TECHNICAL REPORT
UCED 2022/23-07

A COMPREHENSIVE ASSESSMENT OF IDENTIFIED NATURAL AND OTHER DISASTERS IN THE RUBY MOUNTAIN RANGE AND THE SPRING CREEK, NEVADA AREA

UNIVERSITY OF NEVADA, RENO

A COMPREHENSIVE ASSESSMENT OF IDENTIFIED NATURAL AND OTHER DISASTERS IN THE RUBY MOUNTAIN RANGE AND THE SPRING CREEK, NEVADA AREA

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September 2022

This publication, *A Comprehensive Assessment of Identified Natural and Other Disasters in the Ruby Mountain Range and the Spring Creek, Nevada Area*, *was* published by the University Center for Economic Development in the College of Business at the University of Nevada, Reno. This publication's statements, findings, conclusions, recommendations, and/or data represent solely the findings and views of the authors and do not necessarily represent the views of the Spring Creek Association, the University of Nevada, Reno, or any reference sources used or quoted by this study. Reference to research projects, programs, books, magazines, or newspaper articles does not imply an endorsement or recommendation by the authors unless otherwise stated. Correspondence regarding this document should be sent to:

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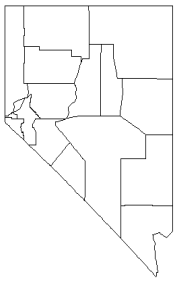

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 Introduction and Overview

Overview

In late 2021, the Spring Creek Association contracted with the University Center for Economic Development, part of the College of Business at the University of Nevada, Reno, to develop a new five-year organizational plan for the Spring Creek Association. The Spring Creek Association is a private, property owners associated with 5,420 total lots that provide rural Nevada residential living opportunity in the northeastern part of the state of Nevada in Elko County. The community of Spring Creek, Nevada, of which the Spring Creek Association is primarily responsible for managing, is located approximately adjacent and southeast of the City of Elko, Nevada.

As part of the development of a new five-year organizational strategic plan, faculty from the University Center for Economic Development developed and conducted a comprehensive community needs assessment survey that was started on February 4, 2022 and was closed on March 4, 2022 and 736 total completed surveys were collected online. University Center for Economic Development faculty also conducted five separate in-person stakeholder community meetings between March 24, 2022 and March 26, 2022 in Spring Creek, Nevada and two additional virtual stakeholder community meetings in April 2022. Respondents of the community needs assessment survey and participants of each of the in-person and virtual stakeholder community meetings expressed their concern about the threat that various natural disasters in and around the community of Spring Creek pose to community residents and private property. This University Center for Economic Development technical report presents a comprehensive assessment of identified natural and other disasters in the Ruby Mountain range and the Spring Creek area in order to shape further development and implementation of the Spring Creek Association's new five-year organizational strategic plan for 2022 through 2027.

Section 2.0 of this University Center for Economic Development technical presents a comprehensive assessment of the frequency and severity of fire and the potential threat that it poses to the community of Spring Creek and surrounding areas. The analysis presented in Section 2.0 is divided among six geographic areas including the City of Elko, the community of Spring Creek (Spring Creek HOA), the City of Carlin, the South Fork Band of the Te-Moak Tribe of Western Shoshone (South Fork Native American Reservation), the Ruby Mountain range (Ruby Mountains), and the Lamoille Canyon area (Lamoille Canyon). Section 3.0 presents a comprehensive assessment of the frequency and severity of other disasters, including the threat posed by earthquakes and other seismic events, floods, and droughts.

Based upon the analysis presented in this University Center for Economic Development technical report, the threat that fire poses for the community of Spring Creek and other

surrounding geographic areas has increasingly become the most frequent type of natural disaster in the Spring Creek area and the frequency of significant fire disasters has increased exponentially as a result of increased and prolonged drought and other unfavorable natures in environmental conditions. The Ruby Mountains, and especially the Lamoille Canyon area, are projected to burn at an increasing and more severe rate into the future. While earthquakes and other seismic events, floods, and even drought remain less of an immediate threat to the community of Spring Creek and to other communities in the area, each of these natural and even manmade disasters pose an increasing threat to the public health and safety and to private property. The analysis of area and drought conditions further suggests a greater risk for agricultural drought, hydrologic drought, and increased fire-weather risk.

2.0 Overview of Fire Risk in Elko County, Nevada

This section presents a comprehensive summary of factors affecting fire behavior in the City of Elko, Spring Creek, City of Carlin, South Fork Reservation, Lamoille, and Ruby Mountain areas within Elko County, Nevada. Whenever possible, each of the area's fuel moisture, burning index, precipitation levels, wind speeds, and humidity will be accounted for with description, mapping, graphical displays, and data tables.

Specifically, in the homeowner's association, Spring Creek, there are relatively flat terrains with winds coming from the south and southeast, afternoon thunderstorms and dry lightning strikes, moderate to high fuel density averaging three to fifteen tons per acre, and widespread hazardous fuels. Spring Creek is a region of Elko County with several green belts and equestrian trails with high moisture content, contributing to high fuel densities.

2.1 Fuel Moisture

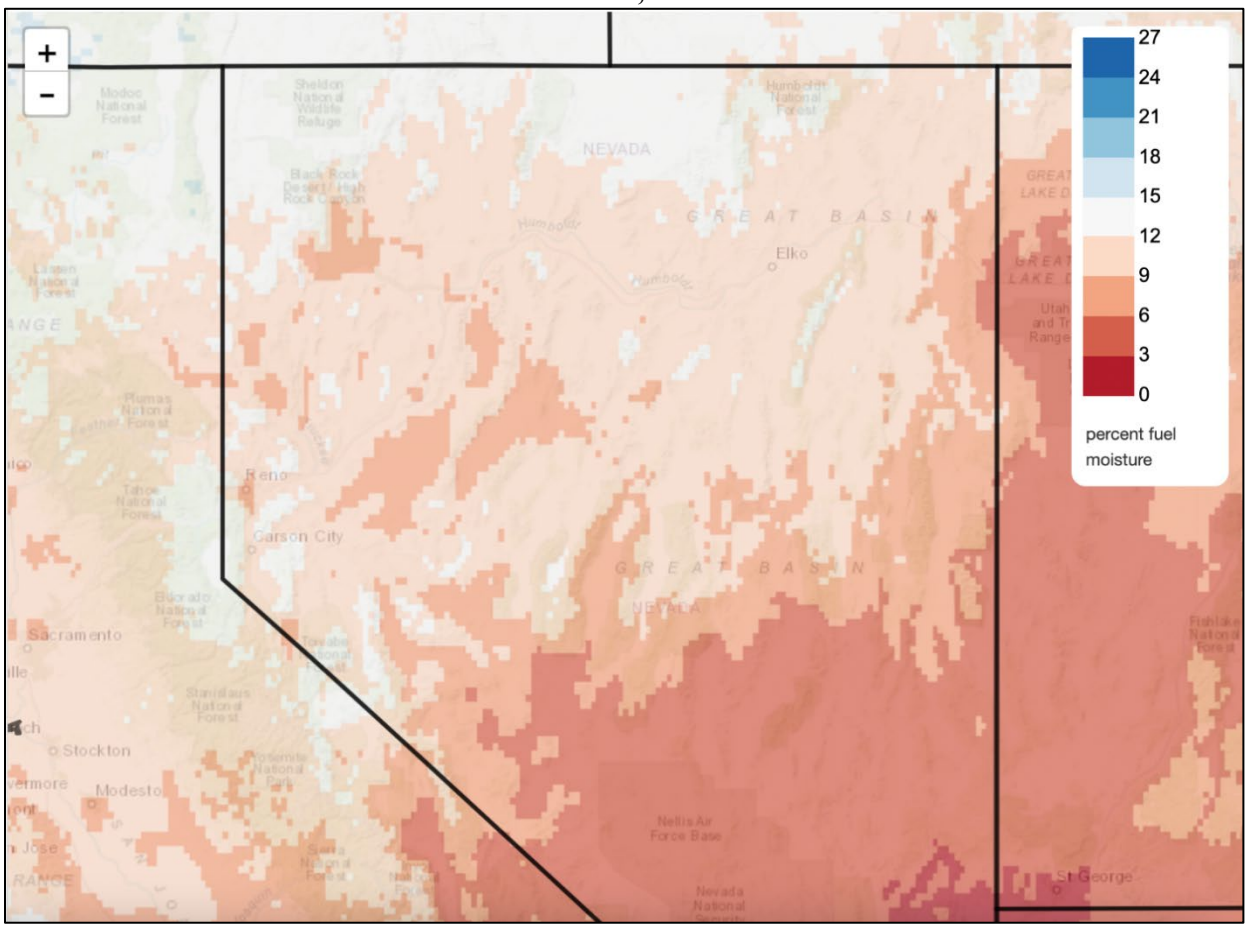
The estimated moisture content of dead fuels, measured as the100-Hour Fuel Moisture level, indicates the moisture content of dead fuels, i.e. dead roundwood, fallen dead leaves and needles, dry brush, litter on the forest floor, etc., within the one-to-three-inch diameter class. This measure may also serve as a rough estimate of the average moisture content of the forest floor from three quarters of an inch to four inches below the surface. Spring Creek and surrounding areas are home to several dry fuels including sagebrush, rabbitbrush, broom snakeweed, juniper trees, bluegrass, squirreltail, basin wildrye, and cheatgrass, depending on precipitation levels throughout the seasons. Generally, fuels with higher moisture contents will reduce the amount of area a fire may cover. Determining the fuel moisture content across an area of land it important to understand if certain vegetation will burn, the rate at which that plant life will burn, and the phase of combustion a fire may reach. Fire danger will show to increase dramatically during the summer months in Elko County based on hazardous 100-hour fuel moisture levels. These projected fuel moisture levels for the summer months will be compared to 100-hour fuel moisture levels in the past, between 1979 and 2015. Projected fuel moisture levels for summer months will also be compared to annual projected 100-hour fuel moisture levels.

2.1.a Mapping Elko Country's Fuel Moisture

Figure 2.1 presents annual past fire danger mapped in Elko County based on average annual 100-hour fuel moisture levels compared to a current date, June 20, 2022. A 0.0 percent fuel moisture level indicates a high burn rate, while a 27.0 percent or greater fuel moisture indicates a low burn rate. Figure 2.1 is a map of past annual 100-hour fuel moisture levels within Elko County. The City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American

Reservation, the Ruby Mountains, and Lamoille Canyon are included in this map. These areas fall between the 9.0 percent to 15.0 percent fuel moisture range.

Figure 2.1 – Annual 100-Hour Fuel Moisture Levels for the State of Nevada and for Elko County, Nevada
June 20, 2022



Historical and Future Climate Mapper- Climate ToolBox with gridMET data; Past/ Real-Time Observations; Fire Danger (Contiguous US); 100 Hour Fuel Moisture Percentile

Between 1979 and 2015, the average 100-hour fuel moisture level for Elko County was 10.4 percent, a moderate to low fuel moisture for the area, indicating moderate burn rates for Elko County as a whole. Within Elko County, the City of Elko had a 9.4 percent 100-hour fuel moisture level, 1.0 percent lower than the total average for Elko County. The Spring Creek HOA had a 10.0 percent 100-hour fuel moisture level, 0.4 percent lower than the total average for Elko County. The City of Carlin had a 9.8 percent 100-hour fuel moisture level, 0.6 percent lower than the total average for Elko County. The South Fork Native American Reservation had a 10.6 percent 100-hour fuel moisture level, 0.2 percent higher than the total average for Elko County. The Ruby Mountains had an 11.8 percent 100-hour fuel moisture level, 1.4 percent higher than the total average for Elko County. Lamoille Canyon had a 10.6 percent 100-hour fuel moisture level, 0.2 percent higher than the total average for Elko County. The City of Elko,

the Spring Creek HOA, and the City of Carlin have shown higher burn rates in the past because of lower 100-hour fuel moisture levels, compared to the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon areas each had lower burn rates in the past based on higher 100-hour fuel moisture levels.

The 100-hour fuel moisture data presented in Table 2.1 has been calculated for all days of the year between the years 1979 and 2015. Table 2.1 shows past percentage fuel moisture for Elko County, the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon.

Table 2.1 – Past (1979 to 2015) Fire Danger Based on 100-Hour Fuel Moisture Compared to Current Date (June 20, 2022)
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)

Area	Fuel Moisture
Elko County (Average)	10.4%
Elko	9.4%
Spring Creek	10.0%
Carlin	9.8%
South Fork Reservation	10.6%
Ruby Mountains	11.8%
Lamoille Canyon	10.6%

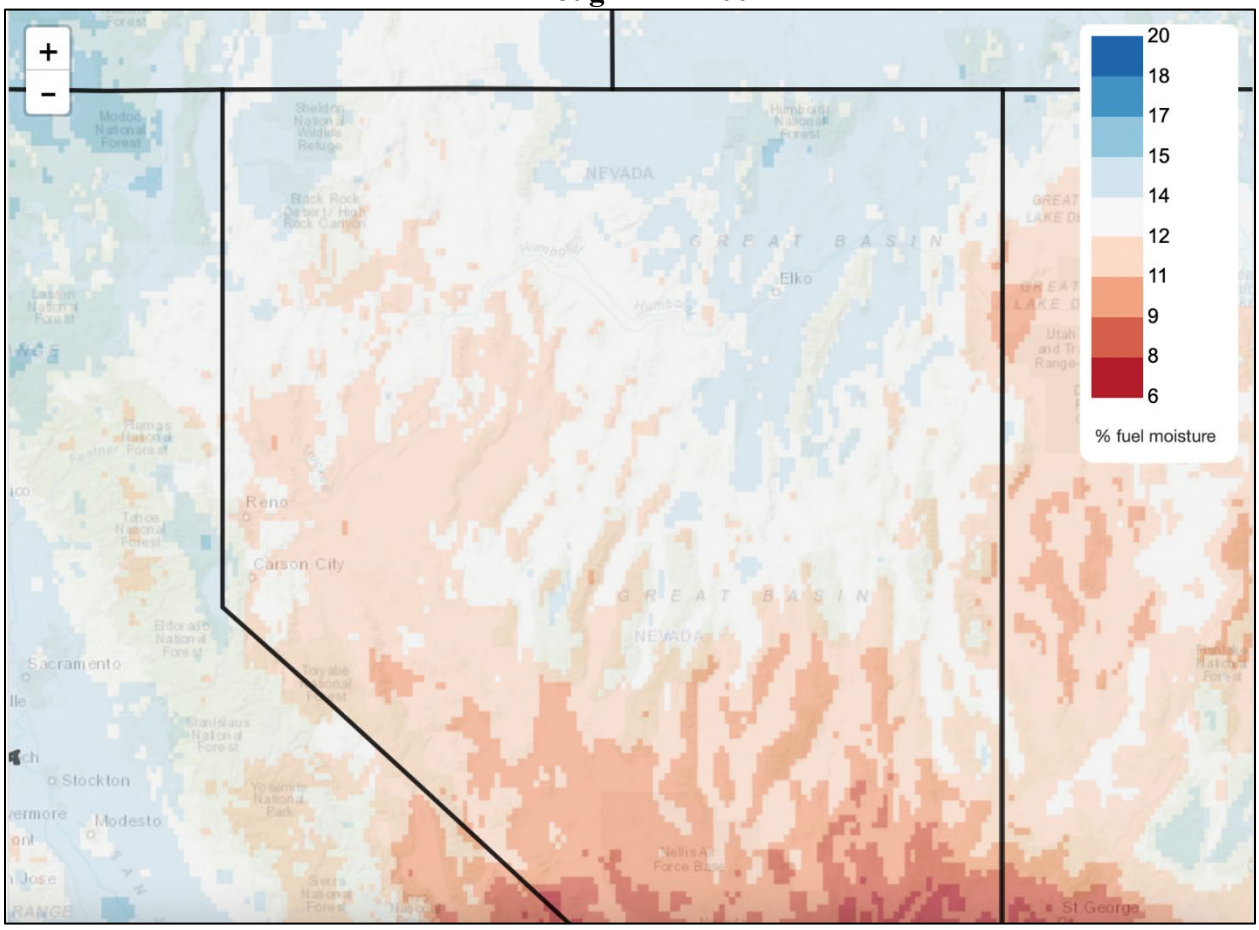
Historical and Future Climate Mapper- Climate ToolBox with gridMET data; Past/ Real-Time Observations; Fire Danger (Contiguous US); 100 Hour Fuel Moisture Percentile

Figure 2.2 presents annual projected fire danger through 2100, mapped in Elko County based on average annual 100-hour fuel moisture data from 1971 to 2000. A 6.0 percent fuel moisture indicates a high burn rate, while a 20.0 percent or greater fuel moisture indicates a low burn rate. Figure 2.2 presents a map of projected annual 100-hour fuel moisture levels within Elko County. The city of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon may be observed. These areas fall between the 12.0 percent to 15.0 percent fuel moisture range.

Projected annual fire danger through 2100 based on the average 100-hour fuel moisture level for Elko County is 14.6 percent, a moderate to high fuel moisture for the area, indicating lower burn rates for Elko County compared to past fire danger data. The city of Elko is projected to have a 13.7 percent 100-hour fuel moisture level, 0.9 percent lower than the total average for Elko County. The Spring Creek HOA is projected to have a 14.5 percent 100-hour fuel moisture level, 0.1 percent lower than the total average for Elko County. The City of Carlin is projected to have a 14.0 percent 100-hour fuel moisture level, 0.6 percent lower than the total average for Elko County. The South Fork Native American Reservation is projected to have a 14.4 percent 100-hour fuel moisture level, 0.2 percent lower than the total average for Elko County. The Ruby Mountains are projected to have a 13.6 percent 100-hour fuel moisture level, 1.0 percent lower than the total average for Elko County. Lamoille Canyon is projected to have a 13.4 percent 100-hour fuel moisture level, 1.2 percent lower than the total average for Elko County.

The City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon areas are projected to have higher burn rates compared to all of Elko County as each area predicts a lower 100-hour fuel moisture level.

Figure 2.2 – Projected Annual Fire Danger for the State of Nevada and for Elko County, Nevada
Through Till 2100



Historical and Future Climate Mapper – Climate Toolbox with gridMET data; Future Projections Through 2100; Fire Danger (Contiguous US); 100 Hour Fuel Moisture; Annual; Historical Simulation, 1971- 2000 Mean; Multi-Model Mean Derived from Eighteen Downscaled CMIP5 Models

The projected 100- hour fuel moisture data presented in Table 2.2 has been calculated using the mean from each year between the years 1971 and 2000. The table shows future percentage fuel moisture for Elko County, the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Reservation, the Ruby Mountains, and Lamoille Canyon.

Compared to burn rates based on past annual 100-hour fuel moisture levels in Figure 2.1, projected annual burn rates show to be lower, on average, in Elko County because projected annual 100-hour fuel moisture levels are predicted to be higher. The 100-hour fuel moisture

level is projected to be 4.2 percent higher in Elko County at 14.6 percent compared to the past 100-hour fuel moisture data at 10.4 percent. The 100-hour fuel moisture level is projected to be 4.3 percent higher for the City of Elko at 13.7 percent compared to the past 100-hour fuel moisture data 9.4 percent. The 100-hour fuel moisture level is projected to be 4.5 percent higher in the Spring Creek HOA at 14.5 percent compared to the past 100-hour fuel moisture data at 10.0 percent. The 100-hour fuel moisture level is projected to be 4.2 percent higher for the City of Carlin at 14.0 percent compared to the past 100-hour fuel moisture data at 9.8 percent. The 100-hour fuel moisture level is projected to be 3.8 percent higher for the South Fork Native American Reservation at 14.4 percent compared to the past 100-hour fuel moisture data at 10.6 percent.

Table 2.2 – Projected Annual Fire Danger to 2100 Based on Past Mean 100-Hour Fuel Moisture Data
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)

Area	Fuel Moisture
Elko County (Average)	14.6%
Elko	13.7%
Spring Creek	14.5%
Carlin	14.0%
South Fork Reservation	14.4%
Ruby Mountains	13.6%
Lamoille Canyon	13.4%

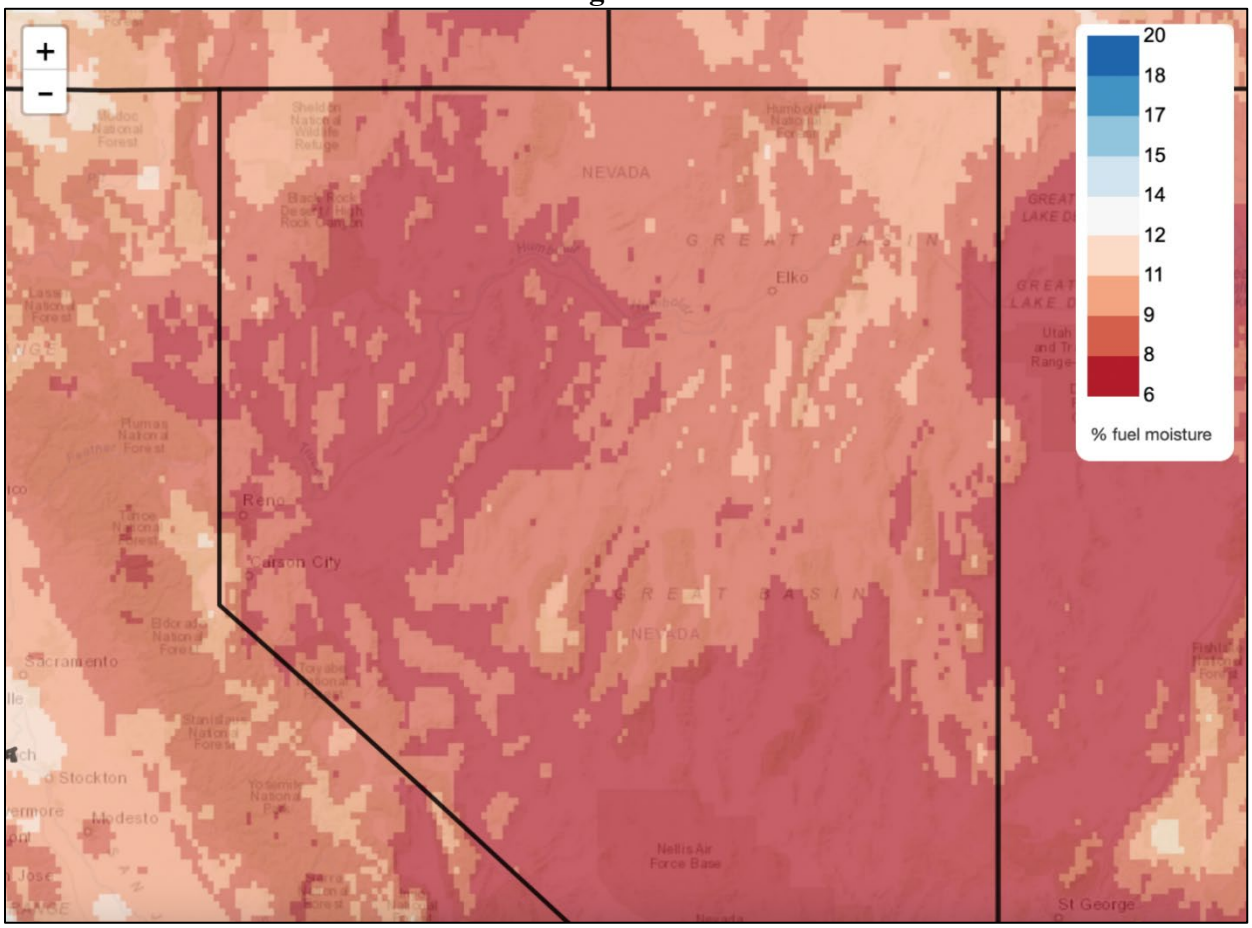
Historical and Future Climate Mapper- Climate Toolbox with gridMET data; Future Projections Through 2100; Fire Danger (Contiguous US); 100 Hour Fuel Moisture; Annual; Historical Simulation, 1971- 2000 Mean; Multi-Model Mean Derived from Eighteen Downscaled CMIP5 Models; CMIP5 is a model meant to provide a framework for coordinated climate change experiments for the next five years. Data will be used to provide projections of long-term future climate change (out to 2100 and beyond).

The 100-hour fuel moisture level is projected to be 1.8 percent higher in the Ruby Mountains at 13.6 percent compared to the past 100-hour fuel moisture data at 11.8 percent. The 100-hour fuel moisture level is projected to be 2.8 percent higher in Lamoille Canyon at 13.4 percent compared to the past 100-hour fuel moisture data 10.6 percent. Although 100-hour fuel moisture levels are projected to increase, the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon areas continue to show lower 100-hour fuel moisture levels compared to the average of Elko County. Lower projected 100-hour fuel moisture levels may indicate higher burn rates in these areas.

Figure 2.3 presents annual projected fire danger through 2100 during summer months (June, July, and August), mapped in Elko County based on average annual 100-hour fuel moisture levels. A 6.0 percent fuel moisture indicates a high burn rate, while a 20.0 percent or greater fuel moisture indicates a low burn rate. Figure 2.3 presents a map of projected annual 100-hour fuel moisture levels during the summer months within Elko County. The City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby

Mountains, and Lamoille Canyon are observed. These areas fall between the 12.0 percent to 15.0 percent fuel moisture range according to the key.

Figure 2.3 – Projected Annual Fire Danger for Summer Months for the State of Nevada and for Elko County, Nevada Through Till 2100



Historical and Future Climate Mapper- Climate Toolbox with gridMET data; Future Projections Through 2100; Fire Danger (Contiguous US); 100 Hour Fuel Moisture; Summer (Jun- July- Aug); Historical Simulation, 1971- 2000 Mean; Multi-Model Mean Derived from Eighteen Downscaled CMIP5 Models

Projected annual fire danger through till 2100 during summer months (June, July, August) based on the average 100-hour fuel moisture level for Elko County is 8.9 percent, a low fuel moisture for the area, indicating higher burn rates for Elko County compared to past fire danger data. The City of Elko is projected to have a 7.9 percent 100-hour fuel moisture level, 1.0 percent lower than the total average for Elko County. The Spring Creek HOA is projected to have an 8.8 percent 100-hour fuel moisture level, 0.1 percent lower than the total average for Elko County. The City of Carlin is projected to have an 8.4 percent 100-hour fuel moisture level, 0.5 percent lower than the total average for Elko County. The South Fork Native American Reservation is projected to have an 8.6 percent 100-hour fuel moisture level, 0.3 percent lower than the total

average for Elko County. The Ruby Mountains are projected to have a 9.7 percent 100-hour fuel moisture level, 0.8 percent higher than the total average for Elko County. Lamoille Canyon is projected to have an 8.7 percent 100-hour fuel moisture level, 0.2 percent lower than the total average for Elko County. The City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, and Lamoille Canyon areas are projected to have higher burn rates during the summer months compared to all of Elko County because each area predicts a lower 100-hour fuel moisture level.

The projected 100- hour fuel moisture data presented in Table 2.3 has been calculated using the mean from each year between 1971 and 2000. The table shows future percentage fuel moisture during summer months (June, July, August) for Elko County, the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon.

Table 2.3 – Projected Fire Danger Based on 100-Hour Fuel Moisture During Summer (June, July, August) Months
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)

Area	Fuel Moisture
Elko County (Average)	8.9%
Elko	7.9%
Spring Creek	8.8%
Carlin	8.4%
South Fork Reservation	8.6%
Ruby Mountains	9.7%
Lamoille Canyon	8.7%

Historical and Future Climate Mapper- Climate Toolbox with gridMET data; Future Projections Through 2100; Fire Danger (Contiguous US); 100 Hour Fuel Moisture; Summer (Jun- July- Aug); Historical Simulation, 1971- 2000 Mean; Multi-Model Mean Derived from Eighteen Downscaled CMIP5 Models

Fire danger increases significantly during the summer months of June, July, and August in Elko County. Projected annual 100-hour fuel moisture for Elko County is predicted to drop by 5.7 percent during summer months, from 14.6 percent annually to 8.9 percent periodically. Projected annual 100-hour fuel moisture for the city of Elko is predicted to drop by 5.8 percent during summer months, from 13.7 percent annually to 7.9 percent periodically. Projected annual 100-hour fuel moisture for the Spring Creek HOA is predicted to drop by 5.7 percent during summer months, from 14.5 percent annually to 8.8 percent periodically. Projected annual 100-hour fuel moisture for the City of Carlin is predicted to drop by 5.6 percent during summer months, from 14.0 percent annually to 8.4 percent periodically. Projected annual 100-hour fuel moisture for the South Fork Native American Reservation is predicted to drop by 5.8 percent during summer months, from 14.4 percent annually to 8.6 percent periodically. Projected annual 100-hour fuel moisture for the Ruby Mountains is predicted to drop by 3.9 percent during summer months, from 13.6 percent annually to 9.7 percent periodically. Projected annual 100-hour fuel moisture for Lamoille Canyon is predicted to drop by 4.7 percent during summer

months, from 13.4 percent annually to 8.7 percent periodically. Compared to the average burn rate for Elko County during summer months, the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, and Lamoille Canyon have lower rates of fuel moisture, indicating higher burn rates for these areas. The Ruby Mountains are the only area with higher fuel moisture levels, indicating potentially lower burn rates.

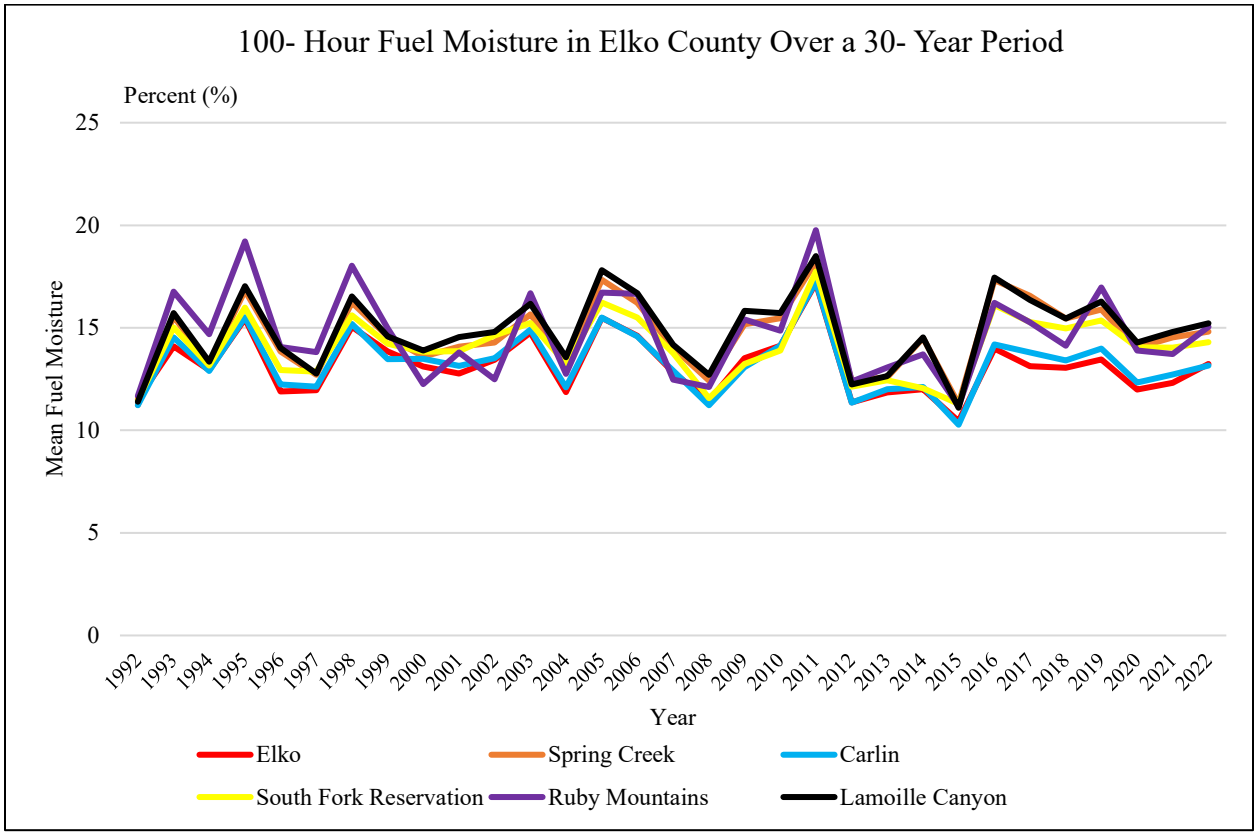
Between 1979 and 2000, annual 100-hour fuel moisture levels had shown moderate fire danger with 100-hour fuel moisture levels ranging between 9.4 percent and 11.8 percent in the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon, with 10.4 percent being the average for Elko County. Projected 100-hour fuel moisture through to 2100 was compared to the past rates. Lower fire danger was shown for 100-hour fuel moisture projections, with levels ranging between 13.6 percent and 14.5 percent for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon, with 14.6 percent being the average for Elko County. Subsequently, future projections of 100-hour fuel moisture levels through to 2100 in the summer months of June, July, and August were compared to the annual projected 100-hour fuel moisture rates. Hazardous fire danger was shown for 100-hour fuel moisture projections during summer months, with levels ranging between 7.9 percent and 9.7 percent for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon, with 8.9 percent being the average for Elko County.

2.1.b Graphing Elko County's Fuel Moisture Levels

Figure 2.4 graphically displays the high and low points for annual mean 100-hour fuel moisture in Elko County over the past 30 years. The City of Elko is highlighted in red, the Spring Creek HOA is highlighted in orange, the City of Carlin is highlighted in blue, the South Fork Native American Reservation is highlighted in yellow, the Ruby Mountains is highlighted in purple, and Lamoille Canyon is highlighted in green. The 100-hour fuel moisture rates for each of these areas show to fall between a 10.0 percent to 20.0 percent range. Table 2.4 presents the raw 100-hour fuel moisture data shown in Figure 2.4 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for Lamoille Canyon for 1992 through to 2022.

For the areas in Elko County, 2015 was the driest recorded year. In 2015, the City of Elko had a 10.45 percent 100-hour fuel moisture level, the Spring Creek HOA had an 11.29 percent fuel moisture level, and the City of Carlin had a 10.27 percent fuel moisture level. The South Fork Native American Indian Reservation had an 11.29 percent 100-hour fuel moisture level, the Ruby Mountains had an 11.18 percent 100-hour fuel moisture level, and Lamoille Canyon had an 11.10 percent 100-hour fuel moisture. Low annual mean 100-hour fuel moisture in Elko County will show to have higher burn rates and higher difficulty containing fire danger for 2015. Comparatively, 2011 was the wettest year for the areas in Elko County. In 2011, the City of Elko had a 17.18 percent 100-hour fuel moisture level, the Spring Creek HOA had an 18.22 percent fuel moisture level, and the City of Carlin had a 17.24 percent fuel moisture level.

Figure 2.4 – 100-Hour Fuel Moisture Levels in Elko County
30 Year Period



The South Fork Native American Indian Reservation had a 17.75 percent 100-hour fuel moisture level, the Ruby Mountains had a 19.76 percent 100-hour fuel moisture level, and Lamoille Canyon had an 18.45 percent 100-hour fuel moisture level. High annual mean 100-hour fuel moisture levels in Elko County will tend to have lower burn rates and less difficulty containing fire danger for 2011.

Table 2.4 – Raw Data for 100-Hour Fuel Moisture in Percent
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)
1992 through 2022

Year	City of Elko	Spring Creek	City of Carlin	South Fork Reservation	Ruby Mountains	Lamoille Canyon
1992	11.5144	11.2376	11.2236	11.4764	11.6731	11.3912
1993	14.0957	15.5414	14.5351	15.0221	16.7595	15.7250
1994	12.9433	13.2440	12.8935	13.1649	14.6872	13.3504
1995	15.4372	16.8150	15.5204	15.9894	19.2147	17.0355
1996	11.9031	13.8473	12.2315	12.9406	14.0653	14.0249
1997	11.9535	12.7032	12.1372	12.8591	13.8206	12.7648

Table 2.4 Cont'd – Raw Data for 100-Hour Fuel Moisture in Percent Elko County (Elko, Spring Creek, Carlin, South Fork Reserve, Ruby Mountains, Lamoille Canyon) 1992 through 2022						
Year	**City of Elko**	**Spring Creek**	**City of Carlin**	**South Fork Reservation**	**Ruby Mountains**	**Lamoille Canyon**
1998	15.0500	16.2281	15.1840	15.6138	18.0279	16.5343
1999	13.8472	14.5752	13.4714	14.2248	14.9674	14.5859
2000	13.1075	13.6037	13.4878	13.8238	12.2481	13.8943
2001	12.7749	14.0813	13.1365	13.8537	13.8032	14.5471
2002	13.4471	14.2889	13.5143	14.6205	12.4948	14.8027
2003	14.7678	15.6483	14.9123	15.2263	16.6862	16.1765
2004	11.8675	13.3815	12.0918	13.2593	12.7524	13.5714
2005	15.4799	17.3444	15.4942	16.2377	16.7227	17.8144
2006	14.6102	16.2102	14.5715	15.5018	16.6544	16.6859
2007	12.8244	14.0320	12.9150	13.7628	12.4734	14.1768
2008	11.4484	12.4202	11.2280	11.5683	12.1109	12.7026
2009	13.5144	15.1767	13.0770	13.2382	15.4116	15.8312
2010	14.1259	15.4716	14.1324	13.8920	14.8630	15.7224
2011	17.1836	18.2213	17.2430	17.7445	19.7593	18.4958
2012	11.3713	12.4326	11.3542	12.1231	12.3816	12.2315
2013	11.8430	12.5796	12.0096	12.4459	13.0601	12.6473
2014	12.0051	14.5056	12.1213	12.0571	13.7037	14.5263
2015	10.4452	11.2930	10.2742	11.2920	11.1758	11.1002
2016	13.9863	17.3202	14.1932	16.1114	16.2192	17.4446
2017	13.1317	16.5550	13.7967	15.2883	15.2650	16.3650
2018	13.0533	15.4517	13.4100	14.9667	14.1217	15.4583
2019	13.4617	15.8850	13.9800	15.3650	16.9633	16.2817
2020	11.9883	14.0333	12.3300	14.0433	13.8933	14.2883
2021	12.3183	14.5300	12.7267	14.0350	13.7233	14.8050

Climate Engine: Climate and Hydrology; Dataset- gridMET Daily (Shaded Yellow = High Point, Shaded Blue = Low Point)

2.1.c 100-Hour Fuel Moisture Level for 1992 through 2022 for Each Area

Figure 2.5 through Figure 2.10 presents the annual mean 100-Hour Fuel Moisture level for the past 30 years, between 1992 and 2022, for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area.

The highest annual mean 100-hour fuel moisture level for the City of Elko was in 2011 at 17.18 percent and the lowest annual mean 100-hour fuel moisture level for the City of Elko was in 2015 at 10.45 percent. The highest annual mean 100-hour fuel moisture for the Spring Creek

Figure 2.5 – Annual Mean 100-Hour Fuel Moisture Levels for the City of Elko 1992 through 2022

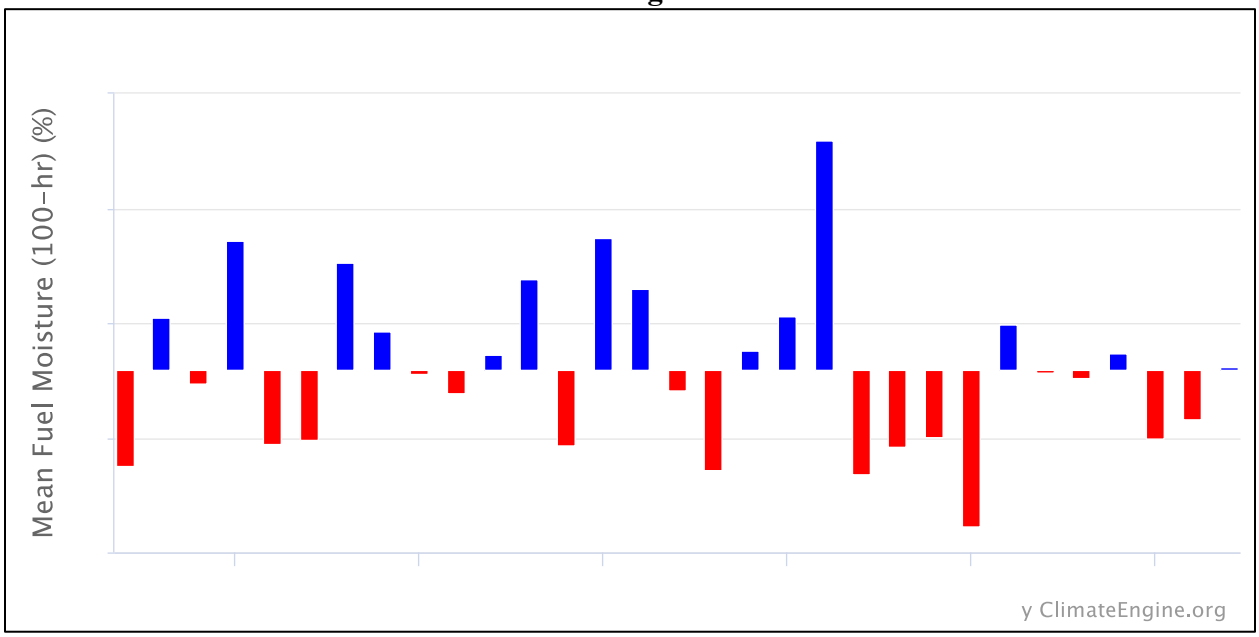


Figure 2.6 – Annual Mean 100-Hour Fuel Moisture Levels for the Spring Creek HOA 1992 through 2022

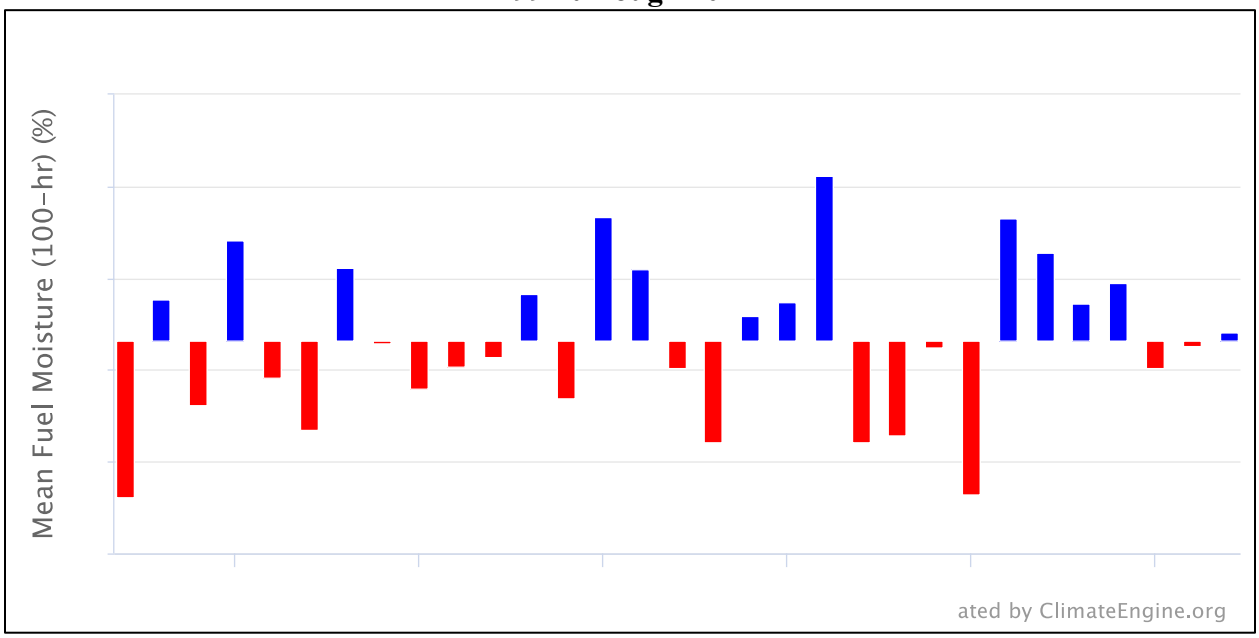


Figure 2.7 – Annual Mean 100-Hour Fuel Moisture Levels for the City of Carlin 1992 through 2022

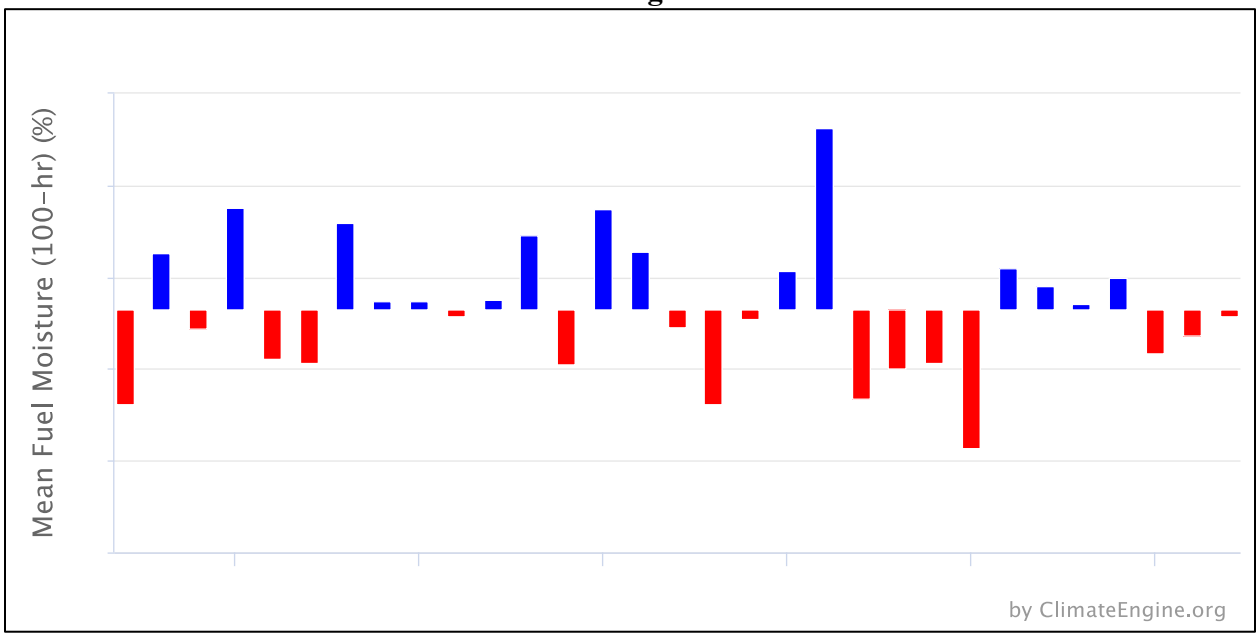


Figure 2.8 – Annual Mean 100-Hour Fuel Moisture Levels for the South Fork Native American Reservation 1992 through 2022

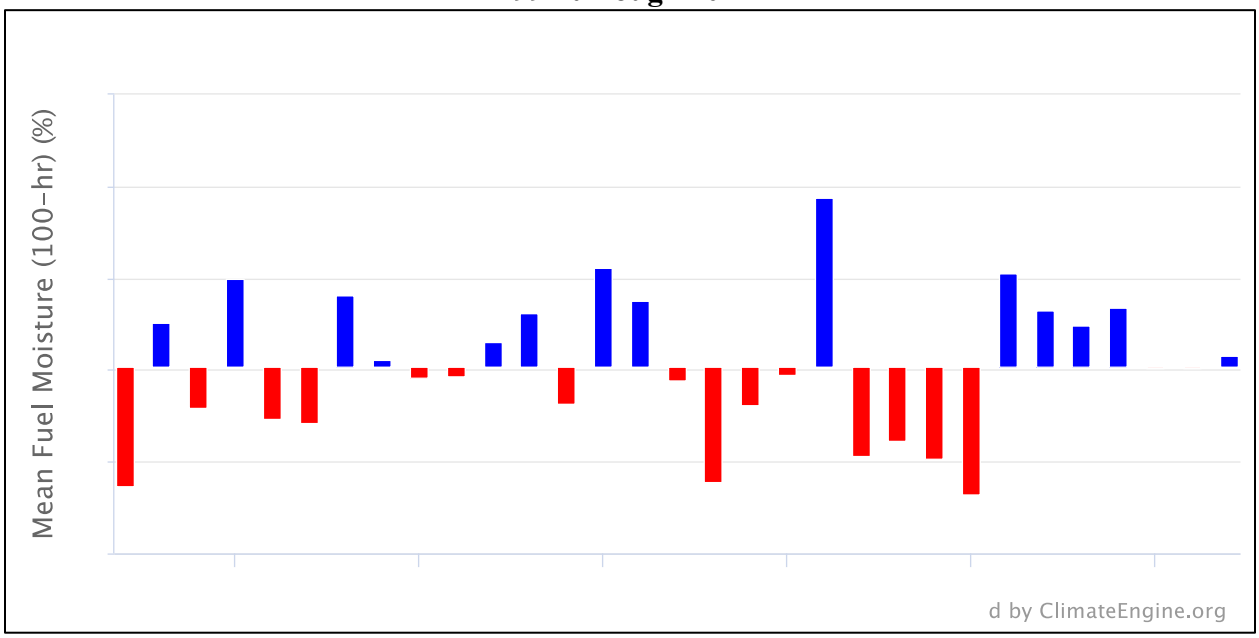


Figure 2.9 – Annual Mean 100-Hour Fuel Moisture Levels for the Ruby Mountains 1992 through 2022

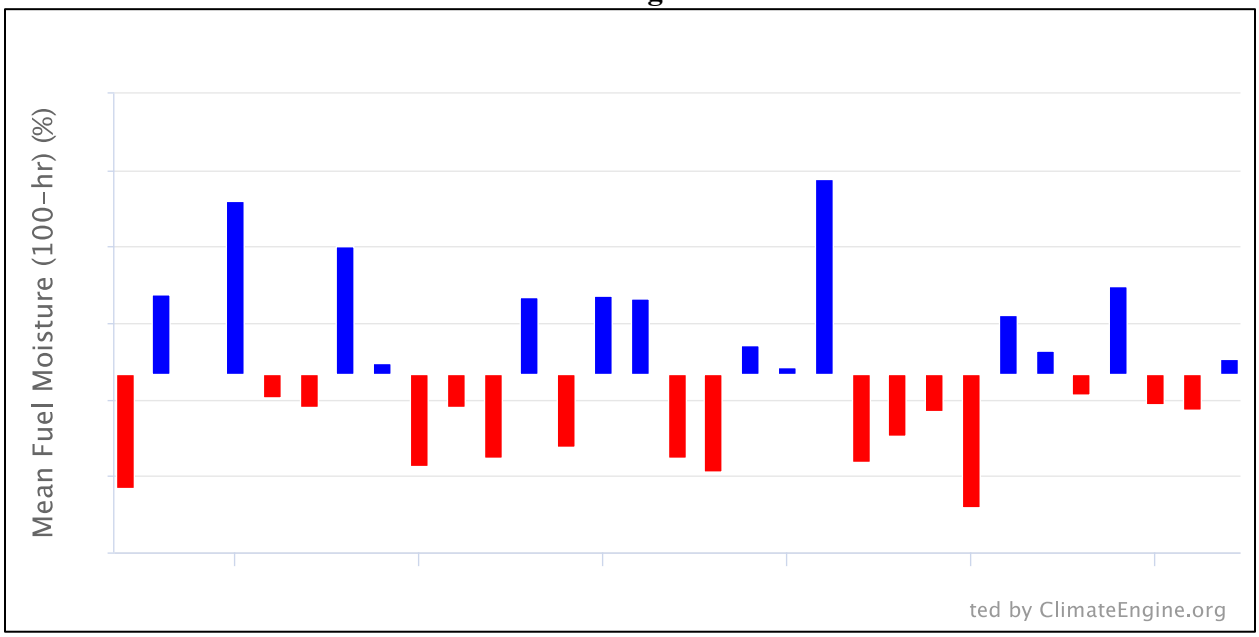
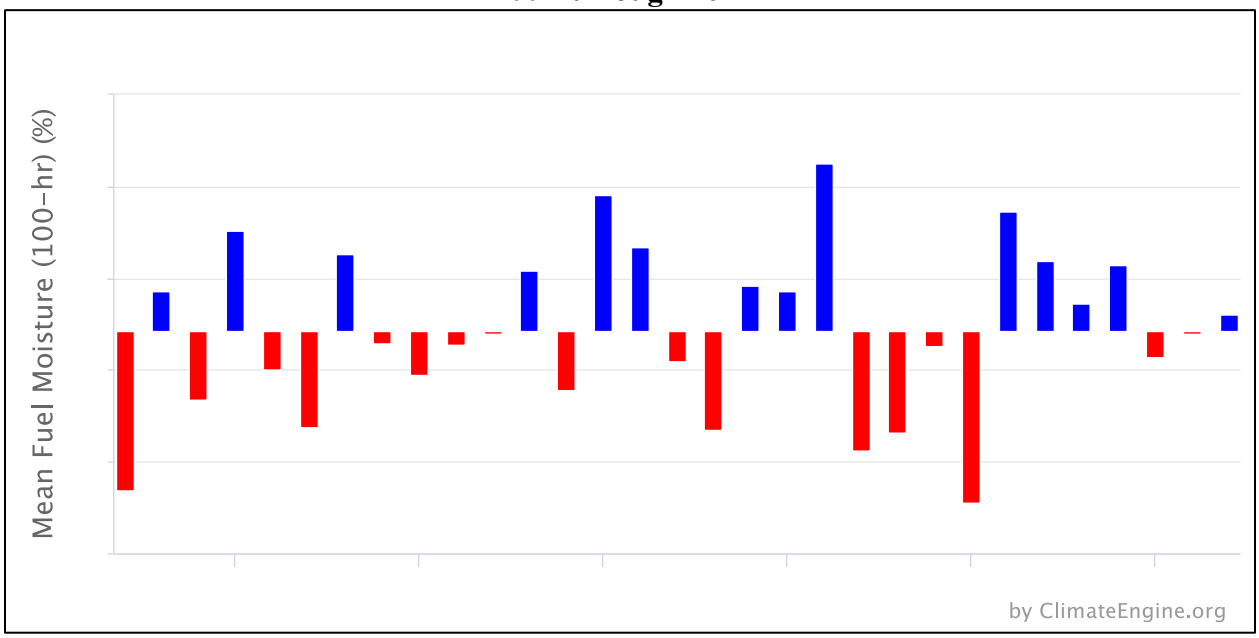


Figure 2.10 – Annual Mean 100-Hour Fuel Moisture Levels for the Lamoille Canyon Area 1992 through 2022



HOA was in 2011 at 18.22 percent and the lowest annual mean 100-hour fuel moisture level for the Spring Creek HOA was in 1992 at 11.23 percent. The highest annual mean 100-hour fuel moisture level for the City of Carlin was in 2011 at 17.24 percent and the lowest annual mean 100-hour fuel moisture level for the City of Carlin was in 2015 at 10.27 percent. The highest annual mean 100-hour fuel moisture level for the South Fork Native American Reservation was in 2011 at 17.75 percent and the lowest annual mean 100-hour fuel moisture level for the South Fork Native American Reservation was in 2015 at 11.29 percent. The highest annual mean 100-hour fuel moisture level for the Ruby Mountains was in 2011 at 19.76 percent and the lowest annual mean 100-hour fuel moisture level for the Ruby Mountains was in 2015 at 11.18 percent. The highest annual mean 100-hour fuel moisture level for Lamoille Canyon was in 2011 at 18.50 percent and the lowest annual mean 100-hour fuel moisture level for the Ruby Mountains was in 2015 at 11.10 percent.

Elko County had observed large swings in annual mean 100-hour fuel moisture levels over the past 30 years. Each area in Elko County had experienced their most dramatic drops in fuel moisture levels within a four-year range, apart from the Spring Creek HOA which experienced its most significant difference over the a 19 year period. Between 2011 and 2015, the City of Elko had exhibited a 6.73 percent drop in fuel moisture levels. Between 1992 and 2011, the Spring Creek HOA had exhibited a 6.99 percent drop in fuel moisture levels.

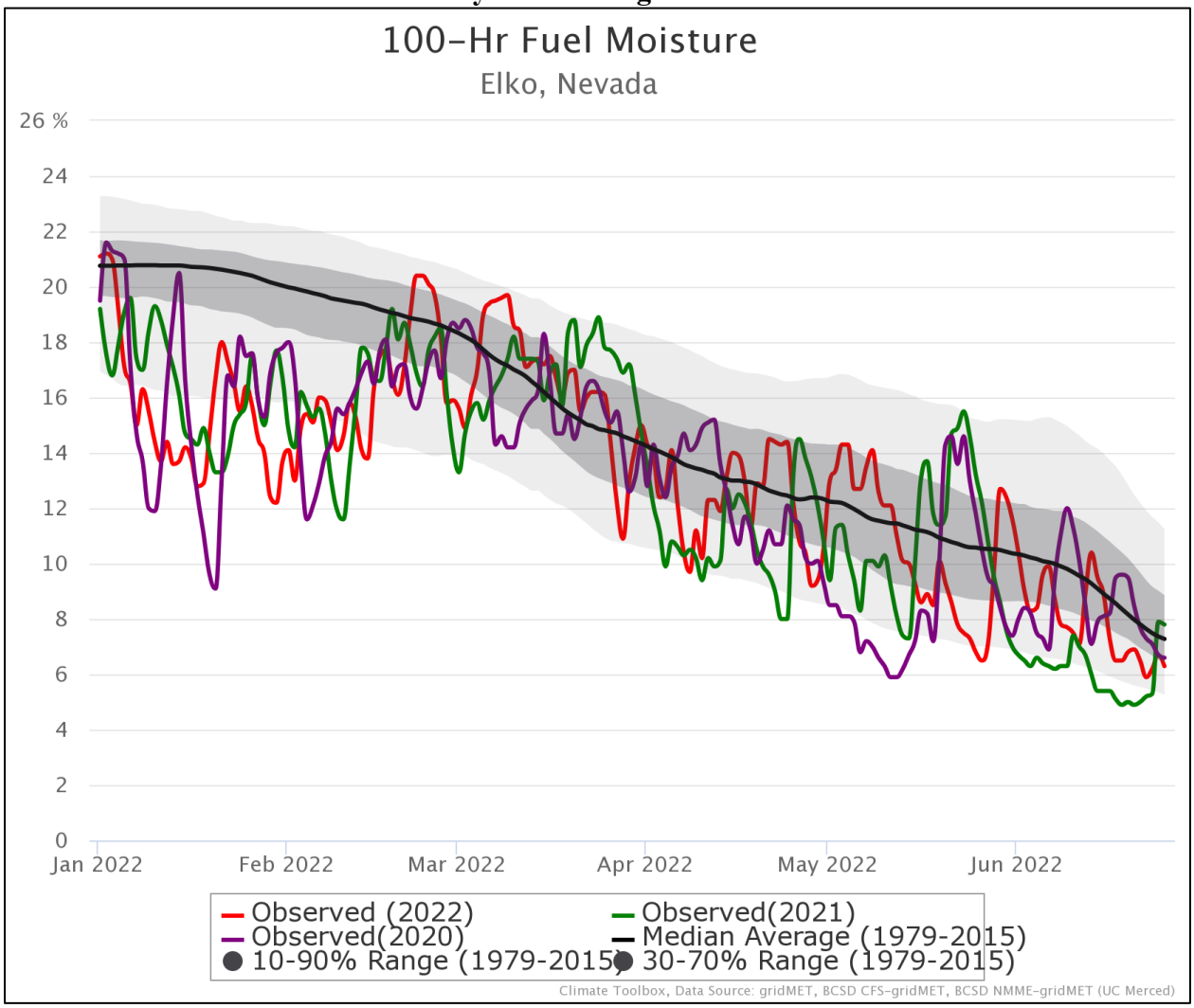
Comparatively, between 2011 and 2015, the Spring Creek HOA had exhibited a 6.93 percent drop in fuel moisture levels. Between 2011 and 2015, the City of Carlin exhibited a 6.97 percent drop in fuel moisture levels and the South Fork Native American Reservation exhibited a 6.46 percent drop in fuel moisture levels. Between 2011 and 2015, the Ruby Mountains had exhibited an 8.58 percent drop in fuel moisture and the Lamoille Canyon area exhibited a 7.40 percent drop in fuel moisture levels.

2.1.d 100-Hour Fuel Moisture Level over the Past Three Years for Each Area

Figure 2.11 presents the annual median 100-hour fuel moisture level for the first six months over the past three years compared to the median average 100-hour fuel moisture level for 2020, 2021, and 2022 for the City of Elko. The median average 100-hour fuel moisture rate is based on data collected between 1997 and 2015.

For the summer months for the City of Elko, the median average 100-hour fuel moisture level drops from 20.8 percent in January to 7.3 percent in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively drop from 19.5 percent, 19.2 percent, and 21.1 percent in January to 6.6 percent, 7.8 percent, and 6.2 percent in June. This dramatic change in fuel moisture levels correlates with increased burn rates. The observed 100-hour fuel moisture level for June 2020 is lower than the median average and the observed 100-hour fuel moisture level for June 2021 is higher than the median average. The observed 100-hour fuel moisture level for June 2022 is also lower than the median average.

Figure 2.11 – Annual Median 100-Hour Fuel Moisture Level for the City of Elko January 2022 through June 2022



Using the Historical Seasonal Progression tool from Climate ToolBox

Figure 2.12 presents the annual median 100-hour fuel moisture level for the first six months over the past three years compared against the median average 100-hour fuel moisture levels for 2020, 2021, and 2022 for the Spring Creek HOA. The median average 100-hour fuel moisture rate is based on data collected between 1997 and 2015.

For the summer months for the Spring Creek HOA, the median average 100-hour fuel moisture level drops from 21.1 percent in January to 8.1 percent in June. The 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively drop from 20.0 percent, 20.5 percent, and 22.6 percent in January to 8.8 percent, 8.6 percent, and 7.6 percent in June. This dramatic change in fuel moisture levels correlates with increased burn rates. The observed 100-hour fuel moisture level for June 2020 is higher than the median average. The observed 100-hour fuel moisture level for

June 2021 is higher than the median average and the observed 100-hour fuel moisture level for June 2022 is lower than the median average.

Figure 2.12 – Annual Median 100-Hour Fuel Moisture Level for the Spring Creek HOA January 2022 through June 2022

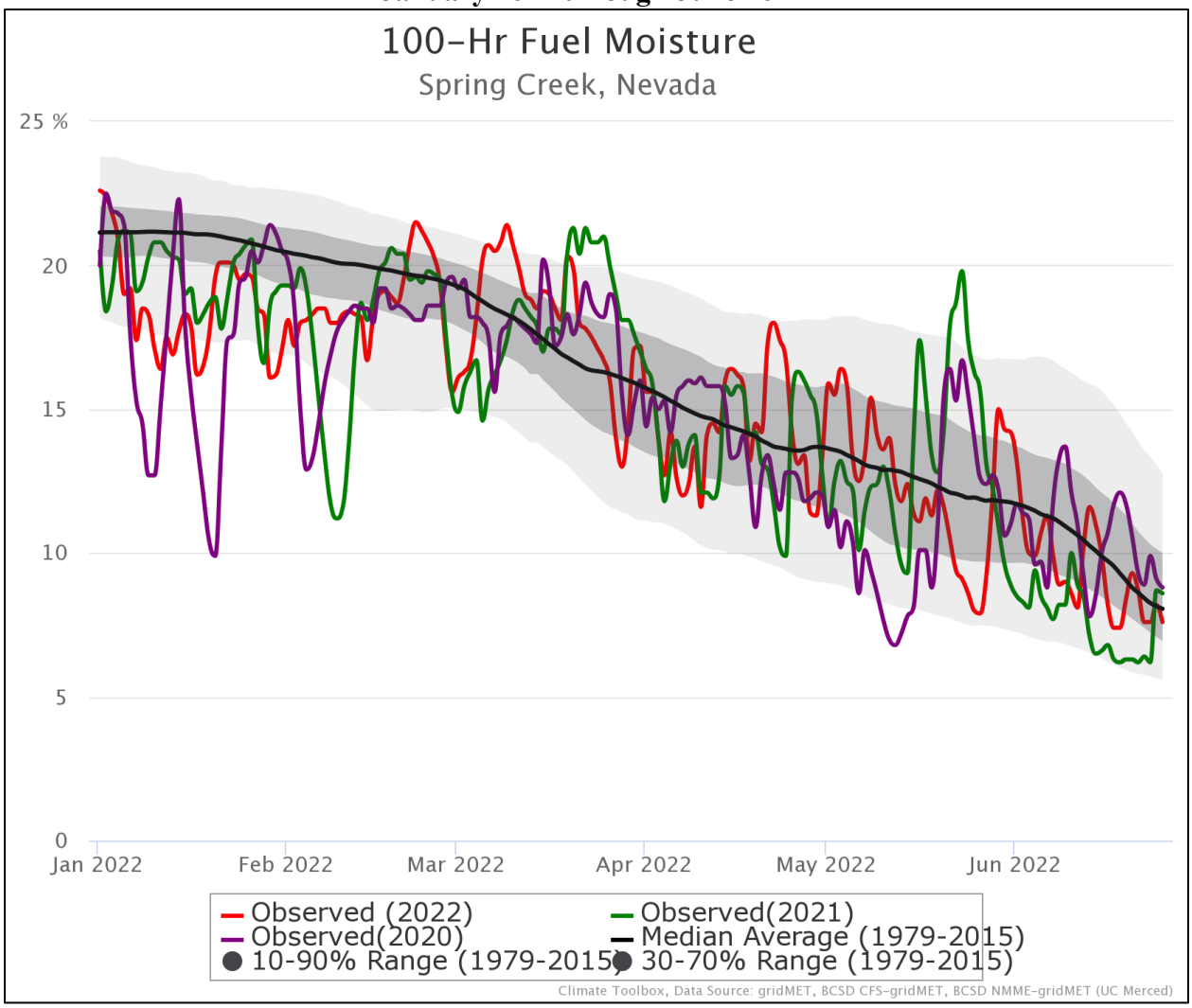


Figure 2.13 presents the annual median 100-hour fuel moisture level for the first six months over the past three years compared against the median average 100-hour fuel moisture levels for 2020, 2021, and 2022 for the City of Carlin. The median average 100-hour fuel moisture rate is based on data collected between 1997 and 2015.

