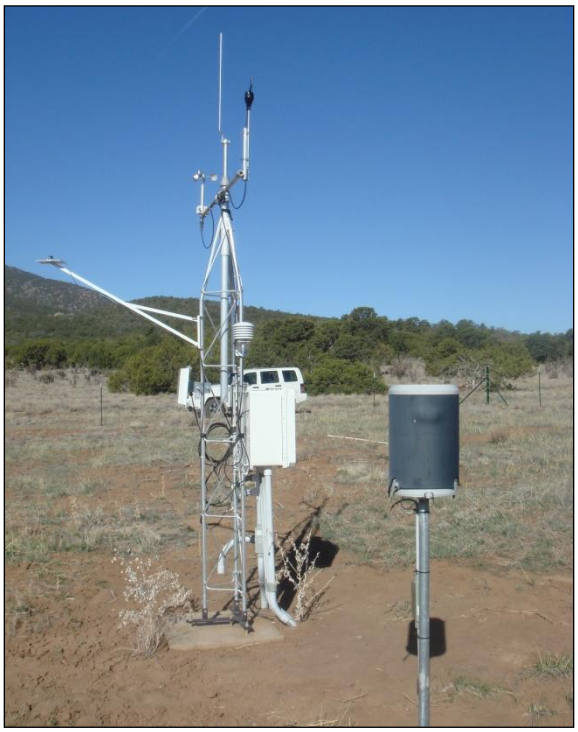
# SOUTH MOUNTAIN WEATHER STATION: REPORT FOR QUARTER 1 (JANUARY–MARCH) 2012



Prepared for
**ESTANCIA BASIN WATERSHED HEALTH,**
**RESTORATION AND MONITORING STEERING COMMITTEE**

**c/o CLAUNCH-PINTO SOIL AND WATER CONSERVATION DISTRICT**
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SWCA Project No. 12996 Task 2

April 1, 2012

# SOUTH MOUNTAIN WEATHER STATION DATA FOR QUARTER 1, 2012 (JANUARY–MARCH)

This quarterly report provides graphs of summarized rainfall and soil moisture data for the period of January through March 2012. Please see the South Mountain Weather Station (SMWS) 2008 Annual Report on the New Mexico Forest and Watershed Restoration Institute (Restoration Institute) website (http://www.nmfwri.org/images/stories/pdfs/Estancia_Basin_Monitoring/South_Mountain_Weather_Station/SMWS_Manual.pdf) for detailed information about the location, configuration, history, and operation of the SMWS. Complete raw data files for hourly measurements of all SMWS variables were submitted to the Restoration Institute at the time this report was submitted. Those data files also may be accessed through the Restoration Institute website (ftp://ftp.nmfwri.org/South_Mountain_Excel_Files/). The weather station data logger records readings from all instruments every 10 minutes. Data presented here are summarized to hourly, daily, or monthly averages.

## SUMMARY OF 2012 QUARTER 1 DATA

This section presents graphical summaries of data obtained from the SMWS, via wireless offload, for the interval of January 1 to March 31, 2012. Summary graphs and tables have been created for several basic climate parameters: 1) daily rainfall, 2) daily minimum and maximum ambient temperatures, 3) average daily ambient temperature with average daily relative humidity, and 4) daily average soil moisture at different depths for each both the Meadow and the Tree sites.

Below is a list of the variables that the SMWS takes every 10 minutes (Table 1). Not all the variables being measured are presented here, this report summarizes the more "important" data.

**Table 1. SMWS Data Variables**

| Variable | Units |
|---|---|
| Wind speed | Inches |
| Wind direction | Miles per hour |
| Ambient air temperature | Degrees |
| Ambient relative humidity | Degrees Fahrenheit |
| Solar, lunar, and sky radiation intensity | Kilowatts per meter |
| Soil temperature at different depths | Degrees Fahrenheit |
| Soil moisture content at different depths | Kilopascals |

### Precipitation

Daily precipitation values from January 1 to March 31, 2012, are presented graphically in Figure 1 below. The total precipitation received during Quarter 1 was 0.3 inch, which is an indication of the current drought in New Mexico.

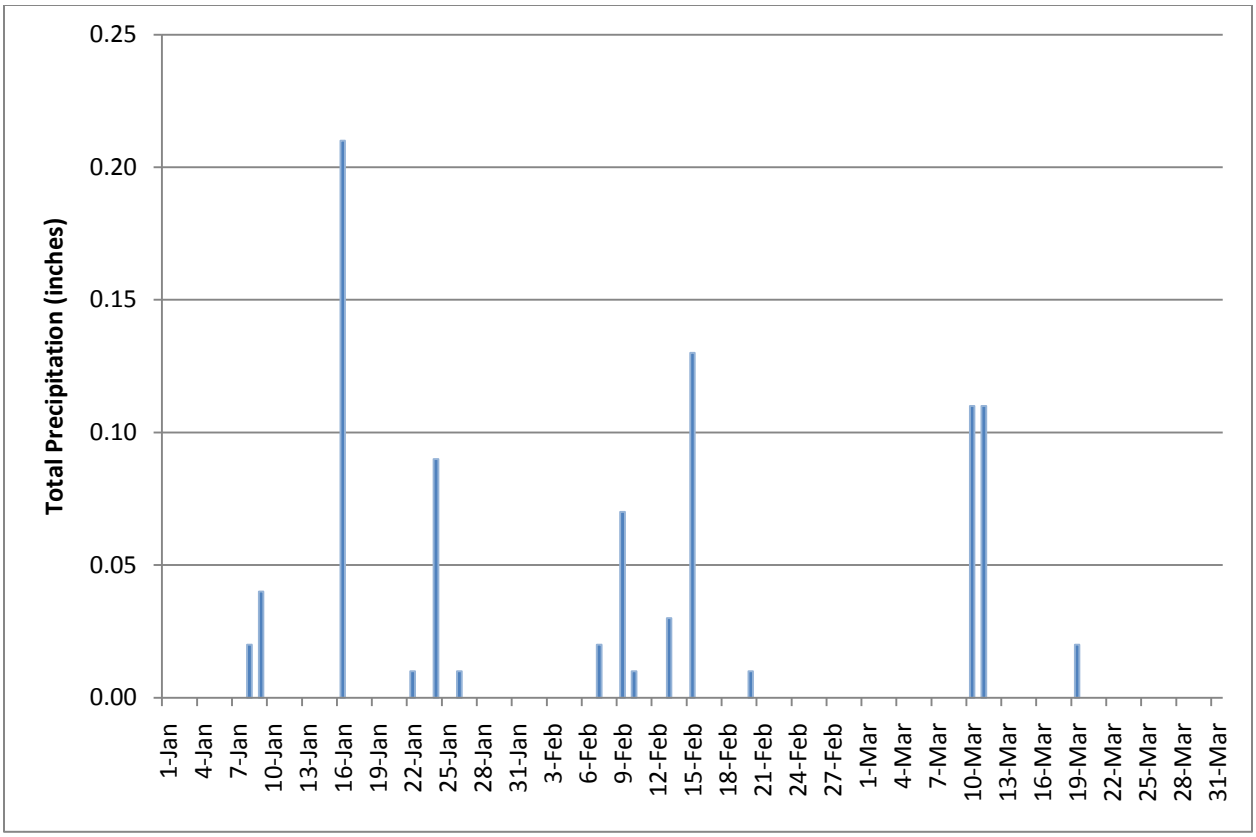



**Figure 1. Daily total precipitation (inches), January –March 2012, from the SMWS.**

## Soil Moisture

Soil moisture measurements taken from both the Tree and Meadow sites are displayed below in Figures 2 through 5.

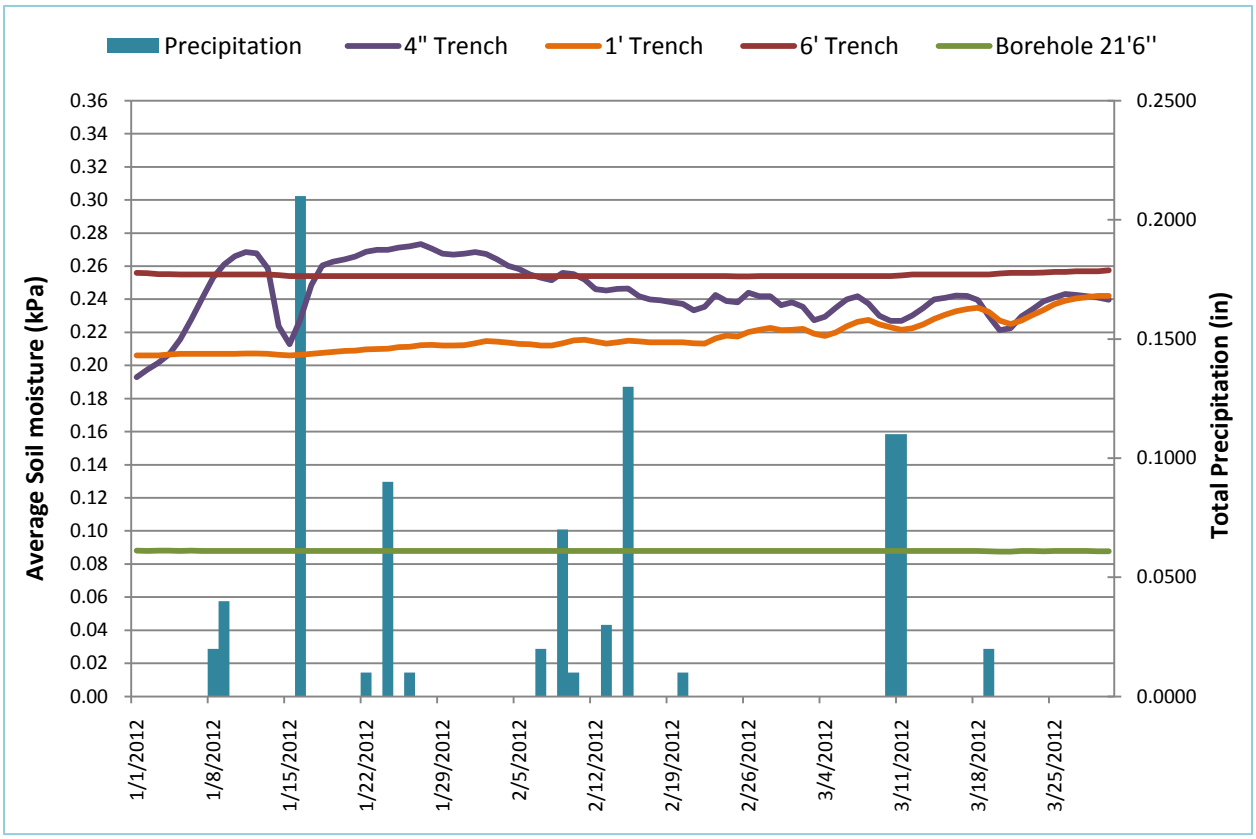



**Figure 2. Average daily soil moisture levels (kPa) at four depths and precipitation (inches) from the Tree site, January –March 2012.**

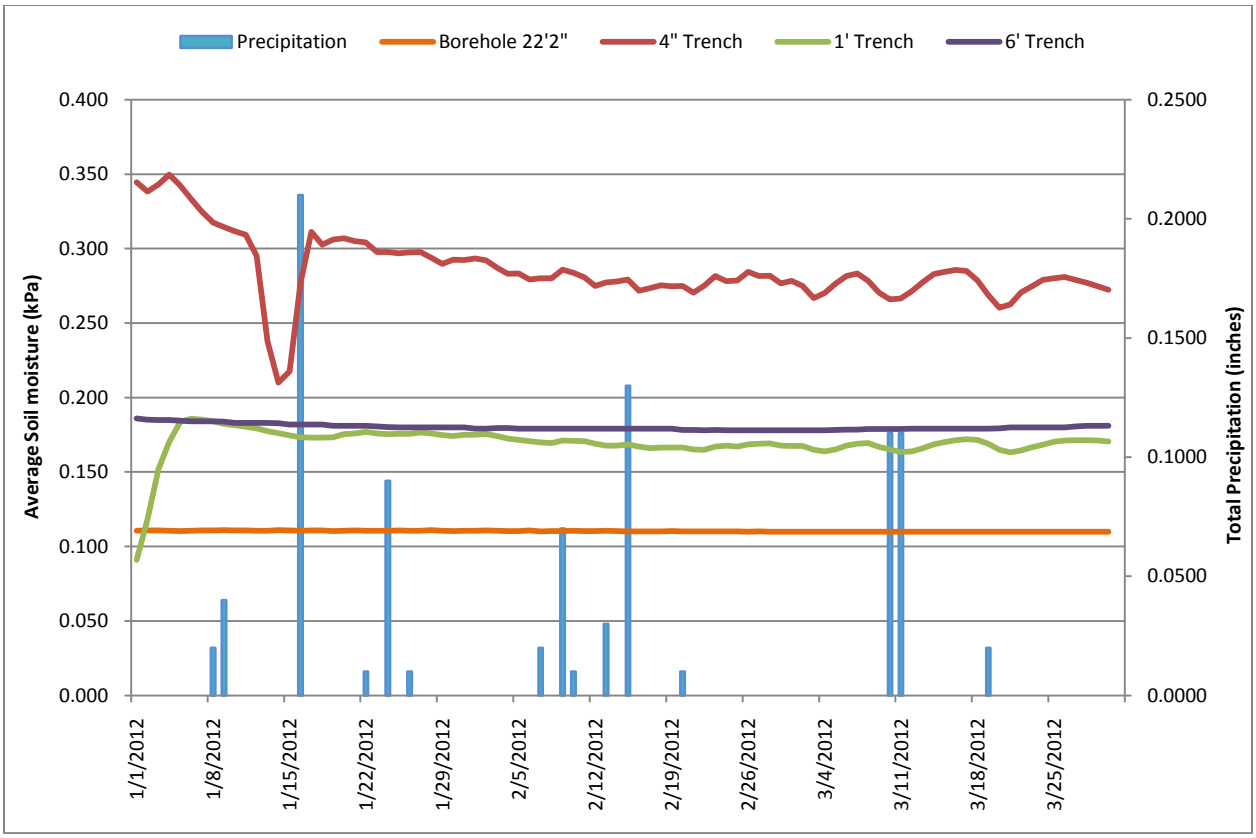



**Figure 3. Average daily soil moisture levels (kPa) at four depths and precipitation (inches) from the Meadow site, January–March 2012.**

