



STATE OF NEVADA MEETING NOTICE AND AGENDA NEVADA HAZARD MITIGATION WORKING GROUP

Name of Organization: Nevada Hazard Mitigation Working Group

Date and Time of Meeting: March 8, 2022, at 1:00 p.m.

Venue Name/Address: Virtual Zoom Meeting

Visual Access: There will be no physical location for this meeting. The meeting can be listened to, or viewed live, over the Internet through the Nevada Division of Emergency Management YouTube channel at:
<https://www.youtube.com/channel/UCFGa6exzrZdlqA6PP55kfqq>

Conference Line Access: Conference line #: (669) 219-2599
Meeting ID# 686 738 8625
When prompted for Participant ID, please press #

Current Voting Membership	
Name	Organization
Stephen Aichroth	NV Division of Housing
Solomé Barton	North Las Vegas Emergency Management
Faith Beekman	NV Health and Human Services
Kathy Canfield	Storey County
John Christopherson	NV Division of Forestry
Craig dePolo	NV Bureau of Mines and Geology
Herman Fillmore	Washoe Tribe
Sheryl Gonzales	WNDD
Clair Ketchum	NOAA (Federal)
Andrew Trelease	Southern NV Regional Flood
Lorayn Walser	Governor's Office of Energy
Erin Warnock	NV Division of Water Resources
Melissa Whipple	NV Health and Human Services
Janell Woodward	NV Division of Emergency Management



STATE OF NEVADA MEETING NOTICE AND AGENDA NEVADA HAZARD MITIGATION WORKING GROUP

This meeting will be video or teleconferenced as specified beginning at 1:00 p.m. The Nevada Hazard Mitigation Working Group (“Working Group”) may act on items marked “For Possible Action.” Items may be taken out of the order presented on the agenda at the discretion of the Chair. Items may be combined for consideration by the Working Group at the discretion of the Chair. Items may be pulled or removed from the agenda at any time.

Please Note: Witnesses wishing to have their complete testimony/handouts included in the permanent record of this meeting should provide a written or electronic copy to the Working Group administrative support staff. Minutes of the meeting are produced in a summary format and are not verbatim.

1. **CALL TO ORDER AND ROLL CALL** – Chair, Lorayn Walser, Governor’s Office of Energy.
2. **PUBLIC COMMENT**– (Discussion Only) – No action may be taken upon a matter raised under this item of the agenda until the matter itself has been specifically included on an agenda as an item upon which action may be taken. Public comments may be limited to 3 minutes per person at the discretion of the Chair. Comments will not be restricted based on viewpoint.

To provide testimony during this period of public comment via telephone, please call in any time after 12:30 p.m. on the day of the meeting by dialing (669) 219-2599. When prompted to provide the Meeting ID, please enter 686 738 8625 and then press #. When prompted for a Participant ID, please press #. When asked to provide public comment, please press *6 to unmute your phone and *6 again when your comments are complete.

Please be advised that the YouTube stream will be between 60-90 seconds behind the live meeting. If you would like to present public comment, please call in using the above number to hear the meeting live.

3. **APPROVAL OF MINUTES** - (Discussion/For Possible Action) – Chair, Lorayn Walser, Governor’s Office of Energy. The Working Group will discuss and review the minutes of the December 14, 2021, Working Group meeting. The Working Group will determine whether to approve the minutes of the December 14, 2021, meeting.
4. **STATE HAZARD MITIGATION PLAN STATUS UPDATE** - (Discussion/For Possible Action) – Janell Woodward, Mitigation Officer, DEM/HS. Ms. Woodward will provide a status update to the State Hazard Mitigation Plan (HMP). The Working Group will discuss the process and update of the plan. Included in this discussion will be review of three of the updated hazard sections from Section Three of the State Plan. The Working Group may vote to finalize these hazard updates for the State Plan. These hazards include the following:
 - a. Severe Storms and Extreme Snowfall
 - b. Extreme Heat
 - c. Drought

5. **MITIGATION GRANTS UPDATE** - (Discussion Only) – Janell Woodward, Mitigation Officer, DEM/HS – Ms. Woodward will provide an update on mitigation grant opportunities, and available funding, including, Hazard Mitigation Grant Program (HMGP) from COVID and HMGP-Post Fire grant programs.
6. **PUBLIC COMMENT** – (Discussion Only) – No action may be taken upon a matter raised under this item of the agenda until the matter itself has been specifically included on an agenda as an item upon which action may be taken. Public comments may be limited to 3 minutes per person at the discretion of the Chair. Comments will not be restricted based on viewpoint.

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7. **ADJOURNMENT** – (Discussion/For Possible Action)

This is a public meeting. In conformance with the Nevada Public Meeting Law, this agenda was posted or caused to be posted on or before 9:00 a.m. on March 3, 2022, at the following:

Nevada State Emergency Operations Center, 2478 Fairview Drive, Carson City, NV; and

Posted to the following websites:

- Nevada Division of Emergency Management and Homeland Security Public Meeting Notifications/Information Website:
https://dem.nv.gov/DEM/DEM_Public_Meeting_Information/
- Nevada Public Notice Website: www.notice.nv.gov

To navigate to Division of Emergency Management and Homeland Security administered meetings, please do the following:

- Within the Government Column, click **State**.
- Within the Entity Column, select **Office of the Military – Division of Emergency Management**.
- Within the Public Body column, click on the **Nevada Hazard Mitigation Working Group**; results will populate on the page.

We are pleased to make reasonable accommodations for members of the public who are disabled. If special arrangements for the meeting are necessary, or if there is a need to obtain copies of any supporting meeting materials, please notify Janell Woodward, Division of Emergency Management and Homeland Security, at 775-687-0300. 24-hour advance notice is requested. Thank you.



**STATE OF NEVADA
MEETING MINUTES
NEVADA HAZARD MITIGATION WORKING GROUP**

Attendance	DATE	December 14, 2021
	TIME	9:00 a.m.
	METHOD	Zoom and In-Person
	RECORDER	Janell Woodward

Appointed Voting Member Attendance					
Member Name	Present	Member Name	Present	Member Name	Present
Lorayn Walser– Chair	X	Herman Fillmore	ABS		
Steven Aichroth	X	Sheryl Gonzales	ABS		
Solome Barton	X	Clair Ketchum	ABS		
Faith Beekman	ABS	Andrew Trelease	X		
Kathy Canfield	X	Erin Warnock	X		
Ryan Shane	X	Melissa Whipple	X		
Craig dePolo	X				

Legal/Administrative Staff		
Name	Agency	Present
Samantha Ladich – Senior Deputy Attorney General	Attorney General's Office – DEM/HS DAG	X
Janell Woodward – Emergency Management	NDEM/HS	X
Mark Shugart – FEMA FIT	FEMA RIX	X

1. CALL TO ORDER AND ROLL CALL

Chair Lorayn Walser, Governor’s Office of Energy, called the meeting to order at 9:00 a.m. Roll call was performed by Janell Woodward, NDEM/HS. Quorum was established for the meeting.

2. PUBLIC COMMENT

Chair Walser opened the first period of public comment for discussion. There was none.

3. APPROVAL OF MINUTES

Chair Walser requested a motion to accept the minutes from September 27, 2021. Craig DePolo moved to approve the minutes. Andrew Trelease seconded the motion. The motion carried unanimously.

4. Community Focus – North Las Vegas Hazard Presentation

Solome Barton, North Las Vegas Emergency Management, informed the group that the city of North Las Vegas was incorporated in 1946 and currently encompasses 130 square miles within Clark County. Ms. Barton explained that between 2000 and 2019, the city's population has grown by approximately 118.1 percent, and as of 2019, was home to about 251,000. The current estimation is 265,000 with a projected 335,622 in 2035. Ms. Barton informed the group that North Las Vegas continues to shine as a major industrial center primarily due to its large amount of land across the northern rim of Las Vegas as well as the industry growth, emphasizing light manufacturing, regional distribution, relocation of high-tech businesses, and custom manufacturing. Ms. Barton further indicated that the airport in North Las Vegas is the second busiest airport in the state in terms of business and tour operations. Ms. Barton informed the group that North Las Vegas is currently approximately 60 percent built out, with the majority of remaining land being considered for development. Ms. Barton explained that the biggest percentage of land developed is in a low-density residential area. Ms. Barton discussed the community partners, some of whom are established and others who are just coming in. Ms. Barton further discussed the hazards that have the potential to disrupt the community, cause damage, and create casualties discovered by conducting a thorough Threat and Hazard Identification Risk Assessment (THIRA) and the comprehensive hazard mitigation plan this garnered. Ms. Barton explained that the city has conducted a consequence analysis with each of the top hazards to prioritize actions with each applicable hazard to which the city may be subject, including natural, technological, and human-caused. Ms. Barton indicated that earthquakes are one of the main natural threats faced by southern Nevada given that North Las Vegas is on Frenchman Mountain Fault. Ms. Barton further described technological hazards such as factory, manufacturer accidents, fires, power outages, and cybersecurity, explaining that this also is one of the main focuses in terms of mitigation.

Solome Barton informed the group that there are high, moderate, and low-hazard facilities in North Las Vegas, and explained that Emergency Management maintains a collaborative relationship with each of these facilities in order to remain abreast of any hazardous issues. Ms. Barton further indicated that schools and neighborhoods are also kept abreast of the facilities in their areas that could potentially contain hazards and as such, communities are engaged to train and exercise together in order to understand the potential hazards and responses. Ms. Barton further indicated that prior to COVID, there had been an awareness and emergency response group in place, and that now Emergency Management would like to reengage that program that brought all community partners together for preparedness in the case of emergency. Ms. Barton explained that Emergency Management works hard to ensure that first responders as well as communities are aware of who to call in case of such an emergency in order for the right teams to arrive from the start so as not to prolong an incident due to response.

Solome Barton next discussed training. Ms. Barton discussed internal training to ensure that all local, county, regional, and state departments know how to respond in case of emergency, including first responders, utilities, and parks and recreation. Ms. Barton further indicated that Emergency Response aims to provide vulnerable citizens and communities with the right tools in order to train them to rely on themselves prior to reaching out to local, state, or federal government.

Solome Barton highlighted the steps in the process of day-to-day operations of planning activities, which include: a comparative analysis of the current emergency response plan; incorporating the latest science and industry standards; comprehensive review by affected department supporting agencies in Nevada Division of Emergency Management (NDEM) to include protection of critical infrastructure and key resources and continuity of operations; regular revision of the emergency operations plan to include all state requirements. Ms. Barton explained the training that takes place for private entities and resort partners in incident management.

Solome Barton discussed the most current THIRA from 2018 as well as the Clark County Multi-Jurisdictional Hazard Mitigation Plan. Ms. Barton explained that it will be submitted to the state upon EOP approval.

Craig dePolo commented on the importance of considering the Frenchman Mountain Fault and explained that the last events on the fault have recently been dated. Dr. dePolo indicated that an event took place approximately 54,000 years ago, and then two smaller events 27,000 years and 25,000 years. Mr. dePolo informed the group that no events have taken place since that time, and as such, the hazard of that fault could go up a bit based on conditional probability. Dr. dePolo next discussed the Eglington Fault in the Aliante area and its inclusion in building codes, as well as the basin effect in the Las Vegas Valley, which has not really been incorporated into the building codes yet and needs better definition in terms of things like measurements. Dr. dePolo cautioned that the basin effects could be some of the strongest in North Las Vegas given that the basin is approximately two times deeper in that location than in most of the rest of the valley.

Solome Barton requested a meeting with Craig dePolo for further information regarding the Eglington Fault.

Chair Lorayn Walser cited the Kentucky tornado incident as a cautionary tale of the importance of having things such as food, water, and medication on hand in the case of an emergency and commended Solome Barton and Emergency Management for teaching citizens to prepare in advance for self-sufficiency in emergencies such as these in the case that the state or FEMA are unable to respond immediately. Chair Walser next asked if Emergency Management requires notification of things like a transport of hazardous materials traveling through North Las Vegas.

Solome Barton explained that Clark County Emergency Management should be notified in this sort of situation.

Janell Woodward emphasized the importance of the Two Weeks Ready program that allows people to be prepared for two weeks' time in the case of an incident or disaster. Ms. Woodward further explained the ability of citizens to prepare these kits gradually rather than invest all at once.

Craig dePolo explained that in terms of personal supplies, citizens may find it easiest to incorporate/replenish them during their routine in order to always have fresh supplies on hand.

Solome Barton discussed the education on rotating supplies that Emergency Management has put in place in order for citizens to be truly prepared in the case of an emergency, including things like shoes and clothes, and children's items such as blankets and toys.

5. Nevada Enhanced State Hazard Mitigation Plan Status Update

Janell Woodward, State Hazard Mitigation Officer, reminded the group that the plan is approximately 1200 pages long, is available in hardcopy in her office, as well as online for anyone's availability. Ms. Woodward explained that an RFP is currently being put together to go out for bid to a company to update the plan. Ms. Woodward further explained that the Bureau of Mines and Geology has been utilized for this in the past, but due to some changes within the Bureau, they were unable to provide the update this year. Ms. Woodward informed the group that all of the different hazard areas have been sent out to the subject-matter experts for updating and once the completed portions are returned, Ms. Woodward will bring them back to the group for review and approval of the different sections. Ms. Woodward explained that an amendment to the state plan is currently in the works, which includes adding mitigation actions in the back section for drought as this is one of the pushes from HMGP, who funded \$13.5 million from COVID. Ms. Woodward informed the group that the current mitigation action section includes earthquake, flood, and wildfire, but does not yet include drought. Ms. Woodward further informed the group that the only funding that can be applied for is that which is included in the mitigation action section, which also does not include pandemic-related mitigation efforts. As such, an amendment is in the works that will then go from the state to FEMA for approval, after which funding can be requested for those added things. Ms. Woodward informed the group that the current plan is set to expire in October of 2023; thus the plan must be fully updated and submitted to FEMA approximately three months prior to that date in order to allow FEMA to review and approve the plan.

Lorayn Walser asked if extreme weather events are included in the plan.

Janell Woodward confirmed that they are, explaining that high wind events, snow and cold weather events, and high heat events are all included.

