Prescribed Fire Emissions Estimate Webtool Instructions

Solutio Environmental, Inc.

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- ## *Purpose:*

  The purpose of this course, "Prescribed Fire Emissions Estimate Webtool Instructions", is to provide general instructions for the use of the Prescribed Fire Emissions Estimate webtool.

- ## *Objectives:*

  - Describe the estimation model

  - Demonstrate the model functionality

  - Provide a brief example of the estimation model

- **This basic course is designed to provide a general overview of the "Prescribed Fire Emission Estimate" webtool and does not cover any aspect of prescribed burns**

- **Emissions provided by the "Prescribed Fire Emission Estimate" webtool are just that, estimated, and may not provide exact emissions measured in the field**

- **For interpretation, emissions values should be compared to DAF site-specific insignificance indicators which are dependent on the burn's location and air quality attainment status. For assistance on obtaining site-specific insignificance indicators contact the ACAM Help Desk at ACAM@solutioenv.com**

- **An Introduction to the Prescribed Fire Emissions Estimator**

- **Using the Emissions Estimator**
    - **Step 1: Location and Size**
    - **Step 2: Air Quality Forest Identification**
    - **Step 3: Fuel Loading Mixture**
    - **Step 4: Estimated Emissions**

- **Example of the Fire Emissions Estimate Webtool**

An Introduction to the Prescribed Fire Emissions Estimator

- **What does the emissions estimator do?**

  - The estimator webtool takes user inputs about the location of a potential prescribed burn to give the user an estimate of the emissions potentially generated by the fire

- **What inputs does the webtool need?**

  - Potential burn location: state and county

  - Potential burned area (acres)

  - Fuel loading rate (tons/acre)

  - Fuel loading mixture (fractions of total fuel)

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State: STATE? ⌄

County: COUNTY? ⌄

Location FIPS Code:

Burned Area: [   ] ⌃⌄ acre(s)

1. Select the first drop down and choose the appropriate state for the potential burn location

2. The county drop down is then available; from this, select the corresponding county location

   - The FIPS code for the county is then displayed

3. Use the "Burned Area" textbox to fill in the total acreage intended for the potential burn location

U.S. Forest Service Region:

Geographic Area:

Fuel Loading: [50   ⬍] ton/acre [Restore Default]

- Once the state and county are selected, the corresponding forest region and geographic area will be displayed.

4. Use the fuel loading textbox to record the ton/acre fuel loading that will potentially be used for the burn

- The emissions estimator uses a default fuel loading value of 50 ton/acre; the user may use this default value or opt to use their own
- To return to the default fuel loading, select the "Restore Default" button

Default fuel loadings and fuel loadings mixture values are generally for planning purposes; however, it is strongly urged to conduct site-specific fuel loading measurements or to contact that state's federal land management agencies and state forestry agencies that conduct prescribed burning to obtain the best information

Fuel	Mixture		Fuel	Mixture
Slash	0.5		Slash	0.5
Conifer - Long Needle	0		Conifer - Long Needle	0
Conifer - Short Needle	0.2		Conifer - Short Needle	0.2
Conifer - Mixed	0		Conifer - Mixed	0
Grassland	0.2		Grassland	0.5
Sagebush	0		Sagebush	0
Chaparral	0		Chaparral	0
Pinyon/Juniper	0		Pinyon/Juniper	0
Hardwood	0		Hardwood	0
Palmetto/Galberry	0		Palmetto/Galberry	0
Other	0.1		Other	0.1

Restore Defaults

Error, sum of all mixtures must equal 1.0

Restore Defaults

5.   Next, the fuel loading mixture is determined by each fuel type and their fraction of the total fuel

- Each forest region is populated with a default mixture, though the user may alter this mixture where appropriate, so long as the fractions provided add up to exactly the whole of the fuel mix

- To return to the forest region's default mixture, the user may click the "Restore Defaults" button

$$E_{Pol} = \Sigma(EF_{Pol}*L*M_i*A)/2000$$

Where:

E_{Pol} = Total Emissions of Pollutant (ton)　　　　L = Fuel Loading (ton/acre)

EF_{Pol} = Emission Factor for Pollutant (lb/ton)　　M_i = Species Mix or Composition (% of total Fuel)

2000 = Conversion Factor (ton/lb)　　　　　　　　A = Land Area Burned (acre)

Fuel	Species Fuel Loading (ton/acre)	Criteria Pollutant Emission (ton) NOx CO SO$_2$ Pb VOC PM10 PM2.5
Slash		
Conifer - Long Needle		
Conifer - Short Needle		
Conifer - Mixed		
Grassland		
Sagebrush		
Chaparral		
Pinyon/Juniper		
Hardwood		
Palmetto/Gallberry		
Other		

Total Emissions =

Fuel	Species Fuel Loading (ton/acre)	Greenhouse Gas Emission (lb/ton) CO$_2$ N$_2$O CH$_4$ CO$_2$e
Slash		
Conifer - Long Needle		
Conifer - Short Needle		
Conifer - Mixed		
Grassland		
Sagebrush		
Chaparral		
Pinyon/Juniper		
Hardwood		
Palmetto/Gallberry		
Other		

Total Emissions =

Print Page

6.　With inputs complete, the webtool provides the user with the estimated potential emissions associated with the prescribed burn in two tables: one for criteria pollutants and the other for greenhouse gas emissions

7.　Now the user can select to print and save their emissions estimated by selecting the "Print Page" button

To demonstrate the use of the Prescribed Fire Emissions Estimate webtool, an example for a potential prescribed burn is given.

