

The Silver and Gold Spotter

**NATIONAL WEATHER SERVICE
RENO, NV**

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FIRST WINTER STORM THE AREA HAS SEEN IN NEARLY 2 MONTHS

After a dry spell that lasted nearly 2 months, the ridge of high pressure over the west has finally broken down, allowing the storm track into the region. A moderate atmospheric river combined with a low dropping out of the Gulf of Alaska, which was an excellent set up for a period of heavy rain and snow. The majority of the moisture fell while snow levels were still relatively high, therefore snow totals were not substantial despite copious amounts of liquid precipitation. In addition, efficient spillover allowed for decent amounts of rain and snow in western Nevada as well. This will most definitely help, though by no means alleviate, the drought conditions. A huge thanks to all of you for your reports with this system!

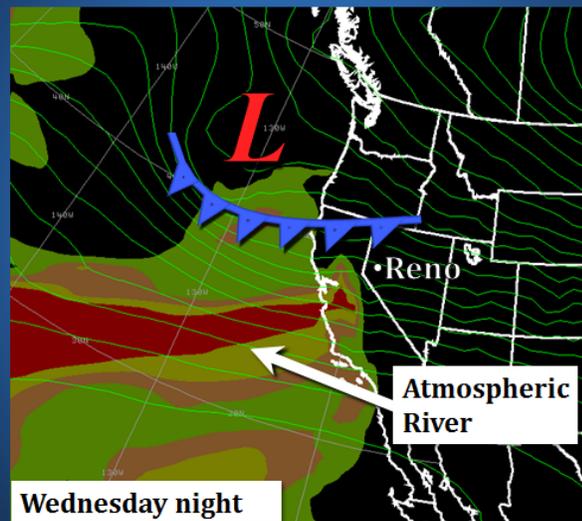
Storm Snow Summary:

- Sierra: 6-24 inches
- Western NV: Trace-12 inches

Storm Liquid Totals Summary:

- Sierra: 1-3 inches of liquid between rain and snowmelt
- Western NV: 0.3-1.5 inches between rain and snowmelt

Cold Front and Moisture



Remember, we are on Facebook, Twitter, and YouTube! All are excellent ways to get information in addition to our traditional website. Plus, you can always share photos and videos of interesting weather happening at your location which is a huge help to us !

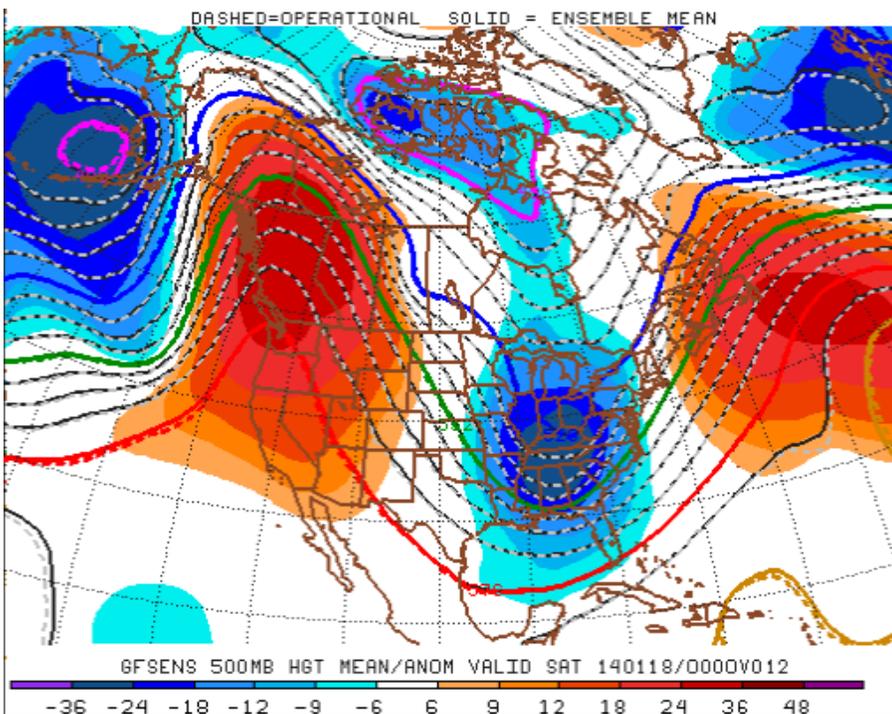
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EARLY WINTER 2013-2014...STARTED COLD, THEN CAME THE RIDGE

