Configuration file format for initialization of NFDRS4 for NFDRS4_cli

NFDRS4 initialization configuration files are based off of Config4*, see http://www.config4star.org/ for complete documentation.

In short, a NFDRS4 initialization configuration file consists of lines containing variables and assigned values in quotes followed by a semicolon (;). Each variable can only appear once in a configuration file. A configuration file can contain comments, which are lines beginning with #.
Example:
#this is a comment

The variable names recognized and required by NFDRS4_cli for NFDRS4 initialization are:

Variable: latitude
Variable Type: numeric, required nonblank

> **latitude** is the latitude of the FW21 data source, range -90 to 90.
> Note: Closest integer latitude is sufficient
>
> Example:
> latitude = “46.95”;

Variable: fuelModel
Variable Type: Character, required

> **fuelModel** is the NFDRS4 fuel model to be used for NFDRS4 processing. Must be one of one of V, W, X, Y, Z, or C. If C, then the custom fuel model must be defined in the same configuration file. See **customFuelModel** settings below.
>
> Example:
> fuelModel = “Y”;

Variable: slopeClass
Variable Type: numeric, required nonblank

> **slopeClass** must be a standard NFDRS Slope Class (1 = 0.25%, 2 = 26-40%, 3 = 41 - 55%, 4 = 56 - 75%, 5 = 76%+)
>
> Example:
> slopeClass = “3”;

Variable: avgAnnualPrecip
Variable Type: numeric, required

avgAnnualPrecip is the average annual precipitation (inches) of the FW21 data source site.
Example:
avgAnnualPrecip = "13.36";

Variable: useLoadTransfer
Variable Type: boolean, required

useLoadTransfer tells NFDRS to use fuel load transfer, this should always be set to “1” at this time.

Example:
useLoadTransfer = “1”;

Variable: useCure
Variable Type: boolean, required

useCure tells NFDRS to cure fuels, this should always be set to “1” at this time.

Example:
useCure= “1”;

Variable: isAnnuals
Variable Type: boolean, required

isAnnuals can either be 1 to indicate herbs are annuals or 0 to indicate perennial herbs.

Example:
#set herbs to perennial
isAnnuals = “0”;

Variable: kbdiThreshold
Variable Type: integer, required

kbdiThreshold is the minimum value to have KBDI modify NFDRS Index calculation.

Example:
kbdiThreshold = “100”;

Variable: startKBDI
Variable Type: integer, required

startKBDI is the initial KBDI value on set on Init.

Example:
startKBDI = “100”;

Variable: MXD
Variable Type: integer, required

MXD is an integer value to override the fuel models default moisture of extinction.

Example 1 (uses the default):
MXD= “0”;
Example2(override default value):
MXD= “25”;

Variable: obsHour
Variable Type: integer, required

obsHour is used to indicate the hour when daily observations are reported and GSI/Live fuel moistures updated. Valis range is 0 - 23.

Example:
obsHour = “13”;

Variable: timeZoneOffset
Variable Type: integer, required

timeZoneOffset is the hours offset from UTC for the data location. Only used if FW21 data is in Zulu time. Valid range is -23 - 23

Example:
timeZoneOffset = “-7”;

Variable: maxSC
Variable Type: integer, required

For **maxSC**, any positive value other than zero (0) will override fuel model default maxSC.

Example:
maxSC = “7”;

Live Fuel Moistures Initialization

NFDRS4 Initialization configuration allows for defining default values for GSI and live fuel moistures, and then using those defaults to customize any of GSI defaults, herbaceous live fuel

moistures, and woody live fuel moistures. The defaults should probably be left alone, and necessary values modified for the specific class options.

Standard live fuel moisture defaults should appear as the following:

```
liveFuelMoisture.defaults {
        gsiMax = "1.0";
        gsiHerbGreenup = "0.5";
        gsiTminMin = "-2";
        gsiTminMax = "5";
        gsiVpdMin = "900";
        gsiVpdMax = "4100";
        gsiDayLenMin = "36000";
        gsiDayLenMax = "39600";
        gsiUseVpdAvg = "1";
        gsiAveragingDays = "21";
        gsiNumPrecipDays = "30";
        gsiRTPrecipMin = "0.5";
        gsiRTPrecipMax = "1.5";
        fuelMoistureMax = "100";
        fuelMoistureMin = "0";
}
```

Then settings for GSI, herbaceous, and woody fuels should appear as copies of liveFuelMoisture.defaults. The classes that should appear as copies of liveFuelMoisture.defaults are:

gsi_opts
These are general options for GSI calculation
herb_opts
These are options specific to herbaceous live fuel moisture calculations
woody_opts
These are options specific to woody live fuel moisture calculations

Standard settings for GSI and live fuel moistures are:

```
gsi_opts {
        @copyFrom "liveFuelMoisture.defaults";

}

herb_opts {
        @copyFrom "liveFuelMoisture.defaults";
        fuelMoistureMax = "250";
        fuelMoistureMin = "30";
}
```

```
woody_opts {
        @copyFrom "liveFuelMoisture.defaults";
        fuelMoistureMax = "200";
        fuelMoistureMin = "50";
}
```

It is recommended to leave these defaults alone unless you really know what you are doing!