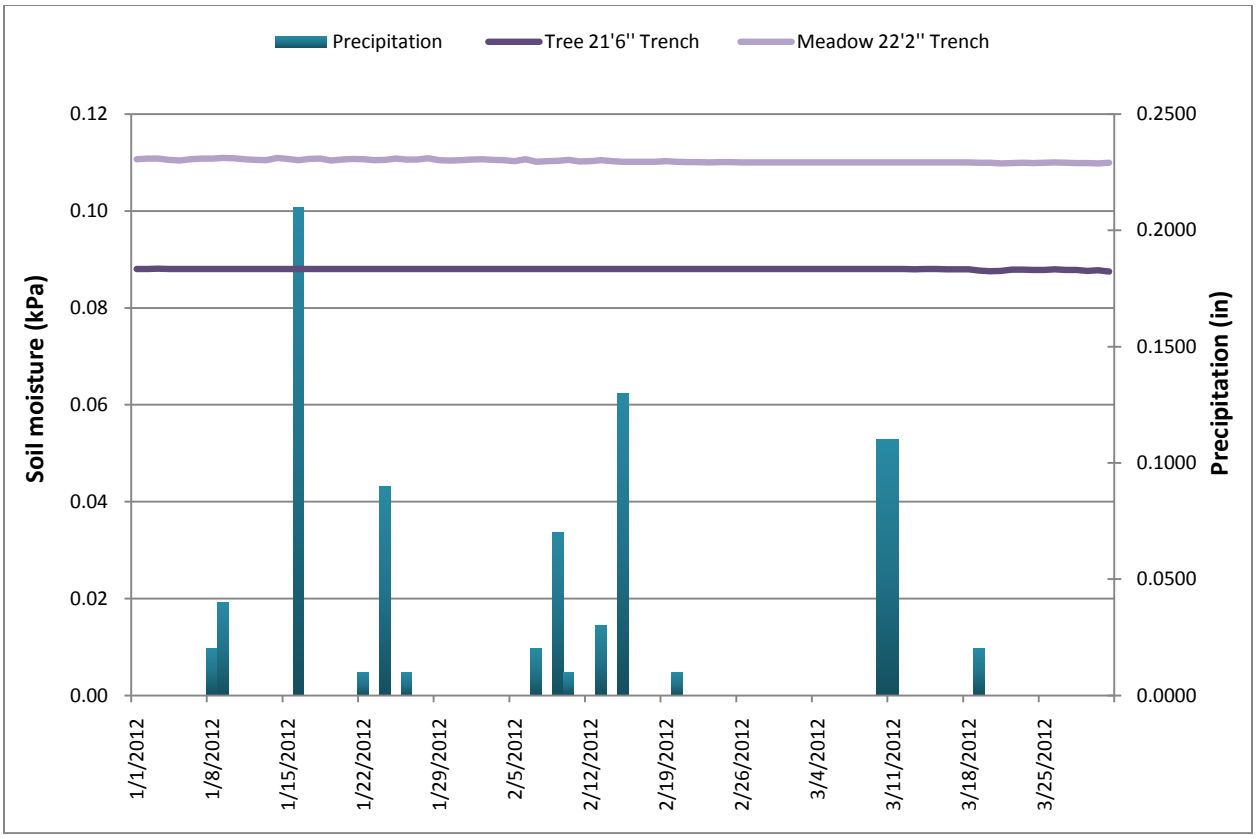



**Figure 4. Comparison of Tree and Meadow soil moisture levels (kPa) at the over 20-foot depths plotted with precipitation, January–March 2012.**

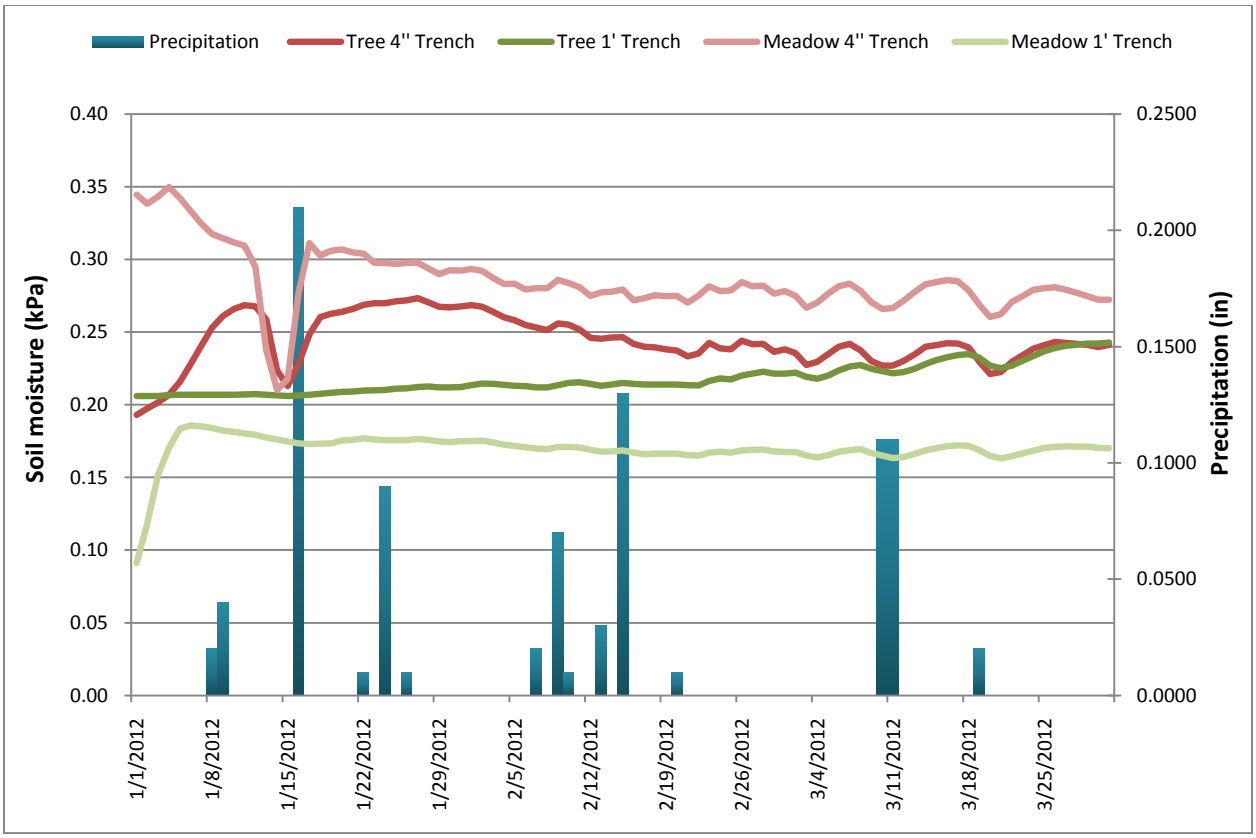



**Figure 5. Comparison of Tree and Meadow soil moisture levels at the 4-inch and 1-foot depths, along with precipitation, January–March 2012.**

**Temperature and Relative Humidity**

Figures 6 and 7 summarize the daily minimum and maximum ambient temperatures occurring during Quarter 1. Figure 8 displays the average temperature plotted against the average relative humidity.

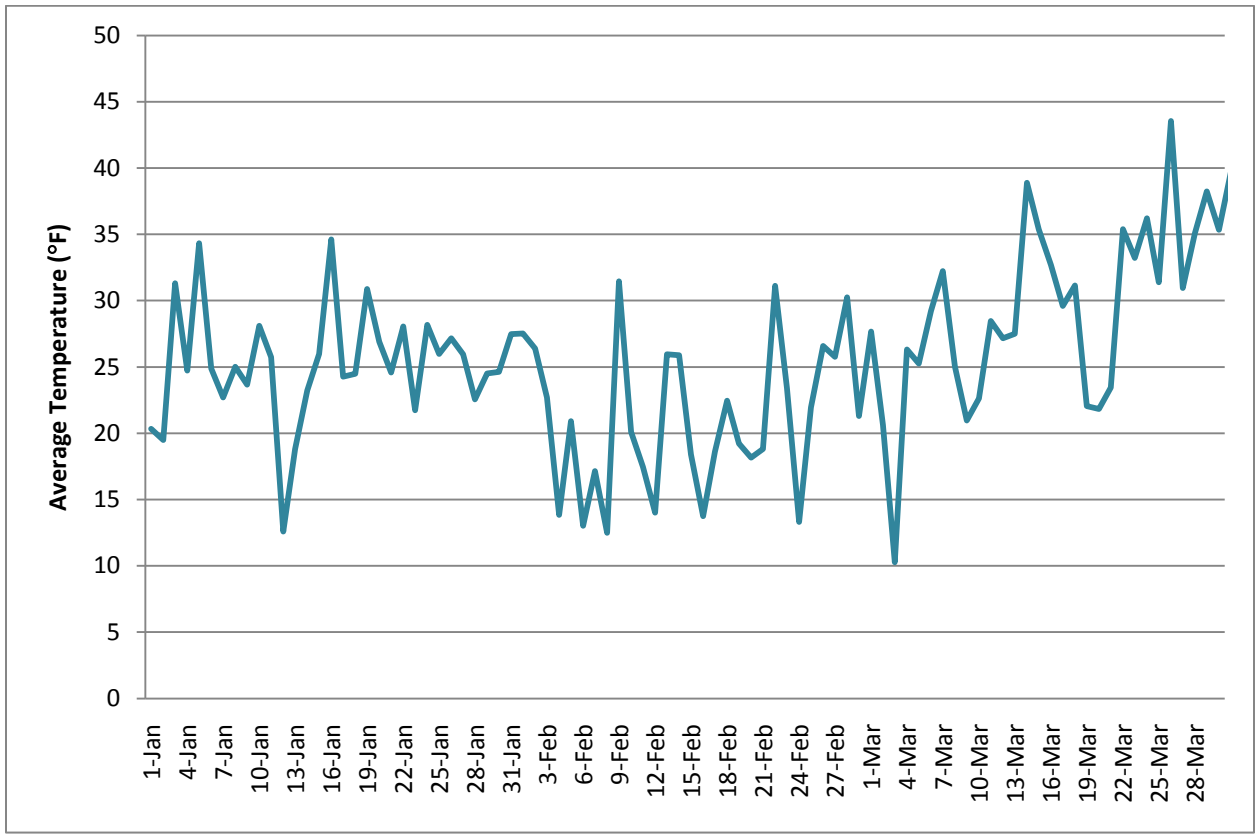



**Figure 6. Daily minimum ambient temperature (degrees Fahrenheit), January–March 2012.**

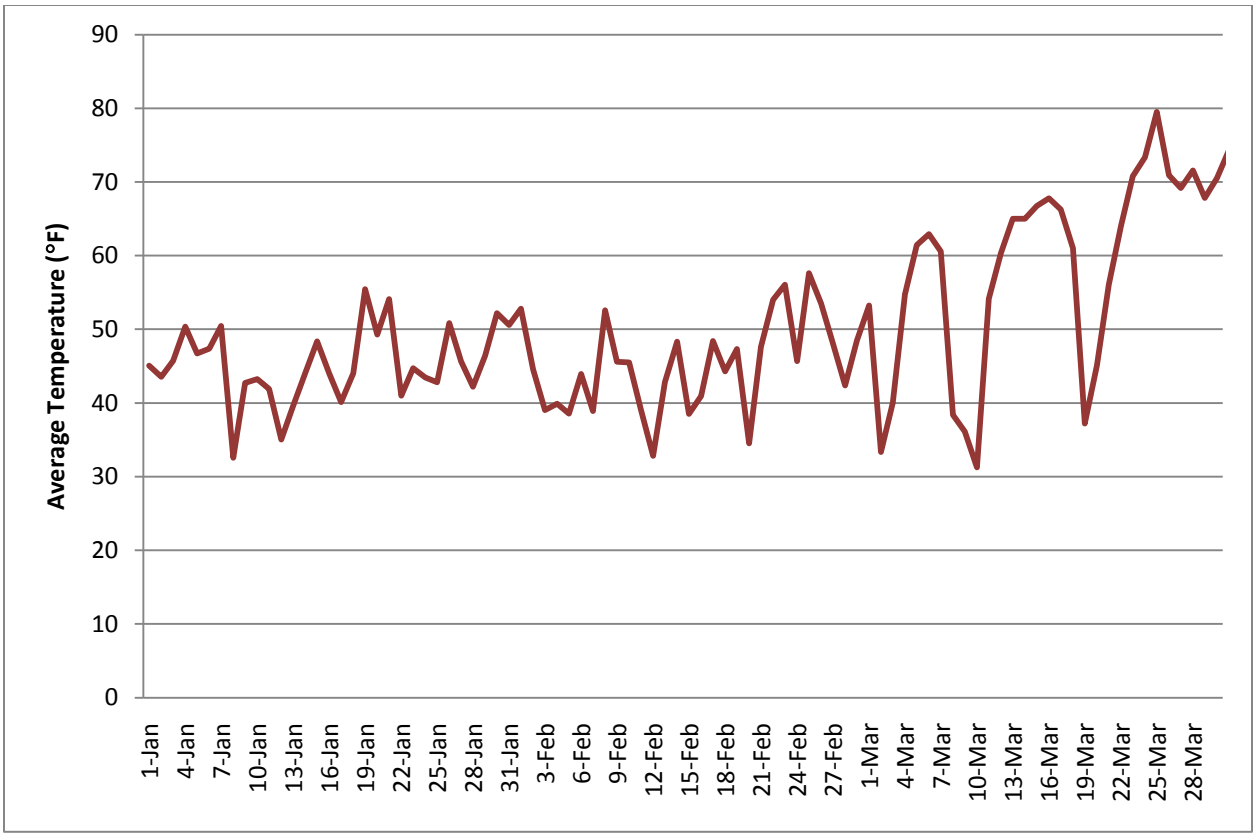



**Figure 7. Daily maximum ambient temperature (degrees Fahrenheit), January–March 2012.**

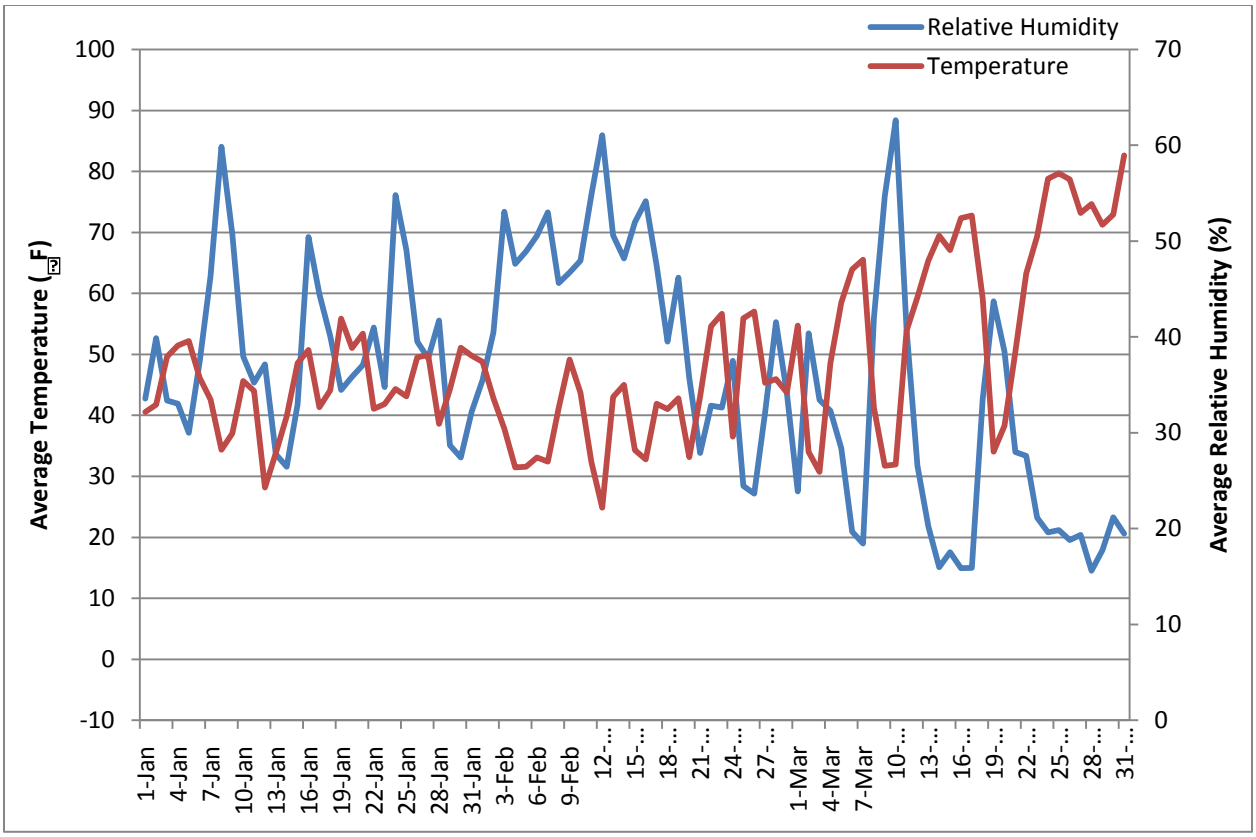


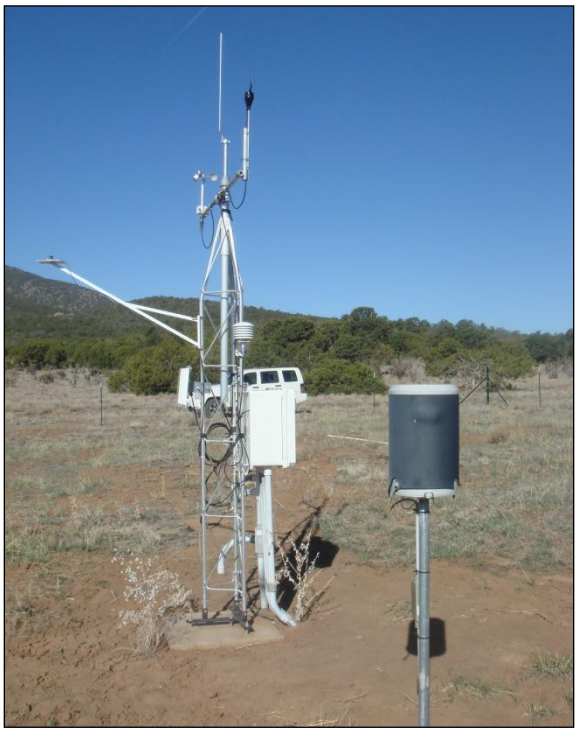

**Figure 8. Average daily ambient temperature and humidity, January–March 2012.**

## Interpretation of Quarter 1 2012 Data

The drought that was prevalent during the 2011 monitoring period was still persisting in 2012. The overlay of precipitation and soil moisture showed no correlation between precipitation and soil moisture levels during the time period of January to March 2012 on either the Tree or Meadow site. This can be attributed to the lack of precipitation during Quarter 1 of 2012.