Ryan Shane asked if hired contractors would be contacting the different agencies for solicitation of information, and if so, whether the agencies should provide the requested information for a more robust report.

Janell Woodward indicated that the contractors would more likely come to committee meetings to request the information collectively from the committee rather than solicit the information from individual departments.

Ryan Shane questioned what the change in operations would look like in terms of updating the sections and how things would work differently with involved contractors.

Janell Woodward explained that contractors have always been involved, and that the biggest difference between the last update and this update is the lack of a subcommittee consisting of subject-matter experts this time. Instead, Ms. Woodward explained that the different hazard sections have been parsed out to the subject-matter experts of which the committee is comprised. Ms. Woodward further indicated that the hazard-mitigation section of the plan, Section 3, is the largest one.

Craig dePolo added that the big emphasis this year is on getting all the mitigation actions possible into the plan and encouraged the members to add as many mitigation strategies as possible.

6. Mitigation Grants Update

Janell Woodward, State Mitigation Officer, discussed the BRIC program, indicating that the application had a NDEM deadline of December 3 with a FEMA deadline of January 28. Ms. Woodward informed the group that the state set-aside contains \$1 million this year and because the grant applications does not reach the million dollars, Ms. Woodward will be continuing to encourage people to apply for the leftover funding that's set aside. As such, Ms. Woodward informed the group that most eligible projects will likely get funded due to the amount of money in the set-aside, the largest amount thus far. Ms. Woodward further indicated that there a billion dollars for competitive projects. Ms. Woodward informed the group that there is only one competitive project thus far and that as a rule, there are not generally many applications for competitive projects.

Janell Woodward next discussed the Hazard Mitigation Grant Program (HMGP), the \$13.5 million received as a result of the COVID pandemic. Ms. Woodward explained that one project has been submitted thus far for this program. Ms. Woodward informed the group that the applications are due to NDEM by June 30 in order to review for completeness prior to the August 5 official BML deadline. Ms. Woodward explained that applicants do not need to wait until the deadline to submit; submissions can be accepted beforehand.

Janell Woodward concluded the grant discussion with information about the HMGP Post-Fire grant, applications of which are due to FEMA on March 31. Ms. Woodward explained that this funding comes as a result of the Fire Management Assistant Grants (FMAGs) that NDF manages for local communities when wildfires occur. Ms. Woodward informed the group that there is a little over \$2 million in funding for that given that there were three FMAGs this year, two in Douglas County and one in Washoe County. Ms. Woodward encouraged anyone with project ideas, even if unsure for which grant or with a fully fleshed out project plan, to contact DEM, who could help decipher which grant might fit best for the project idea.

Stephen Aichroth asked if any grant opportunities were provided in the infrastructure bill for emergency management or if there was any consideration of emergency management in the Build Back Better plan.

Janell Woodward explained that she is not an expert on the infrastructure bill as none of the funding comes through emergency management, but indicated her belief that there are some opportunities coming to the state for different infrastructure-type projects. Ms. Woodward further explained that because Build Back Better has not yet been signed, she has no information at this time of what will be included in that plan.

Andrew Trelease asked if the BRIC funding requires a disaster declaration in the state.

Janell Woodward explained that it does not and that the requirement with BRIC has been building codes that have been added as a scoring option. Ms. Woodward further explained that this works against Nevada as the state does not have statewide building codes but rather adopts at the local level. Ms. Woodward clarified that the HMGP funding is the disaster and post-disaster funding whereas BRIC is the pre-disaster for mitigation.

Andrew Trelease asked if levies are eligible for funding through the BRIC program.

Janell Woodward explained that although levies were not eligible in the past, they are now.

Ryan Shane asked for clarification of the due date for the HMGP Post-Fire applications.

Janell Woodward confirmed that they are due to FEMA by March 31 but that DEM would like them as soon as possible in order to review them against the checklist from FEMA.

Ryan Shane asked about the timeline regarding outstanding applications.

Janell Woodward explained that posting needs to be for 15 days and that DEM needs to let FEMA know the start date of the posting, following which, the project will be funded to move forward.

Ryan Shane explained that some inaccurate information had been provided to DEM and that his staff would be in contact with the correct information to submit to FEMA.

Andrew Trelease asked if a particular community within Clark County could be considered underserved or disadvantaged despite its location.

Janell Woodward confirmed that the community would meet the criteria.

Lorayn Walser questioned whether lesser populated counties could put in a regional application.

Janell Woodward explained that this was dependent upon the project.

Lorayn Walser asked if projects that crossed state lines were allowed.

Janell Woodward confirmed that this was allowable but cautioned that only one state would be responsible for the grant.

Lorayn Walser commended Janell Woodward for always being available and responsive to questions and problems.

7. Building Resilient Infrastructure and Communities (BRIC) Application Review and Ranking

Janell Woodward, State Mitigation Officer, discussed the ranking form for the BRIC application. Ms. Woodward explained that NDEM does not generally receive many applications in the state so as such, FEMA requires a process to review and rank the received applications. Ms. Woodward informed the group that of the \$1 million set-aside, \$600,000 can be used for planning or planning activities and the total \$1 million can be used for projects and project scoping. Ms. Woodward also indicated that any project that's going to cost over that \$1 million would fall into competitive projects. Ms. Woodward asked the members of the group to fill out the forms either manually or electronically and return them to her to keep on record.

Janell Woodward explained that the FEMA GO is the application system for BRIC. Ms. Woodward explained that one of the issues with the system is that it does not sort applications but rather lists everything. Ms. Woodward next went through the Washoe County application for their Hazard Mitigation Plan update to familiarize the group with the application process. Ms. Woodward informed the group that applications can contain any and all attachments needed to support the application. Ms. Woodward explained that the applications is setup to allow the applicant to pick the top three hazards as well as to include the scope of work.

Ryan Shane asked if scoring happened outside of the meeting.

Janell Woodward explained that for these applications, the group would score together as an exercise and confirmed that members should fill out their score sheet. Ms. Woodward further indicated that in the future, she will revise the scoring to include the planning grants.

Kathy Canfield asked for confirmation that the group should be ranking these between each other to see which would be the most important one.

Janell Woodward confirmed that this was correct, a decision would be made on the ranking order of projects and the order would be submitted to the chief, who would then make the final decision regarding the application. Ms. Woodward conceded that likely a part of the ranking process would always come down to opinion of the person rating as to what was most important.

Ryan Shane suggested the importance of considering qualifying criteria, as well and asked if it was possible to adjust the score sheet in a way that would allow for that qualifying criteria.

Craig dePolo concurred with Mr. Shane's suggestion.

Janell Woodward suggested informing the group of what each project is doing, indicating that an overview might be easier than actually going through each application individually.

Solome Barton concurred with this suggestion, particularly because the group has not had opportunity to read through the applications.

NHMWG Draft meeting minutes Dec 14 2021

Janell Woodward gave the group an overview of the application from Washoe County.

Erin Warnock asked if the group should be viewing the applications in FEMA GO.

Janell Woodward indicated that to do so would be cumbersome because part of the issue with FEMA GO was the inability to view the application in its entirety. Ms. Woodward explained this issue also prevented the ability to print applications in their entirety, thus the reason why Ms. Woodward was not able to provide the group with them in advance. Ms. Woodward continued her synopsis of the Washoe application for the purpose of having the group rank it. Ms. Woodward next provided synopses of the additional applications for the group, indicating that the Truckee Meadows application was not entirely complete.

Craig dePolo asked if outside of the application being incomplete, did all other considerations appear to be met.

Janell Woodward indicated that they were, and reiterated that this is a project scoping so no BCA is required because it is considered a type of planning grant where the BCA work will typically be done during the project scoping.

Solome Barton asked if the application has the capacity to finish the project within the project 36-month timeframe.

Janell Woodward indicated her belief that it does. Ms. Woodward next moved onto the third application from NDEM, explaining that the final application needed to be beefed up prior to submission.

Solome Barton asked if with the RFP process, the match would be secured prior to sending out the application.

Janell Woodward confirmed that it would as the final total of the match needed to be secured prior to sending.

Solome Barton asked if the applicant would have the capacity to finish the project within the 36-month timeframe.

Janell Woodward confirmed that it would. Ms. Woodward next indicated that approximately \$547,000 of the \$1 million set-aside would be incorporated into these three projects. Ms. Woodward indicated that Washoe County has a potential project-scoping application in the works, as well, that will redirect water into Pyramid Lake and explained that this is was for information-only for the time being and should not be considered within the ranking along with the aforementioned three projects.

Craig dePolo asked if Washoe County was scoping to the point where the problem would be mitigated given that all the water could neither be eliminated or diverted.

Janell Woodward affirmed that Washoe would be scoping to where the problem would be mitigated.

Ryan Shane asked if this application would be scored the same way as the previous three.

Janell Woodward indicated that it should.

Lorayn Walser asked if feedback for unfunded projects was included to applicants as this project has not been funded the previous year.

Janell Woodward indicated that in the past, only technical feedback was given to projects up to a certain amount of funding.

Ryan Shane asked if the project was considering seismic or flooding resilience.

Janell Woodward indicated that this is a seismic project as it is a seismic retrofit of the dam.

Ryan Shane asked for an explanation of the difference between the terms seismic and non-structural seismic.

Janell Woodward explained that seismic refers to retrofit type and non-structural would include things that can go flying.

Craig dePolo clarified that non-structural would include the contents within a building that could fall, such as ductwork, but do not affect the structure.

Solome Barton asked if flood reduction would also encompass basins and reservoirs.

Craig dePolo's answer was inaudible.

Lorayn Walser asked if it would be possible to partner with a private utility for this project and use their money for the match.

Janell Woodward indicated that this was potentially a possibility, but explained that this project had already matched. Ms. Woodward explained, however, that extra points could be gained under technical criteria for overmatch.

Craig dePolo indicated that his ranking on this particular project would be higher than the other three because the project was for mitigation.

Janell Woodward indicated that this project falls into the competitive rather than the set-aside, and as such, will be considered separately from the other three projects.

Solome Barton asked if Janell Woodward needs copies of the drafts sent to her upon completion.

Janell Woodward confirmed that she would like the copies of the drafts but indicated that for today's purposes, she would ask the members verbally for their order of the three applications and then take a vote within the group for the order in which the applications would be submitted to the chief.

Erin Warnock asked for a quick recap of the three projects.

Ryan Shane listed the three projects for the group: the Washoe County Plan Update for a total of \$67,500; the Truckee Meadows Water Seismic Scoping Project for \$300,000; and the NDEM Underserved Communities Outreach for \$180,000.

Janell Woodward asked each of the members to list their order of the projects. The members listed their projects as follows:

- Craig dePolo: 1, Washoe County; 2, NDEM; 3, Truckee Meadows
- Andrew Trelease: 1, Washoe County; 2, NDEM; 3, Truckee Meadows
- Solome Barton: 1, Truckee Meadows; 2, NDEM; 3, Washoe County
- Kathy Canfield: 1, NDEM; 2, Truckee Meadows, 3, Washoe County
- Ryan Shane: 1, Truckee Meadows; 2, Washoe County; 3, NDEM
- Lorayn Walser: 1, NDEM; 2, Truckee Meadows; 3, Washoe County
- Erin Warnock: 1, NDEM; 2, Washoe County; 3, Truckee Meadows
- Stephen Aichroth: 1, Washoe County; 2, NDEM; 3 Truckee Meadows

Following the tally, Janell Woodward indicated that the majority read as follows: 1, NDEM; 2, Washoe County; 3 Truckee Meadows

Janell Woodward reminded the group to submit their forms to her by the end of the week.

Craig dePolo moved to vote on the slate of prioritization as provided by Ms. Woodward. Solome Barton seconded the motion. The motion carried unanimously.

8. Approved Abbreviations for Use with Hazard mitigation Plans and Updates

Janell Woodward, State Mitigation Officer, provided the group with a list of NRAC-approved terminology and abbreviations as listed in the Nevada Threats and Hazards document, explaining that Henderson had requested that all jurisdictions use the same, standardized language when referring to hazards as listed in the document.

Andrew Trelease asked if there was more that the group should do with this document beyond using it as a reference.

Janell Woodward explained that the document is already NRAC-approved but given that this group has not yet seen it, she wanted to provide the group with an opportunity to review the document as well as potentially provide any suggestions for future revisions for the next iteration.

Craig dePolo vocalized his support for the state to standardize its terminology.

Andrew Trelease concurred.

Solome Barton concurred.

9. PUBLIC COMMENT

Chair Walser opened the second period of public comment. There was no public comment.

10. ADJOURN

Chair Walser asked for a motion to adjourn. Solome Barton moved to adjourn. Andrew Trelease seconded the motion. The motion carried unanimously. The meeting was adjourned at 12:19 p.m.

DRAFT

3.3.15 Severe Storms and Extreme Snowfall (Medium/Significant Risk)

Commented [SCW1]: Updated by NWS, Chris Smallcomb (Warning Coordination Meteorologist)

3.3.15.1 Nature



Severe storms can bring heavy rain or snow, high winds, extreme cold, and in rare cases ice storms.

In Nevada, the primary weather pattern for a winter storm is the jet stream slamming into California and Nevada coupled with an atmospheric river. A significant portion of the winter snowpack is generated by these Pacific atmospheric river winter storms.

These storm systems can bring heavy rain or snow to Nevada (if there's no rain shadowing by the Sierra Nevada or other California mountains), flooding (if the storm is warm enough for a rain on existing snow event), or widespread high winds (if there is rain shadowing – which is common).

These high wind events are focused in areas immediately downwind of large mountain ranges, most notably along Highways 395 and 95 in Northern and Central Nevada. High wind events are also common across the entire state in the spring and autumn associated with strong cold fronts that can produce widespread gusts over 60 MPH and large areas of blowing dust. This is Las Vegas's primary high wind scenario.

Figure 3-38. Heavy snow at NWS Reno during the series of storms December 2004–January 2005. Heavy snow near Incline Village, Nevada. Photo by Nevada Highway Patrol February 27 2017

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Figure 1. Lenticular wave clouds, a common feature with high wind storms in across Nevada.

