

VI.5.5-FFG-FFGUID FLASH FLOOD GUIDANCE COMPUTATION PROGRAM (FFGUID)

Purpose

Program FFGUID is used to compute flash flood guidance using threshold runoff and rainfall-runoff curves.

Threshold runoff was previously defined as parametric information.

Rainfall-runoff curves are computed by Operational Forecast System (OFS) Operational Forecast Program (FCST) when the Hydrologic Command Language (HCL) Flash Flood Guidance Technique (FFG) is set to 1 or 2.

Execution Menu

Flash flood guidance values are computed through the FFG Computation Menu and a sub-menu.

An example is:

NATIONAL WEATHER SERVICE
FLASH FLOOD GUIDANCE SYSTEM

PROGRAM FFGUID (VERSION 5.2.1r20 - 03/26/02)

ffg_level=ofstest ofs_level=ofstest

directory for user info = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/user
directory for areas = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/affg
directory for carryovers = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/cary
directory for gridded ffg = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/grff
directory for gridded runoff = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/grro
directory for headwaters = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/hffg
directory for runoff adj parm = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/gdpm
directory for groups of prod = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/grpp
directory for output = /fs/awips/rfc/nwsrfs/ffg/output
directory for products = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/prod
directory for texts = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/text
directory for water supply = /fs/awips/rfc/nwsrfs/ffg/files/ofstest/wsup

directory for system files: /fs/awips/rfc/nwsrfs/sys_files/
directory for oper files: /fs/awips/rfc/nwsrfs/ffg/files/ofstest/fs5files/
directory for reorder files: /fs/awips/rfc/nwsrfs/ffg/files/ofstest_new/fs5files/
directory for mod files: /fs/awips/rfc/nwsrfs/ffg/files/ofstest/mods/
directory for grid files: /fs/awips/rfc/nwsrfs/ffg/files/ofstest/griddb/

ERROR ON

RUN DATE=02/19/2002 - 14:14:49

COMPUTATIONS MENU

C - Compute All

or separately

G - Gridded FFG

A - Area FFG

H - Headwater FFG

V - Carryover Transfer

W - Water Supply Guidance

S - Setup Menu

Select (<return>-exit):

The purpose and description of each item on the FFG Computation Menu follows:

C - Compute all

Flash flood guidance computations are performed in the sequence grids, areas and headwaters. Descriptions of each type of guidance are given below.

G - Gridded FFG

Gridded flash flood guidance values are computed for all HRAP bins in an user's area as determined from the HRAP coordinates defined by item U - User Info. The sequence of the gridded computations is controlled by the OFS FFG Operations and the basin boundary used by each

Operation.

A - Area FFG

Area guidance values are computed from all the gridded guidance values within a boundary defined for an area. An area can be a county or urban area, etc. A boundary must be defined in the OFS for the area using the basin boundary type BASN. The area guidance values can be the minimum gridded guidance value or the average of the gridded guidance values within the boundary as selected in the U - User Info Menu (a sub-menu of the Setup Menu). The computational sequence is controlled by the area definitions of type AFFG in FFGS.

H - Headwater FFG

Headwater guidance values are computed using defined parameters for the headwaters of type HFFG in FFGS. Optional adjustments are set in the U - User Info Menu (a sub-menu of the Setup Menu). The computational sequence is controlled by the HFFG definitions.

S - Setup Menu

This selection displays the Setup Menu.

Gridded FFG Error and Warning Messages

Gridded runoff is initially defined as -9.90. These values are replaced when actual gridded runoff is defined. Any part of the HRAP grid window not in the forecast area will retain the -9.90. These areas are generally in the corners of the HRAP window that includes the user's area.

When gridded guidance is computed, the gridded field is initially set to -9.8 for all bins. As the computations proceed, the -9.8 is replaced with valid gridded rainfall amounts. Gridded rainfall is set to -9.0 for those bins whose gridded runoff is -9.90. Therefore, the gridded rainfall amounts will be as follows:

<u>Rainfall</u>	<u>Reason</u>
0.1 to 20.0	valid range of computed guidance
-9.8	no computation made (outside user's area)
-9.0	no runoff defined

Gridded guidance is computed by flash flood guidance areas (FFG Operations) and summarized as:

```
[ffgid] grids  cptd= 259  noro=  0  total= 259
```

```
where ffgid  is the Flash Flood Guidance area identifier
      cptd   is the number of gridded values computed bins in the
              ffgid area
      noro   is the number of grids with undefined runoff bins in
              the ffgid area
      total  is the sum of cptd and noro bins in the ffgid area
```

Gridded guidance for ffgid was computed for all bins in the geographic area for ffgid. This represents the ideal situation.

For ffgid areas on the borders of user's area, summaries may appear as:

```
[ffgid] grids  cptd= 112  noro=  30  total= 142
```

In this case, gridded guidance was computed for 112 grids but not computed for 30 because no runoffs were defined. These no-runoff bins remain undefined because they are not in the user's area of responsibility. If these bins were in an interior ffgid area then the runoff probably needs to be defined.

The following examples describe the ERROR and WARNING messages.

Example 1A:

If no runoffs have been defined for all the bins in an FFGid then the summary appears as:

```
ERROR: [ffgid] grids  cptd=   0  noro= 178  total= 178
```

Corrective action:

1. if the ffgid area is in the user's forecast area then define the runoffs
2. otherwise delete the FFG id for the area.

