Consume 5 Command Line Instructions

The Consume 5 calculator module contains the consumption equations that were recently published in:

*Prichard et al. 2017. Predicting forest floor and woody fuel consumption from prescribed burns in southern and western pine ecosystems of the United States. FEM 405:328-338.*

The Consume source code was written in Python and can be cloned from the following bitbucket repository: **FERA\apps-consume**

Within apps-consume, Consume calculations can be run using input files stored within the main folder. These instructions make use of a sample repository that I sent to Jim Cronan (11/8/2017) in which I copied a sample input file that specifies using the western consumption equations on all FCCS reference fuelbeds. It also contains the loadings file for all of those fuelbeds.

1. Open a command prompt. In Windows, you can type “**cmd**” in the search box of the Start menu, and a command prompt will open.
2. Change directories to the Consume calculator folder:

* cd c:\Consume5\apps-consume

1. Fuel and Fire Tools (FFT) comes with the required version of python. You can specify it directly by typing in the path “c:\FuelFireTools\bin\python.exe” before launching the consume batch calculator.

To run the Consume python calculator, you must already have a loadings file (e.g., fccs\_loadings.csv). This is an FCCS output file that is generated whenever the FCCS calculator is run and is written to FuelFireTools\FCCS\_3 if you use the command line version of FCCS. It works best to copy this file into the main folder of apps-consume.

You are also required to specify the following:

* Equation type (activity or natural)
* Environmental inputs file (e.g., input\_western.csv).

*Note: each fuelbed has to have a corresponding input line.*

* Consume loadings file (e.g., fccs\_loadings.csv file – an FCCS 3.0 output)
* Optional output file format (e.g., output\_summary.csv, output\_stratum.csv, or output\_stratum\_combustionphase.csv)

*Note: no need to specify an output format – the default file is what I’d recommend using.*

Examples:

* C:\FuelFireTools\bin\python.exe Consume\_batch.py natural input\_western.csv –f fccs\_loadings.csv

OR

* C:\FuelFireTools\bin\python.exe Consume\_batch.py activity sample\_activity\_input.csv –f consume\_loadings.csv –x output\_summary.csv

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| **Variable** | **Sample arguments** | **Definitions** |
| Burn type | Activity or natural | Activity refers to a burn in recent logging slash and Natural refers to a burn in natural fuels that have not been influenced by recent logging or other disturbances (e.g., wind throw) |
| Environmental input file | input\_western.csv | The environmental input file specifies environmental variables listed in the table below for each fuelbed listed in the consume\_loadings.csv file. |
| Consume loadings file | -f fccs\_loadings.csv | Consume loadings by fuelbed stratum. This file is a standard output of FCCS 3.0 calculations (either batch or within the FFT). |

**Environmental input file (sample natural inputs)**

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| --- | --- |
| Variable |  |
| fuelbeds | Fuelbed ID (one per row) |
| area | Default units = acres |
| Fm\_duff | Duff fuel moisture (%) |
| Fm\_1000hr | 1000-hr fuel moisture (%) |
| Can\_con\_pct | Percent canopy consumption (%) |
| Shrub\_black\_pct | Percent of shrub stratum blackened by fire (%) |
| Pile\_black\_pct | Percent pile consumption (%) |
| Units | Default = tons but metric can be specified |
| Ecoregion | Western |
| Fm\_litter | Litter fuel moisture (%) |
| Season | Fall = default, spring, summer, winter (need to confirm) |

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In this example, the first 10 reference fuelbeds are used:

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| area | fm\_duff | fm\_1000hr | can\_con\_pct | shrub\_black\_pct | pile\_black\_pct | fuelbeds | units | ecoregion |
| 100 | 80 | 50 | 90 | 80 | 90 | 0 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 1 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 2 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 3 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 4 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 5 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 6 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 0 | 7 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 8 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 9 | tons | western |
| 100 | 80 | 50 | 90 | 80 | 90 | 10 | tons | western |

**Environmental input file (sample activity inputs)**

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| --- | --- |
| Variable | Definition |
| Area | Area in acres |
| fm\_duff | Fuel moisture of duff layers |
| fm\_1000hr | Fuel moisture of 1000-hr downed wood |
| Can\_con\_pct | Percent of canopy stratum blackened by fire |
| Shrub\_black\_pct | Percent of shrub stratum blackened by fire |
| Pile\_black\_pct | Percent consumption of piles |
| Fuelbeds | Fuelbed ID |
| Units | Tons |
| Ecoregion | Boreal, Southern, Western |
| Slope | Slope gradient (%) |
| Windspeed | Windspeed (mph) |
| Days\_since\_rain | Number of days since significant rainfall (> ¼ inch) |
| Length\_of\_ignition | Minutes to ignite burn unit. |
| Fm\_type | Type of fuel moisture (MEAS\_Th or NFDRS) |

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