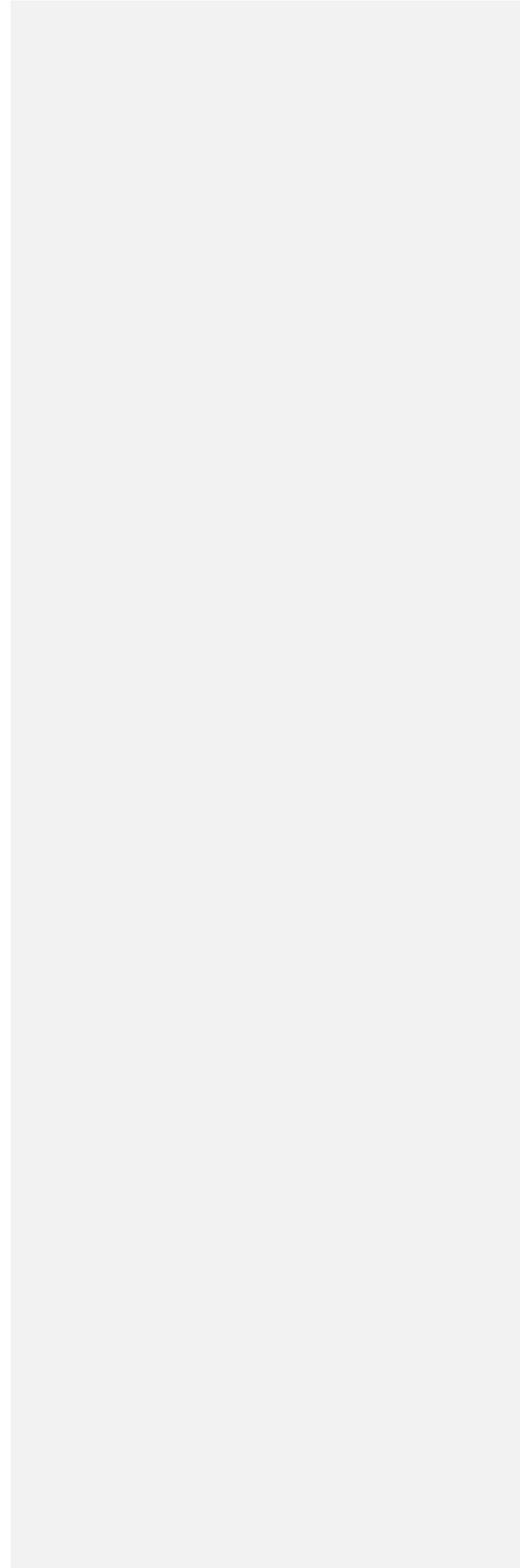
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It should be noted that high winds and windstorms can occur at any time of year and are not limited to winter weather, but rather can also be associated with severe weather thunderstorms in summer. However these particular wind events are much more localized. A significant portion of the winter snowpack is generated by these Pacific atmospheric river winter storms.

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The current predictability of these winter season heavy rain, snow, or high wind storms is generally good, with broad heads-up often possible 5-10 days in advance, with more specific details and potential impacts 1-4 days ahead. River forecasts of potential flooding can be seen out to 5 days into the future,

but these are only for mainstream rivers such as the Truckee, Carson, and Humboldt. One specific aspect to these winter storms which is low predictability is the rain-snow elevation (also known as the “snow level”). This can impact the flood versus heavy snow potential greatly, and can result in big forecast changes even just 12-24 hours ahead of a storm.



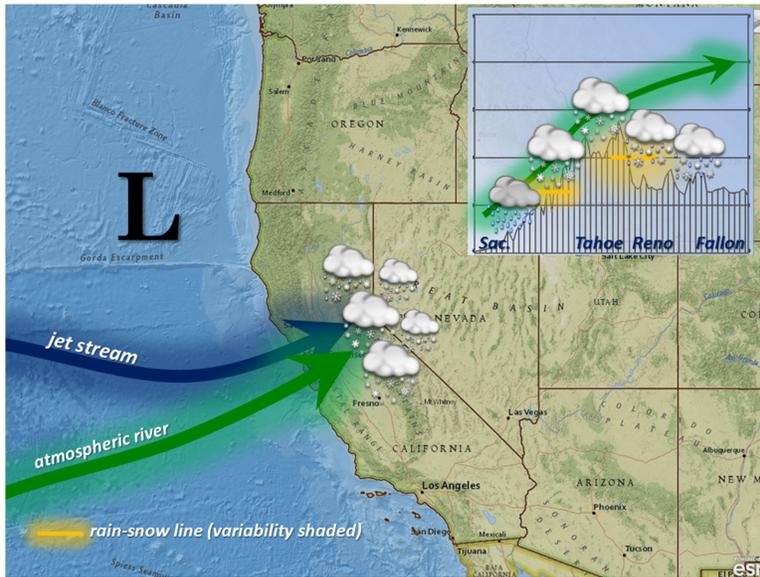


Figure 3-39. Schematic showing a classic weather pattern for heavy snows in central and northern Nevada one of the patterns for heavy snows in northern and central Nevada – a cold atmospheric river scenario.

Other weather patterns which are favorable to heavy snow in Central and Northern Nevada are 1) slow moving cold low pressure off the coast of California and Oregon, 2) inside slider where a strong cold front drops in from the north producing a band of heavy snow, 3) Tonopah Low where heavy snows can be produced on the east facing aspects of mountain ranges in Nevada, and 4) lake effect snow where cold air creates localized bands of heavy snow impacting communities and highways downwind of large lakes such as Tahoe, Pyramid, and Walker in northern Nevada. The predictability of these storm types is much less than the atmospheric river events, often only 1-3-4 days of lead time.

3.3.15.2 History

During winter months, Nevada's higher elevations and lower elevations in Northern Nevada regularly experience rain and snow, sometimes and very rarely freezing rain. Although dramatically less common, these conditions may also be experienced in lower elevations in the southern portion of the State.

Nevada's Basin and Range topography provides the necessary conditions for down-slope winds on the leeward (east) side of the ranges and into the valleys. North-south transportation routes can become obscured by blowing dust or snow during extreme wind conditions. Appendix K contains a Nevada Climate Office storm event summary by county with damage costs.

Table 3-29 lists ~~some~~ a sampling of past severe storms in Nevada causing recorded deaths, injuries, economic hardship, and/or property damage. This data comes from the NOAA National Weather Service Storm Data database.

Table 3-29. Severe Winter Storms in Nevada		
Date	Location	Deaths, Injuries, Damages
1889-90	Genoa area, northern NV	This winter season was known as the "White Winter" when nearly 100 inches of snow - the heaviest snowfall in northern Nevada history. An estimated 90-95% of the state's livestock died during that winter.
Winter 1937	Las Vegas area, Clark and Lincoln Counties	Although severe winter storms are generally thought to affect mainly northern Nevada, a snow storm left twelve inches of snow on Las Vegas and the Caliente Herald reported they were having the "coldest weather spell in memory for the past five days", with temperatures down to 10° above to 31° below zero, with 18 inches of snow.
February, 2004	Sierra Nevada Tahoe area	Two deaths. Severe winter storm. Gusts on the ridges were up to 110 mph. There were white-out conditions in Tahoe area. Several minor accidents were caused by the storm.
December 29, 2004 through January 10 2005:	Northern Nevada	FEMA designated 15 counties (Carson City, Churchill, Clark, Douglas, Elko, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Storey, Washoe, and White Pine) eligible for federal funding to pay part of the cost for emergency protective measures undertaken as a result of the snowstorm on December 29 through January 2. Shortly thereafter, FEMA designated these counties plus Pershing County eligible for federal funding as a result of another snowstorm on January 6-10.
January 3, 2011	Southern Nevada	A strong cold front brought very cold temperatures to the Mojave Desert over New Year's weekend, then a trailing Pacific storm brought locally heavy low elevation snow. A locally heavy snow burst produced five to seven inches of snow in Pahrump (2600').
Feb. 25, 2011	Reno-Carson City-Minden area, Northern Nevada	Up to 18 inches of snow with up to 50 mph winds caused 25 power poles to break and multiple auto accidents and two injuries and \$250,000 damages. Nonessential State workers were sent home.
January 13-14, 2013	Northern Nevada	Governor Sandoval declared a state of emergency due to prolonged cold winter temperatures, allowing extended hours for propane truck driver deliveries. Subzero cold was responsible for several deaths in Elko, Reno, and South Lake Tahoe in January. Several days with lows in the single digits to as low as -14F (South Lake Tahoe airport) and highs in the upper 20s to mid-30s caused pipes to burst at four casinos in Stateline on the 13th and 14th. The burst pipes caused water damage to the 18th floor at Harrah's and flooding of casino

Table 3-29. Severe Winter Storms in Nevada

Date	Location	Deaths, Injuries, Damages
		floors and stores at Harvey's Casino.
November 21-24, 2013	Southern Nevada	Heavy snow in far northern Lincoln County stranded approximately 50 cars on Highway 93, with some drivers trapped for 10-12 hours.
May 10, 2014	Southern Nevada	A strong cold front brought high winds to much of the Mojave Desert and southern Great Basin. In the Callville Bay area, damage included, 17 house trailer skirts; nine trailer awnings; several trailer roofs; flying debris damage to some vehicles, one houseboat, and a dock; a 25 foot sailboat which was flipped off a trailer; and damage to NV Energy infrastructure. At the Las Vegas Boat Harbor, one dock was pushed 20 feet and the bridge leading to it was damaged. Two other docks and private boats were also damaged. One man was presumed drowned in Lake Mead after high winds blew away his boat and caused waves in the lake.
December 11, 2014	Northern Nevada	Widespread wind gusts over 65 mph were noted on the 11th, with the highest gusts (over 80 mph) west of highway 395 in the foothills and the southwestern Carson Valley. There were an exceptionally high number of damage reports including power lines and trees downed (knocking out power to more than 10,000), fences damaged, and a semi-truck blown over on Interstate 80. In addition, winds caused more than 30 flight cancellations at the Reno-Tahoe International airport.
February 6, 2015	Northern Nevada	Widespread wind gusts of 60 to 79 mph were recorded from Minden north to the Palomino Valley. Higher gusts of 80 to 90 mph were noted in the Virginia Range and southwest of Gardnerville, with gusts over 100 mph at the Galena RAWS. Numerous roof and fences were damaged and several 4 foot diameter trees were downed on power lines in Gardnerville. Longtime residents of the area said this was the worst windstorm they had experienced in over 10 years. As many as 21,000 were without power around the area, with the worst damage to power lines in Douglas County. Finally, the high winds were blamed for the loss of power to two emergency communications repeaters critical to Lyon County. Alternate highway 95 east of Yerington was closed for a few hours due to several accidents, with high winds and very low visibility due to blowing dust reported by the Lyon County EM.
November 9-10, 2015	Northern Nevada	Widespread snow totals of 5 to 10 inches were noted in the Reno-Sparks area, highest on the north and west side of Reno (in lake effect band from Lake Tahoe). From the north valleys of Reno to Palomino Valley and Red Rock Rd near the California border lake effect snow from Pyramid Lake

Table 3-29. Severe Winter Storms in Nevada

Date	Location	Deaths, Injuries, Damages
		boosted snowfall totals to 8 to 15 inches, with the highest amounts in the Antelope and Hungry Valleys. Numerous broken tree branches were noted due to the heavy, wet snow and over 35,000 customers were without power in Washoe County due to downed power lines (morning of 11/10).
March 6, 2016	Southern Nevada	Around the Las Vegas Valley, a tree blew down and landed on a vehicle; a rooftop air conditioner blew into power lines, breaking the power pole; a light post blew down; and a few large tree branches snapped.
March 13, 2016	Northern Nevada	Winds of 40 and 55 mph with gusts 60 to 80 mph were recorded in and just east of the foothills of the Carson Range south of Reno on the 13th. The high winds caused a big rig to overturn on highway 395 near Stead. Finally, severe turbulence aloft near the Reno-Tahoe airport caused delays and cancellations on the morning of the 13th.
January 30-31 2016	Northern Nevada	Widespread snow totals of 4 to 8 inches were reported around the Reno-Sparks area. Areas in and near the foothills west of Reno received between 8 and 10 inches of snowfall. Heavy, lake-effect snow off of Pyramid Lake caused whiteout conditions near Wadsworth, with two jackknifed big rigs causing the closure of westbound Interstate 80 in the evening. Twelve inches of snow fell at Goldfield. Near Ely - six to twelve inches of snow was reported in many valley locations and up to 18 inches in the mountains. Winds gusting over 40 mph caused drifting of snow up to 4 feet deep making travel nearly impossible. Schools and county offices were closed the next day.
<u>January 9-12 2017</u>	<u>Northern Nevada</u>	<u>A winter storm and atmospheric river brought exceptional snowfall and a period of blizzard conditions to mountains around Lake Tahoe, as well as a period of snowfall in the lower elevations of western Nevada. Sustained winds were as high as 63 mph at the Walker Lake NDOT sensor. Gusts reached 105 mph. Smith Valley and Yerington has automated sensors with gusts between 58 and 63 mph. The winds caused at least two semi-trucks to blow over on Highway 95 near Walker Lake. Nevada route 341 (Mount Rose Highway) was closed for blizzard conditions into the morning of the 11th. Virginia City received a total of 26 inches of snowfall. Between 6 and 9 feet of snow fell between the 9th and 12th in the higher elevation of the northern Carson Range, including the Mount Rose and Diamond Peak ski areas. Farther south, Daggett Pass reported 45 inches of snowfall. Near lake level on the east side of Lake</u>

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Table 3-29. Severe Winter Storms in Nevada

