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MEETING NOTES

CONCEPTUAL MODEL FOR FIRE DATA PROJECT - CORE SCIENCE TEAM MEETING #2

DATE: February 16, 2021

TIME: 3:00-5:00pm MST

LOCATION: Microsoft Team Meeting

ATTENDEES: Matt Mavko, Tom Moore, Dave Randall, Klaus Scott, Farren Herron-Thorpe, Andrew Kirsch, Mark Fitch, Sara Strachan, Robert Kotchenruther, Rhonda Payne, Lyndsey Boyle

	AGENDA ITEMS	PRESENTER	TIME ALLOTTED
1	Welcome, self-introductions	Tom Moore	5 Minutes
2	Review inputs received from each CST member as homework from Feb 1st	Matt Mavko (facilitator)	30 Minutes
3	Discuss version: A conceptual model integrating "systems" in use	Dave Randall	20 Minutes
4	Core Science Team roundtable open discussion	Dave Randall (facilitator)	25 Minutes
5	Open discussion of products and services to be provided by a data warehouse	Matt Mavko (facilitator)	20 Minutes
6	Next Steps and Meetings	Tom Moore	10 Minutes

	NEW ACTION ITEMS	RESPONSIBLE	DUE DATE
1	Given the interest in a data warehouse, what does that mean to you?	Core Science Team	February 28th
2	Fire EI Survey idea to be developed further	Air Sciences/WRAP	February 28th
3	What is the WFEIS site lacking or missing? How is it in line with our goals?	Core Science Team	February 28th

	UPCOMING MEETINGS	DATE AND TIME
1	Core Science Team Meeting #3	March 1, 2021, 3:00-5:00 PM MST
2	Core Science Team Meeting #4	March 29, 2021, 3:00-5:00 PM MST

	FIRE DATABASES & RESOURCES DISCUSSED	LINK
1	SPECIATE	https://www.epa.gov/air-emissions-modeling/speciate
2	IRWIN	https://www.forestsandrangelands.gov/WFIT/applications/IRWIN/index.shtml

3	FFT (Fuel and Fire Tools) FCCS (Fuel Characteristics Classification System) CONSUME	https://www.fs.usda.gov/pnw/tools/fuel-and-fire-tools-fft [includes FCCS and CONSUME now]
4	LF (LandFire)	https://www.landfire.gov/fccs.php
5	FINN (Fire INventory from NCAR)	https://www2.acom.ucar.edu/modeling/finn-fire-inventory-ncar
6	CALFIRE	https://www.fire.ca.gov/
7	InForm	https://in-form-nifc.hub.arcgis.com/
8	GEOMAC [no longer supported]	https://www.geomac.gov/
9	BlueSky Pipeline	https://tools.airfire.org/websky/v2/#status https://github.com/pnwairfire/bluesky
10	MODIS	https://fsapps.nwcg.gov/afm/activefiremaps.php
11	FOFEM (First Order Fire Effects Model)	https://www.firelab.org/project/fofem-fire-effects-model
12	NEI (National Emissions Inventory)	https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei
13	USFS AirFire	https://www.fs.fed.us/pnw/airfire/
14	SMARTFIREv2	https://github.com/pnwairfire/SmartFire2
15	NIFC (National Interagency Fire Center) Open Data	https://data-nifc.opendata.arcgis.com/
16	NFDRS (National Fire Danger Rating System)	https://www.fs.usda.gov/detail/cibola/landmanagement/resourcemanagement/?cid=stelprdb5368839
17	WFEIS (Wildland Fire Emissions Inventory System)	https://wfeis.mtri.org/
18	WFDSS (Wildland Fire Decision Support System)	https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml
19	North American Wildland Fuels Database	https://fuels.mtri.org
20	Pyregence consortium [wildfire forecasting]	https://pyregence.org/

Meeting Notes

Review of Materials (Matt Mavko – facilitator)

- Sara Strachan
    - Idaho DEQ puts together three varying levels of complexity Fire EIs
        - They fit well into the table presented in the white paper of varying levels of complexity and confidence
        - Least complex: The state-wide Idaho Annual Wildfire Emissions Estimates is an annual back-of-envelope calculation provides general estimates for Governor's office standing request
            - Least complexity because the turn around is quick and little data available
            - Used an area-weighted approach from 2014 NEI data to get total fuel consumption in tons/acre
            - Fuel consumption (done using BlueSky framework): most uncertain step