For the summer months for the City of Carlin, the median average 100-hour fuel moisture level drops from 20.9 percent in January to 7.8 percent in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 drop respectively from 20.3 percent, 20.5 percent, and 21.5 percent in January to 6.7 percent, 7.8 percent, and 6.6 percent in June. This dramatic change in fuel moisture correlates with increased burn rates. The observed 100-hour fuel

moisture level for June 2020 is lower than the median average and the observed 100-hour fuel moisture level for June 2021 is equal to the median average. For the City of Carlin, the observed 100-hour fuel moisture level for June 2022 is lower than the median average.

Figure 2.13 – Annual Median 100-Hour Fuel Moisture Level for the City of Carlin January 2022 through June 2022

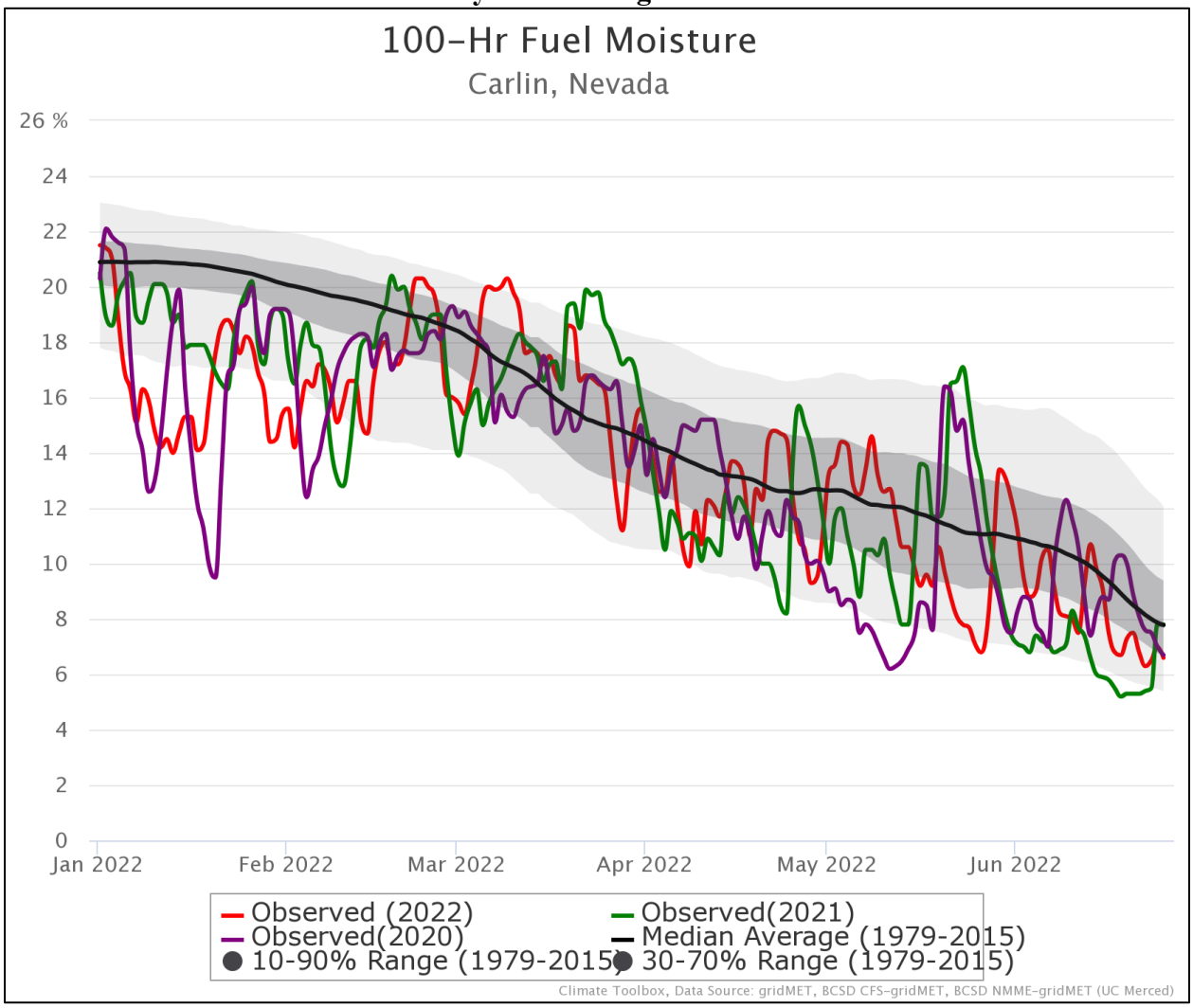


Figure 2.14 presents the annual median 100-hour fuel moisture level for the first six months over the past three years compared against the median average 100-hour fuel moisture levels for 2020, 2021, and 2022 for the South Fork Native American Reservation. The median average 100-hour fuel moisture rate is based on data collected between 1997 and 2015.

For the summer months for the South Fork Native American Reservation, the median average 100-hour fuel moisture level drops from 21.0 percent in January to 8.2 percent in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively drop from 22.7 percent, 19.7 percent, and 23.5 percent in January to 7.4 percent, 8.3 percent, and 7.8

percent in June. This dramatic change in fuel moisture correlates with increased burn rates. The observed 100-hour fuel moisture level for the South Fork Native American Reservation for June 2020 is lower than the median average and the observed 100-hour fuel moisture level for June 2021 is higher than the median average. The observed 100-hour fuel moisture level for the South Fork Native American Reservation for June 2022 is lower than the median average.

Figure 2.14 – Annual Median 100-Hour Fuel Moisture Level for the South Fork Native American Reservation
January 2022 through June 2022

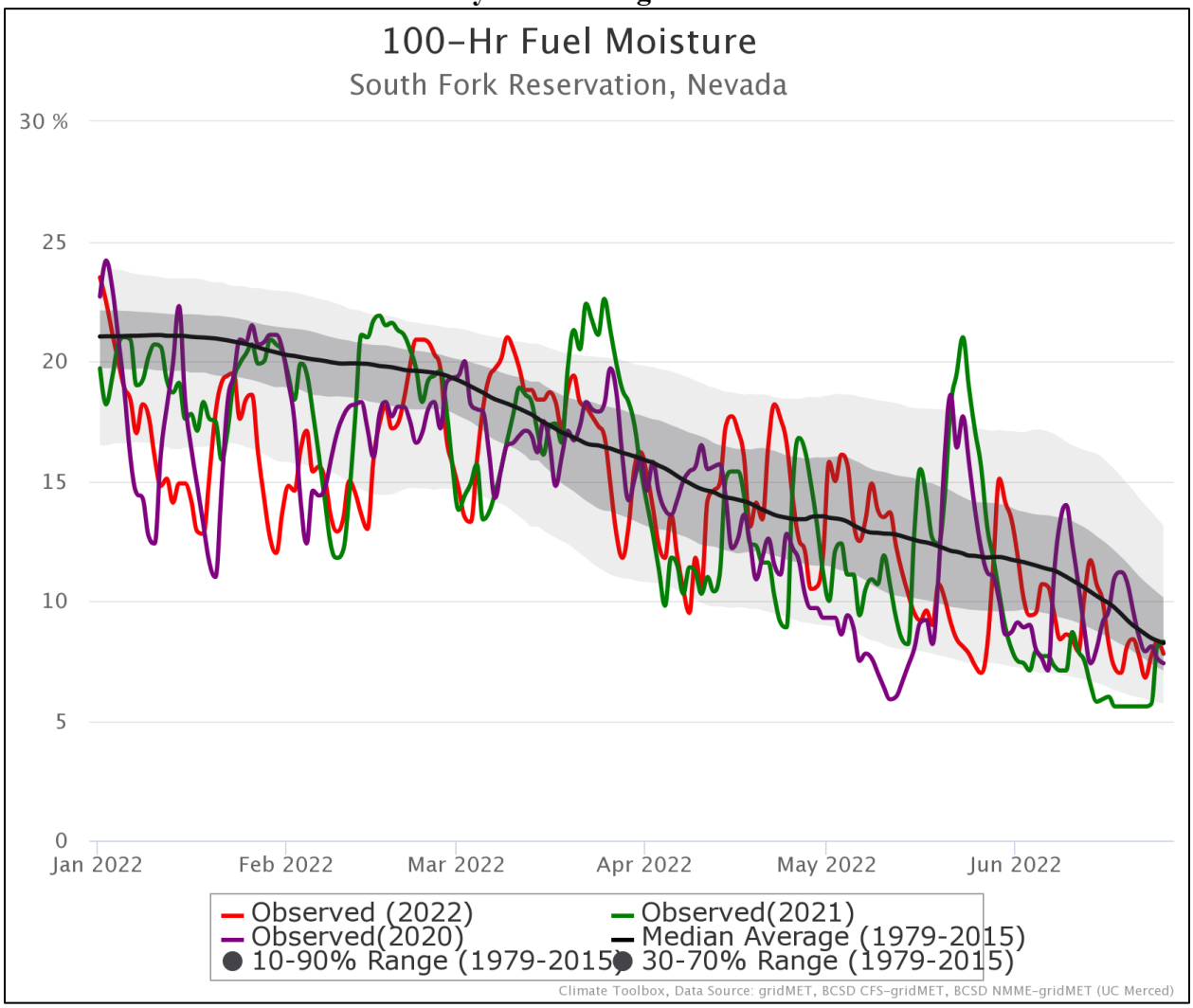
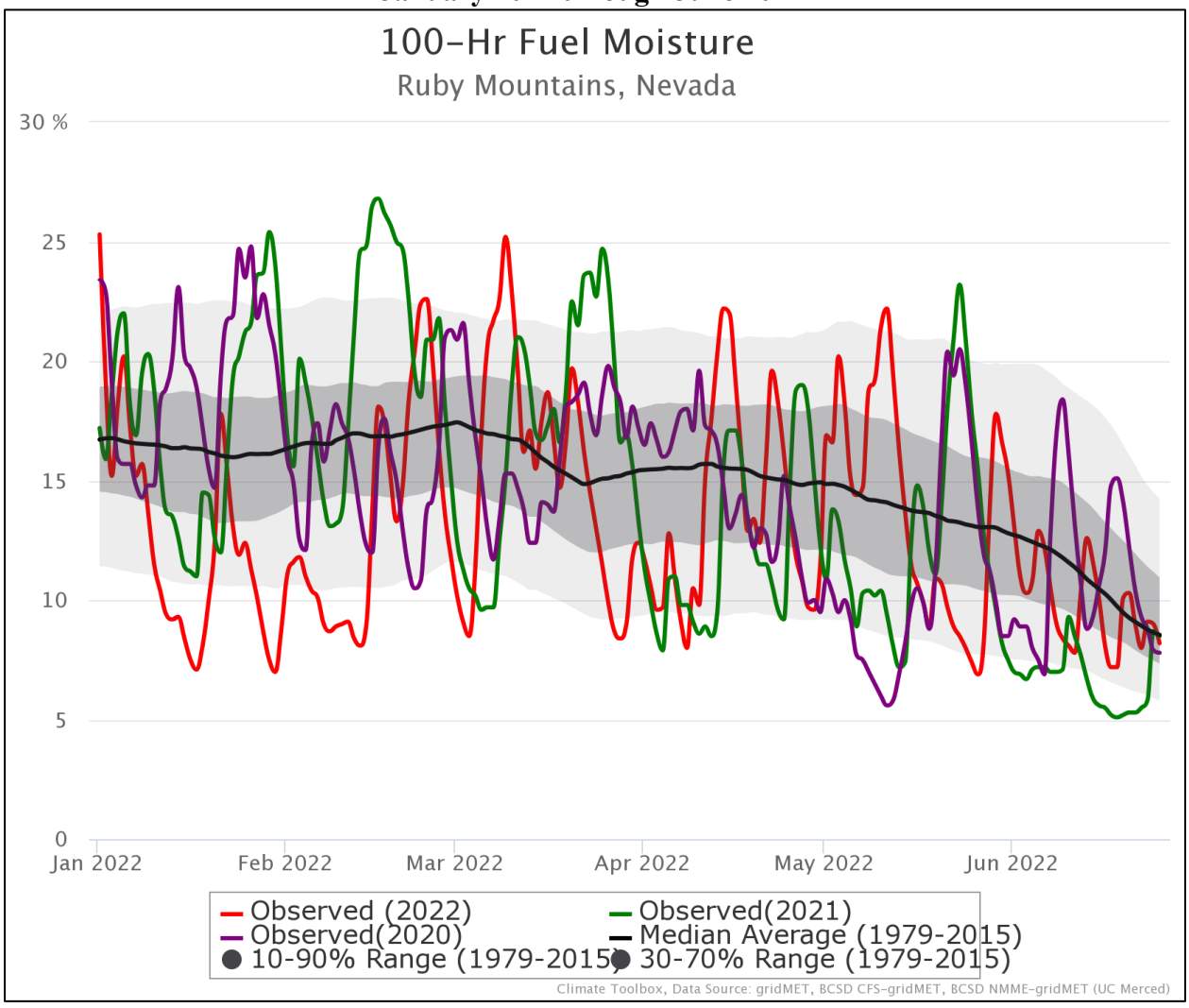


Figure 2.15 presents the annual median 100-hour fuel moisture level for the first six months over the past three years compared against the median average 100-hour fuel moisture levels for 2020, 2021, and 2022 for the Ruby Mountains. The median average 100-hour fuel moisture rate is based on data collected between 1997 and 2015.

For the summer months for the Ruby Mountains, the median average 100-hour fuel moisture level drops from 16.7 percent in January to 8.6 percent in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively drop from 23.4 percent, 17.2 percent, and 25.3 percent in January to 7.8 percent, 8.5 percent, and 8.2 percent in June. This dramatic change in fuel moisture levels correlates with increased burn rates.

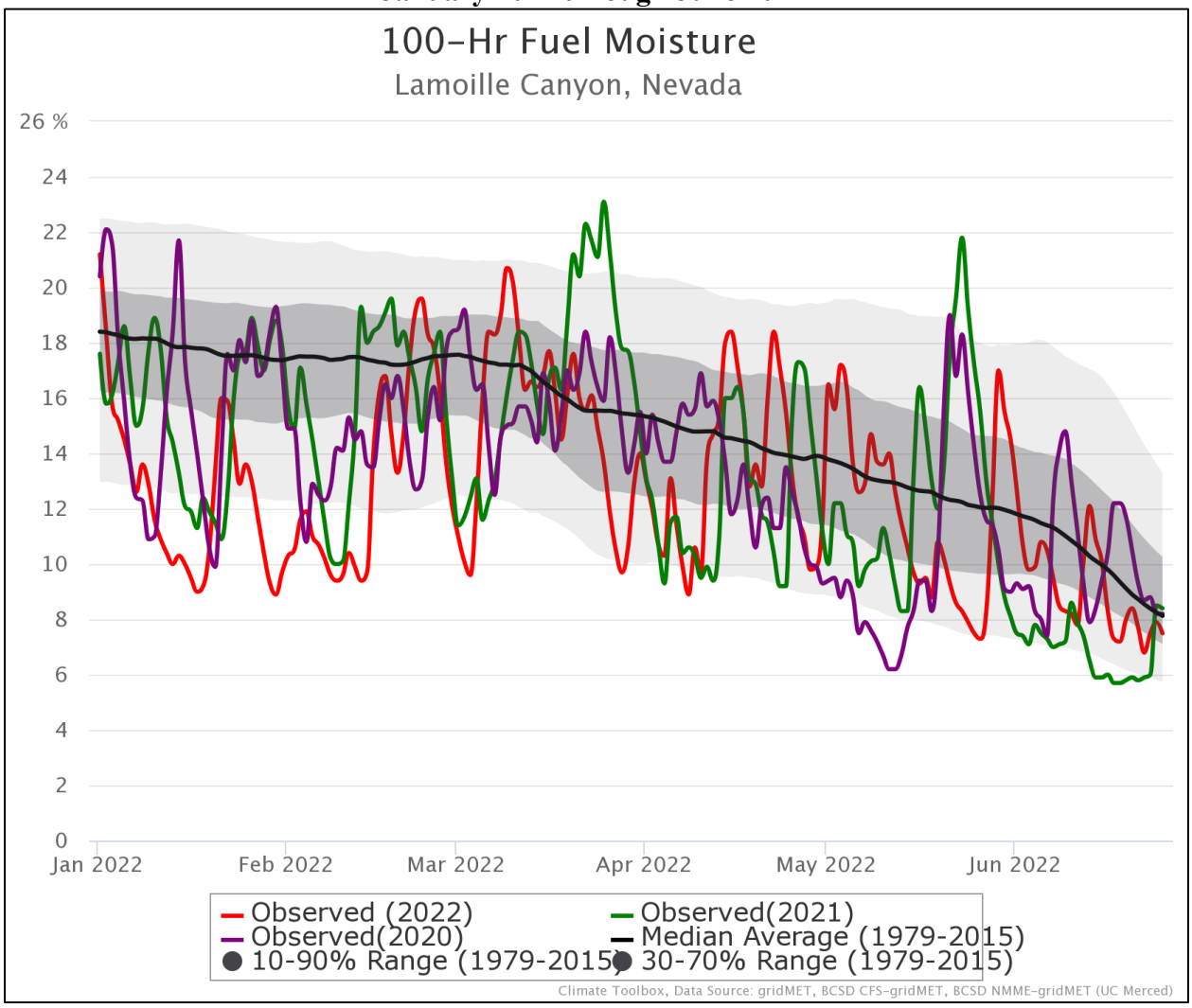
Figure 2.15 – Annual Median 100-Hour Fuel Moisture Level for the Ruby Mountains January 2022 through June 2022



The observed 100-hour fuel moisture level for the Ruby Mountains for June 2020 is lower than the median average and the observed 100-hour fuel moisture level for June 2021 is lower than the median average. For the Ruby Mountains, the observed 100-hour fuel moisture level for June 2022 is lower than the median average. There is high variability in fuel moisture levels observed between January and June for 2020, 2021, and 2022 which may be due to the Ruby Mountains being located at a different elevation and the area's different vegetation patterns.

Figure 2.16 presents the annual median 100-hour fuel moisture level for the first six months over the past three years compared against the median average 100-hour fuel moisture levels for 2020, 2021, and 2022 for Lamoille Canyon. The median average 100-hour fuel moisture rate is based on data collected between 1997 and 2015.

Figure 2.16 – Annual Median 100-Hour Fuel Moisture Level for Lamoille Canyon January 2022 through June 2022



For the summer months in Lamoille Canyon, the median average 100-hour fuel moisture level drops from 18.4 percent in January to 8.1 percent in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively drop from 20.4 percent, 17.6 percent, and 21.2 percent in January to 8.2 percent, 8.4 percent, and 7.5 percent in June. This dramatic change in fuel moisture correlates with increased burn rates. The observed 100- hour fuel moisture level for the Lamoille Canyon area for June 2020 is higher than the median average and the observed 100-hour fuel moisture level for June 2021 is higher than the median average. The observed 100-hour fuel moisture level for the Lamoille Canyon area for June 2022 is lower than

the median average. There is high variability in fuel moisture levels observed between January and June for 2020, 2021, and 2022 which may be due to Lamoille Canyon being located at a different elevation.

2.2 Burning Index

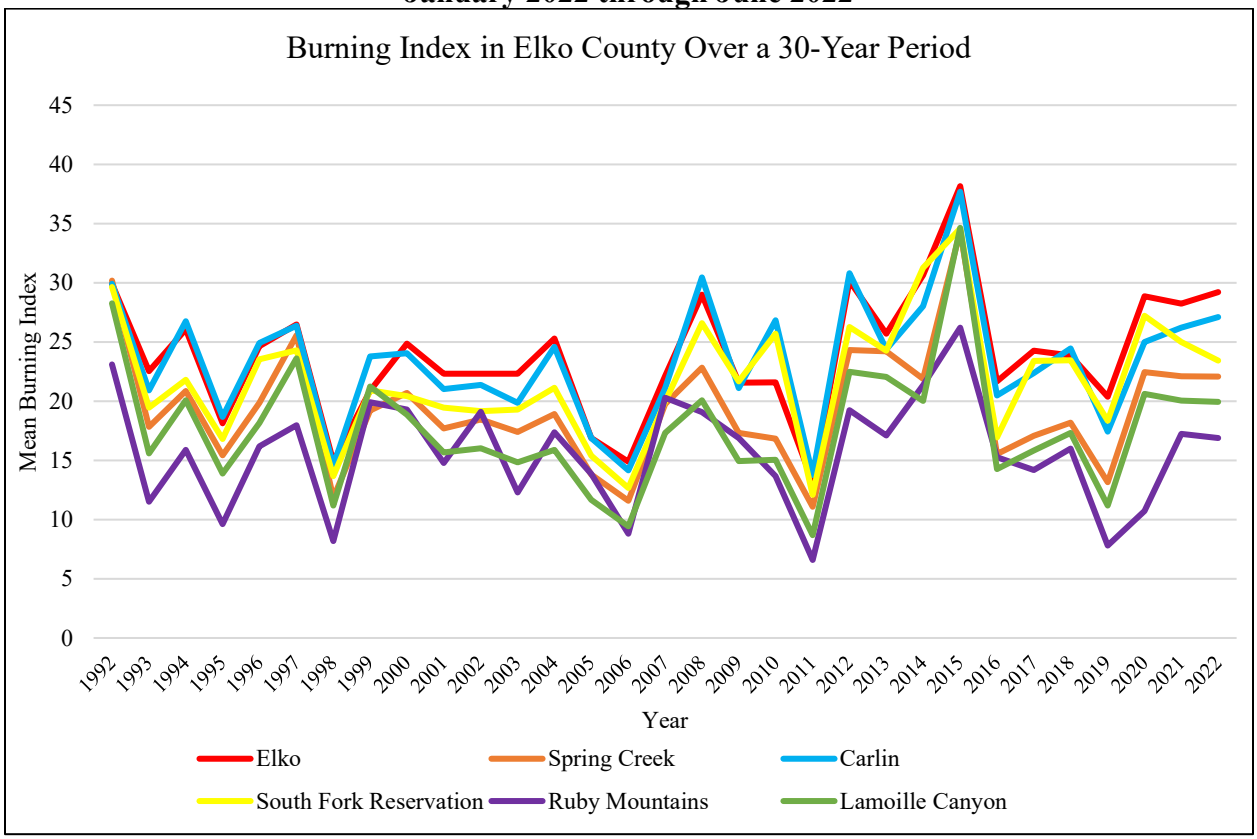
The burning index is a measure of the potential difficulty of containing a single fire with a specific fuel type, live and dead fuel moistures, weather conditions, and flame length. The burning index is also directly affected by wind speeds and it is one of the most useful tools of measurement because it directly relates to the intensity of the fire and measures the severity of burning conditions. Fire danger will increase dramatically during the summer months in Elko County based on hazardous burning index levels. Burning index data from 1992 to 2022 will be analyzed in this sub-section. Additionally, projected annual burn rates will be displayed to illustrate the severity of the growing fire danger in Elko County based on data collected between 1971 and 2000. Burning index levels directly correspond with 100-hour fuel moisture rates. As the burning index level increases, the 100-hour fuel moisture rate will decrease, indicating greater fire danger. Subsequently, as the burring index level decreases, the 100-hour fuel moisture rate will increase, indicating less fire danger.

2.2.a Graphing Elko County's Burning Index

Figure 2.17 presents the high and low points for the annual mean burning index based on a 1-point to 100-point scale for Elko County over the past 30 years. The City of Elko is highlighted in red, the Spring Creek HOA is highlighted in orange, the City of Carlin is highlighted in blue, the South Fork Native American Reservation is highlighted in yellow, the Ruby Mountains are highlighted in purple, and Lamoille Canyon is highlighted in green. The burning index levels for each of these areas show to fall between a 6.50-point to 38.00-point range. Table 2.5 presents the accompanying raw burning index data for the high and low points for the annual mean burning index presented in Figure 2.17 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for Lamoille Canyon for 1992 through 2022.

For all of Elko County, 2015 was the driest year recorded. Based on a 1-point to 100-point scale, each area in Elko County fell between 26.00 and 39.00. In 2015, the City of Elko was at 38.16 on the burning index, the Spring Creek HOA was at 34.38 on the burning index, and the City of Carlin was at 37.69 on the burning index. The South Fork Native American Indian Reservation was at 34.58 on the burning index, the Ruby Mountains was at 26.21 on the burning index, and Lamoille Canyon was at 34.64 on the burning index. High annual mean burning index levels in Elko County tend to have higher burn rates and generally more difficult containing fire danger for 2015. In contrast, 2011 was the wettest year for the areas in Elko County. Based on a 1-point to 100-point scale, each area in Elko County fell between 6.00 and 14.00. In 2011, the City of Elko was at 13.17 on the burning index, the Spring Creek HOA was at 11.08 on the burning index, and the city of Carlin was at 13.77 on the burning index.

Figure 2.17 – Annual Median 100-Hour Fuel Moisture Level for Lamoille Canyon January 2022 through June 2022



The South Fork Native American Indian Reservation was at 12.10 on the burning index, the Ruby Mountains was at 6.59 on the burning index, and Lamoille Canyon was at 8.68 on the burning index. Low annual burning index levels in Elko County will tend to have lower burn rates and less difficulty in containing fire danger for 2011.

Table 2.5 – Raw Data for the Burning Index in Meters
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)
1992 through 2022

Year	City of Elko	Spring Creek	City of Carlin	South Fork Reservation	Ruby Mountains	Lamoille Canyon
1992	29.9048	30.1931	29.9141	29.6384	23.0918	28.2772
1993	22.5286	17.8240	20.9114	19.4671	11.5124	15.5933
1994	26.0873	20.8685	26.7578	21.8147	15.8787	20.0659
1995	18.1412	15.4234	18.6805	16.8094	9.6086	13.8868
1996	24.6354	19.8639	24.9113	23.5390	16.1873	18.1484
1997	26.4893	25.5703	26.3706	24.2997	17.9672	23.6260
1998	14.8874	11.8431	14.5407	13.6684	8.1894	11.1764
1999	20.8783	19.2055	23.7747	20.9033	19.9271	21.2296

Table 2.5 Cont'd – Raw Data for the Burning Index in Meters Elko County (Elko, Spring Creek, Carlin, South Fork Reserve, Ruby Mountains, Lamoille Canyon) 1992 through 2022						
Year	**City of Elko**	**Spring Creek**	**City of Carlin**	**South Fork Reservation**	**Ruby Mountains**	**Lamoille Canyon**
2000	24.8598	20.6978	24.0567	20.4165	19.2933	18.8639
2001	22.3084	17.6919	21.0364	19.4482	14.7734	15.6670
2002	22.3129	18.4598	21.3830	19.1514	19.1118	16.0321
2003	22.3254	17.4054	19.8485	19.3029	12.2849	14.8431
2004	25.2840	18.9283	24.5793	21.1226	17.3742	15.8769
2005	16.8877	13.8047	16.8916	15.3932	13.8727	11.6664
2006	14.8856	11.6014	14.1481	12.6610	8.8162	9.4374
2007	22.1433	19.7555	21.1092	19.9608	20.2974	17.3337
2008	29.0056	22.8223	30.4628	26.5868	19.0638	20.0878
2009	21.5553	17.3322	21.1068	21.6685	16.8791	14.9526
2010	21.5996	16.8300	26.8387	25.7118	13.6821	15.0419
2011	13.1736	11.0830	13.7651	12.0892	6.5904	8.6832
2012	30.1692	24.3124	30.7988	26.2718	19.2447	22.4891
2013	25.7045	24.2015	24.3748	24.2619	17.0938	22.0370
2014	30.6491	21.8813	28.0102	31.2657	21.3582	20.0113
2015	38.1618	34.3748	37.6906	34.5826	26.2102	34.6408
2016	21.6674	15.5250	20.4854	16.9549	15.2773	14.2557
2017	24.2667	17.0667	22.3833	23.4000	14.1833	15.8333
2018	23.8667	18.1833	24.4667	23.4667	15.9833	17.3167
2019	20.3667	13.1667	17.4167	18.3500	7.8000	11.1833
2020	28.8667	22.4667	24.9833	27.2000	10.7167	20.6167
2021	28.2500	22.1167	26.2167	24.9833	17.2500	20.0500

Climate Engine: Climate and Hydrology; Dataset- gridMET Daily

2.2.b Burning Index Between 1992 and 2022 for Each Area

Figure 2.18 through Figure 2.23 presents the annual mean burning index over the past 30 years for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for Lamoille Canyon for 1992 through 2022. Based on a scale of one to 100, the highest annual mean burning index for the City of Elko was in 2015 at 38.17 and the lowest annual mean burning index for the City of Elko was in 2011 at 13.17. The highest annual mean burning index for the Spring Creek HOA was in 2015 at 34.38 and the lowest annual mean burning index for the Spring Creek HOA was in 2011 at 11.08 while the highest annual mean burning index for the City of Carlin was in 2015 at 37.70 and the lowest annual mean burning index for the City of Carlin was in 2011 at 13.77. Based on a scale of one to 100, the highest annual mean burning index for the South Fork Native American Reservation was in 2015 at 34.58 and the lowest annual mean burning index for the South Fork Native American Reservation was in 2011 at 12.10.

Figure 2.18 – Annual Mean Burning Index for the City of Elko
1992 through 2022

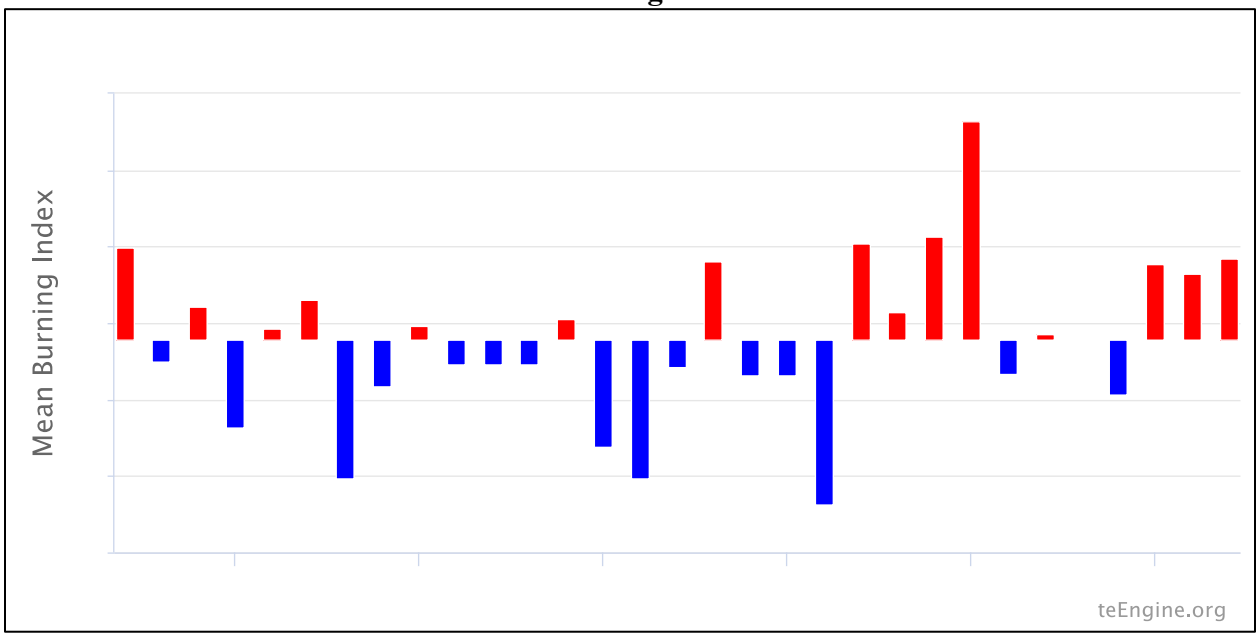


Figure 2.19 – Annual Mean Burning Index for Spring Creek HOA
1992 through 2022

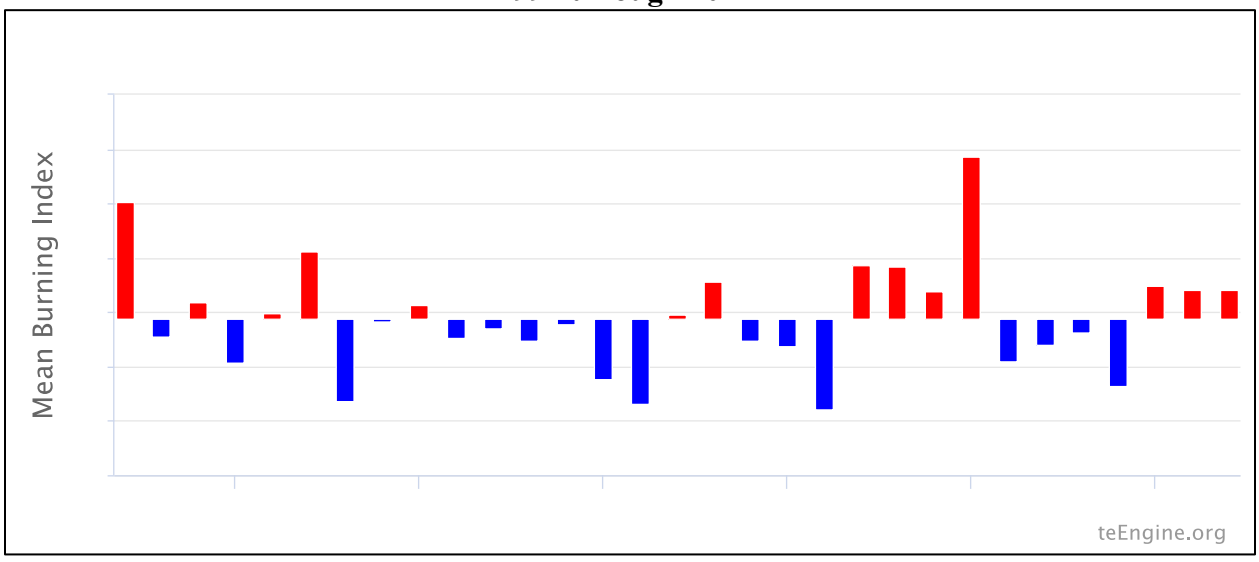


Figure 2.20 – Annual Mean Burning Index for the City of Carlin
1992 through 2022

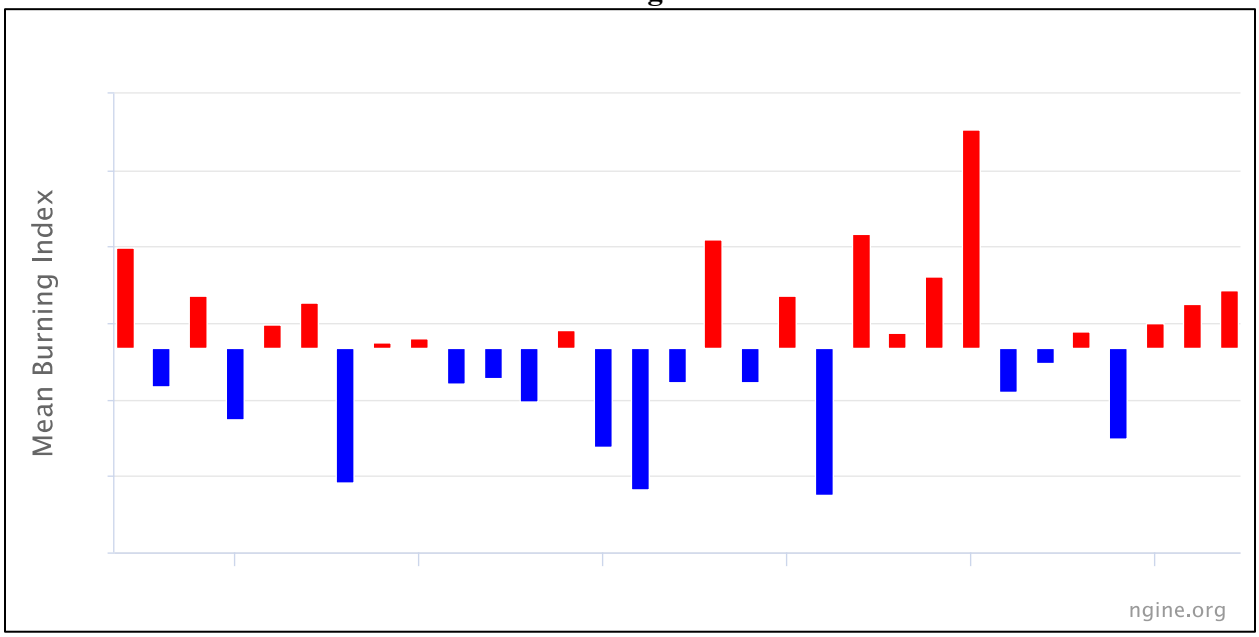


Figure 2.21 – Annual Mean Burning Index for the South Fork Native American Reservation
1992 through 2022

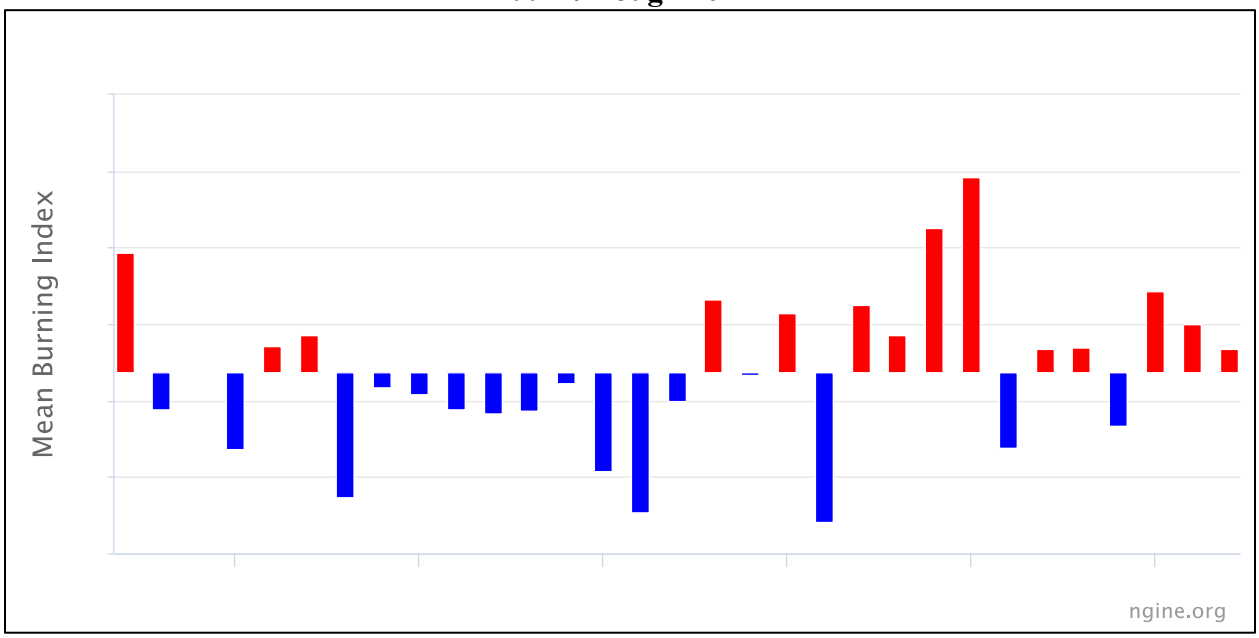


Figure 2.22 – Annual Mean Burning Index for the Ruby Mountains 1992 through 2022

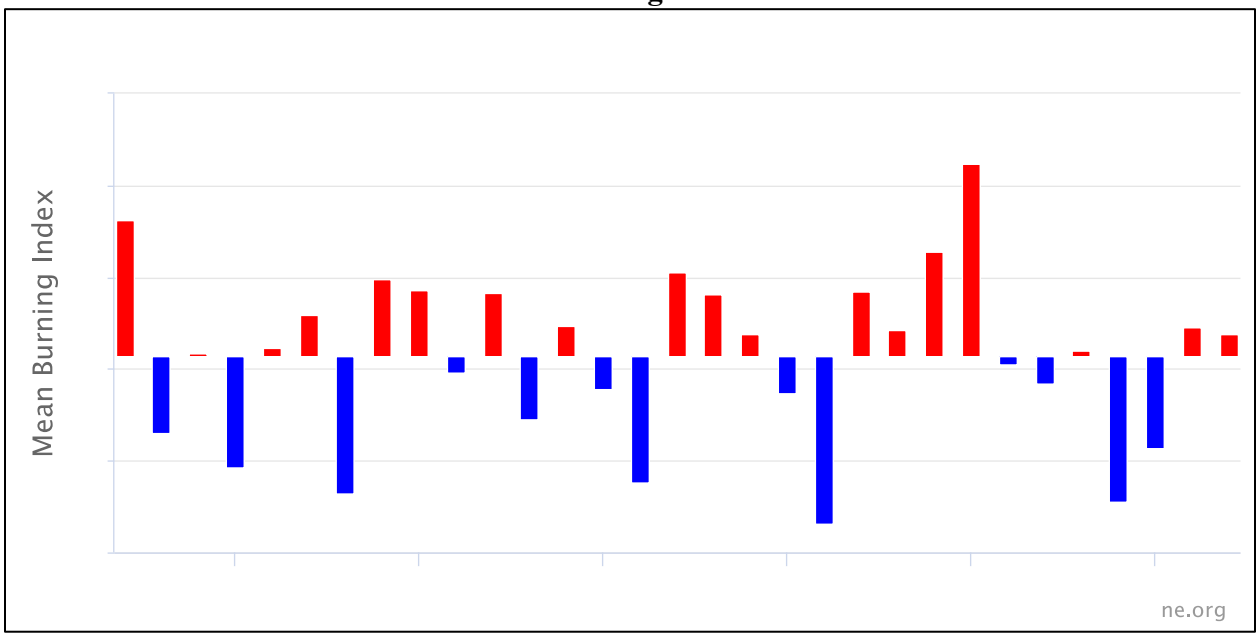
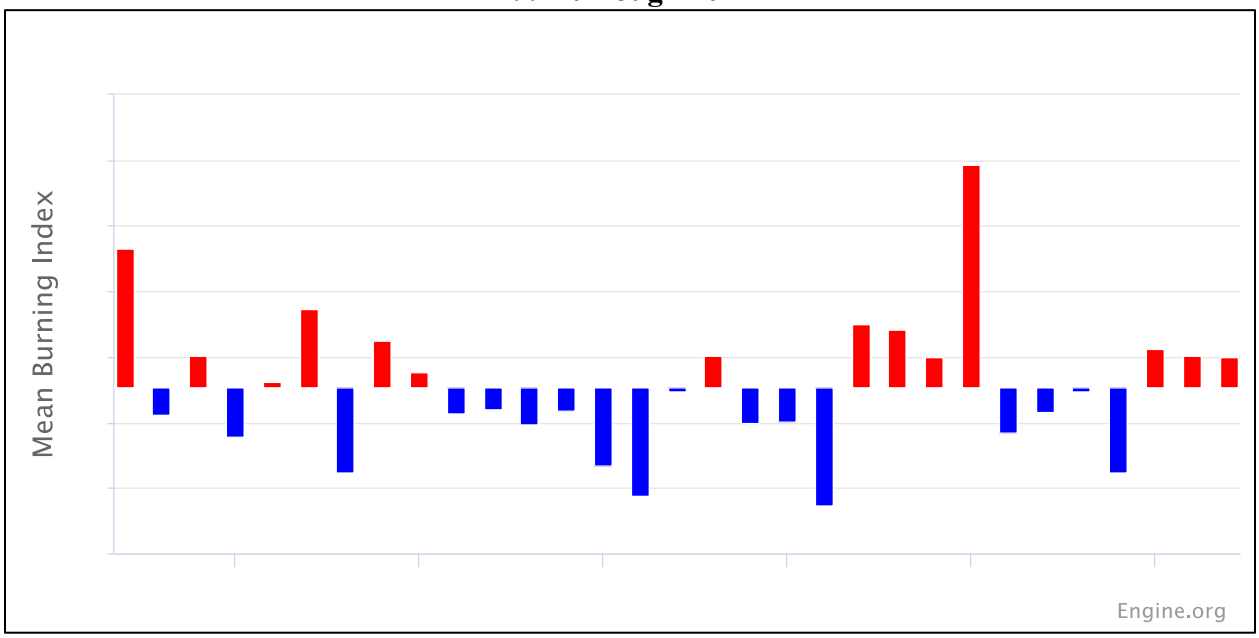


Figure 2.23 – Annual Mean Burning Index for Lamoille Canyon 1992 through 2022



Based on a scale of one to 100, the highest annual mean burning index for the Ruby Mountains was in 2015 at 26.21 and the lowest annual mean burning index for the Ruby Mountains was in 2011 at 6.59. The highest annual mean burning index for Lamoille Canyon was in 2015 at 34.65, and the lowest annual mean burning index for Lamoille Canyon was in 2011 at 8.68.

Elko County has experienced significant swings in the annual mean burning index over the past 30 years. Each area throughout Elko County experienced their most dramatic increase in the burning index within a four-year time range. Between 2011 and 2015, the City of Elko had a 25-point increase in the burning index and the Spring Creek HOA exhibited a 23.30-point increase in the burning index. The City of Carlin exhibited a 23.93-point increase in the burning index between 2011 and 2015 and the South Fork Native American Reservation exhibited a 22.48-point increase in the burning index between 2011 and 2015. Over the same four-year 2011 and 2015 period, the Ruby Mountains exhibited a 19.62-point increase in the burning index and Lamoille Canyon exhibited a 25.97-point increase in the burning index. When comparing the burning index levels to the 100-hour fuel moisture rates, as the 100-hour fuel moisture rate decreases, the burning index level increases. Higher moisture content in vegetation for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for Lamoille Canyon indicates less annual fire coverage for each area.

2.2.c Projected Area Burned

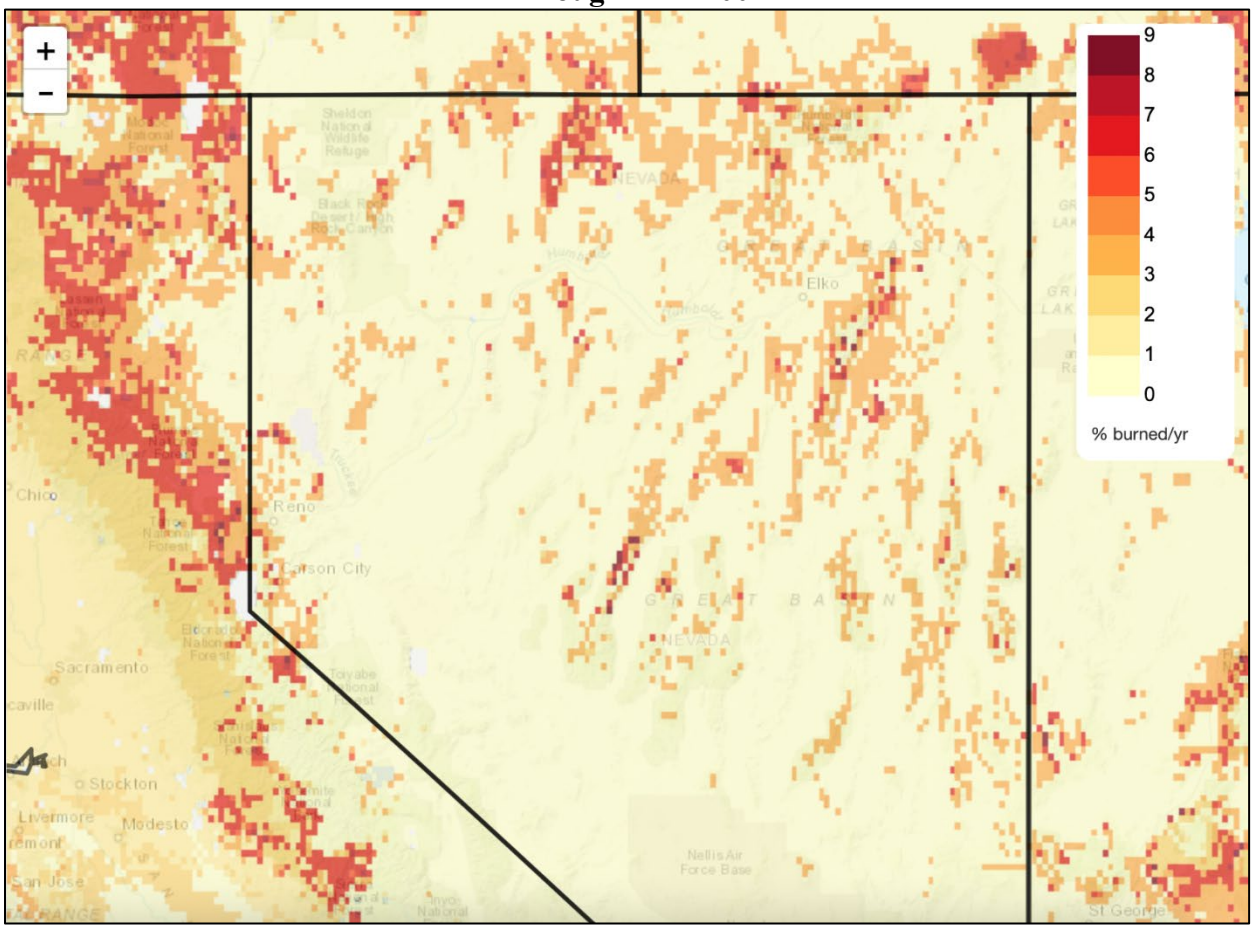
Figure 2.24 presents a model of annual projections of fire danger for Elko County based on data collected from 1971 through 2000. A 0.0 percent rate indicates a low percent of area burned per year, while a 9.0 percent or greater rate indicates a high percent of area burned per year. Subsequently, pale yellow areas are projected to have lower burn rates while deep red areas are projected to have high burn rates. Figure 2.24 maps projected annual burn rates within Elko County. The City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon are observed. These areas fall between the 0.1 percent to 9.0 percent or greater annual burn rate range.

The projected annual burn rate through till 2100 based on data collected from between 1971 and 2000 for Elko County is 0.1 percent, indicating relatively low burn rates for Elko County compared to past fire danger data. The City of Elko is projected to have a 0.1 percent burn rate, the same rate compared to the total average for Elko County. The Spring Creek HOA is projected to have a 3.4 percent burn rate, 3.3 percent higher than the total average for Elko County. The City of Carlin is projected to have a 0.1 percent burn rate, the same rate compared to the total average for Elko County.

The South Fork Native American Reservation is projected to have a 0.1 percent burn rate, the same rate compared to the total average for Elko County. The Ruby Mountains, depending on the area, are projected to have a 0.5 percent to 9.4 percent burn rate, 0.4 percent to 9.3 percent higher than the total average for Elko County. Lamoille Canyon, depending on the area, is projected to have a 3.4 percent to 6.5 percent burn rate, 3.3 percent to 6.4 percent higher than the total average for Elko County. The Spring Creek HOA, the Ruby Mountains, and Lamoille

Canyon areas are projected to have higher burn rates annually compared to all of Elko County. The Ruby Mountains have dangerous projected burn rates, with some areas reaching the 9.0 percent or greater level, falling into the deep red zone.

Figure 2.24 – Projected Fire Danger for the State of Nevada and for Elko County, Nevada Based on 1971 through 2000 Observable Data Through Till 2100



Historical and Future Climate Mapper- Climate ToolBox Using gridMET Data; Future Projections Through 2100; Fire Modeling; Percent Area Burned; Historical Simulation, 1971-2000 Mean; Multi-Model Mean Derived from Twenty Downscaled CMIP5 Models (0.1% = Low Burn Rate; 9.0% or Higher = Extremely High Burn Rate)

The projected annual burn rate data presented in Table 2.6 has been calculated using the estimated annual mean for each year between 1971 and 2000. Table 2.6 illustrates future percentage fire coverage for Elko County, the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon.

Extremely high burn rates are projected for some areas in the Ruby Mountains and Lamoille Canyon, particularly close to the South Fork Native American Reservation. The Ruby

Mountains are projected to experience up to a 9.4 percent of area burned annually. Lamoille Canyon is projected to experience up to a 6.5 percent of area burned annually. The Spring Creek HOA is projected for moderate burning of up to 3.4 percent of area burned. However, close proximity to the Ruby Mountain and Lamoille Canyon areas pose a significant safety threat. Comparing the burn rates for the Spring Creek HOA, the Ruby Mountains, and Lamoille Canyon to the average burn rate for Elko County identifies these areas as dangerous fire zones.

Figure 2.6 – Area Burned Per Year Projected to 2100 Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)	
Area	**Area Burned/ Year**
Elko County (Average)	0.10%
Elko	0.10%
Spring Creek	3.40%
Carlin	0.10%
South Fork Reservation	0.10%
Ruby Mountains	0.50%- 9.40%
Lamoille Canyon	3.40%- 6.50%

Historical and Future Climate Mapper- Climate ToolBox Using gridMET Data; Future Projections Through 2100; Fire Modeling; Percent Area Burned; Historical Simulation, 1971-2000 Mean; Multi-Model Mean Derived from Twenty Downscaled CMIP5 Models

2.2.d Identified Burned Areas over the Past Three Years

Figure 2.25 through Figure 2.30 presents the annual median burning index for the first six months over the past three years compared to the median average burning index over 2020, 2021, and 2022 for the City of Elko, the Spring Creek HOA, the City of Carlin, the Ruby Mountains, and for Lamoille Canyon. The median average burning index level is based on data collected between 1997 and 2015.

For the summer months for the City of Elko, the median average burning index level increases from 17.4 in January to 54.4 in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively rise from 11.0, 21.0, and 18.0 in January to 54.0, 66.0, and 54.0 in June. This significant change in the burning index correlates with increased burn rates. The observed burning index level for June 2020 is lower than the median average. The observed burning index level for the City of Elko for June 2021 is higher than the median average. The observed burning index level for June 2022 is lower than the median average.

An upward trend of the median average and observed burning index levels for the Spring Creek HOA is observed. For the summer months for the Spring Creek HOA, the median average burning index level increases from 16.8 in January to 49.7 in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively rise from 10.0, 19.0, and 16.0 in January to 45.0, 58.0, and 47.0 in June. This dramatic change in the burning index correlates with increased burn rates. The observed burning index level for June 2020 is lower than the

Figure 2.25 – Annual Median Burning Index, City of Elko
2020 through 2022

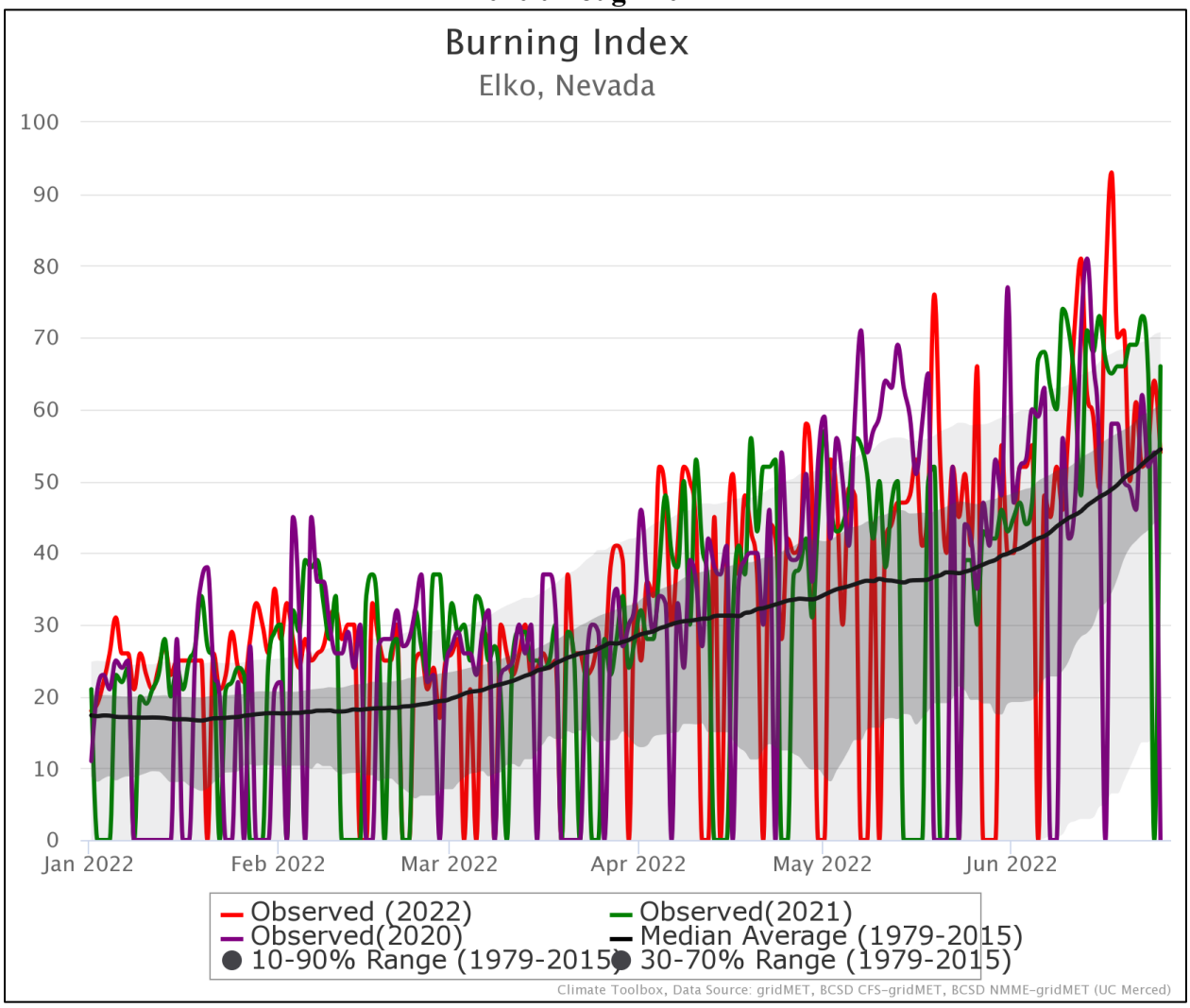


Figure 2.26 – Annual Median Burning Index, Spring Creek HOA 2020 through 2022

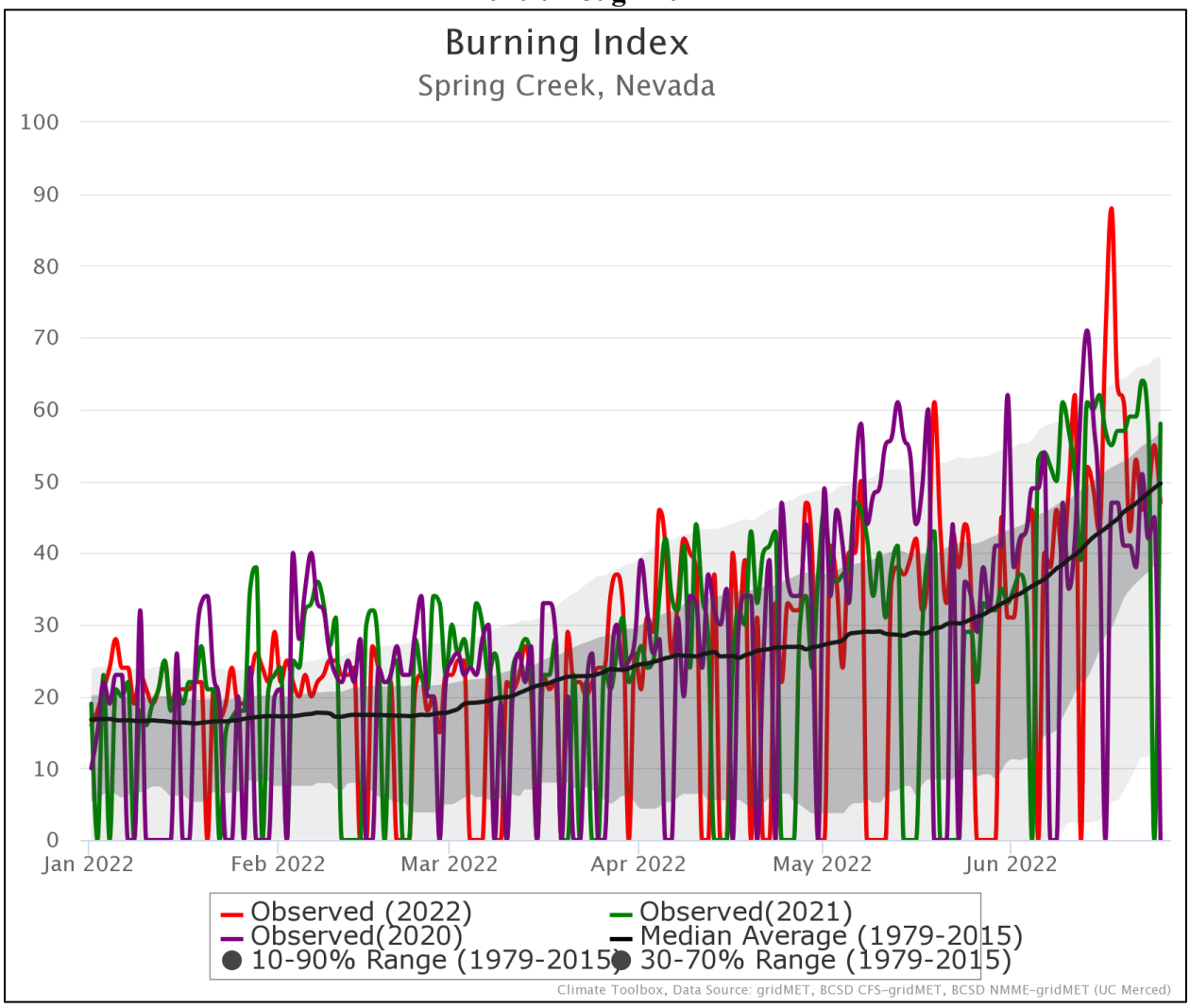


Figure 2.27 – Annual Median Burning Index, City of Carlin
2020 through 2022

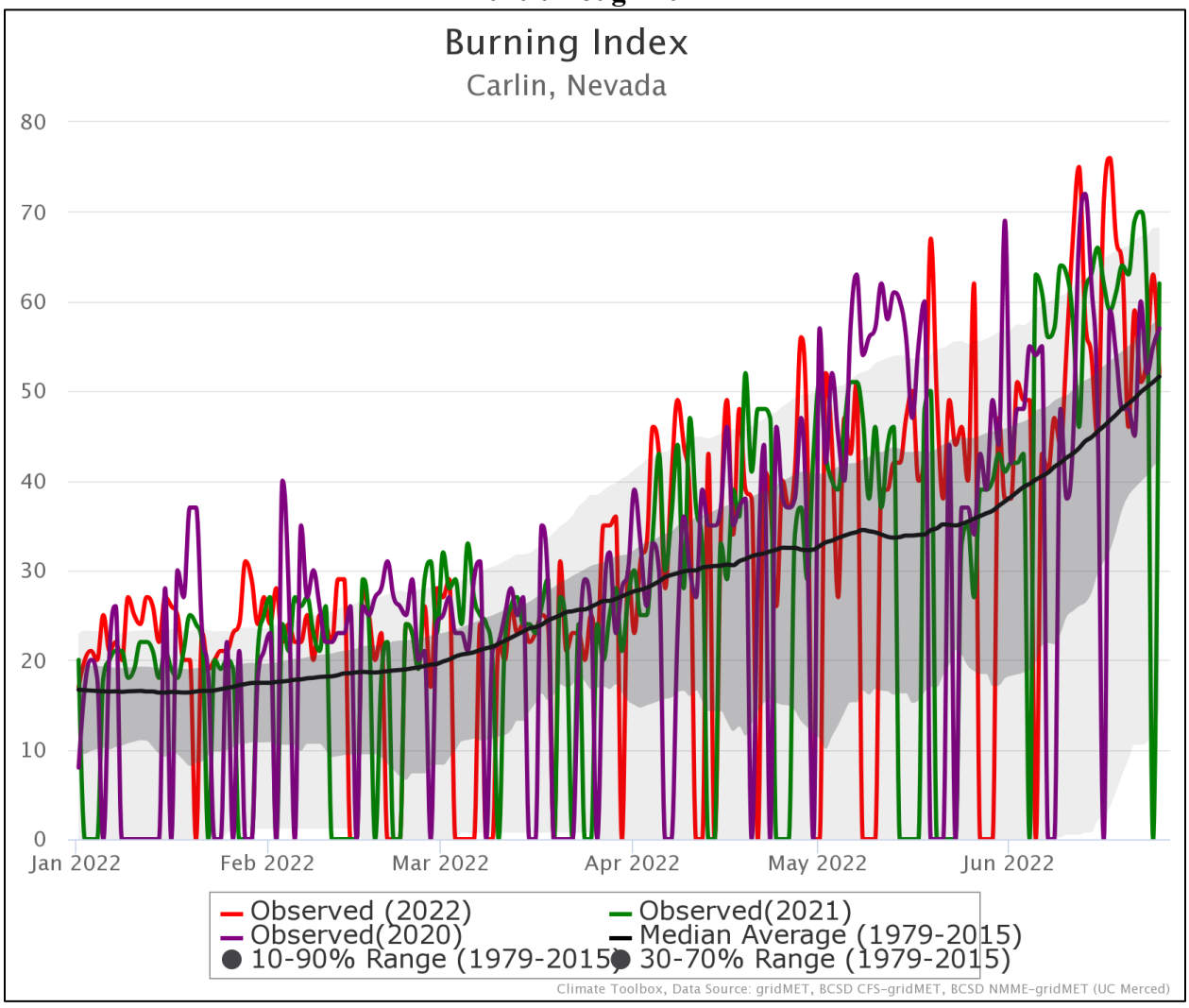


Figure 2.28 – Annual Median Burning Index, South Fork Native American Reservation 2020 through 2022