Early December started with quite the cold snap and a couple of winter systems that made the start of winter look promising, then came the very strong ridge which parked over the West Coast for nearly two months. This has contributed to a very dry air mass over the west, with many sites setting record dry December to January periods and/or having their driest calendar year (2013) on record. Why were we in this unchanging pattern? The atmosphere can go through these blocked patterns from time to time, but the duration of this event makes it stand out. To be candid, we are unsure of why this particular pattern didn't change, other than the global position of several large ridges and troughs held strong. The atmosphere has many variables,

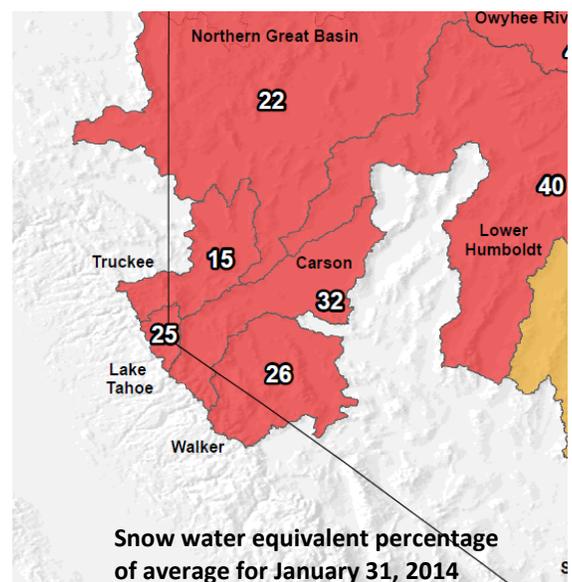
not all of which we fully understand. Luckily we were able to finally break-down the ridge this past week and get the region some much needed precipitation!



Left: High pressure anomaly, highlighted in orange and red, sitting over the west coast, with a trough (blue shading) over the eastern half of the country. Valid January 18, 2014.

WHAT DOES THE SYSTEM WE JUST HAD MEAN FOR THE DROUGHT?