Example 2A:

```
ERROR: no runoff defined in [ffgid] at natl row/col 405 694
```

This message appears when DEBUG is on for each bin when guidance cannot be computed because the gridded runoff is -9.90, i.e. undefined.

Corrective Action: Define runoff for the indicated bin.

Example 3A:

```
ERROR: no rainfall-runoff curves found for [ffgid]. rpprec istat=n
```

Corrective Action:

1. run the Operational Forecast Program (FCST) with the HCL Technique FFG set to 1 or 2 when istat=7 or
2. define the FFG Operation for ffgid when istat=2

Example 4A:

```
ERROR: Flash flood guidance operation never run for area [ffgid].
```

Corrective Action: Run the Operational Forecast Program (FCST) with the HCL Technique FFG set to 1 or 2.

Example 5A:

WARNING: FFG Operation Rainfall-Runoff curves not current for NCCNTY2 :
current date=04/02/1993-12Z most recent date=04/01/1993-12Z

This message appears when the Segment has never been run with the FFG Technique set to 1 or 2. This message also appears if the FFG Technique has been run recently but not for the current date.

Corrective Action: Run the Segment with the FFG technique set to 1 or 2. There may be a problem in the Segment that keeps it from running.

Area FFG (Zones and Counties) Errors and Warnings

Area guidance is the average (or minimum) of the gridded guidance values for all the bins within the area boundary. Computations for an area are shown as:

```
MNC081  2.7  3.1  3.4
        grids  ncptd= 115  nocpt= 0  noro= 0  total= 115
```

where ncptd is the number of grids having valid guidance values
nocpt is the number of grids where guidance not computed,
runoff defined
noro is the number of grids with undefined runoff
total is the sum of all grids in the area boundary

Area guidance for MNC081 was computed from all 115 bins in the county boundary. This represents the ideal situation.

The counter variables for area guidance computations are summarized below:

<u>Bin FFG</u>	<u>Counter</u>
0.004 < ffg < 20.0	ncptd
-9.8 <= ffg < -9.0	nocpt
-9.0 = ffg	noro

When ncptd is 0 then area guidance is set to:

-9.2 when only nocpt > 0
-9.4 when only noro > 0
-9.6 if nocpt and noro both > 0

The following examples with explanations represent other situations:

Example 1B:

```
MIC063  1.3  1.5  1.8
        WARNING: grids  ncptd=  78  nocpt=  13  noro=  0  total=  91
```

The area guidance for MIC063 was computed from the 78 valid gridded guidance values found in the area boundary. Gridded guidance was not computed for 13 bins. There are either has no Segments defined that includes these 13 bins or the Segments did not execute for some

reason.

Corrective Action:

1. define Segments that include the bins or
2. verify that existing Segments are executing completely

Example 2B:

NDC009 -9.2 -9.2 -9.2

WARNING: grids ncptd= 0 nocpt= 93 noro= 0 total= 93

None of the 93 bins in NDC009 are defined in the user's forecast Segments or the Segments did not execute.

Corrective Action:

1. delete from definition or
2. define Segments to include the area

Example 3B:

NDC035 -9.6 -9.6 -9.6

WARNING: grids ncptd= 0 nocpt= 86 noro= 34 total= 120

The 86 bins were not included in any of the user's area. Another 34 bins had no runoff defined.

Corrective Action:

1. since a majority of the bins are not in the user's area, delete the area or
2. Define gridded runoff for the 34 bins and verify that Segments are defined that include these bins

Example 4B:

INC003 -9.4 -9.4 -9.4

ERROR: grids ncptd= 0 nocpt= 0 noro= 106 total= 106

No gridded runoff was defined for the 106 bins in the area.

Corrective Action: Define gridded runoff for the area.

Headwaters FFG Errors and Warnings

Example 1C:

ERROR: no rainfall-runoff curve for [ffgid]. rpprec istat=n

Corrective Action:

1. run the Operational Forecast Program (FCST) with the HCL Technique FFG set to 1 or 2 when istat=7 or
2. define the FFG Operation for FFG area ffgid when istat=2

Example 2C:

ERROR: Flash Flood Guidance Operation never run for area [ffgid].

Corrective Action: Run the Operational Forecast Program (FCST) with the HCL Technique FFG set to 1 or 2.

Example 3C:

ERROR: Rating Curve [rcid] not found.

Corrective Action:

1. enter the correct rating curve identifier in the headwater definition or
2. define the Rating Curve in OFS or
3. define the flow at flood stage instead of the Rating Curve identifier in the headwater definition

Example 4C:

WARNING: forecast flows for [qtsid] type [flows] not found. istat=n

Corrective Action:

1. check that the forecast flow time series identifier and type code are defined correctly for the headwater
2. check that the identifier and type code are defined in the Segment

Example 5C:

WARNING: high precip, low runoff"

[hdid] [ffgid] t x.xx x.xx x.xx x.xx x.xx x.xx x.xx x.xx

where hdid is the headwater identifier

ffgid is the flash flood area identifier (FFG operation id)

x.xx x.xx are the four pairs of points that define the
rainfall-runoff curve

Computed guidance is greater than 20.0.

Corrective Action: Check that snow and rainfall-runoff model parameters are correct.