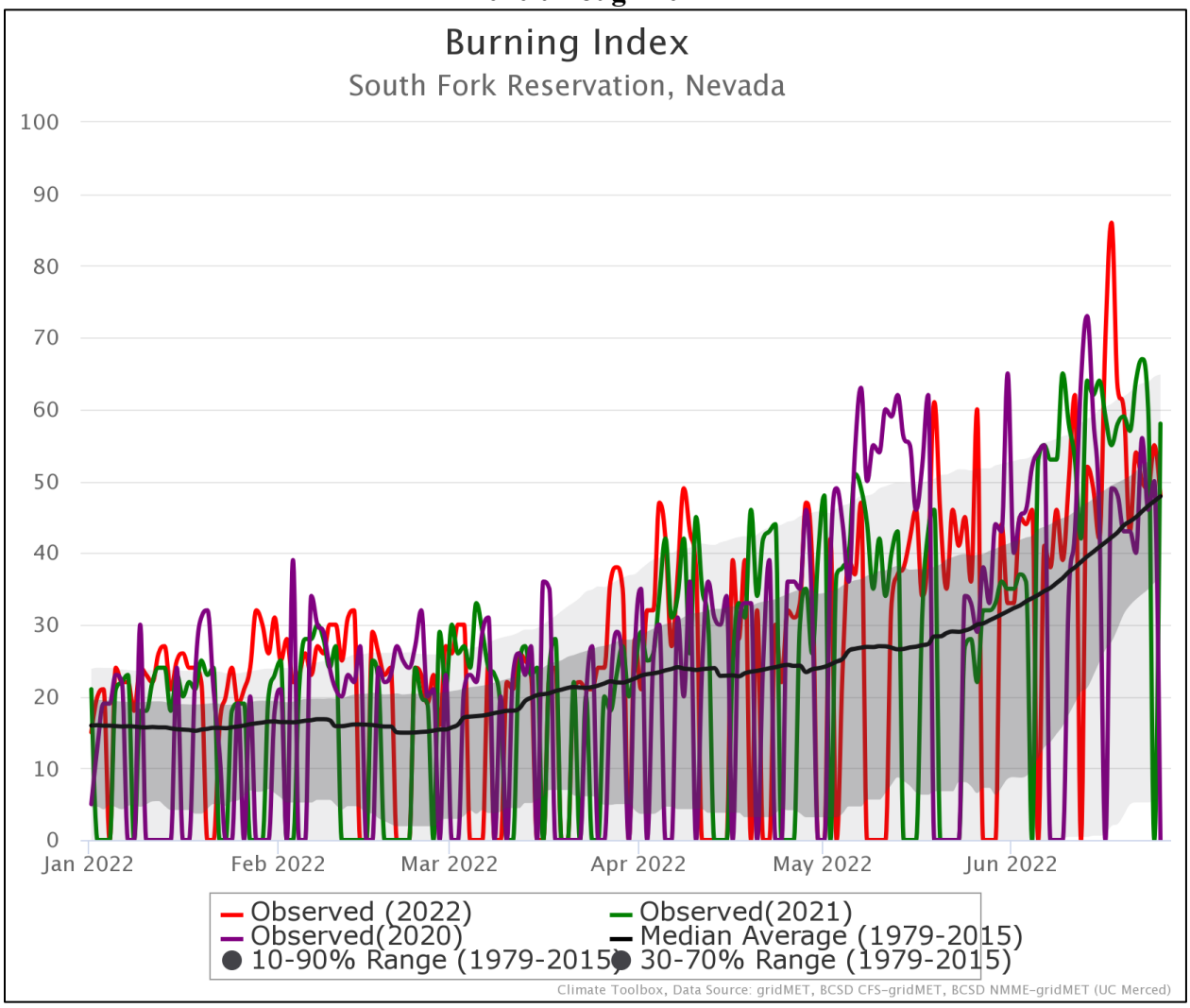


Figure 2.29 – Annual Median Burning Index, Ruby Mountains 2020 through 2022

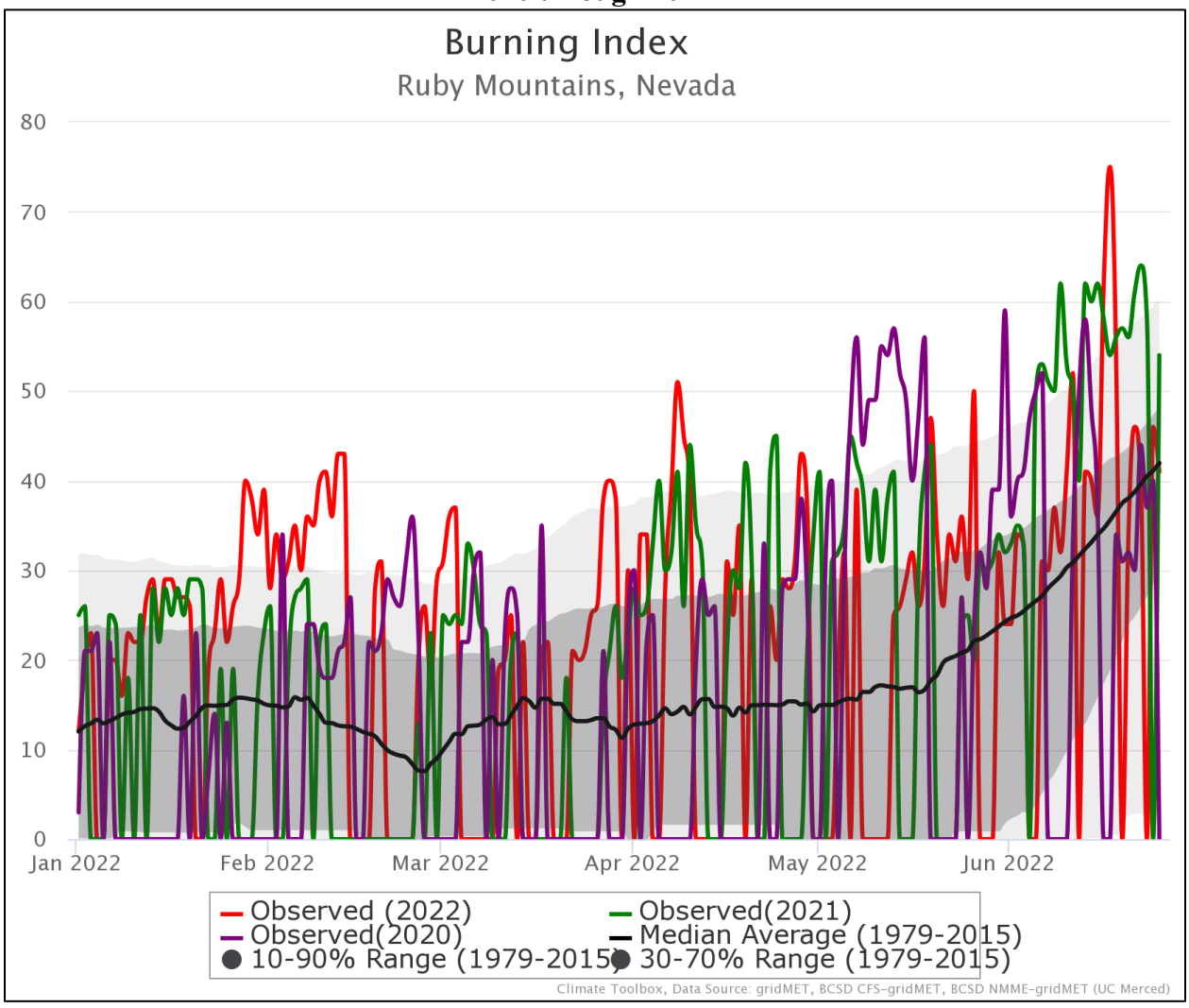
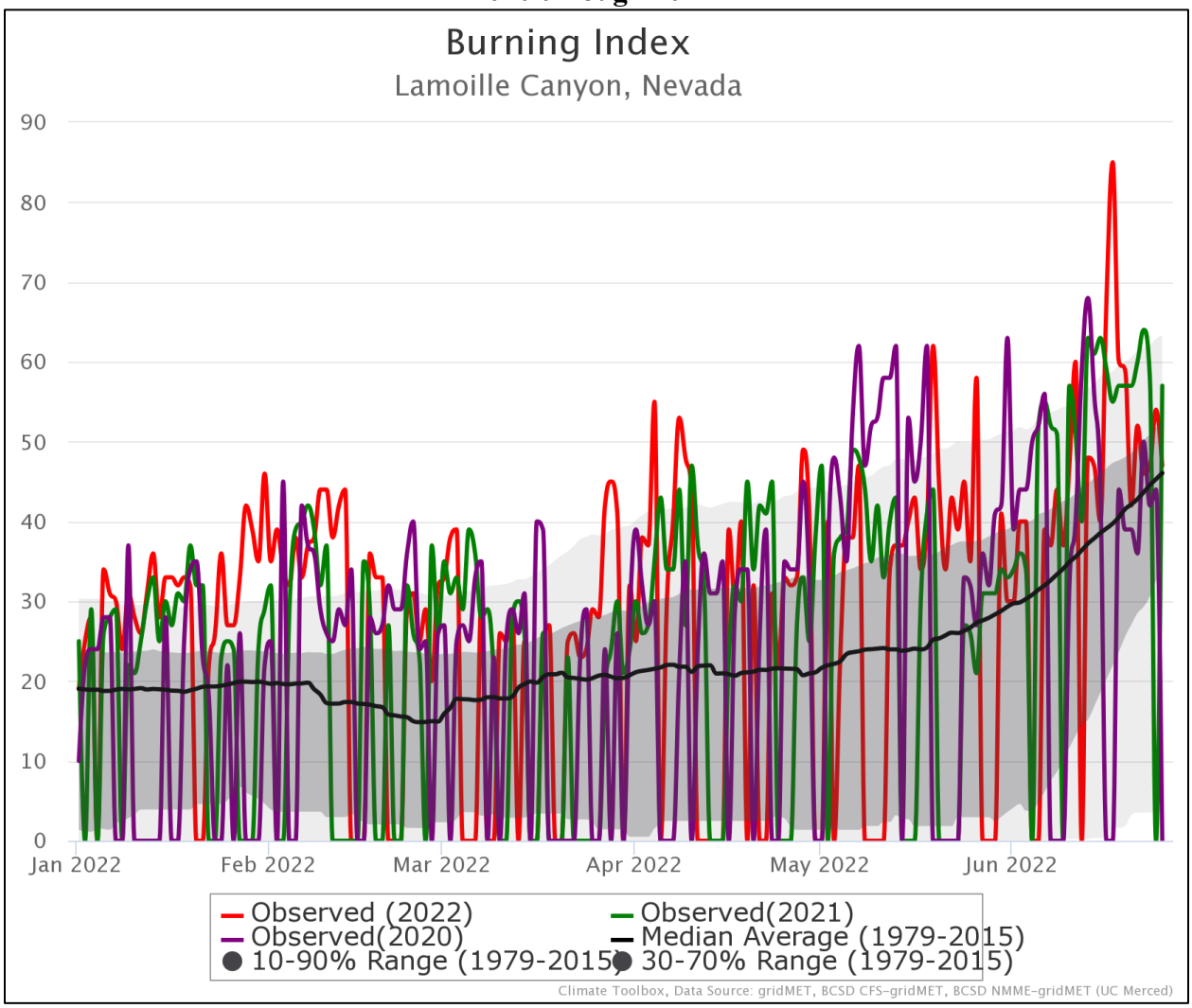


Figure 2.30 – Annual Median Burning Index, Lamoille Canyon 2020 through 2022



median average. The observed burning index level for June 2021 is higher than the median average. The observed burning index level for June 2022 is lower than the median average.

An upward trend of the median average and observed burning index levels for the City of Carlin is observed. For the summer months for the City of Carlin, the median average burning index level increases from 16.7 in January to 51.6 in June. The 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively rise from 8.0, 20.0, and 17.0 in January to 57.0, 62.0, and 52.0 in June. This significant change in the burning index correlates with increased burn rates. The observed burning index level for June 2020 is higher than the median average. The observed burning index level for June 2021 is higher than the median average for the City of Carline and the observed burning index level for June 2022 is higher than the median average. An upward trend of the median average and observed burning index levels for the South Fork Native American Reservation is observed. For the summer months for the South Fork Native American Reservation, the median average burning index level increases from 16.0 in January to 47.9 in June. Subsequently, the 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively rise from 5.0, 21.0, and 15.0 in January to 50.0, 58.0, and 48.0 in June. This significant change in the burning index correlates with increased burn rates. The observed burning index level for June 2020 for the South Fork Native American Reservation is higher than the median average. The observed burning index level for June 2021 for the South Fork Native American Reservation is higher than the median average and the observed burning index level for June 2022 is higher than the median average.

For the summer months for the Ruby Mountains, the median average burning index level increases from 12.1 in January to 42.0 in June and an upward trend of the median average and observed burning index levels for the Ruby Mountains is observed. The 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively rise from 3.0, 25.0, and 12.0 in January to 40.0, 54.0, and 41.0 in June. This significant change in the burning index correlates with increased burn rates. The observed burning index level for June 2020 for the Ruby Mountains is lower than the median average. The observed burning index level for June 2021 is higher than the median average and the observed burning index level for June 2022 is lower than the median average. An upward trend of the median average and observed burning index levels for Lamoille Canyon is observed. For the summer months for the Lamoille Canyon area, the median average burning index level increases from 19.1 in January to 46.1 in June. The 100-hour fuel moisture rates for 2020, 2021, and 2022 respectively rise from 10.0, 25.0, and 19.0 in January to 44.0, 57.0, and 47.0 in June. This significant change in the burning index correlates with increased burn rates. The observed burning index level for June 2020 for Lamoille Canyon is lower than the median average. The observed burning index level for June 2021 for Lamoille Canyon is higher than the median average and the observed burning index level for June 2022 is higher than the median average.

2.3 Precipitation

Precipitation is any result of condensation of atmospheric water vapor that falls to the Earth from clouds due to gravitational pull. Precipitation may come in several forms such as rain, snow, or

hail. Generally, precipitation trended downward over the past several years for many parts of Elko County while area burned per year has increased. There is a trend of decreasing summer precipitation patterns which is expected to continue. Drier summers will further decrease moisture contents in dead fuels and contribute to wildfires, increasing fire danger and area burned. An overall increase in fire danger is evident for several parts of Elko County based on declining precipitation patterns. Precipitation data from 1992 to 2022 will be analyzed in this sub-section. Cumulative precipitation data from the last three years will also be analyzed. Each area, including the City of Elko, the Spring Creek HOA, the City of Carlin, the Ruby Mountains, and the Lamoille Canyon area, will fall below average precipitation levels for Elko County.

2.3.a Precipitation Patterns for Elko County

Figure 2.31 illustrates the high and low points for annual mean precipitation levels measured in millimeters in Elko County over the past thirty years. The City of Elko is highlighted in red, the Spring Creek HOA is highlighted in orange, the City of Carlin is highlighted in blue, the South Fork Native American Reservation is highlighted in yellow, the Ruby Mountains is highlighted in purple, and Lamoille Canyon is highlighted in green. The precipitation levels for each of these areas fall between 13.00 millimeters of precipitation to 363.00 millimeters of precipitation.

Figure 2.31 – Annual Mean Precipitation Levels for Elko County 1992 through 2022

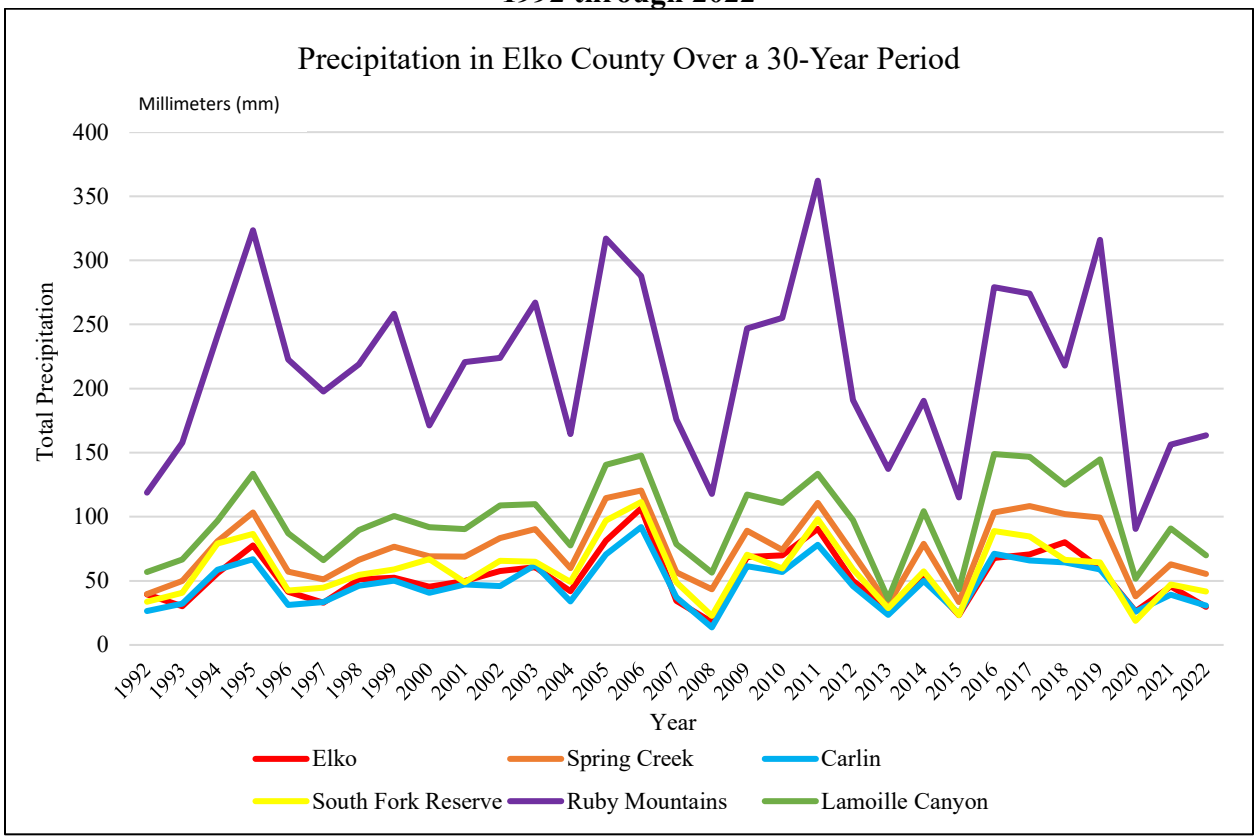


Table 2.7 presents the annual precipitation data used in Figure 2.31 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon for each year between 1992 and 2022.

Table 2.7 – Raw Data for Precipitation in Millimeters
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)
1992 through 2022

Year	Elko	Spring Creek	Carlin	South Fork Reserve	Ruby Mountains	Lamoille Canyon
1992	39.3706	39.6772	26.4502	33.6768	118.8109	57.0203
1993	30.0852	49.9041	32.2268	40.7554	157.7058	66.5999
1994	55.8169	80.9191	58.6408	79.0027	241.2362	96.8183
1995	77.5465	103.3770	66.7930	86.5519	323.5835	133.6247
1996	41.4507	57.1414	31.0846	42.5281	222.7503	87.1900
1997	32.8974	51.1982	33.4888	44.6518	197.7606	66.1341
1998	51.1902	66.3638	46.2287	54.6921	218.9726	89.6094
1999	52.5074	76.5766	50.2224	58.9705	258.4362	100.6266
2000	45.5167	69.1609	40.7738	66.8321	171.1734	91.9657
2001	49.8501	68.8210	47.2535	48.9990	220.6814	90.4568
2002	57.6196	83.4006	45.8033	65.5875	223.9059	108.9102
2003	60.7422	90.3095	62.4251	64.8475	267.1097	109.7343
2004	41.8634	59.8320	33.9102	49.0614	164.4287	77.6681
2005	81.3909	114.6528	70.7496	97.1527	317.0164	140.4553
2006	106.5699	120.4589	91.9446	111.4747	287.8754	147.8094
2007	34.4004	56.6561	37.2839	48.8723	176.0287	78.7427
2008	17.7812	43.4221	13.6779	22.7294	117.9057	56.3858
2009	68.6316	89.1614	61.3644	70.4698	246.7997	117.3928
2010	69.8896	74.0517	56.9864	59.5829	255.0430	110.9045
2011	90.6441	110.7823	78.1651	98.1019	362.1390	133.5293
2012	50.0173	71.4078	46.0168	58.8653	190.8867	97.4000
2013	29.2028	31.5307	23.3498	28.6290	137.2838	35.9018
2014	53.0068	78.9845	50.0136	57.4967	190.5331	104.3106
2015	23.2160	33.4216	24.1214	23.1569	115.0859	43.4205
2016	67.8557	103.4238	71.2191	88.9537	278.9526	148.9064
2017	70.6000	108.4000	65.8000	84.7000	274.0000	146.7000
2018	80.1000	102.0000	64.4000	66.4000	217.9000	125.0000
2019	60.0000	99.4000	59.0000	64.5000	316.0000	144.8000
2020	26.3000	38.0000	26.0000	18.8000	90.5000	51.7000
2021	45.7000	62.8000	39.3000	47.1000	156.3000	90.9000

Climate Engine: Climate and Hydrology; Dataset- gridMET Daily

The driest year for the areas in Elko County was 2015, on average, based on 100-hour fuel moisture and the burning index. However, this is not the case for precipitation levels. In 2015, the City of Elko recorded 23.22 milliliters of rain, the Spring Creek HOA experienced 23.22 milliliters of rain, the City of Carlin experienced 23.22 milliliters of rain, the South Fork Native American Indian Reservation experienced 23.22 milliliters of rain, the Ruby Mountains experienced 23.22 milliliters of rain, and Lamoille Canyon experienced 23.22 milliliters of rain. Minimum precipitation levels have shown to be more volatile in Elko County with the lowest precipitation level for the City of Elko at 17.78 milliliters in 2008, the lowest precipitation level for the Spring Creek HOA at 31.53 milliliters in 2013, and the lowest precipitation level for the City of Carlin at 13.70 milliliters in 2008. The lowest precipitation level for the South Fork Native American Reservation at 18.80 milliliters in 2020, the lowest precipitation level for the Ruby Mountains at 90.50 milliliters in 2020, and the lowest precipitation level for Lamoille Canyon at 35.90 milliliters in 2013.

In contrast, 2011 was the wettest year, on average, for the areas in Elko County based on 100-hour fuel moisture and the burning index. However, this is not the case most of the time for precipitation levels. In 2011, the City of Elko recorded 90.64 milliliters of rain, the Spring Creek HOA experienced 110.78 milliliters of rain, the City of Carlin experienced 78.17 milliliters of rain, the South Fork Native American Indian Reservation experienced 98.10 milliliters of rain, the Ruby Mountains experienced 362.14 milliliters of rain, and Lamoille Canyon experienced 133.53 milliliters of rain. Maximum precipitation levels have shown to be more volatile in Elko County, for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, and Lamoille Canyon. The maximum precipitation level over the past thirty years for the city of Elko was 106.60 milliliters in 2006 and the maximum precipitation level over the past thirty years for the Spring Creek HOA was 120.46 milliliters in 2006. The maximum precipitation level over the past thirty years for the City of Carlin was 91.95 milliliters in 2006 and the maximum precipitation level over the past 30 years for the South Fork Native American Reservation was 111.48 milliliters in 2006. The maximum precipitation level over the past 30 years for the Lamoille Canyon was 148.91 milliliters in 2016.

2.3.b Precipitation Levels Between 1992 and 2022 for Each Area

Figure 2.32 through Figure 2.37 presents the annual mean precipitation levels over the past 30 years for the City of Elko, the Spring Creek HOA, the City of Carlin, the Ruby Mountains, and for the Lamoille Canyon area.

The highest annual mean precipitation level for the City of Elko between 1992 and 2022 was in 2006 at 106.60 milliliters and the lowest annual mean precipitation level for the City of Elko between 1992 and 2022 was in 2008 at 17.78 milliliters. Between 1992 and 2022, the highest annual mean precipitation level for the Spring Creek HOA was in 2006 at 120.50 milliliters and the lowest annual mean precipitation level for the Spring Creek HOA was in 2013 at 31.53 milliliters. The highest annual mean precipitation level for the City of Carlin between 1992 and 2022 was in 2006 at 91.95 milliliters and the lowest annual mean precipitation level for the city of Carlin was in 2008 at 13.68 milliliters.

Figure 2.32 – Annual Mean Precipitation Levels for the City of Elko
1992 through 2022

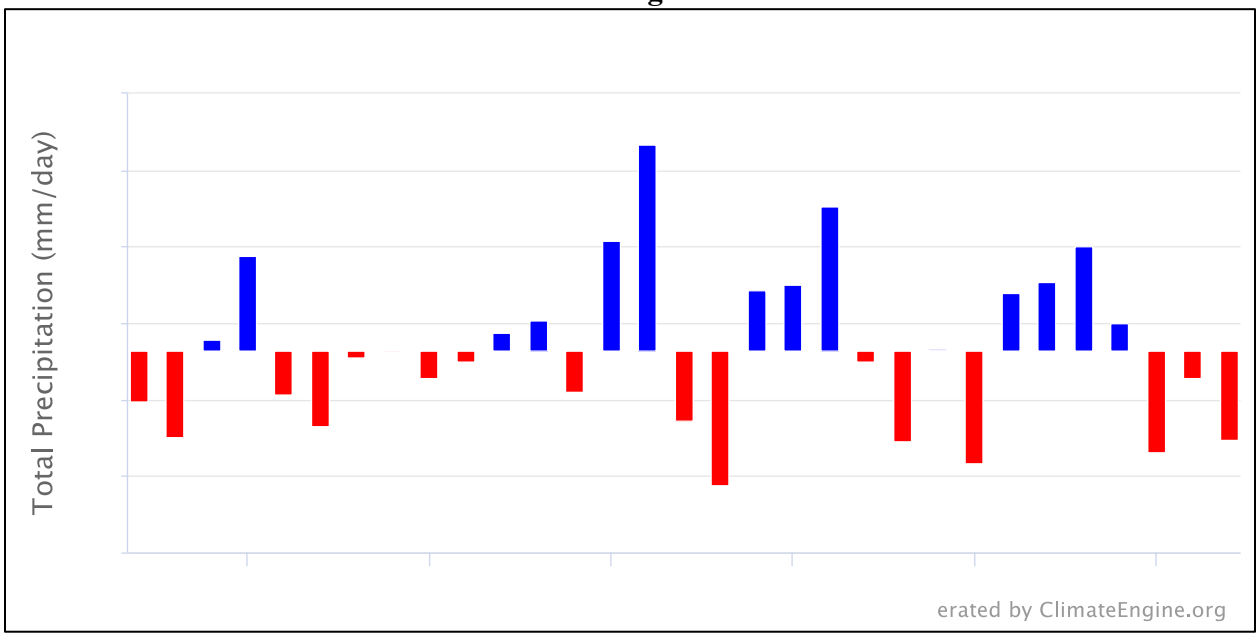


Figure 2.33 – Annual Mean Precipitation Levels for the Spring Creek HOA
1992 through 2022

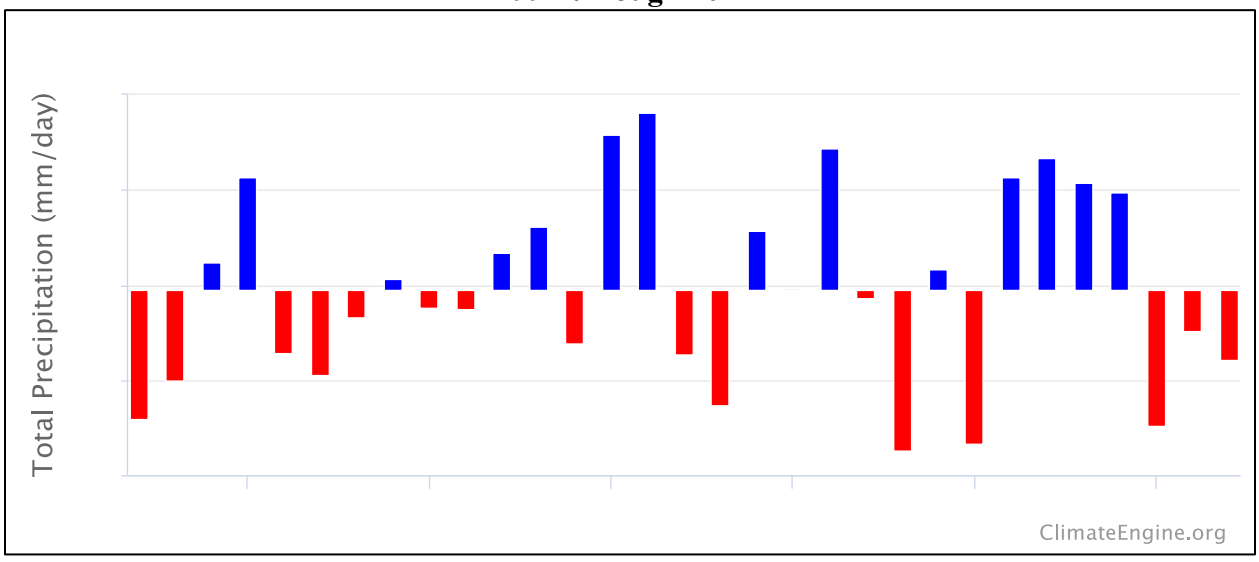


Figure 2.34 – Annual Mean Precipitation Levels for the City of Carlin
1992 through 2022

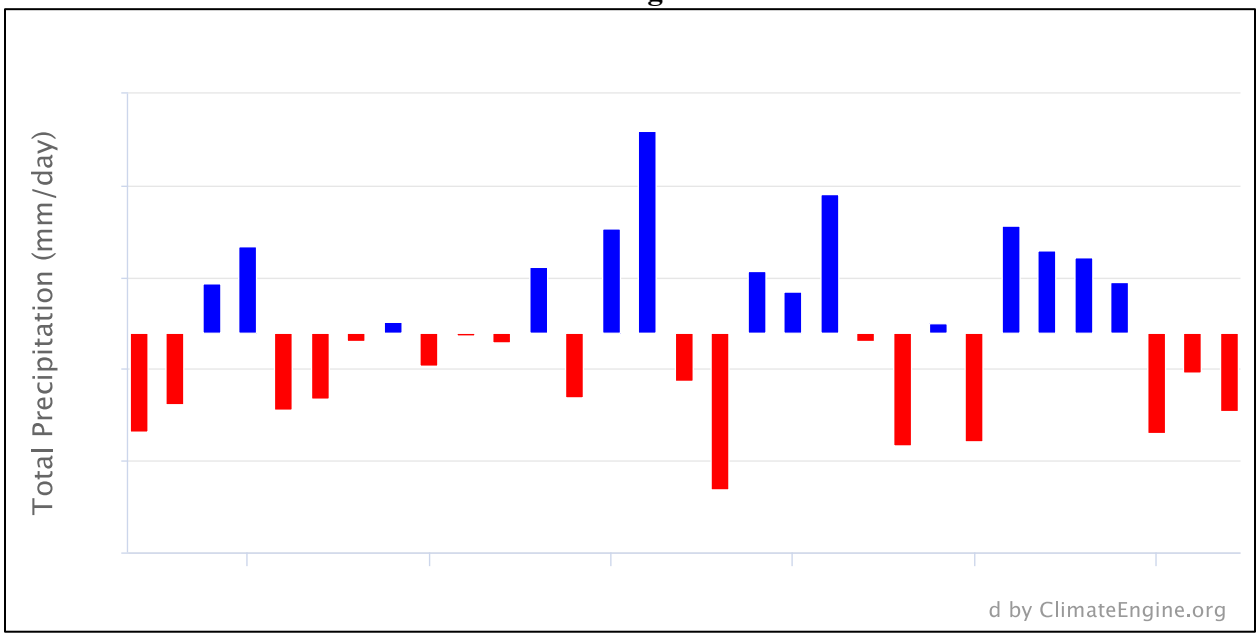


Figure 2.35 – Annual Mean Precipitation Levels for the South Fork Native American Reservation
1992 through 2022

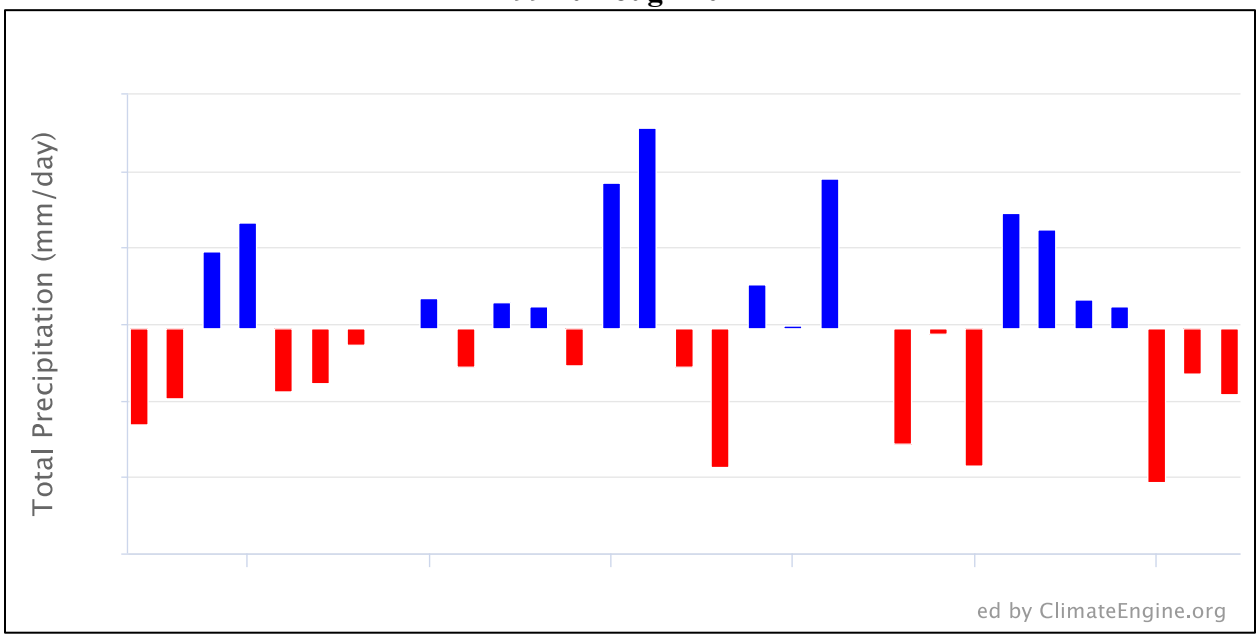


Figure 2.36 – Annual Mean Precipitation Levels for the Ruby Mountains 1992 through 2022

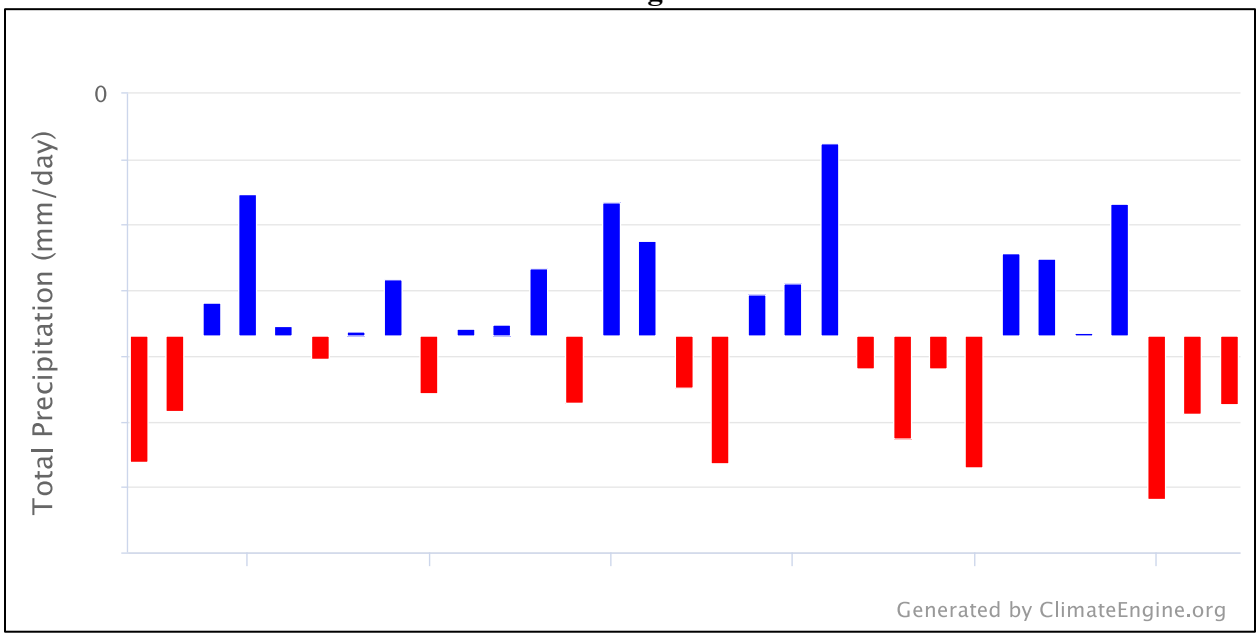
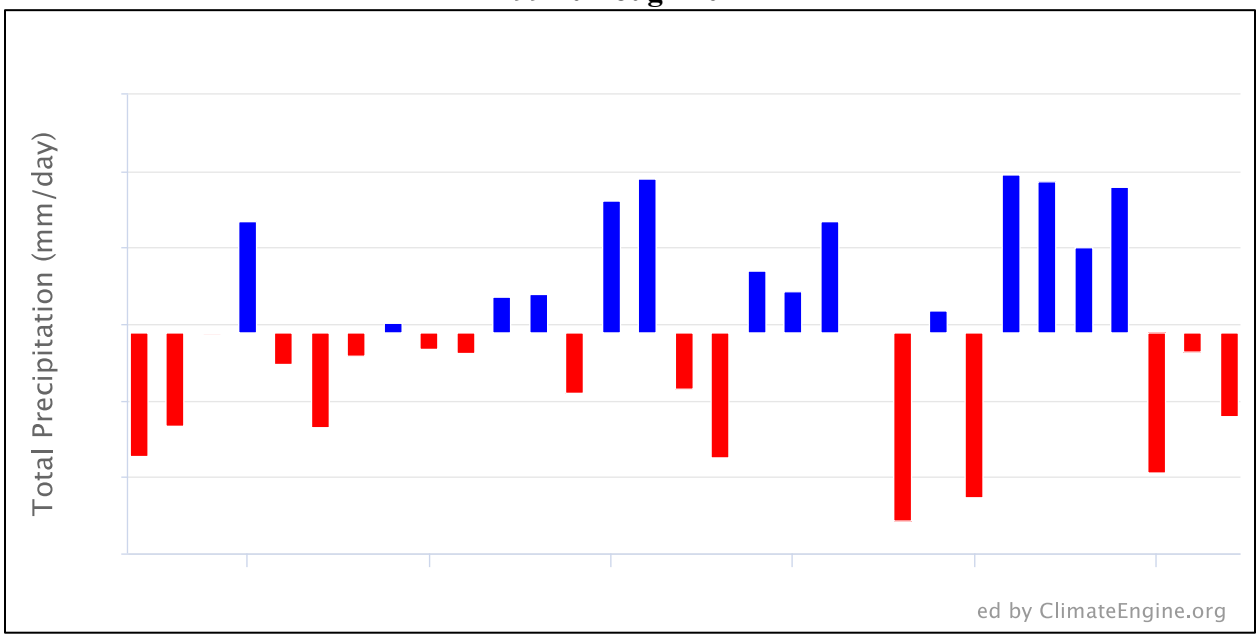


Figure 2.37 – Annual Mean Precipitation Levels for Lamoille Canyon 1992 through 2022



The highest annual mean precipitation level for the South Fork Native American Reservation between 1992 and 2022 was in 2006 at 111.48 milliliters and the lowest annual mean precipitation level for the South Fork Native American Reservation was in 2008 at 18.80 milliliters. Between 1992 and 2022, the highest annual mean precipitation level for the Ruby Mountains was in 2011 at 362.14 milliliters and the lowest annual mean precipitation level for the Ruby Mountains was in 2020 at 90.50 milliliters. The highest annual mean precipitation level for Lamoille Canyon was in 2016 at 148.91 milliliters and the lowest annual mean precipitation level for Lamoille Canyon was in 2013 at 35.90 milliliters.

Elko County has observed large swings in the annual mean precipitation over the past 30 years. Each area throughout Elko County has experienced their most dramatic increase in precipitation across various periods. Between 2006 and 2008, the City of Elko experienced an 88.82 millimeter decrease in precipitation levels while, between 2006 and 2013, the Spring Creek HOA experienced an 88.97 millimeter decrease in precipitation levels. Between 2006 and 2008, the City of Carlin experienced a 78.27 millimeter decrease in precipitation levels and, between 2006 and 2008, the South Fork Native American Reservation experienced a 92.68 millimeter decrease in precipitation levels. Between 2011 and 2020, the Ruby Mountains experienced a 271.64 millimeter decrease in precipitation levels and, between 2013 and 2016, Lamoille Canyon experienced a 113.01 millimeter increase in precipitation levels.

2.3.c Precipitation Patterns over the Past Three Years

Figure 2.38 through 2.43 presents the cumulative precipitation levels measured in inches for October through June over the past three years compared against the median average cumulative precipitation level between 2020, 2021, and 2022 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area. The median average precipitation level is based on data collected between 1980 and 2018.

An upward trend of the median average and observed cumulative precipitation levels for the City of Elko is observed. For the summer months for the City of Elko, the median average cumulative precipitation level increases from 0.0 inches in October to 8.1 inches in June. The cumulative precipitation levels for 2020, 2021, and 2022 respectively rise from 0.0 inches, 0.0 inches, and 0.0 inches in October to 5.5 inches, 6.2 inches, and 6.2 inches in June. The observed precipitation level for June 2020 for the City of Elko is lower than the median average. The observed precipitation level for June 2021 is lower than the median average and the observed precipitation level for June 2022 is lower than the median average. An upward trend of the median average and observed cumulative precipitation levels for the Spring Creek HOA is observed and, for the summer months for the Spring Creek HOA, the median average cumulative precipitation level increases from 0.0 inches in October to 10.2 inches in June. The cumulative precipitation levels for 2020, 2021, and 2022 respectively rise from 0.0 inches, 0.0 inches, and 0.0 inches in October to 6.9 inches, 7.4 inches, and 8.7 inches in June. For the Spring Creek HOA, the observed precipitation level for June 2020 is lower than the median average. The observed precipitation level for June 2021 is lower than the median average and the observed precipitation level for June 2022 is lower than the median average.

Figure 2.38 – Cumulative Precipitation Levels, City of Elko
2020 through 2022

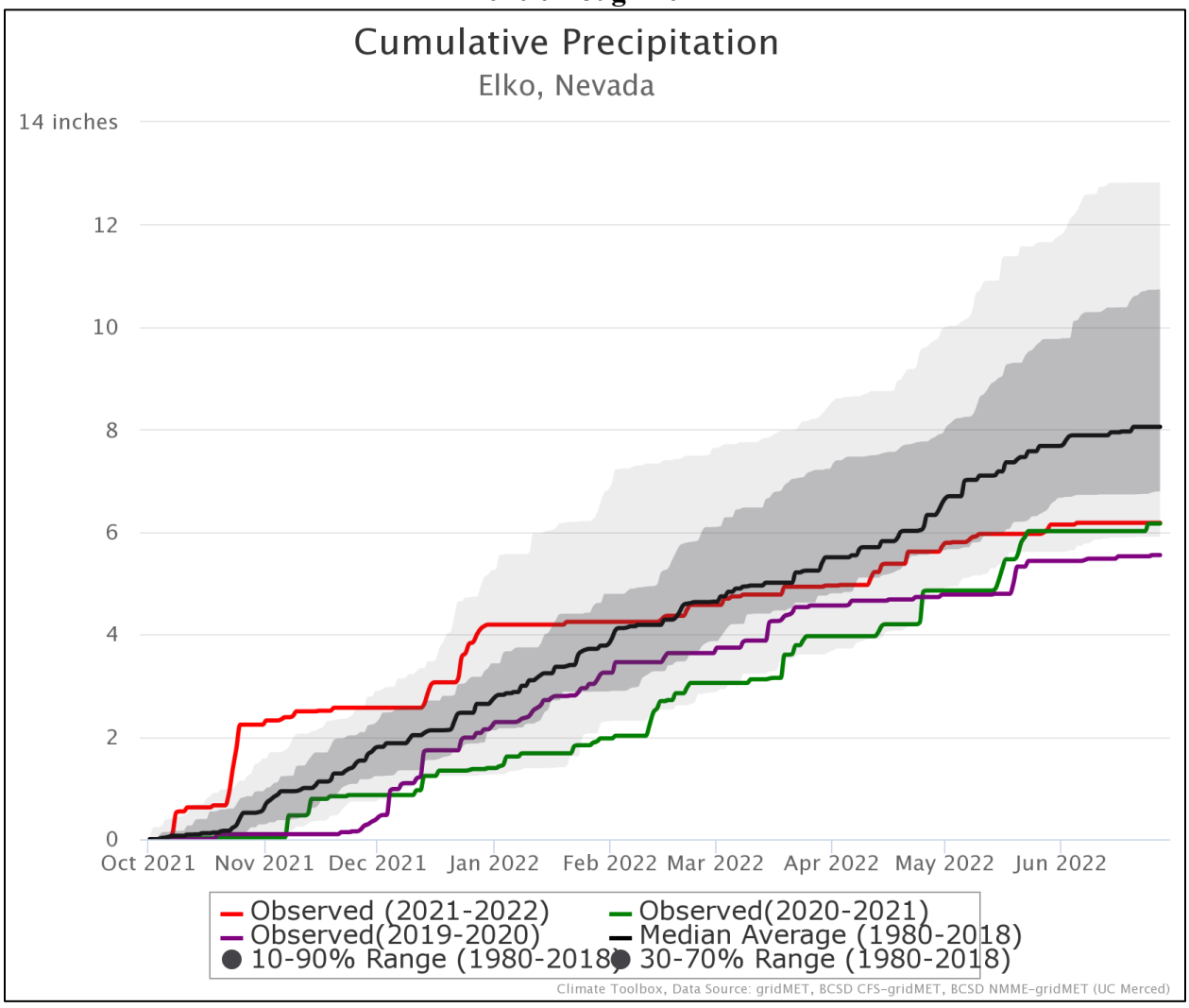


Figure 2.39 – Cumulative Precipitation Levels, Spring Creek HOA 2020 through 2022

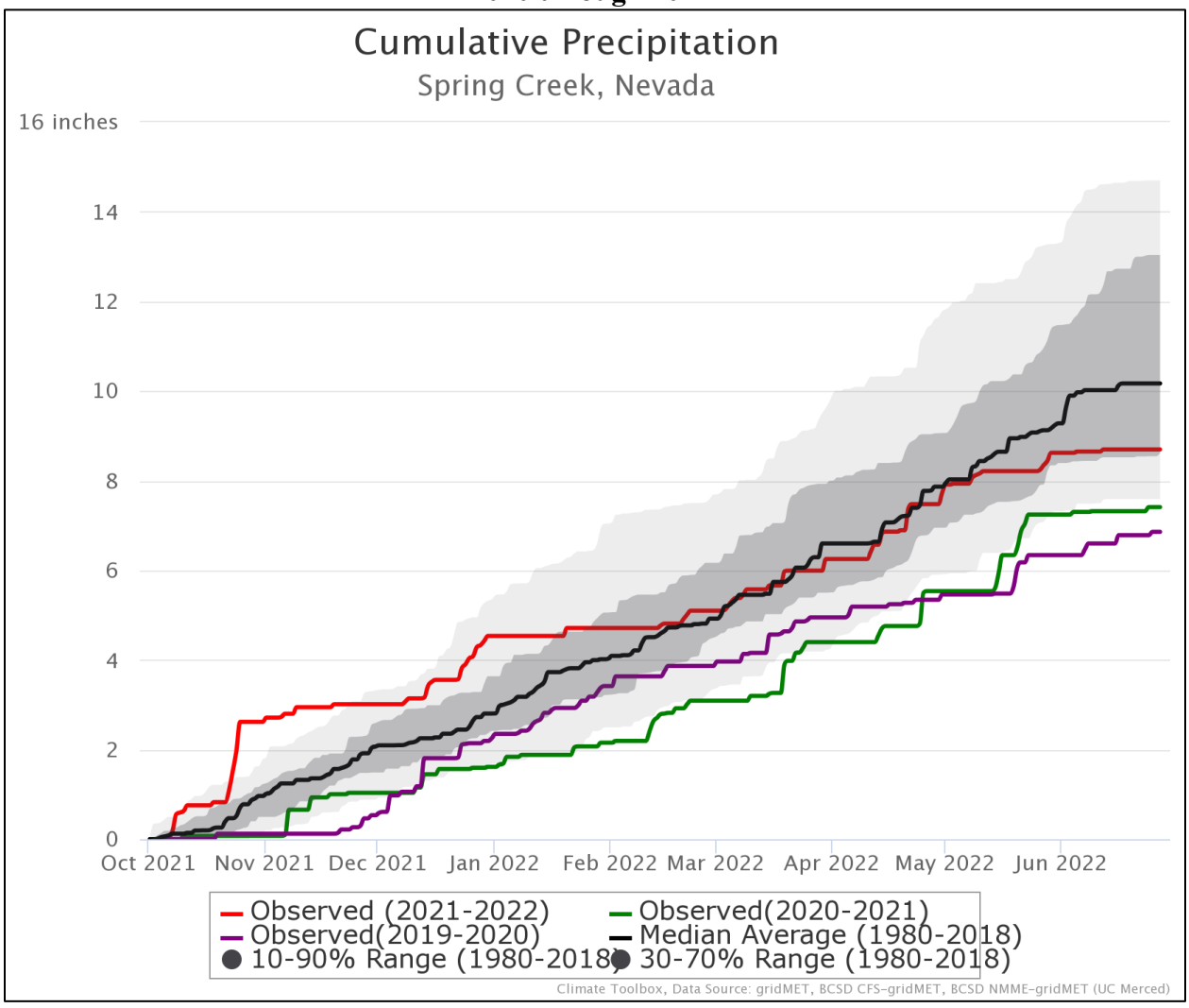


Figure 2.40 – Cumulative Precipitation Levels, City of Carlin 2020 through 2022

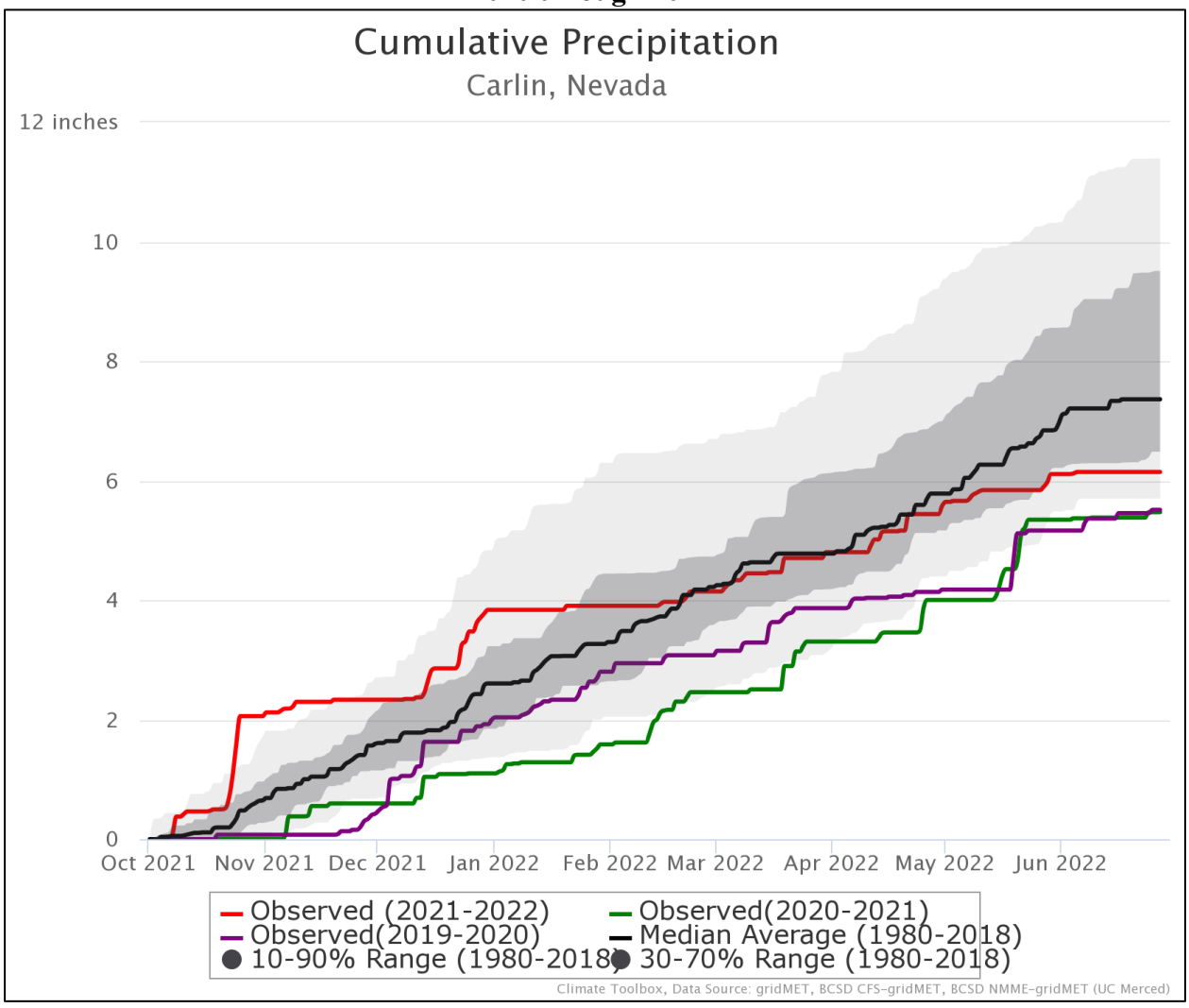


Figure 2.41 – Cumulative Precipitation Levels, South Fork Native American Reservation 2020 through 2022

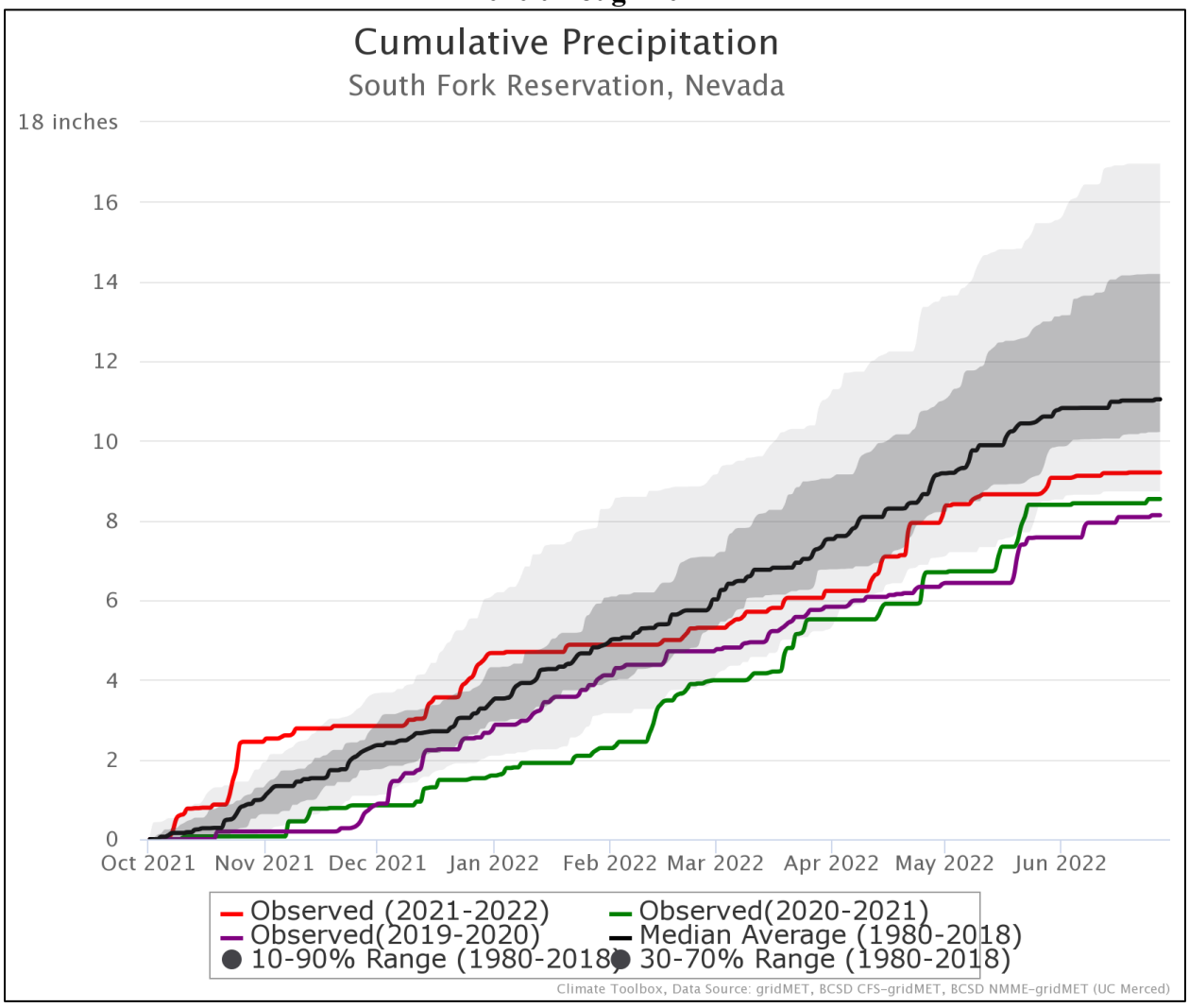


Figure 2.42 – Cumulative Precipitation Levels, Ruby Mountains 2020 through 2022

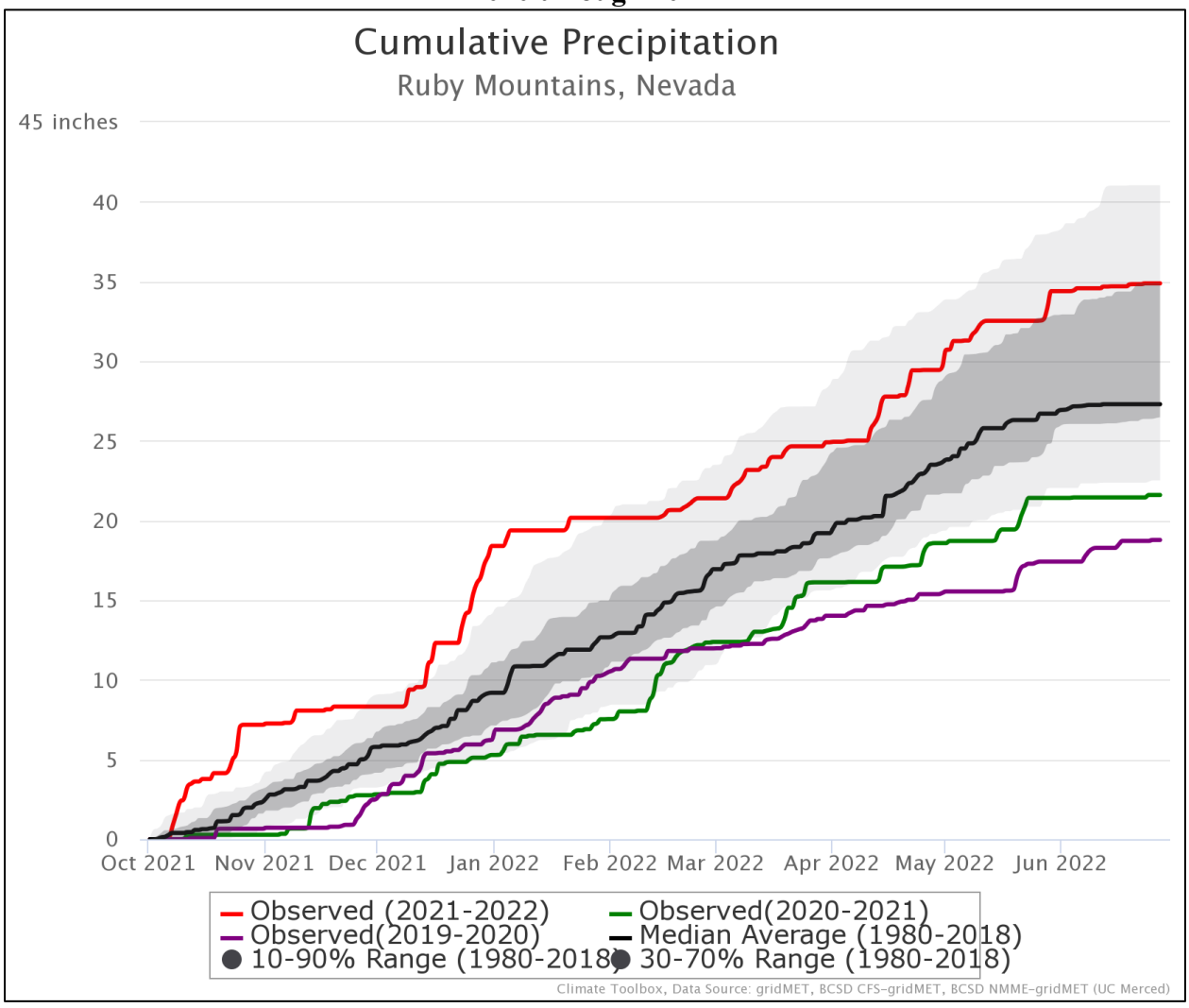
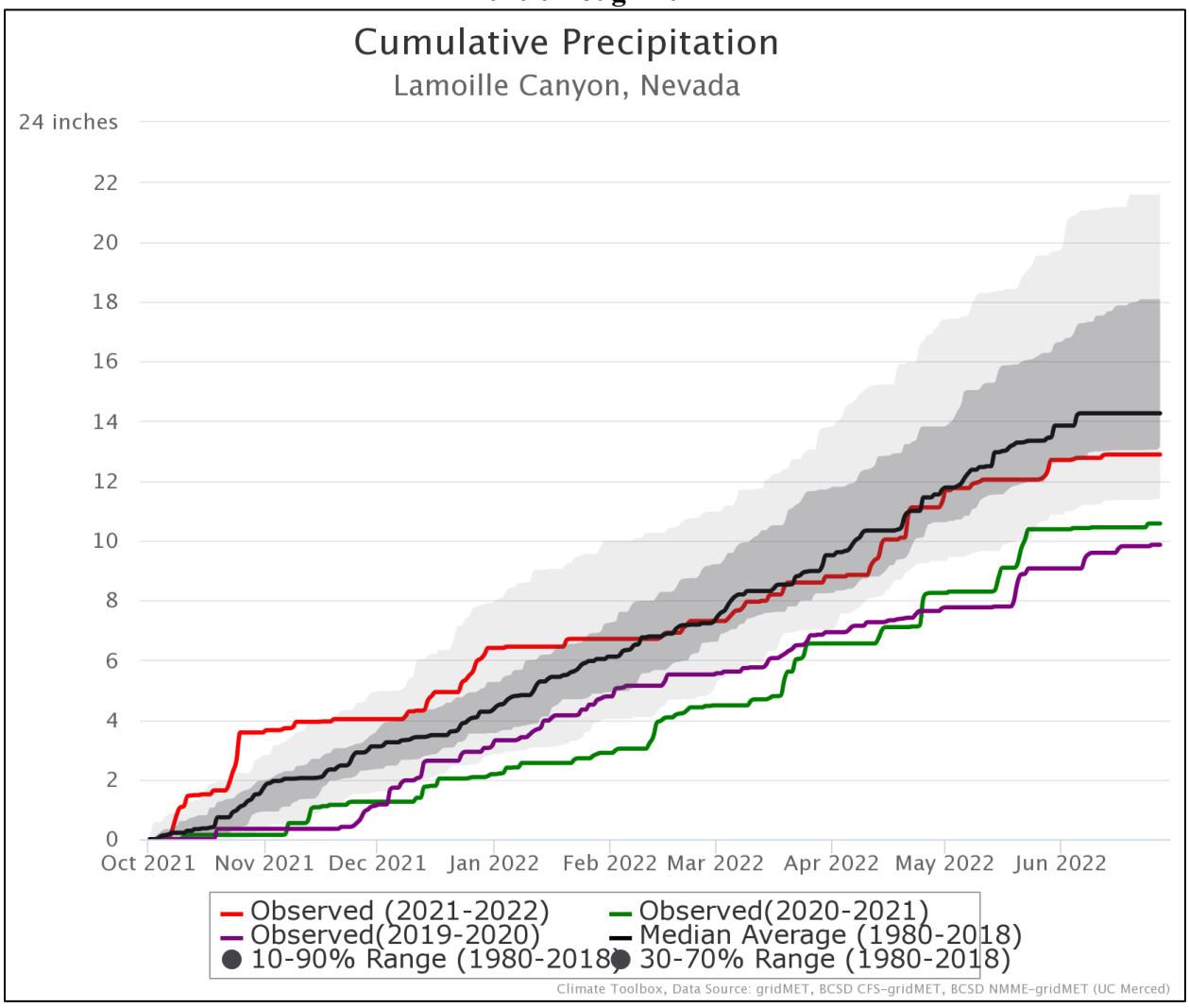


Figure 2.43 – Cumulative Precipitation Levels, Lamoille Canyon 2020 through 2022



An upward trend of the median average and observed cumulative precipitation levels for the City of Carlin is observed and, for the summer months for the City of Carlin, the median average cumulative precipitation level increases from 0.0 inches in October to 7.4 inches in June. The cumulative precipitation levels for 2020, 2021, and 2022 respectively rise from 0.0 inches, 0.0 inches, and 0.0 inches in October to 5.5 inches, 5.5 inches, and 6.1 inches in June. The observed precipitation level for June 2020 for the City of Carlin is lower than the median average. The observed precipitation level for June 2021 is lower than the median average and the observed precipitation level for June 2022 is lower than the median average. An upward trend of the median average and observed cumulative precipitation levels for the South Fork Native American Reservation is observed. For the South Fork Native American Reservation, the median average cumulative precipitation level increases from 0.0 inches in October to 11.0 inches in June. The cumulative precipitation levels for 2020, 2021, and 2022 respectively rise from 0.0 inches, 0.0 inches, and 0.0 inches in October to 8.1 inches, 8.5 inches, and 9.2 inches in June. The observed precipitation level for June 2020 for the South Fork Native American Reservation is lower than the median average. The observed precipitation level for June 2021 is lower than the median average and the observed precipitation level for June 2022 is lower than the median average.