        - Emission Factors: from papers or USFS AirFire
    - Most complex: PM Advance Program[1] or SIP
        - Emissions inventories are required for boundary creation for NAA designations and PM Advance areas
        - IDEQ identifies regional sources and calculates emissions that affect the monitor
- Klaus Scott
    - Uses FOFEM – has fuel loading, consumption, and emission factors included
    - For GHG reporting, IPCC provides resources on calculations for GHG with multiple tiers of complexity. We might be able to leverage their approach.
- Dave Randall
    - To further think through - the conceptual model can either assist with gathering each individual data point (i.e. acres burned, fuel consumption, emissions factors) or it can leverage an existing modeling software (e.g. FOFEM, BlueSky) and focus on the inputs needed for them
    - Each state appears to approach EIs differently; some states gather each piece of information individually and some rely more heavily on these fire emissions estimating systems
- Farren Herron-Thorpe
    - WA does a comprehensive EI every 3 years, same years as NEI
    - The Fire EI uses the NEI data as a base and starting point, but there is a lot of effort to correct and QA the dataset from EPA
        - EPA told them to submit corrected data back to them and they will rerun BlueSky, however they said they would not have time to do that ultimately. WA decided to generate their own EIs and submit them
    - Breaks fires into three categories: Wildfires, Ag burns, and Rx Burns
        - Ag burns – all require a permit, so those are easier to match up
        - Wildfire dataset included some fires that were titled incorrectly (may have been a Rx burn)
            - Typically QA'd using the date (Wildfires are not in December in WA, Ag burns are not in July in WA)
    - Had to piece together datasets and spend a lot of time QA/QCing by hand
    - The time/effort fixing the data does not significantly change the total state EI because they are small acreage
    - Quick initial check on the dataset: WA DOE's estimate of the total acreage burned for the state and the EPA total acreage was off by about 150K acres

[1] The Advance Program supports states, tribes, and local governments that want to take proactive steps to keep their air clean by promoting local actions to reduce ozone and/or fine particulate pollution. https://www.epa.gov/advance

    - Check the EPA dataset for holes in wildfire times, sometimes they will be missing two days of data for a weeklong wildfire
    - FIS/Spider is not ready yet, EPA is still using SMARTFIRE version 2
    - Jeff Vukovich is trying to create a new, improved version of SMARTFIRE using the opensource code [ed. It is written in Java and available on GitHub, see table]
- Mark Fitch
    - BlueSky can make mistakes if it is a cloudy day or more of a smolder
    - However, [a wildfire's total acres] should match because [they are using perimeter data]
- Andrew Kirsch
    - NIFC (National Interagency Fire Center) ArcGIS Opendata website is connected to INFORMS: as data are certified in INFORMS they are sent to the OpenData site
    - Uses point and perimeter data
        - Interagency Fire Perimeter History – All Years
    - Each fire with an IRWIN ID should have a perimeter in the dataset
    - They are trying to get the fire data finalized in the first quarter of the following year (e.g. 2020 data finalized in first quarter of 2021)
    - The point data gets certified if it meets federal criteria and is more than 10 acres, then it will get a perimeter associated (therefore the perimeter is also certified)
    - The perimeter source field will say "Final Fire Feature Service" if it's certified
    - The perimeter and point should be matched up by the IRWIN ID
    - NFDRS (National Fire Danger Rating System) data is attempting to get Gridded Fuel Moisture information or fuel loading on a daily basis [need to find out status of this project, perhaps bring in as a SME]
- Final thoughts
    - A lot of the remote sensing data is available, we just have to locate it (Sara)
    - Matt Jolly is the contact [full name is William M Jolly] (Andy)
        - Working with ESRI to offer more services
    - FCCS came along, then NFDRS 2016 and they are currently updating the NFDRS
    - We have a script that each day "scrapes" the daily national fdr_obs.txt file of RAWS data from WFAS.net's "dead fuel moisture" because the WFAS archive doesn't work (Klaus) [this is built in to FETS, too]

Data Elements and Calculation Stream (Dave Randall)

- What we are trying to do is to take the lessons learned and the best approaches and the most supported datasets and efficient efforts to make use of the datasets and coalesce them into the conceptual model
- Fire Data Elements framework: Event > Activity > Consumption > Emission Factors > Emissions Inventory
- We need to decide which option we want to go with