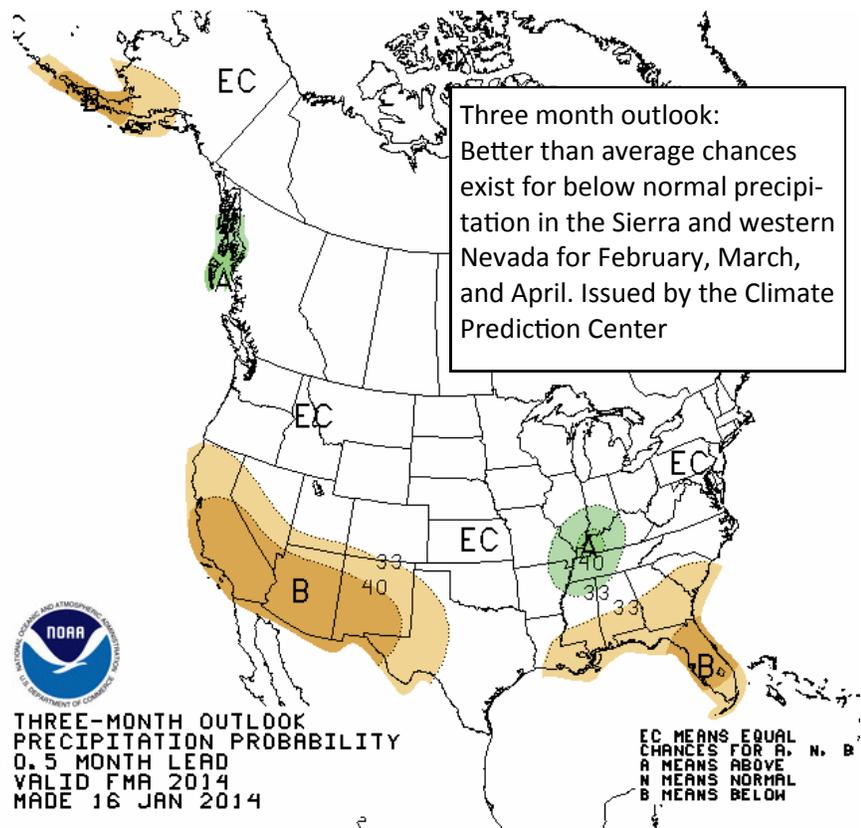
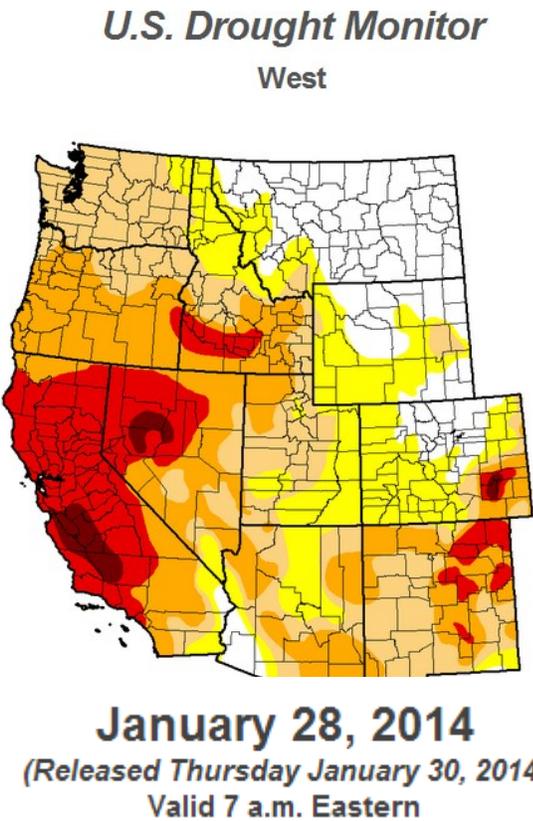
While the system this week did produce a decent amount of rain and wet, heavy snow, quite honestly it was a drop in the bucket when it came to easing the significant water deficit the area is in. Snow water equivalent, or the amount of liquid present in the snow, remains in only the 15-25% range through the Tahoe and Truckee basins. The Carson and Walker Basins in western Nevada are doing a bit better, with 26-32% of average for this time of the year. (See image to right). Farther south, in the Mono Basin, percentages are in the 18-28% range.



Snow water equivalent percentage of average for January 31, 2014

WHAT ARE THE DROUGHT IMPACTS?

- ◆ U.S. Drought monitor expanded the area of extreme and exceptional drought throughout California and northwest Nevada
- ◆ As of January 17, governor Jerry Brown issued a statewide drought emergency for the state of California
- ◆ Economic impacts to the region have been substantial including dramatically reduced ski tourism, and negative impacts to ranching and agriculture due to significant water supply reductions
- ◆ High pressure and lack of storms has lead to more days with poor air quality, and there is enhanced wild-fire risk compared to normal
- ◆ Reservoir storage remains well below normal (Tahoe 10% of capacity, Truckee River basin 44%, Carson River basin 14%, Walker River basin 12%, and Lower Humboldt - Rye Patch 4%)
- ◆ Our Sierra snowpack is actually one of our biggest “reservoirs” and in an average winter would be the equivalent of filling up Lake Shasta completely 3 times!
- ◆ Increasing confidence that the April through July streamflow outlook (issued by the River Forecast Center) will be well below normal, unless we have a very wet February—April period.



