date and End Date
 - Public users can view 1 year worth of data. There are no date restrictions on logged in users.
 - Category
 - Fuel
 - Method
 - Sub-Category
- A legend for the Field Sample map is available that identifies the dot values:
 - Green outlined white circle with a number includes an Average Sample Value that matches the filter criteria.
 - Green outlined white circle without a number identifies a site with data for the fuel type that does exist, but it outside of the defined date range.
 - Gray circle indicates there is no fuel data that matches the filter criteria for that site.
- A Search hyperlink is available in the toolbar. When you click the Search hyperlink, a Browse Fuel Types window opens.
 - The Browse Fuel Types table includes the following filter options:
 - Search Fuel Types
 - Category
 - Sub-Category
 - Method
 - Date Range
 - The Fuel Types Table on the Browse Fuel Types window includes the following data:
 - Fuel Name
 - Category
 - Sub Category
 - Method
 - Last Sample Date
 - Select a row in the Fuel Types table on the Browse Fuel Types window, and click a View Fuel Type button to automatically set the filters on the Field Sample Map based on the fuel type that you selected.
- A Search Bar is available to search for a specific Site on the Field Sample map.
- Hover over a dot on the map to view the site's name and the last sample date for that site.

- Click a dot on the map to view the following Fuel Sample data:
 - Site Metadata
 - Latitude
 - Longitude
 - Elevation
 - Agency Landowner
 - Aspect
 - Area Name
 - Group Name
 - State
 - Created Date
 - Status
 - Slope
 - Sample Dates
 - Remarks
 - Fuel Sample Overview
 - A list of fuel samples for the selected site display.
 - The blue highlighted sample is the sample that meets all filter criteria.
 - Any sample with a bold Latest Sample Date is a sample within the current selected date range.
 - Any sample with a non-bolded date range is a sample outside of the current selected date range.
 - Fuel Chart
 - Blue line indicates Average Sample Average
 - Blank line indicates Current Sample Average
 - Sample Data
 - Date
 - Subsample Count
 - Sample Avg Value (%)
- When logged into FEMS with a role that can access Field Samples (i.e., Field Sample Collector, Field Sample Group Editor, Field Sample Area Editor, FEMS Admin), a Go to Site hyperlink is available on the Field Sample pop-up window. Clicking this link takes you to the Field Sample Site page for the selected site.
- DMS coordinates were converted into decimal latitude and longitude values.
- Zoom levels were adjusted to display the appropriate sites on the Field Samples map.
- Added zoom levels to station meta data call so that system can determine whether observation data is missing.

- Aspect in Metadata now displays as a direction, rather than in degrees on both the Weather Station pop-up window and the Field Sample Site pop-up window.

Updates to Downloads

- Weather Downloads
 - When downloading Weather Observation and Appended Forecast data, a preset button was added under the Date Range area of the page. Clicking the “Previous 5 Days, Current Day, and 7 Day Forecast” for either a Daily or Hourly download will include five days of observations, the current day’s observations and forecasts, and all forecasts up to the current day/time.
 - The message that displays under Date Time Frequency for a Daily download was changed to read “(Daily) Maximum/Minimum data will be downloaded from midnight to midnight local station time.”
 - Historical forecast data is no longer included in the Weather Observation and Appended Forecast data.
- Fire Danger
 - All users can now download Fire Danger data, regardless of the user account’s role.
 - The message that displays under Date Time Frequency for a Daily download was changed to read “(Daily) Maximum/Minimum data will be downloaded from midnight to midnight local station time.”
- Station Metadata
 - Aspect in Metadata now displays as a direction, rather than in degrees.
- Site Metadata
 - Aspect in Metadata now displays as a direction, rather than in degrees.

Field Samples

- The “Not Specified” Method was removed when adding a field sample. The user can leave the Method blank if they do not know the Method.
- The Time Zone that is selected at the top of the page in FEMS now displays next to the Date and Time in the Sample Date & Time field when adding a field sample.
- Aspect in Metadata now displays as a direction, rather than in degrees.