For this example, imagine the user is trying to estimate the emissions for a potential prescribed burn in Wheeling, West Virginia, on 40 acres of land. They have contacted their state's federal land management agency and forest agency to get the appropriate fuel loading of 48 ton/acre, with a mixture of:

- 40% (0.4 fraction of total fuel) slash,
- 10% (0.1 fraction of total fuel) long needle conifer,
- 10% (0.1 fraction of total fuel) short needle conifer,
- 30% (0.3 fraction of total fuel) grassland, and
- 10% (0.1 fraction of total fuel) not listed.

Example of the Fire Emissions Estimate Webtool: Part 1

State: West Virginia ▼

County: Ohio ▼

Location FIPS Code: 54069

Burned Area: 40 ⇅ acre(s)

1. First, the user selects the first drop down to choose their state of West Virginia

2. Next, using the second drop down, the user selected Ohio county where Wheeling resides; the county's FIPS code is then provided underneath

3. In the textbox, the user enters the number 40 as the acreage to be burned

U.S. Forest Service Region: 9(a)

Geographic Area: Eastern

Fuel Loading: 48   ton/acre [Restore Default]

4. After noting the now-displayed forest service region and geographic area, the user takes the appropriately determined 48 ton/acre fuel loading value and populates it into the textbox that follows

Fuel	Mixture		Fuel	Mixture		Fuel	Mixture
Slash	0.5		Slash	0.4		Slash	0.4
Conifer - Long Needle	0		Conifer - Long Needle	0		Conifer - Long Needle	0.1
Conifer - Short Needle	0.1		Conifer - Short Needle	0.1		Conifer - Short Needle	0.1
Conifer - Mixed	0		Conifer - Mixed	0		Conifer - Mixed	0
Grassland	0.3		Grassland	0.3		Grassland	0.3
Sagebush	0		Sagebush	0		Sagebush	0
Chaparral	0		Chaparral	0		Chaparral	0
Pinyon/Juniper	0		Pinyon/Juniper	0		Pinyon/Juniper	0
Hardwood	0		Hardwood	0		Hardwood	0
Palmetto/Galberry	0		Palmetto/Galberry	0		Palmetto/Galberry	0
Other	0.1		Other	0.1		Other	0.1

Restore Defaults

Error, sum of all mixtures must equal 1.0

Restore Defaults

Restore Defaults

5. Next, the user takes their determined fuel loading mixture and makes corresponding changes to the default values, verifying that all parts add up to 1

6. Finally, the user views and records the tabled emissions estimates displayed by the webtool based on the information provided

Fuel	Species Fuel Loading (ton/acre)	Criteria Pollutant Emission (ton)						
		NOx	CO	SO$_2$	Pb	VOC	PM10	PM2.5
Slash	19.20	1.84	58.75	0.81	0.00	3.07	4.76	4.15
Conifer - Long Needle	4.80	0.46	17.09	0.20	0.00	0.61	2.40	2.11
Conifer - Short Needle	4.80	0.46	29.95	0.20	0.00	0.69	2.22	2.09
Conifer - Mixed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grassland	14.40	0.00	29.09	0.00	0.00	4.32	4.53	4.32
Sagebrush	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chaparral	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pinyon/Juniper	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hardwood	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Palmetto/Gallberry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other	4.80	0.38	18.53	0.16	0.00	1.10	2.13	1.92
Total Emissions =		3.14	153.41	1.37	0.00	9.80	16.04	14.60

Fuel	Species Fuel Loading (ton/acre)	Greenhouse Gas Emission (lb/ton)			
		CO$_2$	N$_2$O	CH$_4$	CO$_2$e
Slash	19.20	1286.02	0.18	3.61	1428.86
Conifer - Long Needle	4.80	307.39	0.04	0.79	340.22
Conifer - Short Needle	4.80	295.87	0.04	1.06	335.42
Conifer - Mixed	0.00	0.00	0.00	0.00	0.00
Grassland	14.40	618.91	0.02	1.30	658.08
Sagebrush	0.00	0.00	0.00	0.00	0.00
Chaparral	0.00	0.00	0.00	0.00	0.00
Pinyon/Juniper	0.00	0.00	0.00	0.00	0.00
Hardwood	0.00	0.00	0.00	0.00	0.00
Palmetto/Gallberry	0.00	0.00	0.00	0.00	0.00
Other	4.80	295.29	0.04	0.97	331.51
Total Emissions =		2803.48	0.33	7.71	3094.10

7.   The user then chooses to save their results by selecting the "Print Page" button, and printing the webtool to PDF for records

Printing interface may vary by device

- **The Prescribed Fire Emissions Estimate webtool is used to estimate criteria pollutant and greenhouse gas emissions**

- **To get these emissions estimates requires completing the first three sections of the webtool, with the fourth giving the emissions estimates organized in two tables**

- **While default values exist for some user inputs, to get more accurate emissions estimates requires contacting local state agencies for more applicable fuel loading and mixture values**

- **Regardless, the webtool is only a calculated estimate of possible emissions and real emissions may vary in practice**