Date	Location	Deaths, Injuries, Damages
		<p><u>Tahoe, snowfall amounts ranged from 20 to 32 inches. Numerous power outages were noted and Incline Village declared a snow emergency with roads not expected to be cleared for at least a couple days.</u> This same series of storms also lead to extensive flooding and heavy rainfall around the Reno, Sparks, Carson City, and Minden areas, which is addressed in more detail in the Flood Section.</p>
<p><u>February 6-10, 2017</u></p>	<p><u>Northern Nevada</u></p>	<p><u>Two rounds of precipitation associated with an atmospheric river brought widespread rainfall totals of 1 to 2 inches in far western Nevada, with much higher rainfall and/or liquid equivalent amounts between 3 and 6.5 inches in the foothills and Carson Range west of Interstate 580 and Highway 395. The higher elevations of the Carson Range received up to several feet of snowfall. Widespread gusts between 60 and 70 mph were recorded in the valleys on the 9th, with gusts 70 to as high as 92 mph (Browns Creek Bridge on I-580) in the foothills. Numerous downed trees and power lines were noted, with as many as 7,000 to 8,000 customers without power early in the afternoon, mostly in Douglas County. A big rig was blown over on Highway 395 near Stead. Finally, at least 7 flights into the Reno-Tahoe International airport were delayed or cancelled due to the winds. This atmospheric river also resulted in renewed flooding across much of northern Nevada, addressed in more detail in the Flood Section.</u></p>
<p><u>March 30, 2017</u></p>	<p><u>Las Vegas Area</u></p>	<p><u>An unusually powerful low-pressure system and cold front brought high west to southwest winds ahead of it and high north winds behind it as it tracked through the southern Great Basin and the Mojave Desert. Red Rock Canyon gusted to 82 MPH. Gusts 60-70 MPH in the Las Vegas valley resulted in widespread damage to trees, power poles and lines, street lights, and billboards. Some of the trees and poles damaged homes and cars. There were also numerous power outages.</u></p>
<p><u>January 19, 2018</u></p>	<p><u>Lake Tahoe</u></p>	<p><u>Narrow lake effect snow bands produced heavy snowfall and travel impact east and south of Lake Tahoe. 4-12 inches of snowfall was recorded in areas such as Dagget Pass and Heavenly Ski Resort. Lake effect snow, while infrequent, can bring localized high impact snowfalls near Lake Tahoe, Pyramid Lake, and even Walker Lake in Nevada.</u></p>
<p><u>March 1-4, 2018</u></p>	<p><u>Northeastern Nevada</u></p>	<p><u>Heavy and strong winds occurred across southern Lander and Eureka Counties. Snow amounts ranged from 7 inches in Austin to 14-18 inches around Eureka.</u></p>

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Table 3-29. Severe Winter Storms in Nevada

Date	Location	Deaths, Injuries, Damages
		<u>The mountains received 8-11 inches, higher amounts were likely in the higher peaks. Heavy snow was reported over much of the area. Spring Creek and Lamoille reported between 10 and 20 inches, and 6 to 8 inches were reported in Elko and Carlin. Wind gusts to 64 MPH were reported in Humboldt County.</u>
<u>March 15-17, 2018</u>	<u>Northern Nevada</u>	<u>A slow moving a cold early spring storm brought widespread snowfall to lower elevation cities in Northern and Central Nevada. NWS Reno Official Observation measured 14.2 inches of storm total snowfall. Snowfall of 6-12 inches was fairly common across the Sierra Front from Reno to Carson City to Minden. Significant localized snow amounts ranged from 11 inches around Winnemucca to 16 inches near Golconda Summit. This was a historic snow event for Winnemucca, breaking snowfall records. In southern Nevada, 7 inches of snow was measured in Pioche.</u>
<u>February 2-3, 2019</u>	<u>Northeastern Nevada</u>	<u>A winter storm brought several days of accumulations to northern Nevada with heavy accumulations seen in the mountainous regions. 8 inches of snow fell at Eureka with 9 inches in Spring Creek near Elko.</u>
<u>March 12, 2019</u>	<u>Near Elko</u>	<u>A strong downslope wind event developed east of the Ruby Mountains. Wind gusts over 90 MPH were observed by the Ruby Valley RAWS fire weather station.</u>
<u>January 24-27, 2021</u>	<u>Most of Nevada</u>	<u>An unusually cold atmospheric river brought plentiful snowfall to much of the state over a multi-day period. Widespread travel impacts occurred, though this storm was extremely beneficial as it ended up being the only large storm of the entire winter season, staving off even worse drought impacts. 2-12" of snowfall in Reno and Carson City with 1 to 2 feet in Gardnerville and Yerington. 2 to 4 feet of snow for the Nevada side of Lake Tahoe. Truckee Meadows Community College, Washoe County, and Carson City school districts were closed the 27th. COVID-19 vaccine clinics were closed in Virginia City. There were also power outages reported across Reno and Carson City. Up to 16 inches of snow fell in mountainous areas of Humboldt County and in Great Basin National Park in White Pine County. In southern Nevada the storm was cold enough for one to three inches of snow around the periphery of the Las Vegas Valley, 4 inches in Pahrump, with up to 20 inches on Mt Charleston.</u>
<u>October 24-25, 2021</u>	<u>Near Reno, Carson City</u>	<u>An unusually powerful atmospheric river for so early in the winter storm season brought copious amounts of</u>

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Date	Location	Deaths, Injuries, Damages
		<u>rainfall to Western & Northern Nevada. 2.92” of rain fell at the Reno Airport which ranks as the largest two-day precipitation total on record. The 2.92”, nearly 40% of the typical annual average, was nearly the same as the 3.01” recorded during the entire previous water year. Rainfall amounts of 5-8” were recorded in foothill areas of Reno & Carson City. Little damaging flooding occurred as soils were extremely dry going into the storm.</u>

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Additionally, NOAA compiled the following data shown in Table 3-30 for the top 25 periods of excessive snow (15.0 inches or greater of total snowfall).

Commented [2]: I'm honestly not sure where this table came from or where the data is from location-wise. If it can't be updated by someone else, I could do something where I provide the top-10 single day snowfalls for Reno, Elko, and Las Vegas. Let me know.

Inclusive Dates	Total Snowfall / Daily Maximum Amt. (Date)
Jan. 10–14, 1911	37.9/19.7 (Jan. 12)
Dec. 1–5, 1919	33.6/11.5 (Dec. 3)
Jan. 31–Feb. 6, 1901	28.4/10.1 (Feb. 5)
Feb. 9–11, 1922	27.4/12.6 (Feb. 10)
Jan. 17–18, 1916	25.5/22.5 (Jan. 17)
Dec. 29, 2004–Jan. 1, 2005	22.2/16.4 (Dec. 30)
Feb. 16–21, 1897	22.1/10.0 (Feb. 16)
Feb. 10–12, 1959	21.9/13.2 (Feb. 10)
Feb. 16–18, 1990	21.1/18.0 (Feb. 16)
Dec. 23–29, 1941	20.0/6.5 (Dec. 27)
Jan. 15–20, 1933	19.1/10.5 (Jan. 19)
Jan. 15–16, 1913	19.0/ 10.0 (Jan. 16)
Jan. 24–27, 1956	17.8/11.0 (Jan. 25)
Feb. 23–26, 1969	17.3/8.0 (Feb. 24)
March 14–15, 1952	17.1/13.6 (March 14)
Jan. 28–30, 1937	17.0/10.1 (Jan. 30)
Jan. 22–25, 1923	16.5/9.2 (Jan. 24)
Jan. 7–8, 2005	16.4/10.5 (Jan. 8)
Nov. 8–12, 1985	16.3/15.2 (Nov. 10)
Jan. 3–Feb. 4, 1938	15.6/8.6 (Feb. 3)
March 1–3, 1902	15.5/14.4 (March 1)
Feb. 4–9, 1976	15.1/5.1 (Feb. 4)

The State Climatologist prepared a report on extreme snowfall averages in each county based on historical records. These data are available in Appendix K. A summary of the data is presented in a table showing the average number of days per year with extreme snowfall for representative sites in each county. Extreme snowfall is defined as that above the 15th percentile for that county. These data will assist each county in its preparedness and response planning for extreme snowfall events.

3.3.15.3 Location, Severity, and Probability of Future Events

Severe storms are considered to be “Medium/Significant Risk” hazards. They occur frequently and can cause significant damage to structures that have not been built to meet current building codes. Because the transportation infrastructure within the state is rather robust, weather-related events do not generally have much long-lasting effect on the transportation network. Severe weather events may cause temporary closures, but generally do not cause damage. The exception is severe flooding, that can be caused when storms bring large amounts of rain or warm rain on top of already heavy snow packs. These floods can cause significant damage to roads, railways and airports.

Power infrastructure is at risk of high wind events, however to this point widespread prolonged outages have not been observed. Outages during high wind events have been localized to city or county levels.

Because winter snow, rain, and wind storms occur each year in northern and central Nevada, most local and state jurisdictions are able to manage these types of events. Only when the storms are severe and repeated is there a possibility of these hazards causing damage and prolonged disruption. In southern Nevada while the region is accustomed to strong wind storms, it is less used to heavy snow events. These snows can cause widespread disruptions as a result. More research is necessary to determine and prioritize actions that will mitigate these hazards. The Subcommittee will assist in the development of strategies to mitigate this hazard as new data become available.

3.3.16.4 Impacts from Climate Change

Climate Change

There are some aspects to Nevada severe storms for which we have better confidence in anticipating the impacts of climate change, while for many other aspects much is unknown.

Recent observations and simulations suggest a continued rise in the rain-snow elevation. This will result in a larger portion of winter precipitation falling as rain instead of snow. This scenario could lessen the frequency of lower elevation heavy snow events but increase the risk of winter floods. This scenario also means less snowpack from which to rely on for summer water supply.

Simulations are mixed in terms of winter precipitation in the coming decades, with some showing a decreasing trend for the Sierra and Great Basin and others showing an increasing trend. Most projections show more of the precipitation coming in fewer, but larger atmospheric river type storms. This scenario would increase the risk of severe weather impacts – heavy snow and floods. There is, however, no reliable data on whether or not Nevada wind storms will increase or decrease in frequency and intensity in the coming decades due to climate change.

New requirement from FEMA: need to assess quantitatively how climate change will affect certain hazards in Nevada. By having more specific projections, it allows the State of Nevada to be better prepared to mitigate for risk tomorrow, rather than today (From FEMA’s review of our 2018 HMP).

Commented [3]: Do we want to address off-season wildfires that occur as a result of powerlines being blown down (e.g. 2011 Caughlin Ranch and 2020 Pinehaven fires)?

Commented [RM4]: From 2018 update. Please see note below from FEMA on additional requirements for this new sub-section.

Commented [5]: I’m comfortable with the above statements, however I do not have any quantifiable info on climate change impacts to severe winter weather hazards.

Extreme Heat

Nature

Extreme heat refers to high day and/or nighttime temperatures, usually during the summer, that endanger human and animal health and can damage infrastructure or cause other disruptions. Summer average and annual high temperatures tend to be highest in southern and lower elevation portions of Nevada. Owing to the urban heat island effect, where buildings, pavements and human activity add to and trap heat in cities and large towns, extreme temperatures can also be higher in urban areas.

According to National Weather Service (NWS) statistics, heat is a particularly dangerous kind of extreme weather. In 2020 alone, NWS reported 143 deaths due to extreme heat. This is more than twice as many people as were killed by tornados or flooding (Fig. X.1). While we often think about dangers associated with extremely high daytime temperatures, nighttime temperatures can also have significant health effects. Heatwaves impact some individuals more than others. Children, older adults, people with certain medical conditions, and pregnant people are, on average, more physically vulnerable to the effects of high temperatures. People who work outdoors, take public transportation or use transportation without cooling, and who do not have access to indoor cooling at home have greater heat exposure. Access to functional home cooling and the resources to run it can reduce exposure to heat.

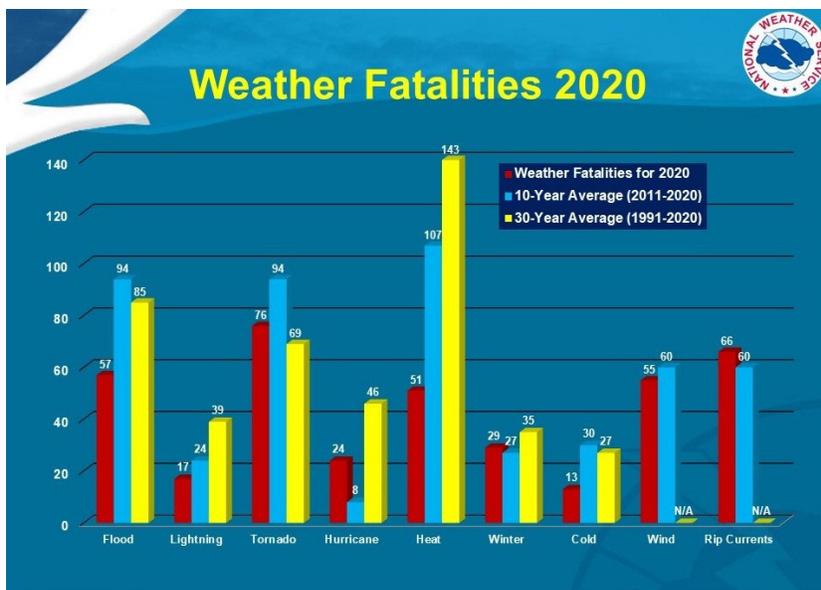


Fig X.1. Weather fatalities in the United States during 2020 and averaged over the previous 10 and 30 years. Source: <https://www.weather.gov/hazstat/>

High temperatures also reduce the reliability of transportation and electrical infrastructure. During heat waves, demand for electricity increases for cooling, but power generation and distribution systems are less efficient. Particularly high temperatures can also disrupt air travel, as the Las Vegas Review Journal reported during a heat wave in July 2021.

Although using a temperature threshold for extreme heat is not always appropriate, because temperatures that would be notably warm in Elko might be routine in Las Vegas, it is also convenient to do so. The recent state climate assessment defined extremely warm days and nights as days when the high temperature

exceeds 95°F and nights when the temperature remains above 65°F. Those definitions are used here. In other parts of the country, a heat index that combines the effects of heat and humidity is often used. Higher humidity levels increase the risk associated with heat. Much of Nevada is dry enough that humidity effects are not a significant concern.

History

July average (1981-2010) high temperatures in southern Nevada are above 100 °F (Table X.1). In northern Nevada, average July high temperatures are in the 80’s or 90’s, with cooler temperatures in the mountains. Daily high temperatures at the McCarran Airport in Las Vegas regularly exceed 110 °F in June, July and August. The highest temperatures ever reported in Reno and Elko, in contrast, are below 110 °F. Average July low temperatures in southern Nevada are above 65°F. Nighttime low temperatures are coolest in northeastern and far northwestern Nevada – averaging in the 40s or 50s during July. July nighttime lows average in the 50s or 60s in central Nevada. In Las Vegas, nighttime low temperatures in the 80s or even 90s happen every June, July and August. The highest ever nighttime lows reported at the Reno and Elko airports are 77° and 73°F, respectively.