For the summer months for the Ruby Mountains, the median average cumulative precipitation level increases from 0.0 inches in October to 27.3 inches in June and an upward trend of the median average and observed cumulative precipitation levels for the Ruby Mountains is observed. The cumulative precipitation levels for 2020, 2021, and 2022 respectively rise from 0.0 inches, 0.0 inches, and 0.0 inches in October to 18.8 inches, 21.6 inches, and 34.9 inches in June. The observed precipitation level for June 2020 for the Ruby Mountains is lower than the median average. The observed precipitation level for June 2021 is lower than the median average and the observed precipitation level for June 2022 is higher than the median average. An upward trend of the median average and observed cumulative precipitation levels for the Lamoille Canyon is observed and, for the summer months for Lamoille Canyon, the median average cumulative precipitation level increases from 0.0 inches in October to 14.3 inches in June. The cumulative precipitation levels for 2020, 2021, and 2022 respectively rise from 0.0 inches, 0.0 inches, and 0.0 inches in October to 9.9 inches, 10.6 inches, and 12.9 inches in June. The observed precipitation level for June 2020 for Lamoille Canyon is lower than the median average. The observed precipitation level for June 2021 is lower than the median average and the observed precipitation level for June 2022 is lower than the median average.

2.4 Wind

Wind speed is a crucial factor affecting fire danger because wind will determine the rate of spread and direction of a fire. Wind may influence fire danger based on factors such as movement of moist air towards or away from fuels, carrying burning embers, bending the convection column, and influencing the supply of oxygen a fire may receive. Wind speed will vary based on the data analyzed between 1992 and 2022. Current data on the impact that wind factors have had on area fires in Elko County and new high wind speeds will be presented at the end of this sub-section.

2.4.a Elko County's Wind Speed

Figure 2.44 presents the high and low points for annual mean wind speed levels measured in miles per hour in Elko County over the past thirty years. The City of Elko is highlighted in red, the Spring Creek HOA is highlighted in orange, the City of Carlin is highlighted in blue, the South Fork Native American Reservation is highlighted in yellow, the Ruby Mountains is highlighted in purple, and Lamoille Canyon is highlighted in green. The wind speed levels for each of these areas fall between a 6.8 miles per hour and 10.40 miles per hour.

Figure 2.44 – Annual Mean Wind Speed Levels for Elko County, Nevada 1992 through 2022

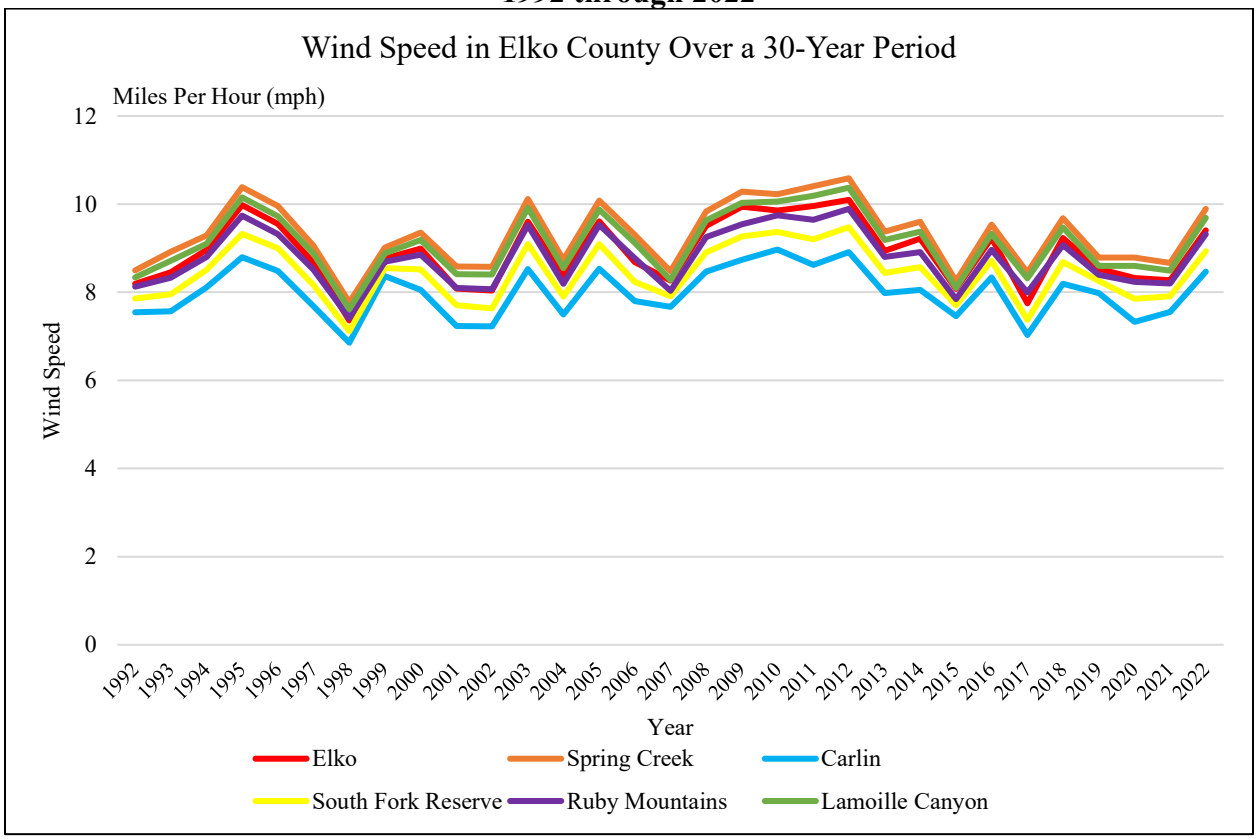


Table 2.8 presents the raw annual wind speed data used in Figure 2.44 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon for each year between 1992 and 2022.

The least windiest year, for all the areas located throughout Elko County between 1992 and 2022 was in 1998. In 1998, the City of Elko recorded 7.36 mile per hour winds, the Spring Creek HOA experienced 7.77 mile per hour winds, and the City of Carlin experienced 6.86 mile per hour winds. The South Fork Native American Indian Reservation experienced 7.12 mile per

hour winds in 1998, the Ruby Mountains experienced 7.41 mile per hour winds, and Lamoille Canyon experienced 7.62 mile per hour winds.

Table 2.8 – Raw Data for Wind Speed in Miles Per Hour Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon) 1992 through 2022						
Year	**City of Elko**	**Spring Creek**	**City of Carlin**	**South Fork Reservation**	**Ruby Mountains**	**Lamoille Canyon**
1992	8.1905	8.4947	7.5486	7.8607	8.1269	8.3402
1993	8.4505	8.9165	7.5673	7.9487	8.3307	8.7134
1994	8.9636	9.2911	8.1115	8.5148	8.8043	9.0971
1995	9.9762	10.3885	8.7912	9.3232	9.7398	10.1538
1996	9.5476	9.9570	8.4814	8.9973	9.3143	9.7234
1997	8.6726	9.0577	7.6846	8.1596	8.5126	8.8716
1998	7.3594	7.7717	6.8554	7.1169	7.4133	7.6152
1999	8.7635	9.0136	8.3667	8.5448	8.6897	8.8795
2000	8.9910	9.3530	8.0507	8.5194	8.8524	9.1834
2001	8.0848	8.5843	7.2350	7.7055	8.0989	8.4120
2002	8.0426	8.5750	7.2295	7.6353	8.0658	8.4031
2003	9.6017	10.1161	8.5270	9.0937	9.5206	9.9135
2004	8.3829	8.7342	7.4934	7.8997	8.1900	8.5470
2005	9.6092	10.0817	8.5297	9.0909	9.5301	9.8742
2006	8.6881	9.3037	7.8016	8.2321	8.7698	9.1207
2007	8.2632	8.4767	7.6657	7.9052	8.0333	8.2811
2008	9.5048	9.8365	8.4708	8.9001	9.2492	9.6317
2009	9.9455	10.2833	8.7335	9.2679	9.5400	10.0311
2010	9.8548	10.2251	8.9695	9.3710	9.7494	10.0561
2011	9.9583	10.4055	8.6216	9.2011	9.6475	10.1903
2012	10.0962	10.5869	8.9132	9.4767	9.8922	10.3725
2013	8.9403	9.3735	7.9806	8.4357	8.7990	9.1848
2014	9.2184	9.5974	8.0505	8.5688	8.9128	9.3771
2015	8.0773	8.2517	7.4569	7.7084	7.8407	8.1008
2016	9.2312	9.5344	8.3346	8.7142	8.9623	9.3273
2017	7.7473	8.4482	7.0314	7.3744	7.9971	8.3177
2018	9.2311	9.6822	8.1947	8.6868	9.0671	9.4697
2019	8.5302	8.7837	7.9784	8.2543	8.3923	8.6010
2020	8.3251	8.7874	7.3260	7.8517	8.2319	8.5973
2021	8.2692	8.6607	7.5497	7.9076	8.2021	8.4892

Climate Engine: Climate and Hydrology; Dataset- gridMET Daily

In contrast, 2012 was the windiest year, on average, for the areas in Elko County except for the City of Carlin which experienced its windiest year in 2010. In 2012, the City of Elko recorded 10.10 mile per hour winds, the Spring Creek HOA experienced 10.59 mile per hour winds, and

the South Fork Native American Indian Reservation experienced 9.48 mile per hour winds. In 2012, the Ruby Mountains experienced 9.89 mile per hour winds and Lamoille Canyon experienced 10.37 mile per hour winds. In 2010, the City of Carlin recorded 8.97 mile per hour winds.

2.4.b Recorded Wind Speeds Between 1992 and 2022 for Each Area

Figure 2.45 through Figure 2.50 presents the annual mean wind speed levels over the past 30 years for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon Area.

The highest annual mean wind speed for the City of Elko was in 2012 at 10.10 miles per hour and the lowest annual mean wind speed for the City of Elko was in 1998 at 7.36 miles per hour. The highest annual mean wind speed for the Spring Creek HOA was in 2012 at 10.59 miles per hour and the lowest annual mean wind speed for the Spring Creek HOA was in 1998 at 7.77 miles per hour. Between 1992 and 2022, the highest annual mean wind speed for the City of Carlin was in 2010 at 8.97 miles per hour and the lowest annual mean wind speed for the City of Carlin was in 1998 at 6.86 miles per hour. The highest annual mean wind speed for the South Fork Native American Reservation was in 2012 at 9.48 miles per hour and the lowest annual mean wind speed for the South Fork Native American Reservation was in 1998 at 7.12 miles per hour.

Figure 2.45 – Annual Mean Wind Speed Levels, City of Elko
1992 through 2022

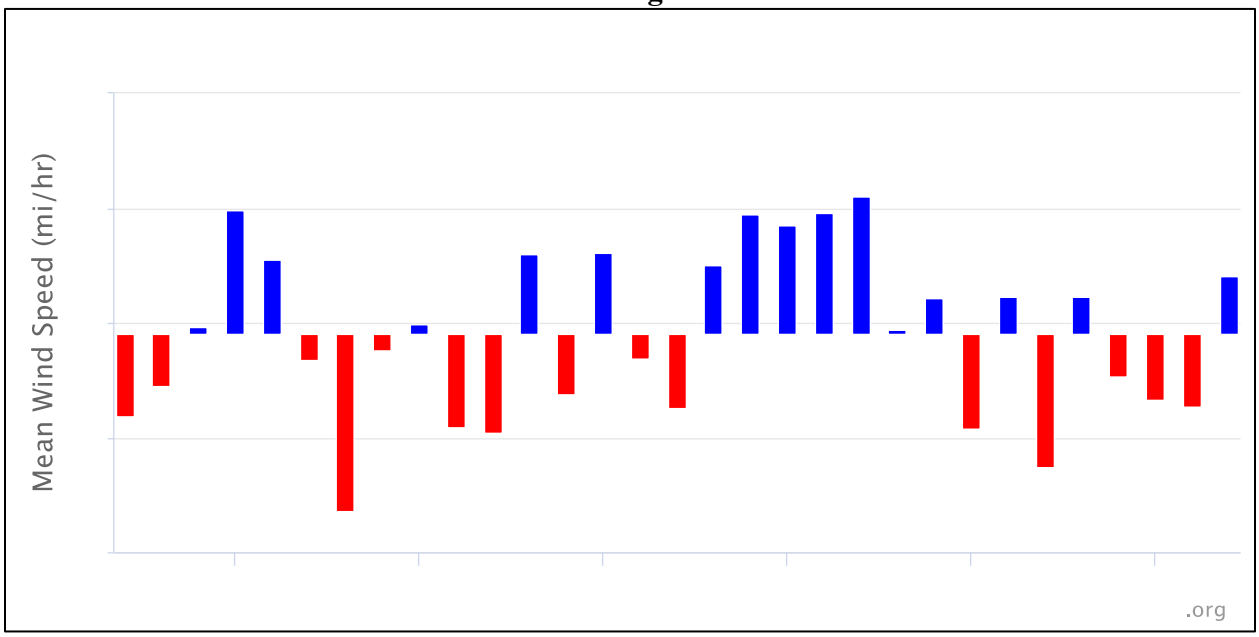


Figure 2.46 – Annual Mean Wind Speed Levels, Spring Creek HOA
1992 through 2022

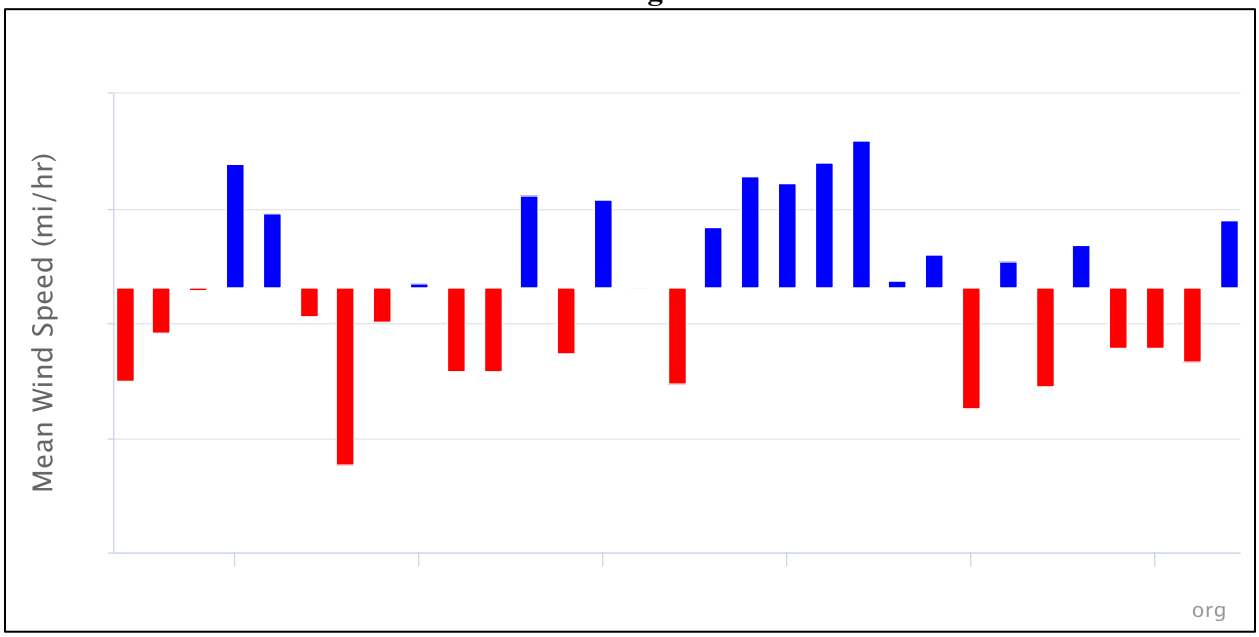


Figure 2.47 – Annual Mean Wind Speed Levels, City of Carlin
1992 through 2022

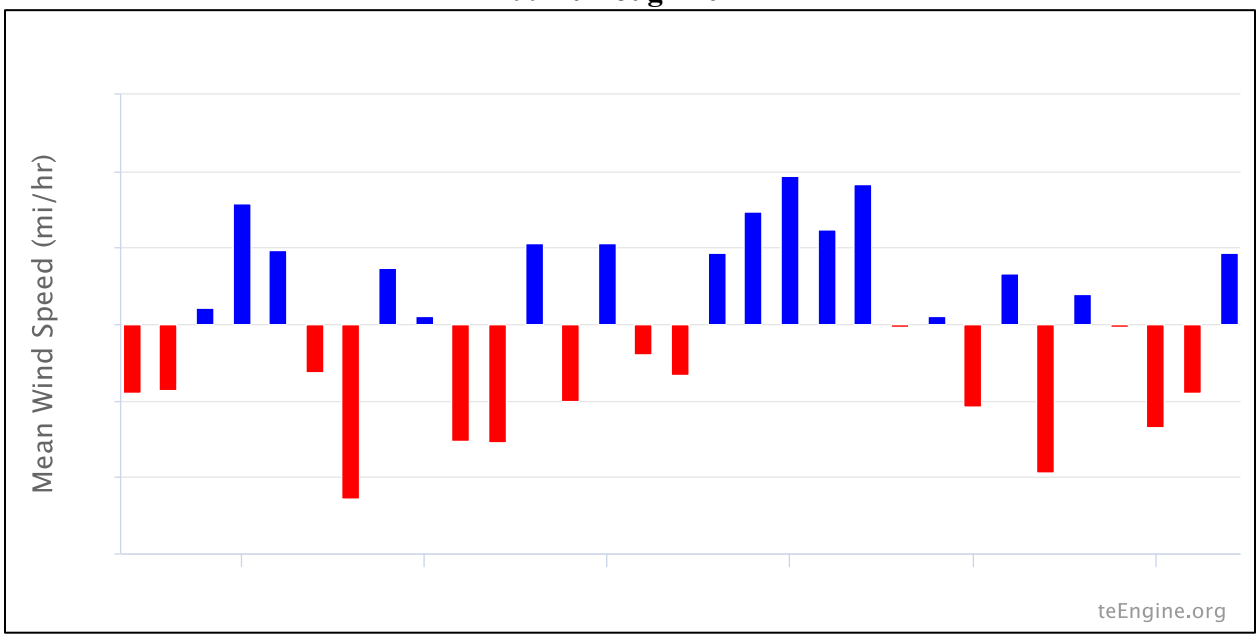


Figure 2.48 – Annual Mean Wind Speed Levels, South Fork Native American Reservation 1992 through 2022

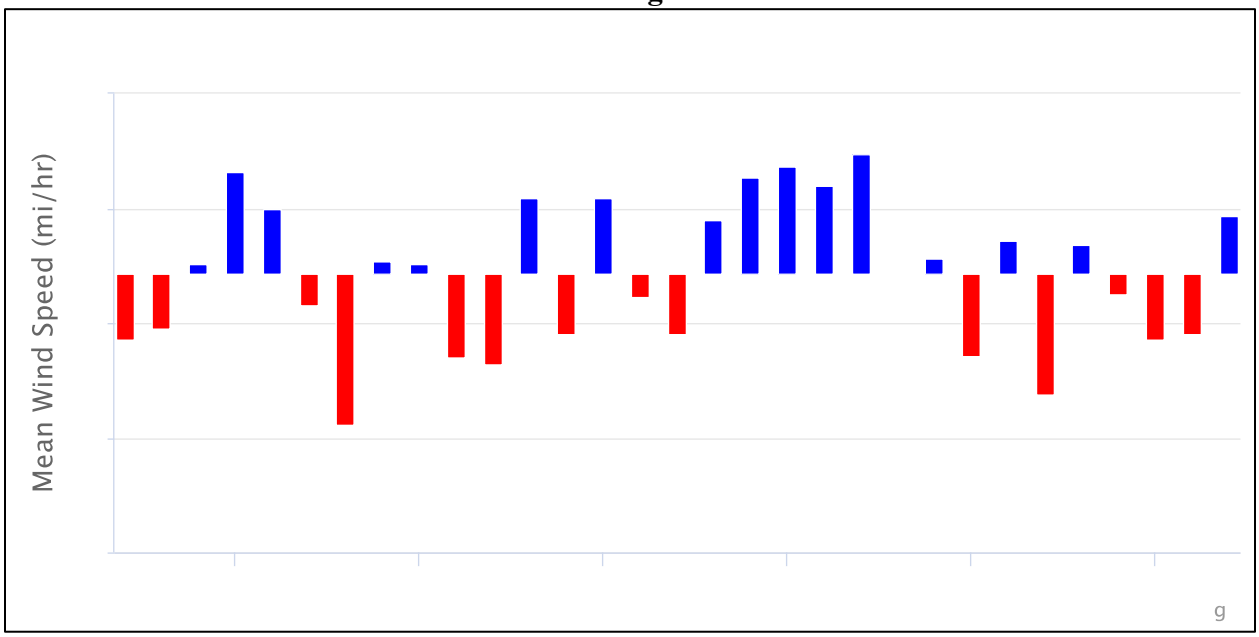


Figure 2.49 – Annual Mean Wind Speed Levels, Ruby Mountains 1992 through 2022

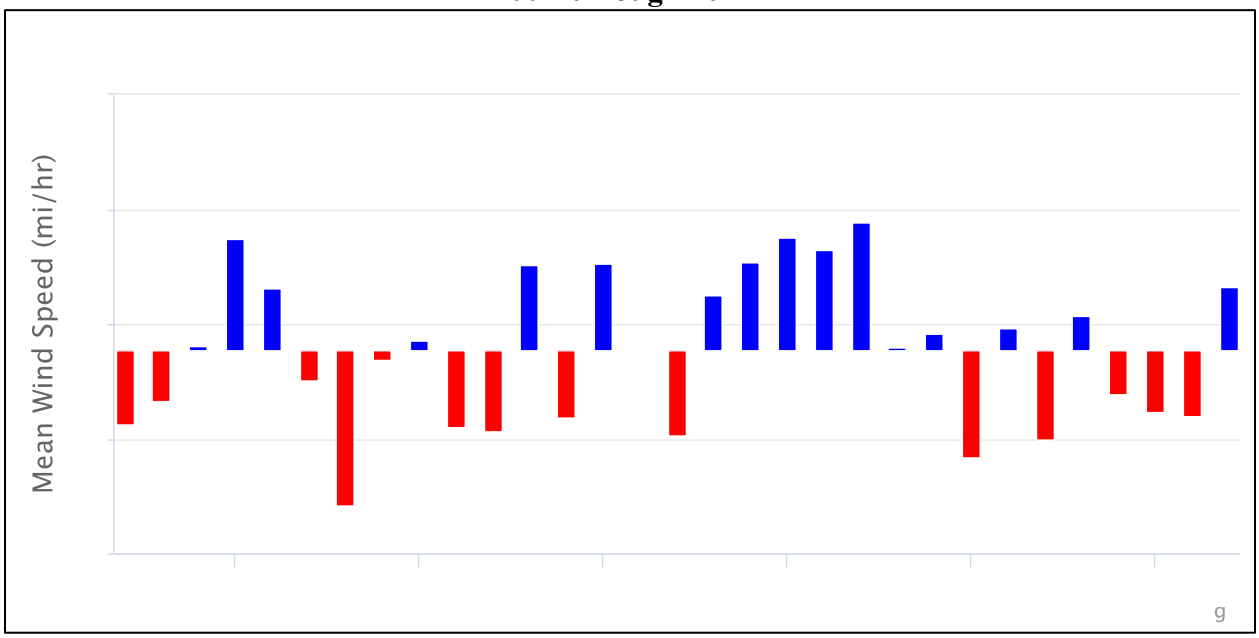
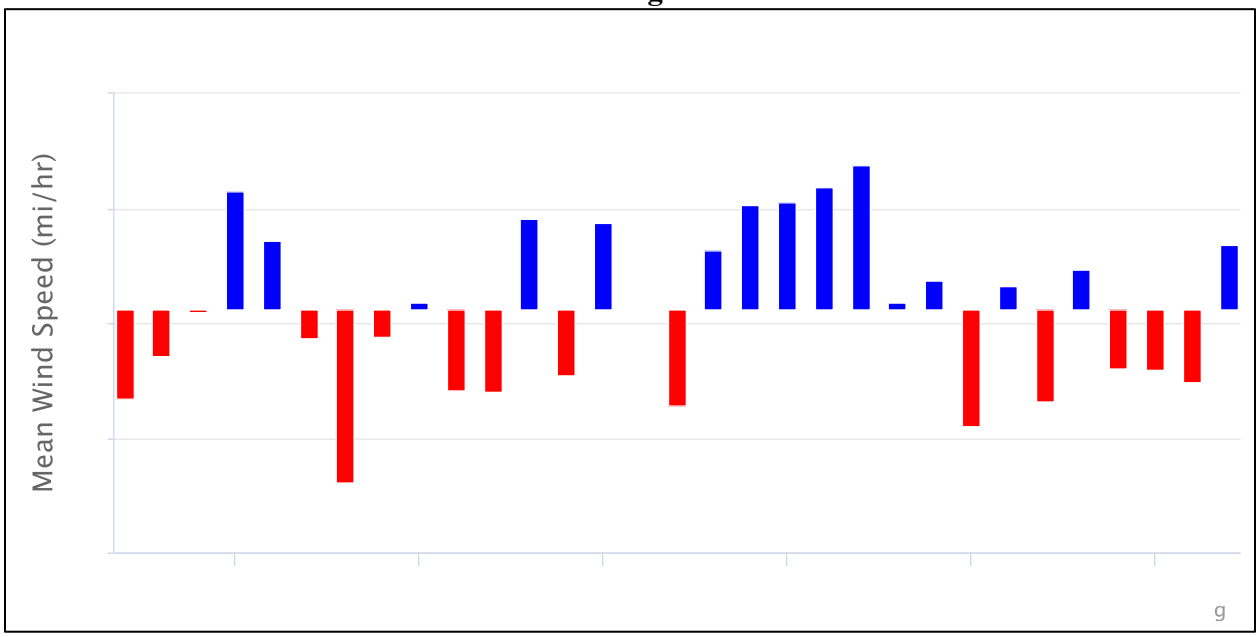


Figure 2.50 – Annual Mean Wind Speed Levels, Lamoille Canyon
1992 through 2022



Between 1992 and 2022, the highest annual mean wind speed for the Ruby Mountains was in 2012 at 9.89 miles per hour and the lowest annual mean wind speed for the Ruby Mountains was in 1998 at 7.41 miles per hour. The highest annual mean wind speed for Lamoille Canyon was in 2012 at 10.37 miles per hour and the lowest annual mean wind speed for the Lamoille Canyon was in 1998 at 7.62 miles per hour.

Elko County has experienced large swings in the annual mean wind speed over the past 30 years. Each area has experienced their most dramatic increase in the wind speed over a 14-year period except for the City of Carlin, which experienced its most dramatic increase in wind speed over a 13-year period. Between 1998 and 2012, the City of Elko experienced a 2.74 mile per hour increase in wind speed and the Spring Creek HOA experienced a 2.82 mile per hour increase in wind speed. Between 1998 and 2011, the City of Carlin experienced a 2.11 mile per hour increase wind speed. For the South Fork Native American Resource, this area experienced a 2.36 mile per hour increase in the wind speed between 1998 and 2012 and, over the same 1998 to 2012 period, the Ruby Mountains experienced a 2.48 mile per hour increase in wind speed. Between 1998 and 2012, the Lamoille Canyon area experienced a 2.75 mile per hour increase in the wind speed.

2.4.c Current Data on Wind Speed

Table 2.9 presents recent data on high wind speed reports for May 2, 2022 for Elko County. The highlighted rows indicate focus areas including the City of Elko, the Spring Creek HOA, the City of Carlin, and the Ruby Mountains.

Table 2.9 – Recently Recorded Wind Speeds for Parts of Elko County Highest Wind Reports from 3 AM PDT Monday May 2, 2022, TO 3 AM PDT Tuesday May 2, 2022		
Location	**Speed (MPH)**	**Elevation (Ft.)**
SOUTHWEST ELKO COUNTY		
COAL MINE CANYON N7NNV CWOP	62	5,549
ELKO AIRPORT ASOS	61	5,048
5.0 E CARLIN	57	5,049
5.0 E CARLIN	57	4,989
4.1 SW ELKO	51	5,045
5.3 E CARLIN	50	4,951
5.3 E CARLIN	50	4,977
SR-227 SP CRK ROUNDABOUT MM1	49	5,452
6.7 E RYNDON	48	5,329
6.7 E RYNDON	48	5,329
2.5 NE DEETH	45	5,394
CRANE SPRINGS RAWS	43	6,414
ELKO	43	5,229
ELKO	41	5,237
SPRING CREEK	36	5,609
SOUTHEASTERN ELKO COUNTY		
SPRING GULCH RAWS	65	5,470
7.3 NW WEST WENDOVER	62	4,650
SOUTH CENTRAL ELKO COUNTY		
4.1 SW RUBY VALLEY	61	6,213
6.3 S CLOVER VALLEY	60	5,794
0.6 W PEQUOP SUMMIT	55	6,954
0.6 W PEQUOP SUMMIT	55	6,954
RUBY LAKE RAWS	53	5,970
11.1 NW CURRIE	43	6,354
SPRUCE MOUNTAIN RAWS	42	6,295
2.3 E WELLS	42	5,845
2.3 E WELLS	40	5,845
3.5 E CLOVER VALLEY	39	5,645
RUBY	30	6,000
RUBY MOUNTAINS AND EAST HUMBOLDT RANGE		
RUBY VALLEY RAWS	57	6,899
NORTHERN ELKO COUNTY		
LONG HOLLOW RAWS	48	5,819
ANTELOPE LAKE RAWS	43	5,459
STAG MOUNTAIN RAWS	42	6,790
10.8 S CONTACT	41	5,668
POLE CREEK RAWS	38	8,501
ROCK SPRING CREEK RAWS	38	5,427
CHARLESTON	37	6,046
1.6 S MOUNTAIN CITY	37	5,766
12.4 NE WELLS	36	6,001

Source: NOAA's National Weather Service

High wind speeds for May 2, 2022, show a range between 30 to 61 miles per hour for various areas in Elko County. The City of Elko in Southwest Elko County had wind speeds of 51 miles per hour at an elevation of 5,045 feet, wind speeds of 43 miles per hour at an elevation of 5,229 feet, and wind speeds of 41 miles per hour at an elevation of 5,237 feet. The Spring Creek HOA in Southwest Elko County had wind speeds of 36 miles per hour at an elevation of 5,609 feet. The City of Carlin in Southwest Elko County had wind speeds of 57 miles per hour at an elevation of 5,049 feet, wind speeds of 57 miles per hour at an elevation of 4,989 feet, wind speeds of 50 miles per hour at an elevation of 4,951 feet, and wind speeds of 50 miles per hour at an elevation of 4,977 feet.

The Ruby Mountains in Southcentral Elko County had wind speeds of 61 miles per hour at an elevation of 6,213 feet and wind speeds of 30 miles per hour at an elevation of 6,000 feet. The Ruby Mountains in the Ruby Mountain and East Humboldt Range had wind speeds of 57 miles per hour at an elevation of 6,899 feet. The Spring Creek HOA in Northern Elko County had wind speeds of 38 miles per hour at an elevation of 5,427 feet. The Southwest Ruby Valley, the Ruby Valley Raws, and East Carlin had the highest wind speeds at 61 miles per hour, 57 miles per hour, and 57 miles per hour, respectively. Ruby, Spring Creek, and the Rock Spring Creek Raws had the lowest wind speeds at 30 miles per hour, 36 miles per hour, and 38 miles per hour, respectively.

2.5 Humidity

Vapor pressure deficit is the difference between the maximum amount of water the air can hold and the amount it truly holds. Vapor pressure deficit is one method to measure the humidity in an environment and allows the measurement of the impact of humidity on plant growth. It is also a way to measure plant empowerment, or cultivation. The rate at which fuels dry is how vapor pressure deficit affects fire behavior. Vapor pressure deficit will be analyzed in this sub-section for a 30-year time span, between 1992 and 2022, and more closely over the past three years. Vapor pressure deficit has substantially increased in the Elko County area, corresponding with increased fire danger.

2.5.a Elko County's Vapor Pressure Deficit

Figure 2.51 illustrates the high and low points for annual mean vapor pressure deficit levels measured in kilopascals (kPa) in Elko County over the past 30 years between 1992 and 2022. The City of Elko is highlighted in red, the Spring Creek HOA is highlighted in orange, the City of Carlin is highlighted in blue, the South Fork Native American Reservation is highlighted in yellow, the Ruby Mountains is highlighted in purple, and Lamoille Canyon is highlighted in green. The kPa levels for each of these areas show to fall between a range of 0.20 kPa and 1.04 kPa.

Figure 2.51 – Vapor Pressure Deficit for Parts of Elko County 1992 through 2022

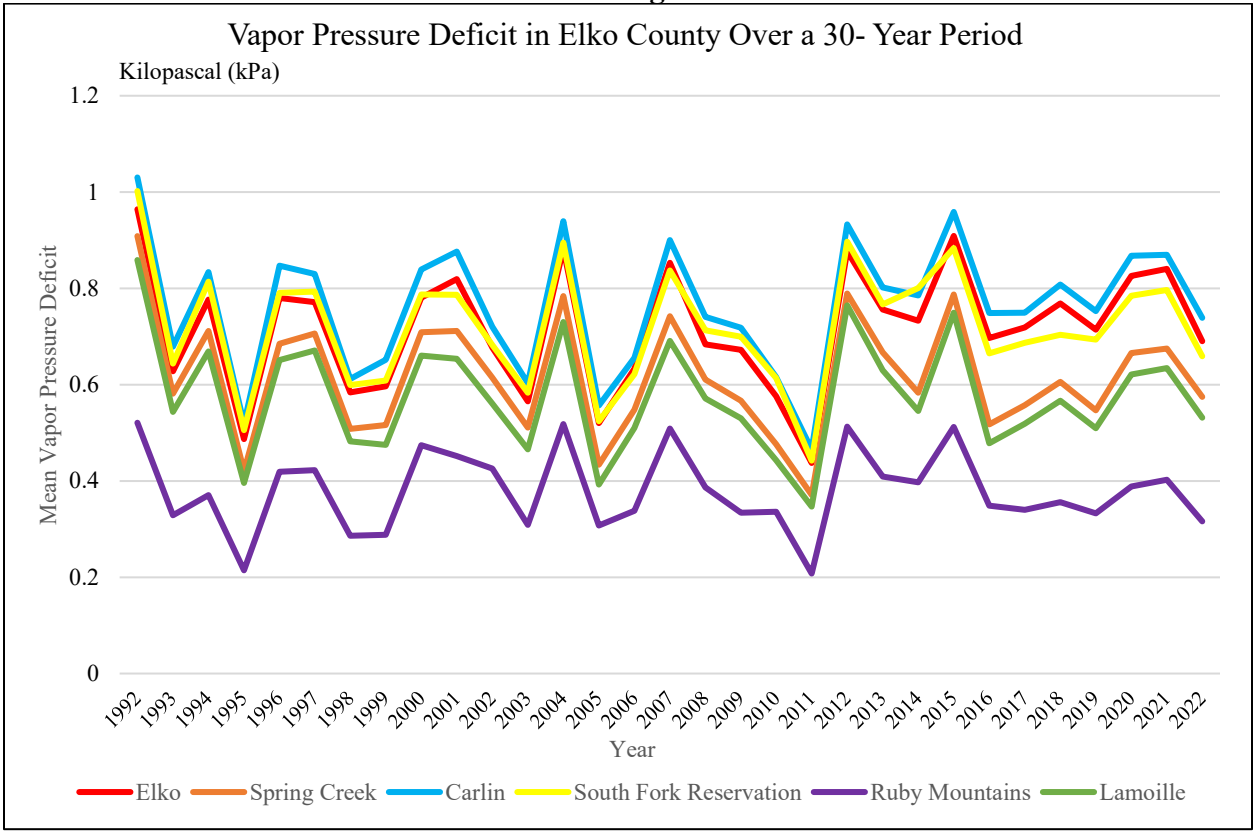


Table 2.10 presents the raw vapor pressure deficit data used in Figure 2.51 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon from 1992- 2022.

Table 2.10 – Raw Data for Vapor Pressure Deficit in kPa
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)
1992 through 2022

Year	City of Elko	Spring Creek	City of Carlin	South Fork Reservation	Ruby Mountains	Lamoille Canyon
1992	0.9642	0.9085	1.0303	1.0022	0.5209	0.8588
1993	0.6281	0.5812	0.6788	0.6434	0.3286	0.5432
1994	0.7768	0.7114	0.8339	0.8139	0.3704	0.6692
1995	0.4868	0.4204	0.5189	0.5053	0.2143	0.3959
1996	0.7799	0.6846	0.8470	0.7903	0.4188	0.6509
1997	0.7716	0.7060	0.8297	0.7935	0.4224	0.6713
1998	0.5839	0.5081	0.6121	0.5990	0.2861	0.4825
1999	0.5966	0.5164	0.6516	0.6084	0.2880	0.4749

Table 2.10 Cont'd – Raw Data for Vapor Pressure Deficit in kPa Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon) 1992 through 2022						
Year	**City of Elko**	**Spring Creek**	**City of Carlin**	**South Fork Reservation**	**Ruby Mountains**	**Lamoille Canyon**
2000	0.7804	0.7091	0.8389	0.7875	0.4742	0.6604
2001	0.8195	0.7112	0.8763	0.7863	0.4517	0.6538
2002	0.6768	0.6146	0.7201	0.6821	0.4255	0.5605
2003	0.5650	0.5105	0.6033	0.5831	0.3088	0.4659
2004	0.8822	0.7837	0.9392	0.8947	0.5178	0.7298
2005	0.5204	0.4340	0.5567	0.5239	0.3073	0.3924
2006	0.6330	0.5480	0.6560	0.6215	0.3381	0.5100
2007	0.8529	0.7422	0.9000	0.8370	0.5087	0.6909
2008	0.6834	0.6105	0.7405	0.7128	0.3866	0.5711
2009	0.6721	0.5666	0.7180	0.6993	0.3341	0.5298
2010	0.5759	0.4763	0.6156	0.6141	0.3362	0.4430
2011	0.4373	0.3709	0.4653	0.4422	0.2077	0.3467
2012	0.8773	0.7893	0.9327	0.8972	0.5127	0.7647
2013	0.7558	0.6670	0.8016	0.7665	0.4094	0.6299
2014	0.7328	0.5830	0.7854	0.8003	0.3973	0.5455
2015	0.9090	0.7871	0.9587	0.8834	0.5122	0.7495
2016	0.6968	0.5177	0.7487	0.6651	0.3489	0.4785
2017	0.7187	0.5573	0.7497	0.6870	0.3397	0.5185
2018	0.7690	0.6057	0.8080	0.7035	0.3562	0.5668
2019	0.7145	0.5470	0.7525	0.6937	0.3327	0.5095
2020	0.8260	0.6655	0.8677	0.7847	0.3883	0.6213
2021	0.8402	0.6752	0.8700	0.7968	0.4023	0.6347

Climate Engine: Climate and Hydrology; Dataset- gridMET Daily

The year with the lowest vapor pressure deficit levels, on average, for the areas in Elko County was 2011. In 2011, the City of Elko experienced 0.44 kPa, the Spring Creek HOA experienced 0.37 kPa, the City of Carlin experienced 0.47 kPa, the South Fork Native American Indian Reservation experienced 0.44 kPa, the Ruby Mountains experienced 0.21 kPa, and Lamoille Canyon experienced 0.35 kPa. In contrast, 1992 was the year with the highest vapor pressure deficit levels, on average, for the areas in Elko County. In 1992, the City of Elko experienced 0.96 kPa, the Spring Creek HOA experienced 0.91 kPa, the City of Carlin experienced 1.03 kPa, the South Fork Native American Indian Reservation experienced 1.00 kPa, the Ruby Mountains experienced 0.52 kPa, and Lamoille Canyon experienced 0.86 kPa.

2.5.b Vapor Pressure Deficit Between 1992 and 2022 for Each Area

Figure 2.52 through 2.57 presents the annual mean vapor pressure deficit levels over the past 30 years for each individual area in Elko County over the 1992 to 2022 period.

Figure 2.52 – Annual Mean Vapor Pressure Deficit Levels, City of Elko
1992 through 2022

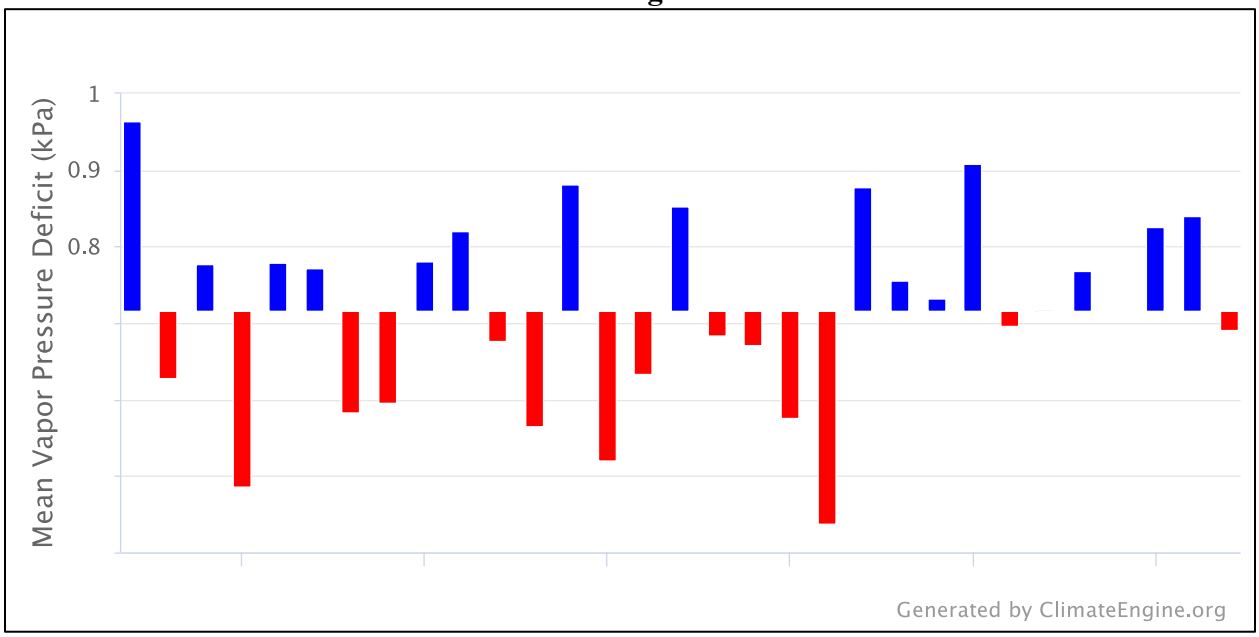


Figure 2.53 – Annual Mean Vapor Pressure Deficit Levels, Spring Creek HOA
1992 through 2022

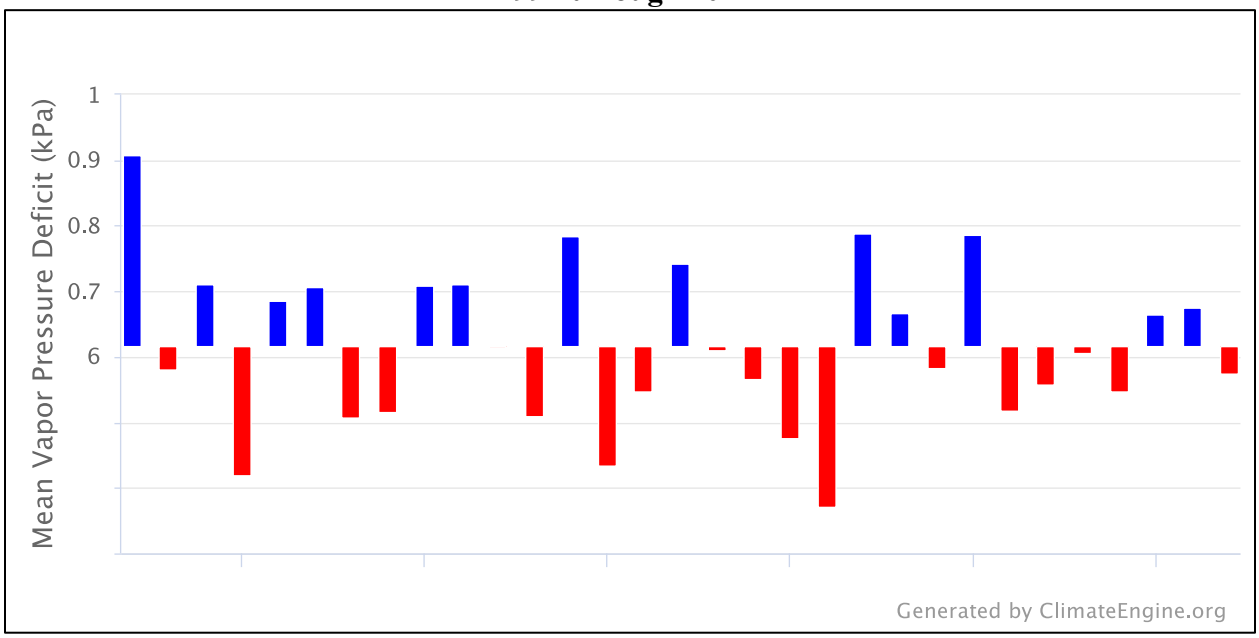


Figure 2.54 – Annual Mean Vapor Pressure Deficit Levels, City of Carlin
1992 through 2022

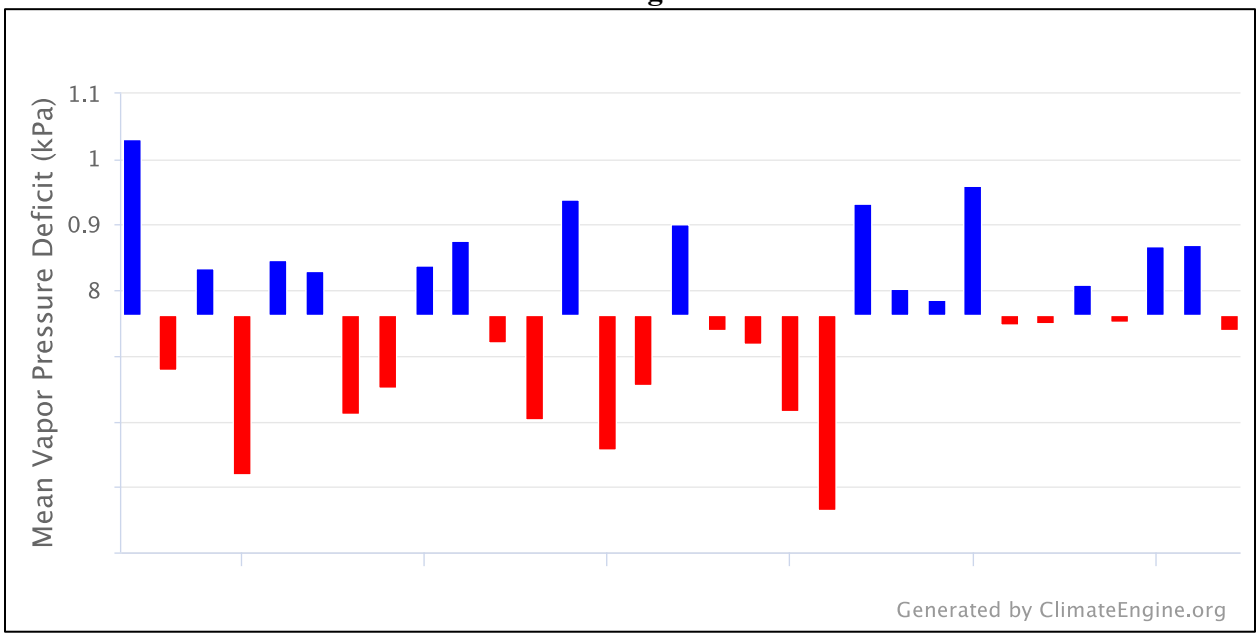


Figure 2.55 – Annual Mean Vapor Pressure Deficit Levels, South Fork Native American Reservation
1992 through 2022

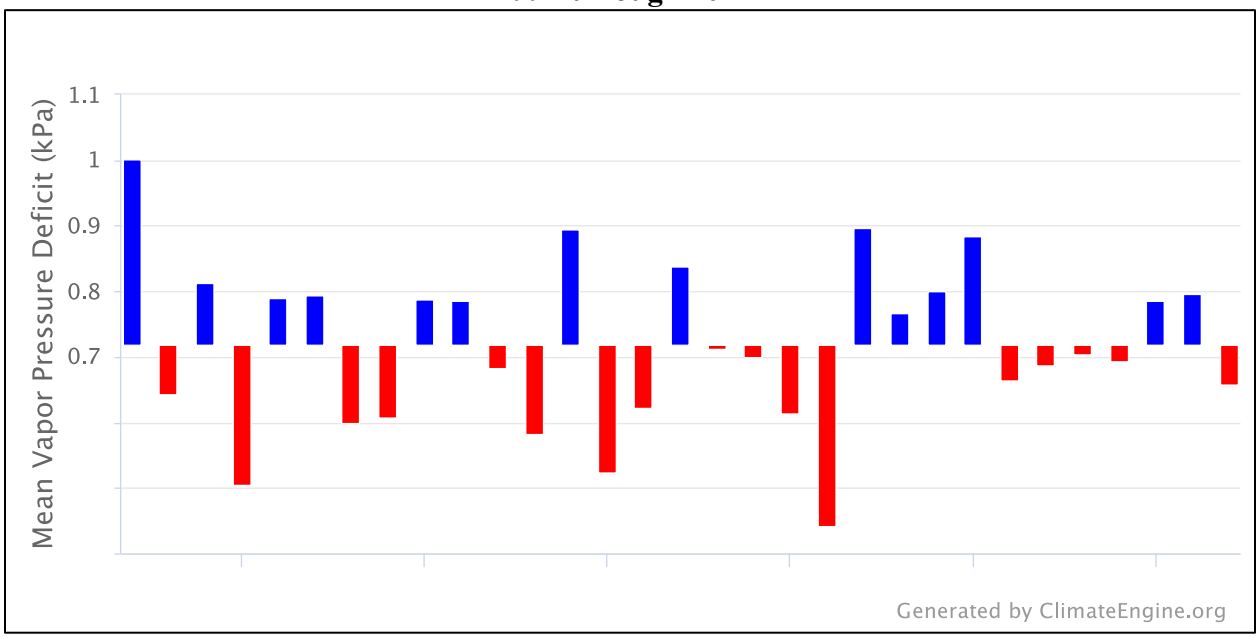


Figure 2.56 – Annual Mean Vapor Pressure Deficit Levels, Ruby Mountains 1992 through 2022

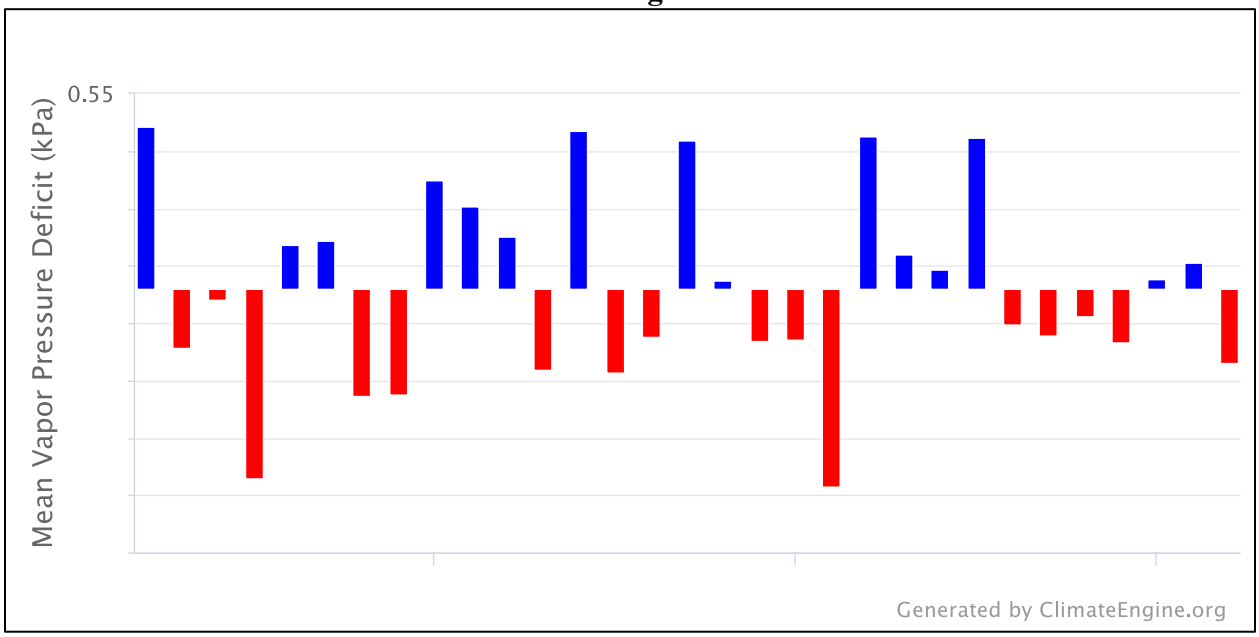
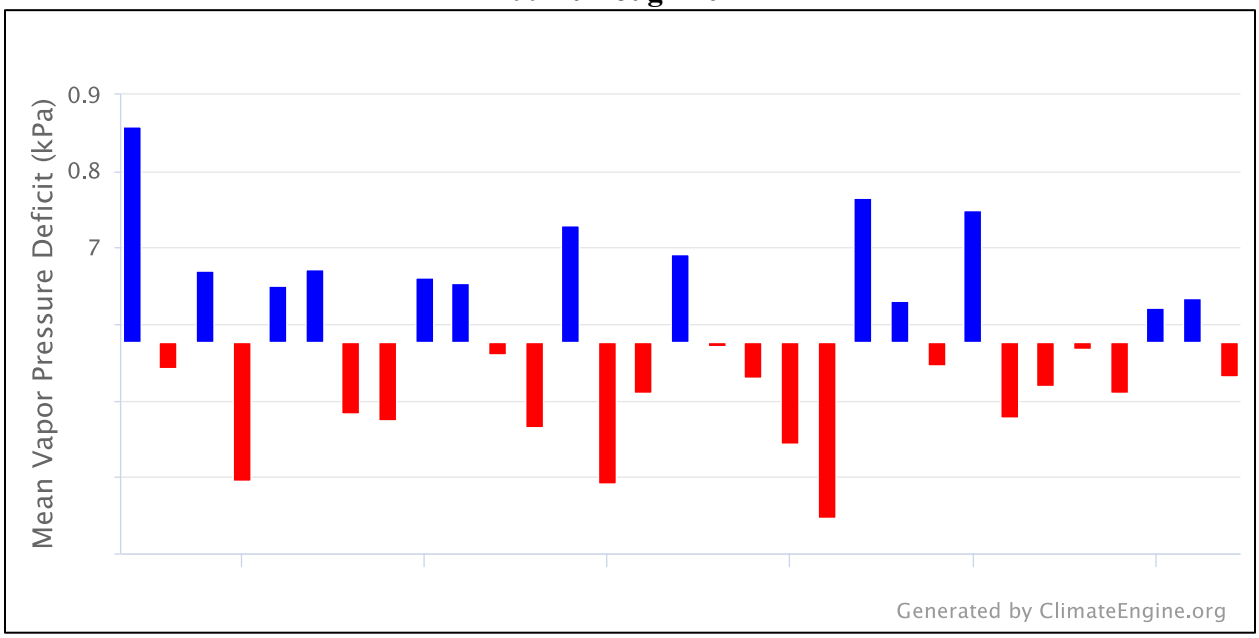


Figure 2.57 – Annual Mean Vapor Pressure Deficit Levels, Lamoille Canyon 1992 through 2022



The highest annual mean vapor pressure deficit for the City of Elko between 1992 and 2022 was in 1992 at 0.96 kPa and the lowest annual mean vapor pressure deficit for the city of Elko was in 2011 at 0.44 kPa. For the Spring Creek HOA, the highest annual mean vapor pressure deficit was in 1992 at 0.91 kPa and the lowest annual mean vapor pressure deficit for the Spring Creek HOA was in 2011 at 0.37 kPa. Between 1992 and 2022, the highest annual mean vapor pressure deficit for the City of Carlin was in 1992 at 1.03 kPa and the lowest annual mean vapor pressure deficit for the city of Carlin was in 2011 at 0.47 kPa.

Between 1992 and 2022, the highest annual mean vapor pressure deficit for the South Fork Native American Reservation was in 1992 at 1.00 kPa and the lowest annual mean vapor pressure deficit for the South Fork Native American Reservation was in 2011 at 0.44 kPa. The highest annual mean vapor pressure deficit for the Ruby Mountains was in 1992 at 0.52 kPa and the lowest annual mean vapor pressure deficit for the Ruby Mountains was in 2011 at 0.21 kPa. The highest annual mean vapor pressure deficit for Lamoille Canyon between 1992 and 2022 was in 1992 at 0.86 kPa and the lowest annual mean vapor pressure deficit for Lamoille Canyon was in 2011 at 0.35 kPa.

Elko County has experienced large swings in the annual mean vapor pressure deficit over the past 30 years. Each area throughout Elko County has experienced their most dramatic shift in the vapor pressure deficit over a 19-year period. Between 1992 and 2011, the City of Elko experienced a 0.52 kPa decrease in the vapor pressure deficit and the Spring Creek HOA experienced a 0.54 kPa decrease in the vapor pressure deficit over the same 1992 to 2011 period. Between 1992 and 2011, the City of Carlin experienced a 0.56 kPa decrease in the vapor pressure deficit and the South Fork Native American Reservation experienced a 0.56 kPa decrease in the vapor pressure deficit. For the Ruby Mountains, this area experienced a 0.31 kPa decrease in the vapor pressure deficit between 1992 and 2011 and, between 1992 and 2011, Lamoille Canyon experienced a 0.51 kPa decrease in the vapor pressure deficit.

2.5.c Vapor Pressure Deficit over the Past Three Years

Figure 2.58 through Figure 2.63 presents the vapor pressure deficit levels measured in inches for January through June over the past three years compared against the median average vapor pressure deficit level over 2020, 2021, and 2022 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for Lamoille Canyon. The median average vapor pressure deficit level is based on data from 1979 and 2018.