Dead Fuel Moistures Initialization

Dead fuel moisture initialization is accomplished in the same way. Standard defaults for dead fuel moistures are:

```
deadFuelMoisture.defualts {
        Radius = “0.64”;
        adsorptionRate = “0.079548303”;
        stickDensity = “0.400”;
        maxLocalMoisture = “0.35”;
        desorptionRate = “0.06”;
}
```

Then the settings for one hour, ten hour, one hundred hour, and one thousand hour fuel sticks can be set with the following subclasses of deadFuelMoisture. The classes that should appear as copies of deadFuelMoisture.defaults are:

```
1hr_opts
10hr_opts
100hr_opts
1000hr_opts
```

The standard settings for classes of dead fuel moisture options are:

```
1hr_opts {
        @copyFrom “deadFuelMoisture.defaults”;
        radius = “0.2”;
        adsorptionRate = “0.462252733”;
}

10hr_opts {
        @copyFrom “deadFuelMoisture.defaults”;
        radius = “0.64”;
        adsorptionRate = “0.0.079548303”;
}

100hr_opts {
        @copyFrom “deadFuelMoisture.defaults”;
```

```
        radius = “2.0”;
        adsorptionRate = “0.06”;
}

1000hr_opts {
        @copyFrom “deadFuelMoisture.defaults”;
        radius = “3.81”;
        adsorptionRate = “0.06”;
}
```

Again, it is recommended you do not mess with these defaults unless you really really really know what you are doing.

Note: The deadFuelMoisture sections are not required unless you want to change something. Live fuel moistures section should always be included

Custom Fuel Models Usage and Initialization

A custom fuel model may be defined and used in an NFDRS4_cli configuration file. If **fuelModel** is 'C', then the custom fuel model will be used. The format for defining a custom fuel model is:

```
customFuelModel {
        # A one character code for the fuel model
        FuelModel = "G";
        # A short description of the model
        Description = "NFDRS88 fuel model G";
        # Surface Area to Volume ratios for the fuel types
        SG1 = "2000";
        SG10 = "109";
        SG100 = "30";
        SG1000 = "8";
        SGWOOD = "1500";
        SGHERB = "2000";
        #Loading for the fuel types
        L1 = "2.5";
        L10 = "2.0";
        L100 = "5.0";
        L1000 = "12.0";
        LWOOD = "0.5";
        LHERB = "0.5";
        # Depth
        DEPTH = "1.0";
        # Moisture of Extinction
        MXD = "25";
        #Heating number
        HD = "8000";
        # Spread Component Maximum
        SCM = "30";
        # Drought loading
        LDROUGHT = "0.0";
        # Wind Reduction Factor
        WNDFC = "0.4";
}
```

Note that if **customFuelModel** is present, but the main **fuelModel** variable is not "C", then the **customFuelModel** section will be ignored.

Only one **customFuelModel** can be defined in an initialization file. **customFuelModel** is not required unless the main **fuelModel** variable is "C"

