

Table A1. Three Climate Scenarios for the Southwest Colorado by 2035

The following summary was compiled from three climate scenarios and a review of literature. The **Hot and Dry** scenario is from hadgem2-es.1.rcp85; the **Warm and Wet** is from cnrm-cm5.1.rcp45 and **Feast and Famine** is from cesm1-bgc.1.rcp85

Scenarios	Hot and Dry	Warm and Wet	Feast and Famine
Temperature	Annual temperature increases by 5F; At lower elevations: summer days with temperature above 77F (25C) increases by 1 month, and nights with temperature above 68F = 10	Annual temperature increases by 2F; At lower elevations: summer days with temperature above 77F (25C) increases by 1 week	Annual temperature increases by 3F; At lower elevations: summer days with temperature above 77F (25C) increases by 2 weeks, and nights with temperature above 68F = 20
Precipitation	Annual precipitation decreases by 10%; less frequent and more intense individual rain events; summer monsoon rains decrease by 20%	Annual precipitation increases by 10%; more intense individual rain events; summer monsoon rains increase by 10%	Annual precipitation does not change but much greater fluctuations year to year (leading to more frequent feast or famine conditions); El Nino of 1982/83 strength occurs every 7 years
Runoff	Runoff decreases by 20% and peak runoff occurs 3 weeks earlier	Runoff volume does not change but peak runoff earlier by 1 week	Runoff decreases by 10% and peak runoff occurs 2 weeks earlier
Heat Wave	Severe and long lasting; every summer is warmer compared to 2002 or 2012 (5F above normal)	Hot summers like 2002 and 2012 occur once every decade	Hot summers like 2002 and 2012 occur once every 3 years
Drought	More frequent drought years like 2002/2012 - every 5 years	No change in frequency but moderate increases in intensity; fewer cases of multi-year drought	Drought years like 2002/2012 occur once every decade
Snowline or Freezing Level	Snowline moves up by 1200ft	Snowline moves up by 600ft	Snowline moves up by 900ft
Wildfire	Fire season widens by 1 month; greater fire frequency (12x) and extent (16x) in high elevation forest	Increases in fire frequency (4x) and extent (6x)	Fire risk during dry years is very high at all elevations b/c of large fuel build up from wet years; on average fire frequency increases 8x, and area burnt increases 11x
Dust Storms	Extreme spring dust events like 2009 every other year; causing snowmelt and peak runoff to be six weeks earlier	Same as current	Frequency of extreme dust events increases from current but tied to extreme dry years
Flood Risk	Flood less frequent but risk increases for big summer rain events	Flood frequency increases substantially as well as the overall risk	Risk increases substantially during the wet years
Growing Season	Increases by 3 weeks	Increases by 1 week	Increases by 2 weeks

Three Climate Scenarios for the Southwest Colorado by 2035: Summary & Hard Numbers

Hot and Dry	<ul style="list-style-type: none"> ❑ Sustained and longer duration drought: 2002-like drought occurs every 5 years ❑ Chronic summer-time dry conditions: Summer monsoons are significantly reduced (-20%) ❑ Chronic summer time heat waves: Every summer warmer compared to 2002 (5°F above normal)
Warm and Wet	<ul style="list-style-type: none"> ❑ Water availability does not change but climate is warmer ❑ Timing of snowmelt, streamflow, growing season change but more moderate compared to other scenarios ❑ Chronic flood risks because of increases in moisture and more heavy precipitation events
Feast and Famine	<ul style="list-style-type: none"> ❑ No long-term droughts but more frequent and intermittent severe-drought conditions (2002 drought once every decade) ❑ Large year-to-year fluctuations that go from “hot and dry” to “warm and wet” conditions ❑ Doubling in the frequency of alternating extreme dry and wet conditions relative to present

	Hot and Dry	Warm and Wet	Feast and Famine
Annual temperature increase (F)	5	>2	2.9
Winter temperature increase (F)	4.1	3.5	3.3
Spring temperature increase (F)	3.8	2.3	2.2
Summer temperature increase (F)	6	2.8	3.4
Fall temperature increase (F)	5.3	2.1	2.9
Annual precipitation (%)	decrease 10%	increase 10%	no change but large year to year variation
Winter precipitation (%)	19	13	6
Spring precipitation (%)	-9	6	0
Summer precipitation (%)	-19	8	3
Fall precipitation (%)	-15	10	-9
Freezing level	shifts up by 1200 ft	shifts up by 600 ft	shifts up by 900 ft
Runoff	> 20% decrease	stays the same as baseline	10% decrease
Timing of peak runoff	earlier by 3 weeks	earlier by 1 week	earlier by 2 weeks
Summer monsoon	decrease by 20%	increase by 10%	large year to year fluctuation
Summer like 2002	every summer	every 10 years	every 3 years
Severe drought duration	1-5 years	1 year	1-2 years
2002/2012 Drought	every 5th year	every 15th year	every 10th year
Strong El Nino return frequency	no change	no change	doubles

(Source: Imtiaz Rangwala, Western Water Assessment & NOAA PSD, Boulder; Renee Rondeau, Colorado Natural Heritage Program)