About

- The About page was updated to include current FEMS information. Updates were made to:
 - Historical Observations (2005 through 2022)
 - Current Observations (2022 through present)
 - RAWS Station Metadata
 - NFDRS System Catalogs

National and Regional Catalogs

- Data schema was redesigned to include a unique station ID for FEMS. NOTE: This key ID will be internally used to integrate multiple station data ingests, with their own source IDs, and associated them all to the unique FEMS station. FEMS will need to keep unique source station IDs as part of the FEMS metadata.
- A new table structure was created for the WXx data import
- Four regional catalogs were manually set for the live fuel moisture (GSI) parameters.
- Data model changes were made for the ingest process.
- The solution architecture of the catalog structure was updated.

Ingest WXx Metadata Service to Regularly Update New Station Metadata Schema Table Fields

- An e-mail notification will be sent when Station Field changes occur (e.g., lat/long, state ID, Class, Status, Transmit Frequency)
- Infrastructure for New Spring Boot application FEMS-WeatherService
- Station information is pulled from WXx on a scheduled basis.
- One Forecast File is pulled from NOAA at 0300 UTC.
- Station time zone is now populated based on the Lat and Longs from the WXx.

System Changes/Issues

- Addressed container vulnerabilities for 3.1 release.
- Changed the Fuel Model Service inap.uri
- Addressed sonarqube issues for the 3.1 release (reliability, security, etc.)
- Added unit test coverage run to pipelines.

API (Application Programming Interface) Changes:

- notification
- GetAverages
- GetcodeTables
- GetFuels
- GetFuelSamples
- GetSampleHeaders
- GetSiteForMap
- GetSiteKeys
- GetsiteMetaData
- GetStationMap
- GetUniqueFuels
- GetWeatherObs
- PresetDownloadButtons

Version 3.0: December 19, 2024

- Updates to Maps Page
 - The FEMS map was refactored using a different mapping tool.
 - Users can view the map as either a World Topographic map or with USGS Imagery.
 - Observations display on the map as circular dots. Forecasts now display on the map as diamonds.
 - A Filter tab was added to the toolbar. When this option is selected, the user can change the Station Elevation for the map.
 - A new Yr option was added to the Date options. When the user clicks the Yr button, the system updates the map with observations for the selected year. This option was added in addition to the Day and Hr options that currently exist.
 - The user can now choose to view Daily Summary data, as well as Hourly data on the map.
 - The following weather data is available when the Hourly option is selected:
 - Temperature
 - Relative Humidity
 - Precipitation
 - Wind Speed
 - Gust Speed

- Solar Radiation
- The following weather data is available when the Daily Summary option is selected:
 - Max Temperature
 - Min Temperature
 - Max Relative Humidity
 - Min Relative Humidity
 - Daily Sum Precipitation
 - Max Wind Speed
 - Min Wind Speed
 - Max Solar Radiation
 - Snow Flag
- The observation dots and Forecast diamonds on the map change color based on the Weather Data option that is selected.
 - A legend was added to the map to identify the meaning of each color that displays for an observation or forecast.
 - The legend is updated, based on the Weather Data selection.
 - When a user expands the new legend, they can move the legend anywhere on the screen by using the mouse to drag the legend to a new location.
 - When the legend is collapsed, it will automatically return to its previous position on the map.
- When a user searches for a station using the Search Station ID or Name field, the system zooms into that station and highlights the station in yellow.
- When a user clicks a station's observation dot or forecast diamond, a station pop-up window displays. This window has been reformatted to make it easier to read the data.
 - The Station Metadata is automatically collapsed. When expanded, it now includes the following information:
 - Network
 - Network ID
 - Owner
 - Latitude
 - Longitude
 - Elevation
 - Grass Type
 - Aspect/Slope
 - Avg Annual Precip
 - The Chart is automatically collapsed. When the chart is expanded, it shows a chart for the Weather Data that is selected. The chart includes three days prior to the selected date, the selected date, and three days after the selected date.

