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# It's Story time!

Weather Story Guidelines for the National Weather Service Western Region

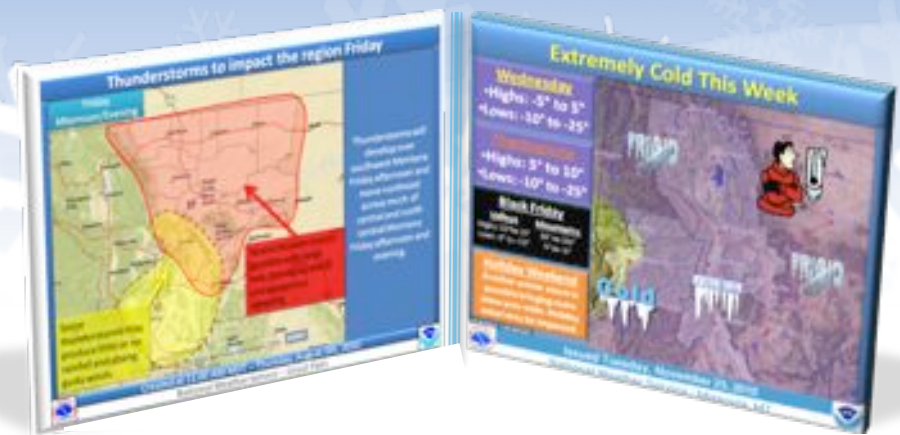


By Gina Eosco

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Her research focuses on the intersection of science, risk, and visual communication with a special interest in weather and natural hazards. Most notably, she studies public interpretations of the cone of uncertainty, a commonly used hurricane track graphic.

If you have any questions regarding this report or Gina's research, please contact her at [eosco@ametsoc.org](mailto:eosco@ametsoc.org), or (781) 704-4458.



## Introduction

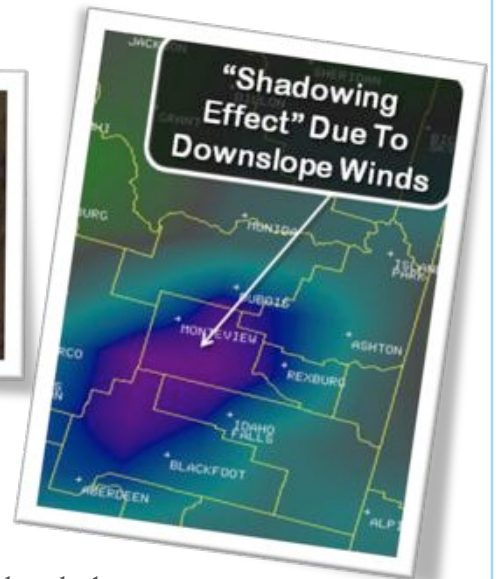
Weather stories have become a prominent part of the daily forecast for the National Weather Service Western Region local offices. Each office creates its own unique design and layout based on their region's weather of the day. The purpose of this study was to assess the weather stories created by Western Region forecasters and develop guidelines for how to improve the visual depictions of the forecast. To do this, informal focus groups were conducted to gather feedback on the weather stories. The groups consisted of individuals with and without meteorological experience. From these discussions, codes were developed, and weather stories were grouped based on the codes. This report summarizes all of the codes and provides general recommendations for how to improve some of the design concerns. Please consider that these guidelines are based on the idea that the main audience for weather stories is the public, a non-weather audience.

Please note that this study does *not* predict how people react, respond, use or take action from these stories. These guidelines are meant to act as a starting point for improving the design effectiveness of weather stories.

## Definition of Terms

Although many terms may seem like common sense to a forecaster, a non-forecaster may question their meaning. What *is* the difference between ‘cold’ or ‘frigid?’ What is the temperature difference between them? What is the ‘shadowing effect?’ And what does the forecaster mean by ‘favored areas?’ Perhaps these last two examples are terms that your audience may understand, but there is a chance that they do not.

