

## Data Warehouse for Long-Term Fire Datasets – Activity and Emissions

### A. Guiding Principles

1. Flexibility
  - i. Multiple options at each step
  - ii. Ability to upload own data and examine supplied data
2. Transparency
  - i. No black boxes
  - ii. Links to documentation (literature, user guides, websites, etc.)
  - iii. Tracks metadata, i.e., no data presented that doesn't have metadata
3. Guidance
  - i. Guides a user through the steps in the process (provides a structure)
  - ii. Presents existing data or methods that may be unknown to user
4. Stability
  - i. Data and methods are stable enough across time so that multi-year comparisons can be made
  - ii. Data are accessible to a wide range of end-users and applications

### B. Data Products and Services

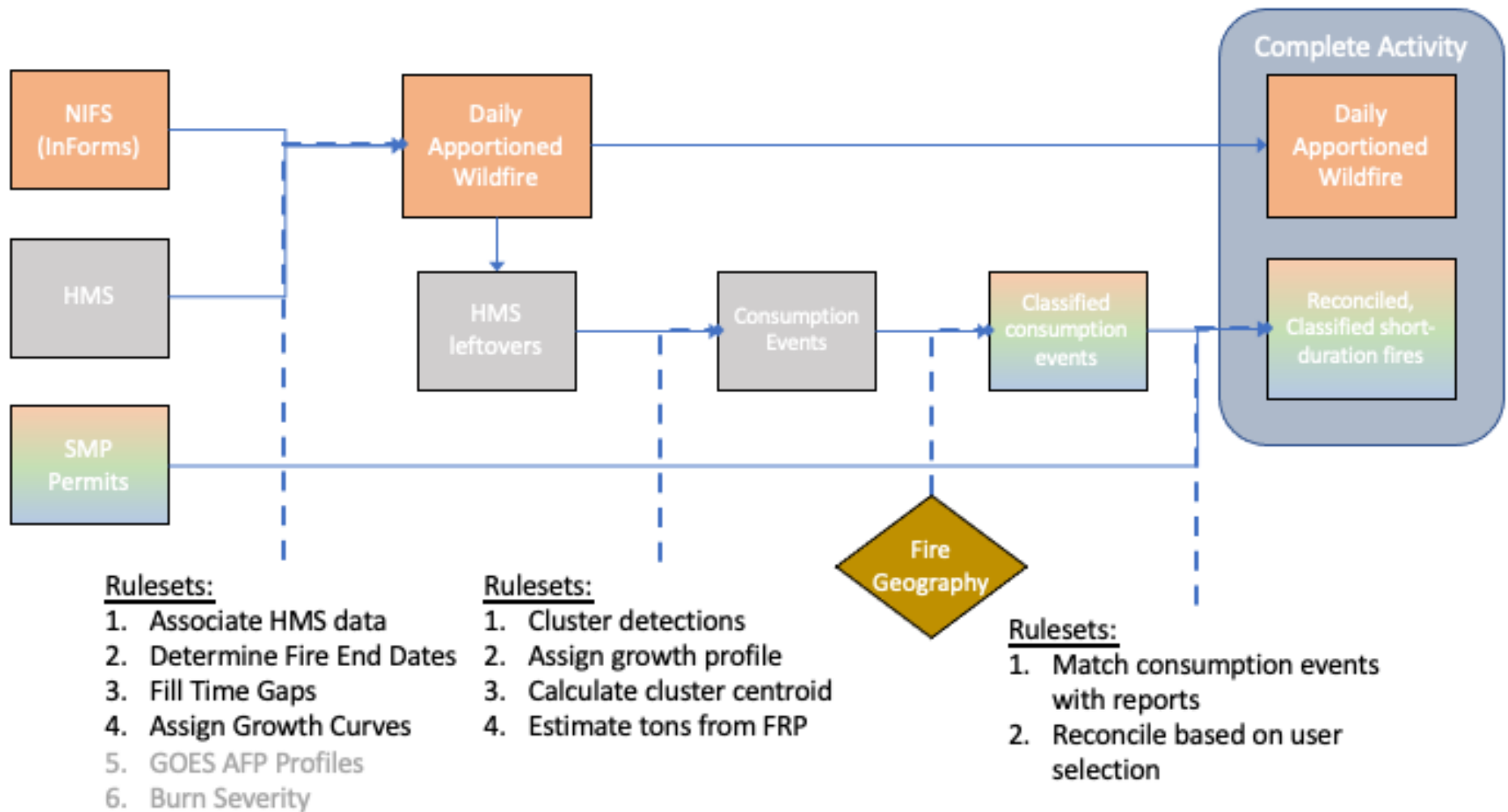
1. Comprehensive fire activity datasets for preset domains offered by the IWDW
2. Model-ready fire emissions datasets
3. QA/QC worksheets to accompany metadata
4. Multiple, nested cycle times of product availability

