VI.5.3C-ESP   PROGRAM FCST EXTENDED STREAMFLOW PREDICTION FUNCTION
              (ESP)

Purpose

Function ESP (Extended Streamflow Prediction) is a forecast Function
that creates long-term probabilistic forecasts of flow volumes, peak
flows, minimum flows, reservoir stages, flow durations, etc., using
the current watershed conditions with historical time series data such
as MAP, MAT, MAPE and STG.

Function ESP uses the Operations Table concept developed for the
Calibration and Operational Forecast systems. The Segments defined
for Function ESP must correspond with those defined for Function
FCEXEC since Function ESP obtains the order of Segment execution, the
list of Operations for each Segment and the parameters for each
Operation from the Forecast Component files maintained by the Forecast
Component Initialization Program (FCINIT - see Section VI.3.4
[Hyperlink]).

The current watershed conditions are obtained from the carryover files
which are updated by Function FCEXEC.

Historical time series external location information and ESP analysis
information are obtained from the ESP parameter file maintained by the
Extended Streamflow Prediction Initialization Program (ESPINIT - see
Section VI.3.5 [Hyperlink]).

HCL Input

Input to Function ESP is through the Hydrologic Command Language
(HCL).

The input consists of Techniques and their Arguments (see Section
VI.5.3C-ESP-TECH [Hyperlink]).

Sample HCL Input

The following example will run the Segment GSPRGRF. Local default for
the start of the run and the start and end of the windows Techniques
have been set. Historical water years 1951 through 1976 will be used
for the analysis.

Example 1. One Segment

   @SETOPTIONS
    ONESEG GSPRGRF
    HISTWYRS 1951 1976
   @COMPUTE ESP
   @STOP

Example 2. Forecast Group with Options

The following example will run the Forecast Group GREENMTN.
Historical water years 1960 through 1979 will be used for the
analysis. The run will begin on 2/1/82 and the analysis will be
performed on two windows: 2/1/82 to 2/28/82 and 4/1/82 to 6/30/82.
The historical simulation will be performed. Frequency plots will not
be produced.

```
   @SETOPTIONS
    FGROUP GREENMTN
    HISTWYRS 1960 1979
    STARTESP 020182
    WINDOWS(2) 020182 022882 040182 063082
    HISTSIM
    FREQPLOT(0)
   @COMPUTE ESP
   @STOP
```

Example 3. Multiple Computes

The following example shows how multiple computes can be used allowing
options to be changed between computes. For the second compute the
FGROUP Technique was turned off, the ONESEG Technique was turned on,
the historical water years were changed and the windows were changed.

```
   @SETOPTIONS
    FGROUP GREENMTN
    HISTWYRS 1960 1979
    WINDOWS(2) 0210182 022882 040182 063082
   @COMPUTE ESP
   @SETOPTIONS
    FGROUP(0)
    ONESEG GSPRGRF
    HISTWYRS 1951 1976
    WINDOWS(1) 040182 093082
   @COMPUTE ESP
   @STOP
```

Output

Function ESP produces printer output and writes time series data to
ESP time series data files.

The ESP time series data files are used by program ESPADP [Hyperlink]
to produce extended water resources forecasts.

When Function ESP is run in the historical simulation mode it runs
from the STARTESP date to the end of the ESP run (the end date of the
longest window). For example the following HCL will get HS data from
4/1/50 to 7/31/90 which is 40 complete years of data and 1 incomplete
year of data:

```
   STARTESP 0401/2004
   WINDOWS  0401/2004 0731/2004
   HISTWYRS 1950 1990
```

In order for program ESPADP to display a consistent number of traces for every time step the last incomplete year is not displayed. If it was displayed then the time periods which extended past the end of the original CS run would include 1 incomplete trace.

If the HS is generated as a part of a 12 month CS run then the complete year for every year will be displayed.

Error Messages

Error messages printed by Function ESP are described in Section VI.5.3C-ESP-ERROR [Hyperlink].

Other errors may be printed by other parts of the Forecast Program (see Section VI.5.3C-FCEXEC-ERROR [Hyperlink]) and by Operations (see Section V.3.3 [Hyperlink]).