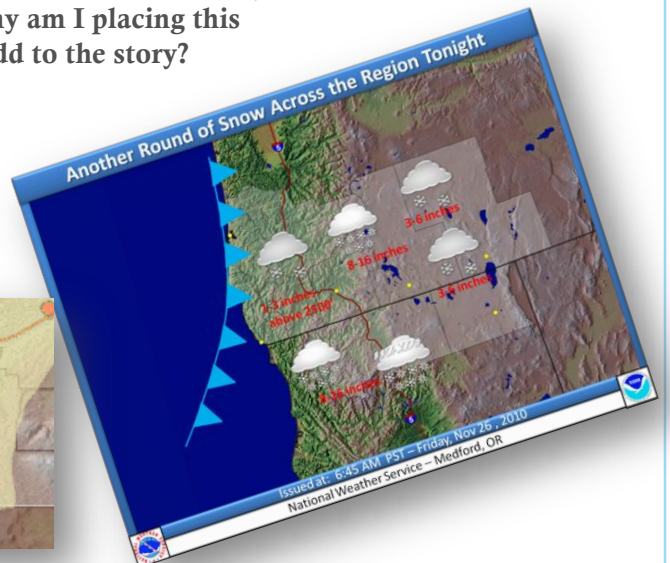
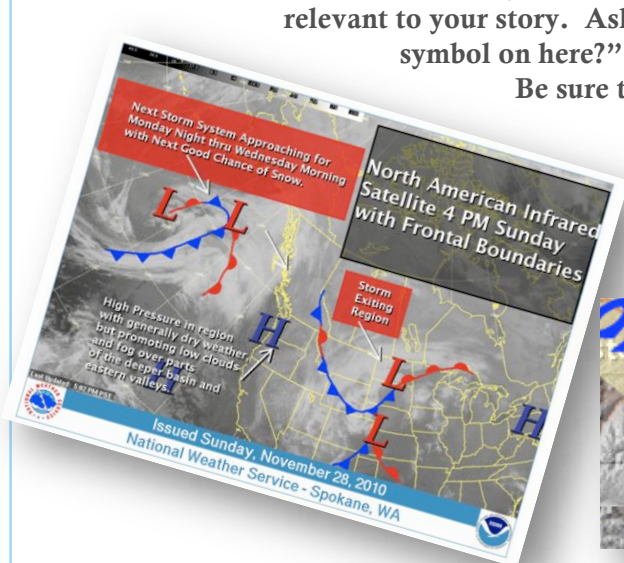
**#1: DEFINE YOUR TERMS.** Give an example of a frigid temperature. Give a list of your favored areas. Define terms such as shadowing effect, or your watches and warnings. It’s okay to use terms as long as they are defined.



## Definition of Symbols

Symbols come in a variety of shapes and sizes. There are “serious” meteorological symbols, i.e., fronts. There are “fun” weather symbols, i.e., raindrops, snow flakes, etc. Then there are humorous symbols such as penguins, thermometers, or wind socks (Took a while to figure out that one ... it looked like a knocked over construction cone!). Symbols are very useful images to describe the context of a forecast, but only if they are relevant and make sense.

**#2: DEFINE YOUR SYMBOLS.** Each office should develop a glossary of common symbols. This way forecasters do not need to re-define the symbols each day, but that there is always a clear place to go on the local website to find out what the symbols mean. Furthermore, make sure the symbols are relevant to your story. Ask yourself, “Why am I placing this symbol on here?” How does it add to the story?  
Be sure to explain!