An upward trend in the median average and observed vapor pressure deficit for the City of Elko is observed and, for the summer months, the median average vapor pressure deficit level increases from 0.2 kPa in January to 2.0 kPa in June. The vapor pressure deficit levels for 2020, 2021, and 2022 respectively rise from 0.2 kPa, 0.2 kPa, and 0.1 kPa in January to 2.4 kPa, 2.6 kPa, and 2.9 kPa in June. This change in the vapor pressure deficit correlates with increased burn rates. The observed vapor pressure deficit level for June 2020 for the City of Elko is higher than the median average and the observed vapor pressure deficit level for June 2021 is higher

Figure 2.58 – Vapor Pressure Deficit Levels, City of Elko
2020 through 2022

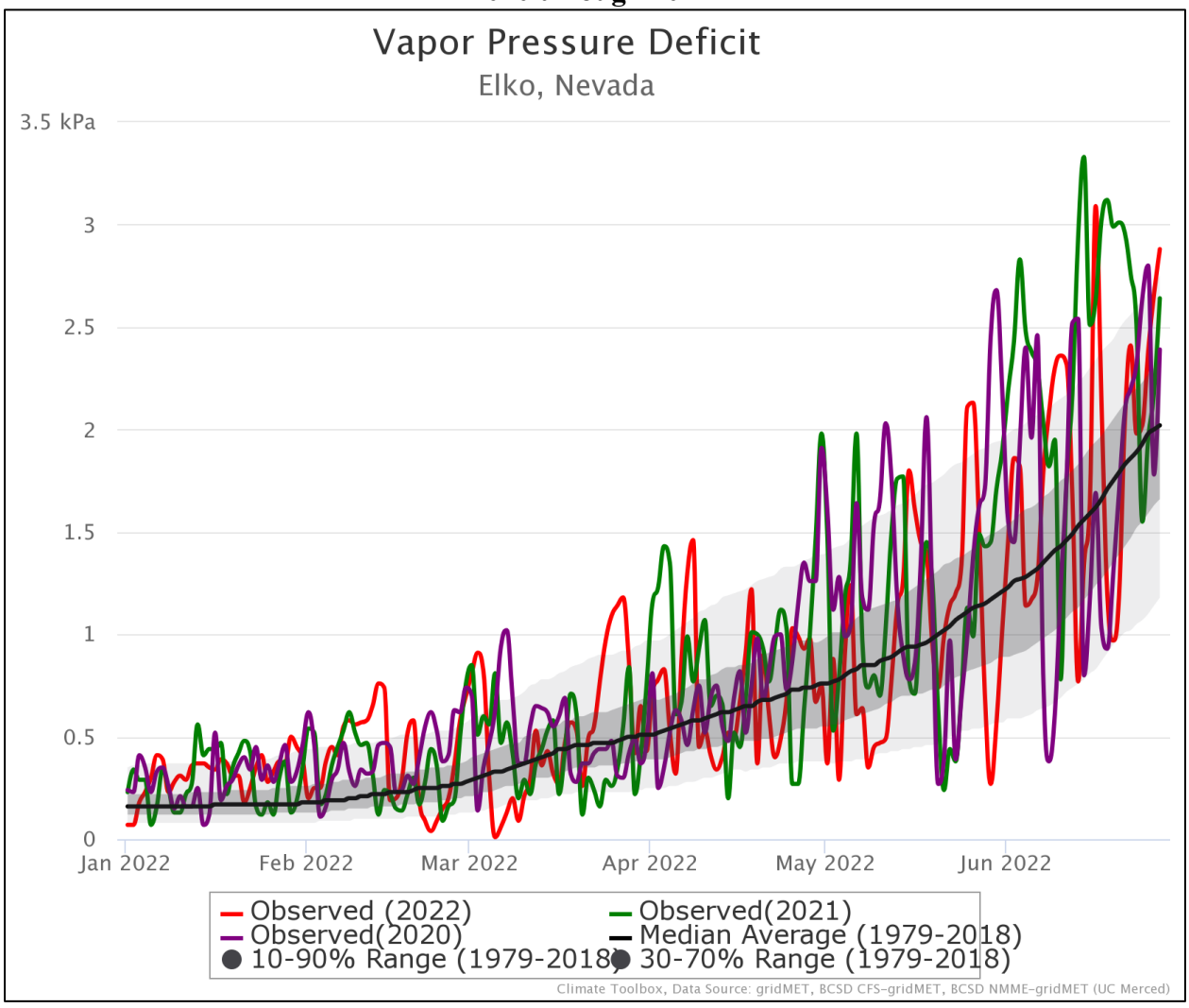


Figure 2.59 – Vapor Pressure Deficit Levels, Spring Creek HOA 2020 through 2022

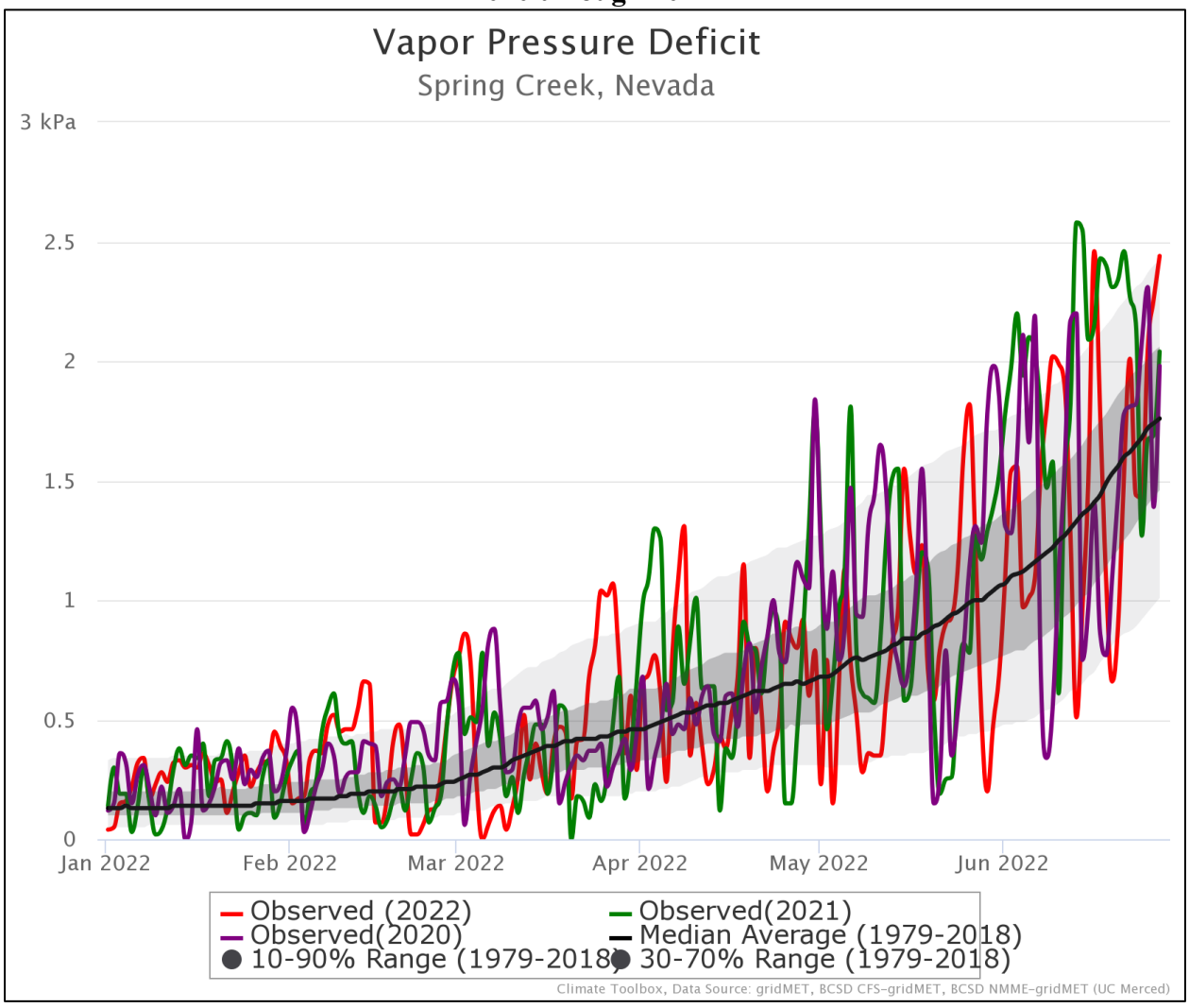


Figure 2.60 – Vapor Pressure Deficit Levels, City of Carlin 2020 through 2022

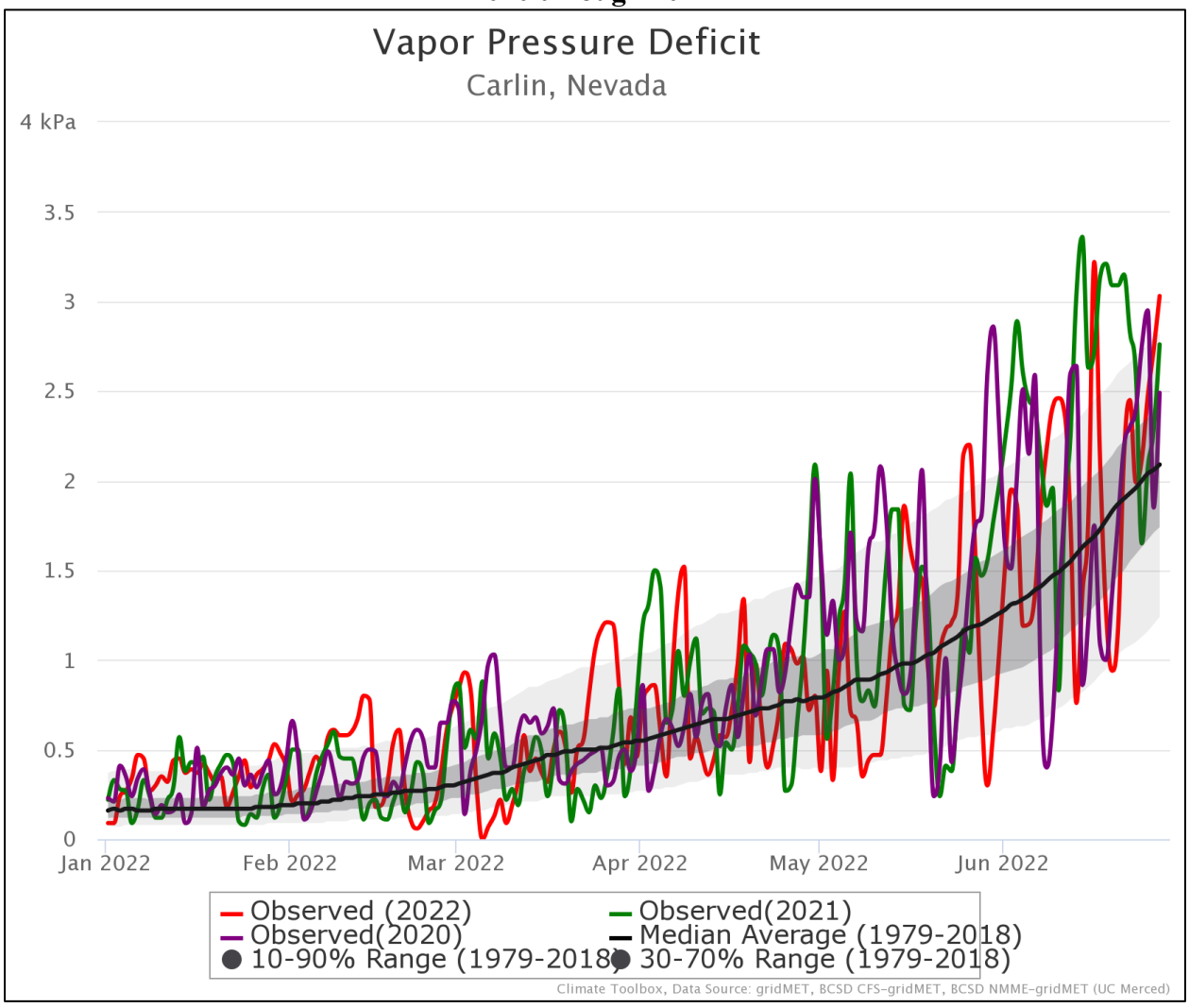


Figure 2.61 – Vapor Pressure Deficit Levels, South Fork Native American Reservation 2020 through 2022

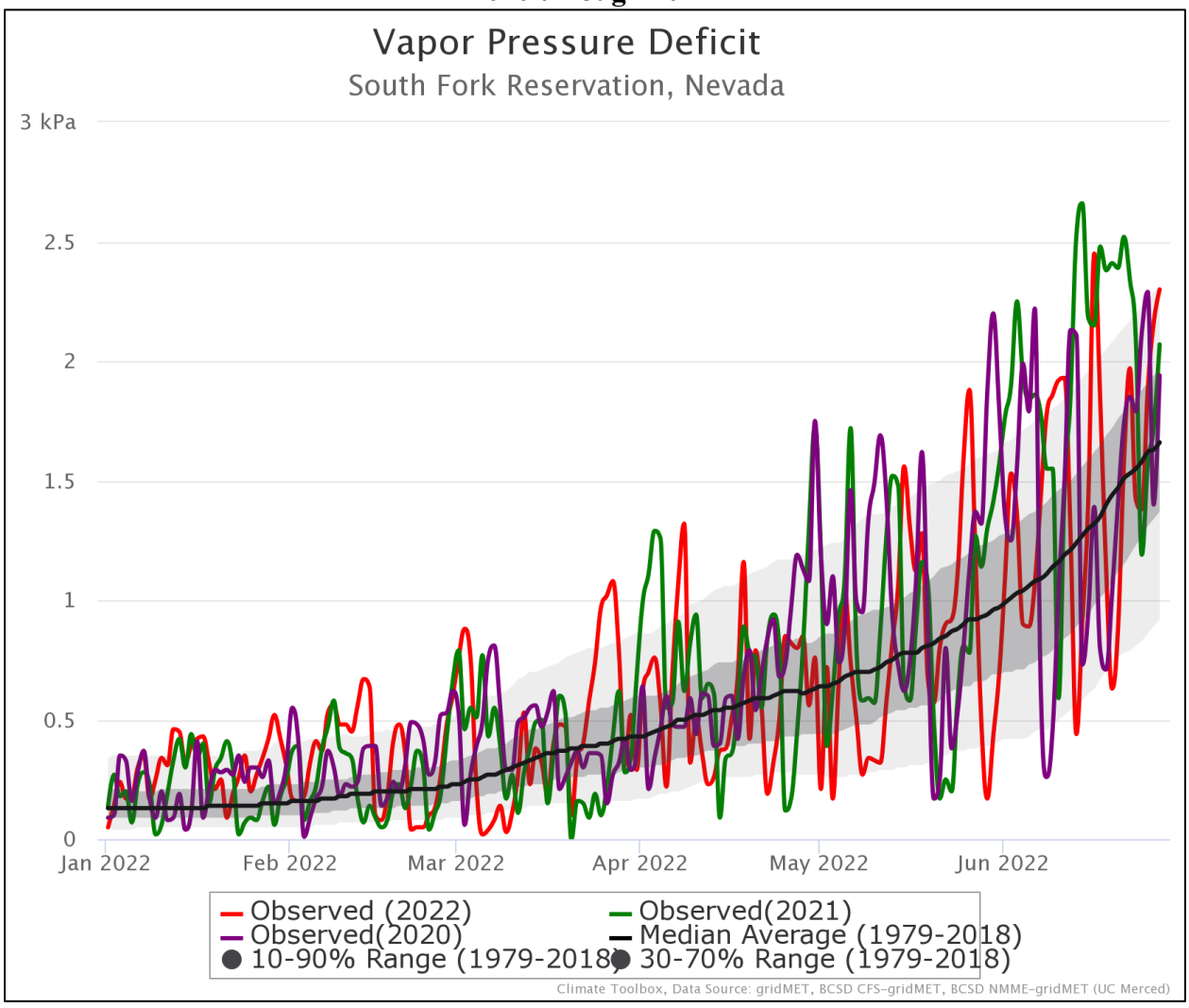


Figure 2.62 – Vapor Pressure Deficit Levels, Ruby Mountains 2020 through 2022

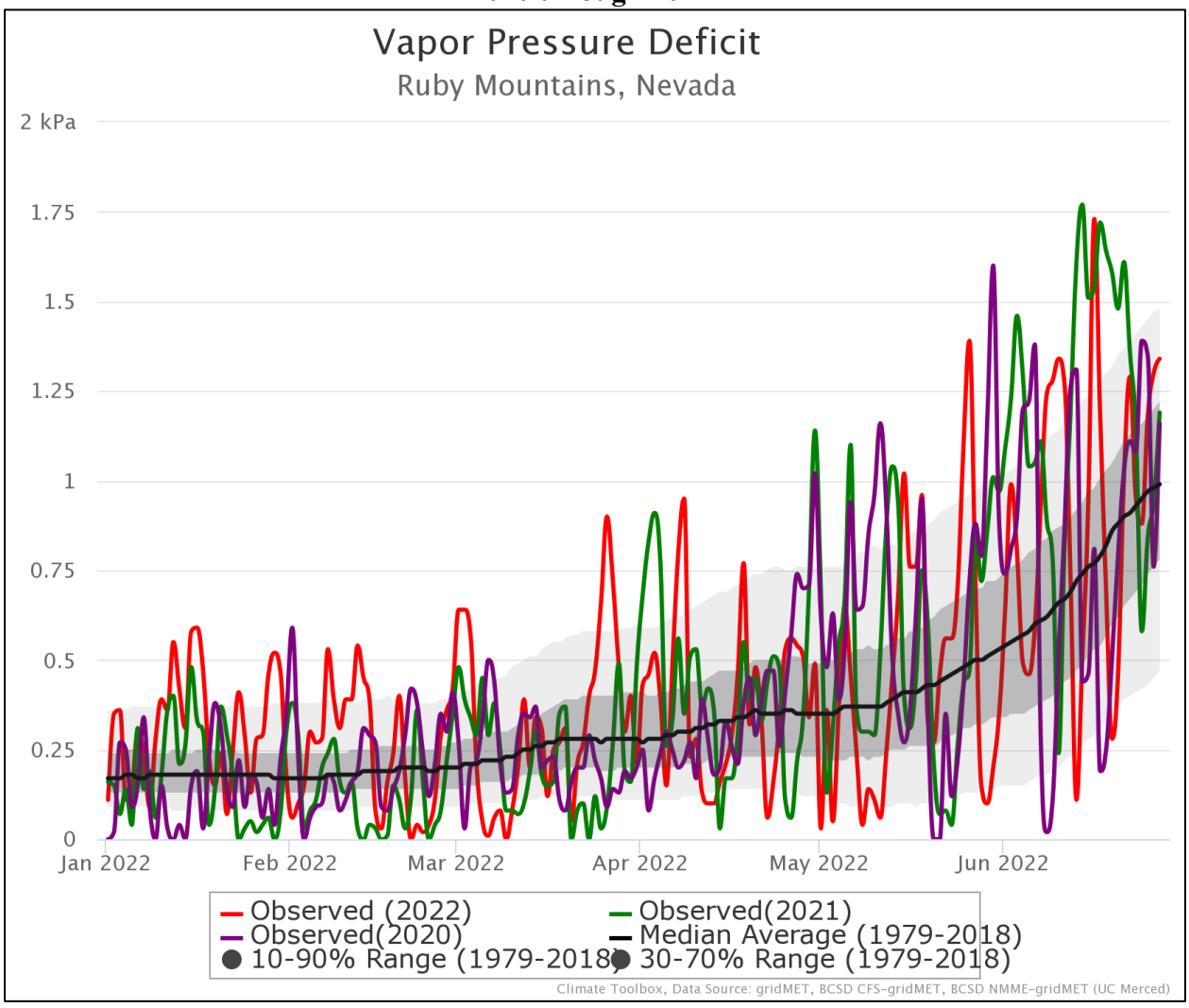
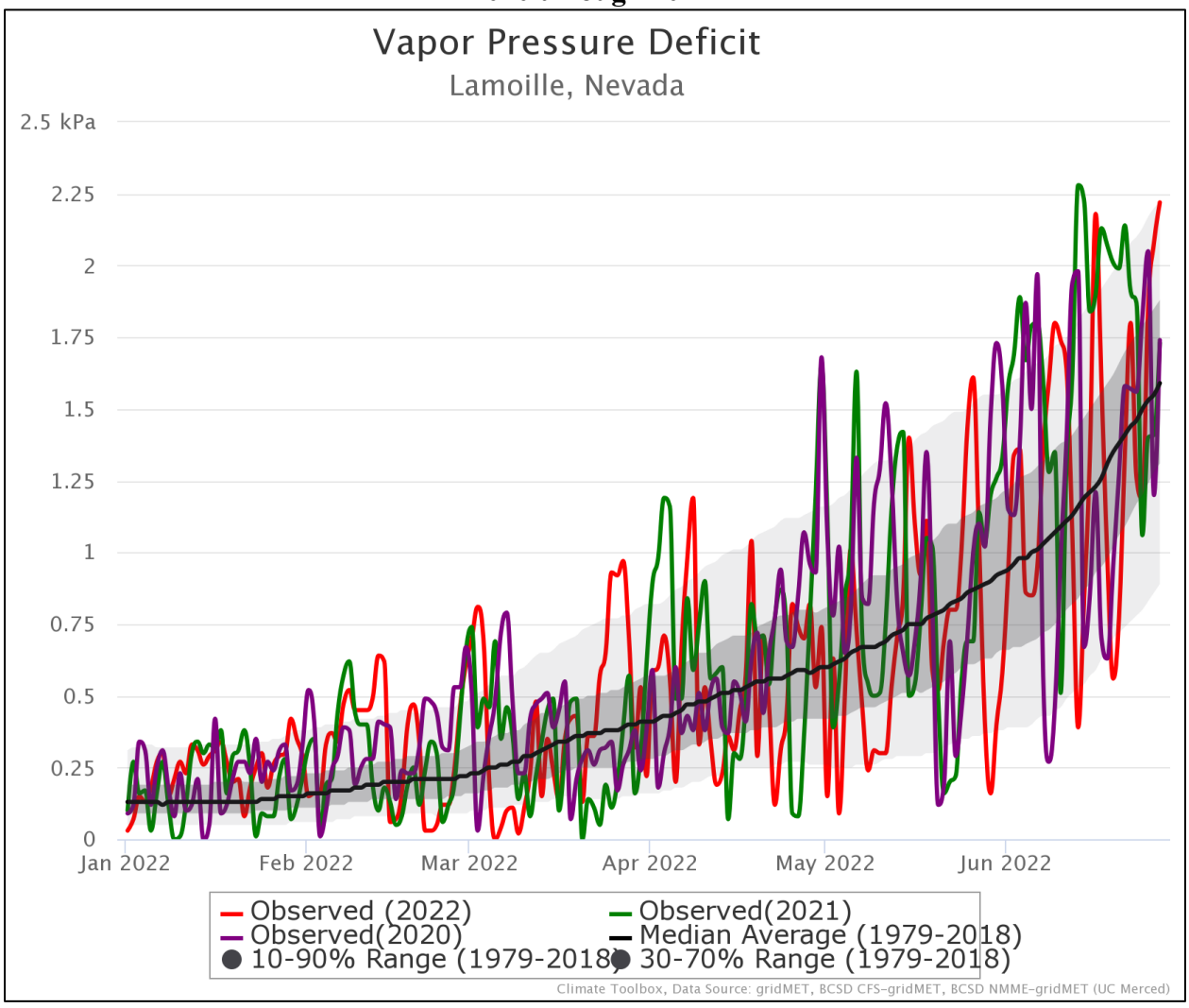


Figure 2.63 – Vapor Pressure Deficit Levels, Lamoille Canyon 2020 through 2022



than the median average. The observed vapor pressure deficit level for June 2022 is higher than the median average.

For the Spring Creek HOA, an upward trend of the median average and observed vapor pressure deficit is observed. For the summer months for the Spring Creek HOA, the median average vapor pressure deficit level increases from 0.1 kPa in January to 1.8 kPa in June. The vapor pressure deficit levels for 2020, 2021, and 2022 respectively rise from 0.1 kPa, 0.1 kPa, and 0.0 kPa in January to 2.0 kPa, 2.0 kPa, and 2.4 kPa in June. This significant change in the vapor pressure deficit correlates with increased burn rates. The observed vapor pressure deficit level for June 2020 for the Spring Creek HOA is higher than the median average. The observed vapor pressure deficit level for June 2021 for the Spring Creek HOA is higher than the median average and the observed vapor pressure deficit level for June 2022 is higher than the median average.

An upward trend of the median average and observed vapor pressure deficit for the City of Carlin is observed and, for the summer months, the median average vapor pressure deficit level increases from 0.2 kPa in January to 2.1 kPa in June. The vapor pressure deficit levels for 2020, 2021, and 2022 respectively rise from 0.2 kPa, 0.2 kPa, and 0.1 kPa in January to 2.5 kPa, 2.8 kPa, and 3.0 kPa in June. This significant change in the vapor pressure deficit for the City of Carlin correlates with increased burn rates. The observed vapor pressure deficit level for June 2020 is higher than the median average and the observed vapor pressure deficit level for June 2021 is higher than the median average. The observed vapor pressure deficit level for June 2022 is higher than the median average.

For the South Fork Native American Reservation, an upward trend of the median average and observed vapor pressure deficit is observed. For the summer months for the South Fork Native American Reservation, the median average vapor pressure deficit level increases from 0.1 kPa in January to 1.7 kPa in June. The vapor pressure deficit levels for 2020, 2021, and 2022 respectively rise from 0.1 kPa, 0.1 kPa, and 0.1 kPa in January to 1.9 kPa, 2.1 kPa, and 2.3 kPa in June. This dramatic change in the vapor pressure deficit for the South Fork Native American Reservation correlates with increased burn rates. The observed vapor pressure deficit level for June 2020 is higher than the median average. The observed vapor pressure deficit level for June 2021 is higher than the median average and the observed vapor pressure deficit level for June 2022 is higher than the median average.

An upward trend of the median average and observed vapor pressure deficit for the Ruby Mountains is observed and, for the summer months, the median average vapor pressure deficit level increases from 0.2 kPa in January to 1.0 kPa in June. The vapor pressure deficit levels for 2020, 2021, and 2022 respectively rise from 0.0 kPa, 0.2 kPa, and 0.1 kPa in January to 1.2 kPa, 1.2 kPa, and 1.3 kPa in June. This significant change in the vapor pressure deficit correlates with increased burn rates. The observed vapor pressure deficit level for June 2020 for the Ruby Mountains is higher than the median average. The observed vapor pressure deficit level for June 2021 is higher than the median average and the observed vapor pressure deficit level for June 2022 is higher than the median average.

For the Lamoille Canyon area, an upward trend of the median average and observed vapor pressure deficit is observed. For the summer months, for the Lamoille Canyon area, the median average vapor pressure deficit level increases from 0.1 kPa in January to 1.6 kPa in June. The vapor pressure deficit levels for 2020, 2021, and 2022 respectively rise from 0.1 kPa, 0.1 kPa, and 0.0 kPa in January to 1.7 kPa, 1.7 kPa, and 2.2 kPa in June. This significant change in the vapor pressure deficit for the Lamoille Canyon area correlates with increased burn rates. The observed vapor pressure deficit level for June 2020 for the Lamoille Canyon area is higher than the median average. The observed vapor pressure deficit level for June 2021 is higher than the median average and the observed vapor pressure deficit level for June 2022 is higher than the median average.

2.5.d Elko County's Minimum Relative Humidity

Relative humidity is a climate parameter and common method to measure humidity levels in a greenhouse and is defined as a ratio of the amount of moisture in the air to the amount of moisture necessary to saturate the air at the same temperature and pressure. When relative humidity drops, fire behavior increases for lighter fuels such as grass and pine needles, while heavy fuels respond to changes in humidity slowly. Storms and other similar weather events may cause significant changes in heavy fuel moisture. Relative humidity may increase or decrease fuel moisture affecting smoke production, flame length, rate of combustion, and energy release. This sub-section explores minimum relative humidity and maximum relative humidity over a 30-year period between 1992 and 2022. The data presented in this sub-section indicates that minimum relative humidity rates continue to increase and maximum relative humidity rates continue to decrease.

Figure 2.64 illustrates the high and low points for annual mean minimum relative humidity levels measured in percent in Elko County over the past 30 years. The City of Elko is highlighted in red, the Spring Creek HOA is highlighted in orange, the City of Carlin is highlighted in blue, the South Fork Native American Reservation is highlighted in yellow, the Ruby Mountains is highlighted in purple, and Lamoille Canyon is highlighted in green. The minimum relative humidity rates for each of these areas show to fall between a range of 17.10 percent to 45.40 percent.

For the areas of Elko County, except for the Ruby Mountains, 1992 was the year with the lowest minimum relative humidity rates, on average, for the areas of Elko County including the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, and the Lamoille Canyon area. In 1992, the City of Elko recorded an 18.55 percent relative humidity rate, the Spring Creek HOA experienced a 19.13 percent relative humidity rate, and the City of Carlin experienced a 17.71 percent relative humidity rate. The South Fork Native American Indian Reservation recorded a 17.26 percent relative humidity rate in 1992 and Lamoille Canyon experienced a 20.55 percent relative humidity rate. In 2012, the year in which the Ruby Mountains experienced its lowest minimum relative humidity rate, the Ruby Mountains experienced a 22.55 percent relative humidity rate.

Figure 2.64 – Minimum Relative Humidity Rates, Areas throughout Elko County 1992 through 2022

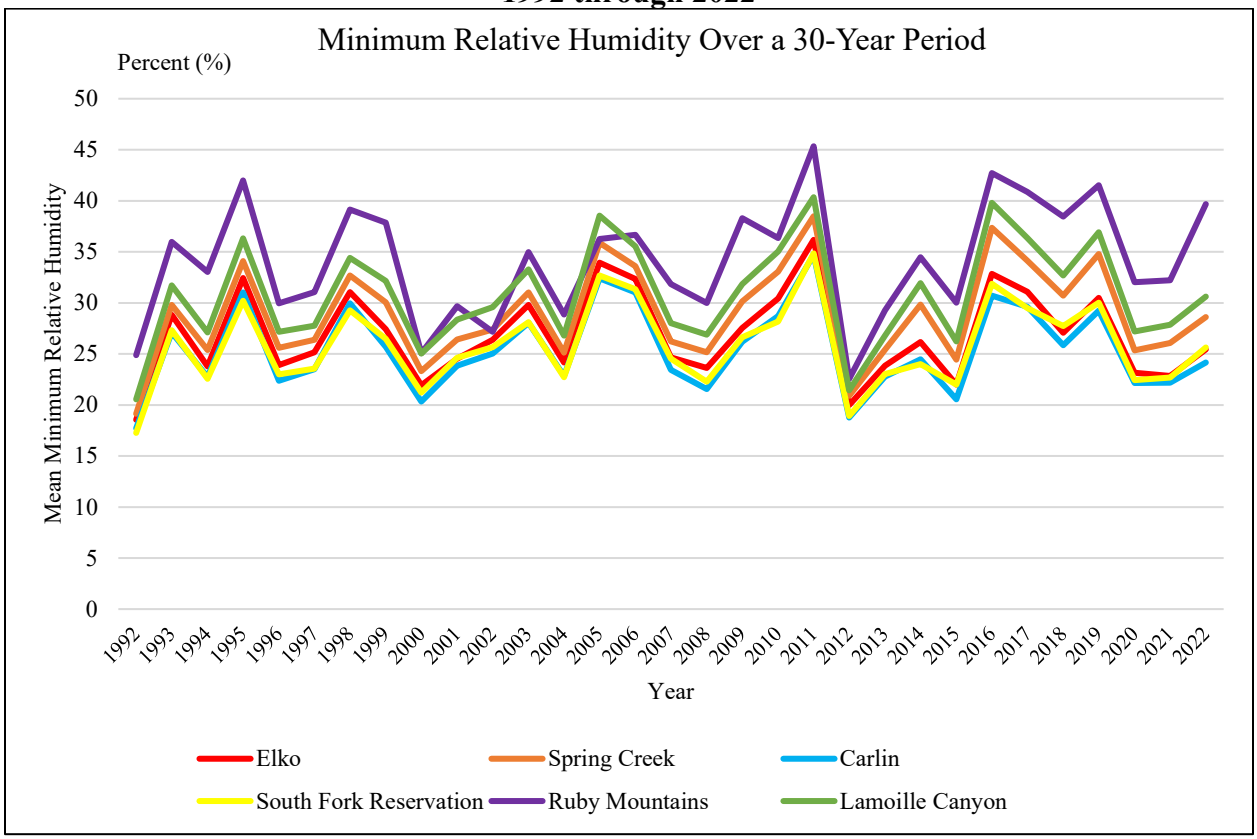


Table 2.11 contains the raw minimum relative humidity data presented in Figure 2.64 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and Lamoille Canyon for each year between 1992 and 2022.

Table 2.11 – Raw Data for Minimum Relative Humidity in Percent Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon) 1992 through 2022

Year	City of Elko	Spring Creek	City of Carlin	South Fork Reservation	Ruby Mountains	Lamoille Canyon
1992	18.5459	19.1322	17.7138	17.2610	24.8879	20.5513
1993	28.8288	29.7905	27.1097	27.3081	35.9914	31.7190
1994	23.7701	25.3942	22.7424	22.5515	33.0260	27.1122
1995	32.4203	34.0814	31.0270	30.2175	42.0070	36.3304
1996	23.9017	25.5896	22.3707	22.9969	29.9439	27.1544
1997	25.1572	26.3940	23.5112	23.5772	31.0614	27.7677
1998	31.0552	32.6887	29.9621	29.2597	39.1500	34.4183
1999	27.4321	30.0642	25.6814	26.4910	37.8554	32.1422
2000	21.9460	23.3040	20.3400	21.2085	25.0512	25.0464

Table 2.11 Cont'd – Raw Data for Minimum Relative Humidity in Percent Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon) 1992 through 2022						
Year	**City of Elko**	**Spring Creek**	**City of Carlin**	**South Fork Reservation**	**Ruby Mountains**	**Lamoille Canyon**
2001	24.5313	26.4058	23.8460	24.6313	29.6698	28.3477
2002	26.3884	27.3790	25.0463	25.6757	27.1638	29.5755
2003	29.8039	31.0080	28.0330	28.1159	34.9637	33.2858
2004	24.1469	25.1199	22.8468	22.7217	28.8617	26.7761
2005	33.9283	35.8681	32.4034	32.6730	36.2683	38.5424
2006	32.3453	33.6007	31.0230	31.3435	36.6725	35.5422
2007	24.6515	26.2206	23.4347	24.5181	31.8256	28.0131
2008	23.6307	25.1663	21.5624	22.2827	29.9954	26.8984
2009	27.5454	30.1376	26.1803	26.6451	38.2943	31.8300
2010	30.4325	33.0716	28.6977	28.1630	36.3599	35.0307
2011	36.1768	38.4867	34.7092	34.8465	45.3410	40.3526
2012	19.9741	20.8821	18.7680	18.9096	22.5492	21.4431
2013	23.8421	25.3999	22.7857	23.0278	29.2734	26.8029
2014	26.1567	29.8183	24.4613	24.0021	34.4706	31.9265
2015	21.9813	24.4479	20.5398	22.0051	30.0326	26.2317
2016	32.8531	37.3652	30.7220	31.8791	42.7012	39.7928
2017	31.0950	34.1200	29.6067	29.4717	40.8783	36.3650
2018	27.0850	30.7167	25.8633	27.7167	38.4617	32.6817
2019	30.5050	34.7933	29.2367	30.0117	41.5383	36.9283
2020	23.1617	25.3600	22.1500	22.4317	32.0267	27.1833
2021	22.8483	26.0617	22.1700	22.6817	32.2283	27.8533

Climate Engine: Climate and Hydrology; Dataset- gridMET Daily

The years with the highest minimum relative humidity rates, on average, for the areas of Elko County were between 2005 and 2011. In 2005, the City of Elko recorded a 33.93 percent relative humidity rate and the Spring Creek HOA experienced a 35.87 relative humidity rate. In 2011, the City of Carlin recorded a 34.71 percent relative humidity rate, the South Fork Native American Indian Reservation experienced a 34.85 relative humidity rate, the Ruby Mountains experienced a 45.34 relative humidity rate, and the Lamoille Canyon area experienced a 40.35 relative humidity rate.

2.5.e Minimum Relative Humidity Between 1992 and 2022 for Each Area

Figure 2.65 through Figure 2.70 presents the annual mean minimum relative humidity levels over the past 30 years between 1992 and 2022 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area.

Figure 2.65 – Annual Mean Minimum Relative Humidity Levels, City of Elko
1992 through 2022

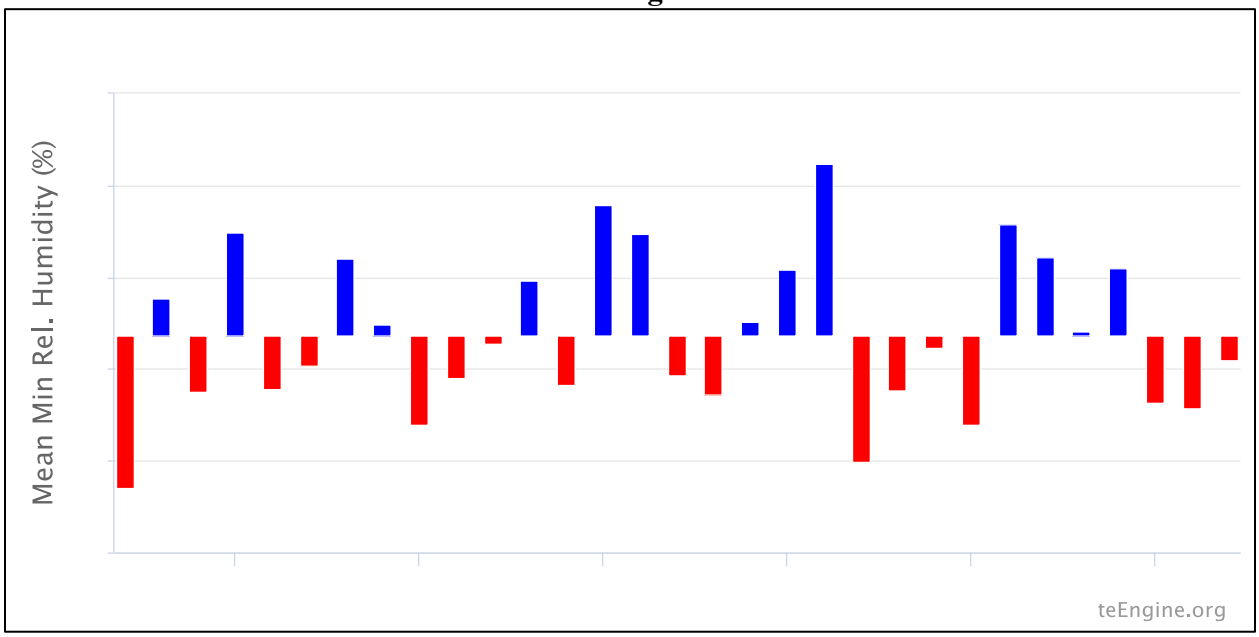


Figure 2.66 – Annual Mean Minimum Relative Humidity Levels, Spring Creek HOA
1992 through 2022

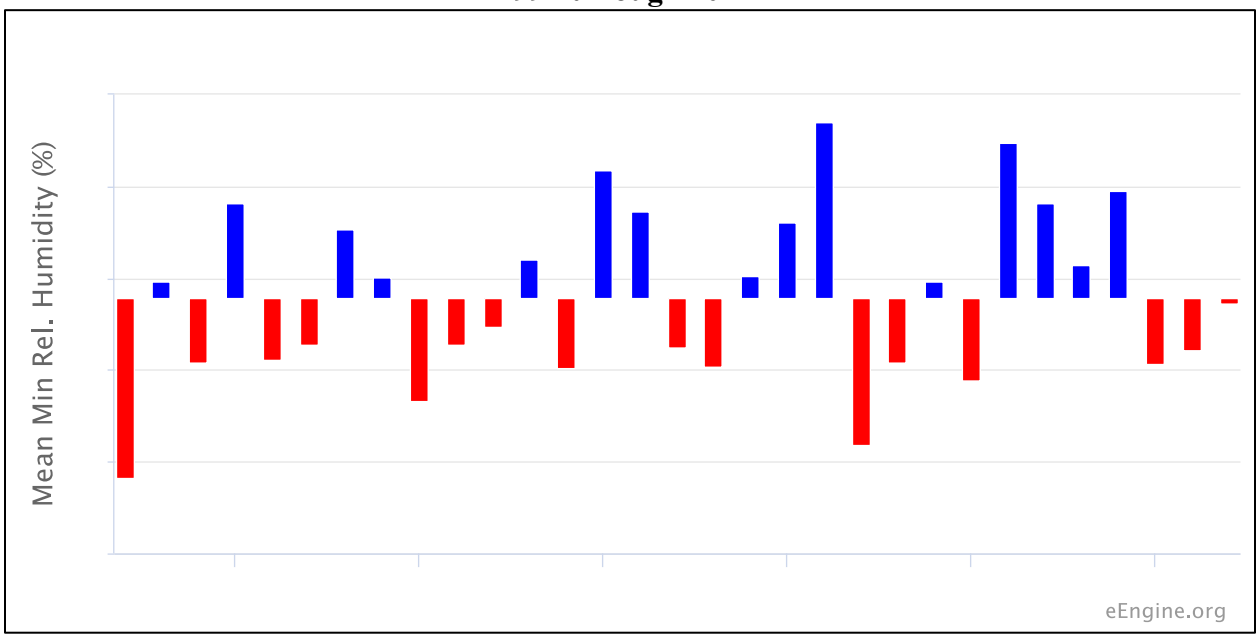


Figure 2.67 – Annual Mean Minimum Relative Humidity Levels, City of Carlin
1992 through 2022

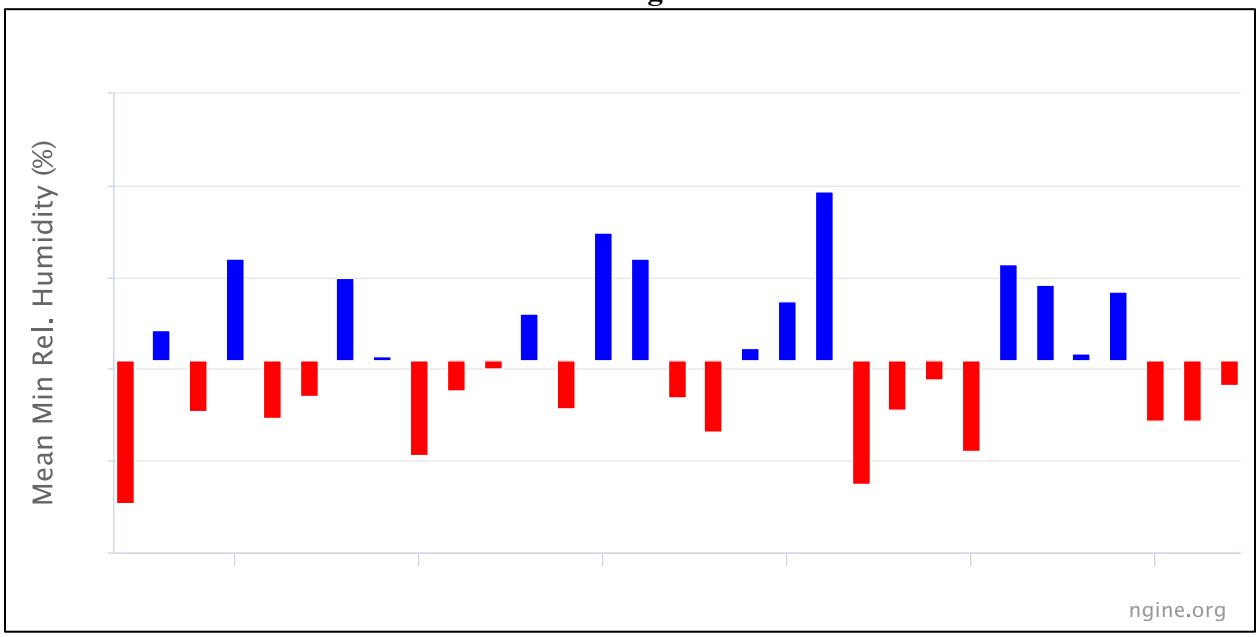


Figure 2.68 – Annual Mean Minimum Relative Humidity Levels, South Fork Native American Reservation
1992 through 2022

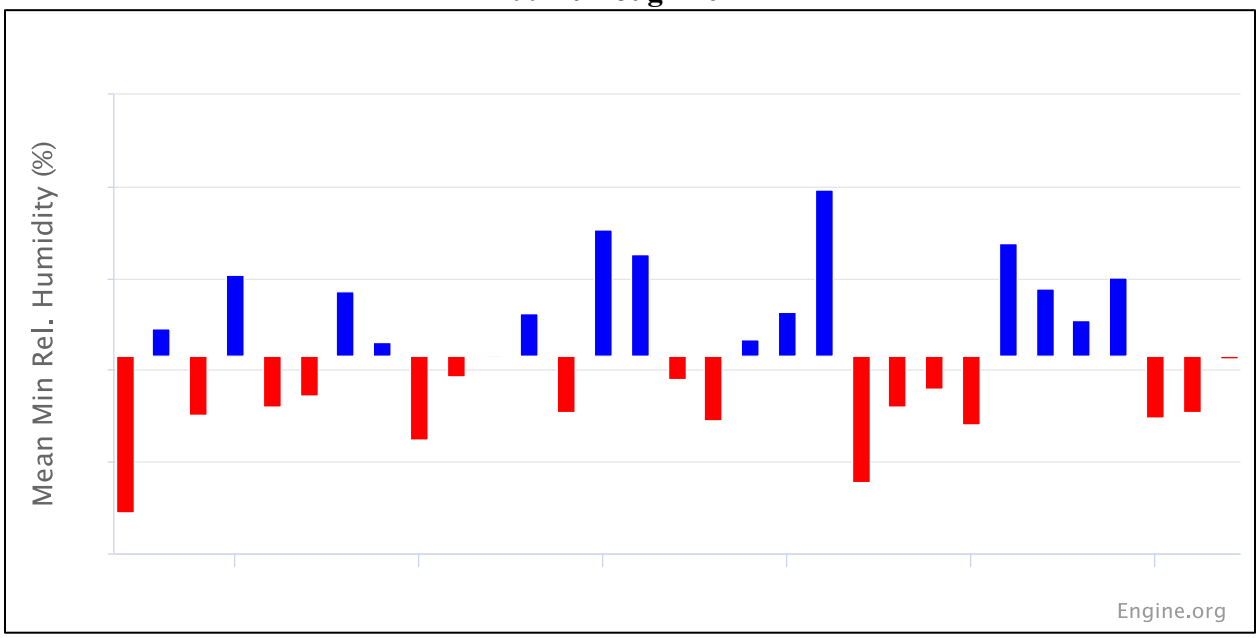


Figure 2.69 – Annual Mean Minimum Relative Humidity Levels, Ruby Mountains 1992 through 2022

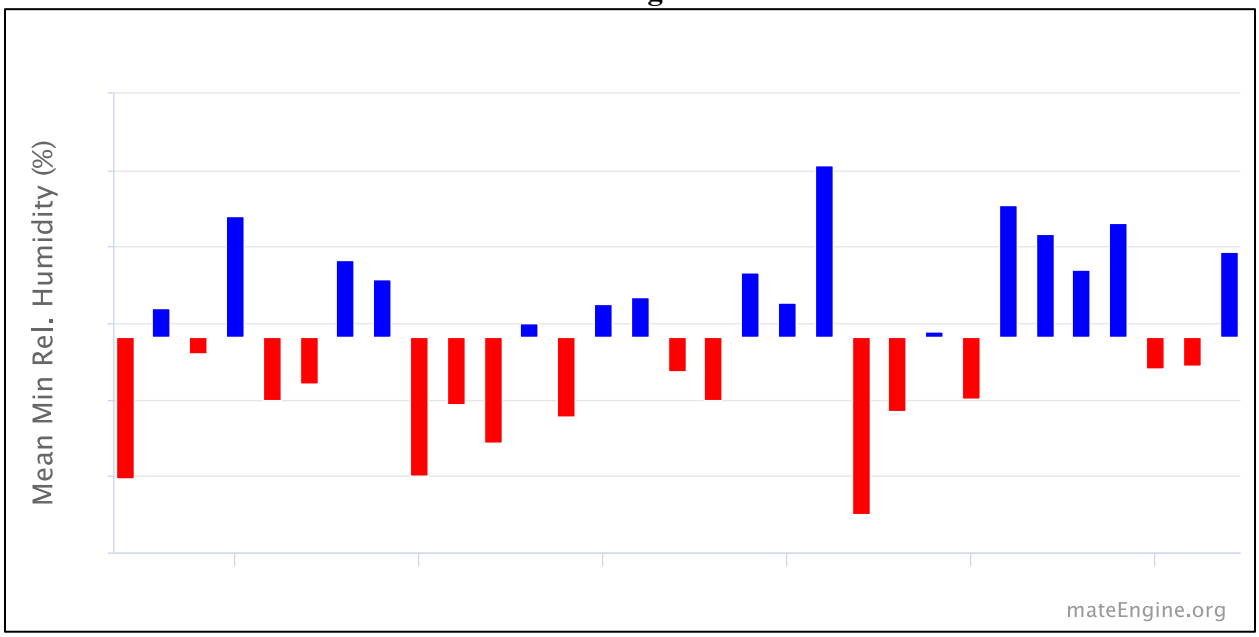
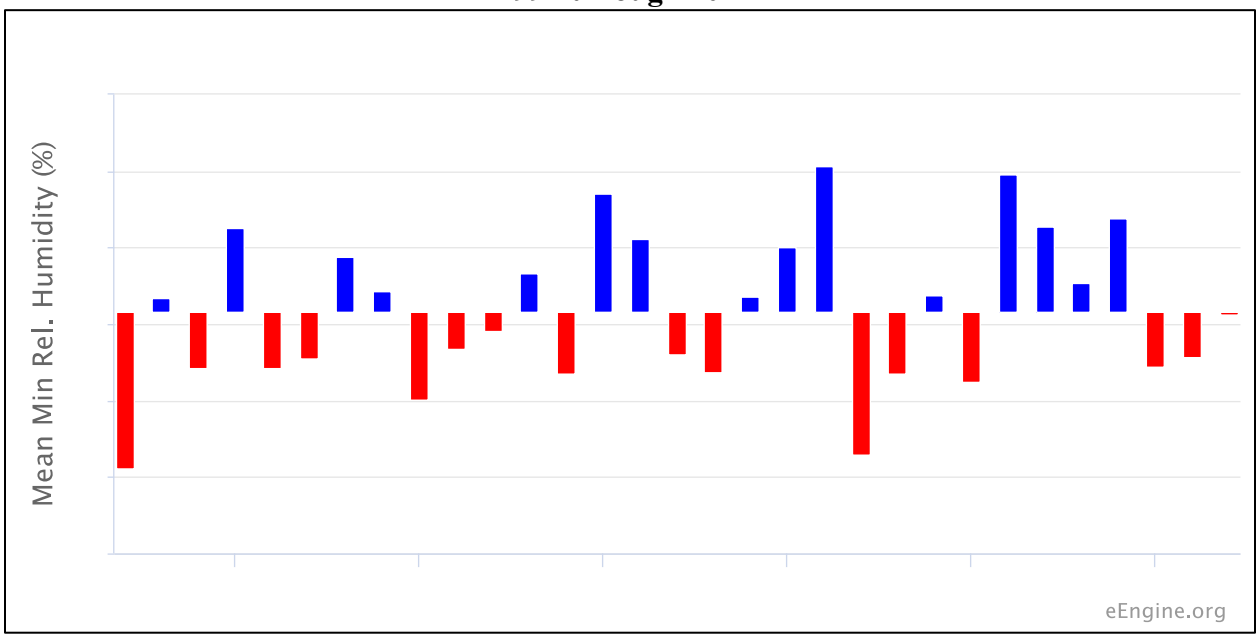


Figure 2.70 – Annual Mean Minimum Relative Humidity Levels, Lamoille Canyon 1992 through 2022



The highest annual mean minimum relative humidity rate for the City of Elko was in 2005 at 33.93 percent and the lowest annual mean minimum relative humidity rate for the city of Elko was in 1992 at 18.55 percent. For the Spring Creek HOA, the highest annual mean minimum relative humidity rate was in 2011 at 35.87 percent and the lowest annual mean minimum relative humidity rate for the Spring Creek HOA was in 1992 at 19.13 percent. The highest annual mean minimum relative humidity rate for the City of Carlin was in 2011 at 34.71 percent and the lowest annual mean minimum relative humidity rate for the City of Carlin was in 1992 at 17.71 percent.

For the South Fork Native American Reservation, the highest annual mean minimum relative humidity rate was in 2011 at 34.85 percent and the lowest annual mean minimum relative humidity rate for the South Fork Native American Reservation was in 1992 at 17.26 percent. The highest annual mean minimum relative humidity rate for the Ruby Mountains was in 2011 at 45.34 percent and the lowest annual mean minimum relative humidity rate for the Ruby Mountains was in 2012 at 22.55 percent. For the Lamoille Canyon area, the highest annual mean minimum relative humidity rate in 2011 at 40.35 percent and the lowest annual mean minimum relative humidity rate for Lamoille Canyon was in 1992 at 20.55 percent.

Elko County has experienced large swings in the annual mean minimum relative humidity rate over the past 30 years. Each area within Elko County has experienced varying and dramatic shifts in the minimum relative humidity rate. Between 1992 and 2005, the City of Elko experienced a 15.38 percent increase in the minimum relative humidity rate and the Spring Creek HOA experienced a 16.74 percent increase in the minimum relative humidity rate. Between 1992 and 2011, the City of Carlin experienced a 17.00 percent increase in the minimum relative humidity rate, the South Fork Native American Reservation experienced a 17.59 percent increase in the minimum relative humidity rate, and the Lamoille Canyon area experienced a 19.80 percent increase in the minimum relative humidity rate. In just one year, between 2011 and 2012, the Ruby Mountains experienced a 22.79 percent decrease in the minimum relative humidity rate.

2.5.f Elko County's Maximum Relative Humidity

Figure 2.71 presents the high and low points for annual mean maximum relative humidity levels measured in percent for Elko County over the past 30 years. The City of Elko is highlighted in red, the Spring Creek HOA is highlighted in orange, the City of Carlin is highlighted in blue, the South Fork Native American Reservation is highlighted in yellow, the Ruby Mountains is highlighted in purple, and Lamoille Canyon is highlighted in green. The maximum relative humidity rates for each of these areas range between a 64.90 and 97.30 percent. For the areas in Elko County, the years between 2012 and 2015 had the lowest maximum relative humidity rates, on average. In 2012, the City of Elko experienced a 69.56 percent relative humidity rate, the Spring Creek HOA experienced a 71.16 percent relative humidity rate, the City of Carlin experienced a 70.95 percent relative humidity rate, the South Fork Native American Indian Reservation experienced a 72.60 percent relative humidity rate, and Lamoille Canyon experienced a 69.18 percent relative humidity rate. In 2015, the Ruby Mountains experienced a 65.00 percent relative humidity rate.

Figure 2.71 – Annual Mean Maximum Relative Humidity, Areas throughout Elko County 1992 through 2022

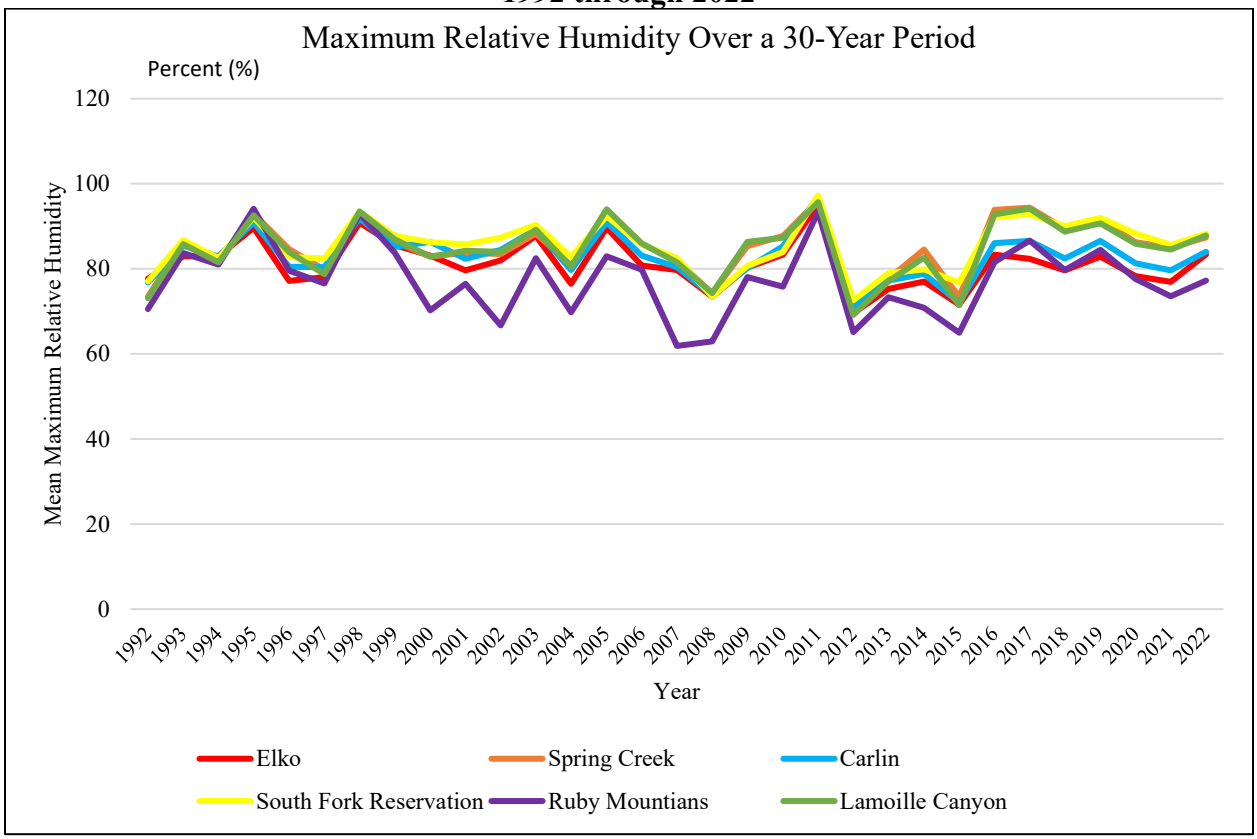


Table 2.12 contains the raw maximum relative humidity data presented in Figure 2.71 for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area for each year between 1992 and 2022.

Table 2.12 – Raw Data for Maximum Relative Humidity in Percent
Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon)
1992 through 2022

Year	City of Elko	Spring Creek	City of Carlin	South Fork Reservation	Ruby Mountains	Lamoille Canyon
1992	77.6945	73.5124	76.7632	77.0726	70.5381	73.1065
1993	82.9437	86.2450	85.4628	86.7764	83.7414	85.7877
1994	83.0258	81.8362	82.8975	82.4898	80.9667	81.5261
1995	89.6260	92.9697	90.9520	92.1174	94.1102	92.5601
1996	77.1771	84.5927	80.4781	82.7713	79.5608	83.8977
1997	78.0732	79.8311	80.3964	82.4550	76.5905	78.7523
1998	90.8837	93.2264	91.9309	93.4890	92.9269	93.4650
1999	85.5642	86.4394	85.1573	87.7885	83.7482	86.9724

Table 2.12 Cont'd – Raw Data for Maximum Relative Humidity in Percent Elko County (Elko, Spring Creek, Carlin, South Fork Reservation, Ruby Mountains, Lamoille Canyon) 1992 through 2022						
Year	**City of Elko**	**Spring Creek**	**City of Carlin**	**South Fork Reservation**	**Ruby Mountains**	**Lamoille Canyon**
2000	83.1390	82.8580	86.3451	86.2687	70.2628	82.9054
2001	79.6172	83.7632	82.3832	85.7704	76.4866	84.2128
2002	81.9458	83.4893	84.4968	87.3021	66.6887	83.9729
2003	87.7928	88.2672	89.2680	90.3543	82.4750	89.2076
2004	76.5169	80.7960	79.7149	82.8134	69.8155	80.4417
2005	89.6511	93.6219	90.9085	92.3779	82.9368	94.0097
2006	80.7483	85.9131	83.1116	85.6299	79.8277	85.9360
2007	79.7040	81.9468	80.4244	82.5762	61.8715	81.5195
2008	73.4747	74.2580	73.7665	73.4546	62.9537	74.2872
2009	80.3133	85.379	80.2044	80.6991	78.0374	86.3584
2010	83.3056	87.6702	85.2532	83.9276	75.7963	87.3031
2011	94.9792	96.0891	96.9846	97.2155	93.4232	95.6716
2012	69.5633	71.1561	70.9468	72.6030	65.1120	69.1776
2013	75.2500	77.6673	77.2714	78.9460	73.2980	77.1202
2014	77.0175	84.5223	78.7852	79.8769	70.8741	82.6600
2015	71.6223	73.4184	71.9389	76.7868	65.0040	71.4280
2016	83.3417	93.8851	86.0564	92.2326	81.6355	92.8428
2017	82.3667	94.3617	86.5417	92.8167	86.6367	94.1483
2018	79.6683	89.4117	82.4067	90.0483	79.7217	88.7317
2019	82.8833	91.5317	86.5433	92.0200	84.4833	90.7317
2020	78.3050	86.2417	81.3367	88.3300	77.6400	85.9167
2021	76.9167	84.9883	79.6267	85.6400	73.5533	84.5733

Climate Engine: Climate and Hydrology; Dataset- gridMET Daily

The years with the highest maximum relative humidity rates, on average, for the areas in Elko County were 1995, 1998, and 2011. In 1998, the City of Elko experienced a 90.88 percent relative humidity rate. In 2011 the Spring Creek HOA experienced a 96.09 relative humidity rate, the City of Carlin experienced a 96.99 percent relative humidity rate, the South Fork Native American Indian Reservation experienced a 97.22 relative humidity rate, and the Lamoille Canyon area experienced a 95.67 relative humidity rate. In 1995, the Ruby Mountains experienced a 94.11 percent relative humidity rate.

2.5.g Maximum Relative Humidity Between 1992 and 2022 for Each Area

Figure 2.72 through Figure 2.77 presents the annual mean maximum relative humidity levels over the past 30 years for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area.

Figure 2.72 – Annual Mean Maximum Relative Humidity Levels, City of Elko 1992 through 2022

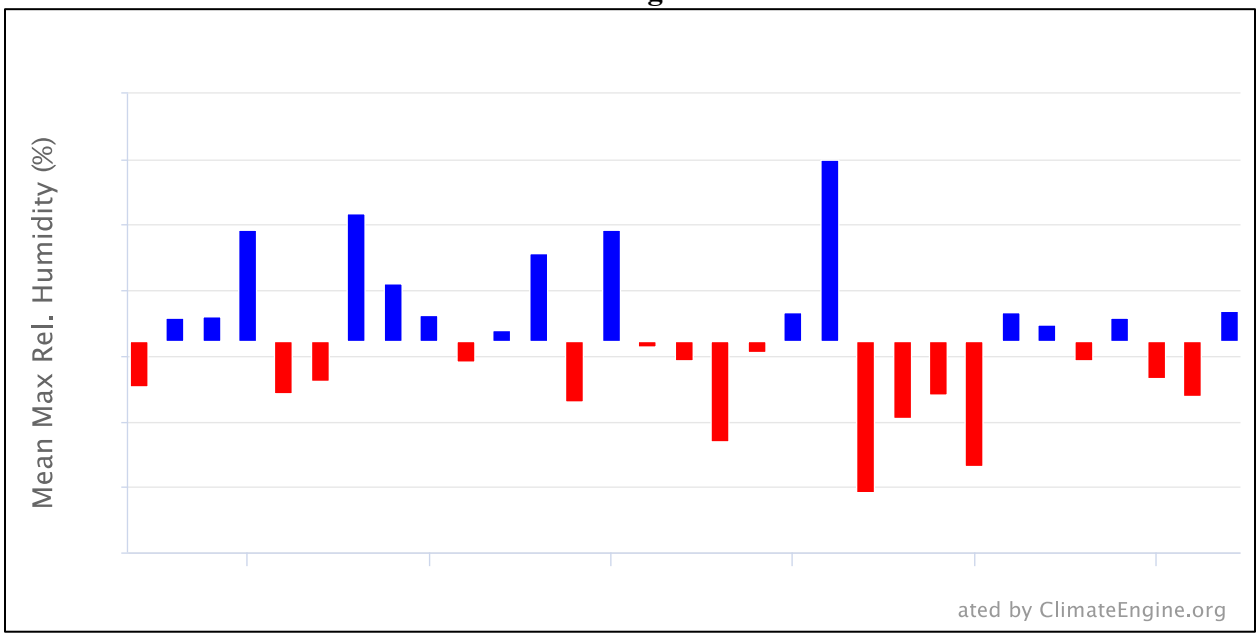


Figure 2.73 – Annual Mean Maximum Relative Humidity Levels, Spring Creek HOA 1992 through 2022

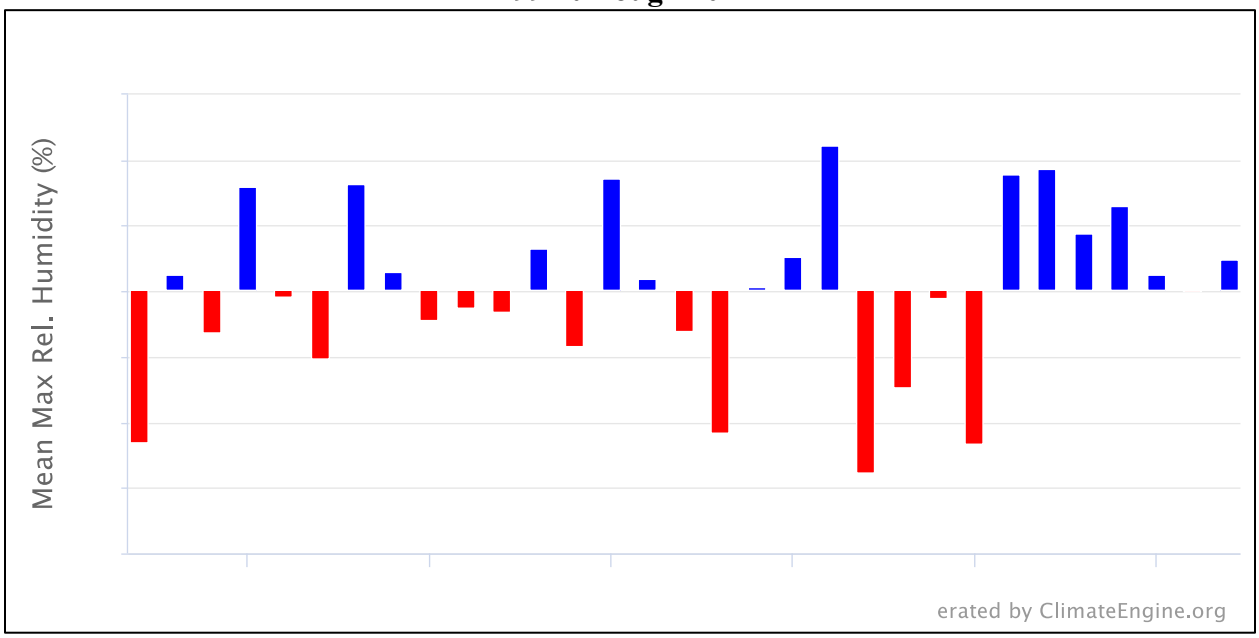


Figure 2.74 – Annual Mean Maximum Relative Humidity Levels, City of Carlin
1992 through 2022

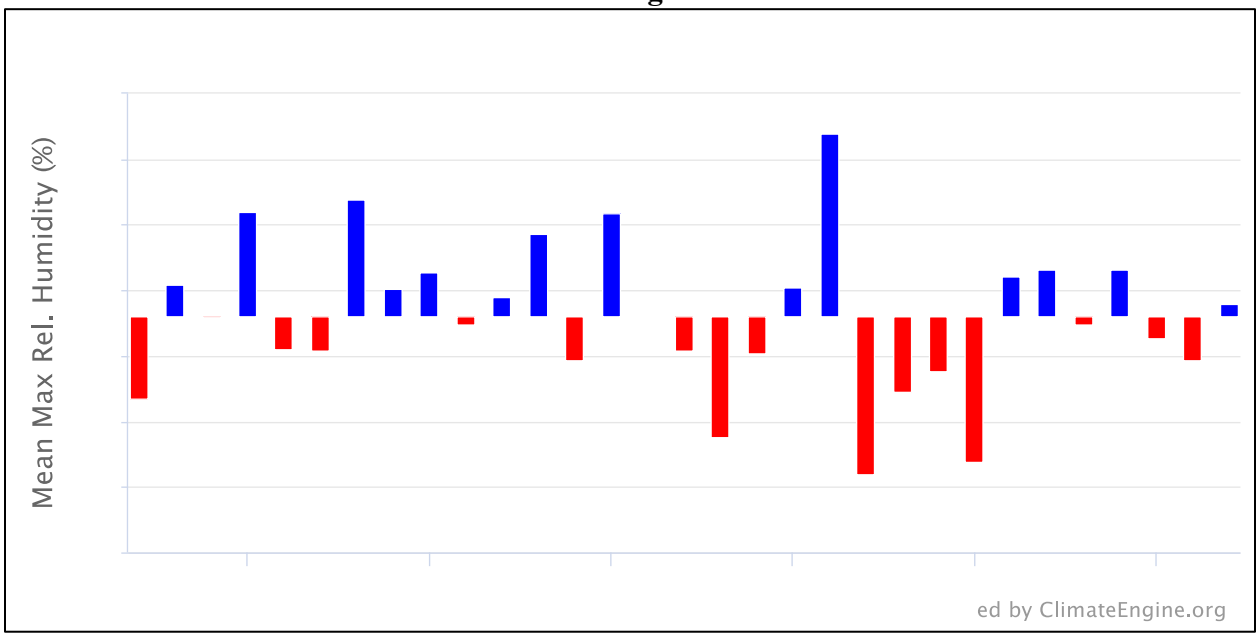


Figure 2.75 – Annual Mean Maximum Relative Humidity Levels, South Fork Native American Reservation
1992 through 2022

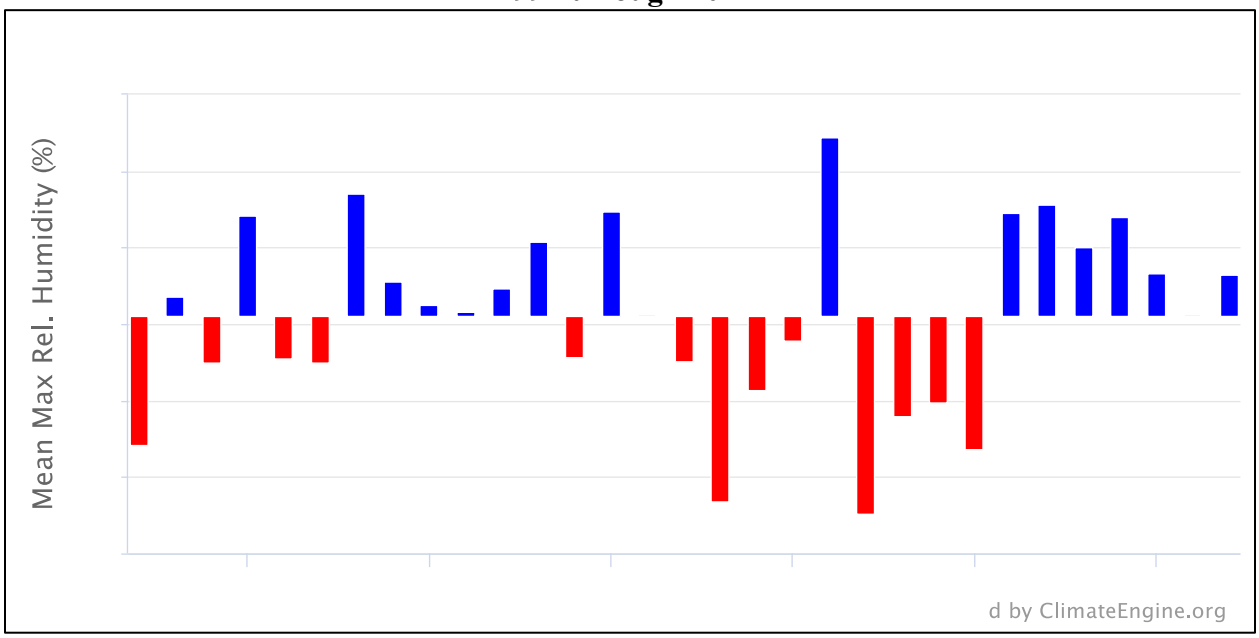


Figure 2.76 – Annual Mean Maximum Relative Humidity Levels, Ruby Mountains 1992 through 2022

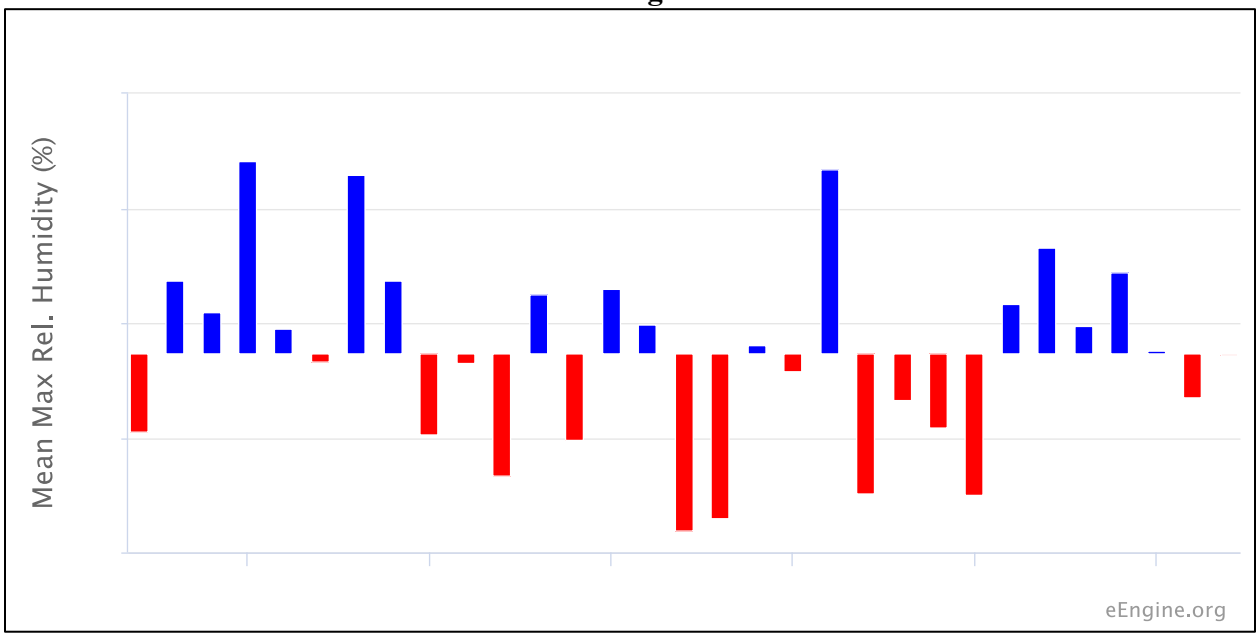
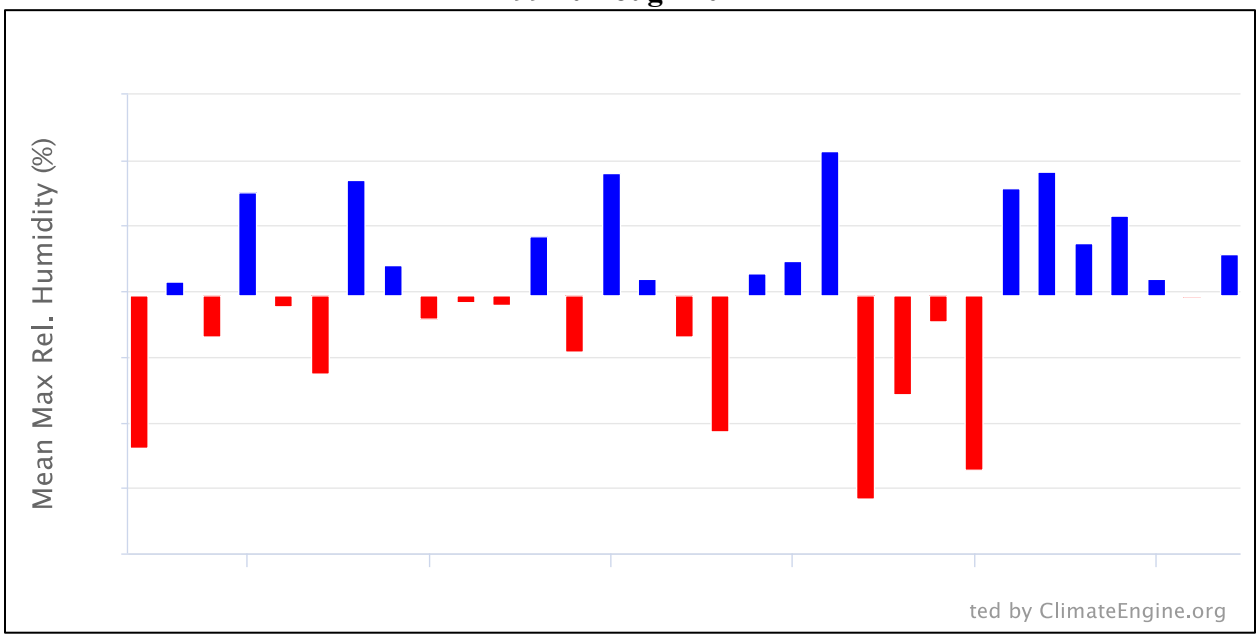


Figure 2.77 – Annual Mean Maximum Relative Humidity Levels, Lamoille Canyon 1992 through 2022



The highest annual mean maximum relative humidity rate for the City of Elko was in 1998 at 90.88 percent and the lowest annual mean maximum relative humidity rate for the city of Elko was in 2012 at 69.56 percent. For the Spring Creek HOA, the highest annual mean maximum relative humidity rate was in 2011 at 96.09 percent and the lowest annual mean maximum relative humidity rate for the Spring Creek HOA was in 2012 at 71.16 percent. The highest annual mean maximum relative humidity rate for the City of Carlin was in 2011 at 96.99 percent and the lowest annual mean maximum relative humidity rate for the City of Carlin was in 2012 at 70.95 percent.