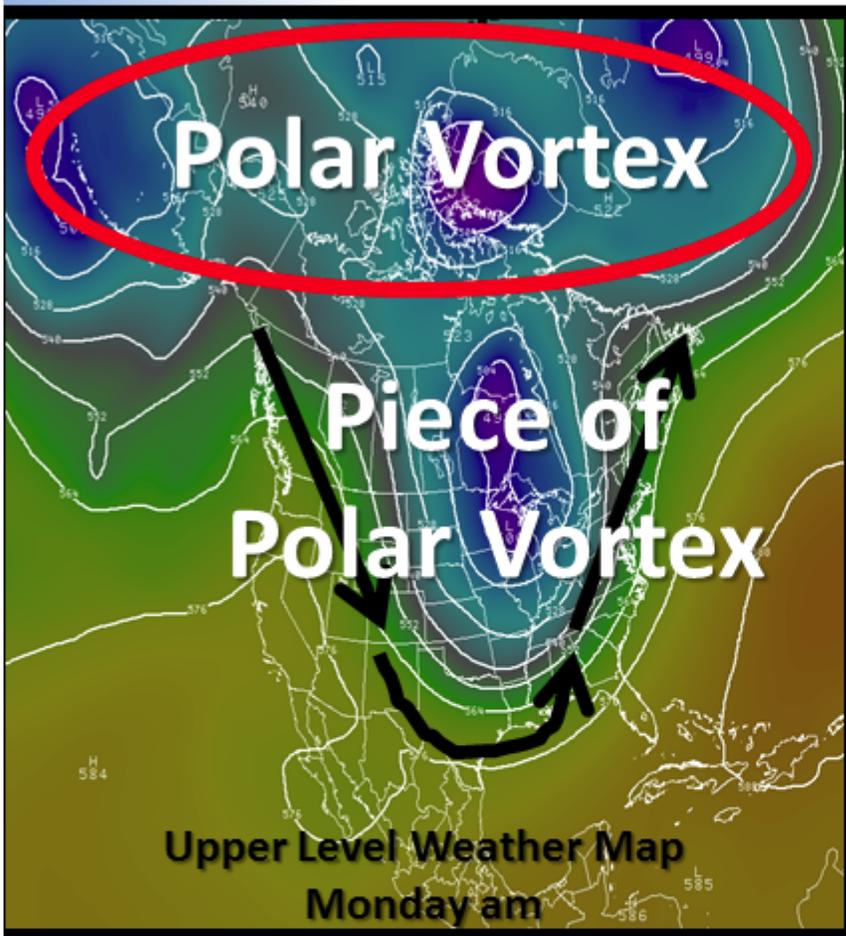
Intensity:

- D0 - Abnormally Dry
- D1 - Moderate Drought
- D2 - Severe Drought
- D3 - Extreme Drought
- D4 - Exceptional Drought

All it takes are a few big storms and our snowpack situation can drastically improve - we still have February and March left which are months that we can get significant Pacific storms. But due to the severe lack of snow in November-January we're in a big deficit - therefore the odds of having below average snowfall for the entire winter are increasing. Based on some model simulations, the chances of having enough precipitation the remainder of this winter to get us back to average for the water year is only 0.5%, meaning odds are favorable to end the water year below normal for the third winter in a row.

Despite all the hype, the “polar vortex” which affected the eastern portion of the United States is nothing new. In fact, it is a constant cyclone that exists near one or both of the earth’s poles. The graphic below was done by the New York City NWS office on January 6, 2014 and has an excellent explanation of what the polar vortex is and what it is not.

What is the Polar Vortex?



- A persistent, large-scale upper level cyclone near one or both of earths poles.
- It **ALWAYS** exists at the poles, but weakens in summer and strengthens in winter.
- Many times in winter, a piece of the vortex breaks off and is sent southward with the jet stream which is what is happening now.

The Polar Vortex is Not.....

- is not something new.
- is not something that exists at the earths surface, it is in the upper atmosphere.
- is not something that will be visibly observed like tornadoes, funnel clouds, thunderstorms, lightning etc.
- is not something in itself dangerous to humans, but the cold, arctic air associated with them at the surface could be.

KELVIN-HELMHOLTZ WAVES



Left: Reno, 1/28/14. Photo taken from NWS office.

Bottom: Squaw Valley High Camp webcam image. 2/7/11

A rare cloud phenomenon, known as Kelvin-Helmholtz (K-H) waves, was observed over Reno just a few nights ago. These form when there is wind shear in the atmosphere, with varying wind speeds/direction between two layers within an area of cloud formation. These clouds form just like waves in the ocean. In the ocean, waves break when their bases slow in shallow water and their crests surge ahead. These cloud waves break the same way, when their crests are pushed ahead of their troughs by the difference in air currents.

The phenomenon that causes these clouds is actually present in our atmosphere relatively often, as many of you may have felt on a bumpy descent into the airport. However, there needs to be moisture present at the right layers and absence of other blocking clouds to view K-H waves, in addition once the wave breaks, the clouds tend to dissipate quickly. Therefore, we typically won't see these in the area very frequently.