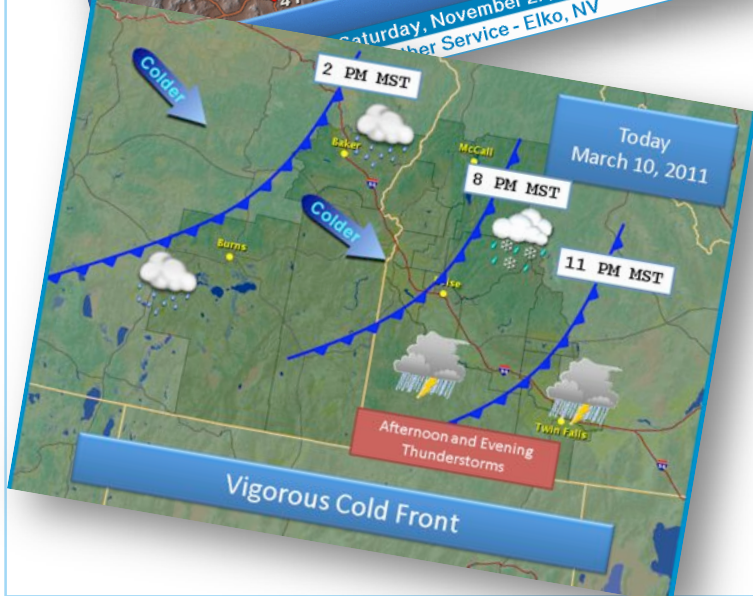
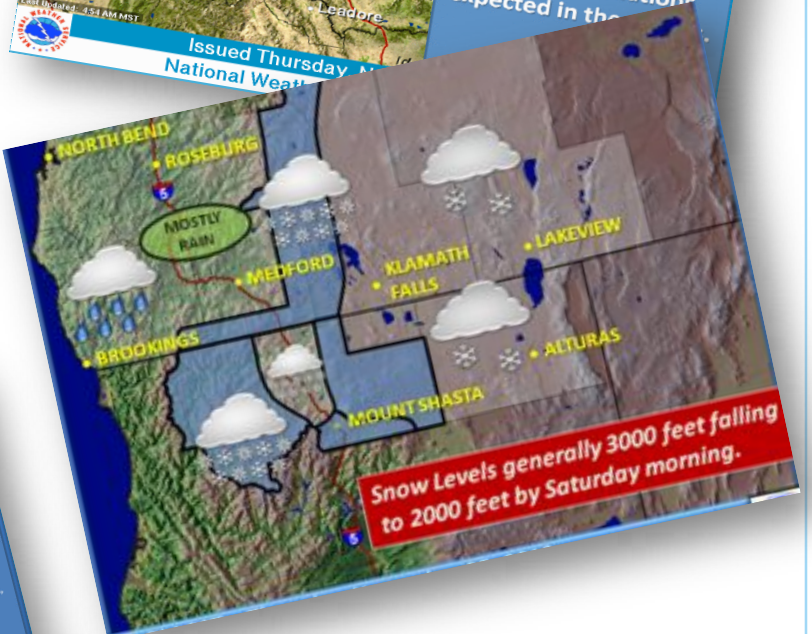
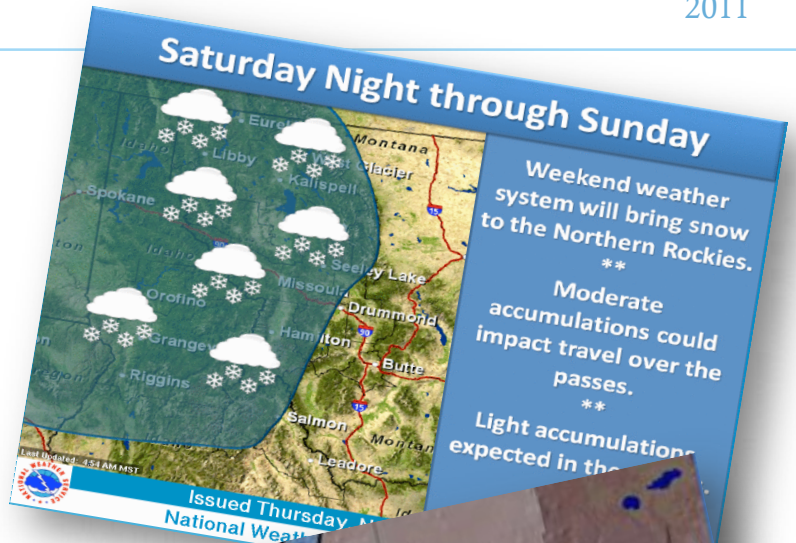




## Visual Layering

There are a lot of layers to a weather story. There are maps, roads, polygons, symbols, text, and descriptions. The order of these layers can make the viewing process easier or more difficult to interpret the story. Take the first example to the right. The symbols and polygons are on top of the geographic boundaries and cities making it difficult to see “where I am.” The example below, on the other hand, still has polygons and symbols, but the cities are clearly visible as the top layer.

**#3: Always make sure the “where am I” layers take first priority. This means that cities or roads should be a top layer, whereas the map and polygon layers should be in the background.** Also, make sure there is enough color contrast between layers.