- The Observation Table is automatically expanded. When the “Hourly” Weather Data option is selected, the following data displays:
 - Date/Hour – This row identifies the date and hour for the observations. The table includes one day prior to the selected date, the selected date, and three days after the selected date.
 - Hr:Min – This row identifies the hour and minutes for the observations.
 - Temp (°F) – This row identifies the temperature, in Fahrenheit), for the observations.
 - RH (%) – This row identifies the relative humidity percentage for the observations.
 - Precip (IN) – This row identifies the precipitation in inches for the observations.
 - WS (MPH) – This row identifies the wind speed miles per hour for the observations.
 - WD (°) – This row identifies the wind direction with an arrow for the observations.
 - GS (MPH) – This row identifies the gust speed miles per hour for the observations.
 - SR (W/m2) – This row identifies the solar radiation for the observations.
 - SF – This row identifies whether there was snow fall for the observations.
- The Observation Table is automatically expanded. When the “Daily Summary” Weather Data option is selected, the following data displays:
 - Date/Hour – This row identifies the date for the observations. The table includes three days prior to the selected date, the selected date, and three days after the selected date.
 - Max Temp (°F) – This row identifies the maximum temperature for the day in Fahrenheit.
 - Min Temp (°F) – This row identifies the minimum temperature for the day in Fahrenheit.
 - Max RH (%) – This row identifies the maximum relative humidity percentage for the day.
 - Min RH (%) – This row identifies the minimum relative humidity percentage for the day.
 - Max Wind (MPH) – This row identifies the maximum wind speed in miles per hour for the day.
 - Max Wind Gust (Time/Dir) – This row identifies the time and direction for the maximum gust speed for the day.
 - Precip Total (IN) – This row identifies the maximum precipitation in inches for the day.
 - Max SR (W/m2) – This row identifies the maximum solar radiation for the day.

- Snow Flag – This row identifies whether there was snow fall for the day.
- The station information data that displayed on the right side of the page when zooming into a station was removed.
- API (Application Programming Interface) Changes:
 - Call to see if there is any missing observation data
 - GetWeatherObs
 - WxMinMax
 - GetStationMetaData
- Updates to Weather Downloads
 - Date and Time Frequency was moved after the Data Set field.
 - There is now a Daily and an Hourly option available in the Date and Time Frequency options.
 - When the user selects Daily as the Date and Time Frequency, the following occurs:
 - Data Format is automatically set to CSV (LST – Local Standard Time).
 - The user can select a Start Date and an End Date
 - The user can select the stations to include in the download.
 - The downloaded CSV file includes Daily Summary data for the weather observations.
 - When the user selects Hourly as the Date and Time Frequency, the following occurs:
 - The user can select either FW21 (LST – Local Standard Time) or CSV (UTC) as the Data Format.
 - The user can select a Start Date and End Date.
 - The user can select a Start Hour and End Hour.
 - The user can select the stations to include in the download.
 - The downloaded file (CSV or FW21) includes hourly data for the time period selected.
- Updates to Fire Danger Downloads
 - Fire Danger is a new download option available in the Data Subject Area drop-down.
 - The Fire Danger download option is only available for FEMS Admins and FEMs Testers.
 - The user can select the Fuel Model(s) to include in the Fire Danger download. This field defaults to Y. However, the user can select to include any or all of the following fuel models:
 - V
 - W
 - X