02/07 12:20 Squaw Valley High Camp



Fun Fact: The same properties that causes K-H Waves also occur in the rings of Saturn, Jupiter's Red Spot, and the Sun's corona!

2013 YEAR IN REVIEW - HIGHLIGHTS FROM THE PAST 12 MONTHS

January 2013 Weather Highlights

- Strong valley inversions resulted in haze and reduced air quality early in the month.
- Very cold mid-month with several record lows below -10° at South Lake Tahoe.
- Fog was reported at least once in Reno on 18 days of the month.



Strong Inversion over Reno on the 8th



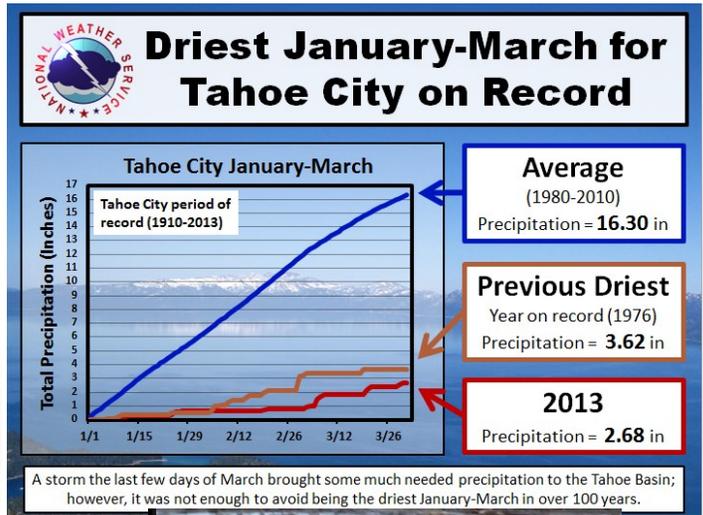
Pogonip in Spanish Springs on the 17th



Lake Tahoe covered in fog on the 25th



Above: Left: Spanish Springs, June 10, 2013: Huge hail drifts and flash flooding. Right: Same day, different thunderstorm produced extremely heavy rainfall with a flash flood washing out Highway 447. Photo credit: Jonathan Paul Asturais.



RENO	Friday - 6/28	Saturday - 29	Sunday - 30	Monday - 1	Tuesday - 2	Wednesday - 3
Actual High (record max)	103 (100-2010)	102 (100-1972)	103 (100-1972)	105 (100-2002)	105 (102-2001)	100 (101-1937)
Actual Low (record high min)	64 (65-2006)	68 (66-2007)	66 (65-1980)	70 (63-2006)	73 (64-2009)	64 (64-2001)
FALLON	Friday - 6/28	Saturday - 29	Sunday - 30	Monday - 1	Tuesday - 2	Wednesday - 3
Actual High (record max)	104 (102-1957)	105 (100-1924)	106 (102-1967)	108* (103-1967)	106 (103-1967)	100 (102-1957)
Actual Low (record high min)	60 (64-1977)	67 (64-2000)	63 (66-1977)	68 (64-1974)	69 (64-1967)	65 (68-1925)
TAHOE CITY	Friday - 6/28	Saturday - 29	Sunday - 30	Monday - 1	Tuesday - 2	Wednesday - 3
Actual High (record max)	81 (88-1918)	82 (88-1950)	82 (92-1924)	86 (87-1930)	88 (87-1924)	72 (88-1922)
Actual Low (record high min)	49 (53-1986)	48 (52-1980)	50 (53-1980)	56 (53-1932)	55 (51-1967)	51 (53-2001)

Factoids - Many Previous Records Broken

- Red indicates high was tied or broken. Numbers in parentheses show the previous record. Fallon tied their all-time high on 7/1
- Very rare to have this many consecutive days of record temperatures!

NWS Reno

4th of July

"When Thunder Roars, Go Indoors."

If you can hear thunder you are likely within striking distance.



