

Muskingum Routing (MUSKROUT) Model

1. Description of Algorithm

<https://vlab.ncep.noaa.gov/documents/207461/1893022/24muskroun.pdf>

2. Model Parameters

MUSKROUT uses and XML representation of Model Parameters where each parameter is captured within a separate XML tag. The tags are closely related to the NWSRFS operation definition of MUSKROUT defined at:

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

The table below shows the available parameter tags.

Name	Type	Required [Yes/No]	Comment
GENERAL_INFO	String	Yes	General heading information for this Operation
TS_INFLOW_ID	String	Yes	Internal identifier for the inflow time series
TS_INFLOW_TYPE	Integer	Yes	Data type code for the inflow time series
TS_INFLOW_TIME STEP	Integer	Yes	Data time interval for the inflow time series
TS_OUTFLOW_ID	String	Yes	Internal identifier for the outflow time series (blank if routing at a point)
TS_OUTFLOW_TY PE	String	Yes	Data type code for the outflow time series (blank if routing at a point)
TS_OUTFLOW_TI MESTEP	Integer	Yes	Data time interval for the outflow time series (blank if routing at a point)
K_PARAMETER	Double	Yes	K parameter
X_PARAMETER	Double	Yes	X parameter

Sample Parameters xml file:

```
<parameter id="INITIAL_OUTFLOW">
  <dblValue>460.9126</dblValue>
</parameter>
<parameter id="K_PARAMETER">
  <dblValue>30.0</dblValue>
</parameter>
<parameter id="GENERAL_INFO">
  <stringValue>TANACROSS RT TO BGDA</stringValue>
</parameter>
<parameter id="TS_INFLOW_TYPE">
  <stringValue>SQIN</stringValue>
</parameter>
<parameter id="TS_OUTFLOW_TIMESTEP">
  <intValue>6</intValue>
</parameter>
<parameter id="TS_INFLOW_ID">
  <stringValue>TSGA2MRG</stringValue>
</parameter>
<parameter id="TS_OUTFLOW_ID">
  <stringValue>TSGA2R</stringValue>
</parameter>
<parameter id="TS_INFLOW_TIMESTEP">
  <intValue>6</intValue>
</parameter>
<parameter id="TS_OUTFLOW_TYPE">
  <stringValue>SQIN</stringValue>
</parameter>
<parameter id="INITIAL_INFLOW">
  <dblValue>455.6303</dblValue>
</parameter>
```

3. Model States

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

Property Name	Description
INITIAL_INFLOW	Initial Inflow Carryover
INITIAL_OUTFLOW	Initial Outflow Carryover
UNIT	Units for State Variables (always METRIC)

An example is shown below.

UNIT=METRIC
INITIAL_INFLOW=5.40414
INITIAL_OUTFLOW=0.00

4. Model Time Series

MUSKROUT has 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]
Channel Inflow	CMS	any	Input	No	Yes
Chanel Outflow	CMS	Must \geq inflow time interval	Output	Yes	Yes

5. Notes about configuring Model in FEWS workflow

Examples:

Module Configuration File

[ModuleConfigFiles\MUSKROUT_HOLW3_BRUW3ROU_Forecast.xml](#)

Module Parameter File

[ModuleParFiles\MUSKROUT_HOLW3_BRUW3ROU_UpdateStates.xml](#)

6. FEWS Adapter Used

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