Between 1992 and 2022, the highest annual mean maximum relative humidity rate for the South Fork Native American Reservation was in 2011 at 97.22 percent and the lowest annual mean maximum relative humidity rate for the South Fork Native American Reservation was in 2012 at 72.60 percent. The highest annual mean maximum relative humidity rate for the Ruby Mountains was in 1995 at 94.11 percent and the lowest annual mean maximum relative humidity rate for the Ruby Mountains was in 2015 at 65.00 percent. For the Lamoille Canyon area, the highest annual mean maximum relative humidity rate was in 2011 at 95.67 percent and the lowest annual mean maximum relative humidity rate for Lamoille Canyon Mountains was in 2012 at 69.18 percent.

Elko County has experienced large swings in the annual mean maximum relative humidity rate over the past 30 years. Each area throughout Elko County has experienced varying and dramatic shifts in the maximum relative humidity rate. Between 1998 and 2012, the City of Elko experienced a 21.32 percent decrease in the maximum relative humidity rate. Within one year, between 2011 and 2012, the Spring Creek HOA experienced a 24.93 percent decrease in the maximum relative humidity rate, and the City of Carlin experienced a 26.04 percent decrease in the maximum relative humidity rate. Over the same 2011 to 2012 one-year period, the South Fork Native American Reservation experienced a 24.62 percent decrease in the maximum relative humidity rate and the Lamoille Canyon area experienced a 27.49 percent decrease in the maximum relative humidity rate. Between 1995 and 2015, the Ruby Mountains experienced a 29.11 percent decrease in the maximum relative humidity rate.

3.0 Overview of Other Natural Disaster Risk in Elko County, Nevada

This section of this University Center for Economic Development technical report presents a comprehensive summary of various other natural disasters, excluding fire, for various areas in Elko County including the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and the Lamoille Canyon area. Whenever possible, each of the area's history and potential future threat of earthquakes, flood danger, and droughts will be presented with descriptive analysis and graphical displays.

3.1 Earthquakes and Other Seismic Events

Table 3.1 presents recorded earthquake and seismic event data over a 30-year period between 1992 to 2022 for various areas in Elko County. The United State Geological Survey (USGS) Earthquake Database was used to identify recorded earthquake and seismic events for the City of Elko, the Spring Creek HOA, and for the City of Carlin with recorded event magnitudes ranging between 0.5 and 5.0 on the Richter magnitude scale.

Table 3.1 – Earthquakes and Seismic Disturbances Recorded in Elko County 1992 through 2022

Date	Location	Type	Magnitude
2022-03-05T11:37:41.644Z	1 km SE of Carlin, Nevada	Earthquake	2.2
2021-12-22T07:53:12.234Z	9 km ENE of Carlin, Nevada	Earthquake	2.6
2021-12-22T06:49:02.025Z	8 km ENE of Carlin, Nevada	Earthquake	1.7
2021-12-22T06:36:22.923Z	11 km NE of Carlin, Nevada	Earthquake	1.3
2021-12-22T04:34:18.229Z	7 km E of Carlin, Nevada	Earthquake	0.8
2021-12-21T07:13:59.725Z	Nevada	Earthquake	1.6
2021-11-09T05:47:10.346Z	11 km NE of Carlin, Nevada	Earthquake	1.7
2021-06-08T01:44:17.232Z	12 km S of Elko, Nevada	Earthquake	3.3
2020-01-23T08:42:56.505Z	4 km E of Elko, Nevada	Earthquake	2.1
2019-11-22T09:10:16.911Z	22 km SW of Spring Creek, Nevada	Earthquake	2.7
2019-10-30T00:44:20.120Z	15 km ESE of Carlin, Nevada	Earthquake	1.9
2019-10-30T00:00:52.229Z	15 km ESE of Carlin, Nevada	Earthquake	2.1
2019-08-20T00:43:43.705Z	9 km SSW of Elko, Nevada	Earthquake	1.7
2019-02-02T15:02:53.061Z	15 km ENE of Carlin, Nevada	Earthquake	2.1
2019-02-02T08:57:59.762Z	13 km E of Carlin, Nevada	Earthquake	1.9
2019-02-02T02:27:29.858Z	15 km SE of Carlin, Nevada	Earthquake	3.3
2018-12-25T20:34:40.420Z	10 km S of Carlin, Nevada	Earthquake	2.0

Table 3.1 Cont'd – Earthquakes and Seismic Disturbances Recorded in Elko County 1992 through 2022			
Date	**Location**	**Type**	**Magnitude**
2018-11-23T10:32:56.117Z	13 km NE of Carlin, Nevada	Earthquake	1.9
2018-09-24T20:05:53.399Z	12 km SE of Carlin, Nevada	Explosion	2.4
2018-08-19T17:44:40.770Z	8 km SSE of Carlin, Nevada	Earthquake	1.6
2018-08-13T20:11:13.973Z	17 km SE of Carlin, Nevada	Explosion	2.2
2018-06-14T07:04:42.033Z	17 km SSW of Elko, Nevada	Earthquake	1.7
2018-06-14T06:41:59.241Z	18 km SSW of Elko, Nevada	Earthquake	2.7
2018-04-23T20:11:38.089Z	17 km SE of Carlin, Nevada	Explosion	2.2
2018-04-16T20:17:06.790Z	18 km SE of Carlin, Nevada	Explosion	2.1
2018-04-15T20:16:23.524Z	15 km NE of Carlin, Nevada	Earthquake	1.5
2018-04-08T02:37:41.389Z	14 km NE of Carlin, Nevada	Earthquake	3.0
2018-02-06T21:11:06.970Z	12 km SSE of Carlin, Nevada	Mining Explosion	1.7
2018-01-04T21:20:46.052Z	16 km ESE of Carlin, Nevada	Explosion	2.2
2017-10-09T02:16:53.083Z	6 km NNE of Carlin, Nevada	Earthquake	1.8
2017-09-10T20:44:57.106Z	16 km W of Elko, Nevada	Earthquake	1.4
2017-09-07T13:09:54.475Z	11 km ENE of Carlin, Nevada	Earthquake	2.5
2017-09-06T11:23:47.834Z	12 km NE of Carlin, Nevada	Earthquake	1.6
2017-09-06T09:22:55.510Z	12 km NE of Carlin, Nevada	Earthquake	2.2
2017-09-06T09:22:26.628Z	13 km NE of Carlin, Nevada	Earthquake	2.7
2017-09-05T03:45:32.612Z	13 km ENE of Carlin, Nevada	Earthquake	1.7
2017-09-05T03:12:40.090Z	14 km ENE of Carlin, Nevada	Earthquake	2.1
2017-09-04T14:39:24.396Z	13 km ENE of Carlin, Nevada	Earthquake	2.0
2017-09-04T14:38:33.391Z	13 km NE of Carlin, Nevada	Earthquake	1.6
2017-09-04T11:42:49.792Z	13 km ENE of Carlin, Nevada	Earthquake	1.8
2017-09-04T10:49:02.954Z	10 km ENE of Carlin, Nevada	Earthquake	3.4
2017-09-02T16:22:23.659Z	15 km W of Elko, Nevada	Earthquake	1.1
2017-09-02T14:03:52.768Z	12 km ENE of Carlin, Nevada	Earthquake	2.7
2017-09-02T08:19:06.515Z	16 km NE of Carlin, Nevada	Earthquake	0.9
2017-09-01T12:03:45.883Z	15 km NE of Carlin, Nevada	Earthquake	3.4
2017-08-30T01:34:24.763Z	16 km W of Elko, Nevada	Earthquake	2.6
2017-08-29T19:43:16.453Z	14 km NE of Carlin, Nevada	Earthquake	2.4
2017-06-21T19:37:51.554Z	15 km NE of Carlin, Nevada	Earthquake	1.8
2017-06-13T04:33:21.811Z	2 km SSW of Carlin, Nevada	Earthquake	1.4
2017-06-12T03:48:08.770Z	14 km NE of Carlin, Nevada	Earthquake	1.6
2017-06-07T13:08:02.364Z	13 km ENE of Carlin, Nevada	Earthquake	1.8
2017-06-02T11:56:20.018Z	12 km S of Carlin, Nevada	Earthquake	1.7
2017-05-28T23:07:19.252Z	14 km ENE of Carlin, NV	Earthquake	1.8
2017-05-10T03:27:29.537Z	14 km ENE of Carlin, Nevada	Earthquake	1.3
2017-04-21T15:02:30.666Z	9 km E of Carlin, Nevada	Earthquake	1.5

Table 3.1 Cont'd – Earthquakes and Seismic Disturbances Recorded in Elko County 1992 through 2022			
Date	**Location**	**Type**	**Magnitude**
2017-04-21T12:03:44.674Z	14 km SSW of Elko, Nevada	Earthquake	1.7
2017-04-21T10:38:46.523Z	5 km SSW of Elko, Nevada	Earthquake	2.5
2017-04-20T06:57:25.523Z	12 km SSW of Elko, Nevada	Earthquake	1.6
2017-04-05T19:24:26.293Z	11 km SSW of Elko, Nevada	Earthquake	1.3
2017-04-05T02:37:30.353Z	15 km SSW of Elko, Nevada	Earthquake	1.3
2017-04-01T15:28:21.553Z	13 km N of Carlin, Nevada	Earthquake	1.4
2017-03-18T14:40:21.414Z	16 km SSW of Elko, Nevada	Earthquake	1.4
2017-03-15T12:54:05.352Z	15 km SSW of Elko, Nevada	Earthquake	1.7
2016-11-03T12:11:09.852Z	5 km SE of Carlin, Nevada	Earthquake	2.8
2016-11-03T07:04:00.272Z	4 km ESE of Carlin, Nevada	Earthquake	1.9
2016-11-03T06:47:24.705Z	5 km SSE of Carlin, Nevada	Earthquake	1.9
2016-07-18T06:28:32.571Z	8 km ENE of Carlin, Nevada	Earthquake	2.5
2016-07-06T03:26:07.529Z	10 km NNE of Carlin, Nevada	Earthquake	1.3
2015-11-13T18:50:56.651Z	19 km SSW of Elko, Nevada	Earthquake	1.7
2013-10-03T20:10:36.990Z	7 km ESE of Carlin, Nevada	Mining Explosion	2.1
2008-11-15T05:23:27.345Z	12 km E of Carlin, Nevada	Earthquake	3.2
2005-11-19T05:25:27.362Z	2 km E of Carlin, Nevada	Earthquake	3.2
2001-06-15T07:13:28.202Z	12 km SSW of Elko, Nevada	Earthquake	3.0
2001-04-26T19:49:21.130Z	15 km E of Carlin, Nevada	Earthquake	3.1
1998-05-09T08:12:06.180Z	6 km SSW of Elko, Nevada	Earthquake	3.6

Source: USGS Earthquake Database; Magnitude Scale between 0.5 and 5.0

Between 1992 and 2022, the City of Elko had 18 recorded natural earthquakes with magnitudes ranging between 1.1 to 3.6 and the Spring Creek HOA experienced one recorded natural earthquake with a magnitude of 2.7. The City of Carlin had 48 recorded natural earthquakes with magnitudes ranging between 0.8 to 3.4 between 1992 and 2022, five recorded seismic events due to explosions with magnitudes ranging between 1.7 to 2.4, and two recorded seismic events due to mining explosions with magnitudes of 1.7 and 2.1 respectively. Compared to the City of Elko and the Spring Creek HOA, the City of Carlin experienced a significantly greater number of natural earthquakes and manmade seismic events due to mining-related explosions.

3.2 Flood Danger

Several factors affect flood behavior including precipitation levels, waterways, and catchments. Types of precipitation like rain or snow may fall on a catchment (a surface area of land that collects and drains water into different waterways in rural or urban areas). Precipitation may be recaptured in soil or by vegetation. The greater the amount of rainfall, typically the greater the likelihood of runoff. Conversely, the greater the amount of vegetation that exists in a defined

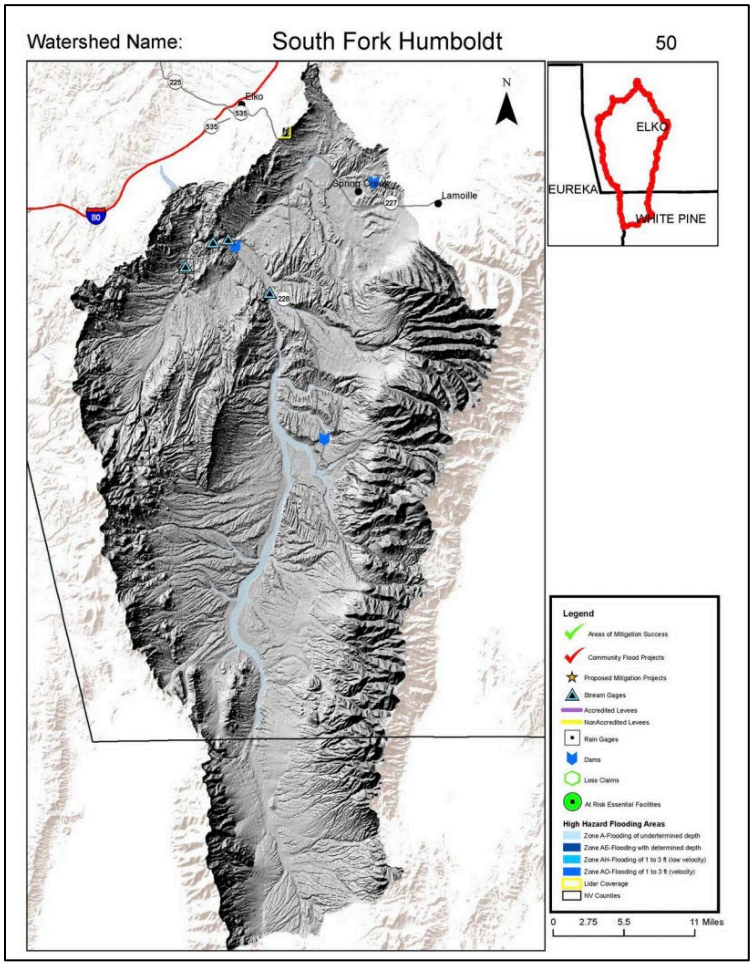
geographic area, the more likely rainfall will be recaptured in that defined geographic area and less water will end up covering area surfaces. Waterways in the Elko County area include the Humboldt River, South Fork Reservoir, the Spring Creek Marina, Lamoille Creek, Talbot Creek, Tenmile Creek, and Little Rabbit Creek. Lamoille Canyon is recognized as a catchment area and runoff regularly occurs from the surrounding Ruby Mountains.

3.2.a Watersheds in the Spring Creek Area

Watersheds are general defined as drainage areas where precipitation is channeled to creeks, streams, rivers, and eventually to larger waterways. During periods of heavy rain or snowfall, water may run across impervious surfaces such as manmade structures. The excess volume of water may overwhelm smaller areas of drainage, such as a stream or river, resulting in area flooding.

Figure 3.1 presents a map for the South Fork Humboldt watershed in Elko County. The Spring Creek HOA is the only significant population center located within the South Fork Humboldt watershed.

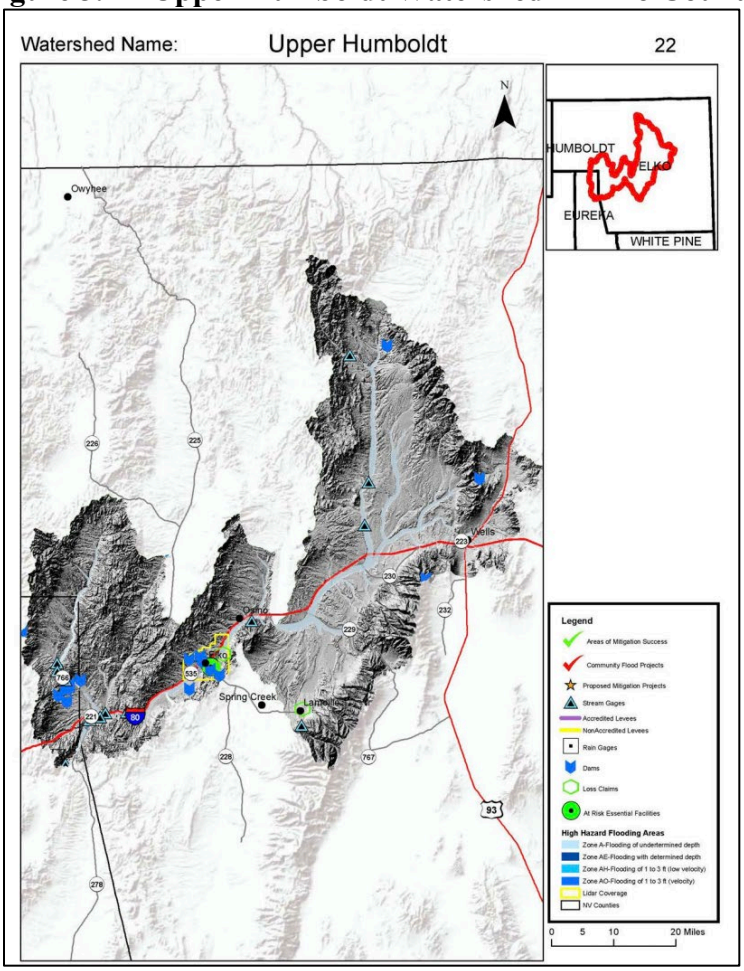
Figure 3.1 – South Fork Humboldt Watershed in Elko County



The major watercourses within the South Fork Humboldt watershed include the South Fork of the Humboldt River and Huntington Creek and there are recognized flood hazard zones along both of these watercourses. The South Fork Humboldt watershed also includes three reservoirs, impounded by dams, including Zunino, Spring Creek, and South Fork.

Figure 3.2 presents a map for the Upper Humboldt watershed in Elko County. The City of Elko and the City of Carlin are the two largest population centers in the Upper Humboldt watershed. This watershed typically follows the portion of U.S. Interstate 80 running across Elko County and connecting the City of Carlin, the City of Elko, and the City of Wells.

Figure 3.2 – Upper Humboldt Watershed in Elko County

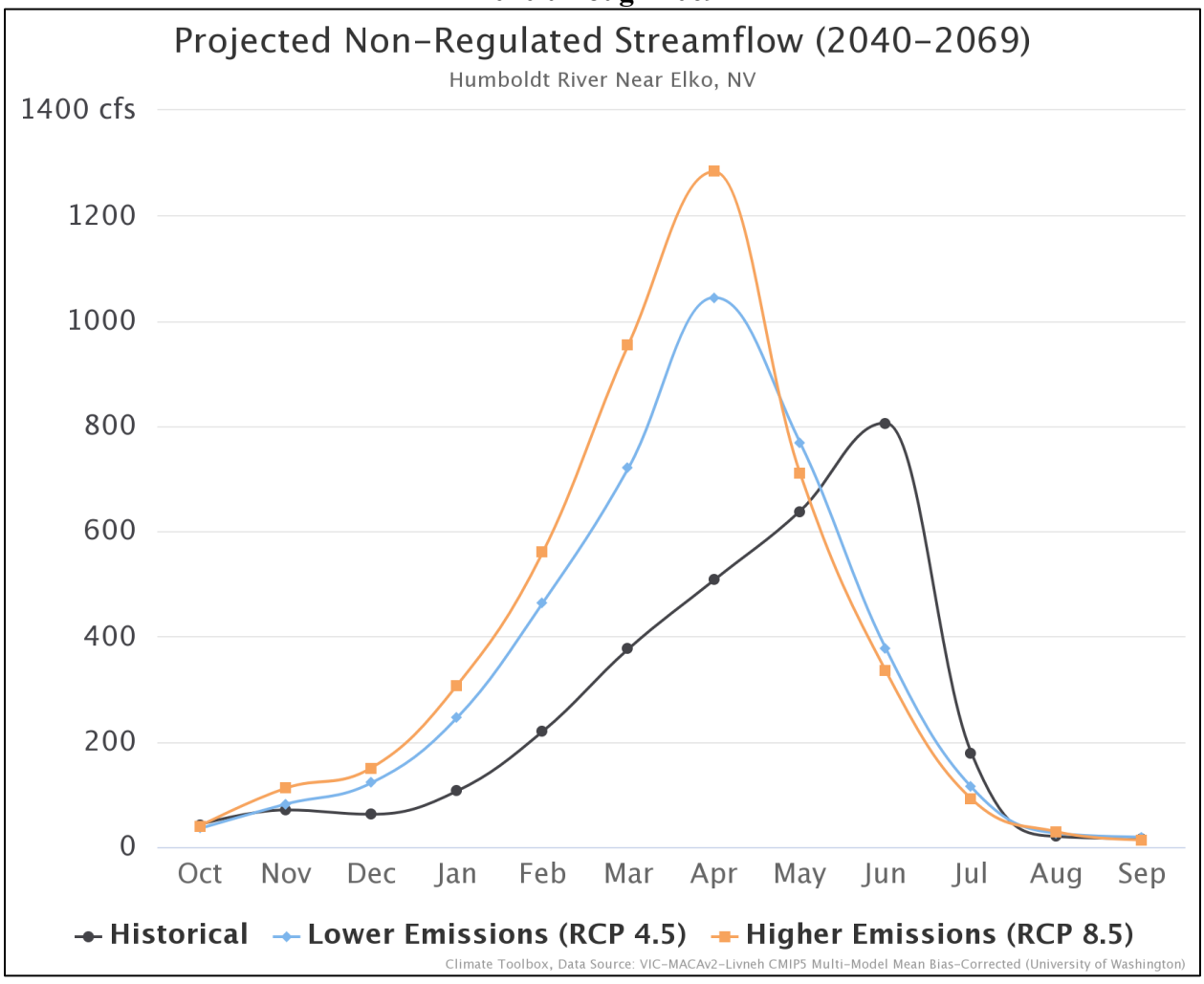


A significant amount of flooding occurs throughout the Upper Humboldt watershed due to the Humboldt River and its branching waterways including the Maggie, Tabor, Bishop, and Susie Creeks, and Mary's River. Within the Upper Humboldt watershed, the City of Elko, the City of Carlin, and the City of Wells regularly experience various water flooding hazard events on an annual basis, largely due to heavy summertime thunderstorms.

3.2.b Projected Streamflow

Figure 3.3 presents projected future non-regulated streamflow for the Humboldt River near the City of Elko for 2040 through 2069, measured in cubic feet per second. Lower emissions and higher emissions are compared against historical data over a one-year period, starting from October and ending in September. Historical emissions typically range from 15.91 cubic feet per second to 805.95 cubic feet per second. Lower emissions will typically range from 19.23 cubic feet per second to 1044.24 cubic feet per second and higher emissions will typically range from 13.72 cubic feet per second to 1283.42 cubic feet per second.

Figure 3.3 – Projected Non-Regulated Streamflow, Humboldt River near City of Elko 2040 through 2069



Source: Climate Toolbox- Humboldt River Near Elko, NV Stream Outlet; Future Time Period: Mid 21st Century (2040- 2069); Higher Emissions (RCP 8.5); 10 Model Mean

Future projected non-regulated streamflow for the Humboldt River will vary. For the month of October, lower emissions are projected to be 35.42 cubic feet per second, higher emissions are

projected to be 40.50 cubic feet per second, and historical data typically shows 43.00 cubic feet per second. For the month of November, lower emissions are projected to be 81.66 cubic feet per second, higher emissions are projected to be 112.01 cubic feet per second, and historical data typically shows 70.59 cubic feet per second. For the month of December, lower emissions are projected to be 122.08 cubic feet per second, higher emissions are projected to be 150.65 cubic feet per second, and historical data typically shows 62.35 cubic feet per second.

For the month of January, lower emissions are projected to be 245.90 cubic feet per second, higher emissions are projected to be 307.88 cubic feet per second, and historical data typically shows 62.35 cubic feet per second. For the month of February, lower emissions are projected to be 464.33 cubic feet per second, higher emissions are projected to be 560.43 cubic feet per second, and historical data typically shows 220.00 cubic feet per second. For the month of March, lower emissions are projected to be 720.62 cubic feet per second, higher emissions are projected to be 955.06 cubic feet per second, and historical data typically shows 367.78 cubic feet per second.

Lower emissions are projected to be 1,044.24 cubic feet per second for future projected non-regulated streamflow for the Humboldt River near the City of Elko for the month of April, higher emissions are projected to be 1,283.42 cubic feet per second, and historical data typically shows 507.55 cubic feet per second. For the month of May, lower emissions are projected to be 769.45 cubic feet per second, higher emissions are projected to be 711.18 cubic feet per second, and historical data typically shows 638.17 cubic feet per second. For the month of June, lower emissions are projected to be 378.29 cubic feet per second, higher emissions are projected to be 335.60 cubic feet per second, and historical data typically shows 805.95 cubic feet per second.

For the month of July, lower emissions are projected to be 114.38 cubic feet per second, higher emissions are projected to be 91.84 cubic feet per second, and historical data typically shows 179.56 cubic feet per second. For the month of August, lower emissions are projected to be 26.32 cubic feet per second, higher emissions are projected to be 29.13 cubic feet per second, and historical data typically shows 20.07 cubic feet per second. For the month of September, lower emissions are projected to be 19.23 cubic feet per second, higher emissions are projected to be 13.72 cubic feet per second, and historical data typically shows 15.91 cubic feet per second.

Lower emissions are projected to peak in the month of April at 1,044.24 cubic feet per second and higher emissions are projected to peak in the month of April at 1,283.42 cubic feet per second. Historically, streamflow for the Humboldt River has peaked in the month of June at 805.95 cubic feet per second. In the future, streamflow for the Humboldt River is projected to peak at 238.29 to 477.47 cubic feet per second heavier and occur two months sooner.

3.3 Droughts

The analysis of droughts for Elko County presented in this sub-section uses the Standardized Precipitation Index (SPI), the Evaporative Demand Drought Index (EDDI), and the Standardized Precipitation Evapotranspiration Index (SPEI) for the City of Elko, the Spring Creek HOA, the

City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area.

3.3.a The Standardized Precipitation Index

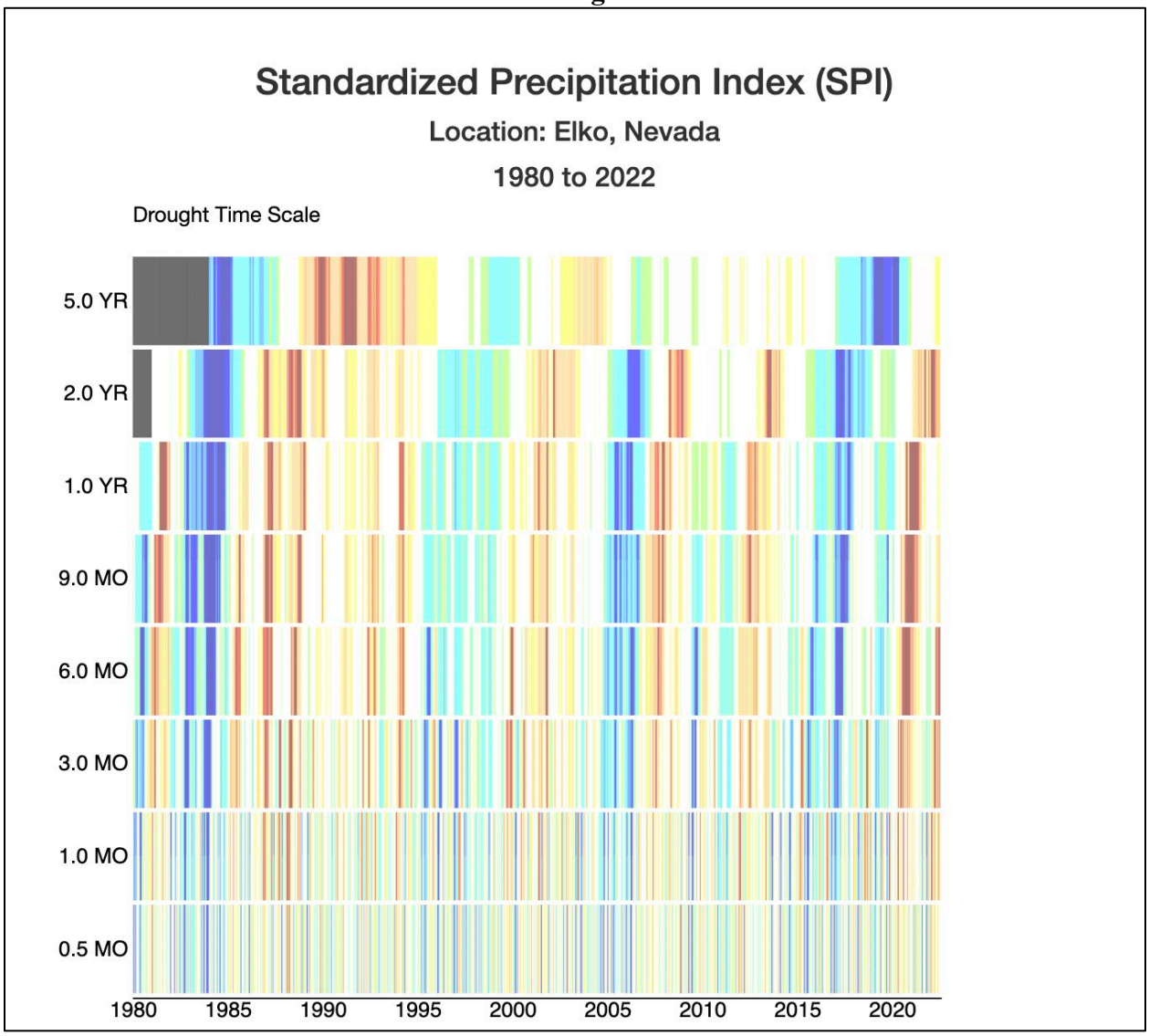
The Standardized Precipitation Index (SPI) is a commonly used index for characterizing drought weather data along a range of timescales. On short timescales, the SPI is closely related to soil moisture while, along longer timescales, the SPI tends to be related to groundwater and reservoir storage levels. Key strengths of using the SPI include exclusively using precipitation to characterize drought or abnormal wetness, the index is easily comparable across regions with different climates, and the SPI is less complicated to calculate. Drawbacks of using the SPI include not being able to account for evapotranspiration and the generally limited ability to capture the effect of increased temperatures, the general reliability of data is typically limited to a 30-year to 50-year time range, and the SPI does not factor in impacts of runoff, streamflow, and water availability in an area.

Figure 3.4 through Figure 3.9 presents historical SPI drought stripes for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area between 1980 and 2022 with periods spanning from half a month to five years. A dark red line indicates exceptional drought, a red line indicates extreme drought, an orange line indicates severe drought, a light orange line indicates moderate drought, and a yellow line indicates abnormal dry. A white line indicates neutral, a green line indicates abnormal wet, a neon blue line indicates moderate wet, a light blue line indicates severe wet, a dark blue line indicates extreme wet, and an indigo line indicates exceptional wet.

For the City of Elko in Elko County, drought levels have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the City of Elko experienced exceptionally wet weather in 1980 compared to abnormally dry weather in 2022. Based on the 1.0-month drought stripe, the City of Elko experienced extremely wet weather in 1980, compared to severe drought weather in 2022. The City of Elko, based on the 3.0-month drought stripe, experienced abnormally wet weather in 1980 compared to exceptional drought weather in 2022 and, based on the 6.0-month drought stripe, the City of Elko experienced neutral weather in 1980 compared to exceptional drought weather in 2022. Based on the 9.0-month drought stripe, the City of Elko experienced moderately wet weather in 1980 compared to moderate drought weather in 2022. The City of Elko, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to abnormally dry weather in 2022 and, based on the 2.0-year drought stripe, the City of Elko had experienced neutral weather in 1981 compared to severe drought weather in 2022. Based on the 5.0-year drought stripe, the City of Elko experienced severely wet weather in 1984 and abnormally dry weather in 2022.

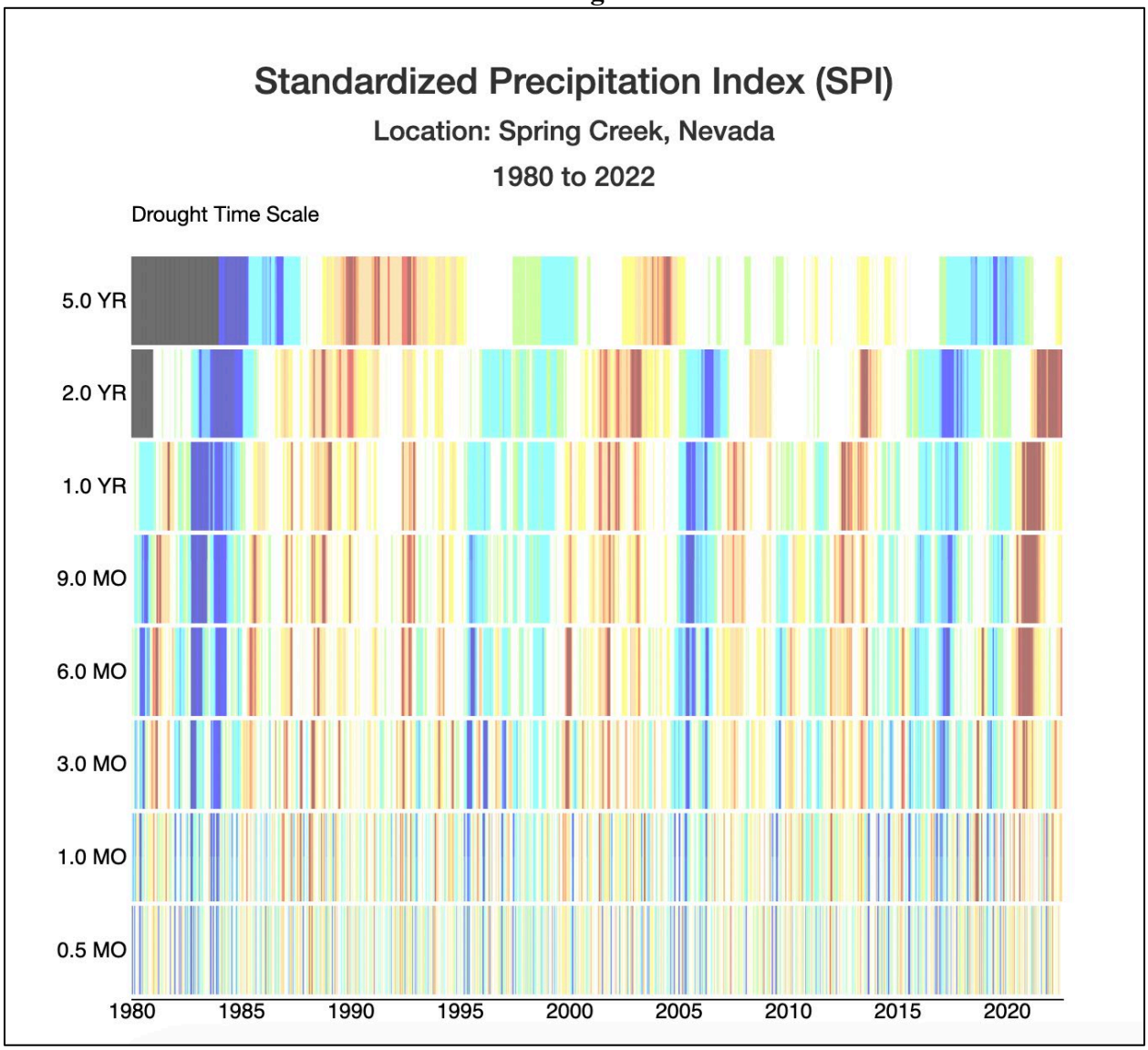
For the Spring Creek HOA in Elko County, drought levels have varied significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the Spring Creek HOA experienced neutral weather in 1980 compared to neutral weather in 2022 and, based on the 1.0-month drought stripe, experienced moderate drought weather in 1980 compared to moderate drought

Figure 3.4 – Historical Standardized Precipitation Index Results, City of Elko 1980 through 2022



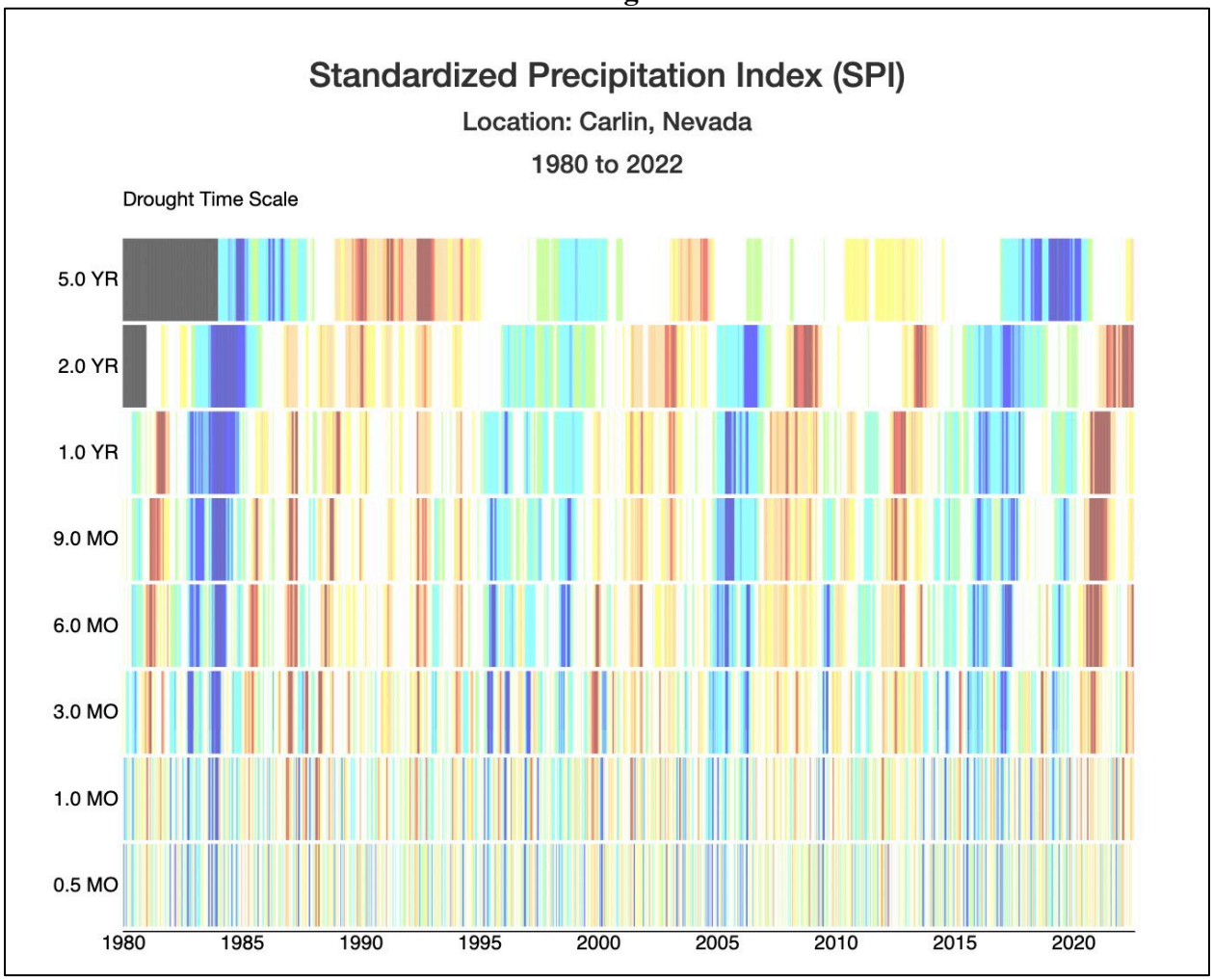
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5-month, 1.0-month, 3.0-month, 6.0-month; 9.0-month; 1.0-year; 2.0-year; 5.0-year

Figure 3.5 – Historical Standardized Precipitation Index Results, Spring Creek HOA 1980 through 2022



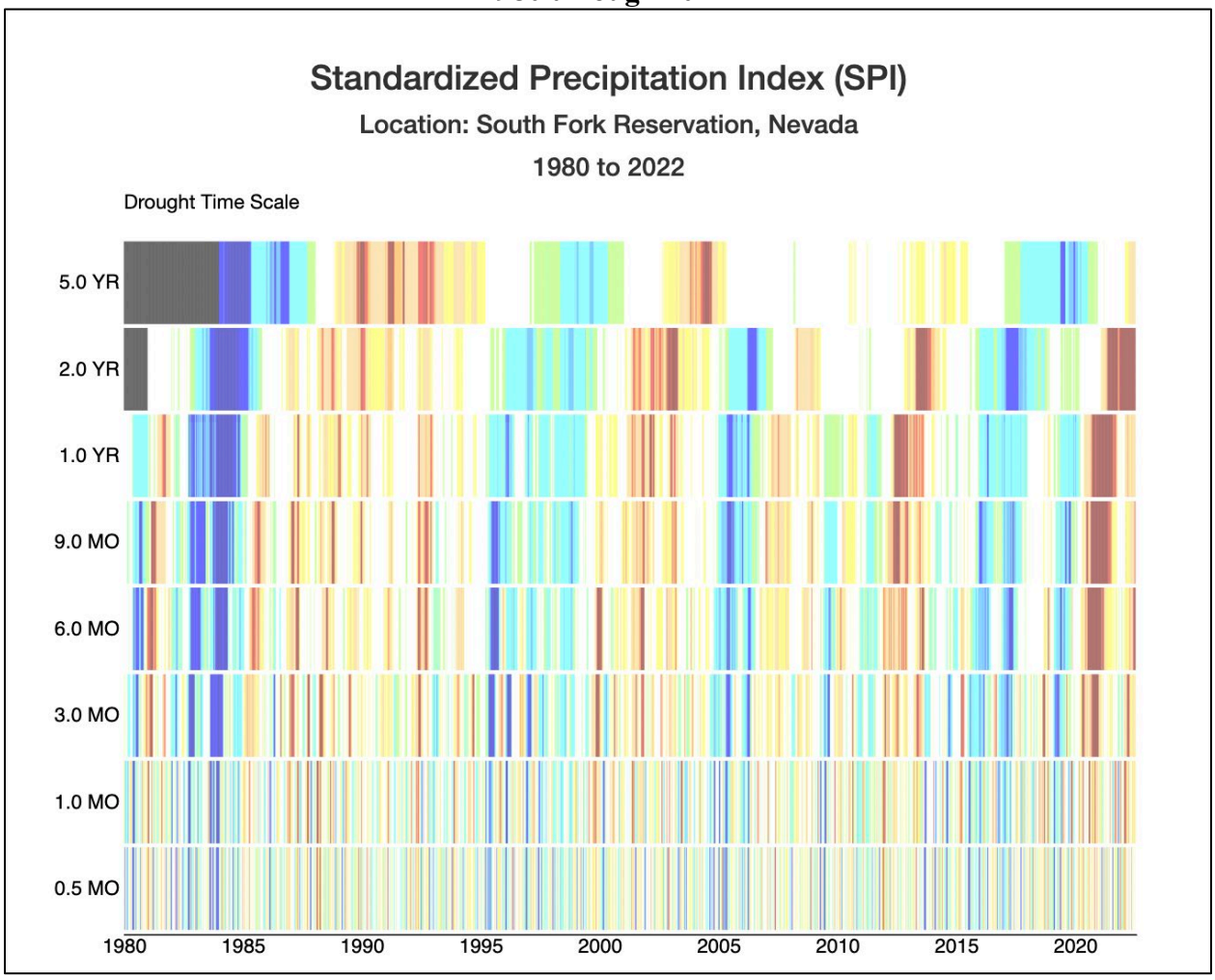
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.6 – Historical Standardized Precipitation Index Results, City of Carlin 1980 through 2022



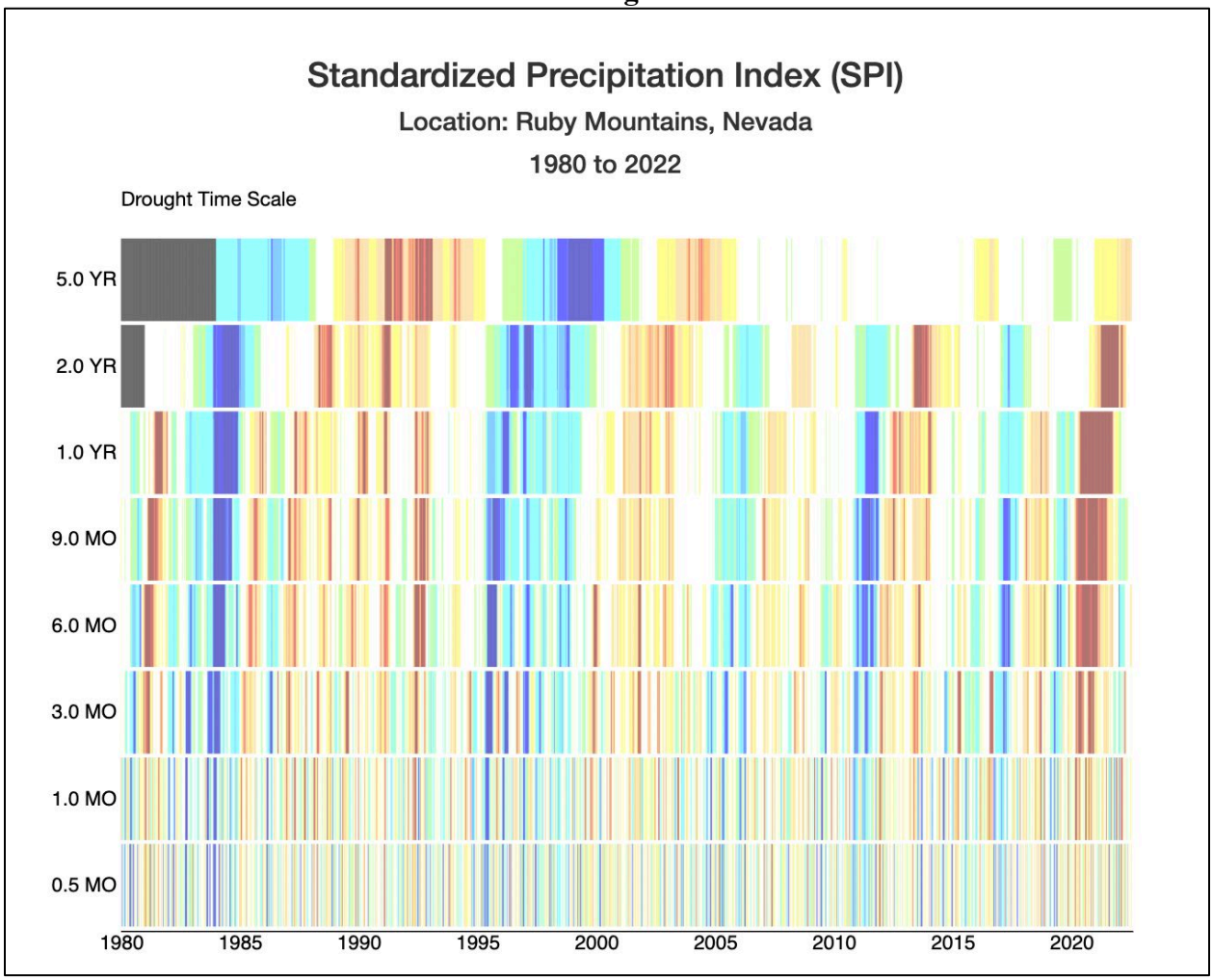
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.7 – Historical Standardized Precipitation Index Results, South Fork Native American Reservation
1980 through 2022



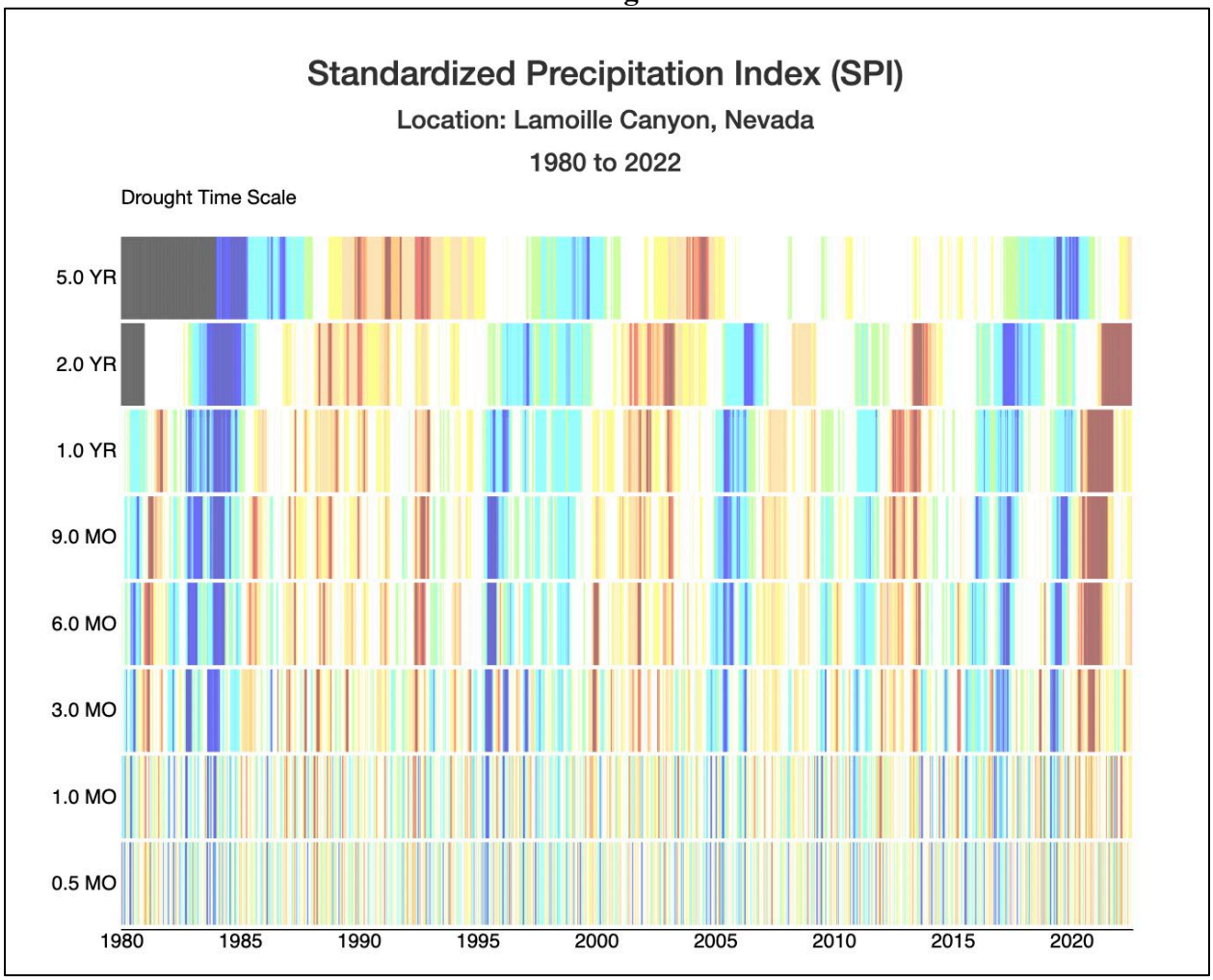
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.8 – Historical Standardized Precipitation Index Results, Ruby Mountains 1980 through 2022



Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.9 – Historical Standardized Precipitation Index Results, Lamoille Canyon 1980 through 2022



Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

weather in 2022. Based on the 3.0-month drought stripe, the Spring Creek HOA experienced neutral weather in 1980 compared to moderate drought weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to exceptional drought weather in 2022. The Spring Creek HOA, based on the 9.0-month drought stripe, experienced neutral weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to abnormally dry weather in 2022. Based on the 2.0-year drought stripe, the Spring Creek HOA experienced neutral weather in 1981 compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced extremely wet weather in 1984 compared to abnormally dry weather in 2022.

Drought levels have changed significantly for the City of Carlin between 1980 and 2022. Based on the 0.5-month drought stripe, the City of Carlin experienced neutral weather in 1980 compared to neutral weather in 2022 and, based on the 1.0-month drought stripe, the City of Carlin experienced neutral weather in 1980 compared to moderate drought weather in 2022. Based on the 3.0-month drought stripe, the City of Carlin experienced neutral weather in 1980 compared to moderate drought weather in 2022 and, based on the 6.0-month drought stripe, the City of Carlin experienced neutral weather in 1980 compared to exceptional drought weather in 2022. Based on the 9.0-month drought stripe, the City of Carlin experienced neutral weather in 1980 compared to exceptional drought weather in 2022 and, based on the 1.0-year drought stripe, the City of Carlin experienced neutral weather in 1980, compared to abnormally dry weather in 2022. The City of Carlin, based on the 2.0-year drought stripe, experienced neutral weather in 1981 compared to exceptional drought weather in 2022. Based on the 5.0-year drought stripe, the City of Carlin experienced moderately wet weather in 1984 compared to moderate drought weather in 2022.

For the South Fork Native American Reservation, drought levels have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the South Fork Native American Reservation experienced neutral weather in 1980 compared to neutral weather in 2022 and, based on the 1.0-month drought stripe, experienced moderately wet weather in 1980 compared to abnormally dry weather in 2022. Based on the 3.0-month drought stripe, the South Fork Native American Reservation experienced neutral weather in 1980 compared to exceptional drought weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to exceptional drought weather in 2022. The South Fork Native American Reservation, based on the 9.0-month drought stripe experienced neutral weather in 1980 compared to extreme drought weather in 2022 and, based on the 1.0-year drought stripe, the experienced neutral weather in 1980, compared to moderate drought weather in 2022. Based on the 2.0-year drought stripe, the South Fork Native American Reservation experienced neutral weather in 1981 compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced extremely wet weather in 1984, compared to moderate drought weather in 2022.

Drought levels for the Ruby Mountains have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the Ruby Mountains experienced extremely wet weather in 1980 compared to neutral weather in 2022 and, based on the 1.0-month drought stripe, experienced abnormally wet weather in 1980 compared to neutral weather in 2022. Based on the

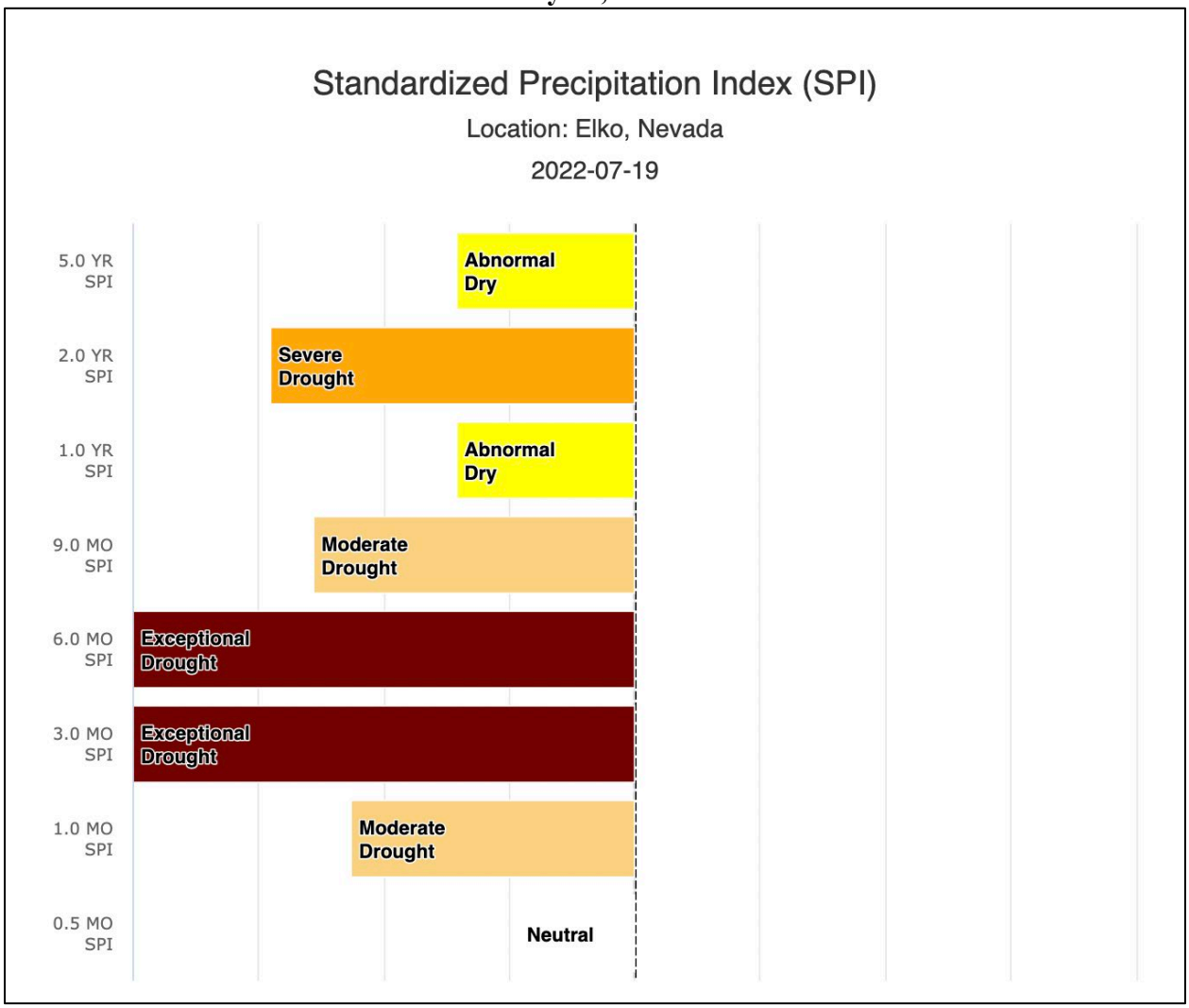
3.0-month drought stripe, the Ruby Mountains experienced neutral weather in 1980 compared to neutral weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to moderate drought weather in 2022. The Ruby Mountains, based on the 9.0-month drought stripe, experienced neutral weather in 1980 compared to neutral weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to neutral weather in 2022. Based on the 2.0-year drought stripe, the Ruby Mountains experienced neutral weather in 1981 compared to neutral weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to moderate drought weather in 2022.

For Lamoille Canyon, drought levels have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, Lamoille Canyon experienced neutral weather in 1980 compared to abnormally dry weather in 2022 and, based on the 1.0-month drought stripe, experienced moderate drought weather in 1980 compared to moderate drought weather in 2022. The Lamoille Canyon area, based on the 3.0-month drought stripe, experienced neutral weather in 1980 compared to severe drought weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to severe drought weather in 2022. Based on the 9.0-month drought stripe, Lamoille Canyon experienced neutral weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to abnormally dry weather in 2022. The Lamoille Canyon area, based on the 2.0-year drought stripe, experienced neutral weather in 1981 compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced extremely wet weather in 1984, compared to moderate drought weather in 2022.

Figure 3.10 through Figure 3.15 presents current SPI drought stripes for the for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area for July 19, 2022 with periods spanning from half a month to five years. A dark red line indicates exceptional drought, a red line indicates extreme drought, an orange line indicates severe drought, a light orange line indicates moderate drought, and a yellow line indicates abnormal dry. A white line indicates neutral, a green line indicates abnormal wet, a neon blue line indicates moderate wet, a light blue line indicates severe wet, a dark blue line indicates extreme wet, and an indigo line indicates exceptional wet.