Table 1. Summary of Data Products, Cycle Times, and Applications

Hierarchy	Input Datasets and Tools	Timing	Purpose
<b>Level 0</b>	<ul style="list-style-type: none"> <li>• NIFS (InForm), HMS, Default Fire Geography</li> <li>• WFEIS Emissions Calculator</li> </ul>	Available annually no later than 6 months after the end of the previous calendar year	<ul style="list-style-type: none"> <li>• Base platform for subsequent levels</li> <li>• Rapid-response first-order estimate of daily emissions</li> </ul>
<b>Level 1</b>	<ul style="list-style-type: none"> <li>• Level 0, SMP Reports, Annual Fire Geography</li> <li>• WFEIS Emissions Calculator</li> </ul>	Available annually no later than 12 months after the end of the previous calendar year	<ul style="list-style-type: none"> <li>• EI analysis and reporting</li> <li>• Exceptional Events</li> </ul>
<b>Level 2</b>	<ul style="list-style-type: none"> <li>• Level 1, GOES AFP (diurnal activity), MTBS</li> <li>• WFEIS Emissions Calculator</li> </ul>	Available annually no later than 18 months after the end of the previous calendar year	<ul style="list-style-type: none"> <li>• Photochemical Grid Modeling (PGM)</li> <li>• Suitable for climatology analyses</li> </ul>

The following figures outline a conceptual model for estimating fire activity using three primary input data streams and calculating emissions using the Wildland Fire Emissions Inventory System. Emissions for events based on FRP profiles will bypass the majority of the WFEIS process.

Figure 1. Conceptual Model for building activity datasets within the Continental United States



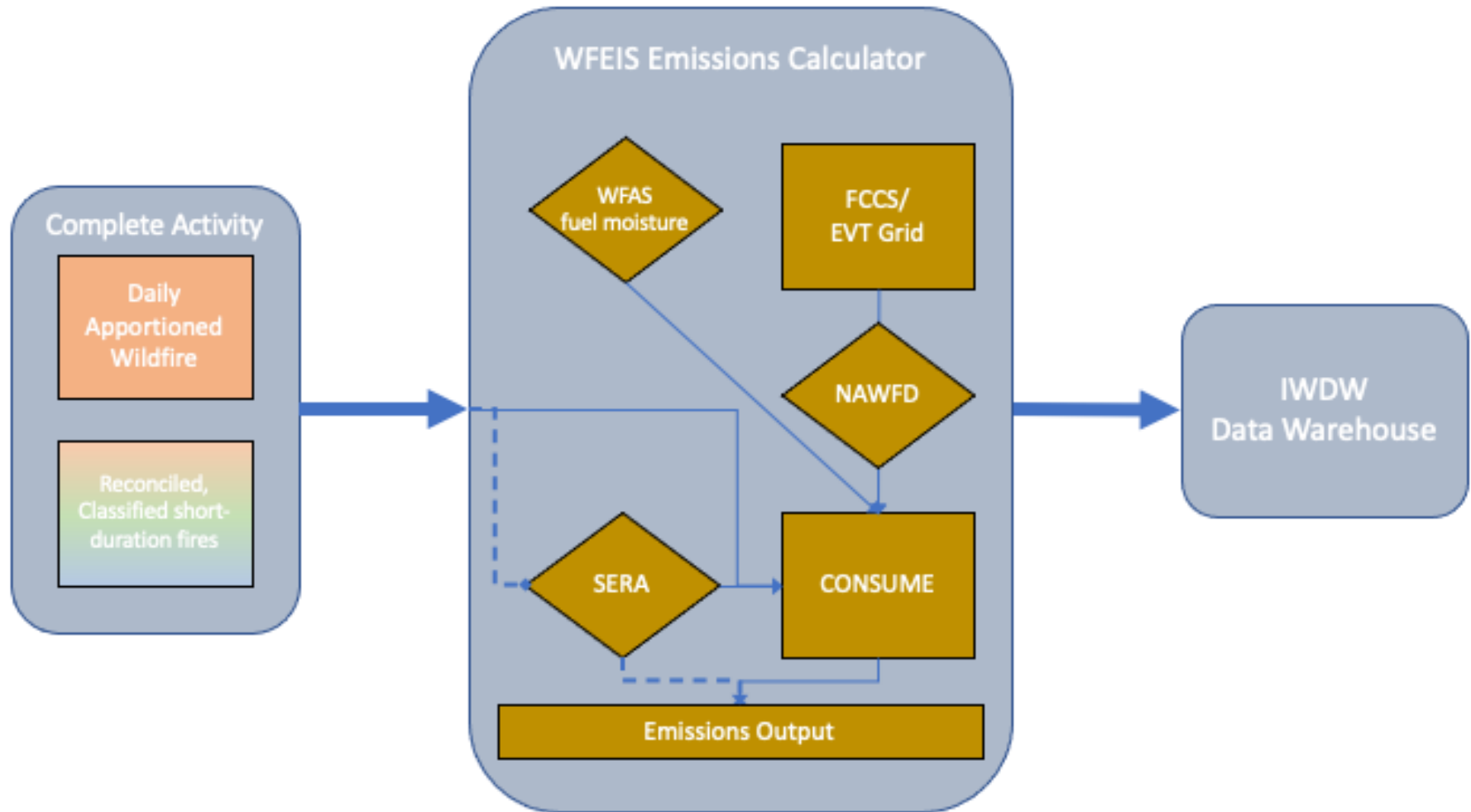
Definitions:

HMS – [Hazard Mapping System](#), a NOAA product that combines FRP-based fire detections from multiple sensors

NIFS – [National Incident Feature Service](#), a consolidated dataset of fire perimeters certified by the National Interagency Fire Center

SMP Permits – Activity data about short-duration fires from Smoke Management Programs, gathered through state-specific permitting processes

Figure 2. Interaction of Activity Datasets, Wildland Fire Emissions Inventory System emissions calculation process, and Data Warehouse. For more details about WFEIS see French et al. 2014<sup>1</sup>



Definitions:

WFAS—[Wildland Fire Assessment System](#), a daily compilation of fuel moisture information from a network of fire weather stations across the United States

FCCS/EVT—Fuel Characteristics Classification System/[Existing Vegetation Type](#), a gridded dataset of fuels using multiple strata that is compatible with [Consume](#)

NAWFD—[North American Wildland Fuels Database](#), a web service that aggregates fuel loading information from 26,620 field sites mapped to FCCS/EVT fuelbeds

SERA—[Smoke Emissions Repository Application](#), a database of field and laboratory emission factors of wildland fire across the United States and Canada

<sup>1</sup> French, N.H.F., D. McKenzie, T. Erickson, B. Koziol, M. Billmire, K.A. Endsley, N.K.Y. Scheinerman, L. Jenkins, M.E. Miller, R. Ottmar, and S. Prichard. "Modeling regional-scale fire emissions with the Wildland Fire Emissions Information System." *Earth Interactions* 18, no. 16 (2014)

## C. Operations and Maintenance

### 1. Host site – [Intermountain West Data Warehouse](#)

#### i. March 3, 2021 high-level status report on IWDW and associated websites by WESTAR and CIRA

1. [WESTAR \(Tom Moore\) modeling progress report presentation \(\\*.pptx\)](#)
2. [CIRA \(Shawn McClure\) Air Data Mgmt. System / IWDW operations presentation \(\\*.pptx\)](#)
3. See below for Figure 1 for architecture and Figure 2 for delivery websites

#### ii. WESTAR-WRAP Long-Term Fire Data website (LTFD – better acronym!?) would be added to CIRA ADMS portfolio

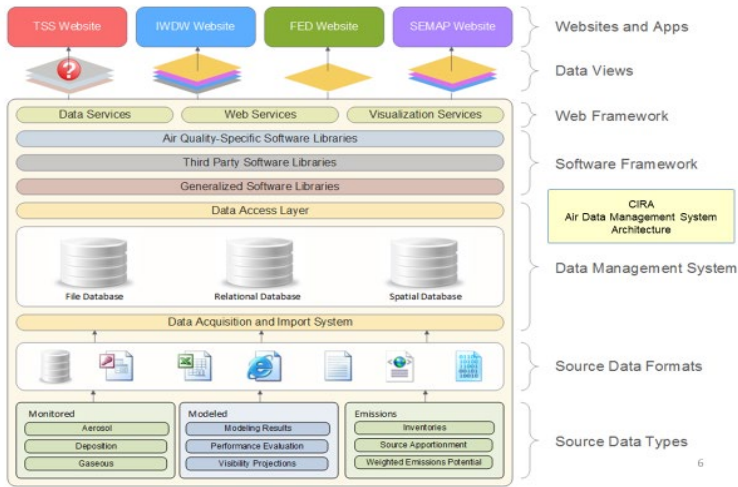
##### 1. Activities by CIRA

- a. Hardware
- b. Networking
- c. Software
- d. Develop and implement LTFD website
- e. Register and track users
- f. Track data uses and requests
- g. Report composition of website traffic for organizations / user types

#### iii. Staffing

1. CIRA LTFD implementation = 1.0 FTE, software engineer reporting to Shawn McClure
  - a. Annual cost, ongoing
  - b. Funding mechanism would be existing WESTAR-WRAP agreement with CSU/CIRA for IWDW and TSS operations and maintenance (20% indirect rate), add LTFD effort
  - c. Tom Moore to provide on-site facilitation and coordination at CIRA
2. Air Sciences' support for design assistance/calculations/QA via existing WESTAR contract
  - a. Collaboration with MTRI to implement WFEIS datasets and tools
  - b. Collaboration with CSU-CIRA on presentation and management of datasets and metadata in the Warehouse
  - c. Develop process and format for WESTAR-WRAP member agencies to have their fire activity and emissions data included and made accessible via the standard Warehouse inventory products and datasets
  - d. Analyze and ensure consistency for data available from the Warehouse
  - e. Greatest effort would be year 1 and taper back to a constant lower level of effort in year 2 and onward
  - f. Tom manages Air Sciences' contract with regular reporting to WESTAR-WRAP Fire & Smoke WG

**Figure 1. CIRA Air Data Management System architecture**



**Figure 2. CIRA Air Data Management System ecosystem of website instances**