- Y
- Z
- The user can download a Fire Danger Observation, Fire Danger Forecast, or Fire Danger Observation and Forecast report.
- The user can download either Daily or Hourly Fire Danger data.
 - When Daily is selected:
 - Data will be downloaded at the 1300 hour, which is the Display hour.
 - The Data Format is automatically set to CSV (LST – Local Standard Time).
 - The user can enter a Start Date and an End Date to include in the download.
 - The user can select the station(s) to include in the download.
 - When Hourly is selected:
 - The Data Format is automatically set to CSV (LST – Local Standard Time).
 - The user can enter a Start Date and an End Date and a Start Hour and End Hour to include in the download.
 - The user can select the station(s) to include in the download.
- Updates to Weather Data
 - FEMS Weather Data was updated to the current Weather Dataset, which fixes the weather data integrity.
 - The NFDR Calculator was refactored to remove redundant calculations and recalculate NFDR values for the updated weather dataset.
 - Weather Ingest issues from the WXx and subsequent NFDR calculations were addressed.
 - Missing Weather Observation data was backfilled.
- Updates to Contacts
 - The Group filter on the Contacts page was updated to allow number
- Updates to About
 - The About page was updated to include the latest information about the weather dataset.
- Refactor NFDR Calculator to Remove Redundant Calculations and Recalculate NFDR Values for Updated Weather Dataset
- Twelve 508 Compliant Issues were fixed

Version 2.3: September 16, 2024

- Upgrades to Fire Danger Database (FDD):
 - weather_station_observations_daily_summary was updated to include daily_precipitation_total for a 24 hour period of time.

- API (Application Programming Interface) Changes:
 - WxMinMax Query
- Reinstalled Ingest State Machine 2.1
- Upgrades to Field Sample Database (FSD):
 - Disassociated State <-> Group Association:
 - Removed StateID from Group_Detail.
 - Removed StateID from Group_State_Contact
 - Renamed Group_State_Contact to Group_Contact
 - When downloading Field Sample data for sites, the system now includes Status information.
 - Users with a FEMS Admin or Field Sample Area Editor role can now include “Archived” samples in a Field Sample data download file.
 - When downloading Field Sample data for sites, the size of the Search Fuel Types field expands or contacts based on the number of filters selected.
 - The Date Range field for downloading data was replaced with Start Date and End Date fields to make it easier to identify the dates to include in the file that will be downloaded.
 - A new Site Metadata option is now available on the Downloads page. This option allows users to either download a site’s metadata in a CSV format or copy a link that can be pasted into a document or e-mail. The link will open the site metadata in a csv format.
 - Users with a FEMS Admin or Field Sample Area Editor role can now delete contacts.
 - When a FEMS Admin or Field Sample Area Editor make changes to contact data for existing contacts, there are no longer any save issues.
 - When a FEMS Admin or Field Sample Area Editor add a contact, the system now includes scroll bars if the screen resolution does not display all fields.
 - General FEMS users can now view Contact data by logging into FEMs, selecting the ... (Settings and More) drop-down menu, and selecting the Contacts option.
 - Users with the FEMS Admin or Field Sample Area Editor roles can now view archived samples and sub-samples for a selected site.
 - Field Samples for a site are now sorted by date in descending order with the most recent sample date at the top of the table.
 - Error messages have been standardized in Field Samples to reflect that the error occurred in Field Samples.
 - When viewing field samples on the Tables page, the system now sorts the sample data by date in descending order with the most recent sample date at the top of the table.
 - Users with the FEMS Admin role can now change the status of non-archived samples through the bulk Field Sample Data Upload process.
 - Users with the FEMS Admin role can now change the site for non-archived samples through the Bulk Field Sample Upload process.

- Ninety 508 Compliance issues were fixed in FEMS.
- API (Application Programming Interface) Changes:
 - Included Null and All checks for the following services:
 - GetAuditTrailItems
 - GetSampleForBulkDownload
 - GetFuels
 - GetSamples
 - GetSampleHeaders
 - Updated CreateUpdateContacts to handle deleting contacts.
 - Updated GetSampleForBulkDownload to include status changes
 - Updated Bulk data upload for fuel sample to handle status changes and site changes
 - Updated GetSites to populate Site Metadownload csv file.