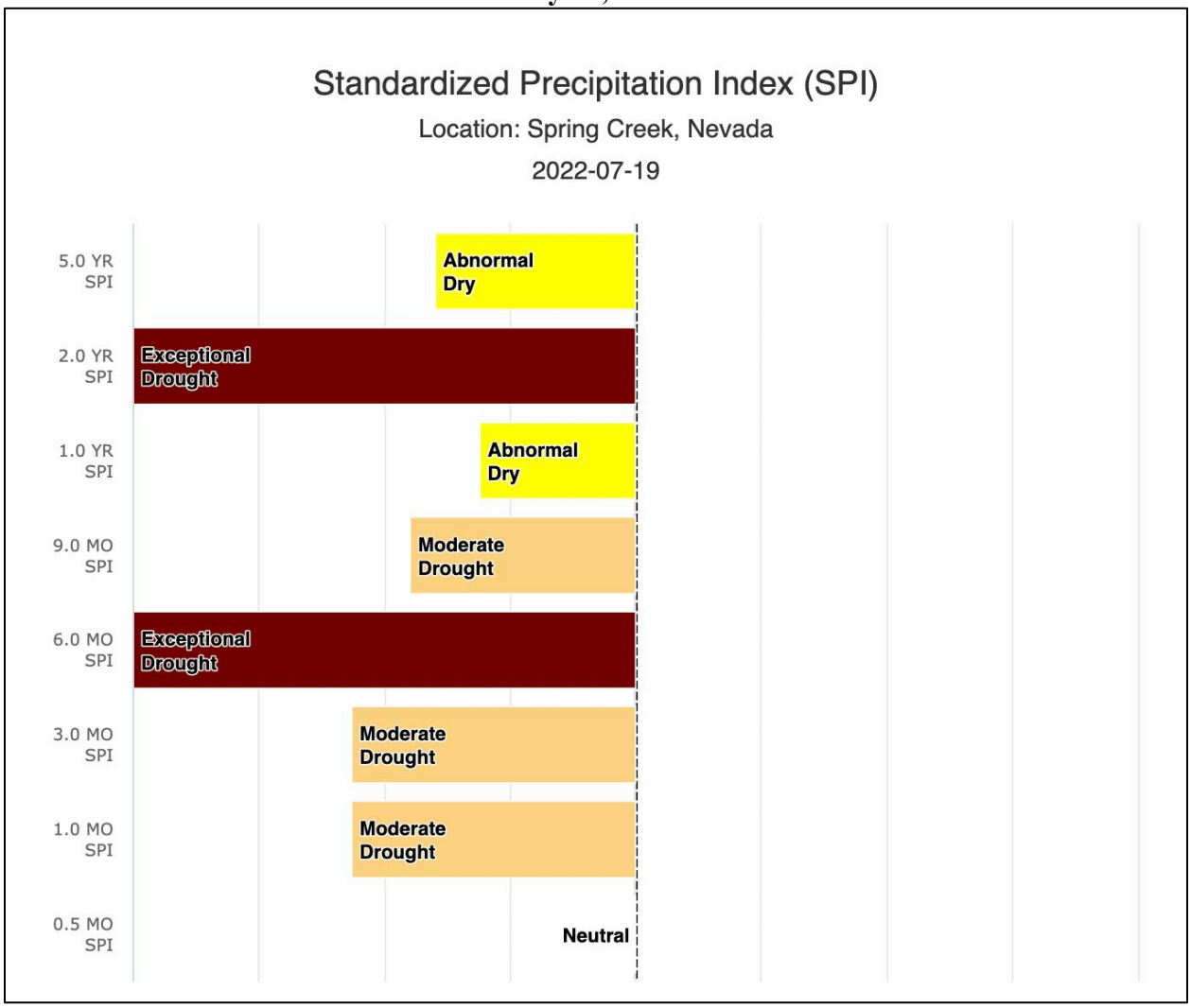
According to recent data from July 19, 2022, the 0.5 month SPI for the City of Elko indicated a neutral drought level, the 1.0 SPI indicated a moderate drought level, and the 3.0 month SPI indicated an exceptional drought level. For the City of Elko, the 6.0 month SPI indicated an exceptional drought level, the 9.0 month SPI indicated a moderate drought level, the 1.0 year SPI indicated an abnormal dry level, the 2.0 year SPI indicated a severe drought level, and the 5.0 year SPI indicated an abnormal dry level. According to recent data for July 19, 2022, the Spring Creek HOA, based on the 0.5 month SPI, experienced a neutral drought level, experienced a moderate drought level based on the 1.0 SPI, and experienced a moderate drought level based on the 3.0 month SPI. The 6.0 month SPI indicated an exceptional drought level for the Spring Creek HOA area, the 9.0 month SPI indicated a moderate drought level, and the 1.0 year SPI

Figure 3.10 – Current Standardized Precipitation Index Results, City of Elko
July 19, 2022



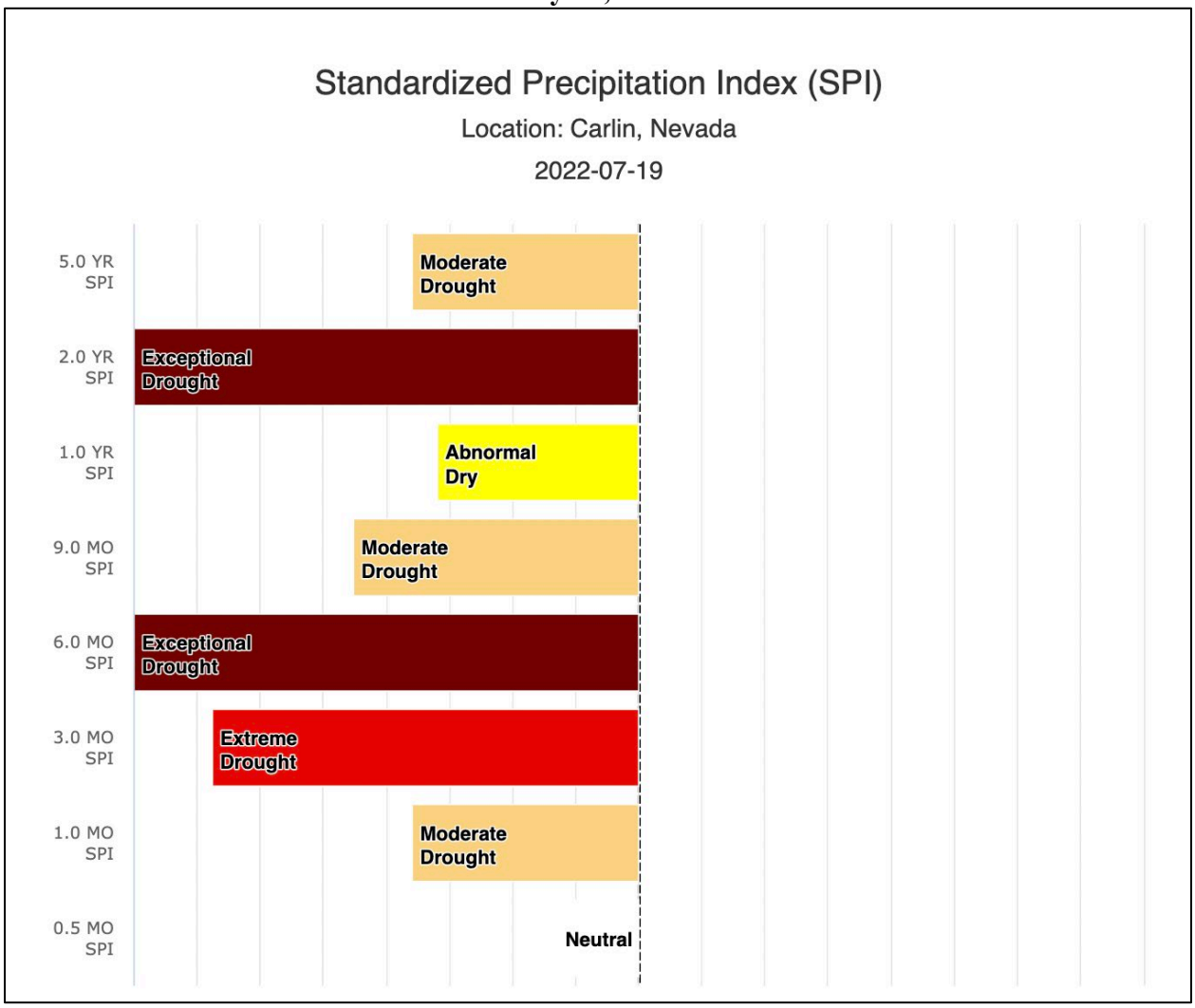
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.11 – Current Standardized Precipitation Index Results, Spring Creek HOA
July 19, 2022



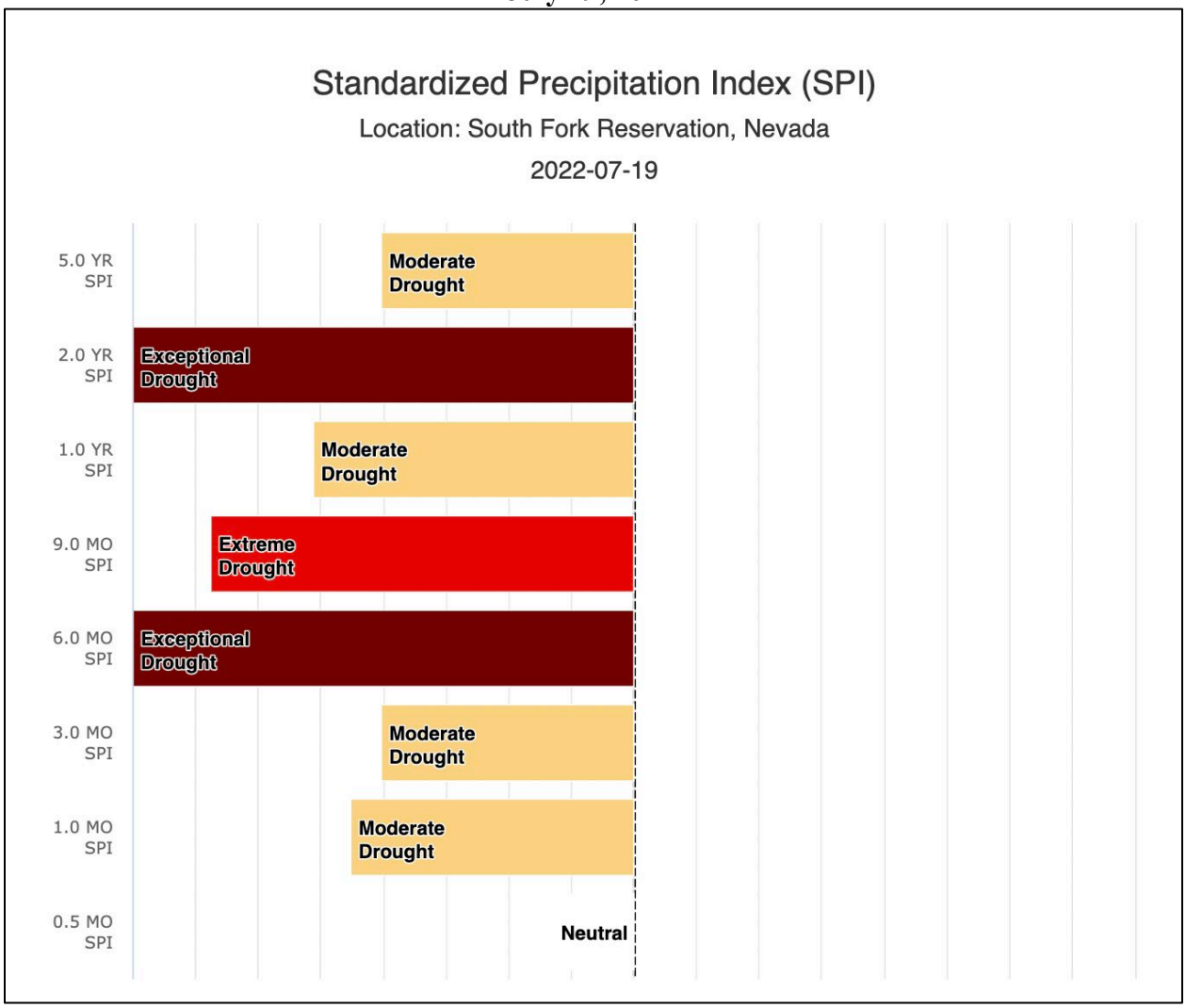
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.12 – Current Standardized Precipitation Index Results, City of Carlin
July 19, 2022



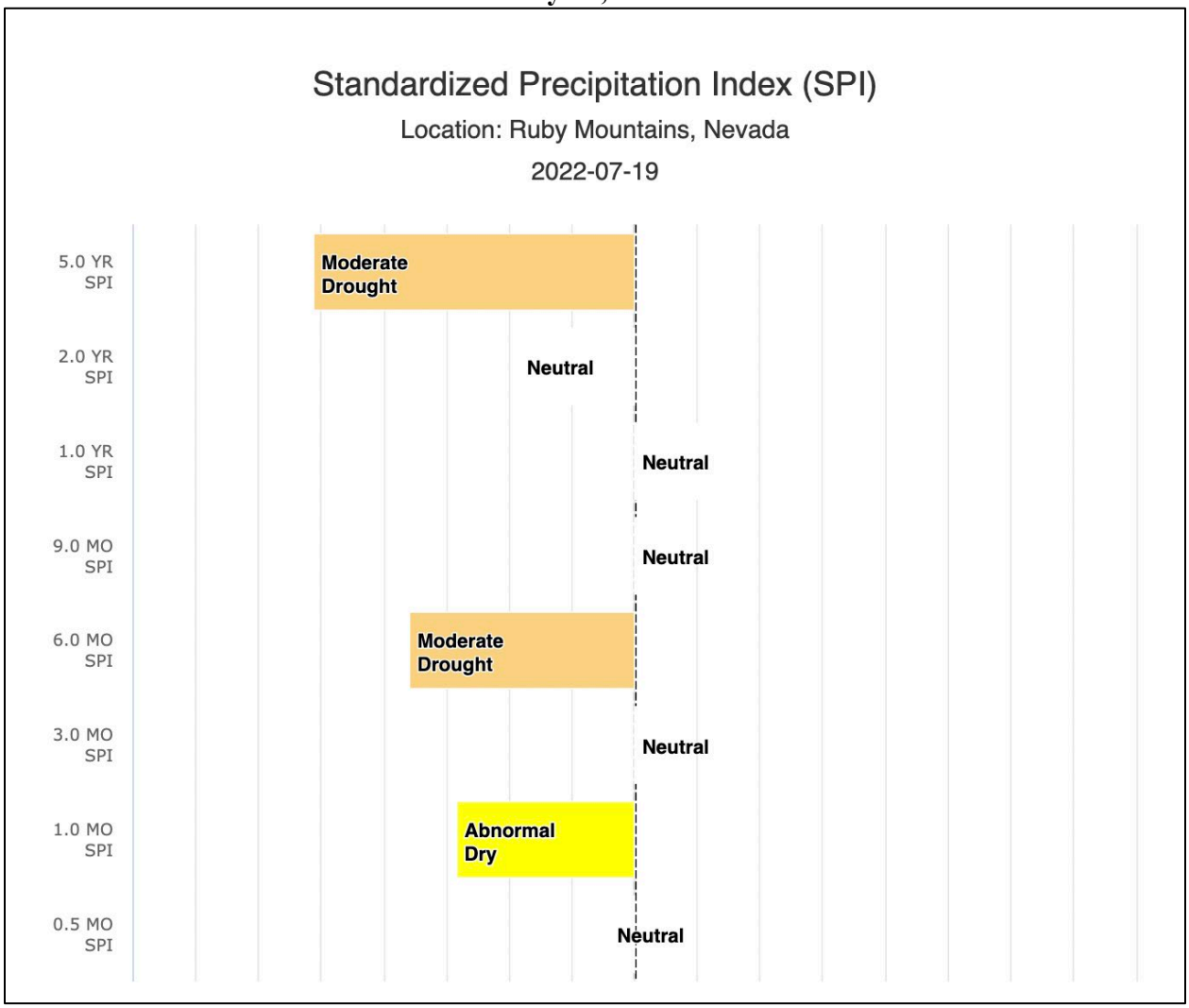
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.13 – Current Standardized Precipitation Index Results, South Fork Native American Reservation
July 19, 2022



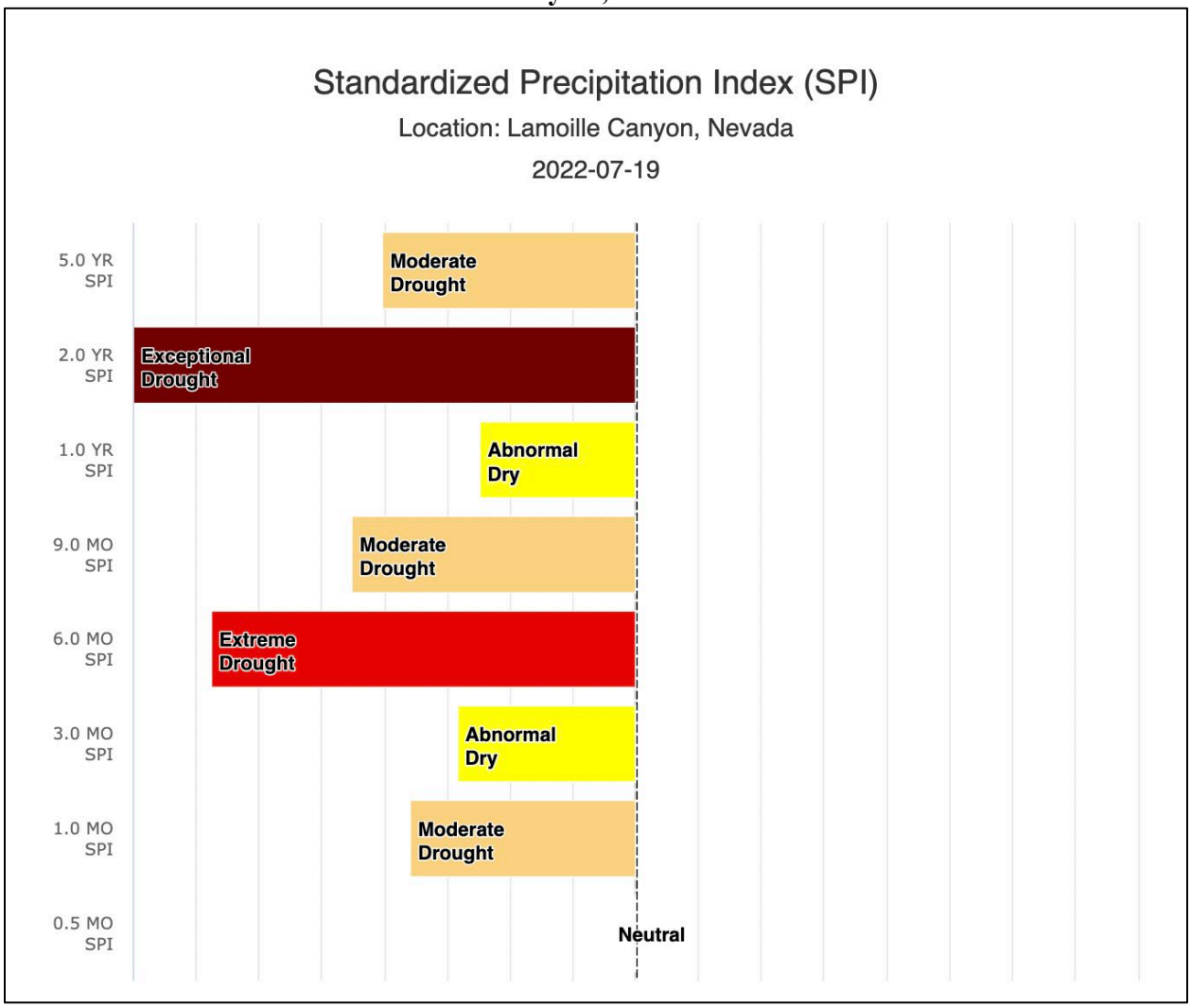
Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.14 – Current Standardized Precipitation Index Results, Ruby Mountains July 19, 2022



Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.15 – Current Standardized Precipitation Index Results, Lamoille Canyon July 19, 2022



Source: Climate Toolbox- Historical Drought Stripes; SPI: Standardized Precipitation Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

indicated an abnormal dry level. For the Spring Creek HOA area, the 2.0 year SPI indicated an exceptional drought level and the 5.0 year SPI indicated an abnormal dry level.

For July 19, 2022 and for the City of Carlin, the 0.5 month SPI indicated a neutral drought level, the 1.0 SPI indicated a moderate drought level, and the 3.0 month SPI indicated an extreme drought level. For the City of Carlin, the 6.0 month SPI on July 19, 2022 indicated an exceptional drought level, the 9.0 month SPI indicated a moderate drought level, the 1.0 year SPI indicated an abnormal dry level, the 2.0 year SPI indicated an exceptional drought level, and the 5.0 year SPI indicated an moderate drought level. According to the 0.5 month SPI, the South Fork Native American Reservation experienced a neutral drought level on July 19, 2022, experience a moderate drought level at the 1.0 SPI, and experience a moderate drought level at the 3.0 month SPI. The South Fork Native American Reservation, at the 6.0 month SPI, experienced an exceptional drought level, experienced an extreme drought level at the 9.0 month SPI, and experienced a moderate drought level at the 1.0 year SPI. The 2.0 year SPI indicated an exceptional drought level and the 5.0 year SPI indicated a moderate drought level.

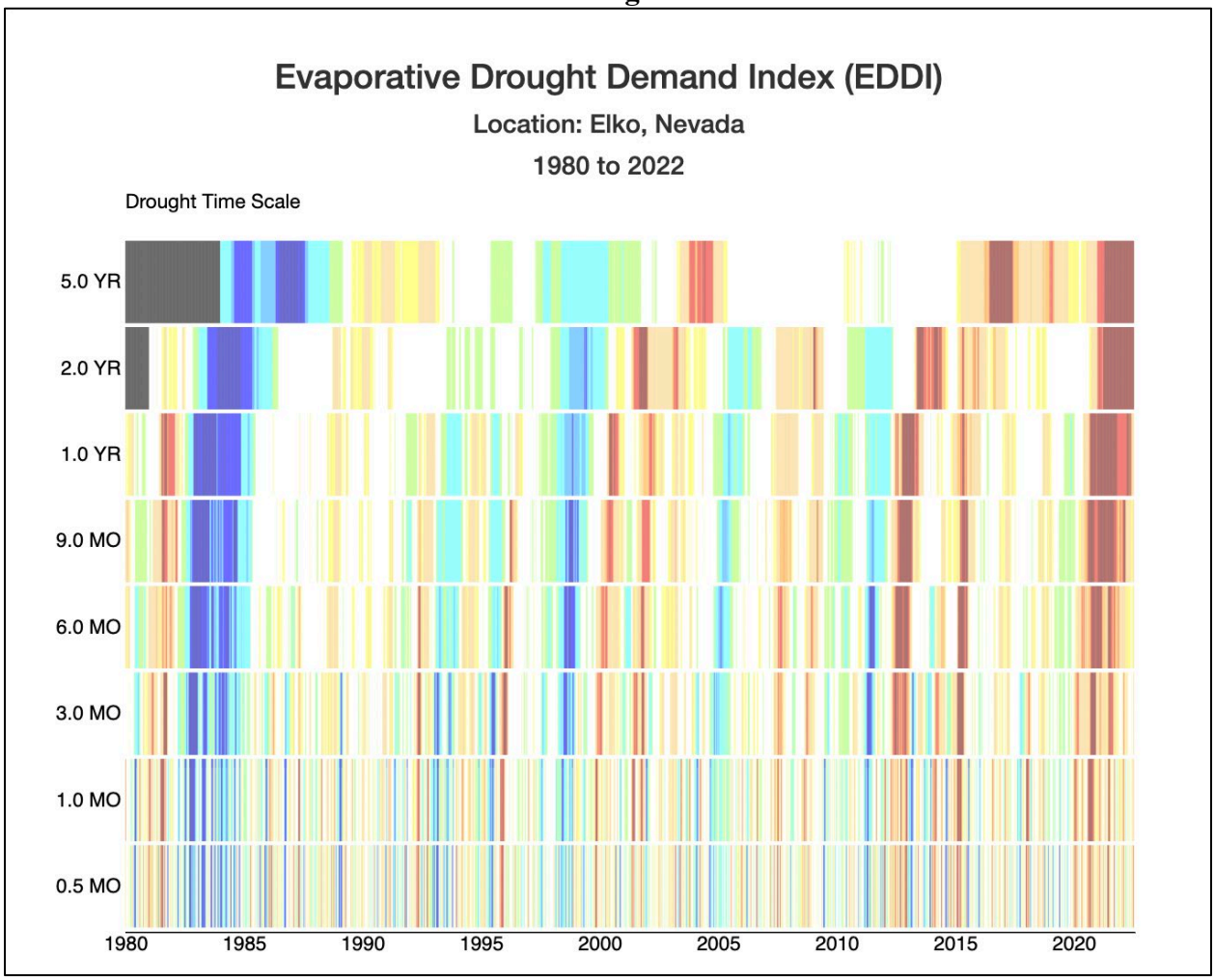
For the Ruby Mountains, the 0.5 month SPI indicated a neutral drought level, the 1.0 SPI indicated an abnormal dry level, and the 3.0 month SPI indicated a neutral drought level. The 6.0 month SPI indicated a moderate drought level for the Ruby Mountains, the 9.0 month SPI indicated a neutral drought level, the 1.0 year SPI indicated a neutral drought level, the 2.0 year SPI indicated a neutral drought level, and the 5.0 year SPI indicated a moderate drought level. On July 19, 2022 for the Lamoille Canyon area, the 0.5 month SPI indicated a neutral drought level, the 1.0 SPI indicated a moderate drought level, and the 3.0 month SPI indicated an abnormal dry drought level. For the Lamoille Canyon area, the 6.0 month SPI indicated an extreme drought level, the 9.0 month SPI indicated a moderate drought level, the 1.0 year SPI indicated an abnormal drought level, the 2.0 year SPI indicated an exceptional drought level, and the 5.0 year SPI indicated a moderate drought level.

3.3.b The Evaporative Demand Drought Index

The Evaporative Demand Drought Index (EDDI) is another experimental drought monitoring tool. EDDI examines irregular patterns in the atmospheric evaporative demand for a given location and across a period of time. EDDI may offer early warning of agricultural drought, hydrologic drought, and fire-weather risk by providing information on abnormal evaporative demand patterns in a region.

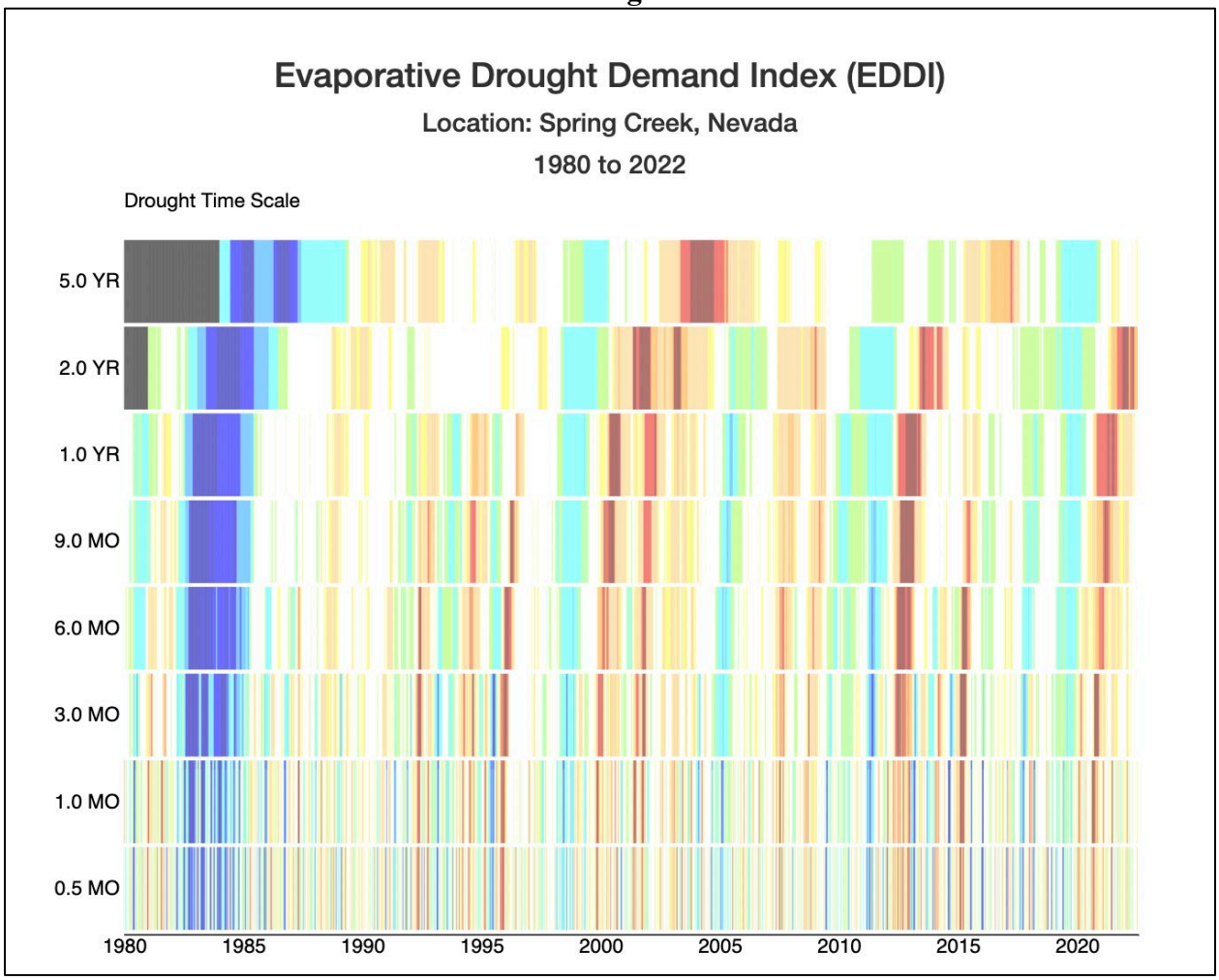
Figure 3.16 through Figure 3.21 presents historical EDDI drought stripes for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area between 1980 and 2022 with periods spanning from half a month to five years. A dark red line indicates exceptional drought, a red line indicates extreme drought, an orange line indicates severe drought, and a light orange line indicates moderate drought. A yellow line indicates abnormal dry, a white line indicates neutral, a green line indicates abnormal wet, a neon blue line indicates moderate wet, a light blue line indicates severe wet, a dark blue line indicates extreme wet, and an indigo line indicates exceptional wet.

Figure 3.16 – Historical Evaporative Demand Drought Index Results, City of Elko 1980 through 2022



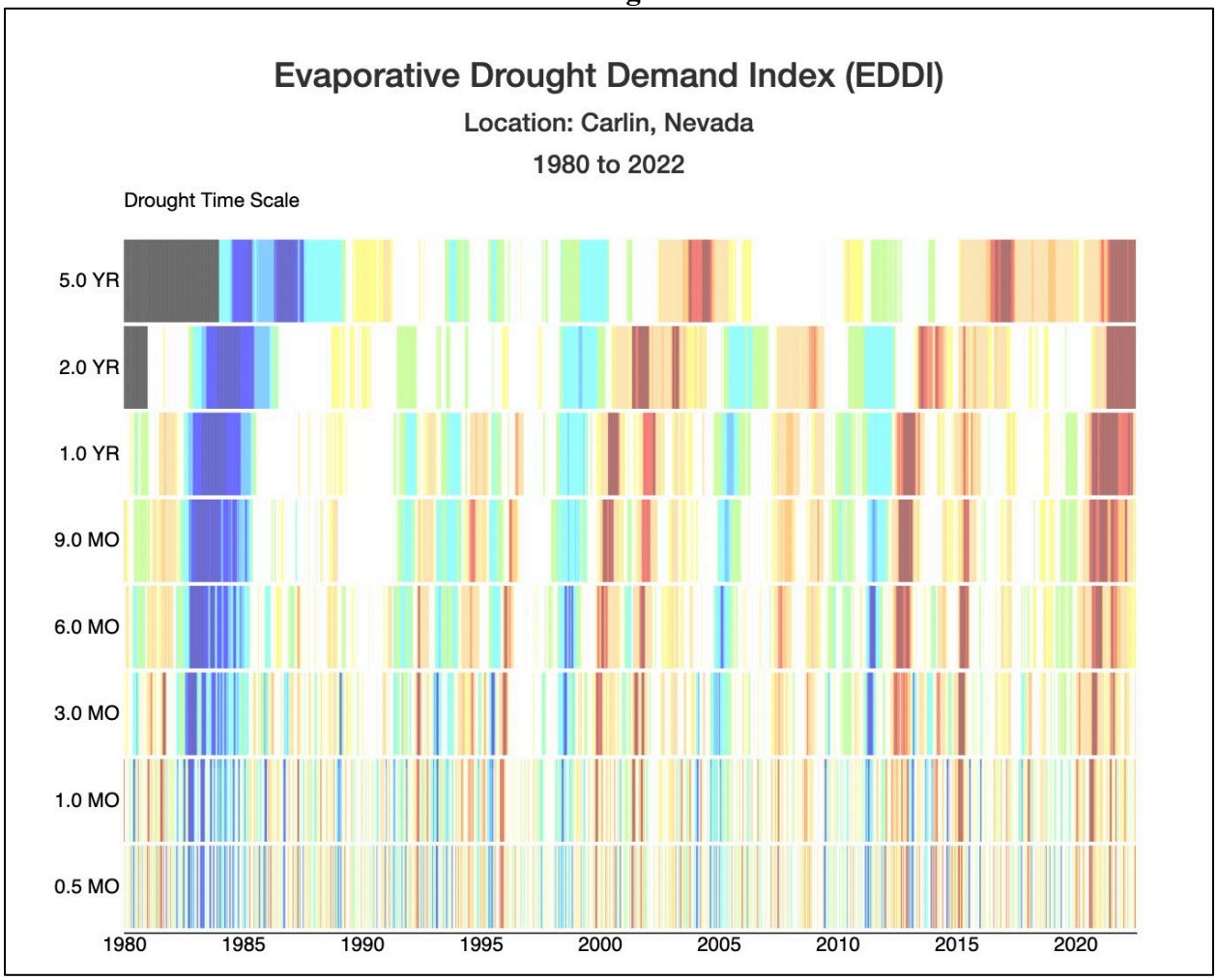
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.17 – Historical Evaporative Demand Drought Index Results, Spring Creek HOA 1980 through 2022



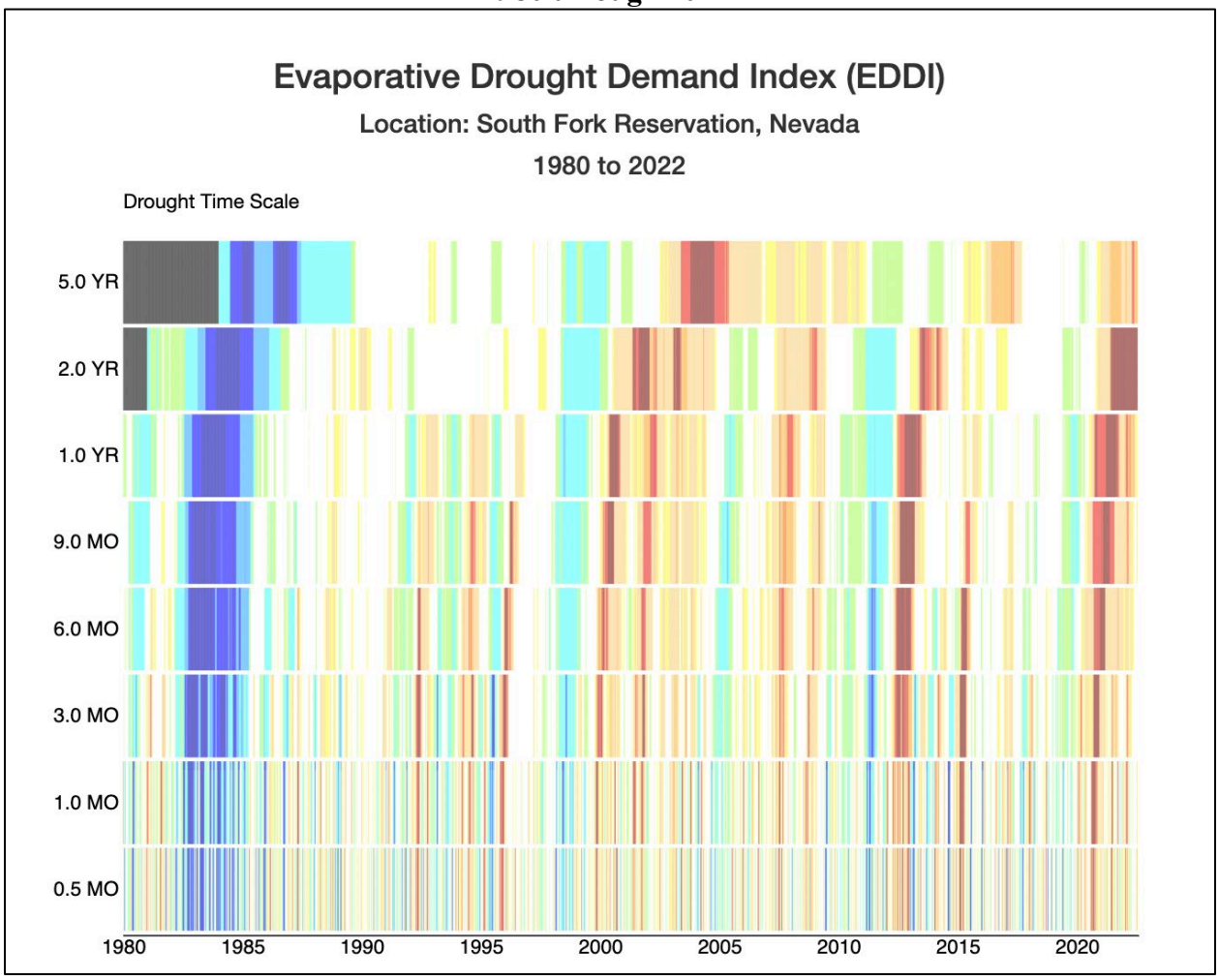
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.18 – Historical Evaporative Demand Drought Index Results, City of Carlin 1980 through 2022



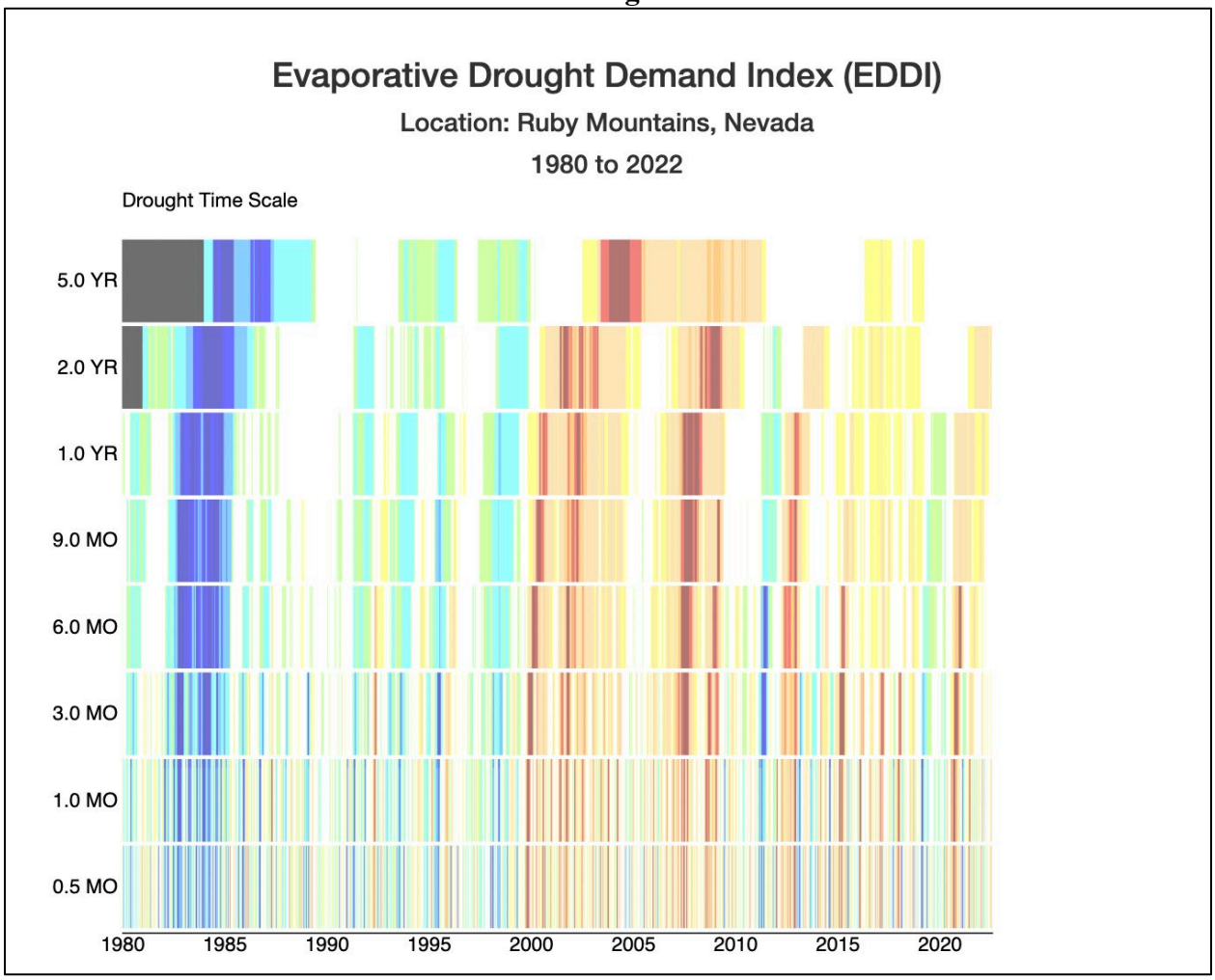
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.19 – Historical Evaporative Demand Drought Index Results, South Fork Native American Reservation
1980 through 2022



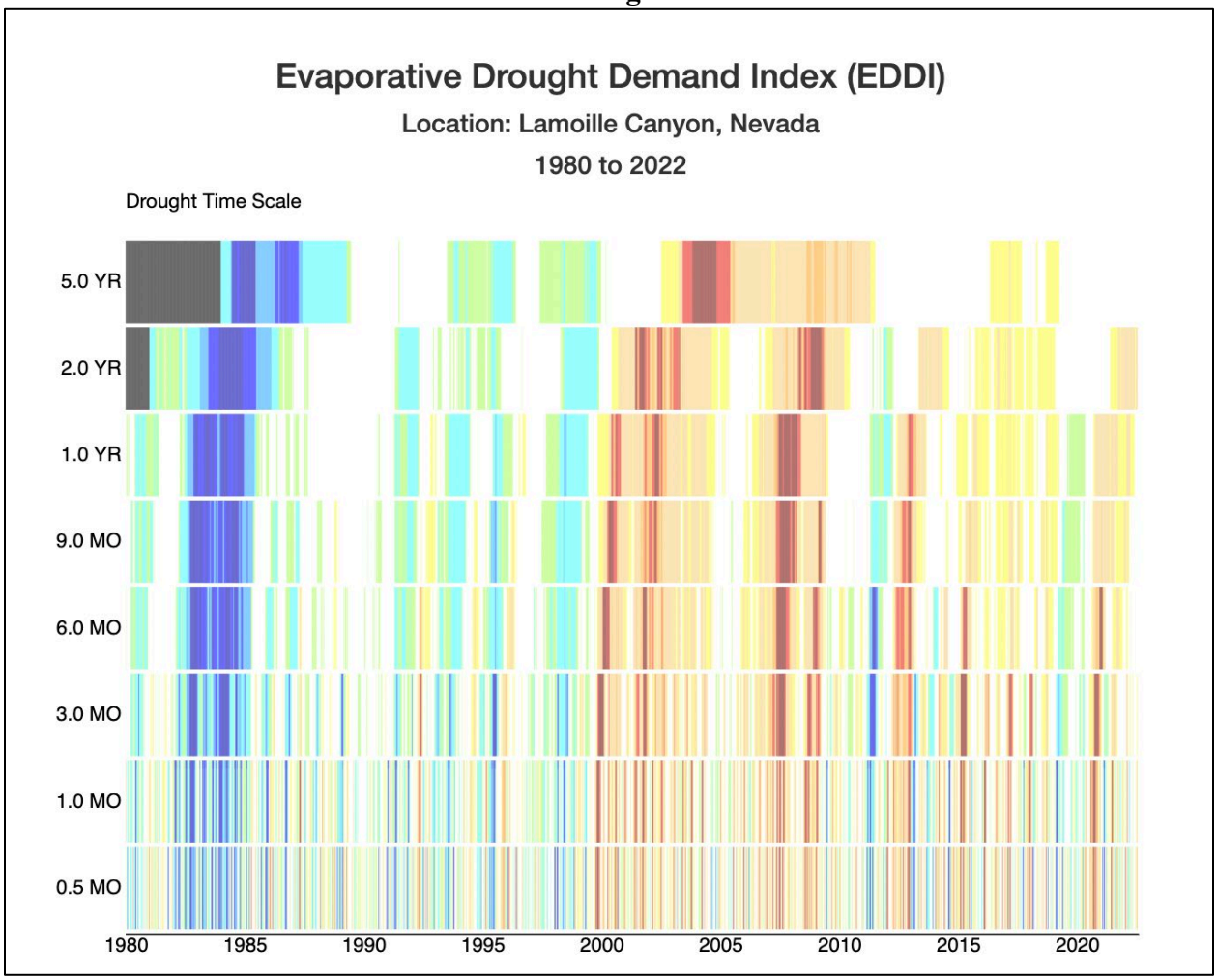
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.20 – Historical Evaporative Demand Drought Index Results, Ruby Mountains 1980 through 2022



Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.21 – Historical Evaporative Demand Drought Index Results, Lamoille Canyon 1980 through 2022



Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

For the City of Elko, drought levels have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the City of Elko experienced neutral weather in 1980 compared to severe drought weather in 2022 and, based on the 1.0-month drought stripe, the City of Elko experienced severe drought weather in 1980 compared to severe drought weather in 2022. The City of Elko, based on the 3.0-month drought stripe, experienced neutral weather in 1980 compared to neutral weather in 2022 and, based on the 6.0-month drought stripe, the City of Elko experienced abnormally dry weather in 1980 compared to moderate drought weather in 2022. Based on the 9.0-month drought stripe, the City of Elko experienced moderate drought weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-year drought stripe, the City of Elko experienced neutral weather in 1980 compared to moderate drought weather in 2022. Based on the 2.0-year drought stripe, the City of Elko experienced neutral weather in 1981 compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, the City of Elko experienced moderately wet weather in 1984 compared to exceptional drought weather in 2022.

For the Spring Creek HOA, drought levels have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the Spring Creek HOA experienced neutral weather in 1980 compared to moderate drought weather in 2022. For the Spring Creek HOA and based on the 1.0-month drought stripe, the area experienced extreme drought weather in 1980 compared to moderate drought weather in 2022 and, based on the 3.0-month drought stripe, experienced neutral weather in 1980 compared to moderate drought weather in 2022. Based on the 6.0-month drought stripe, the Spring Creek HOA experienced abnormally dry weather in 1980 compared to moderate drought weather in 2022 and, based on the 9.0-month drought stripe, experienced moderate drought weather in 1980 compared to moderate drought weather in 2022. The Spring Creek HOA experienced abnormally dry weather in 1980 based on the 1.0-year drought stripe compared to moderate drought weather in 2022. Based on the 2.0-year drought stripe, the Spring Creek HOA experienced neutral weather in 1981 compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to exceptional drought weather in 2022.

Drought levels have changed significantly for the City of Carlin between 1980 and 2022 according. Based on the 0.5-month drought stripe, the City of Carlin experienced moderate weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-month drought stripe, experienced exceptional drought weather in 1980 compared to moderate drought weather in 2022. The City of Carlin experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to neutral weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to abnormally dry weather in 2022. Based on the 9.0-month drought stripe, the City of Carlin experienced moderate drought weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to moderate drought weather in 2022. The City of Carlin had experienced neutral weather in 1981 based on the 2.0-year drought stripe compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to exceptional drought weather in 2022.

For the South Fork Native American Reservation, drought levels have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the South Fork Native American Reservation experienced extremely wet weather in 1980 compared to severe drought weather in 2022 and, based on the 1.0-month drought stripe, experienced abnormally wet weather in 1980 compared to severe drought weather in 2022. The South Fork Native American Reservation experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to neutral weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to neutral weather in 2022. Based on the 9.0-month drought stripe, the South Fork Native American Reservation experienced neutral weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-year drought stripe, experienced abnormally wet weather in 1980 compared to abnormally dry weather in 2022. The South Fork Native American Reservation experienced moderately wet weather in 1981 based on the 2.0-year drought stripe compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to severe drought weather in 2022.

Drought levels have changed significantly between 1980 and 2022 for the Ruby Mountains. Based on the 0.5-month drought stripe, the Ruby Mountains experienced neutral weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-month drought stripe, experienced moderate drought weather in 1980 compared to moderate drought weather in 2022. The Ruby Mountains experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to abnormally dry weather in 2022 and, based on the 6.0-month drought stripe, experienced abnormally wet weather in 1980 compared to neutral weather in 2022. Based on the 9.0-month drought stripe, the Ruby Mountains experienced neutral weather in 1980 compared to neutral weather in 2022 and, based on the 1.0-year drought stripe, experienced abnormally wet weather in 1980 compared to neutral weather in 2022. The Ruby Mountains experienced moderately wet weather in 1981 based on the 2.0-year drought stripe compared to moderate drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to neutral weather in 2022.

For Lamoille Canyon, drought levels have changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, Lamoille Canyon experienced abnormally dry weather in 1980 compared to severe drought weather in 2022 and, based on the 1.0-month drought stripe, experienced moderate drought weather in 1980 compared to abnormally dry weather in 2022. Lamoille Canyon experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to neutral weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to neutral weather in 2022. Based on the 9.0-month drought stripe, Lamoille Canyon experienced neutral weather in 1980 compared to abnormally dry weather in 2022 and, based on the 1.0-year drought stripe, experienced abnormally wet weather in 1980 compared to abnormally dry weather in 2022. Lamoille Canyon experienced moderately wet weather in 1981 based on the 2.0-year drought stripe compared to moderate drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to neutral weather in 2022.

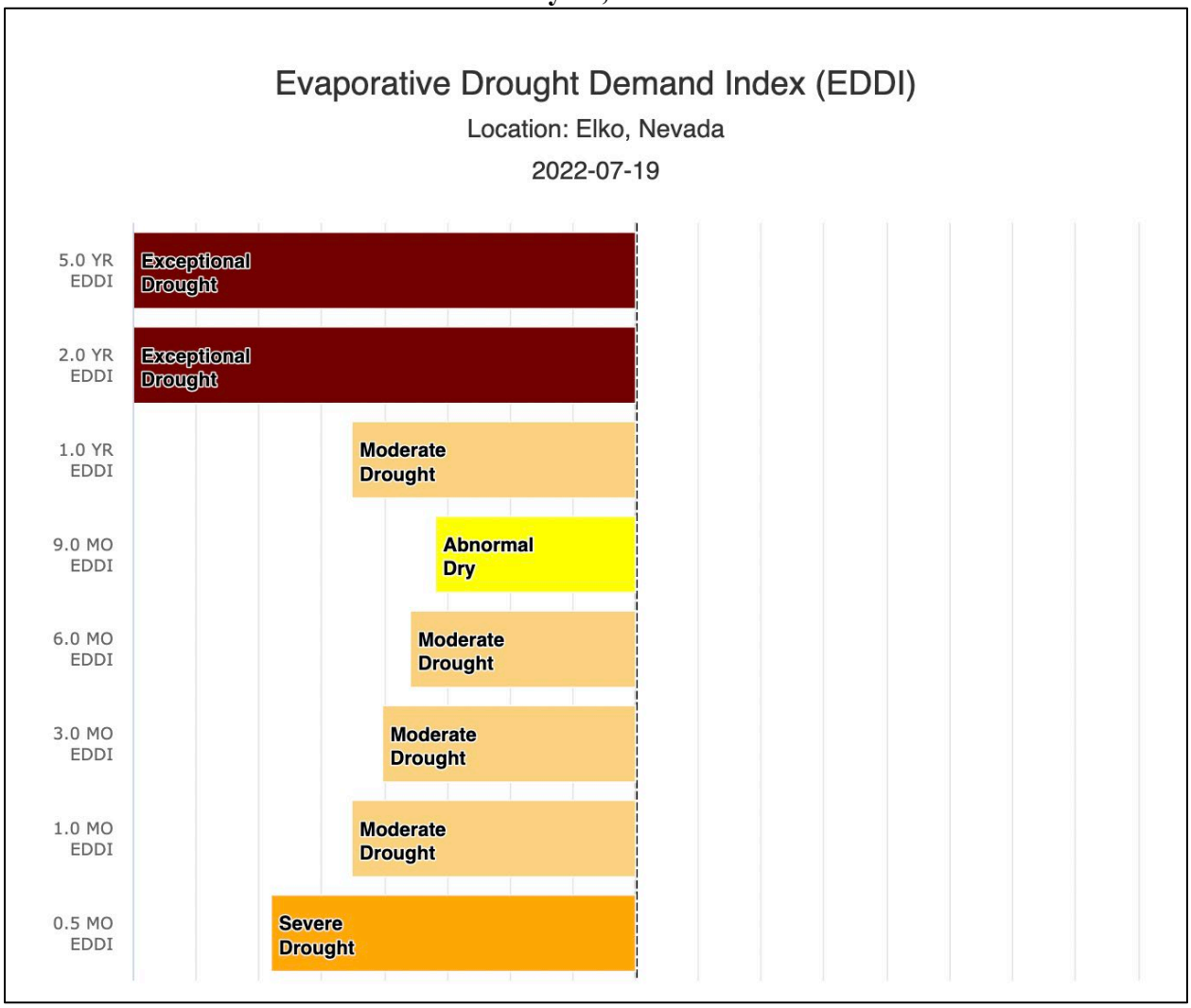
Figure 3.22 through 3.27 presents current EDDI drought stripes for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area for July 19, 2022 with periods spanning from half a month to five years. A dark red line indicates exceptional drought, a red line indicates extreme drought, an orange line indicates severe drought, and a light orange line indicates moderate drought. A yellow line indicates abnormal dry, a white line indicates neutral, a green line indicates abnormal wet, a neon blue line indicates moderate wet, a light blue line indicates severe wet, a dark blue line indicates extreme wet, and an indigo line indicates exceptional wet.

On July 19, 2022 for the City of Elko, the 0.5 month EDDI indicated a severe drought level, the 1.0 month EDDI indicated a moderate drought level, the 3.0 month EDDI indicated a moderate drought level, and the 6.0 month EDDI indicated a moderate drought level. The 9.0 month EDDI for the City of Elko on July 19, 2022 indicated an abnormal drought level, the 1.0 year EDDI indicated a moderate drought level, the 2.0 year EDDI indicated an exceptional drought level, and the 5.0 year EDDI indicated an exceptional drought level. On July 19, 2022 for the Spring Creek HOA, the 0.5 month EDDI indicated a moderate drought level, the 1.0 month EDDI indicated an abnormal dry level, the 3.0 month EDDI indicated a neutral drought level, and the 6.0 month EDDI indicated a neutral drought level. The 9.0 month EDDI for the Spring Creek HOA on July 19, 2022 indicated a neutral drought level, the 1.0 year EDDI indicated a neutral drought level, the 2.0 year EDDI indicated a severe drought level, and the 5.0 year EDDI indicated an abnormal dry drought level.

For the City of Carlin on July 19, 2022, the 0.5 month EDDI indicated a severe drought level, the 1.0 month EDDI indicated a moderate drought level, the 3.0 month EDDI indicated a moderate drought level, and the 6.0 month EDDI indicated an abnormal dry drought level. The 9.0 month EDDI for the City of Carlin on July 19, 2022 indicated an abnormal dry drought level, the 1.0 year EDDI indicated a moderate drought level, the 2.0 year EDDI indicated an exceptional drought level, and the 5.0 year EDDI indicated an exceptional drought level. On July 19, 2022, for the South Fork Native American Reservation, the 0.5 month EDDI indicated a moderate drought level, the 1.0 month EDDI indicated an abnormal dry level, the 3.0 month EDDI indicated a neutral drought level, and the 6.0 month EDDI indicated a neutral dry drought level. The 9.0 month EDDI for the South Fork Native American Reservation on July 19, 2022 indicated an abnormal dry drought level, the 1.0 year EDDI indicated an abnormal dry level, the 2.0 year EDDI indicated an exceptional drought level, and the 5.0 year EDDI indicated a severe drought level.

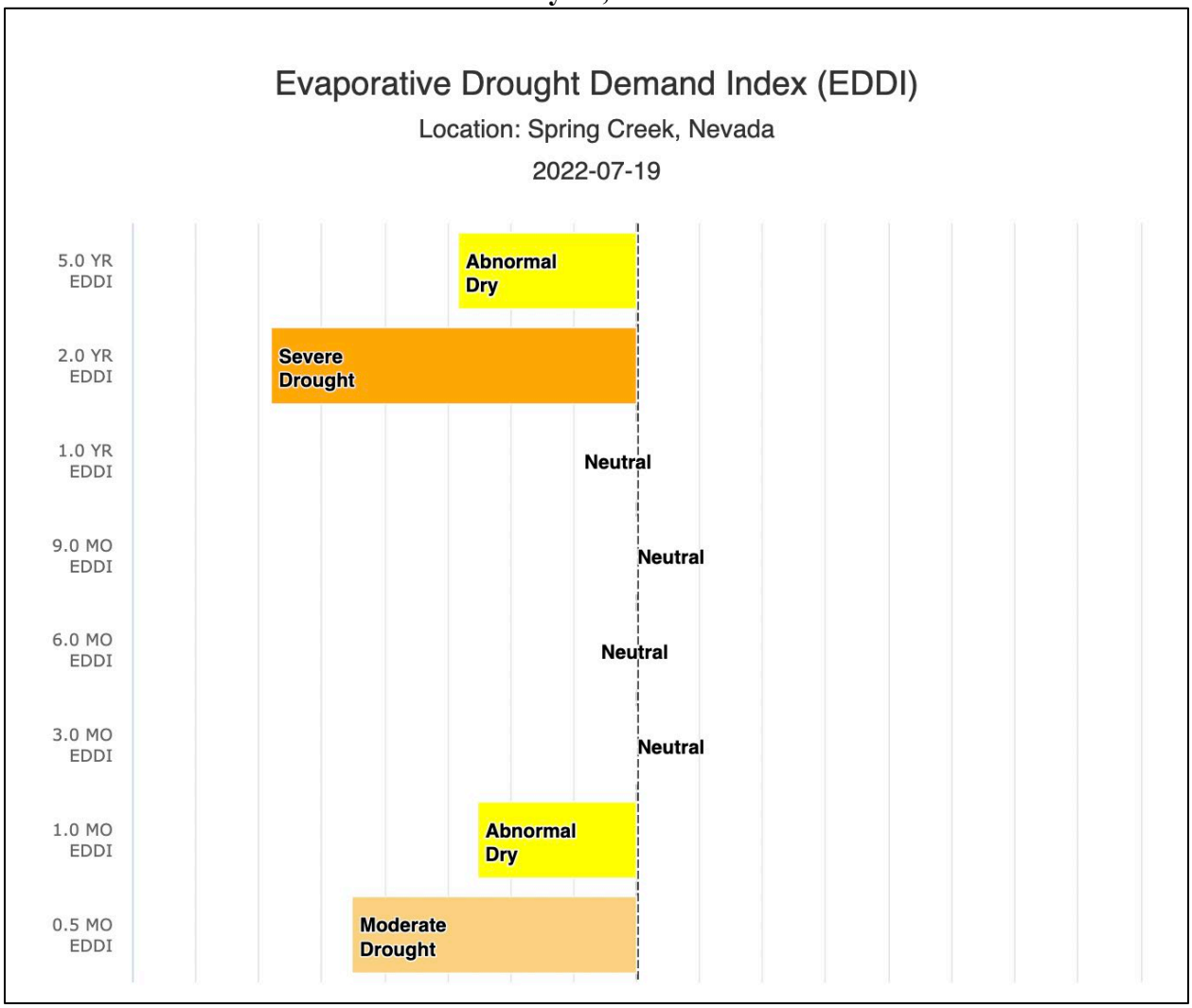
On July 19, 2022 for the Ruby Mountains, the 0.5 month EDDI indicated a moderate drought level, the 1.0 month EDDI indicated a moderate drought level, the 3.0 month EDDI indicated an abnormal dry level, and the 6.0 month EDDI indicated a neutral drought level. The 9.0 month EDDI for the Ruby Mountains on July 19, 2022 indicated a neutral drought level, the 1.0 year EDDI indicated a neutral drought level, the 2.0 year EDDI indicated a moderate drought level, and the 5.0 year EDDI indicated a neutral drought level. For the Lamoille Canyon area, the 0.5 month EDDI on July 19, 2022 indicated a moderate drought level, the 1.0 month EDDI indicated a moderate drought level, the 3.0 month EDDI indicated an abnormal dry level, and the 6.0 month EDDI indicated a neutral drought level. The 9.0 month EDDI for the Lamoille Canyon

Figure 3.22 – Current Evaporative Drought Demand Index Results, City of Elko
July 19, 2022



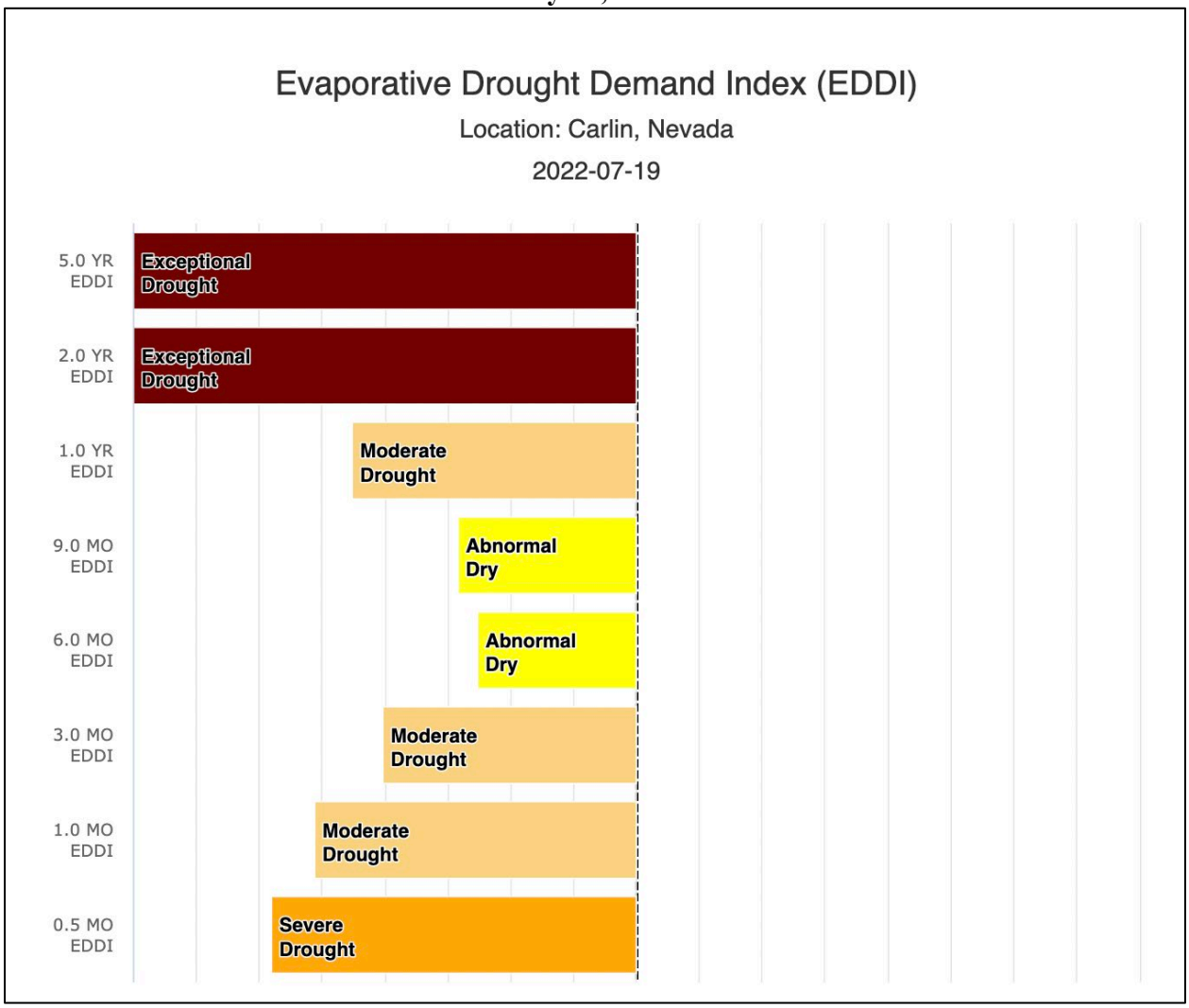
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.23 – Current Evaporative Drought Demand Index Results, Spring Creek HOA July 19, 2022