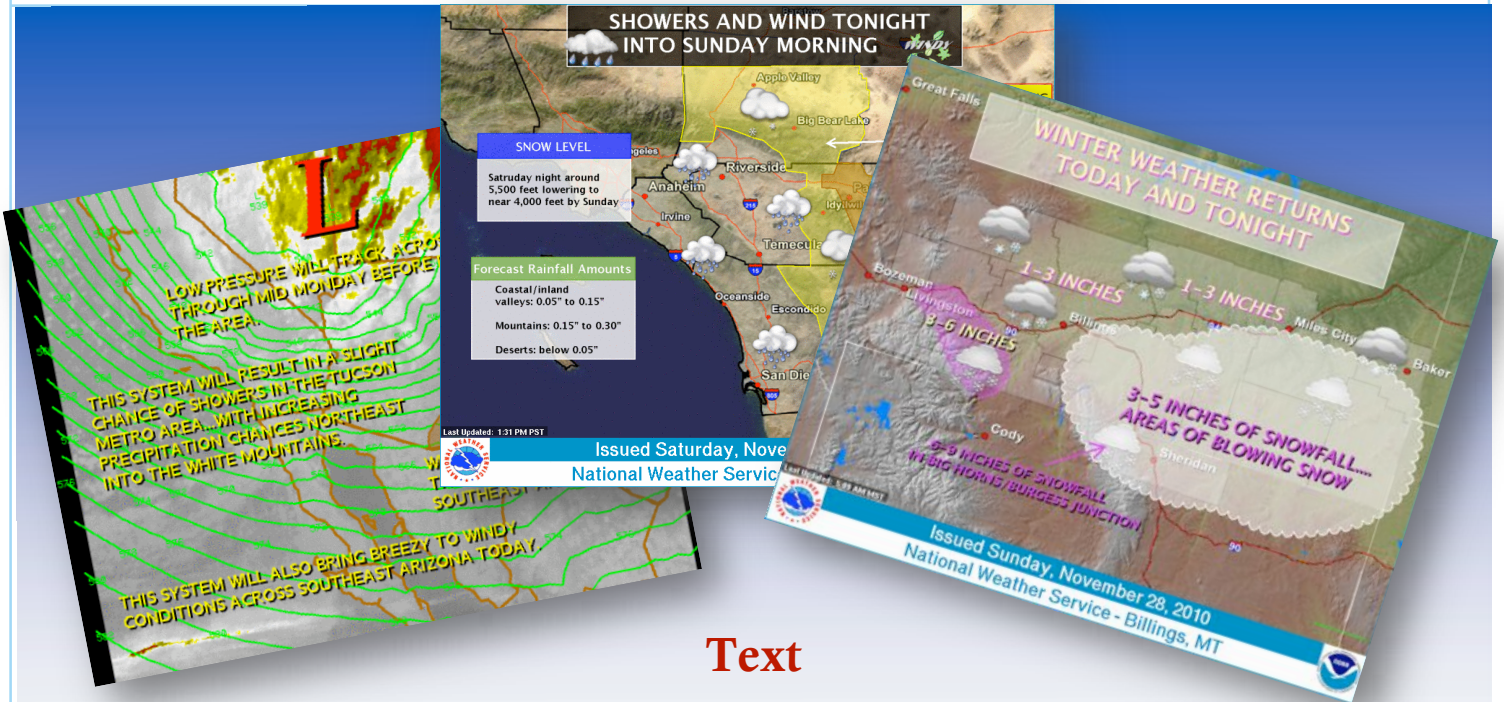


## Timing and Movement

Timing and movement are among the most difficult features to draw on a static image. Comic strips show time by a series of boxes that show a story progression, a technique that is possible in a weather story. The examples to the left also show time. The top left uses numbers with a description, which is a useful presentation. But, why does the bottom polygon not have a description? The bottom left story also shows time by placing time with a front. The concern here is that the time does not match with the impacts. What happens at 2, 8, and 11pm? Does the rain turn to snow because it's cooler air?

**#4: There is no right way to show time. Both examples to the left are ways to draw it. Just be clear on what will happen at that time, even if it's nothing (as in the case of the white polygon from the left top example). Symbols may help show impacts, but a text description may be clearer.**





**Text**

There are many dimensions of text to think about when designing a weather story. Here are some features to consider:

**#5: Amount of Text**

Using text to describe what is happening with today's weather is an excellent way to provide context. But if it's too much text, as in the example on the left, you will lose your audience. What makes a weather story any different if it has the same amount of text as a text forecast? Make sure your text is concise! If your story requires a lot of text, you may want to consider a two-image weather story instead of one.

**#6: Color of Text**

There are certain colors that are difficult to read: red on blue or blue on red; pink on green or green on pink. The red text on the far right example above may not have been the best choice. Consider using a color wheel to find out which color is more readable with your background. (Try: <http://www.checkmycolours.com/>, where you can enter your weather story website and the checkmycolours tool will check every color combination on your site. Or, try a downloadable application <http://www.stainlessvision.com/projects/colour-contrast-visualiser>). Also, remember that colors evoke emotion, such as red for dangerous. Choose carefully!

**#7: Placement of Text**

In the U.S., people naturally read from top left to bottom right. If you have a major headline, such as, huge snowstorm brewing, make sure to place it at the top of the weather story, like all three examples above. There is no exact way to place other text

boxes. If it's a general description, you may want to place it in the top left, or bottom right, as our eyes naturally move to those areas. However, make sure if you place them randomly on the weather story that they make sense. That is, does the text *only* apply to the area that the text box covers? Or, is it a general description? Use arrows to show which area the text is relevant to, such as the middle example above. Also, some text is in boxes, whereas others are placed around the weather story. Make sure you consider why you placed it where you did, because readers will "read" more into it.