The atmospheric data collected at the SMWS can be used as a reference for particular storm events. It also can provide the ability to compare meteorological data from 2008, 2009, 2010, 2011, 2012, and future data. For example, this year it would be possible to compare 2007–2011 precipitation data and daily maximum temperatures to see how the inter-year variability looks. The SMWS will also provide an interesting comparison to the WatchDog Mini Weather Stations installed in and around the Estancia Basin and within the Trigo fire burn area perimeter.

# SOUTH MOUNTAIN WEATHER STATION: REPORT FOR QUARTER 2 (APRIL–JUNE) 2012



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SWCA Project No. 12996 Task 2

July 1, 2012

# SOUTH MOUNTAIN WEATHER STATION DATA FOR QUARTER 2, 2012 (APRIL–JUNE, 2012)

This quarterly report provides graphs of summarized rainfall and soil moisture data for the period of April through June 2012. Please see the South Mountain Weather Station (SMWS) 2008 Annual Report on the New Mexico Forest and Watershed Restoration Institute (Restoration Institute) website (http://www.nmfwri.org/images/stories/pdfs/Estancia_Basin_Monitoring/South_Mountain_Weather_Station/SMWS_Manual.pdf) for detailed information about the location, configuration, history, and operation of the SMWS. Complete raw data files for hourly measurements of all SMWS variables were submitted to the Restoration Institute at the time this report was submitted. Those data files also may be accessed through the Restoration Institute website (ftp://ftp.nmfwri.org/South_Mountain_Excel_Files/). The weather station data logger records readings from all instruments every 10 minutes. Data presented here are summarized to hourly, daily, or monthly averages.

## SUMMARY OF 2012 QUARTER 2 DATA

This section presents graphical summaries of data obtained from the SMWS, via wireless offload, for the interval of April 1 to June 30, 2012. Summary graphs and tables have been created for several basic climate parameters: 1) daily rainfall, 2) daily minimum and maximum ambient temperatures, 3) average daily ambient temperature with average daily relative humidity, and 4) daily average soil moisture at different depths for each both the Meadow and the Tree sites.

Below is a list of the variables that the SMWS takes every 10 minutes (Table 1). Not all the variables being measured are presented here, this report summarizes the more "important" data.

**Table 1. SMWS Data Variables**

| Variable | Units |
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| Wind direction | Miles per hour |
| Ambient air temperature | Degrees |
| Ambient relative humidity | Degrees Fahrenheit |
| Solar, lunar, and sky radiation intensity | Kilowatts per meter |
| Soil temperature at different depths | Degrees Fahrenheit |
| Soil moisture content at different depths | Kilopascal |

### Precipitation

Daily precipitation values from April 1 through June 30, 2012, are presented graphically in Figure 1 below. The total precipitation received during Quarter 2 was 1.11 inches with a majority of the rain coming during two separate storm events during the month of April (0.53 inches) and May (0.57 inches). The precipitation values are much lower than in other years because of an exceptional drought occurring over the study area in 2012.

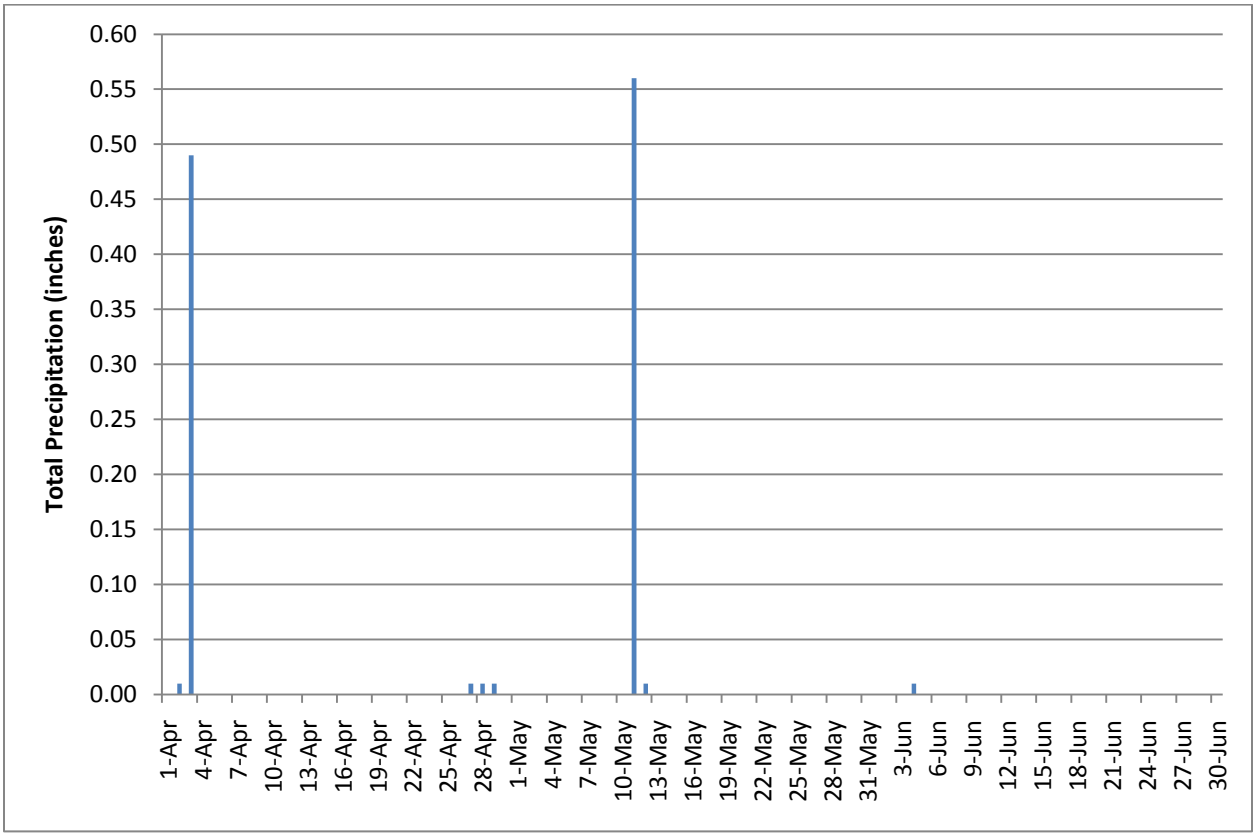



**Figure 1. Daily total precipitation (inches), April–June 2012, from the SMWS.**

## Soil Moisture

Soil moisture measurements taken from both the Tree and Meadow sites are displayed below in Figures 2 through 5.

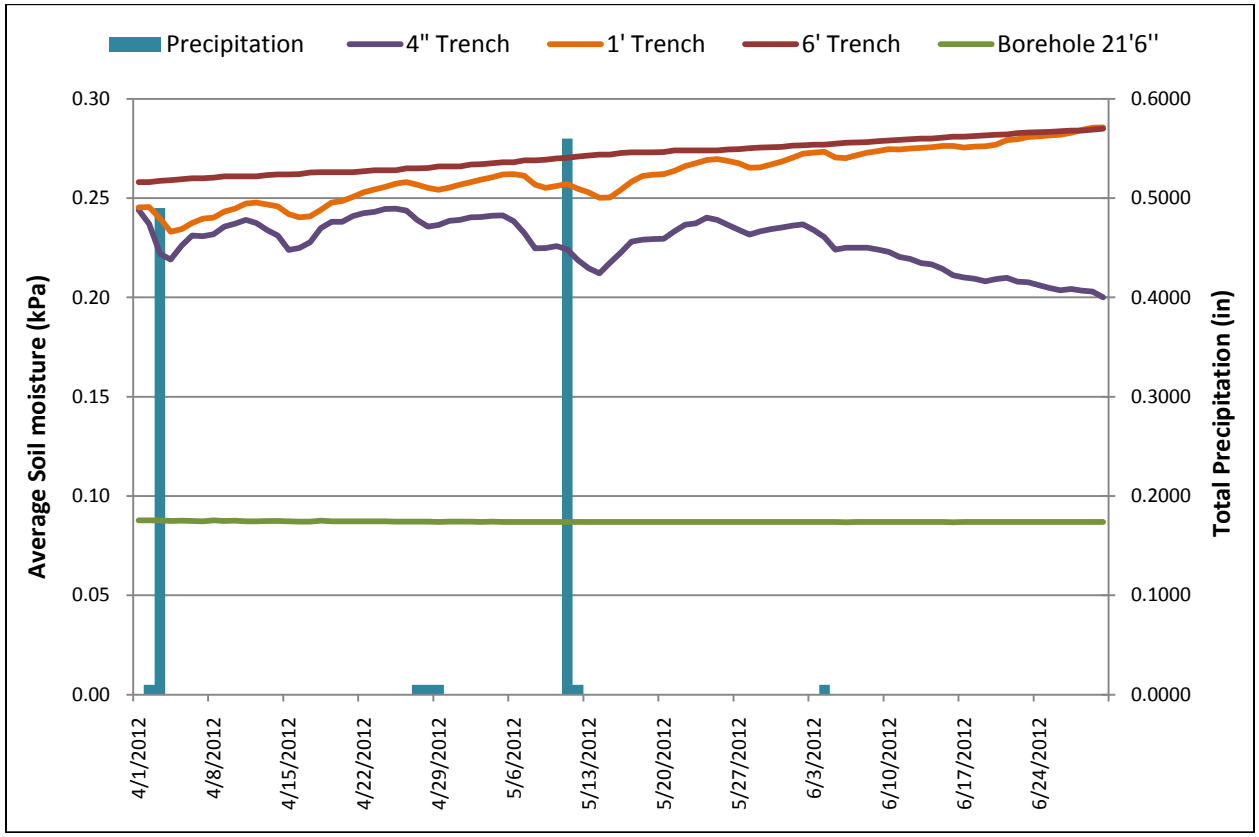



**Figure 2. Average daily soil moisture levels (kPa) at four depths and precipitation (inches) from the Tree site, April–June 2012.**

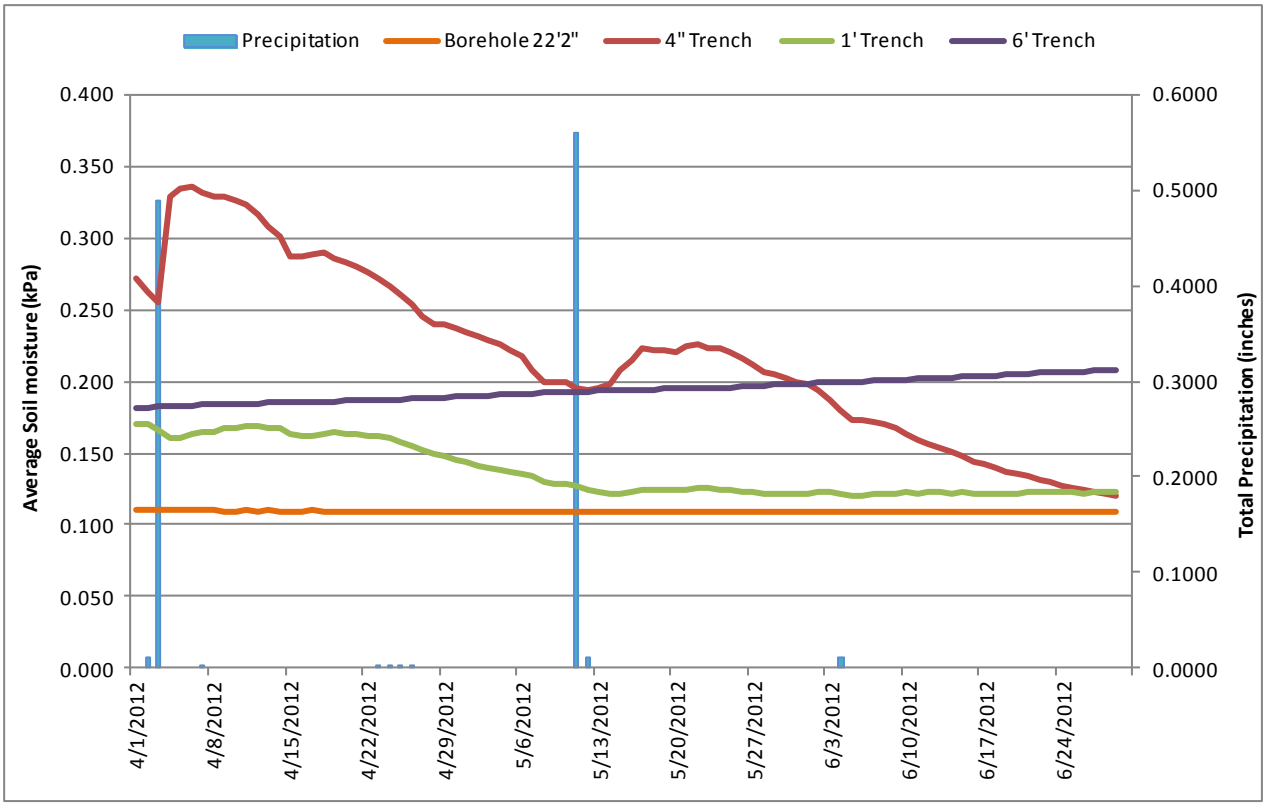



**Figure 3. Average daily soil moisture levels (kPa) at four depths and precipitation (inches) from the Meadow site, April–June 2012.**