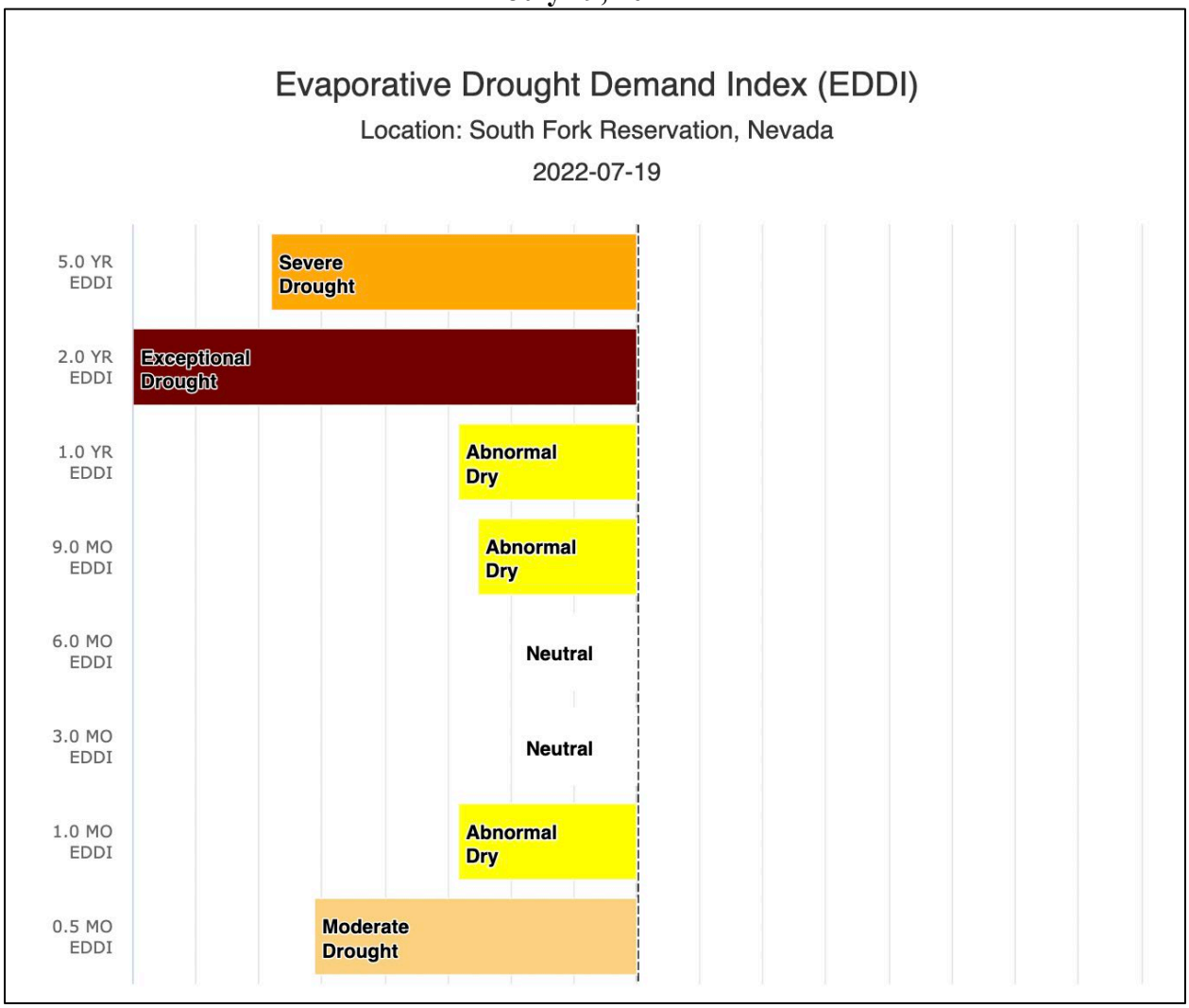
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.24 – Current Evaporative Drought Demand Index Results, City of Carlin July 19, 2022



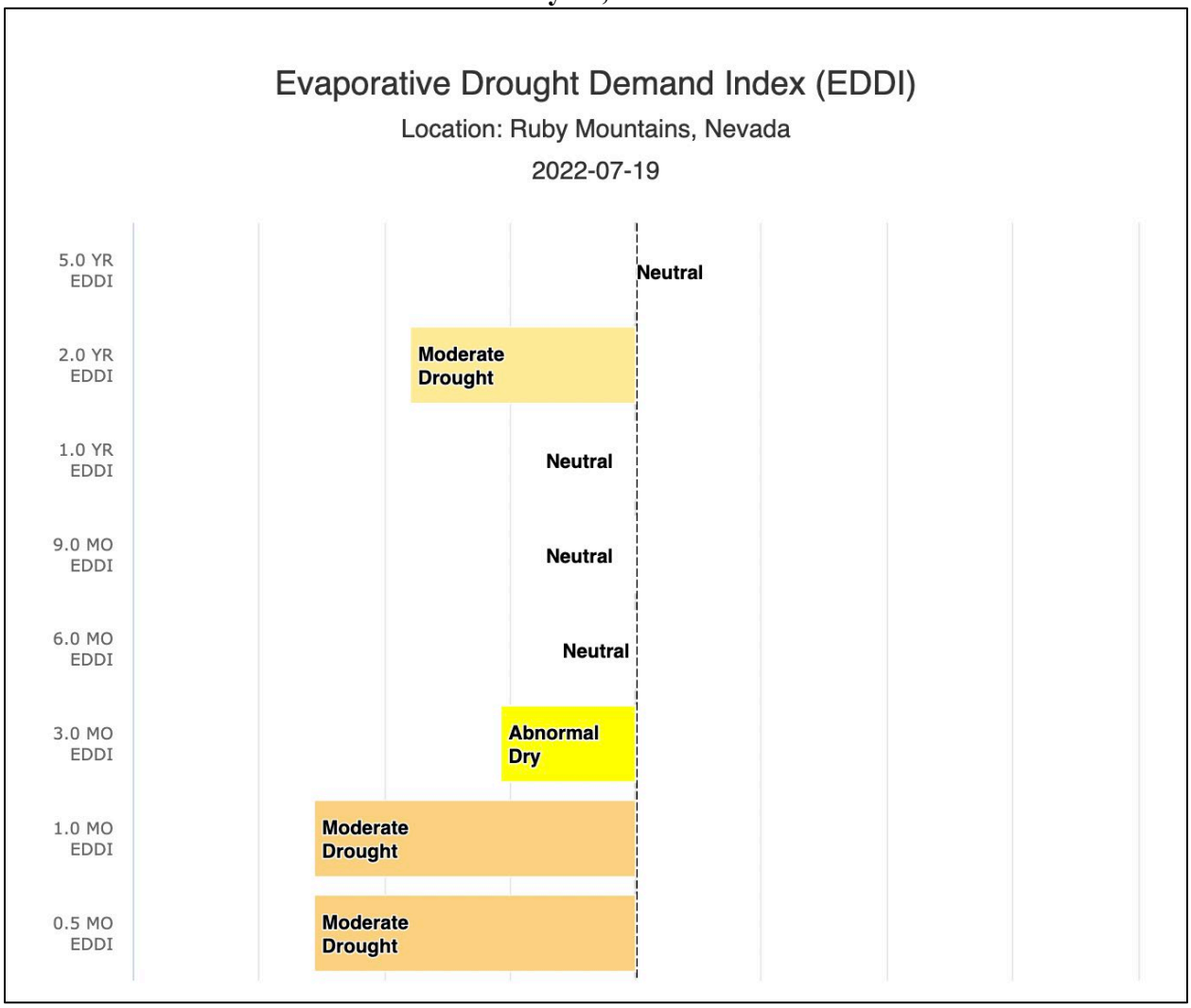
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.25 – Current Evaporative Drought Demand Index Results, South Fork Native American Reservation
July 19, 2022



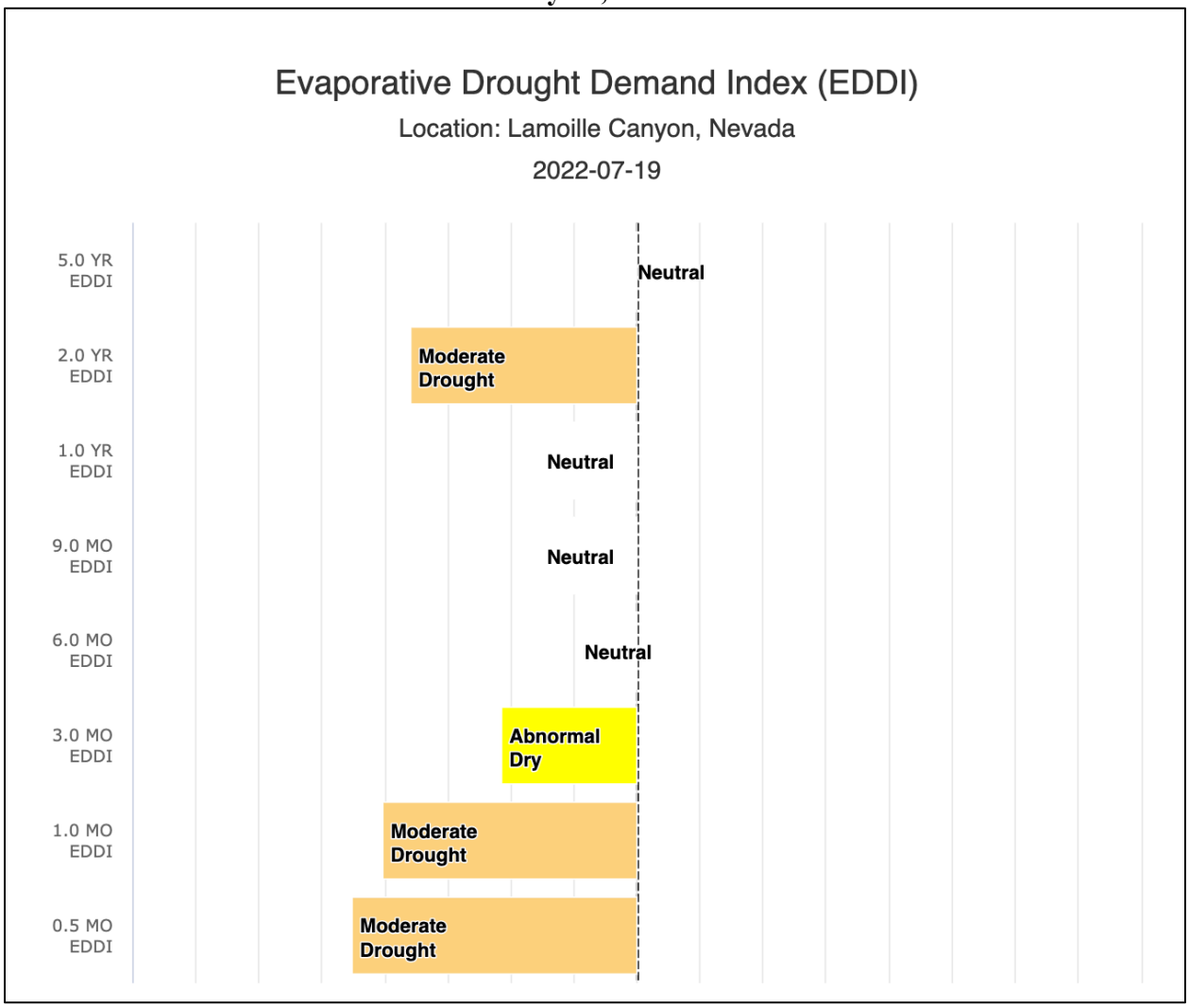
Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.26 – Current Evaporative Drought Demand Index Results, Ruby Mountains July 19, 2022



Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.27 – Current Evaporative Drought Demand Index Results, Lamoille Canyon July 19, 2022



Source: Climate Toolbox- Historical Drought Stripes; EDDI: Evaporative Demand Drought Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

area on July 19, 2022 indicated a neutral drought level, the 1.0 year EDDI indicated a neutral drought level, the 2.0 year EDDI indicated a moderate drought level, and the 5.0 year EDDI indicated a neutral drought level.

3.3.c The Standardized Precipitation Evapotranspiration Index

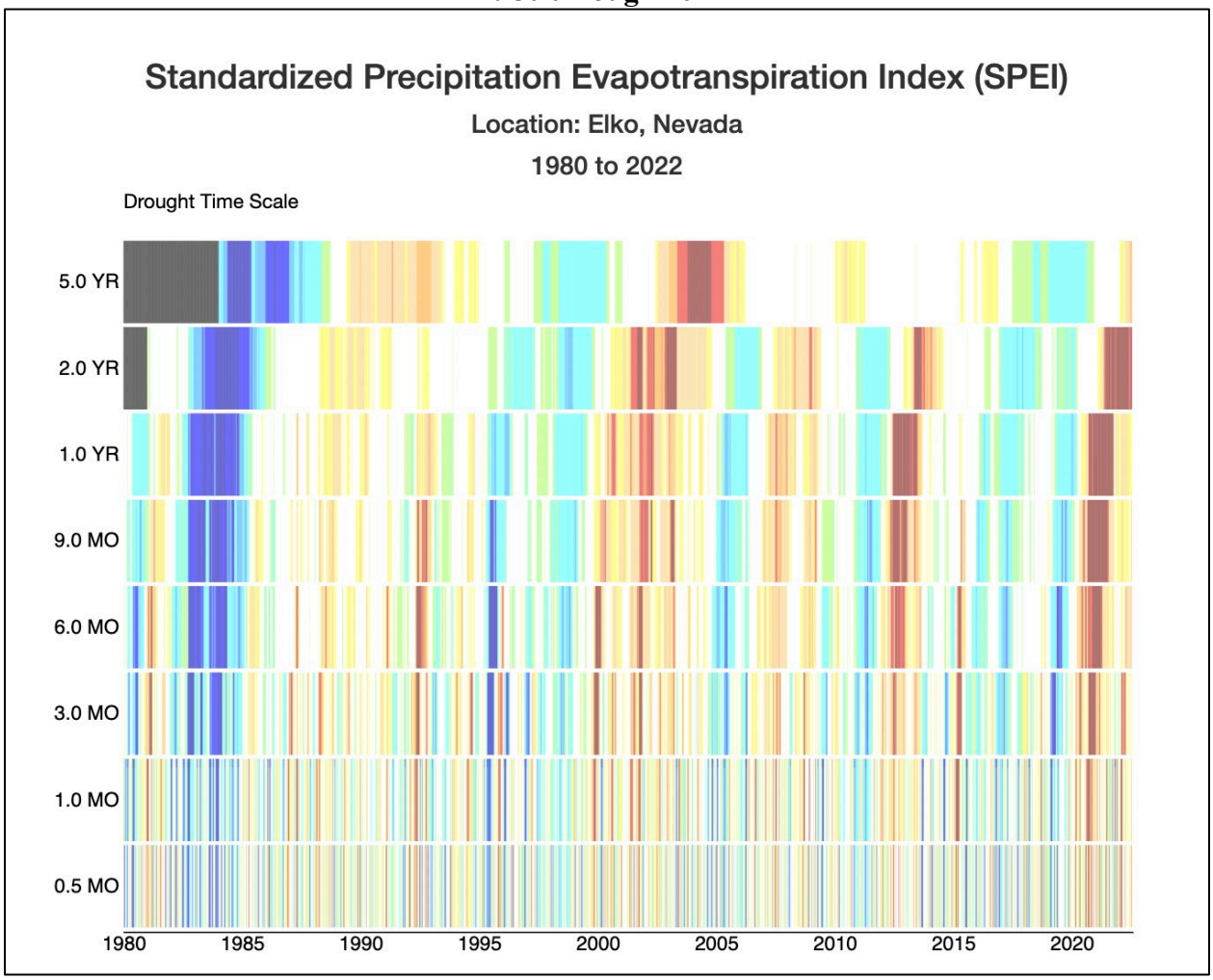
The Standardized Precipitation Evapotranspiration Index (SPEI) is an extension of the widely used Standardized Precipitation Index (SPI), accounting for both precipitation and potential evapotranspiration (PET) to determine and measure drought. The SPEI focuses on capturing the main impact of increased temperatures on water demand. Key strengths of using the SPEI include combining SPI with evapotranspiration data to create a useful tool for climate change studies. The SPEI is also a statistically based index. Drawbacks of using the SPEI include the requirement that more data is required compared to the precipitation SPI. The SPEI is also a sensitive method to calculate potential evapotranspiration and a large sample size is required to ensure overall statistical robustness.

Figure 3.28 through 3.33 presents historical SPEI drought stripes for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area between 1980 and 2022 with periods spanning a half a month to five years. A dark red line indicates exceptional drought, a red line indicates extreme drought, an orange line indicates severe drought, and a light orange line indicates moderate drought. A yellow line indicates abnormal dry, a white line indicates neutral, a green line indicates abnormal wet, a neon blue line indicates moderate wet, a light blue line indicates severe wet, a dark blue line indicates extreme wet, and an indigo line indicates exceptional wet.

For the City of Elko, drought levels changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the City of Elko experienced extremely wet weather in 1980 compared to extreme drought weather in 2022 and, based on the 1.0-month drought stripe, experienced moderately wet weather in 1980 compared to severe drought weather in 2022. The City of Elko had experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to severe drought weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to exceptional drought weather in 2022. Based on the 9.0-month drought stripe, the City of Elko experienced abnormally dry weather in 1980 compared to severe drought weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to moderate drought weather in 2022. The City of Elko experienced neutral weather in 1981 based on the 2.0-year drought stripe compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984 compared to exceptional drought weather in 2022.

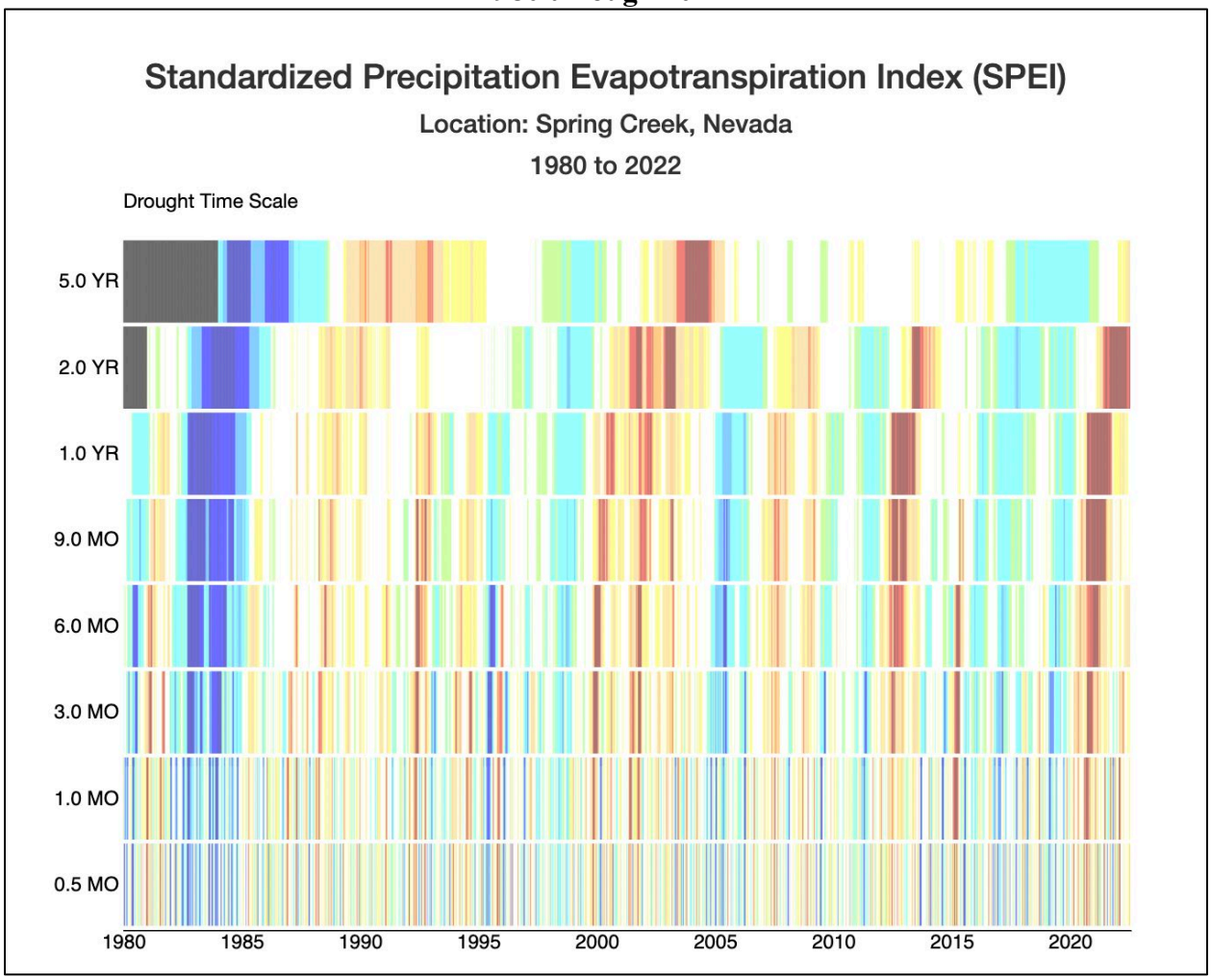
For the Spring Creek HOA, drought levels changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the Spring Creek HOA experienced extremely wet weather in 1980 compared to severe drought weather in 2022 and, based on the 1.0-month drought stripe, experienced abnormally dry weather in 1980 compared to moderate drought weather in 2022. The Spring Creek HOA experienced moderately wet weather in 1980 based on the 3.0-month drought stripe compared to moderate drought weather in 2022 and, based on the 6.0-month

Figure 3.28 – Historical Standardized Precipitation Evapotranspiration Index Results, City of Elko 1980 through 2022



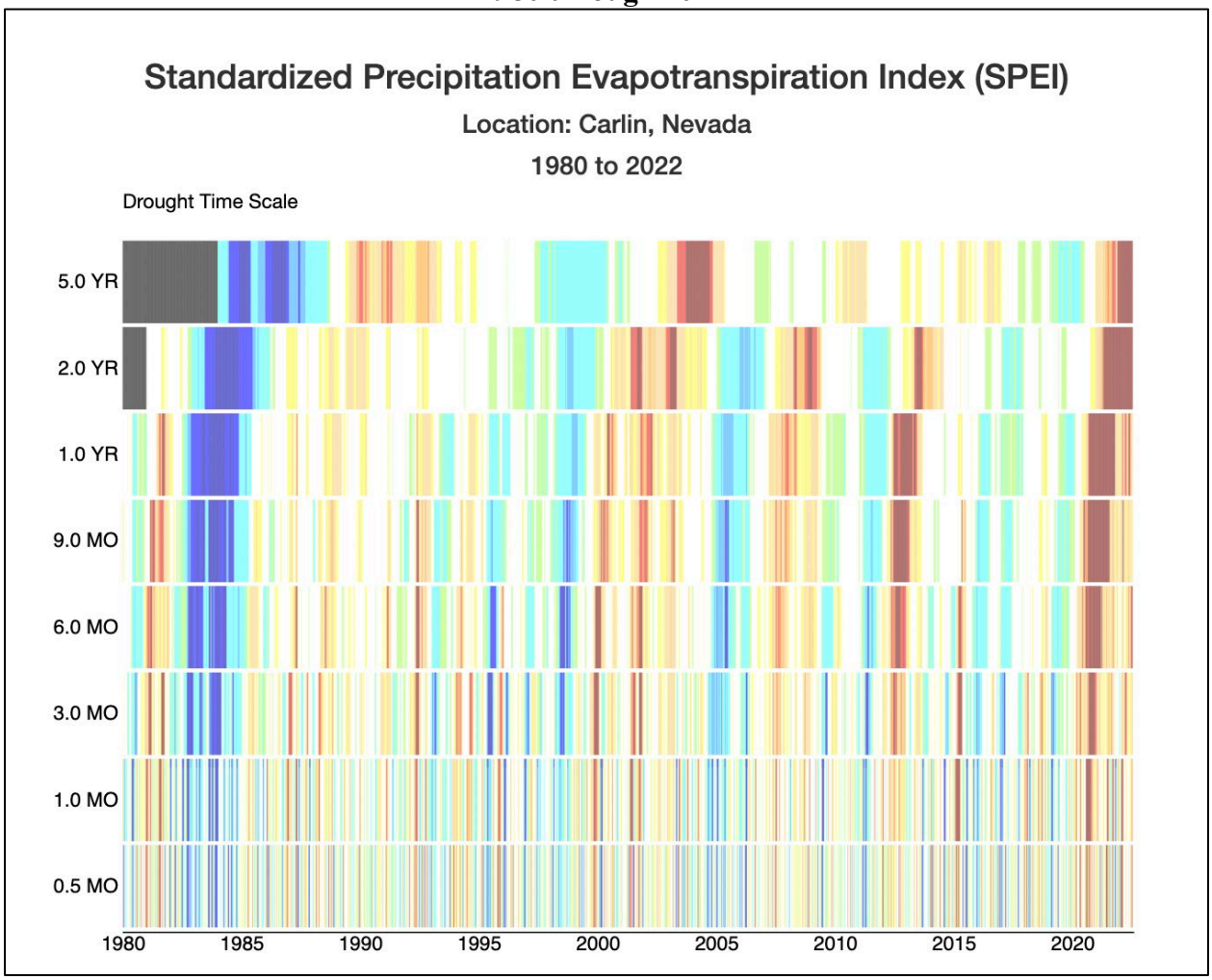
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.29 – Historical Standardized Precipitation Evapotranspiration Index Results, Spring Creek HOA 1980 through 2022



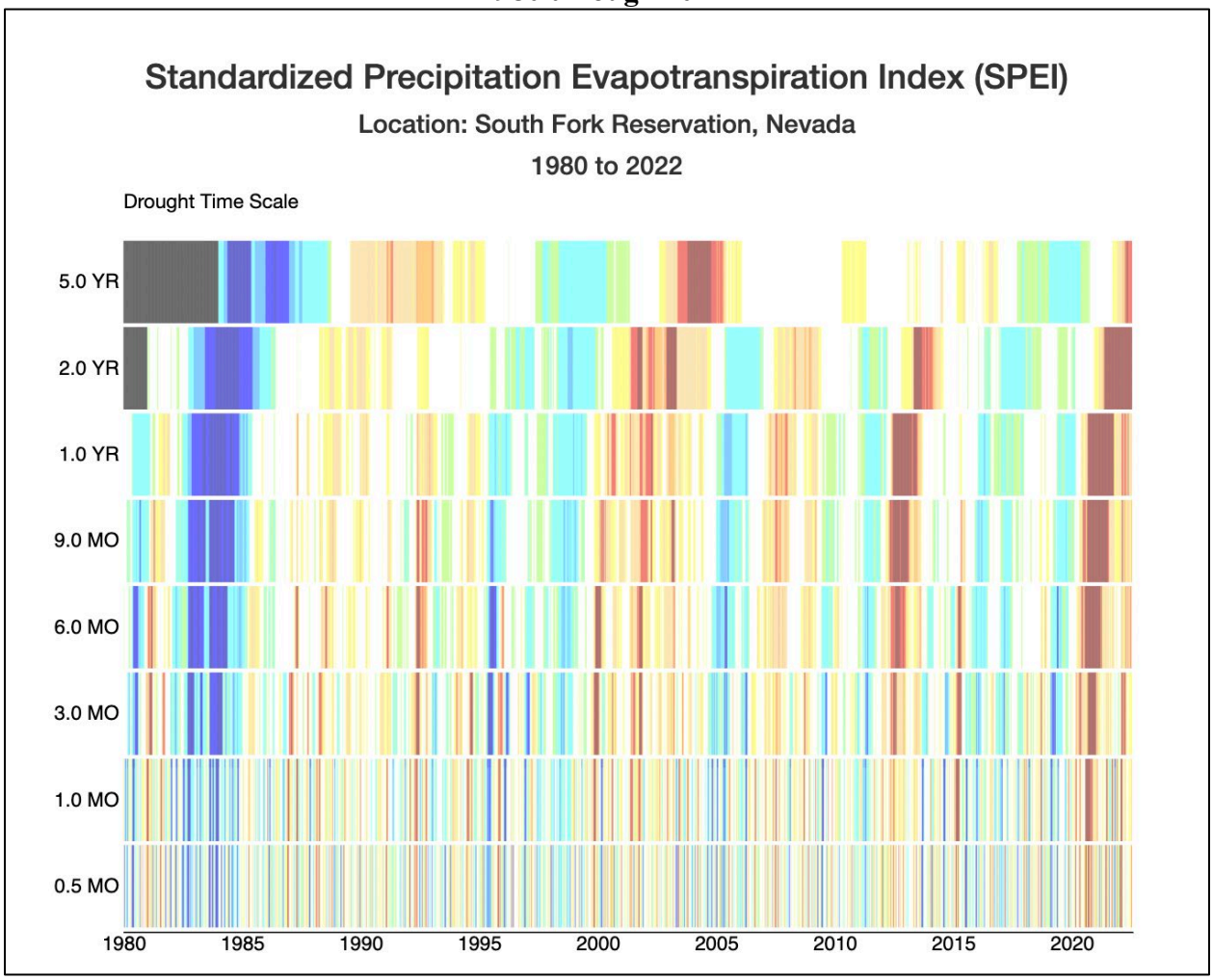
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.30 – Historical Standardized Precipitation Evapotranspiration Index Results, City of Carlin 1980 through 2022



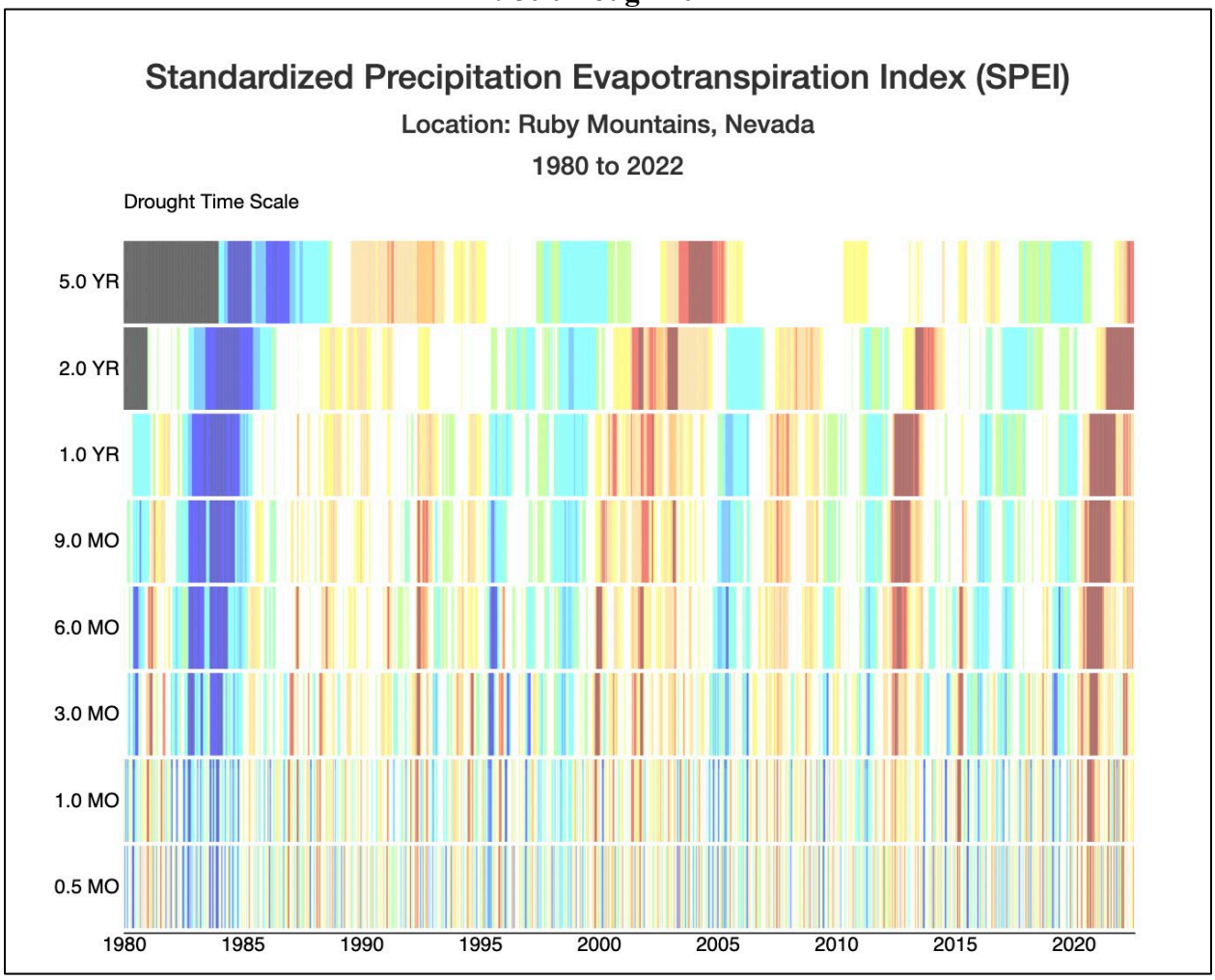
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.31 – Historical Standardized Precipitation Evapotranspiration Index Results, South Fork Native American Reservation 1980 through 2022



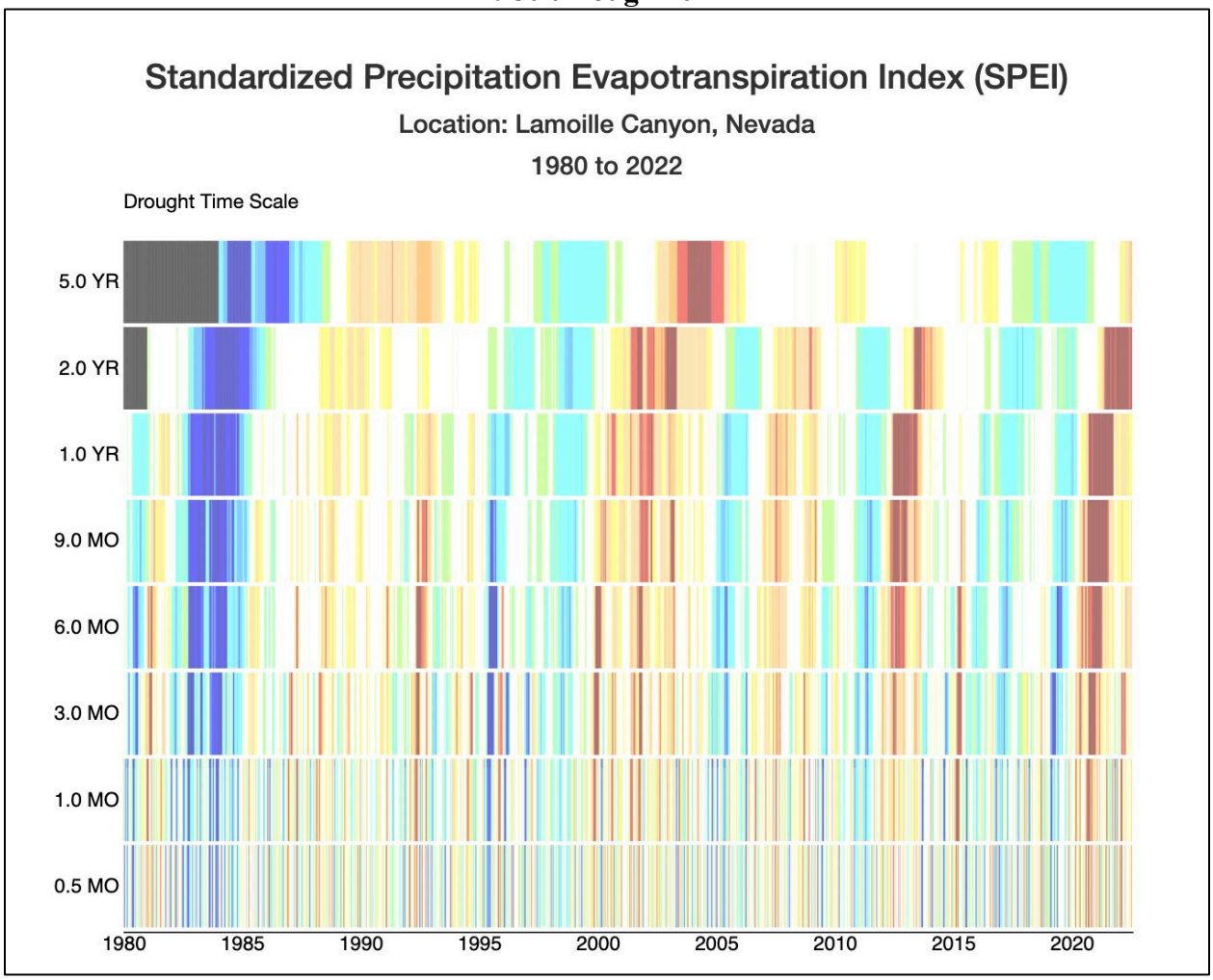
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.32 – Historical Standardized Precipitation Evapotranspiration Index Results, Ruby Mountains 1980 through 2022



Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.33 – Historical Standardized Precipitation Evapotranspiration Index Results, Lamoille Canyon 1980 through 2022



Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

drought stripe, experienced neutral weather in 1980 compared to moderate drought weather in 2022. Based on the 9.0-month drought stripe, the Spring Creek HOA experienced neutral weather in 1980 compared to abnormally dry weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to neutral weather in 2022. The Spring Creek HOA experienced neutral weather in 1981 based on the 2.0-year drought stripe compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced severely wet weather in 1984, compared to moderate drought weather in 2022.

For the City of Carlin, drought levels changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the City of Carlin experienced severe drought weather in 1980 compared to severe drought weather in 2022 and, based on the 1.0-month drought stripe, experienced severe drought weather in 1980 compared to severe drought weather in 2022. The City of Carlin experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to severe drought weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to extreme drought weather in 2022. Based on the 9.0-month drought stripe, the City of Carlin experienced neutral weather in 1980 compared to moderate drought weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to moderate drought weather in 2022. The city of Carlin experienced neutral weather in 1981 based on the 2.0-year drought stripe compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to exceptional drought weather in 2022.

Drought levels have changed significantly between 1980 and 2022 for the South Fork Native American Reservation. Based on the 0.5-month drought stripe, the South Fork Native American Reservation experienced extremely wet weather in 1980 compared to extreme drought weather in 2022 and, based on the 1.0-month drought stripe, experienced severely wet weather in 1980 compared to moderate drought weather in 2022. The South Fork Native American Reservation experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to moderate drought weather in 2022, experienced neutral weather in 1980 based on the 6.0-month drought stripe compared to extreme drought weather in 2022 and, based on the 9.0-month drought stripe, experienced neutral weather in 1980 compared to exceptional drought weather in 2022. Based on the 1.0-year drought stripe, the South Fork Native American Reservation experienced neutral weather in 1980 compared to moderate drought weather in 2022, experienced neutral weather in 1981 compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984 compared to exceptional drought weather in 2022.

For the Ruby Mountains, drought levels changed significantly between 1980 and 2022. Based on the 0.5-month drought stripe, the Ruby Mountains experienced moderate drought weather in 1980 compared to extreme drought weather in 2022 and, based on the 1.0-month drought stripe, experienced moderate drought weather in 1980 compared to moderate drought weather in 2022. The Ruby Mountains experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to neutral weather in 2022 and, based on the 6.0-month drought stripe, experienced neutral weather in 1980 compared to abnormally dry weather in 2022. Based on the 9.0-month drought stripe, the Ruby Mountains experienced neutral weather in 1980 compared to neutral

weather in 2022 and, based on the 1.0-year drought stripe, experienced neutral weather in 1980 compared to neutral weather in 2022. The Ruby Mountains experienced neutral weather in 1981 based on the 2.0-year drought stripe compared to moderate drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to severe drought weather in 2022.

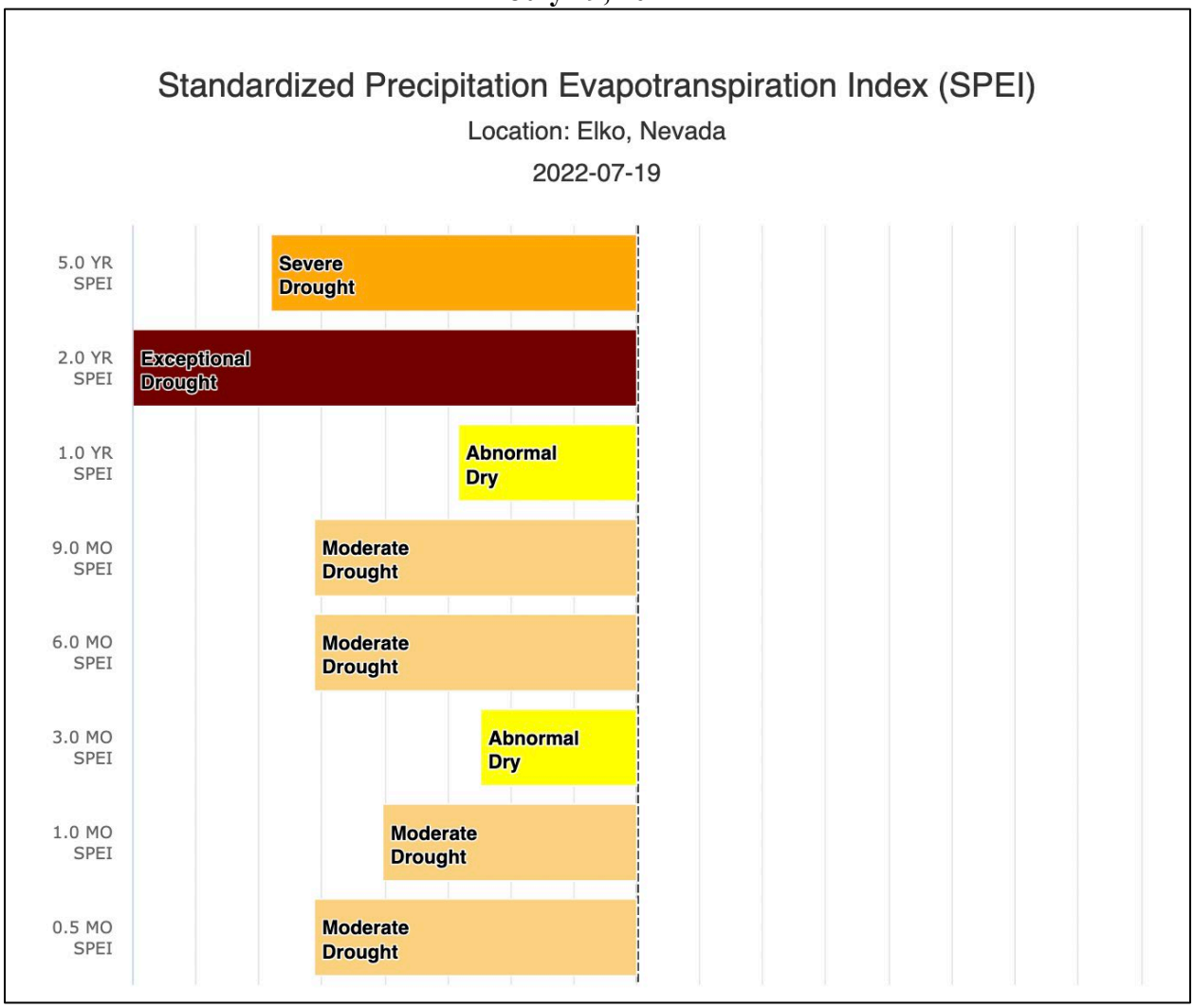
Drought levels changed significantly between 1980 and 2022 for the Lamoille Canyon area. Based on the 0.5-month drought stripe, Lamoille Canyon experienced abnormally wet weather in 1980 compared to severe drought weather in 2022 and, based on the 1.0-month drought stripe, had experienced severe drought weather in 1980 compared to moderate drought weather in 2022. The Lamoille Canyon area experienced neutral weather in 1980 based on the 3.0-month drought stripe compared to abnormally dry weather in 2022, experienced neutral weather in 1980 based on the 6.0-month drought stripe compared to moderate drought weather in 2022 and, based on the 9.0-month drought stripe, experienced neutral weather in 1980 compared to extreme drought weather in 2022. Based on the 1.0-year drought stripe, Lamoille Canyon experienced neutral weather in 1980 compared to abnormally dry weather in 2022, experienced neutral weather in 1981 based on the 2.0-year drought stripe compared to exceptional drought weather in 2022 and, based on the 5.0-year drought stripe, experienced moderately wet weather in 1984, compared to severe drought weather in 2022.

Figure 3.34 through 3.39 presents current SPEI drought stripes for the City of Elko, the Spring Creek HOA, the City of Carlin, the South Fork Native American Reservation, the Ruby Mountains, and for the Lamoille Canyon area for July 19, 2022 with periods spanning from half a month to five years. A dark red line indicates exceptional drought, a red line indicates extreme drought, an orange line indicates severe drought, and a light orange line indicates moderate drought. A yellow line indicates abnormal dry, a white line indicates neutral, a green line indicates abnormal wet, a neon blue line indicates moderate wet, a light blue line indicates severe wet, a dark blue line indicates extreme wet, and an indigo line indicates exceptional wet.

For the City of Elko on July 19, 2022, the 0.5 month SPEI indicated a moderate drought level, the 1.0 month SPEI indicated a moderate drought level, the 3.0 month SPEI indicated an abnormal dry level, and the 6.0 month SPEI indicated a moderate drought level. The 9.0 month SPEI for the City of Elko on July 19, 2022 indicated a moderate drought level, the 1.0 year SPEI indicated an abnormal dry level, the 2.0 year SPEI indicated an exceptional drought level, and the 5.0 year SPEI indicated a severe drought level. For the Spring Creek HOA on July 19, 2022, the 0.5 month SPEI indicated a moderate drought level, the 1.0 month SPEI indicated an abnormally dry level, the 3.0 month SPEI indicated an abnormal dry level, and the 6.0 month SPEI indicated a moderate drought level. The 9.0 month SPEI for the Spring Creek HOA on July 19, 2022 indicated an abnormally dry level, the 1.0 year SPEI indicated a neutral level, the 2.0 year SPEI indicated an exceptional drought level, and the 5.0 year SPEI indicated a moderate drought level.

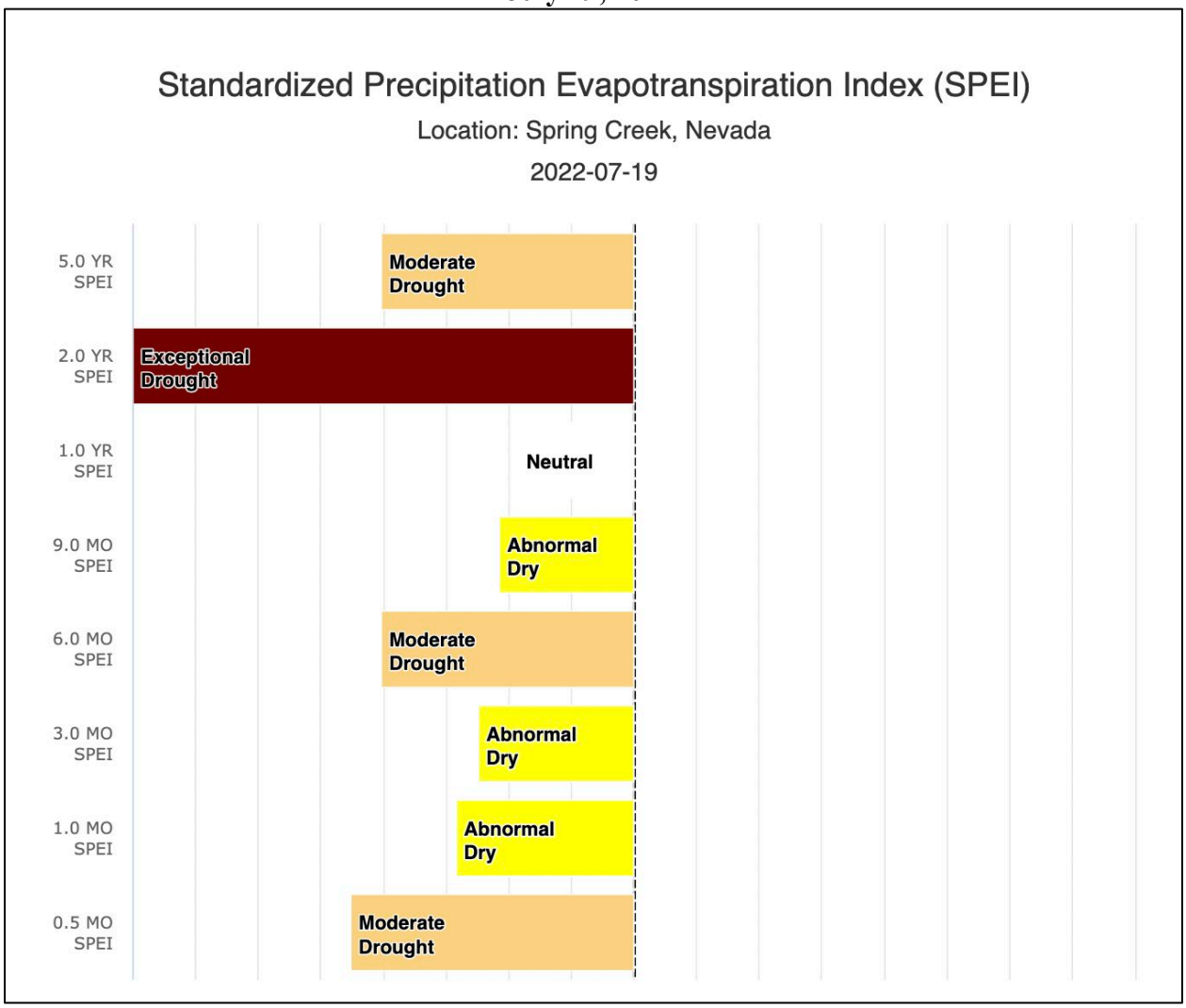
The 0.5 month SPEI for the City of Carlin on July 19, 2022 indicated a severe drought level, the 1.0 month SPEI indicated a severe drought level, the 3.0 month SPEI indicated a moderate drought level, and the 6.0 month SPEI indicated an extreme drought level. The 9.0 month SPEI

Figure 3.34 – Current Standardized Precipitation Evapotranspiration Index Results, City of Elko
July 19, 2022



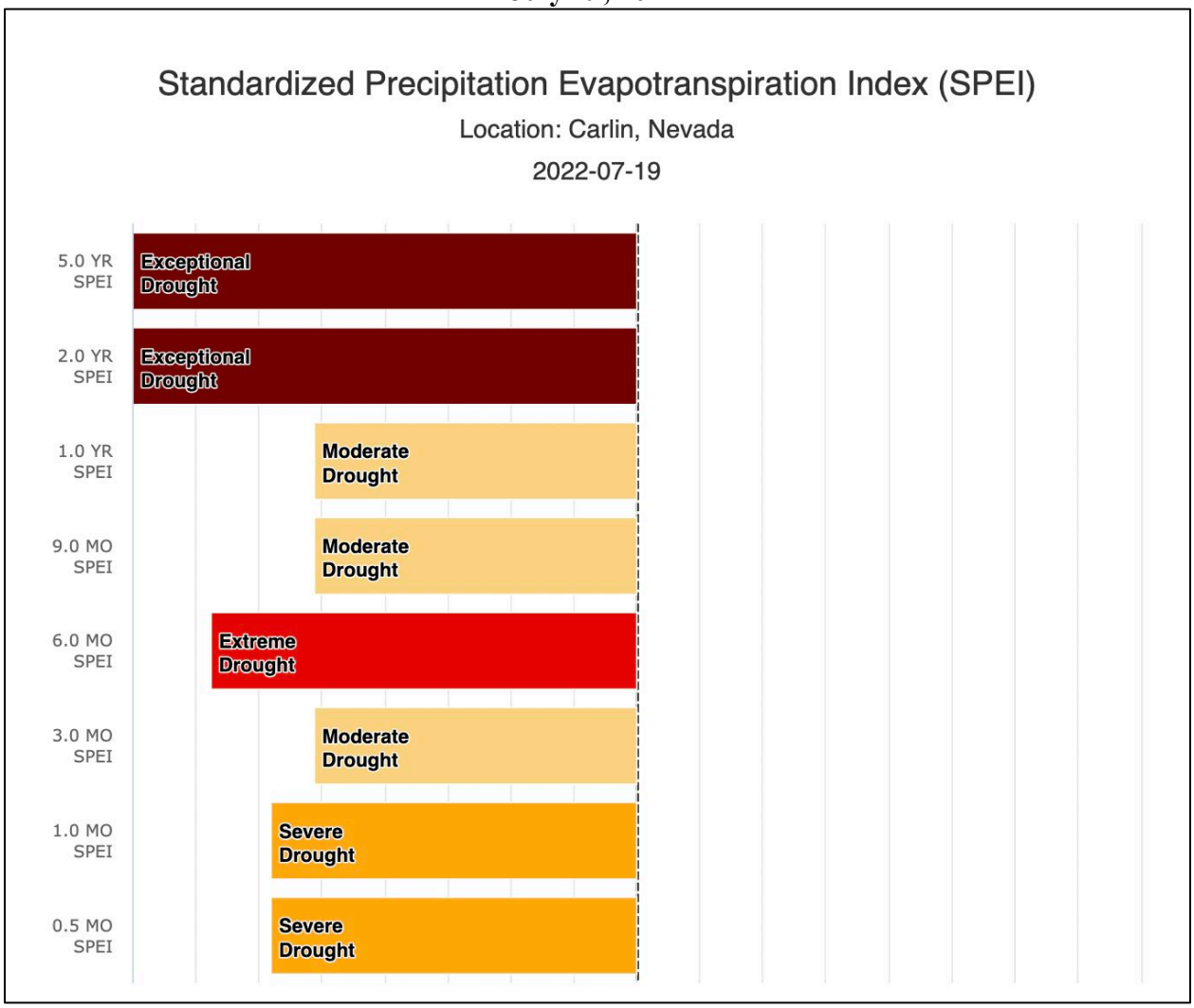
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.35 – Current Standardized Precipitation Evapotranspiration Index Results, Spring Creek HOA
July 19, 2022



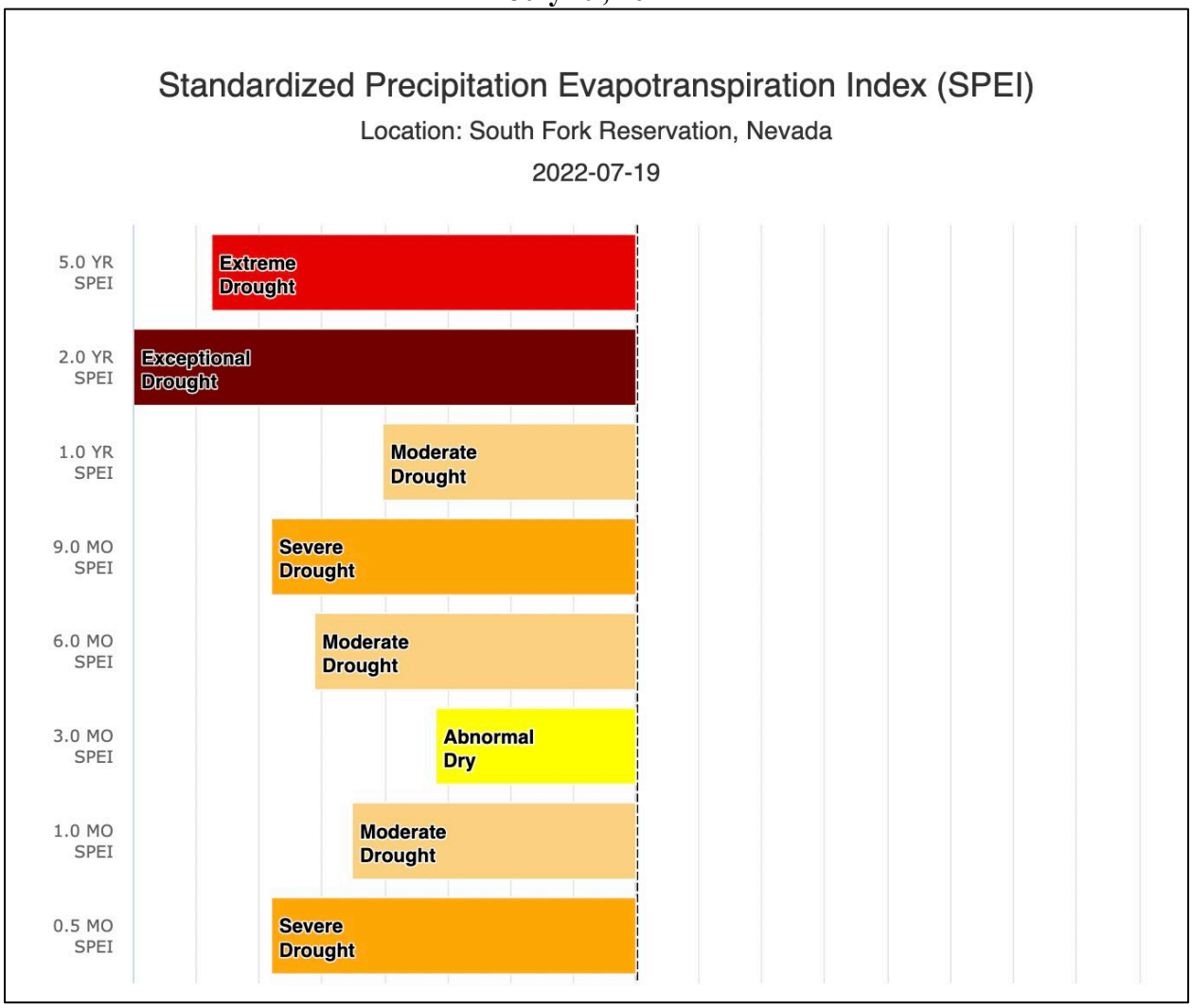
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.36 – Current Standardized Precipitation Evapotranspiration Index Results, City of Carlin
July 19, 2022



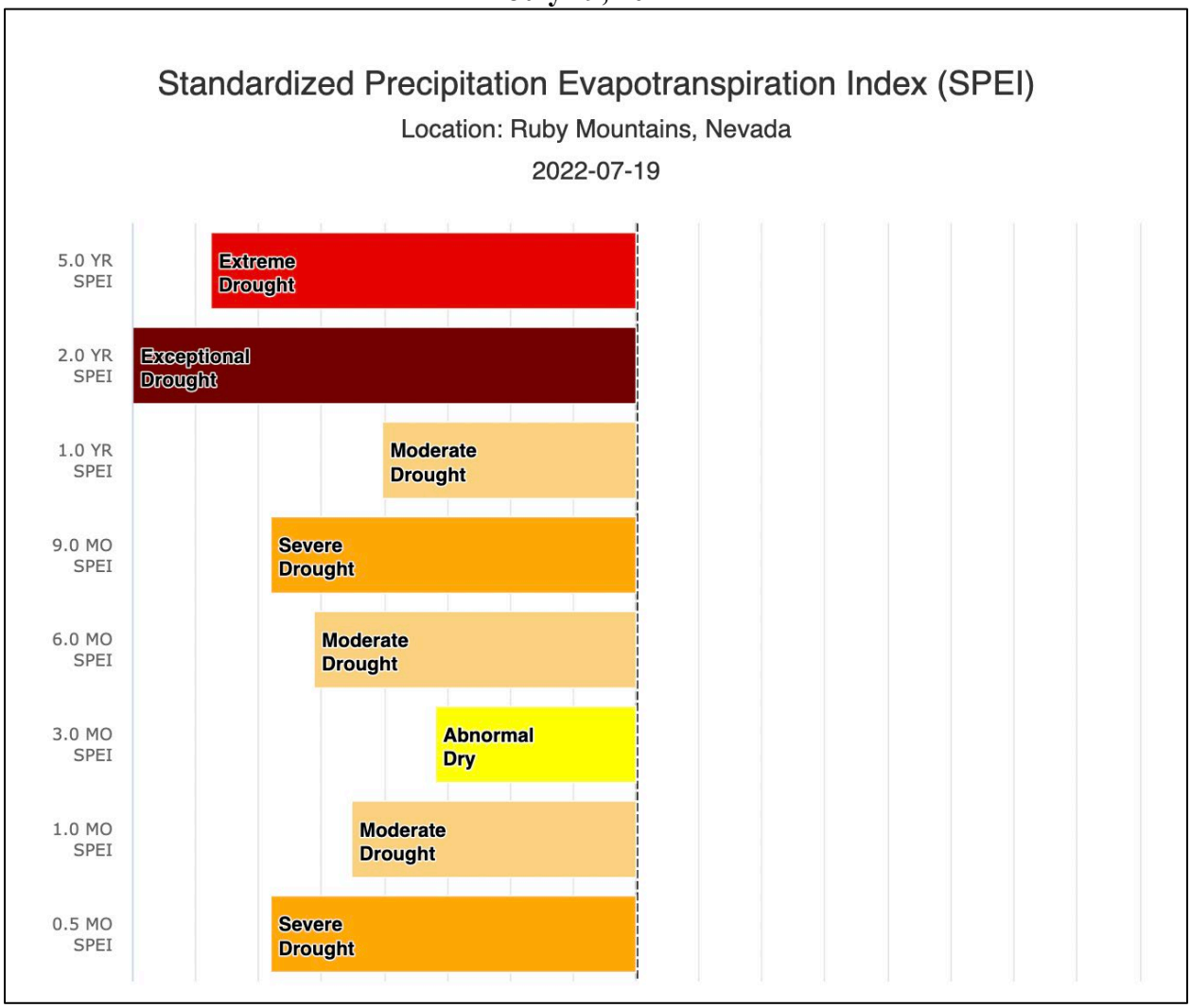
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.37 – Current Standardized Precipitation Evapotranspiration Index Results, South Fork Native American Reservation
July 19, 2022



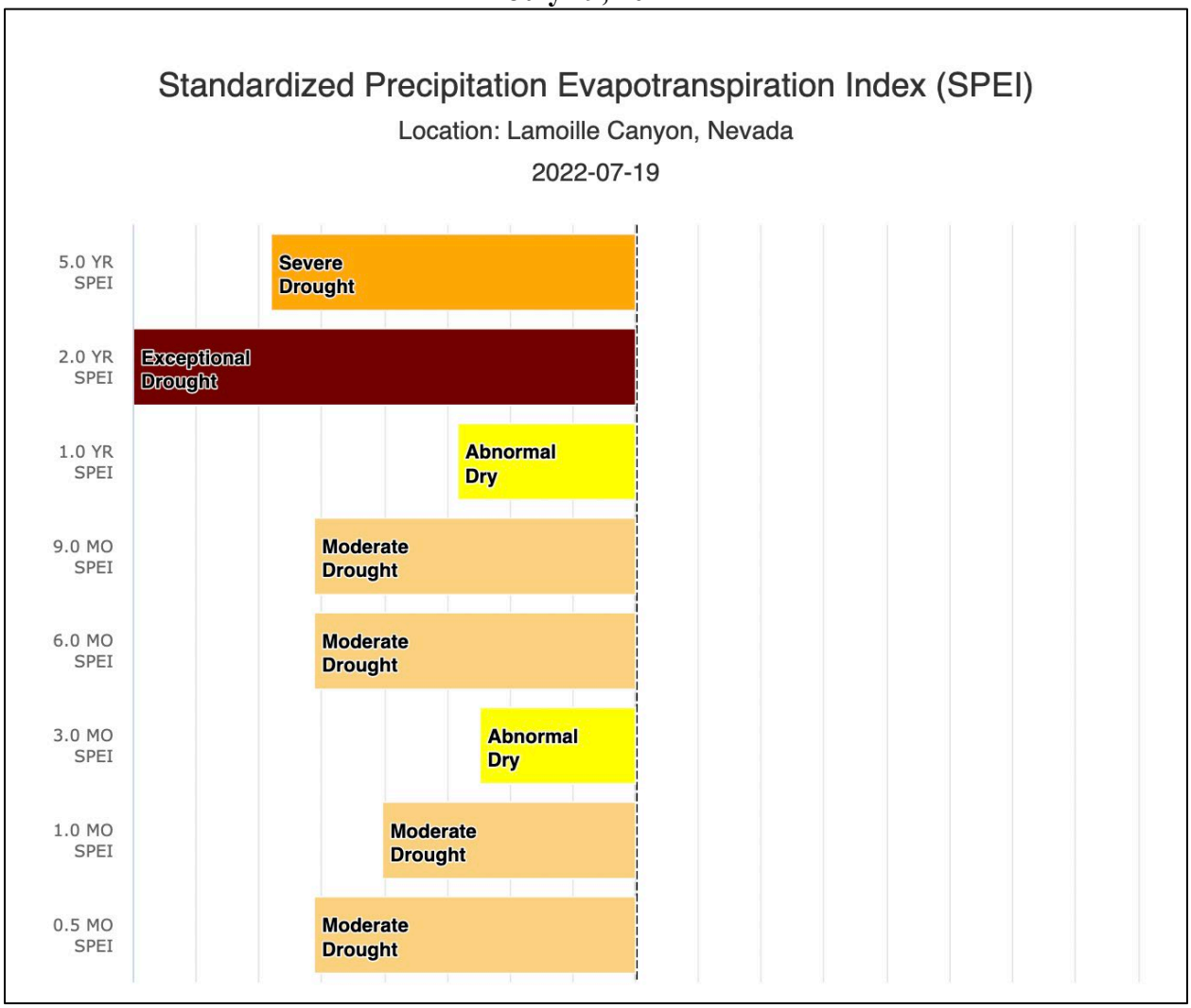
Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.38 – Current Standardized Precipitation Evapotranspiration Index Results, Ruby Mountains
July 19, 2022



Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

Figure 3.39 – Current Standardized Precipitation Evapotranspiration Index Results, Lamoille Canyon
July 19, 2022



Source: Climate Toolbox- Historical Drought Stripes; SPEI: Standardized Precipitation Evapotranspiration Index; Drought Time Scale: 0.5 month, 1.0 month, 3.0 month, 6.0 month; 9.0 month; 1.0 year; 2.0 year; 5.0 year

for the City of Carlin on July 19, 2022 indicated a moderate drought level, the 1.0 year SPEI indicated a moderate drought level, the 2.0 year SPEI indicated an exceptional drought level, and the 5.0 year SPEI indicated an exceptional drought level. On July 19, 2022 for the South Fork Native American Reservation, the 0.5 month SPEI indicated a severe drought level, the 1.0 month SPEI indicated a moderate drought level, the 3.0 month SPEI indicated an abnormal dry level, and the 6.0 month SPEI indicated a moderate drought level. The 9.0 month SPEI for the South Fork Native American Reservation on July 19, 2022 indicated a severe drought level, the 1.0 year SPEI indicated a moderate drought level, the 2.0 year SPEI indicated an exceptional drought level, and the 5.0 year SPEI indicated an extreme drought level.

For the Ruby Mountains on July 19, 2022, the 0.5 month SPEI indicated a severe drought level, the 1.0 month SPEI indicated a moderate drought level, the 3.0 month SPEI indicated an abnormal dry level, and the 6.0 month SPEI indicated a moderate drought level. The 9.0 month SPEI for the Ruby Mountains on July 19, 2022 indicated a severe drought level, the 1.0 year SPEI indicated a moderate drought level, the 2.0 year SPEI indicated an exceptional drought level, and the 5.0 year SPEI indicated an extreme drought level. On July 19, 2022 for the Lamoille Canyon area, the 0.5 month SPEI indicated a moderate drought level, the 1.0 month SPEI indicated a moderate drought level, the 3.0 month SPEI indicated an abnormal dry level, and the 6.0 month SPEI indicated a moderate drought level. The 9.0 month SPEI for the Lamoille Canyon area on July 19, 2022 indicated a moderate drought level, the 1.0 year SPEI indicated an abnormally dry level, the 2.0 year SPEI indicated an exceptional drought level, and the 5.0 year SPEI indicated a severe drought level.