    - One option is to start at the last step (emissions inventory) from an existing EI system (e.g., NEI, FIMM, WFEIS) and then QA/QC the activity data. Seems like a "head-start"…but is it? Lots of hand-stitching and reconciling
    - Another option is to go through each step in the order presented in this framework. Investment is in the activity data and data element gathering (potentially more work in the "from-scratch" method; potential for greater variation in calculation streams)
- WRAP's purpose is assessing/understanding the quality of data element and sub element
- If a Level 0 EI is the most basic and Level 3 3 is the absolute best ("inspiration") quality EI available, we are shooting for somewhere in the 2-3 range
- One of the challenges will be to get a known degree of consistency across WRAP states because each state does this work so differently
    - We do not want to restrict or prescribe one method, so perhaps we will need to build in options
- We need to understand the completeness and the options available
- Figure out how this model provides for updates and remains up to date with needs
- BlueSky does a modular approach, where you can enter individual pieces of data, choose among a variety of data elements (lots of built-in flexibility)
    - We'll make more decisions in our Conceptual Model…we'll steer end-users to activity data sets and data elements of understood quality and a consistent calculation stream

Round-table discussion (Dave Randall & Matt Mavko Facilitate)

- When we do not have great data and we are using HMS, how are we determining size? This will be helpful for us to pin down because there is not a great method at the moment. We may need to have an alternate path to work around these kinds of issues (Farren)
- We may want to set us up for an iterative process and build in a revision process because there will be errors in whatever we produce and/or there could be refinements in the activity data. The primary data that will be important to QA is activity data (Farren)
- We use the NEI data to get the event information, we do not really use their total emissions because the NEI leaves out some fires/information. (Sara)
- We will likely need to build in a process for utilizing satellite detects to get at event/activity data because of the infrequency of the NEI. (Sara)
- The last step in this framework should really be Emission Inventory and not Emissions, because it includes all data necessary to get at emissions. (Dave)
- Perhaps we create a path for data (analogous to emissions reporting for point sources): Sources generate data, state agency does a review of the data and reports to EPA, EPA does a high-level review, then point source data is "set-in-stone". We likely will not be able to remove humans from this process. (Farren)

- We may need to create a QA rubric (becomes the metadata for how each step in the calculation stream is done) so that this work is not tied to a particular person or agency. (Matt)
    - Having a QA rubric makes sense to go along with a conceptual model (Farren)
- We could implement a survey of all users WESTAR-WRAP to determine the level of effort they put into EIs currently and their needs, especially downwind states that may have less information about fire events but deal with smoke. A QA rubric could help give them confidence. (Tom)
- Downwind states might like to know more detail about the Fire EI's and having activity data from other states would be helpful in creating a more complete Fire EI for bordering states. (Klaus)
- Might need a pathway for each fire type (wildfire, ag, Rx); the ag and Rx might need to differ by state (Farren)
- Perhaps this conceptual model and iteration is only geared toward wildfires because of these types of complexities; conceptual model provides support for Ag and Rx fire but data elements/calculation stream is more up to S/L/Ts (Dave)
- Perhaps we create more of a decision tree framework pointing to different available tools and options that already exist (Matt)
- WFEIS (Wildland Fire Emissions Inventory System) got pretty close to the acres and emissions burned in the Idaho Fire EI
    - Has the ability to evaluate the data provided from different sources
    - CST believes this is being used by a forest service research team maybe
    - Includes fire and fuel moisture data from Canada as well
    - Pull the methodology/emission calculation information from this Michigan Tech site to compare it with the existing methodologies we have from the CST (Dave)
        - It is similar to Klaus' methodology
- Not related to the WFDSS (Wildland Fire Decision Support System)

Meeting Wrap-up and Final Thoughts (Matt Mavko & Tom Moore)

- Fire EI Survey to be developed further
    - To broaden our reach to state, local, and tribal agencies
    - Look into digging into prescribed fires more. It is a regulated source (loosely)
    - How important tracking is?
- Given the interest in a data warehouse, what does that mean to you? What is the Michigan site lacking or missing, if anything?
- Most of WRAP's work is done for fires retroactively, although some of Farren's work and Mark's work is done to forecast fire emissions from active fires (i.e. using BlueSky Playground)
- Pyregence does work on forecasting fire emissions for active fires