Version 2.2: August 8, 2024.

- Upgrades to Field Sample Database (FSD):
 - Contacts data was updated to include Group and Area information.
 - When adding or editing a Contact, the fields now specify Government Email and Government Phone.
 - The system now prevents a FEMS Admin or Field Sample Area Editor from adding duplicate contacts.
 - Entered and Last Modified Dates now display as part of the sub-sample data.
 - When entering sub-sample data, you can now include a Container #.
 - The system prevents a user from adding duplicate samples to a site.
 - The Area Name and Group Name hyperlinks were added to a Site's "breadcrumb" trail that displays when a Site is selected in Field Samples. If you click the Area link, the system displays data on the screen for the selected Area. If you click the Group link, the system displays data on the screen for the selected Group.
 - Users can now enter multiple sub-samples and save all of the sub-sample data at the same time by clicking a "Save All" option.
 - The First Sample and Last Sample Dates for a site were added to the site's metadata in Field Samples.
 - The system prevents users from entering a negative value in the Weight and Value fields when entering sub-sample data.
 - If the dry weight is greater than the wet weight for sub-sample data, an error message displays and the system will not allow you save the data.
 - If the tare weight is greater than the wet or the dry weight for sub-sample data, an error message displays and the system will not allow you save the data.

- New fuel types, Bear Clover, Oceanspray, and Menziesia were added to Fuel Types when adding a new sample in Field Samples.
- When viewing sample data for a selected Site, the system now limits the Sample Type filter to only include samples that exist for the selected site.
- A FEMS Admin user can now view Audit data for sub-samples by clicking the . . . (Fuel Settings) menu that displays next to a fuel sub-sample.
- The system now prevents a FEMS Admin or Field Sample Area Editor from adding duplicate groups.
- The system prevents the FEMS Admin or Field Sample Area Editor from adding a contact to a group if that contact was already added to that group.
- The system now prevents a FEMS Admin from adding duplicating areas.
- The system prevents a FEMS Admin from adding a contact to an area if that contact was already added to that area.
- The system displays an error message to the user if they enter an invalid Start or End Date on the Tables page.
- When viewing sample data on the Tables page for a selected Site, the system now limits the Sample Type filter to only include samples that exist for the selected site.
- When multiple stations are selected for the Weather Download option, the system now clears all of the stations that were selected when the “Clear All” option is selected.
- A new Field Sample Download option is available on the Downloads page that allows users to download sample data in a csv format.
- A user with a FEMS Admin role can now select a “Field Sample Data Import” option from the . . . (Settings and More) menu. This option allows a FEMS Admin to upload Field Sample data into FEMS from a csv file.
- New training videos were added to the Help page.
- The system now allows dashes in all input fields.
- S3 Trigger Updates were added for the Field Sample Data Upload Process.
- The FEMS system can now process uploaded Fuel Sample Data.
- FTP files were downloaded, unzipped & uploaded for FEMS.
- Users can now move between the Maps page and the Tables page without any errors. Previously a white screen displayed.
- Fixed Security Hotspots in SonarQube for Climatology.
- There was a one-time manual update to the GSI station metadata in FEMS via the backend.
- A Snowflag Internal Error Notification & Fix was applied to FEMS (i.e., how to handle data other than 1 or 0 is in the file and create a log file with the erroneous data).
- Sixty-Six 508 Compliance Issues were fixed in FEMS.
- API (Application Programming Interface) Changes
 - nfdrsPercentilsMinMax change Values from Int to FLOAT, which displays the decimal points rather than rounding the values.
 - Update getContacts Service to send groups and areas

- Update GetWeatherObsChartPopup Query to pull data
- Fixed issue with getSamples on screen when method or sub-category are null
- Add Date Range for Active Sampling to Metadata for each site
- Add Sample Collection Date Range to GetSites
- Update API services to Add Created_Date and Created_By to All Responses for Gets
- Update Create Update Group for Unique Contact ID
- Update Create Update Area for Unique Contact ID
- Update Get Site Key for Field Sample Download Search
- New API: Get Field Sample Data for Download
- New API: Upload Data
- New API: Get Bulk Data Jobs with Filters
- New API: Audi Trail Service

Version 2.1: May 17, 2024.