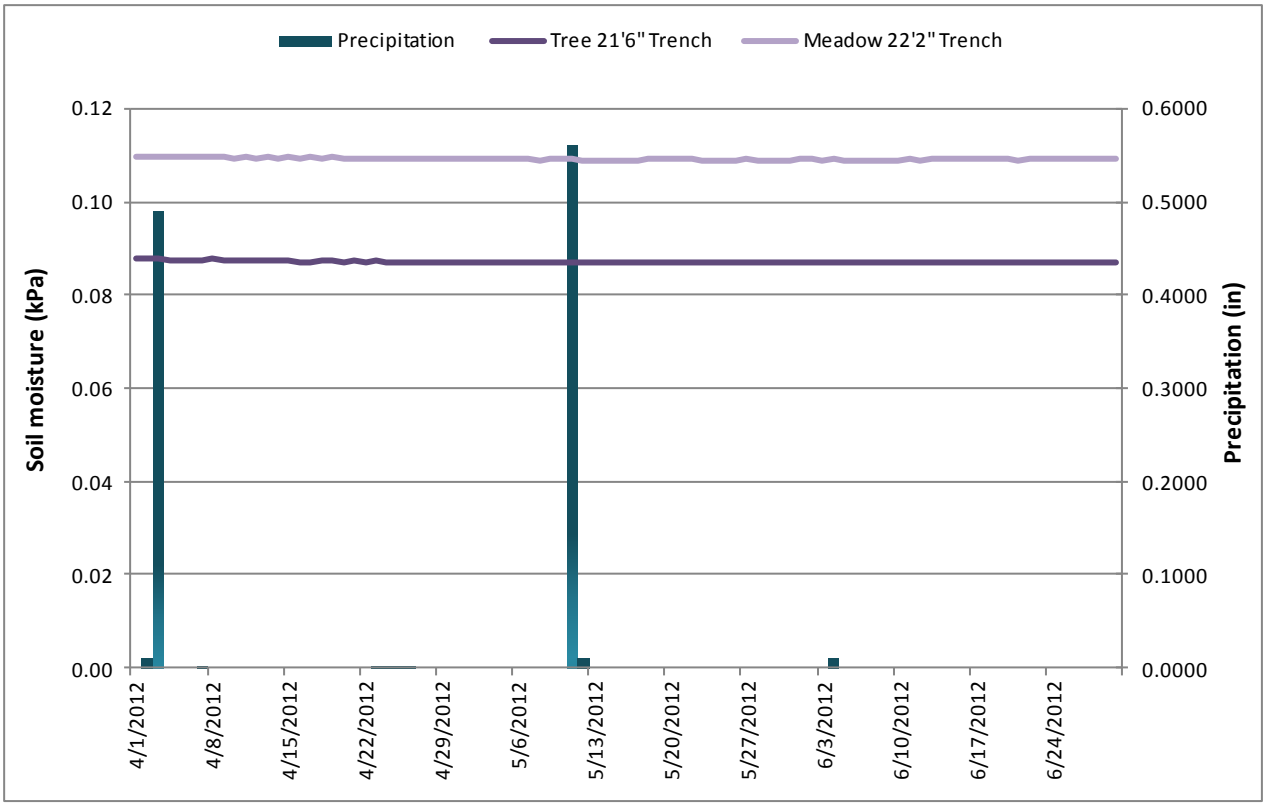



**Figure 4. Comparison of Tree and Meadow soil moisture levels (kPa) at the over 20-foot depths plotted with precipitation, April–June 2012.**

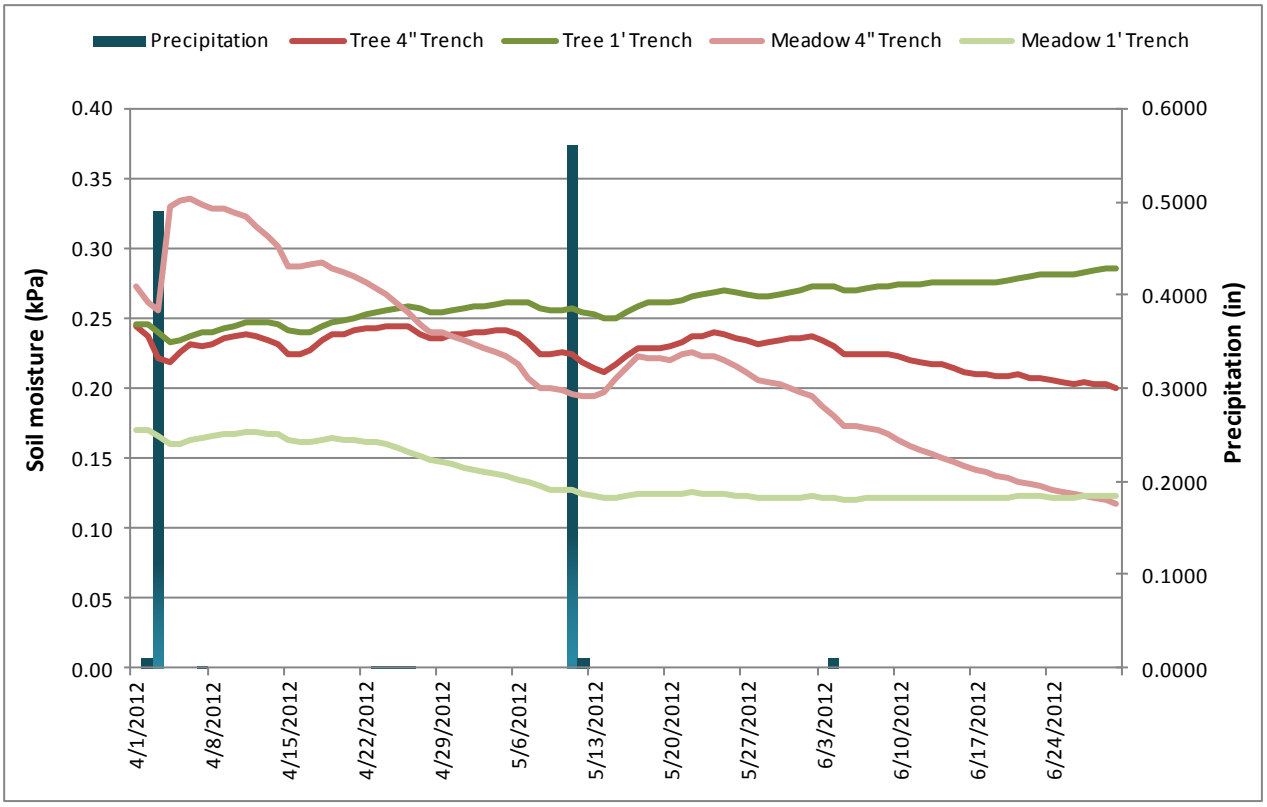



**Figure 5. Comparison of Tree and Meadow soil moisture levels at the 4-inch and 1-foot depths, along with precipitation, April–June 2011.**

**Temperature and Relative Humidity**

Figures 6 and 7 summarize the daily minimum and maximum ambient temperatures occurring during Quarter 2. Figure 8 displays the average temperature plotted against the average relative humidity.