The number of county-average (1981-2010) hot days per year varies between 1.7 in White Pine County and 74.8 in Clark County. Nights when the temperature remains above 65 °F are rare in most Nevada counties. On average, there are two or fewer extremely warm nights in nine of the state’s 17 counties. In contrast, Clark County averages 90.8 days per year when the nighttime temperature was more than 65°F (Table X.1). There are differences within each county, as well. Cooler portions of the counties will experience fewer extreme warm days and nights and warmer areas more.

Most of the notable heat events reported since 2015 have occurred in southern Nevada (Table X.2). Notable or impactful heatwaves from identified from the NOAA Storm Events Database; a description of the July 2021 heat event in northern Nevada was also described.

Table X.1. Average (1981 – 2010) number of days when the county-average daytime temperature was over 95° F (a hot day) and when the nighttime temperature remained above 65°F (a hot night). Based on PRISM data and summarized by SC-ACIS

County	Number of days maximum temperature > 95°F	Number of days minimum temperature > 65°F
Carson City	2.7	0.2
Churchill	20.3	2.7
Clark	74.8	90.8
Douglas	4.6	0.0
Elko	2.6	0.6
Esmeralda	15.5	4.6
Eureka	4.0	0.2
Humboldt	11.4	2.4
Lander	7.1	1.0
Lincoln	22.5	23.3
Lyon	13.5	1.9
Mineral	10.9	1.5
Nye	16.7	9.2
Pershing	16.1	2.8

Storey	5.1	2.9
Washoe	5.8	1.7
White Pine	1.7	0.1

Table X.2. Notable heat waves in Nevada since 2015. Information about each of the heat waves was retrieved from the National Centers for Environmental Information Storm Events Database and SC-ACIS

Date and Location of Event Average maximum temperatures at impacted stations	Narrative and Impacts
Las Vegas Valley June 19 – 30, 2015 McCarran International Airport: 110.3 °F Valley of Fire State Park: 110.3 °F Laughlin: 113.4 °F Bunkerville: 113.5 °F	From June 12 through 30, Las Vegas was hot enough to trigger Excessive Heat Warnings on five days. The heat wave caused at least one death, and a number of fatalities in July may also have been caused by the heat wave. Many emergency medical service calls and hospital visits due to the heat were also reported.
Las Vegas Valley and Lake Mead July 22 – 29, 2016 Bunkerville: 117.3 °F McCarran International Airport: 112.8 °F Overton: 115.3 °F Searchlight: 103.4 °F	Very high temperatures in the Las Vegas and Lake Mead area during late July of 2016. Nearly 30 deaths, mostly indoors, were attributed to the heat wave.
Las Vegas Valley July 6 – 10, 2018 McCarran International Airport: 107.3 °F Valley of Fire State Park: 109.2 °F Laughlin: 112.8 °F Red Rock Recreational Area: 99.7 °F.	Between July 6 th and 10 th , the Las Vegas area experienced excessive heat leading to nine fatalities.
Las Vegas Valley, Lake Mead and Mojave, and Spring Mountains June 11 – 14, 2019 Alan Bible Visitor Center: 104.2 °F Kyle Canyon: 77.5 °F McCarran International Airport: 102.3 °F Mt. Charleston Fire Station: 74.3 °F Overton: 106.2 °F	Excessive heat in the region peaked in the middle of this period. In addition to temperatures over 100°F in urban areas, temperatures hit 80°F at the Mt. Charleston Fire Station (elevation 7,460') almost 7°F above normal for the time of year.

<p>Esmeralda, Nye, Lincoln, Clark Counties August 14 – 20, 2020</p> <p>Desert National Wildlife Refuge: 108.0 °F Laughlin: 117.3 °F Mercury: 108.3 °F Overton: 114.6 °F Silver Peak: 100.7 °F</p>	<p>In mid-August 2020, a high pressure aloft over much of the US Southwest and Four Corners region allowed high temperatures to reach over 110°F at many locations in southern Nevada.</p>
<p>Greater Reno-Carson City Area July 9 – 12, 2021</p> <p>Carson City: 102.2 °F Fallon: 103.3 °F Incline Village: 85.3 °F Mt. Rose Ski Area: 77.5 °F Reno Airport: 103.3 °F Virginia City: 93.2 °F</p>	<p>Several maximum temperature records were broken as part of a weekend heat wave that hit the Northern portions of Nevada. Reno reached 104 °F on July 9, breaking a record set in 2007. Excessive heat warnings were issued across Washoe, Mineral, and parts of Lyon County. This was part of a larger pattern where Reno recorded temperatures over 100°F for 12 days in a row.</p>

Location, Severity, and Probability of Future Events

Weather forecasts are fairly accurate in predicting temperature over the next 7-10 days and are effective tools for identifying extreme heat risk. Seasonal outlooks can be reasonably skillful in forecasting whether average temperatures will be below, near, or above average over the summer. Because those forecasts provide information about three-month average temperatures, they are not always useful in understanding whether periods of extreme heat are likely.

Climate change is expected to increase the number and severity of extreme heat events. The state climate assessment projects that in the relatively near future – the middle of this century – northern Nevada will experience, on average, 7 – 35 more extremely hot days. In southern Nevada, there may be an additional month or more when daytime maximum temperatures exceed 95°F. In the near-term, the number of warm nights is also expected to increase, with larger increases in the southern part of the state (Figure X.2). By the end of this century, southern Nevada is projected to experience extremely hot days for an addition month or so of the year, under a low-emissions scenario. Under higher emissions scenarios, there could be nearly 80 additional days when the temperature exceeds 95°F (Figure X.3).

Mitigation Actions

Strategies for responding to extreme heat typically involve mitigation or management, where mitigation refers to moderating temperatures and management refers to reducing the negative impacts of heat.

Numerous strategies have been suggested for reducing the warming associated with urban development. These include:

- Expanding the urban tree canopy and the amount of urban green space.
- Using green, cool and/or reflective building and paving materials.
- Reducing waste heat – for example with community design that reduces reliance on cars.

These kinds of strategies can be effective, but they may also have costs or unexpected consequences. For example, in desert cities like Las Vegas and Reno, it would be important to evaluate the costs and benefits of using water to maintain outdoor vegetation.

When and where reducing ambient temperatures is not possible or sufficient, approaches to reducing exposure or offsetting impacts can be used. These include:

- Shifting outdoor work and recreation to cooler times of day.
- Ensuring access to shade and drinking water for those who have to be outdoors (i.e., people who work outdoors, people who use public transportation, bike, walk, etc.).
- Cooling centers for people who do not have shelter or whose homes lack adequate cooling.
- Ensuring adequate cooling on public transportation and in public buildings, such as schools.
- Providing subsidies or other programs to help people offset the costs of home cooling and/or weatherization.
- Ensuring grid reliability to avoid power outages during extreme heat.

Some of these strategies (cooling centers, cooling on public transit) may be more appropriate for cities than for small towns or rural areas. Agricultural areas may also need to consider heat mitigation for livestock. These include many of the same strategies used for people: shade, fans, sprinkler systems, and avoiding activities that are taxing or stressful for the animals when temperatures are high.

Better education and messaging around heat and its impacts has also been used. This approach includes:

- Educating the public or parts of the public about the health impacts of heat, warning signs of heat-related illness, and what to do in the event of heat-related illness.
- Providing information about low-cost home and vehicle cooling techniques as well as community resources.
- Heat forecasts that include information about what to do to prepare.
- Encouraging people to check on high-risk neighbors.

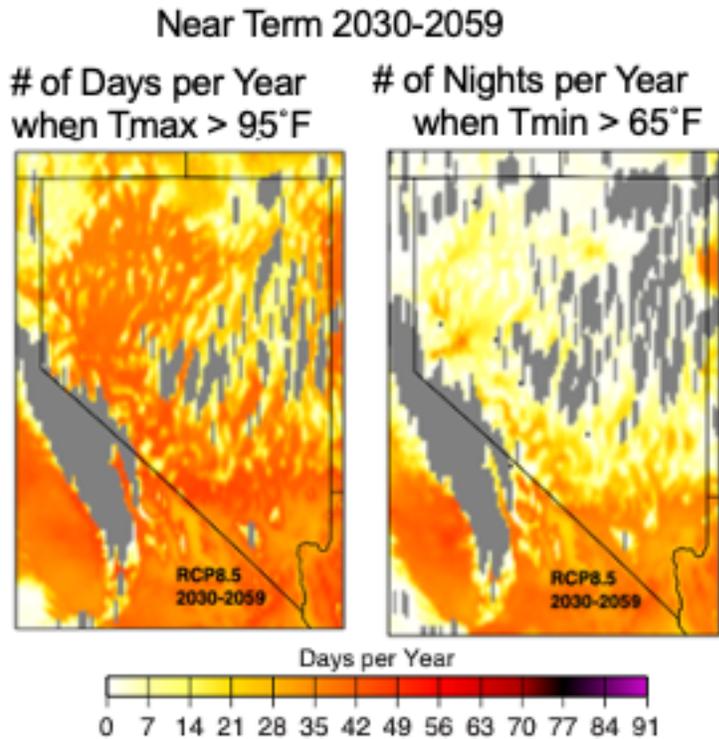


Figure X.2. Near-term increase in number of days per year in the when daytime high temperatures will exceed 95°F (left) and when nighttime temperatures will remain above 65°F. Both use the RCP8.5 emissions scenario. This is higher emissions scenario in the long-term, similar to the RCP4.5 scenario in the near-term. Source: Nevada Climate Strategy. Climate Change in Nevada. <https://climateaction.nv.gov/policies/climate-nv/>

Long Term: Days per year >95°F

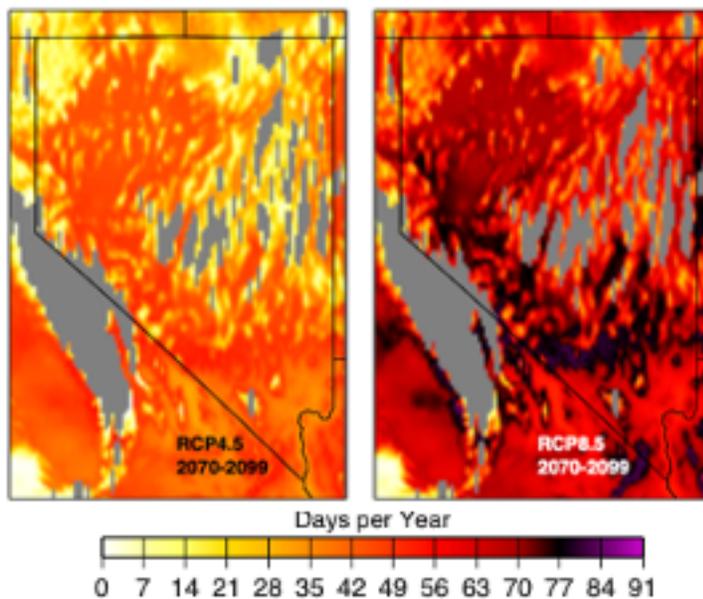


Figure X.3. Long-term increase in number of days per year in the when daytime high temperatures will exceed 95°F under a low emissions scenario (RCP4.5, left) and a high emissions scenario (RCP8.5, right). Source: Nevada Climate Strategy. Climate Change in Nevada. <https://climateaction.nv.gov/policies/climate-nv/>

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Drought

Nature

Nevada is a generally dry state, with the lowest statewide-average precipitation in the U.S. In much of Nevada, the majority of precipitation falls between autumn and spring. In the northern part of the state less than 20% of the annual precipitation falls during the summer (June – August). Southern Nevada receives slightly more summer precipitation, up to 30% of the expected yearly total. However, Nevada is not continuously in drought or in drought every summer. Drought occurs when it is drier than normal for the location and time of year. The American Meteorological Society defines drought as unusually dry weather that causes negative impacts. Different regions, sectors and individuals within a region can be differently impacted by the same drought.

Typically, lack of precipitation is the primary driver of drought, but higher than normal temperatures can cause or worsen drought. With warmer temperatures, the atmosphere's demand for moisture increases, so evapotranspiration is higher. With higher evapotranspiration, plants and soils dry more rapidly, and water levels in streams, lakes and reservoirs drop more than would be expected given the precipitation shortfall. Drought can also change patterns of water use, increasing the need for agricultural irrigation and residential watering. When winter temperatures are higher, precipitation is more likely to fall as rain instead of snow, and the snowpack can melt earlier. In Nevada, as in much of the West, the winter snowpack is an important reservoir within the water resource system. For example, Figure X.1 shows that in the later winter and spring, there is more water stored in the Lake Tahoe Basin snowpack than there is in the reservoir portion of the lake (i.e. water levels above the natural rim). As a result, receiving less snow than usual can strain water resources and ecosystems, even if the overall amount of precipitation is normal. This is referred to as snow drought.