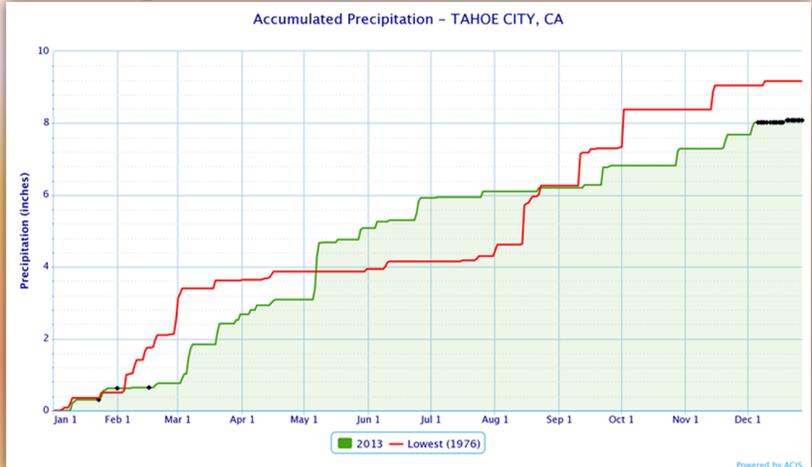
Heat wave end of June through July 4 with several very active thunderstorm days



Inside Slider December 2nd - 3rd



Driest year on record at Tahoe City



- 2013: 8.08 inches of precipitation so far this year.
— 23.47 inches below normal.
- 1976: 9.34 inches of precipitation. Previous driest year on record.
- Yearly average is 31.55 inches.
- Records at Tahoe City date back to 1910.

We did have a couple of early December snow storms, followed by very cold temperatures, but since it has been very dry with Tahoe City having their driest calendar year on record.

For a full 2013 recap, please check out this YouTube video our office produced:

http://www.youtube.com/watch?v=zZli_a3tves



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WINTER PREPAREDNESS GUIDELINES

It hasn't been the most exciting winter so far this year, but remember that winter storms can strike at any time and you always want to be prepared. Here are some excellent reminders to stay safe:

Up Front - Be Ready

1. **Know your risk of winter storms** - weather.gov/reno + local media
2. **Take action** - have a plan, multiple sources of alerts, supplies ready
3. **Be an example** - share alerts, preparedness with friends, family
4. **Personal responsibility** - lots of sources of info, up to you to act!



Winter Storms: The Snow

- Make sure your car is ready for winter travel (e.g. chains, emergency kit, good tires, don't leave the windows open)
- Be prepared for rapid visibility and road condition changes when driving - slow down.
- Have an alternate plan for travel in case roads are closed.
- Stay inside during blizzard conditions (strong winds + snow)
- Be aware of avalanche danger in the mountains



Winter Storms: The Cold

- Wind chill can lead to frostbite and hypothermia - know the signs.
- Dress appropriately for outdoor activities (e.g. in layers, with winter cap/gloves, minimize exposed skin)
- Bring pets and livestock indoors or to a sheltered area.



Wind Chill Factor		Actual Air Temperature °F								
Wind Speed (mph)	40°	30°	20°	10°	0°	-10°	-20°	-30°	-40°	
-10	34	21	9	-4	-16	-29	-41	-53	-66	
10	30	17	4	-9	-22	-35	-48	-61	-74	
20	28	15	1	-12	-26	-39	-53	-67	-80	
30	27	13	-1	-15	-30	-43	-57	-71	-84	
40	26	12	-3	-17	-33	-45	-60	-74	-88	
50	25	11	-5	-19	-36	-48	-62	-76	-91	

Wintertime High Winds

- Secure loose outdoor objects, garbage, lawn furniture when high wind watches or warnings are issued.
- Plan for power outages: have flashlights, batteries handy - don't come near downed power lines
- Be aware of flying debris...
- Don't drive high profile vehicles through wind prone areas (e.g. Washoe Valley)



Preparedness Kits



- Car Kit:**
- Cell phone with charger
 - Tire Chains
 - Blanket/Sleeping Bag
 - Flashlight with extra batteries
 - First Aid Kit
 - Non-perishable food and extra water
 - Dry clothing
 - Small can and waterproof matches to melt snow into drinking water
 - Sack of sand or cat litter for traction
 - Shovel
 - Battery booster cables
 - Compass and road maps

Home Kit:

- Flashlight
- Portable radio
- Extra batteries
- Food that doesn't require cooking or refrigeration
- Plenty of drinking water
- First Aid Kit and medical supplies
- Baby items if necessary
- Pet supplies if necessary
- Emergency heat source
- Fire extinguisher