- Upgrades to Field Sample Database (FSD):
 - A Settings and More menu icon now displays next to the Login button at the top of the screen. This menu displays as three dots (...).
 - If you are not logged into the system, the ... menu includes the Help, Feedback and About options.
 - When you are logged into the system with a user account that has the FEMS Admin, Field Sample Area Editor, Field Sample Group Editor, or Field Sample Collector role, the... menu also includes a Contacts option.
 - A user with the FEMS Admin or Field Sample Area Editor role can Add and Edit Contacts by selecting the Contacts option from the ... menu. Users with a Field Sample Group Editor or Field Sample Collector role can view Contact data.
 - Users with a FEMS Admin role can now Add or Edit Area data.
 - Users with a FEMS Admin or Field Sample Area Editor can now Add or Edit Group data.
 - Users with a FEMS Admin, Field Sample Area Editor, or Field Sample Group Editor role can add Site data.
 - When a user with the FEMS Admin, Field Sample Area Editor, Field Sample Group Editor, or Field Sample Collector role accesses the Field Samples page, they can now sort the data in all the Field Sample columns in the table that displays.
 - When a user with the FEMS Admin, Field Sample Area Editor, Field Sample Group Editor, or Field Sample Collector role adds a new sample to a site, the system now automatically displays that Field Sample on the screen and expands all data for that sample.

- When a user with the FEMS Admin, Field Sample Area Editor, Field Sample Group Editor, or Field Sample Collector role adds a new Field Sample, the system only includes the Moisture Probe option for Dead Categories.
- When a user logs out of the FEMS system from the Field Sample screen, the system now automatically displays the Maps screen.
- API (Application Programming Interface) Changes:
 - Create and Update Area
 - Create and Update Group
 - Create and Update Site
 - Create and Update Contacts
 - Get Contact Data
- Reordered the Sub-Categories list when adding a new sample to FSD to display as Lower, Middle, Upper, Old New.
- Automatically expand all carrots for New Samples in FSD
- Deleting or Archiving a Field Sample in FSD resets the filters to the defaults
- Added an indicator (...) for truncated remarks in FSD that can be expanded for a site.
- Label for Group Name(s) and Area Name(s) was changed to Group Editor(s) and Area Editor(s) in FSD.
- Combined Eastern and Western Great Basin into a singular “Great Basin” group.
- Rounded Sub-Sample Values to two decimal places in FSD.
- Limited Latitude and Longitude inputs to 4 decimal places in FSD.
- Added an Audit Trail that is stored in the database for any changes made to the Fuel Samples in FSD.
- Added additional videos to the Help page.

Version 2.0: April 1, 2024.

- Introduction of the Field Samples Database (FSD) within FEMS.
- Enables sampled fuel moisture data entry and access.
- Data entry is restricted by roles and permissions. Display of data in table form is unrestricted.
- FSD replaces the National Fuel Moisture Database, which is terminated.

Version 1.0: July 7, 2023.

- The initial on-line application release.
- Enabled RAWS weather data access as an interactive map, and in tables and charts.
- Enabled RAWS data download.

- First step towards replacement of the Weather Information Management System (WIMS).
- Established access criteria for the public (unauthenticated users) and government wildland fire personnel (authenticated users).
- Without logging into FEMS, public users can access to a weather map, table, chart, and download features for the most recent 14 days of observations and the 7-day forecast.
- Once authorized, fire personnel have access to data from January 1, 2000, to the present.