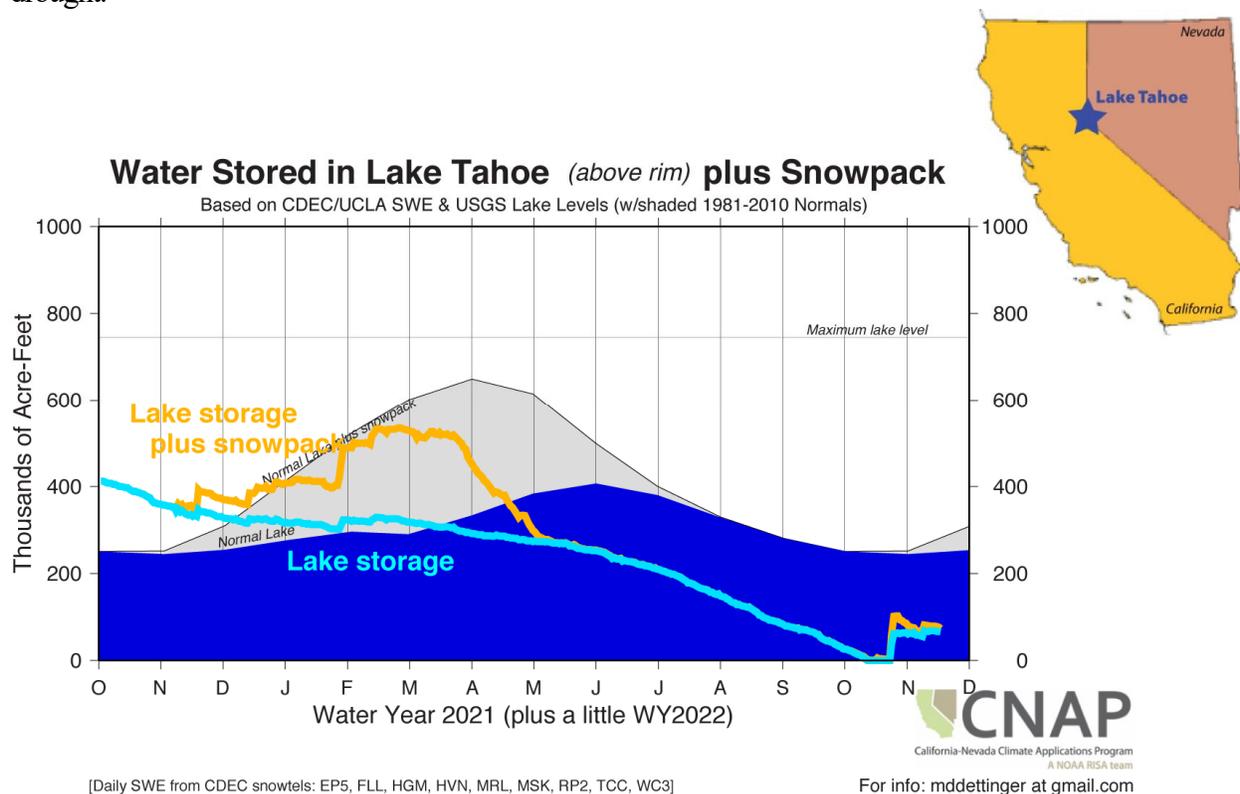


Figure X.1. Snowpack and reservoir storage in the Lake Tahoe Basin. Average reservoir and lake storage between 1981 and 2010 are shown with blue and gray shading, respectively. The light blue and orange lines show water storage in the lake and in the lake and snow from October 2020 through November 2021. Figure from CNAP. Source: https://cnap.ucsd.edu/storage_in_sierra_ucrb/

Drought can be tracked in a variety of ways. Currently the U.S. Drought Monitor is the most commonly used tool. It is a joint effort from the U.S. Department of Agriculture, the National Oceanic and Atmospheric Administration and the National Drought Mitigation Center, located at the University of Nebraska-Lincoln. The U.S. Drought Monitor provides information about drought status as a weekly map and narrative. It has been used to track drought since 2000. To compile the map, authors assess many lines of evidence including information about precipitation, temperature, reservoir storage, soil moisture and crop and vegetation conditions. There are four levels of drought, increasing in severity from D1 – Moderate Drought through D2 – Severe Drought, D3 – Extreme Drought and D4 – Exceptional Drought. In addition, the Drought Monitor also uses the D0 – Abnormally Dry category to highlight areas that are unusually dry for the area or time of year but not yet dry enough to be in drought (Figure X.2). Since 2012, the U.S. Drought Monitor has been used to designate drought disasters through the Fast Track process. When a drought disaster is declared in a county, farmers and ranchers have access to a range of federal disaster relief programs (<https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/disaster-designation-information/index>).

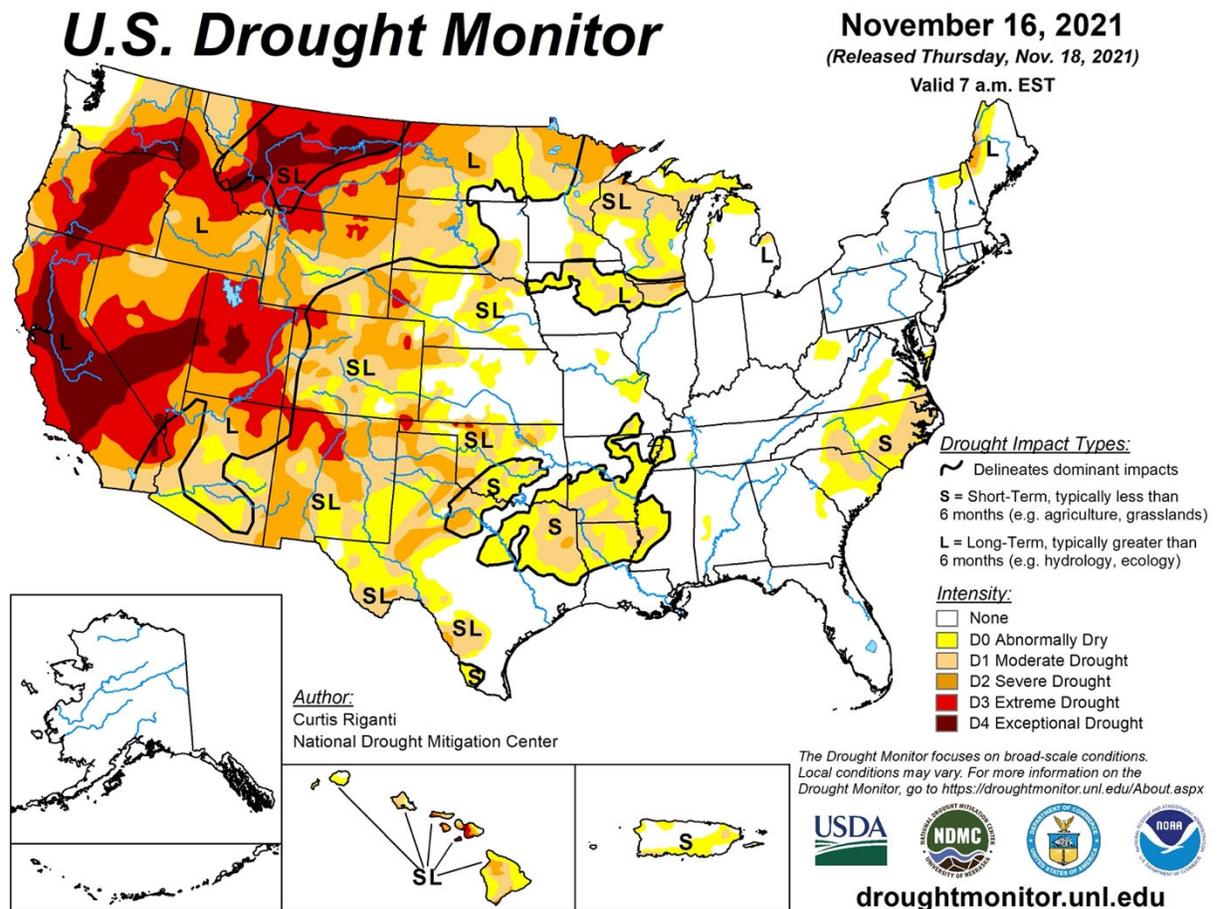


Figure X.2. US Drought Monitor map showing conditions as of November 16, 2021. Current and archived maps are available from <https://droughtmonitor.unl.edu/>

History

Drought is a reasonably common occurrence in Nevada. It negatively impacts farming and ranching, recreation, wildlife and ecosystems, and can stress water supplies, although water providers in the state plan for drought.

Drought occurrence in the state from 1895 through 2020 is tracked based on the Palmer Drought Severity Index (PDSI) from the National Centers for Environmental Information (NCEI) Climate at a Glance. The PDSI estimates drought severity on the basis of precipitation and temperature. The PDSI provides a longer record than the U.S. Drought Monitor, although it is a less comprehensive tool. The U.S. Drought Monitor considers a PDSI value of -3 or less indicative of D2-Severe Drought. Figure X.3 shows the number of months per calendar year when each climate division in the state experienced drought conditions equivalent to D2-Severe Drought or worse.

Most of the state experienced drought between the late 1920s and mid 1930s as part of the Dust Bowl and during the 1950s drought. Southern Nevada experienced a brief drought in the early 1970s, while northern Nevada experienced a drought in the mid-1970s. Drought occurred again in the late 1980s and early 1990s. Since the late 1990s, Nevada has experienced more persistent droughts than previously, with D2-Severe Drought present for six months or more in at least one climate division in 2001 – 2004, 2007 – 2009, 2012-2015, and 2020. The most recent drought, which began early in the 2020 water year and worsened rapidly during the summer of 2020 has impacted the entire state but been most severe in southern Nevada. The 2012-2015 drought impacted the entire state at times but was most focused in northern Nevada.

Location, Severity, and Probability of Future Events

Projections for increasing temperature, irrespective of any changes in precipitation will increase the chance for drought in Nevada over the coming decades because of increased evaporative demand and a shift from rain to snow. By the end of this century (2070-2099), average temperatures in Nevada are expected to increase 4-6 °F if greenhouse gas emissions are low and could increase 8-12 °F if emissions are high. The increase in temperature will contribute to increases in evaporative demand of 5% to more than 20% relative to the 1971-2000 average. According to the State's 2020 climate assessment, average conditions late in the 21st century will be similar to what we currently consider D2-Extreme drought in much of the state and will be similar to current D3-Exceptional Drought in southern and eastern Nevada if emissions are high (Fig. X.4). With warming temperatures, the state is also likely to experience a shift in the balance between rain and snow, with more of the winter precipitation arriving as snow. The shift may be as large as 20-30% in northern and higher elevation parts of the state that currently receive snow. Although the changes in the ratio of snow to rain will be smaller in the warmer southern parts of the state, they will still be impacted by this change because of the importance of snowpack outside the state in sustaining water resources.

Precipitation projections are currently less certain with different climate models projecting different changes in the average amount of precipitation. In general, the average of projections shown in the State's climate assessment suggest drying and southern Nevada and the potential for slightly more precipitation in northern Nevada (Figure X.5). If precipitation does increase, it is not expected to offset the drying effects of higher temperatures (see Figure X.4). Changes in average temperature and/or precipitation will combine with the occurrence of periodic droughts related to precipitation shortfalls and/or periods of warmer than normal

temperature. In much of the state, the occurrence of dry and/or low-snow winters that can precipitate drought are not easy to forecast. Southern Nevada is often drier than normal during La Niña winters and wetter than normal during El Niño winters, providing some predictability about local conditions. Climate projections suggest that there is potential for greater year-to-year variability in precipitation (Swain et al. 2018). This may further complicate drought planning in the future.

The state has had a drought plan to provide a general framework for coordinating drought response in place since at least 1991. It was revised in 2003 and again in 2012. The current State of Nevada Drought Response Plan is available at <http://water.nv.gov/programs/planning/StateDroughtResponsePlan2012.pdf>. It is being revised as of 2022.

Impacts to Rural and Urban Nevada

In rural Nevada, communities and agriculture rely primarily on groundwater. Groundwater supplies are typically better buffered against drought impacts because of greater storage. A 2016 report on the drought-resilience of groundwater supplies in nine northern Nevada basins defined drought as half the normal groundwater recharge over 15 years, and the analysis was conducted using a widely used groundwater model (see attached report by Pohll et al.). It found that most municipal supplies were robust to drought, although individual domestic wells might experience drought impacts. Drought had the greatest impact on groundwater levels in the mountains. Drought impacts in valleys were much smaller. Overall, pumping was a bigger contributor to declines in groundwater than drought.

Urban areas in Nevada (the Las Vegas metropolitan area and the Reno-Sparks-Carson City region) rely heavily on surface water that falls as snow in the mountains and recharges reservoirs. The Colorado River is primary water supply for Clark County. Colorado River flows and storage in Lake Mead have both been dropping over the last two decades owing to periods drought and higher temperatures. As a result, the first shortage under the 2019 Lower Basin Drought Contingency Plan was declared in summer of 2021. This reduces Nevada's share of water from the Colorado by 7%. Dropping water levels in Lake Mead and other reservoirs can also threaten hydropower production. Although water providers in urban areas, in particular, have taken steps to safeguard the resilience of water systems, increasing temperatures and potentially less predictable precipitation increase potential drought impacts.