**#8: Content of the Text**

First, make sure the heading of the story provides the context for the entire story. If your story shows current temperatures, then your heading should also include temperatures.

Second, make sure any text is redundant with your visual. That is, your text and visual should match. If your text says it's snowing, then your symbols should be snow. If your text is about snowfall amounts, then you shouldn't have temperature boxes all over the graphic. The text and visual features should make sense together.

**#9: Grammar and Spelling**

This is a friendly reminder to always run a spell check, and briefly review your grammar before making your story live on the web. Can you find the misspelling in the above weather stories?

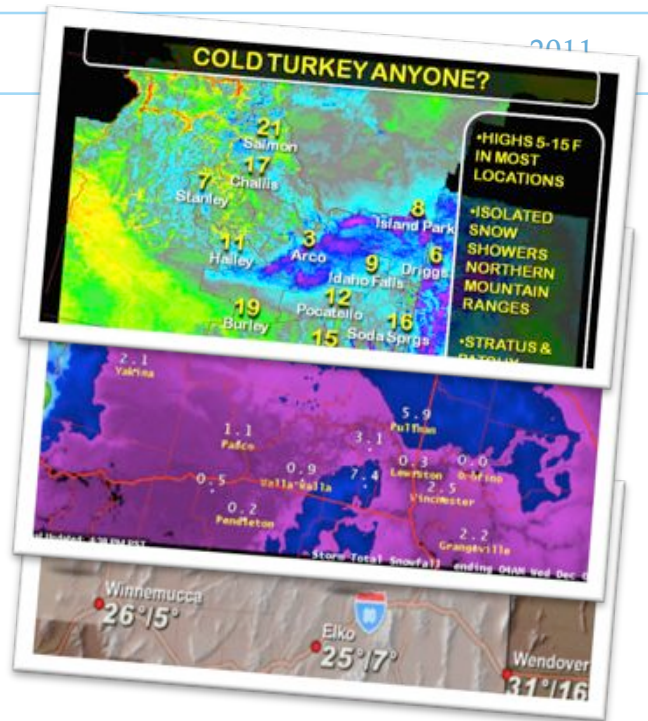
**#10: Font Type**

Some font types are not easy to read especially on complicated backgrounds such as a topographic map (see far right example). Make sure to use easy to read fonts such as Arial, Courier, or Verdana.

## Numbers

Numbers in the context of weather mean many different things. Numbers represent temperatures, snowfall amount, wind speed, rainfall amount, etc. If there's no description for the number, it leaves the reader guessing. The top example to the left is showing temperatures (?), and when it says, Highs 5 – 15, could that also mean negative 15 degrees? Looking at the middle example, the headline is, "More Snow This Week," so are those snowfall predictions? If you look *very* closely to the tiny, black print on the bottom, you will determine that it's storm total snowfall. Looking at the bottom example, the headline said, "Snowy Sunday," and a text box said, "Forecast for Sunday," so are these snowfall amounts? High versus low temp? Morning versus evening temp?

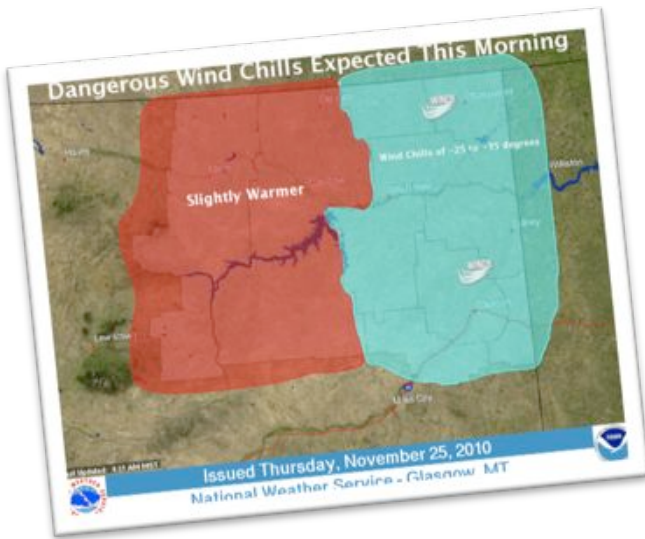
**#11: Make sure all numbers have a clear description either in a sidebar, text box, or headline.**



## Relative to What?

When phrases have an “er” on them, there is typically a comparison (They are called comparative adjectives after all!). I’m happi-er than last week. My teacher is tough-er than your teacher. My office is bigger than your office. If it says, “Slightly warmer,” then what is it warmer than? Yesterday? Warmer than the rest of the region?