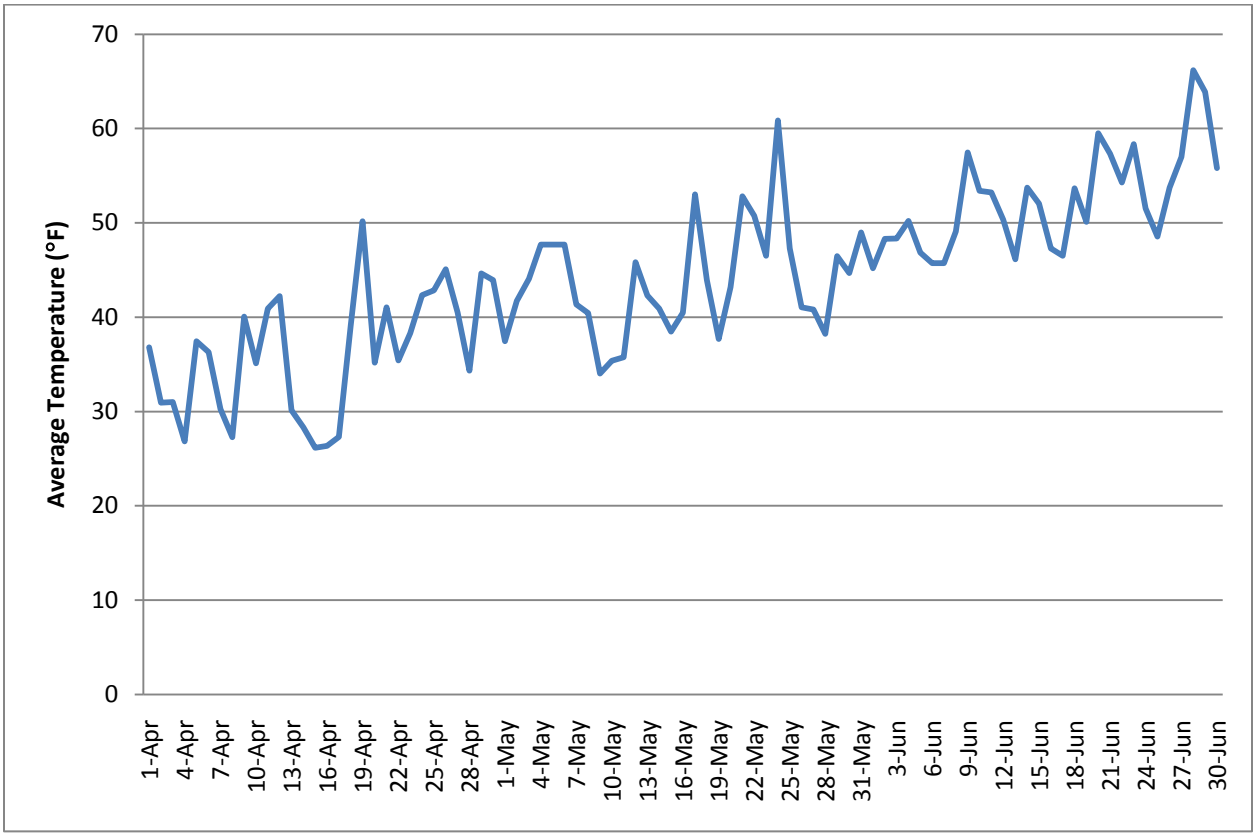



**Figure 6. Daily minimum ambient temperature (degrees Fahrenheit), April–June 2011.**

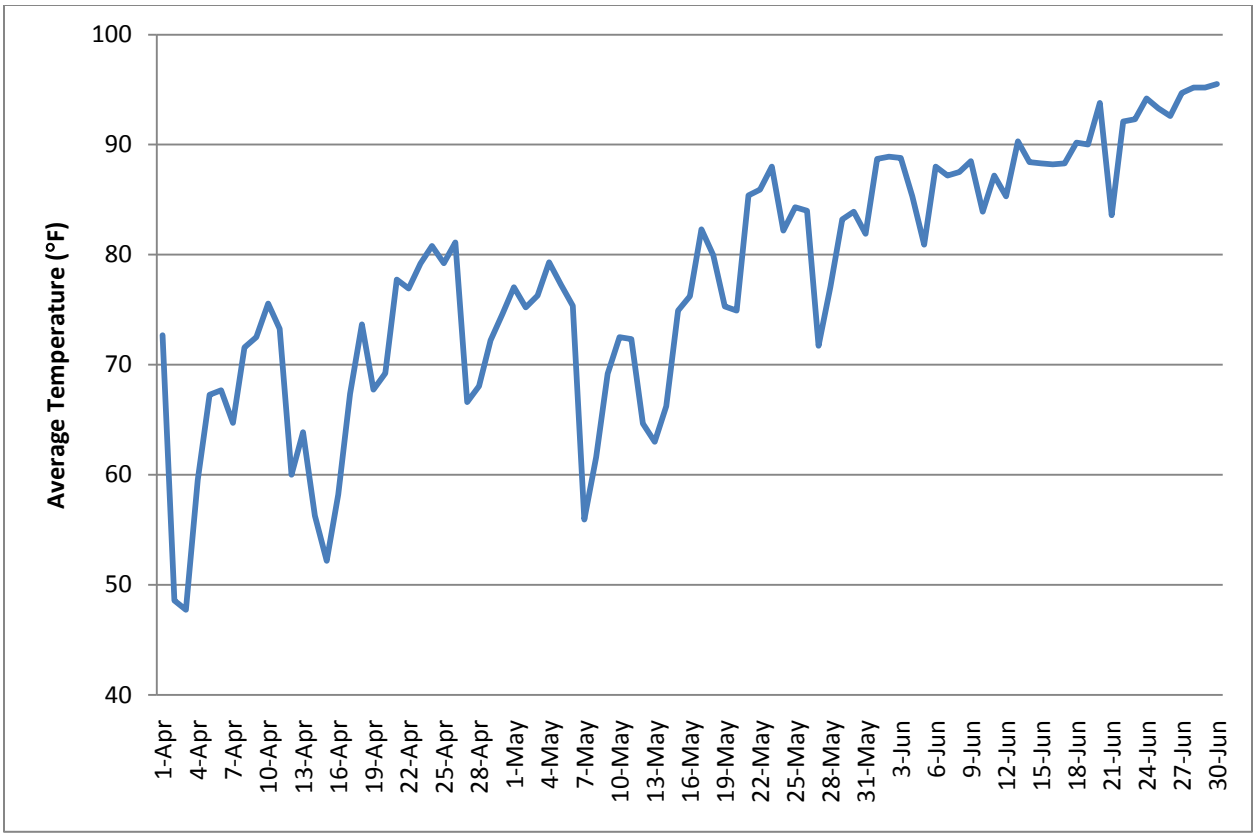



**Figure 7. Daily maximum ambient temperature (degrees Fahrenheit), April–June 2011.**

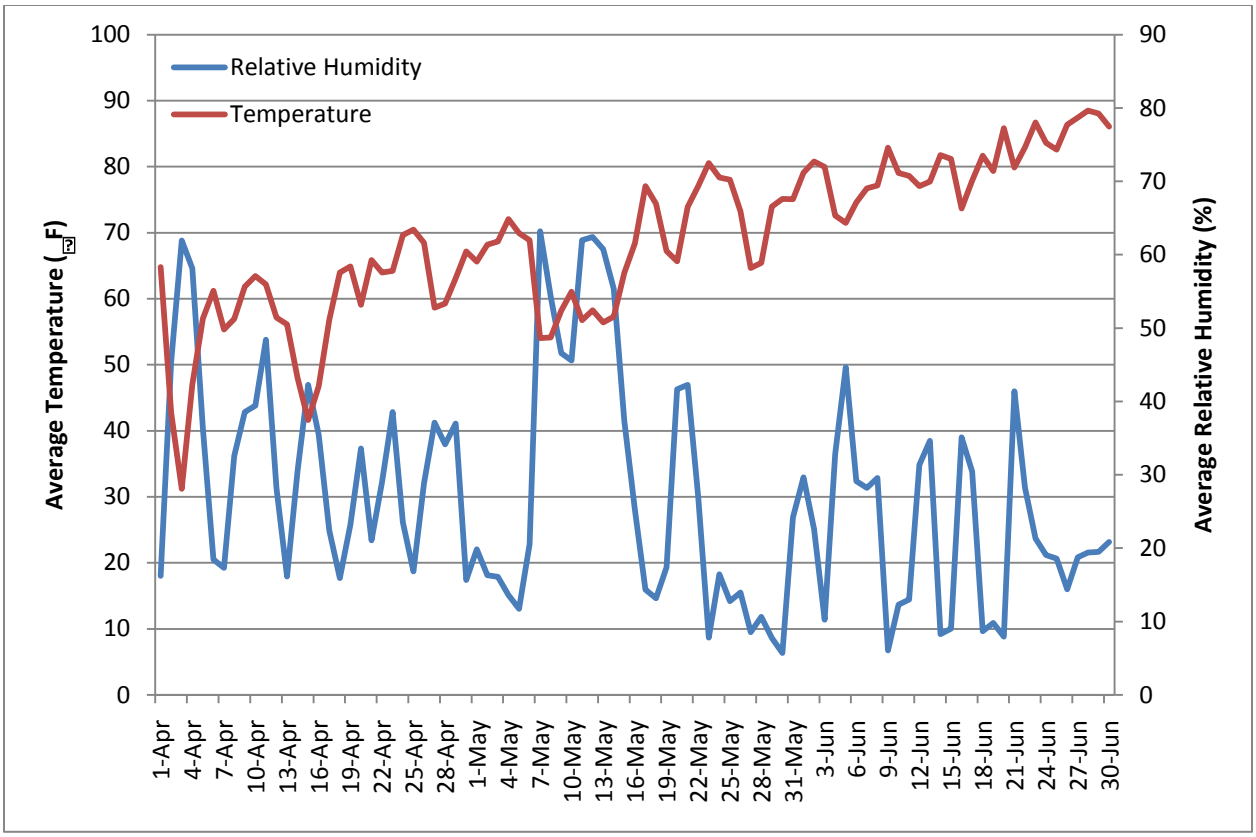


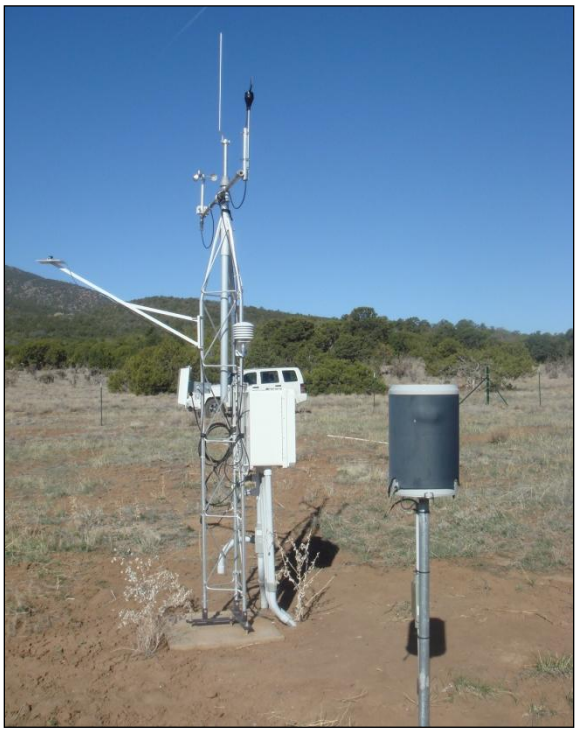

**Figure 8. Average daily ambient temperature and humidity, April–June 2011.**

## Interpretation of Quarter 2 2012 Data

The overlay of precipitation and soil moisture showed no correlation between precipitation and soil moisture levels during the time period of April to June 2012 on either the Tree or Meadow site. This can be attributed to the lack of precipitation that occurred during Quarter 2 of 2012.

The atmospheric data collected at the SMWS can be used as a reference for particular storm events. It also can provide the ability to compare meteorological data from 2008, 2009, 2010, 2011, 2012 and future data. For example, this year it would be possible to compare 2007–2011 precipitation data and daily maximum temperatures to see how the inter-year variability looks. The SMWS will also provide an interesting comparison to the WatchDog Mini Weather Stations installed in and around the Estancia Basin and within the Trigo fire burn area perimeter.

# SOUTH MOUNTAIN WEATHER STATION: REPORT FOR QUARTER 3 (JULY–SEPTEMBER) 2012



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SWCA Project No. 12996 Task 2

October 1, 2012

# SOUTH MOUNTAIN WEATHER STATION DATA FOR QUARTER 3, 2012 (JULY–SEPTEMBER)

This quarterly report provides graphs of summarized rainfall and soil moisture data for the period of July through September 2012. Please see the South Mountain Weather Station (SMWS) 2008 Annual Report on the New Mexico Forest and Watershed Restoration Institute (Restoration Institute) website (http://www.nmfwri.org/images/stories/pdfs/Estancia_Basin_Monitoring/South_Mountain_Weather_Station/SMWS_Manual.pdf) for detailed information about the location, configuration, history, and operation of the SMWS. Complete raw data files for hourly measurements of all SMWS variables were submitted to the Restoration Institute at the time this report was submitted. Those data files also may be accessed through the Restoration Institute website (ftp://ftp.nmfwri.org/South_Mountain_Excel_Files/). The weather station data logger records readings from all instruments every 10 minutes. Data presented here are summarized to hourly, daily, or monthly averages.

## SUMMARY OF 2012 QUARTER 3 DATA

This section presents graphical summaries of data obtained from the SMWS, via wireless offload, for the interval of July 1 to September 30, 2012. Summary graphs and tables have been created for several basic climate parameters: 1) daily rainfall, 2) daily minimum and maximum ambient temperatures, 3) average daily ambient temperature with average daily relative humidity, and 4) daily average soil moisture at different depths for each both the Meadow and the Tree sites.

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| Solar, lunar, and sky radiation intensity | Kilowatts per meter |
| Soil temperature at different depths | Degrees Fahrenheit |
| Soil moisture content at different depths | Kilopascal |

### Precipitation

Daily precipitation values from July 1 through September 30, 2012, are presented graphically in Figure 1 below. The total precipitation received during Quarter 3 was 5.25 inches with July receiving 1.7 inches, August receiving 2.06 inches, and September receiving 1.49 inches. Due to the persisting drought throughout the area all these values are lower than what was recorded during the 2011 monitoring.

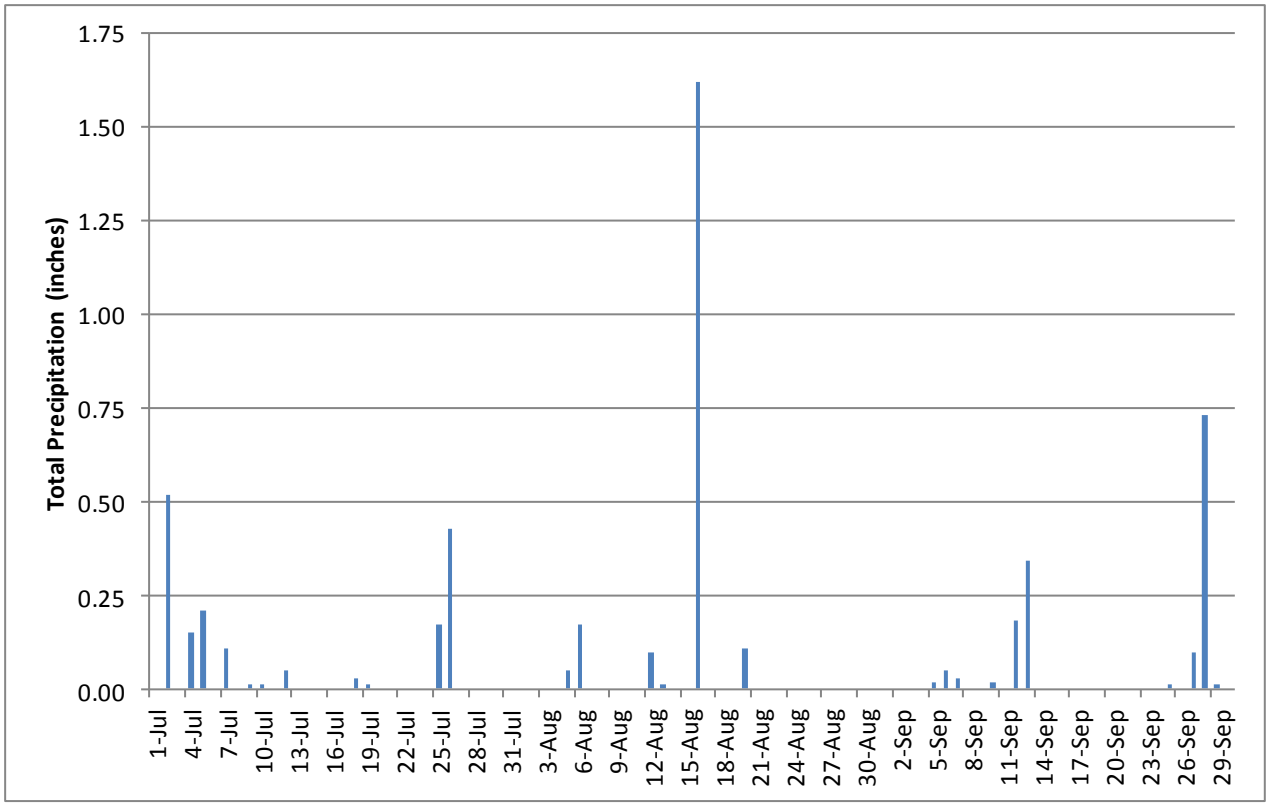



**Figure 1. Daily total precipitation (inches), July–September 2012, from the SMWS.**

**Soil Moisture**

Soil moisture measurements taken from both the Tree and Meadow sites are displayed below in Figures 2 through 5.

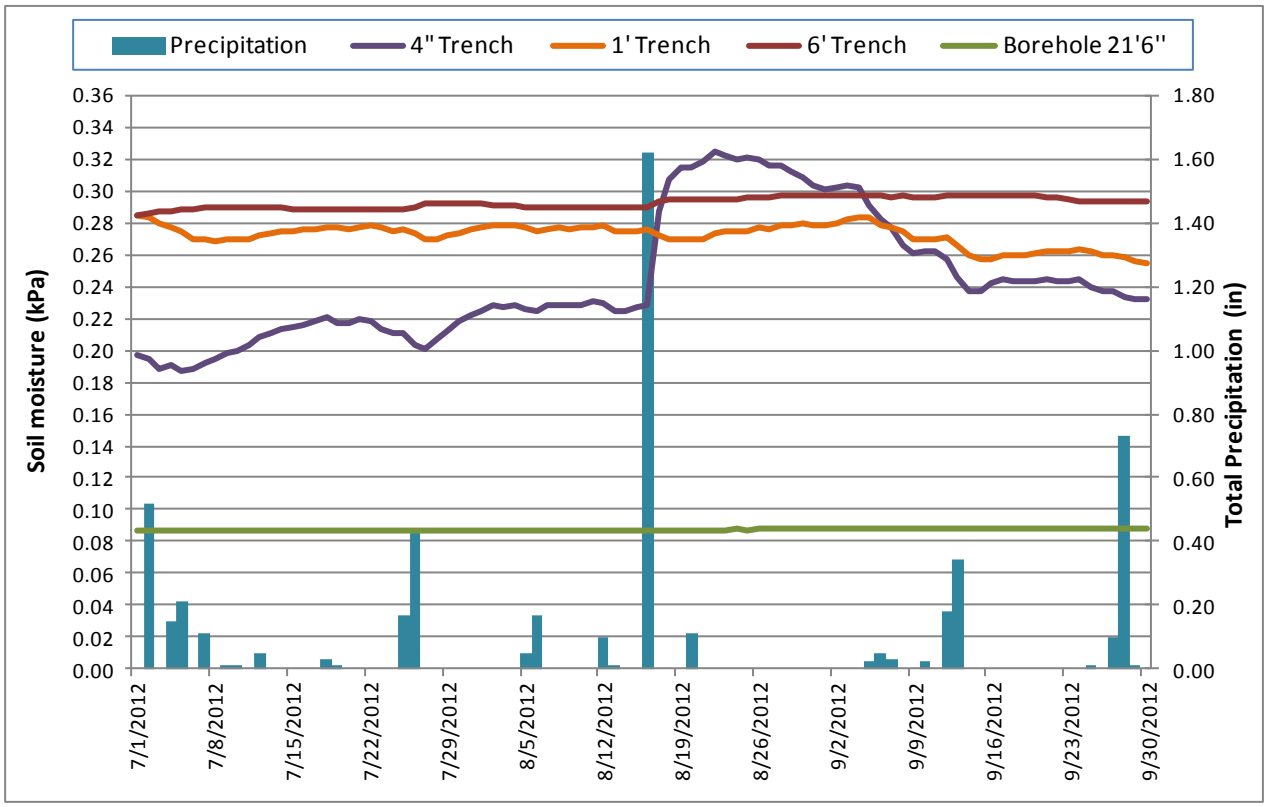



**Figure 2. Tree site soil moisture levels (kPa) at four depths and daily precipitation amount (inches), July–September 2012.**

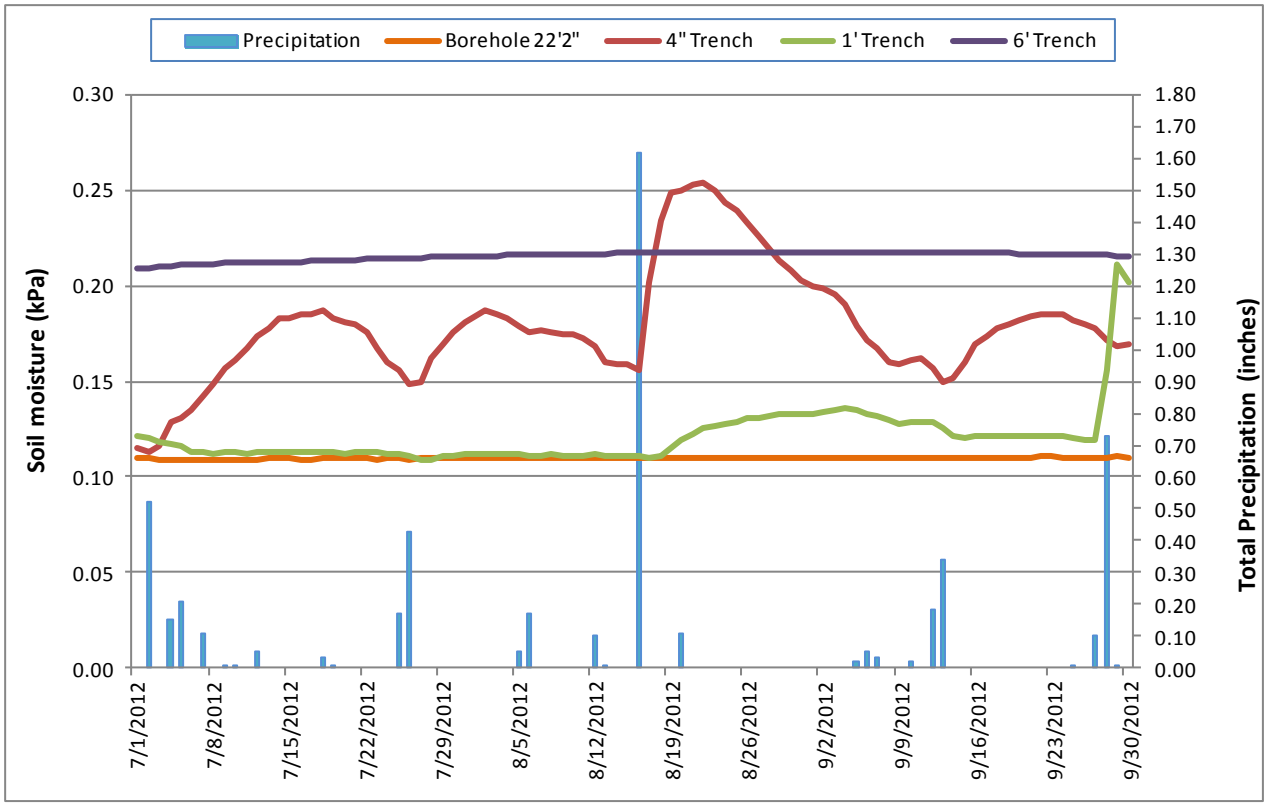



**Figure 3. Meadow site soil moisture levels (kPa) at four depths and daily precipitation amount (inches), July–September 2012.**