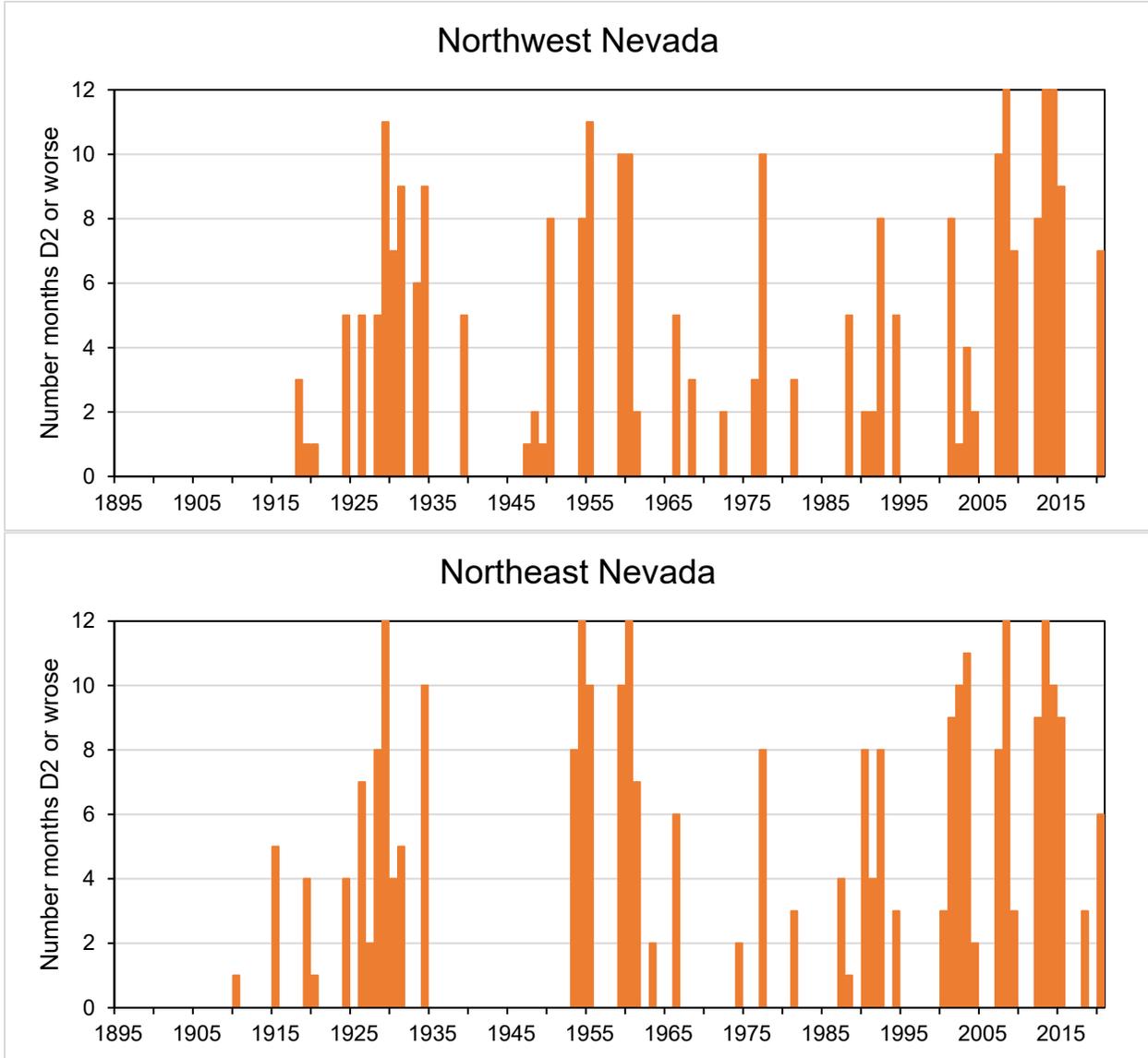
Mitigation

The 2015 Drought Forum convened by then-Governor Sandoval outlined a number of recommendations to better prepare for drought in Nevada. These recommendations included:

- Better and more extensive condition monitoring
- Directing water providers to develop water conservation plans that include strategies like water metering, tiered-rating, and outdoor watering guidelines that limit irrigation to cooler times of day.
- More efficient use of agricultural water
- Modification and amendment of state water law
- Identifying new water sources, including water reuse.
- Improving access to information about drought mitigation and response programs.

The federal government provides a number of drought response programs for agriculture through the US Department of Agriculture and Natural Resources Conservation Service (see attached FSA Disaster

Assistance Programs at a Glance). The US Army Corps of Engineers can also provide technical support during drought.



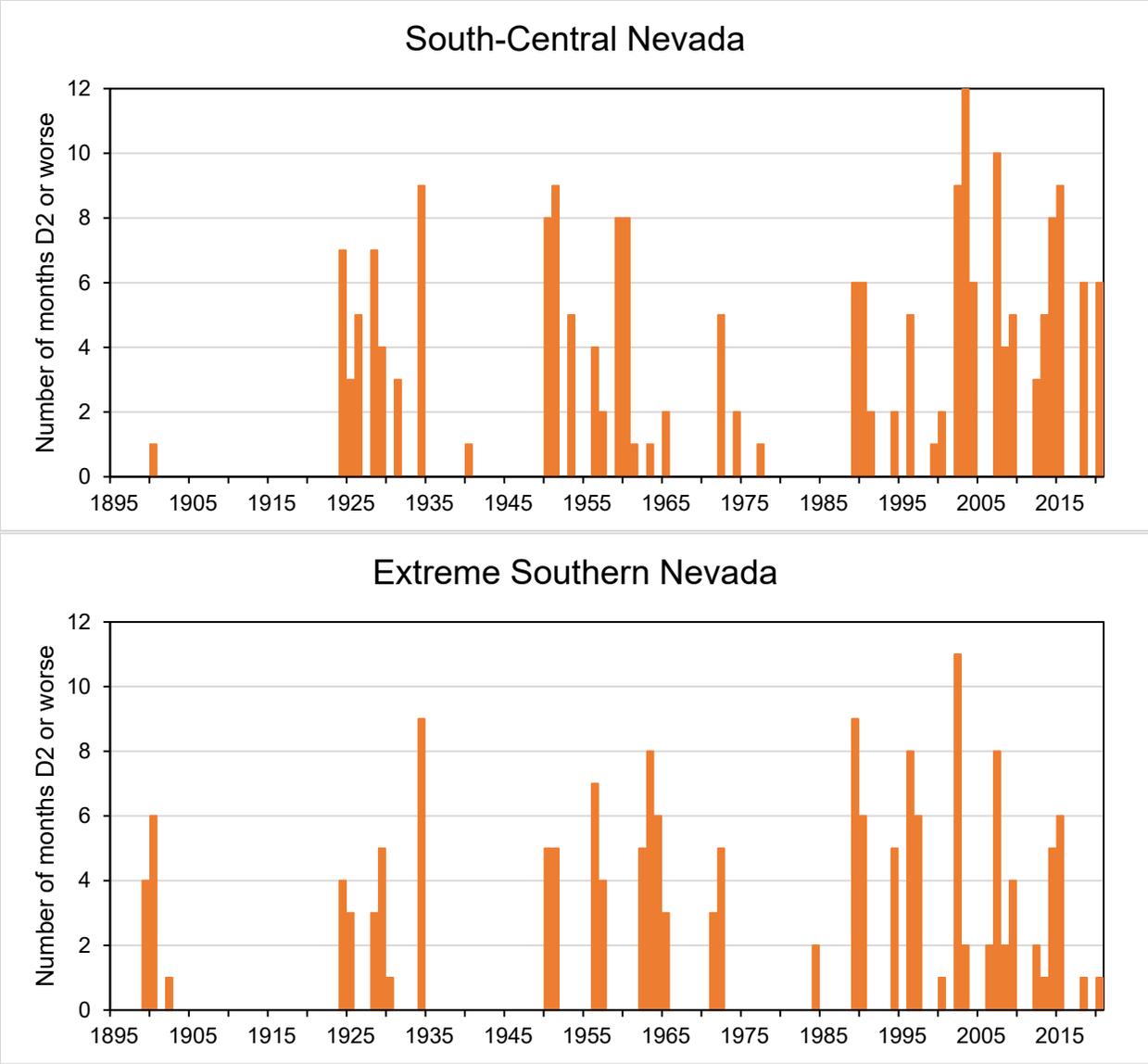


Figure X.3. Number of months per year when each climate division in Nevada experienced drought equivalent to the US Drought Monitor's D2 – Severe Drought or worse based on the Palmer Drought Severity Index (PDSI). According to US Drought Monitor guidance, PDSI < -3 indicates D2 or worse drought. Monthly PDSI from NOAA National Centers for Environmental information, Climate at a Glance (retrieved November 23, 2021). <https://www.ncdc.noaa.gov/cag/>

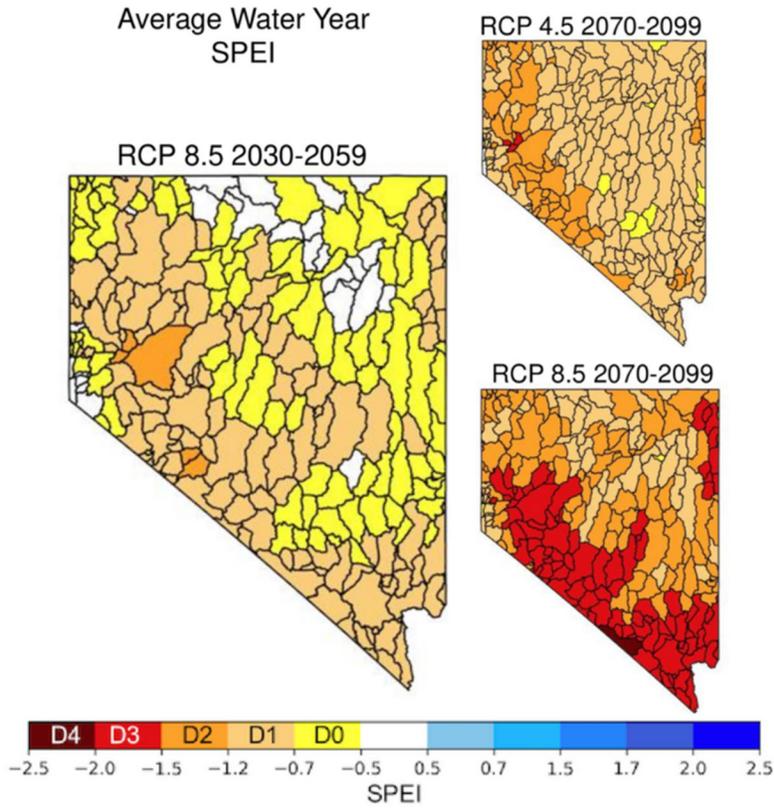


Fig. X.4. Drought conditions tracked by the Standardized Precipitation – Evaporation Index (SPEI), a drought index that, like the Palmer Drought Severity Index, tracks both precipitation and temperature effects on drought. Conditions are shown for the near-term (2030-2059, left) and the late 21st century under lower (RCP4.5, upper right) and higher (RCP8.5, lower right) emissions scenarios. Source: Nevada Climate Initiative <https://climateaction.nv.gov/policies/climate-nv>

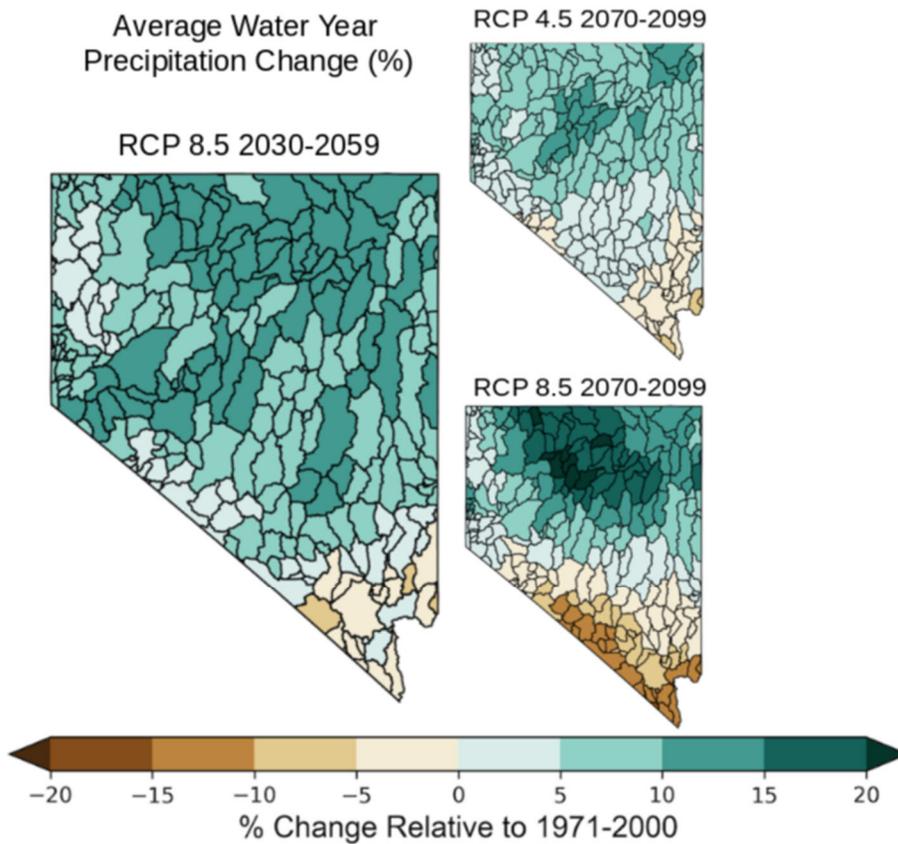


Fig. X.5. Average percent change in annual precipitation for the near-term (2030-2059, left) and the late 21st century under lower (RCP4.5, upper right) and higher (RCP8.5, lower right) emissions scenarios. Source: Nevada Climate Initiative <https://climateaction.nv.gov/policies/climate-nv>

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USDA Disaster Assistance Programs At a Glance

Disaster Programs	Agency	Blizzard	Fire	Hurricane/ Typhoon	Excessive Moisture/ Flood	Excessive Winds/ Tornado	Drought	Hail	Volcanic Eruption/ Emissions	Freeze	Earthquake
Noninsured Crop Disaster Assistance Program (NAP) - provides financial assistance to producers of non-insurable crops to protect against natural disasters that result in lower yields or crop losses, or prevents crop planting.	FSA	✳️ ⁸	✳️ ⁸	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️
Tree Assistance Program (TAP) - provides financial cost-share assistance to qualifying orchardists and nursery tree growers to re-plant or, where applicable, rehabilitate eligible trees, bushes, and vines lost by natural disasters. A qualifying mortality loss in excess of 15 percent (in excess of normal mortality) must be sustained to trigger assistance.	FSA	✳️ ⁸	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️

⁸ Yes, only as a related condition to an eligible disaster

Other natural disasters that may apply to some of these programs (not all perils are eligible loss conditions for all programs) include:

- Explosion;
- High water;
- Landslide;
- Mudslide;
- Severe snowstorm;
- Storm, including ice storms;
- Tidal wave;
- Wind-driven water;
- Insect infestation;
- Plant disease;
- Lightning; and
- Other natural phenomena.