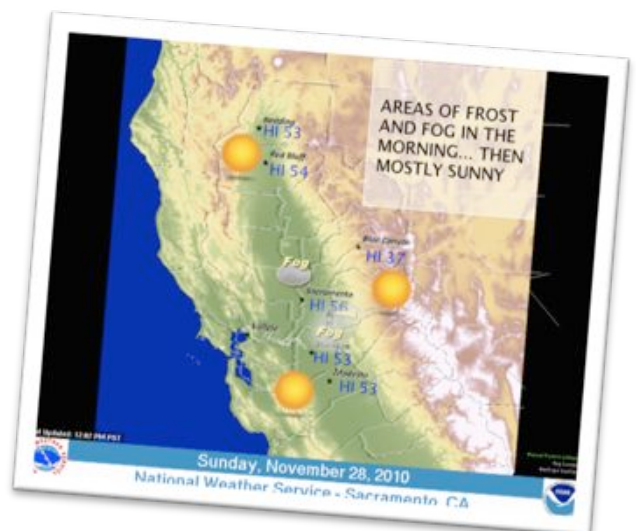
**#12: When making an “er” comparison, be sure to make reference to its comparison. Emphasize what your forecast is relative to.**



## Consistency

It’s important when using symbols, color or other design features to have consistency throughout the weather story. For example, all temperatures in the 40s are light blue. All the 50s are dark blue. Alternatively, all of the snowflake symbols have 3 snowflakes versus just one. People read into patterns making the overall message feel consistent. When features vary by color, shape or size, individuals also read into those patterns, but may not come away with an effective interpretation. The varying features allow for interpretation. Looking at the image to the right, why are the fog symbols different? Is the fog worse north of Sacramento compared to Stockton?

**#13: Make sure your colors, symbols, and other design features are consistent throughout your weather story. If, for example, 3 versus 2 snowflakes mean something different, then use a legend to clarify this difference.**



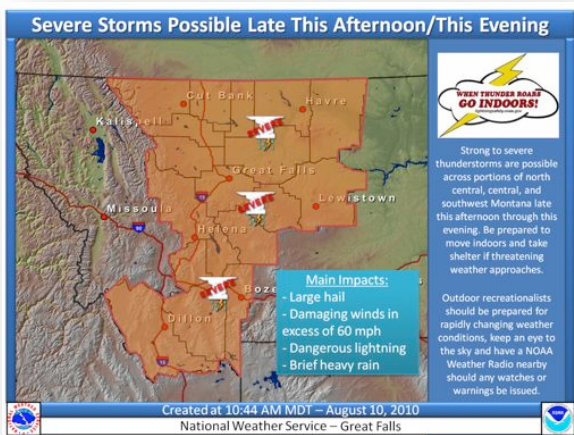


## Risk and Efficacy: Now that I know today's weather, what am I supposed to do with it?

By the very nature of a weather story showing the day's weather, all weather stories communicate risk. Communicating risk alone, however, is not enough to promote positive, preparedness behavior to protect life and safety, the mission of the National Weather Service (<http://www.weather.gov/admin.php#mission>). Risk information combined with "what to do" tips is more powerful for the individual, as it helps the individual believe that they have the ability to respond. These tips create "self-efficacy," a term used to describe an individual's ability to respond to the risk. For some people, simply knowing the day's risk may prompt them to take different behavior, as they may be aware of what to do. For other individuals, unless the message conveys what to do, the risk information is not adequate for them to take action. In other words, now that I know the risk, what am I supposed to do with it?

Many local offices in the Western Region NWS are already including "what to do" tips. Here are some examples:

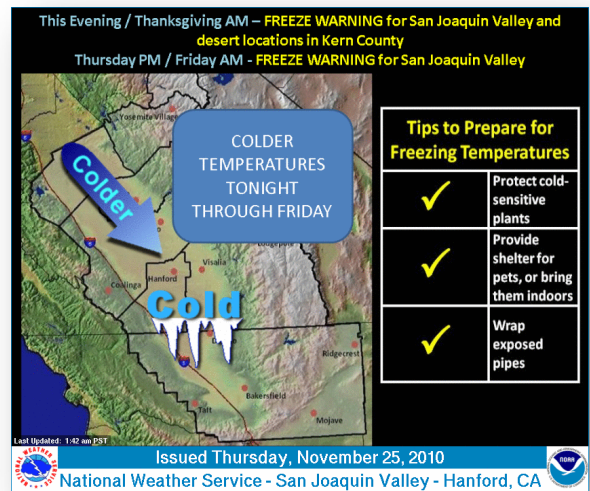
**#14: Forecasters can empower their readers by suggesting some actions. Of course, you cannot provide specific, unique actions for each reader. But rather, you can provide general suggestions for how to respond or what to do with the weather information.**



