

United States Department of Agriculture



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March 7, 2008

**NATIONAL RANGE AND PASTURE HANDBOOK (NRPH)  
190-VI  
Amendment NM2**

**SUBJECT: ECS - ESIS-ESD CLIMATE SUMMARY PROTOCOL**

**Purpose:** To advise all employees of the official NM-NRCS solution for entering climate summary data into ESIS.

**Effective Date:** When received

**Filing Instructions:** File a copy in office National Range and Pasture Handbook also maintained on NRCS web page.

This amendment note outlines a protocol for converting climate data from the Western Regional Climate Center (WRCC) to a format that is compatible with Ecological Site Description (ESD) format in the Ecological Site Information System (ESIS). The protocol uses the "Climate Summarizer" workbook that is introduced here.

Amend is to National Range and Pasture Handbook Chapter 3, Section 1 part 600.0304

"Ecological Site Descriptions on Rangeland", Subpart g "Climate". File this amendment behind

"Appendix A" at the end of the Handbook.

A handwritten signature in black ink, appearing to read "George Chavez", written over a horizontal line.

GEORGE CHAVEZ  
State Resource Conservationist

Attachments:  
ESIS-ESD\_Climate\_Summary\_Protocol.doc

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## ESIS-ESD CLIMATE SUMMARY PROTOCOL

### Summary

The format of some Ecological Site Description (ESD) climate attributes in the Ecological Site Information System (ESIS) is incompatible with data available from the Western Regional Climate Center (WRCC). This technical note introduces the “Climate Summarizer”<sup>1</sup> workbook that converts WRCC climate data into an ESIS-compatible format. In addition to formatting data for a single climate station, the Climate Summarizer combines data from multiple stations for those ecological sites that are not well represented by a single station. The Climate Summarizer can be used for any of the 13 western states<sup>2</sup> with climate data available from WRCC.

### Background

ESIS-ESD climate data are obtained from WRCC. For some climate parameters, ESIS format is not compatible with WRCC format, and there is no established protocol for combining data from multiple climate stations into a single summary for an ecological site. For example, WRCC lists some parameters as single values (i.e., frost-free period, freeze-free period, mean annual precipitation) although ESIS format requires a range of values as defined by minimum and maximum values. This may not be problematic where multiple climate stations are used, as the range could be created by using the lowest and highest values from the combined data set to represent the minimum and maximum, respectively. However, some ecological sites are well-represented by a single climate station only; and where an ecological site is better represented by multiple stations, the stations may not represent the site equally well, either spatially (proximity of site to climate station, proportional acreage) or temporally (period of record).

### Climate Summarizer

The Climate Summarizer workbook is comprised of 4 worksheets. The first worksheet is an illustrated tutorial. The second through fourth worksheets (“Precipitation,” “Temperature,” “Frost-free & Freeze-free”) interactively calculate ESIS-compatible climate summaries as WRCC climate data are entered into the appropriate cells. Each of these 3 interactive worksheets averages the typical ranges of up to 10 climate stations. Data for a particular station can be entered more than once to produce weighted-average minimum and maximum values. For example, for an ecological site represented unequally by 2 stations (one station is twice as representative as the other, but both stations are relevant), data from the less representative station are entered once, data from the more representative station are entered twice, and the resulting minimum and maximum values are weighted accordingly.

#### *Precipitation.*

WRCC presents precipitation data as means and standard deviations and as the extreme values from the period of record. The lowest monthly minimum precipitation on record for all months at some climate stations in the southwestern United States is 0.00 inches. However, the minimum and maximum climate values in ESIS-ESDs are intended to define a “typical range” of observations, not the recorded extremes (G.L. Peacock, personal communication, July 2007).

Monthly precipitation minima and maxima currently listed in some ESIS-ESDs appear to be the extremes from the period of record (e.g., minimum of 0.00 inches for the wettest month of the year). Conversely, other ESIS-ESDs list a typical range where the minimum and maximum values for a given month may be quite similar (within 30% of each other); however there is no documented, standardized method of calculating such a range. The Climate Summarizer produces a typical range defined by minimum and maximum values which bound the interquartile range (“middle half”) of the distribution of observed WRCC climate data.

*Temperature.* WRCC monthly temperature minima and maxima are available for each climate station in ESIS-compatible format. For ecological sites represented by multiple climate stations, the Climate Summarizer can be used to produce an average (or weighted average) of monthly temperature minima and maxima for up to 10 stations.

*Frost-free and freeze-free.* WRCC presents single-value data (number of days) for length of frost-free and freeze-free periods by probability (10%, 20%,..., 90%) and as extremes (minimum and maximum period-lengths on record). The Climate Summarizer calculates ESIS-compatible, typical ranges of frost-free and freeze-free periods for single or multiple climate stations.

### **Documentation in ESIS**

It should be noted in the ESIS Climate Features Section which climate stations have been included and if the results have been weighted. In the Climate Summarizer, the relative proportion of each climate station in a weighted result is evident in the number of times each station has been entered. However, while the ESIS Climate Features Section dialogue box allows multiple climate station IDs to be entered, it does not permit multiple entries of the same station. Therefore, the Climate Features Narrative should reference how the tabular climate summary was generated. Below are example references.

#### *Single climate station:*

The tabular climate summary for this ESD was generated by the Climate Summarizer ([http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate\\_Summarizer.xls](http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate_Summarizer.xls)) using data from the following climate station:

296812 PIETOWN 19 NE, NM (Period of record = 1951 to 2006)

#### *Multiple climate stations (unweighted):*

The tabular climate summary for this ESD was generated by the Climate Summarizer ([http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate\\_Summarizer.xls](http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate_Summarizer.xls)) using data from the following climate stations (results are unweighted averages):

296812 PIETOWN 19 NE, NM (Period of record = 1965 to 2007)

297180 QUEMADO, NM (Period of record = 1976 to 2006)

#### *Multiple climate stations (weighted):*

The tabular climate summary for this ESD was generated by the Climate Summarizer ([http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate\\_Summarizer.xls](http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate_Summarizer.xls)) using data from the following climate stations (results are weighted averages; numbers in square brackets represent relative weights):

296812 PIETOWN 19 NE, NM (Period of record = 1981 to 2005) [2]

297180 QUEMADO, NM (Period of record = 1979 to 2007) [1]

1. [http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate\\_Summarizer.xls](http://www.nm.nrcs.usda.gov/technical/handbooks/nrph/Climate_Summarizer.xls)

2. Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Prepared by Michael Carpinelli, Rangeland Management Specialist, Grants, New Mexico.