Some man-made conditions qualify for disaster assistance, as follows:

Disaster Programs	Agency	Pesticide Contamination	Nuclear Radiation/ Fallout	Toxic Substances Other Than Pesticides	Chemical Residue Other Than Pesticides
Dairy Indemnity Payment Program (DIPP) - provides compensation to dairy producers when a public regulatory agency directs them to remove their raw milk from the commercial market because it has been contaminated by pesticides, nuclear radiation or fallout, or toxic substances and chemical residues other than pesticides.	FSA	✔️	✔️	✔️	✔️

FSA = Farm Service Agency | NRCS = Natural Resources Conservation Service | RMA = Risk Management Agency



More Information

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USDA Disaster Assistance Programs at a Glance



UNITED STATES DEPARTMENT OF AGRICULTURE

DISASTER ASSISTANCE PROGRAMS AT A GLANCE

FARM PRODUCTION AND CONSERVATION

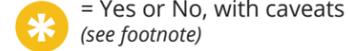
FARM SERVICE AGENCY (FSA) | NATURAL RESOURCES CONSERVATION SERVICE (NRCS) | RISK MANAGEMENT AGENCY (RMA)



DISASTER ASSISTANCE

USDA Disaster Assistance Programs At a Glance

Icon Key



Disaster Programs	Agency	Blizzard	Fire	Hurricane/Typhoon	Excessive Moisture/Flood	Excessive Winds/Tornado	Drought	Hail	Volcanic Eruption/Emissions	Freeze	Earth-quake
Crop Insurance – provides indemnity payments to growers who purchased crop insurance for production and quality losses related to drought and other weather hazards, including losses from an inability to plant caused by an insured cause of loss.	RMA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Conservation Reserve Program (CRP) Haying and Grazing – provides for emergency haying and grazing on certain CRP practices in a county designated as D2 or higher on the U.S. Drought Monitor, or in a county where there is at least a 40 percent loss in forage production.	FSA	* ¹	* ¹	* ¹	* ¹	* ¹	✓	* ¹	* ¹	* ¹	* ¹
Emergency Assistance for Livestock, Honeybees and Farm-Raised Fish Program (ELAP) – provides assistance to eligible owners of livestock, and producers of honeybees and farm-raised fish for losses due to disease (including cattle tick fever), adverse weather, or other conditions not covered by LFP and LIP.	FSA	✓	* ²	✓	✓	✓	* ³	* ⁴	✓	* ¹	✓
Emergency Conservation Program (ECP) – provides funding and technical assistance for farmers and ranchers to restore farmland damaged by natural disasters and for emergency water conservation measures in severe droughts.	FSA	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓
Emergency Forest Restoration Program (EFRP) – provides funding to restore privately owned forests damaged by natural disasters. Assistance helps landowners carry out emergency measures to restore forest health on land damaged by floods, hurricanes or other natural disasters.	FSA	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓
Farm Loans – provides Emergency and Operating loans to help producers recover from production and physical losses due to natural disasters or livestock quarantine and can pay for farm operating and family living expenses.	FSA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

¹ Yes, but only if determined eligible by FSA.

² Yes, except on federally managed land.

³ No, except for water and feed transportation.

⁴ Yes, but only for grazing losses.

FSA = Farm Service Agency
 NRCS = Natural Resources Conservation Service
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Disaster Programs	Agency	Blizzard	Fire	Hurricane/Typhoon	Excessive Moisture/Flood	Excessive Winds/Tornado	Drought	Hail	Volcanic Eruption/Emissions	Freeze	Earth-quake
Environmental Quality Incentives Program (EQIP) – provides agricultural producers with financial resources and one-on-one help to plan and implement improvements on the land including financial assistance to repair and prevent the excessive soil erosion caused or impacted by natural disasters. These practices include activities like stream bank restoration, grassed waterways and buffers. NRCS-funded conservation practices protect your land from erosion, support disaster recovery and repair and can help mitigate loss from future natural disasters. Assistance may also be available for emergency animal mortality disposal from natural disasters and other causes.	NRCS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Watershed Program (EWP-Recovery) – offers vital recovery options for local communities to help people reduce hazards to life and property caused by floodwaters, droughts, wildfires, earthquakes, windstorms, and other natural disasters. Project funds address erosion related watershed impairments by supporting activities such as removing debris from stream channels, road culverts, and bridges; reshaping and protecting eroded banks; correcting damaged drainage facilities; repairing levees and structures; and reseeding damaged areas. EWP Floodplain Easements – provide an alternative to Recovery efforts described above. NRCS has the authority to purchase floodplain easements (FPE) as an alternative measure to traditional Recovery where sites meet EWP-FPE eligibility criteria and it is determined that acquiring an easement in lieu of Recovery is the more economical and prudent approach to reducing the threat to life or property.	NRCS		✓		✓	✓	✓		✓		✓
Livestock Forage Disaster Program (LFP) – provides compensation to eligible livestock producers who have suffered grazing losses due to drought or fire on land that is native or improved pastureland with permanent vegetative cover or that is planted specifically for grazing.	FSA	✗	* ⁵	✗	✗	✗	✓	✗	✗	✗	✗
Livestock Indemnity Program (LIP) – provides benefits to livestock owners and some contract growers for livestock deaths in excess of normal mortality that are the direct result of an eligible adverse weather event. In addition, LIP covers attacks by animals reintroduced into the wild by the Federal Government or protected by Federal Law. Also, LIP provides assistance to livestock owners that must sell livestock at a reduced price because of an injury from an eligible loss condition.	FSA	✓	✓	✓	✓	✓	* ⁶	✓	✓	* ⁷	✓

⁵ Yes, but only on federally managed lands impacted by the fire for which the producer is prohibited from grazing the normally permitted livestock by the Federal agency

⁶ No, except when associated with anthrax

⁷ Yes, but only if deaths result from freeze incidental to a winter storm or extreme cold as determined by FSA.

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Tree Assistance Program (TAP) - provides financial cost-share assistance to qualifying orchardists and nursery tree growers to re-plant or, where applicable, rehabilitate eligible trees, bushes, and vines lost by natural disasters. A qualifying mortality loss in excess of 15 percent (in excess of normal mortality) must be sustained to trigger assistance.	FSA	✳️ ⁸	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️	✔️

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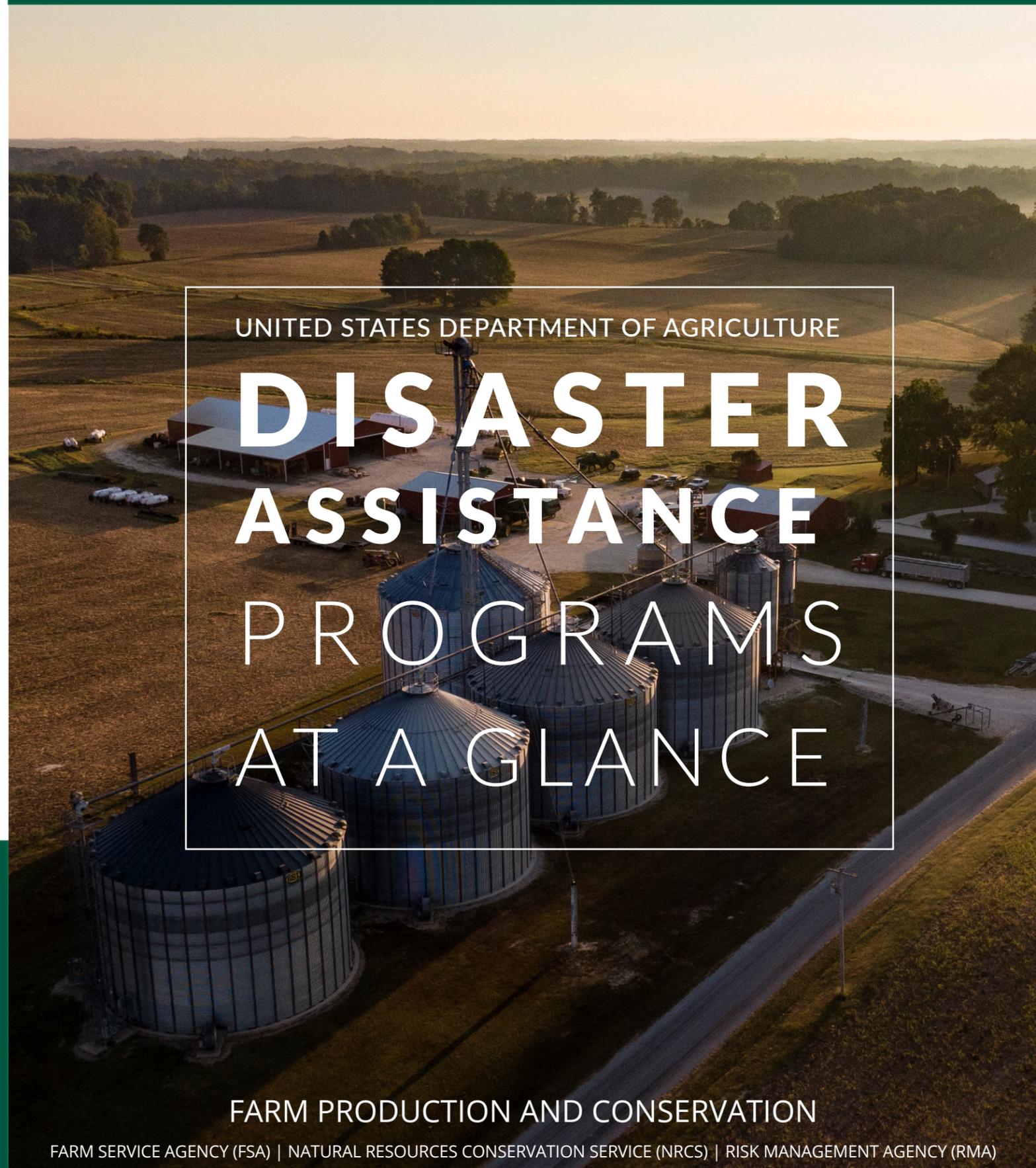
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USDA Disaster Assistance Programs at a Glance



UNITED STATES DEPARTMENT OF AGRICULTURE

DISASTER ASSISTANCE PROGRAMS AT A GLANCE

FARM PRODUCTION AND CONSERVATION

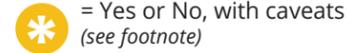
FARM SERVICE AGENCY (FSA) | NATURAL RESOURCES CONSERVATION SERVICE (NRCS) | RISK MANAGEMENT AGENCY (RMA)



DISASTER ASSISTANCE

USDA Disaster Assistance Programs At a Glance

Icon Key



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Crop Insurance – provides indemnity payments to growers who purchased crop insurance for production and quality losses related to drought and other weather hazards, including losses from an inability to plant caused by an insured cause of loss.	RMA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Conservation Reserve Program (CRP) Haying and Grazing – provides for emergency haying and grazing on certain CRP practices in a county designated as D2 or higher on the U.S. Drought Monitor, or in a county where there is at least a 40 percent loss in forage production.	FSA	* ¹	* ¹	* ¹	* ¹	* ¹	✓	* ¹	* ¹	* ¹	* ¹
Emergency Assistance for Livestock, Honeybees and Farm-Raised Fish Program (ELAP) – provides assistance to eligible owners of livestock, and producers of honeybees and farm-raised fish for losses due to disease (including cattle tick fever), adverse weather, or other conditions not covered by LFP and LIP.	FSA	✓	* ²	✓	✓	✓	* ³	* ⁴	✓	* ¹	✓
Emergency Conservation Program (ECP) – provides funding and technical assistance for farmers and ranchers to restore farmland damaged by natural disasters and for emergency water conservation measures in severe droughts.	FSA	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓
Emergency Forest Restoration Program (EFRP) – provides funding to restore privately owned forests damaged by natural disasters. Assistance helps landowners carry out emergency measures to restore forest health on land damaged by floods, hurricanes or other natural disasters.	FSA	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓
Farm Loans – provides Emergency and Operating loans to help producers recover from production and physical losses due to natural disasters or livestock quarantine and can pay for farm operating and family living expenses.	FSA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

¹ Yes, but only if determined eligible by FSA.

² Yes, except on federally managed land.

³ No, except for water and feed transportation.

⁴ Yes, but only for grazing losses.

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Disaster Programs	Agency	Blizzard	Fire	Hurricane/Typhoon	Excessive Moisture/Flood	Excessive Winds/Tornado	Drought	Hail	Volcanic Eruption/Emissions	Freeze	Earth-quake
Environmental Quality Incentives Program (EQIP) – provides agricultural producers with financial resources and one-on-one help to plan and implement improvements on the land including financial assistance to repair and prevent the excessive soil erosion caused or impacted by natural disasters. These practices include activities like stream bank restoration, grassed waterways and buffers. NRCS-funded conservation practices protect your land from erosion, support disaster recovery and repair and can help mitigate loss from future natural disasters. Assistance may also be available for emergency animal mortality disposal from natural disasters and other causes.	NRCS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Emergency Watershed Program (EWP-Recovery) – offers vital recovery options for local communities to help people reduce hazards to life and property caused by floodwaters, droughts, wildfires, earthquakes, windstorms, and other natural disasters. Project funds address erosion related watershed impairments by supporting activities such as removing debris from stream channels, road culverts, and bridges; reshaping and protecting eroded banks; correcting damaged drainage facilities; repairing levees and structures; and reseeding damaged areas. EWP Floodplain Easements – provide an alternative to Recovery efforts described above. NRCS has the authority to purchase floodplain easements (FPE) as an alternative measure to traditional Recovery where sites meet EWP-FPE eligibility criteria and it is determined that acquiring an easement in lieu of Recovery is the more economical and prudent approach to reducing the threat to life or property.	NRCS		✓		✓	✓	✓		✓		✓
Livestock Forage Disaster Program (LFP) – provides compensation to eligible livestock producers who have suffered grazing losses due to drought or fire on land that is native or improved pastureland with permanent vegetative cover or that is planted specifically for grazing.	FSA	✗	* ⁵	✗	✗	✗	✓	✗	✗	✗	✗
Livestock Indemnity Program (LIP) – provides benefits to livestock owners and some contract growers for livestock deaths in excess of normal mortality that are the direct result of an eligible adverse weather event. In addition, LIP covers attacks by animals reintroduced into the wild by the Federal Government or protected by Federal Law. Also, LIP provides assistance to livestock owners that must sell livestock at a reduced price because of an injury from an eligible loss condition.	FSA	✓	✓	✓	✓	✓	* ⁶	✓	✓	* ⁷	✓

⁵ Yes, but only on federally managed lands impacted by the fire for which the producer is prohibited from grazing the normally permitted livestock by the Federal agency

⁶ No, except when associated with anthrax

⁷ Yes, but only if deaths result from freeze incidental to a winter storm or extreme cold as determined by FSA.

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