**Risk:** Strong to severe thunderstorms are possible...

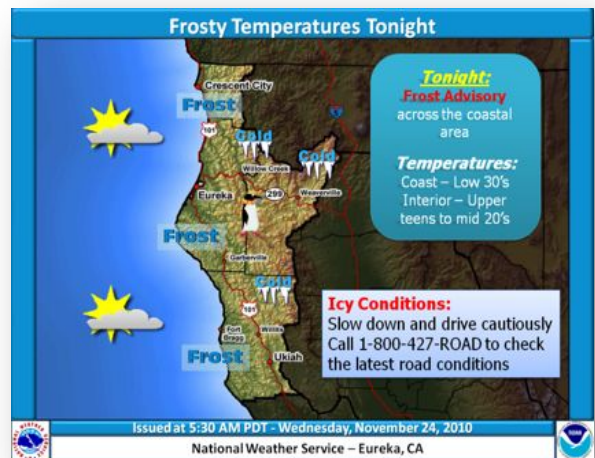
**What do I do with this:** Be prepared to move indoors and take shelter if threatening weather approaches.

Outdoor recreationalists should be prepared for rapidly changing weather conditions, keep an eye to the sky and have a NOAA weather radio nearby should any watches or warnings be issued.



**Risk:** Cold temperatures tonight through Friday

**What do I do with this:** Protect cold-sensitive plants, provide shelter for pets, or bring them indoors, and wrap exposed pipes.



**Risk:** Freeze warning for coastal areas

**What do I do with this:** Slow down and drive cautiously. Call 1-800-427-ROAD to check the latest road conditions.

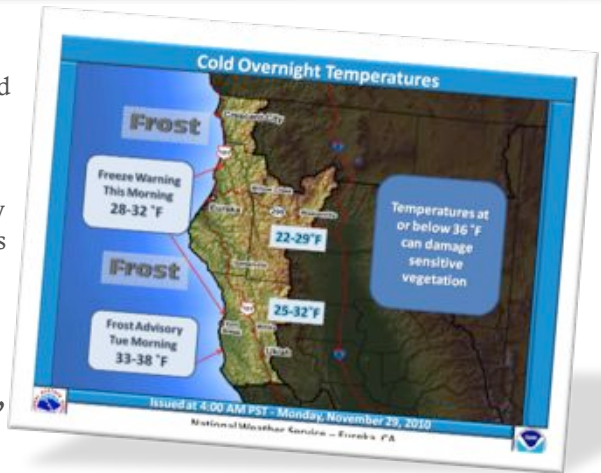
## A funny, little note about humor...

A number of weather stories use fun symbols, such as a turkey or penguins, to show a little humor. In moderation, these humorous symbols may potentially build stronger relationships with your readers. None of the weather stories assessed in this project used too much humor. However, be aware that using humor too much can also have negative impacts on a forecast/reader relationship. For example, a few focus group participants had negative reactions to penguins, as they said, "Penguins do not live here!" No pun intended, but humor is a funny concept that can both help and hurt your audience relationship.

## Placement

Whether it's a symbol, text, or a text box, all of these features need a "place" on the weather story. Readers may associate the item with that place. In other words, they are reading into your placement of the item. For example, the story to the right shows two sets of temperature ranges, 22-29F, and 25-32F. Why are they placed there? Will it be those temperatures everywhere? Where is the boundary between those ranges? (And why do the ranges overlap?)

**#15: Make sure to consider why you are placing a symbol, text, or text box where you are. Also, try not to cover a city name or road marker sign with a symbol.**



## Visual Clutter

Have you ever had to clean your office desk before you could work because it was too cluttered? Clutter, visual or otherwise, can negatively influence our ability to process information. Visual clutter does not necessarily mean there are too many features on the map, but that there are too many features to process, understand, or interpret. Take the story to the left, it has a lot of informative information on it, but there are text boxes, text on the map, a topographic background, colored polygons, etc. Alternatively, look below, your eyes become overwhelmed with callout boxes. With the title, "Blizzard Tracker," individuals



thought the callouts were snowfall amounts. After processing the visual for many seconds, the reader notices that the negative snowfall amounts are actually temperatures. Too many features on the story can overwhelm the reader.