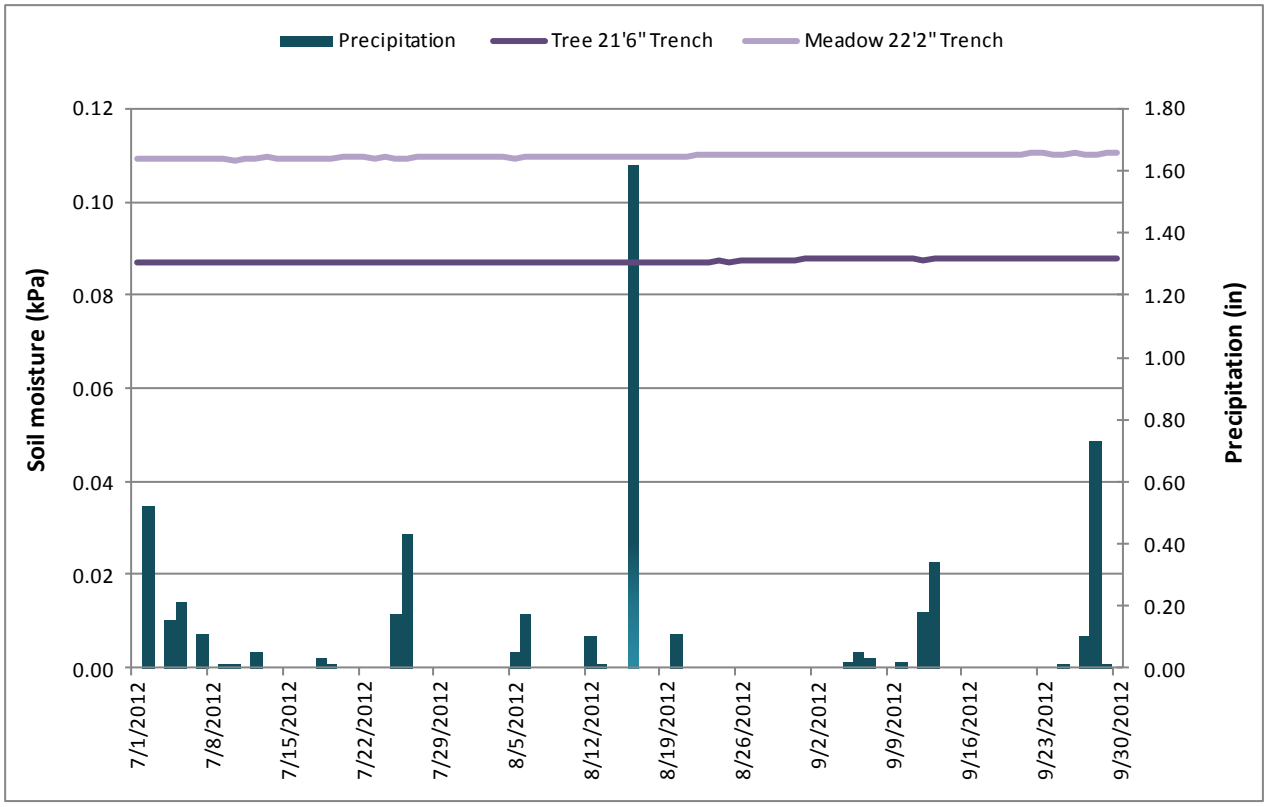



**Figure 4. Comparison of Tree and Meadow soil moisture levels (kPa) at the over 20-foot depths, along with precipitation (inches), July–September 2012.**

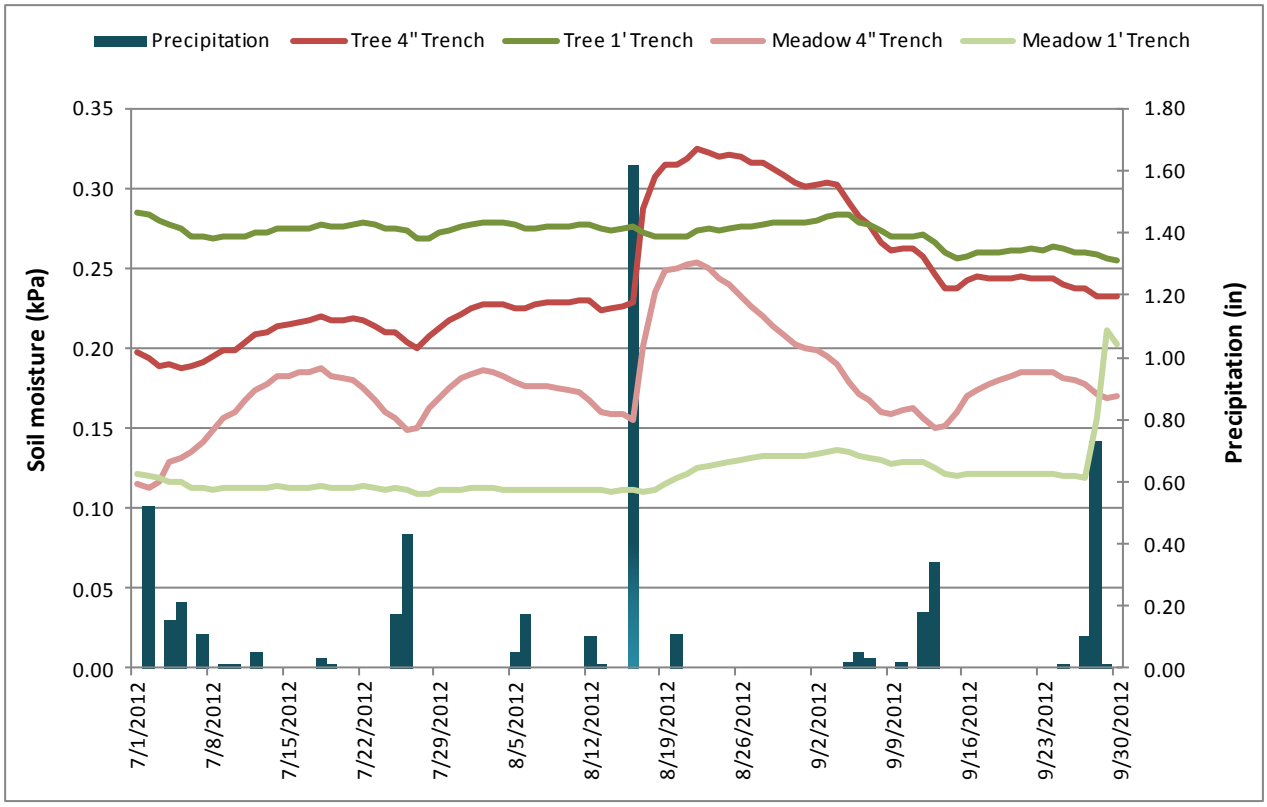



**Figure 5. Comparison of Tree and Meadow soil moisture levels at the 4-inch and 1-foot depths, along with precipitation, July–September 2012.**

**Temperature and Relative Humidity**

Figures 6 and 7 summarize the daily minimum and maximum ambient temperatures occurring during Quarter 3. Figure 8 displays the average temperature plotted against the average relative humidity.

