

BASEFLOW Simulation Model

1. Description of Algorithm

This operation enables the user to compute the baseflow contribution to the outflow hydrograph. Three options are included: constant baseflow, baseflow reduction at a constant rate, and baseflow reduction at a variable rate. Since this operation stores baseflow as a time series, total discharge from a given area can be tabulated into component parts of discharge due to baseflow and discharge due to surface runoff. This operation is primarily designed to be used with API based rainfall/runoff operations. Currently, no provision is included to simulate baseflow recharge.

2. Model Parameters

BASEFLOW uses an XML representation of model parameters where each parameter is captured within a separate XML tag. The tags are closely related to the NWSRFS definition of BASEFLOW defined at:

<https://vlab.ncep.noaa.gov/documents/207461/1893022/533baseflow.pdf>

The table below shows the available parameter tags. The sequence of parameters in the table below or in the xml file has no any significance.

Name	Type	Required [Yes/No]	Comment
BASEFLOW_OPTIO N_INDICATOR	Integer	Yes	Variable baseflow option indicator switch: '0' No variable baseflow '1' Single baseflow recession coefficient '2' recession coefficient supplied as time series.
CONSTANT	Double	Yes	Constant baseflow amount(CFS or CMS)
AREA	Double	Yes	Area associated with this operation (MI2 or KM2)
UNIT	Integer	Yes	Indicator of units specified for parametric input 0 = English 1 = Metric
OUTPUT_TIMESER IE_ID	String	Yes	Identifier of baseflow time series

OUTPUT_TIMESERIE_TYPE	String	Yes	Data type code of baseflow time series
OUTPUT_TIMESERIE_TIME_STEP	Integer	Yes	Data time interval of baseflow time series (HR)

```

<group id="default">
  <parameter id="UNIT">
    <intValue>0</intValue>
  </parameter>
  <parameter id="OUTPUT_TIMESERIE_ID">
    <stringValue>ANNM7BF</stringValue>
  </parameter>
  <parameter id="OUTPUT_TIMESERIE_TYPE">
    <stringValue>SQIN</stringValue>
  </parameter>
  <parameter id="OUTPUT_TIMESERIE_TIME_STEP">
    <intValue>6</intValue>
  </parameter>
  <parameter id="AREA">
    <dblValue>397.8</dblValue>
  </parameter>
  <parameter id="CONSTANT">
    <dblValue>15.0</dblValue>
  </parameter>
  <parameter id="BASEFLOW_OPTION_INDICATOR">
    <intValue>1</intValue>
  </parameter>
</group>

```

3. Model States

BASEFLOW model states are defined in a property file format. An example is shown below. The model state property names are:

Property Name	Description
PREVIOUS_BASEFLOW	Initial total previous baseflow (CFS or CMS)
BASEFLOW_RECESSIO N_COEFFICIENT	Previous recession coefficient (range greater than or equal to 0.5 and less than 1.0)

UNIT	Units for State Variables (always METRIC)
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An example is shown below.

PREVIOUS_BASEFLOW=1.70298438
UNIT=METRIC

4. Model Time Series

BASEFLOW requires minimum 0 input time series and maximum 1 input time series and 1 output time series

Time Series Type	Internal Model Units	Time Step	Input or Output	Missing Values Allowed	Required [Yes or No]
Baseflow	CMS	any	Output	No	Yes
Baseflow Recession	PCTD	24	Input/Output	Yes	No

5. Notes about configuring Model in FEWS workflow

When the Baseflow model uses an input time series, the property, baseflowModelTimeInterval, must appear in the runInfo.xml file.

For example:

```
<properties>
  <string key="legacyLocation" value="$OHDBINDIR$"/>
  <int key="printDebugInfo" value="0"/>
  <string key="outputLocationId" value="town8"/>
  <string key="model"
    value="ohd.hseb.ohdmodels.baseflow.BaseflowModelDriver"/>
  <int key="baseflowModelTimeInterval" value="6"/>
</properties>
```

Examples:

Module Configuration File

[ModuleConfigFiles\BASEFLOW_BENM5_BENM5_Forecast.xml](#)

Module Parameter File

[ModuleParFiles\BASEFLOW_BENM5_BENM5_UpdateStates.xml](#)

6. FEWS Adapter Used

The Baseflow model uses the OHDFewadapter to communicate. Information about this adapter can be found at [OHDFewadapter](#).