Sample NFDRS4 Initialization Configuration file contents:

```
#Sample NFDRS2016 initialization file
#contains all parameters to initialize an NFSDRS2016 object for computation
#used by config2cpp as:
#config2cpp -cfg NFDRSInitSample.txt -class NFDRSInitConfig -singleton
#
#latitude to nearest degree
latitude = "47";
#NFDRS2016 fuel model (one of V, W, X, Y, Z)
fuelModel = "X";
#standard NFDRS Slope Class (1 = 0.25%, 2 = 26-40%, 3 = 41 - 55%, 4 = 56 - 75%, 5 = 76%+)
slopeClass = "3";
#average annual precipitation (inches)
avgAnnualPrecip = "13.36";
#load transfer flag, should always be "1"
useLoadTransfer = "0";
#curing flag, should always be "1"
useCure = "0";
#annuals flag, 1 = herbs are annuals, 0 = perennial
isAnnuals = "1";
#threshold KBDI value, minimum value to have KBDI modify NFDRS Index calculation
kbdiThreshold = "100";
# initial KBDI value on Init
startKBDI = "100";
# flag to override moisture of extinction
MXD = "0";
# hour when daily observations are reported and GSI/Live fuel moistures updated
obsHour = "13";
# timeZone offset from UTC, absolutely necessary if FW21 data is Zulu time
timeZoneOffset = "+2";
#for maxSC, any positive value other than zero (0) will override fuel model default maxSC
maxSC = "0";
#
#GSI and Live Fuel Moistures
#
liveFuelMoisture.defaults {
        gsiMax = "1.0";
        gsiHerbGreenup = "0.5";
        gsiTminMin = "-2";
        gsiTminMax = "5";
        gsiVpdMin = "900";
        gsiVpdMax = "4100";
        gsiDayLenMin = "36000";
```

```
        gsiDayLenMax = "39600";
        gsiUseVpdAvg = "1";
        gsiAveragingDays = "21";
        gsiNumPrecipDays = "30";
        gsiRTPrecipMin = "0.5";
        gsiRTPrecipMax = "1.5";
        gsiUseRTPrecip = "0";
        fuelMoistureMax = "100";
        fuelMoistureMin = "0";
}
#set any GSI specific options here
gsi_opts {
        @copyFrom "liveFuelMoisture.defaults";
        gsiTminMin = "-2";
        gsiTminMax = "10";
        gsiVpdMin = "250";
        gsiVpdMax = "3000";
        gsiDayLenMin = "0";
        gsiDayLenMax = "1";
        gsiUseVpdAvg = "0";
        gsiAveragingDays = "60";
        gsiNumPrecipDays = "30";
        gsiRTPrecipMin = "0";
        gsiRTPrecipMax = "1.5";
        gsiUseRTPrecip = "1";

}
#set any Herb LFM specific options here
herb_opts {
        @copyFrom "liveFuelMoisture.defaults";
        fuelMoistureMax = "250";
        fuelMoistureMin = "30";
        gsiMax = "1.0";
        gsiHerbGreenup = "0.01";
        gsiTminMin = "-2";
        gsiTminMax = "10";
        gsiVpdMin = "250";
        gsiVpdMax = "3000";
        gsiDayLenMin = "0";
        gsiDayLenMax = "1";
        gsiUseVpdAvg = "0";
        gsiAveragingDays = "60";
        gsiNumPrecipDays = "30";
        gsiRTPrecipMin = "0";
```

```
        gsiRTPrecipMax = "1.5";
        gsiUseRTPrecip = "1";
}

#set any Woody LFM specific options here
woody_opts {
        @copyFrom "liveFuelMoisture.defaults";
        fuelMoistureMax = "200";
        fuelMoistureMin = "50";
        gsiMax = "1.0";
        gsiHerbGreenup = "0.01";
        gsiTminMin = "-2";
        gsiTminMax = "10";
        gsiVpdMin = "250";
        gsiVpdMax = "3000";
        gsiDayLenMin = "0";
        gsiDayLenMax = "1";
        gsiUseVpdAvg = "0";
        gsiAveragingDays = "60";
        gsiNumPrecipDays = "30";
        gsiRTPrecipMin = "0";
        gsiRTPrecipMax = "1.5";
        gsiUseRTPrecip = "1";

}

#Dead Fuel Moisture settings
#1hr, 10 hr, 100hr, 1000hr
deadFuelMoisture.defaults {
#These were previously specific to stick size, should always be present
        radius = "0.64";
        adsorptionRate = "0.079548303";
#These were previously defaults in DeadFuelMoisture::initializeParameters()
        stickDensity = "0.400";
        maxLocalMoisture = "0.35";
        desorptionRate = "0.06";
}
# 1hr options
1hr_opts {
        @copyFrom "deadFuelMoisture.defaults";
        radius = "0.2";
        maxLocalMoisture = "0.35";
}
# 10hr options
```

```
10hr_opts {
        @copyFrom "deadFuelMoisture.defaults";
        radius = "0.64";
        adsorptionRate = "0.01";
                desorptionRate = "0.02";
                stickDensity = "0.62";
        maxLocalMoisture = "0.35";
}
# 100hr options
100hr_opts {
        @copyFrom "deadFuelMoisture.defaults";
        radius = "2.0";
        adsorptionRate = "0.06";
}
# 1000hr options
1000hr_opts {
        @copyFrom "deadFuelMoisture.defaults";
        radius = "3.81";
        adsorptionRate = "0.06";
}

customFuelModel {
        FuelModel = "G";
        Description = "NFDRS88 fuel model G";
        SG1 = "2000";
        SG10 = "109";
        SG100 = "30";
        SG1000 = "8";
        SGWOOD = "1500";
        SGHERB = "2000";
        L1 = "2.5";
        L10 = "2.0";
        L100 = "5.0";
        L1000 = "12.0";
        LWOOD = "0.5";
        LHERB = "0.5";
        DEPTH = "1.0";
        MXD = "25";
        HD = "8000";
        SCM = "30";
        LDROUGHT = "0.0";
        WNDFC = "0.4";
}
```