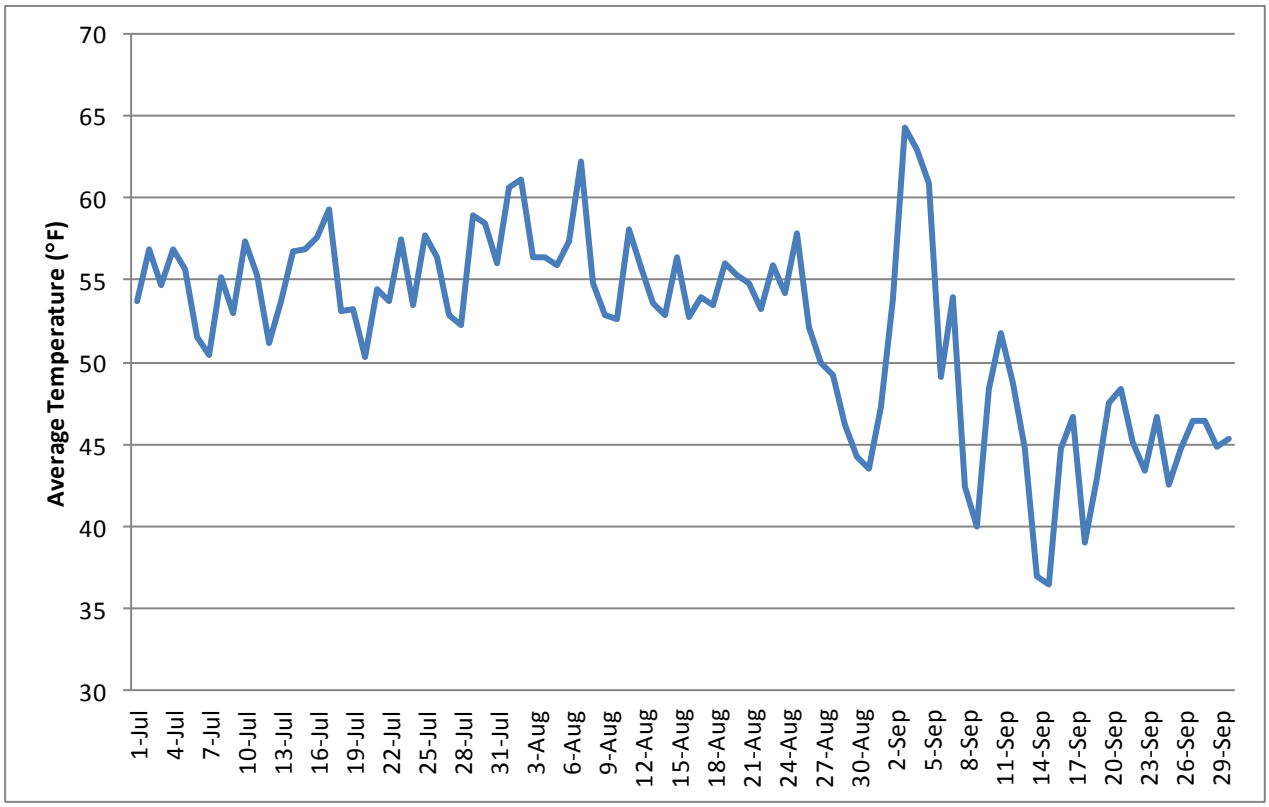



**Figure 6. Daily minimum ambient air temperature (degrees Fahrenheit), July–September 2012.**

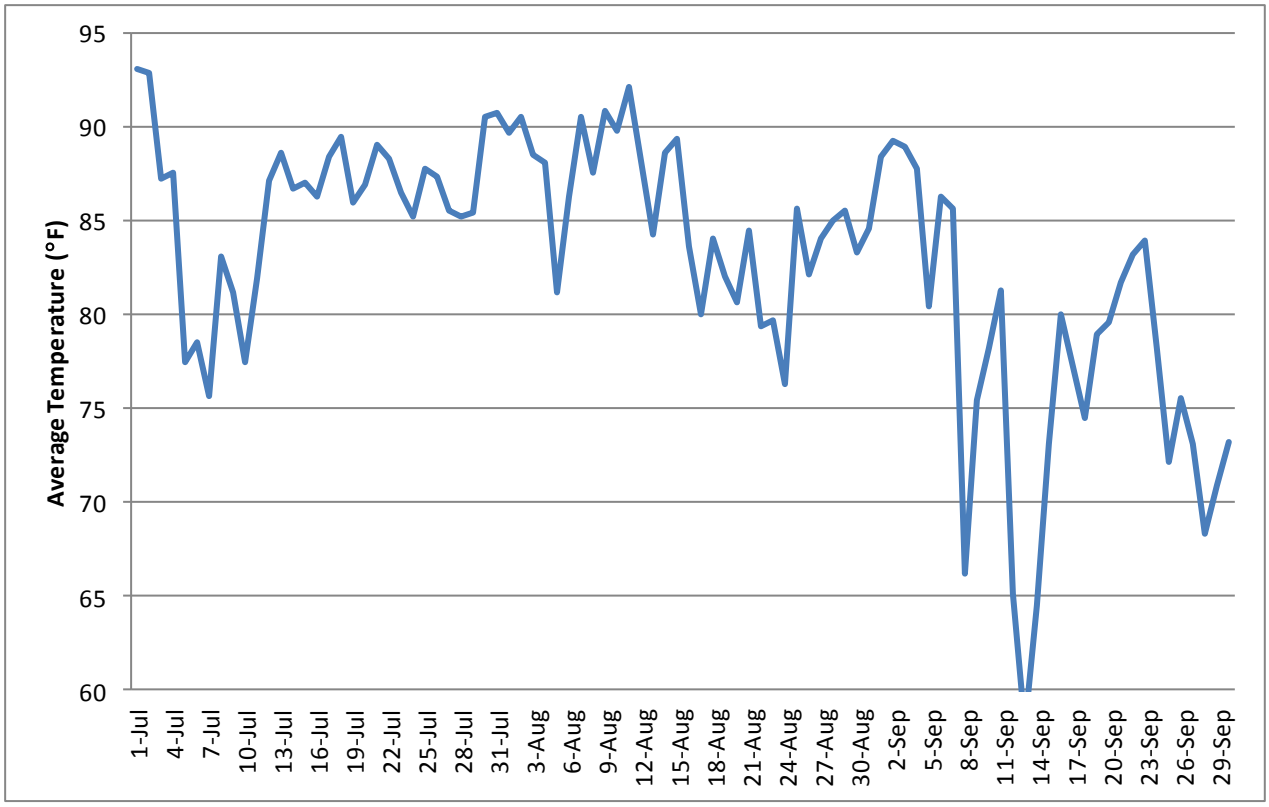



**Figure 7. Daily maximum ambient air temperature (degrees Fahrenheit), July–September 2012**

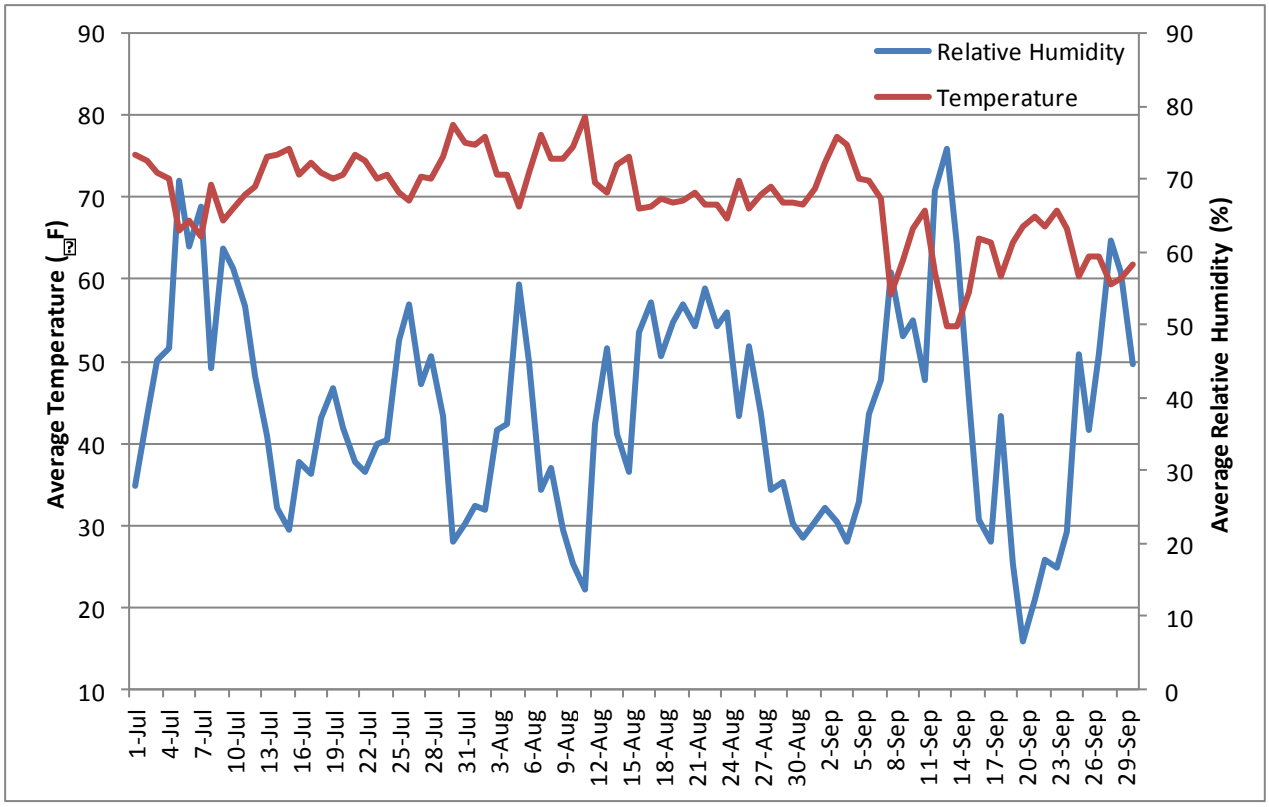


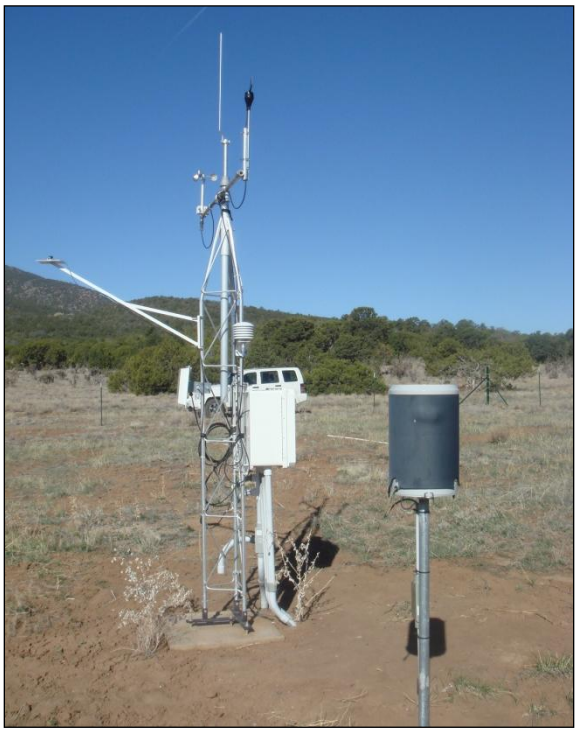

**Figure 8. Daily average ambient air temperature and relative humidity, July–September 2012.**

**Interpretation of Quarter 3 2012 Data**

The overlay of precipitation and soil moisture showed correlation between precipitation and soil moisture levels during the time period of July to September 2012. A response to the precipitation events can clearly be seen in the soil moistures at both the Tree and Meadow sites. Visually examining the graphs of soil moisture and precipitation at the Tree and Meadow sites show that the soil moisture response was more pronounced at the 4-inch and 1-foot trench levels at the meadow location. This can possibly be attributed to the difference of the spatial variances between the sites. Not surprisingly, the closer to the surface and the more exposed to the elements, the faster the soil moisture values for the Meadow site respond to precipitation in comparison with the Tree site.

The atmospheric data collected at the SMWS can be used as a reference for particular storm events. It also can provide the ability to compare meteorological data from 2008, 2009, 2010, 2011, 2012, and future data. For example, this year it would be possible to compare 2007–2011 precipitation data and daily maximum temperatures to see how the inter-year variability looks. The SMWS will also provide an interesting comparison to the WatchDog Mini Weather Stations installed in and around the Estancia Basin and within the Trigo fire burn area perimeter.

# SOUTH MOUNTAIN WEATHER STATION: REPORT FOR QUARTER 4 (OCTOBER–DECEMBER) 2012



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SWCA Project No. 12996 Task 2

January 1, 2013

# SOUTH MOUNTAIN WEATHER STATION DATA FOR QUARTER 4, 2012 (OCTOBER–DECEMBER)

This quarterly report provides graphs of summarized rainfall and soil moisture data for the period of October through December 2012. Please see the South Mountain Weather Station (SMWS) 2008 Annual Report on the New Mexico Forest and Watershed Restoration Institute (Restoration Institute) website (http://www.nmfwri.org/images/stories/pdfs/Estancia_Basin_Monitoring/South_Mountain_Weather_Station/SMWS_Manual.pdf) for detailed information about the location, configuration, history, and operation of the SMWS. Complete raw data files for hourly measurements of all SMWS variables were submitted to the Restoration Institute at the time this report was submitted. Those data files also may be accessed through the Restoration Institute website (ftp://ftp.nmfwri.org/South_Mountain_Excel_Files/). The weather station data logger records readings from all instruments every 10 minutes. Data presented here are summarized to hourly, daily, or monthly averages.

## SUMMARY OF 2012 QUARTER 4 DATA

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| Ambient relative humidity | Degrees Fahrenheit |
| Solar, lunar, and sky radiation intensity | Kilowatts per meter |
| Soil temperature at different depths | Degrees Fahrenheit |
| Soil moisture content at different depths | Kilopascals |

### Precipitation

Daily precipitation values from October 1 through December 31, 2012, are presented graphically in Figure 1 below. The total precipitation received during Quarter 4 was 0.67 inches with October receiving 0.04 inches, November receiving 0.15 inches, and December receiving 0.48 inches

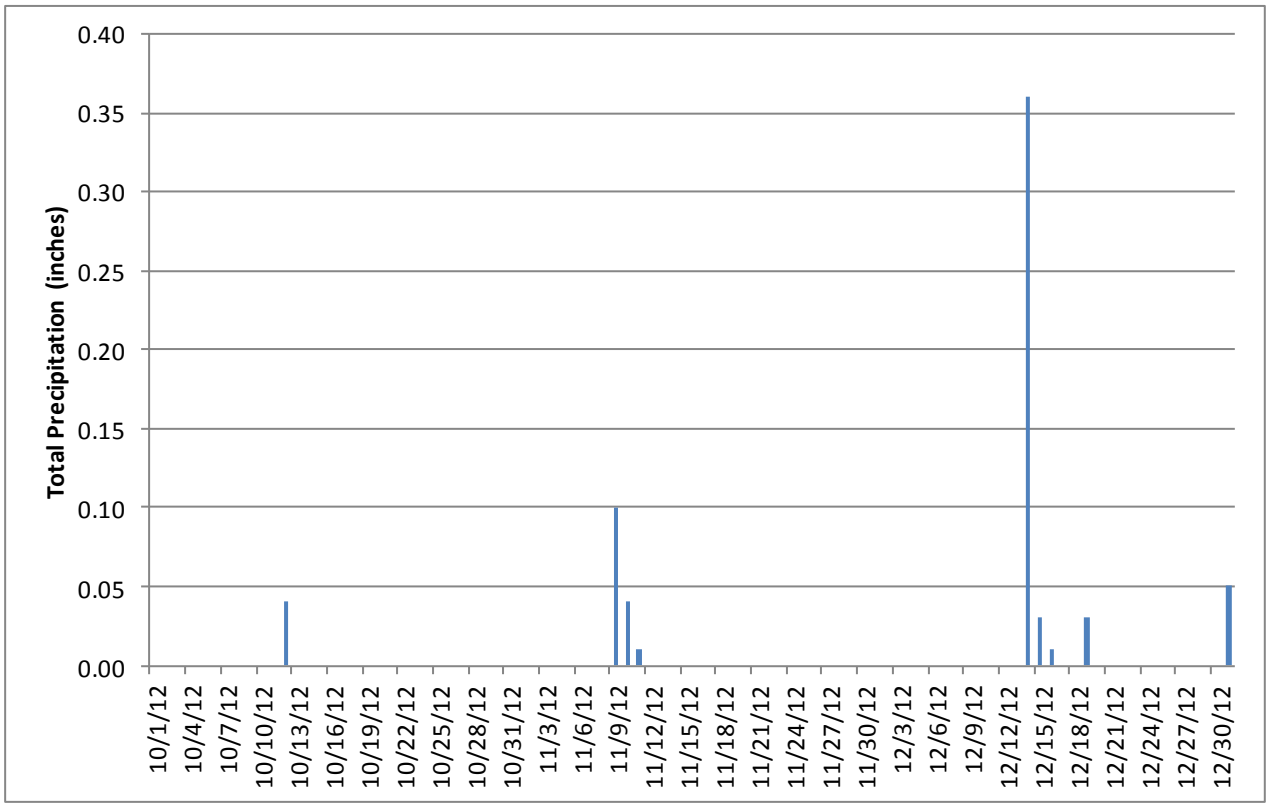


**Figure 1. Daily total precipitation (inches), October–December 2012, from the SMWS.**

## Soil Moisture

Soil moisture measurements taken from both the Tree and Meadow sites are displayed below in Figures 2 through 4.

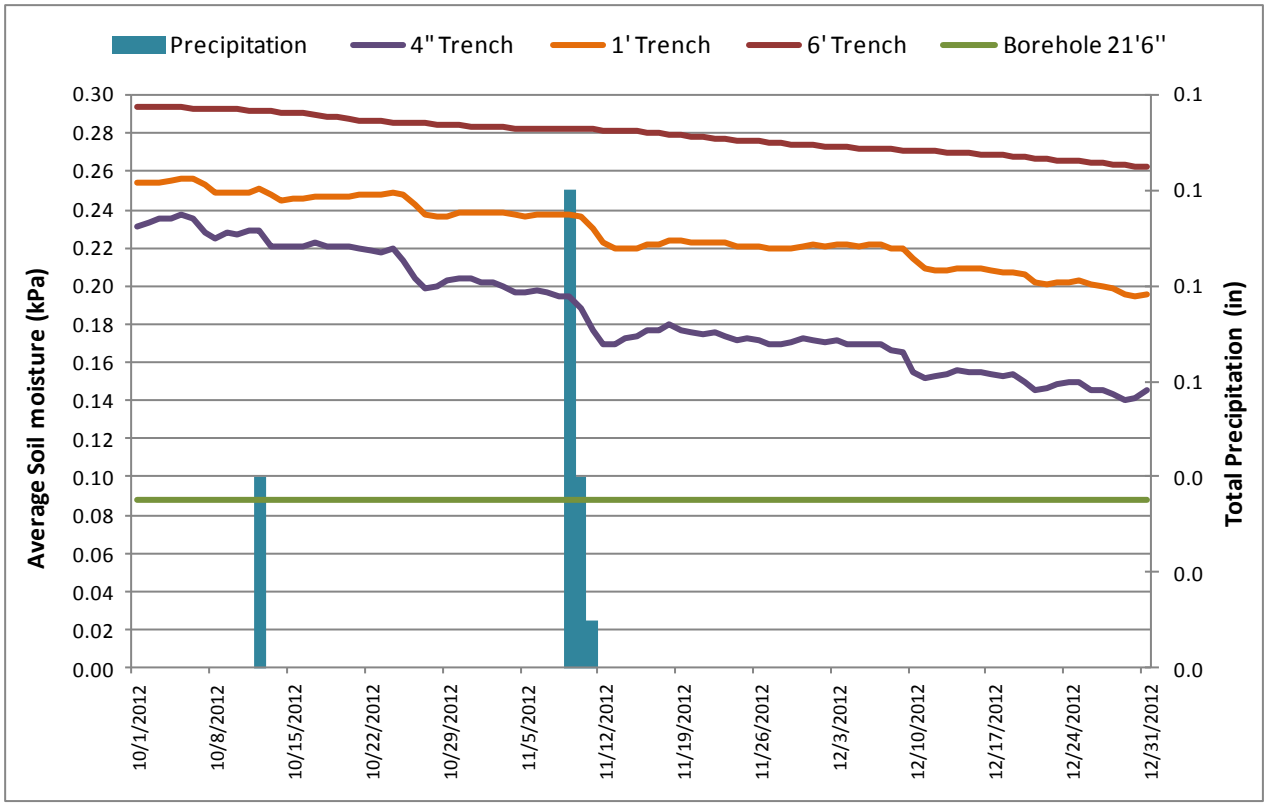


**Figure 2. Tree site soil moisture levels (kPa) at four depths and daily precipitation amount (inches), October–December 31, 2012.**

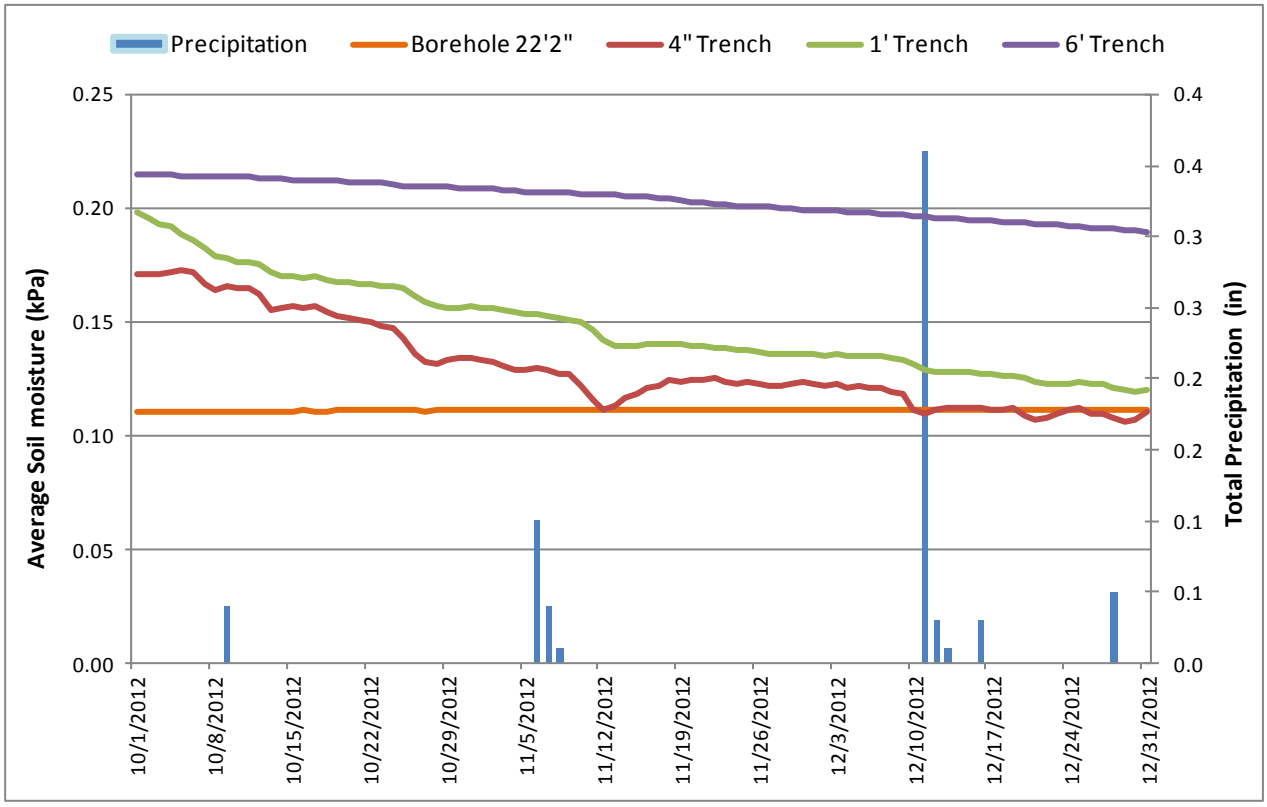


**Figure 3. Meadow site soil moisture levels (kPa) at four depths and daily precipitation amount (inches), October–December 2012.**

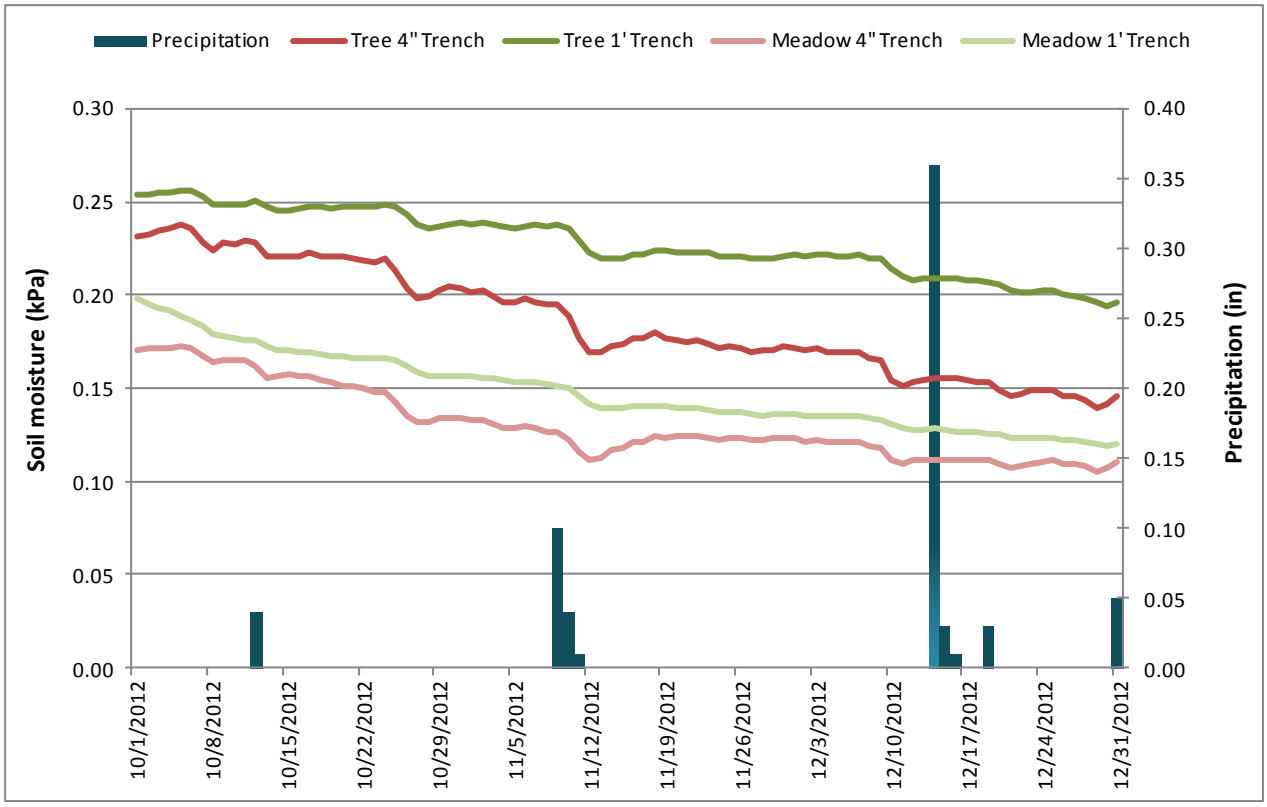


**Figure 4. Comparison of Tree and Meadow soil moisture levels at the 4-inch and 1-foot depths, along with precipitation, October–December 2012.**

## Temperature and Relative Humidity

Figures 5 and 6 summarize the daily minimum and maximum ambient temperatures occurring during Quarter 4. Figure 7 displays the average temperature plotted against the average relative humidity.

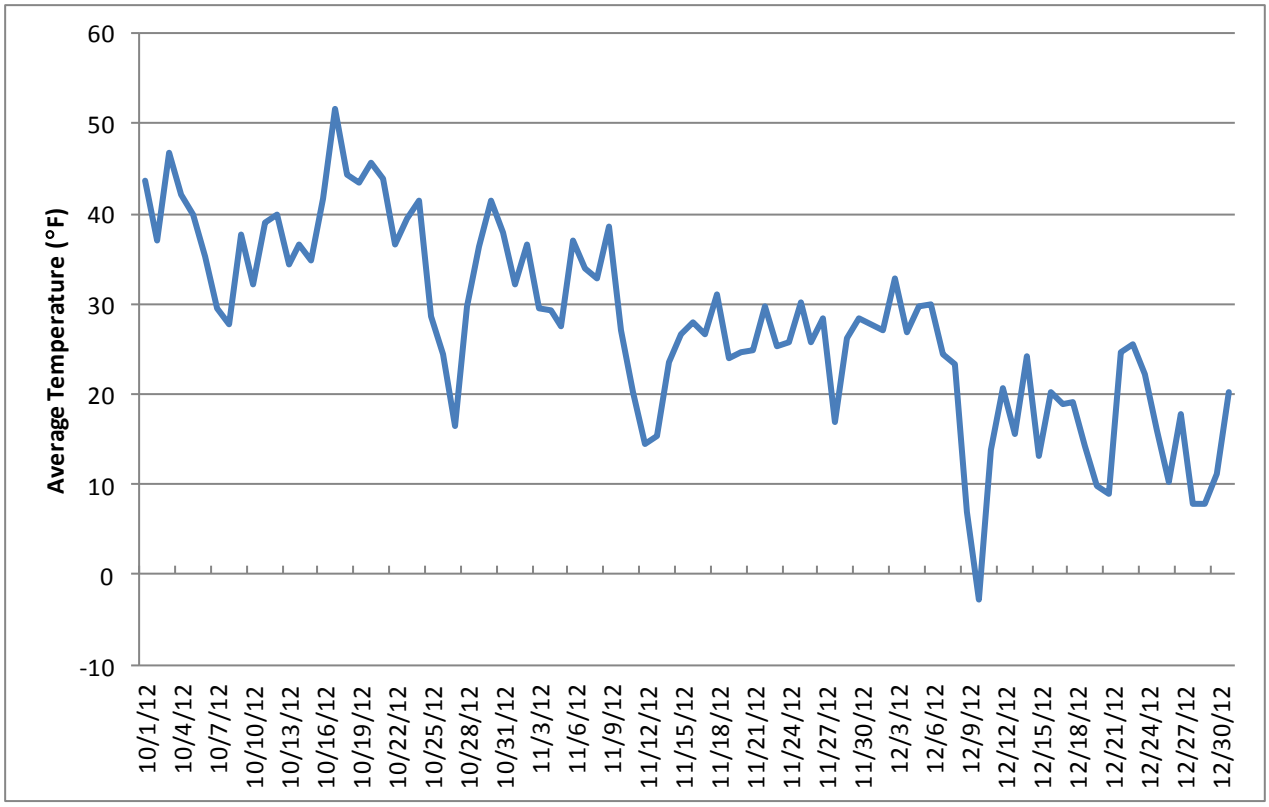


**Figure 5. Daily minimum ambient air temperature (degrees Fahrenheit), October–December 2012.**

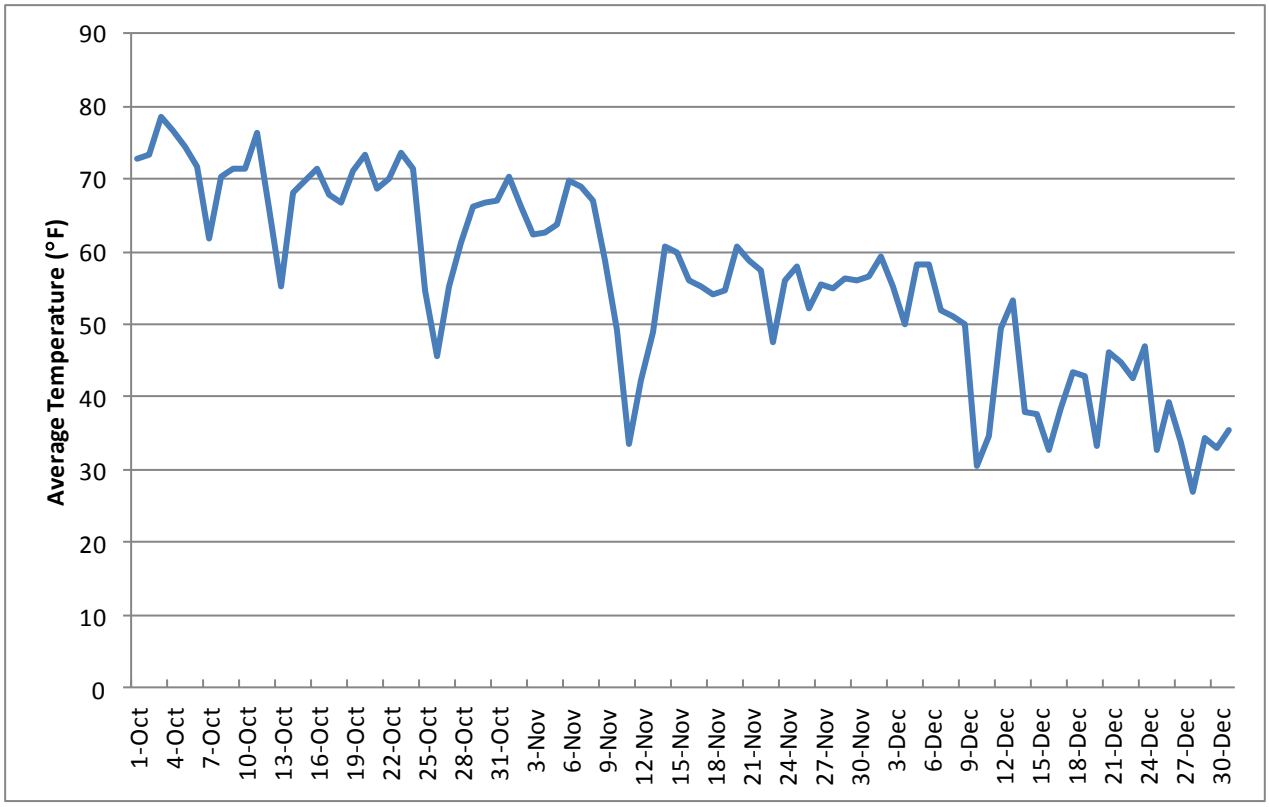


**Figure 6. Daily maximum ambient air temperature (degrees Fahrenheit), October–December 2012.**

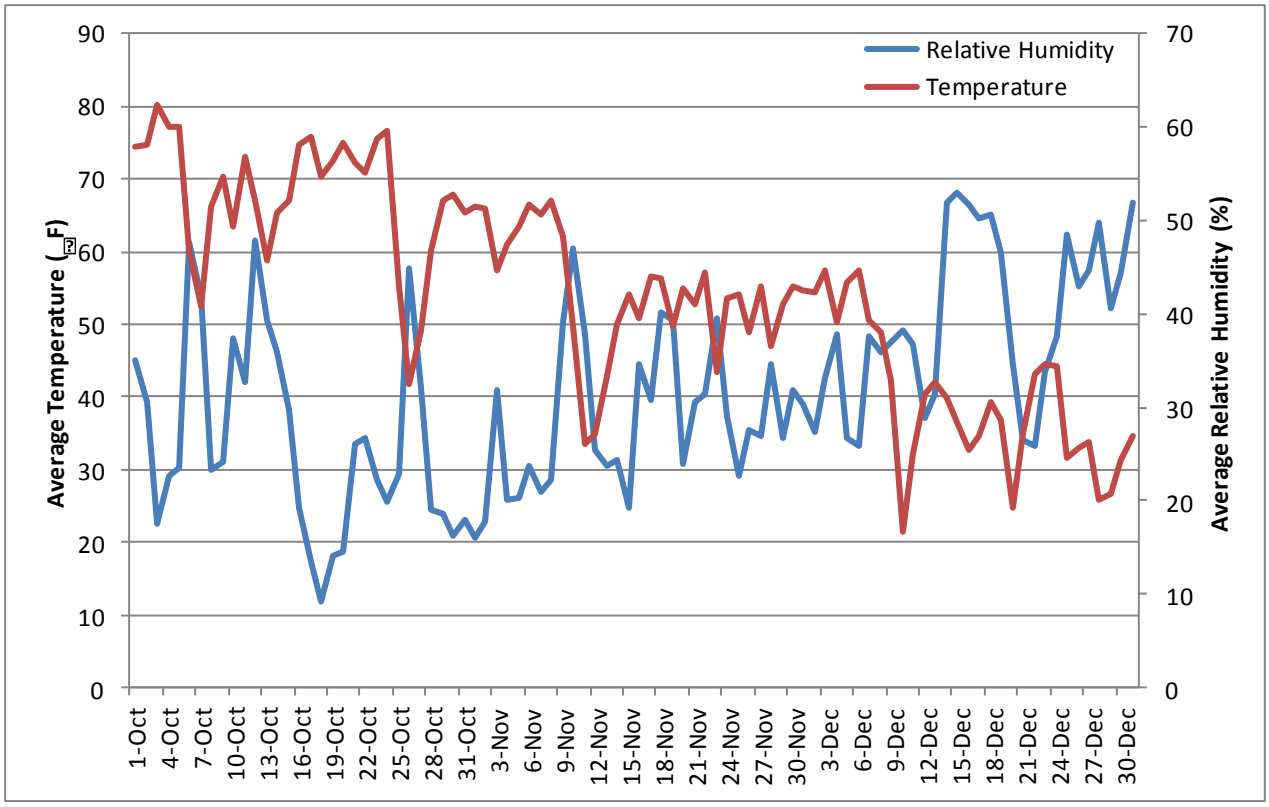


**Figure 7. Daily average ambient air temperature and relative humidity, October–December 2012.**

**Interpretation of Quarter 4 2012 Data**

The overlay of precipitation and soil moisture showed correlation between precipitation and soil moisture levels during the time period of October to December 2012. A response to the precipitation events can clearly be seen in the soil moistures at both the Tree and Meadow sites. Visually examining the graphs of soil moisture and precipitation at the Tree and Meadow sites show that the soil moisture response was more pronounced at the 4-inch and 1-foot trench levels at the Meadow location. This can possibly be attributed to the difference of the spatial variances between the sites. Not surprisingly, the closer to the surface and the more exposed to the elements, the faster the soil moisture values for the Meadow site respond to precipitation in comparison with the Tree site.

The atmospheric data collected at the SMWS can be used as a reference for particular storm events. It also can provide the ability to compare meteorological data from 2008, 2009, 2010, 2011, 2012, and future data. For example, this year it would be possible to compare 2007–2012 precipitation data and daily maximum temperatures to see how the inter-year variability looks. The SMWS will also provide an interesting comparison to the WatchDog Mini Weather Stations installed in and around the Estancia Basin and within the Trigo fire burn area perimeter.