**#16: Use your best judgment to determine if there are too many features on the graphic. Reduce unnecessary symbols or text.**





## Background Choice

One of the first layers of a weather story, and a very important feature, is the background. There are many types of backgrounds that one can use in geography and meteorology including relief maps, radar images, or satellite images, just to name a few. One common feature is that there is a layer showing political boundaries, that is, showing the outlines of states, or perhaps even counties. What you choose behind that layer needs to make sense for your forecast area, as well as for the context of your story.

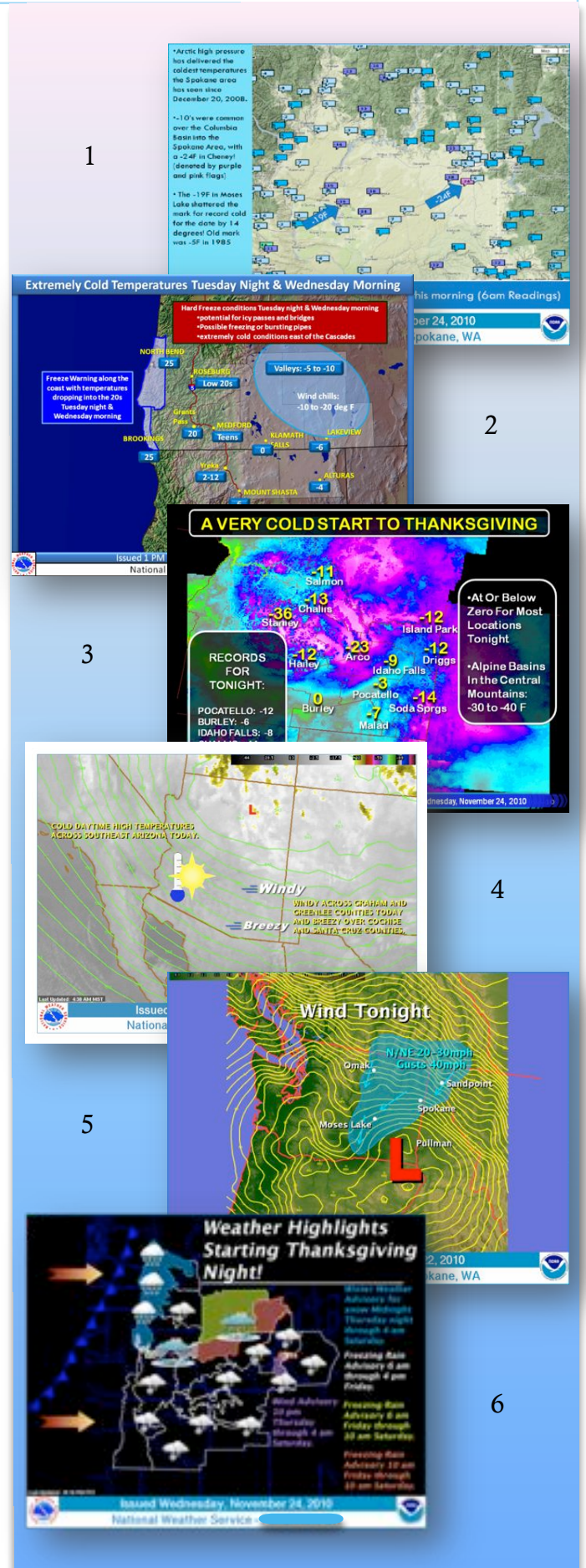
### #17: Here are some general background tips

Believe it or not, not everyone understands what a relief map or radar is or what the colors mean. For example, looking at images 1 +2, what do the dark green, light green and brown colors mean on these two stories? Is that a radar map or temperature coloring on story 3? *Take a moment to define your map background so that your readers are clear on what they are viewing.*

*Make sure your background is relevant to the weather story, not just a cool weather background.* Looking at example 4, the text says, “COLD DAYTIME HIGH TEMPERATURES ACROSS SOUTHEAST ARIZONA TODAY.” None of the text on the graphic mentions clouds. This background, although pretty, does not seem relevant to the content of the story. Perhaps adding daytime temps in different locations would have been more appropriate.

*Make sure your background is relevant to the weather story AND understandable to a non-meteorologist.* Although showing isobars in story 5 is relevant to a windy night, how many individuals can identify those lines as isobars, and further, do they know what they represent?

A blank background is not necessarily a poor choice. *Background alone, however, does not provide enough information.* If there is no background relevant to your story, then choosing a solid colored background is a great choice. But, in doing so, *make sure you still include the “where am I” layer.* Looking at story 6, do you know what forecast area this is?





## Use of Color

Every feature of a weather story needs a color whether it's a symbol, text, text box, map, etc. As stated earlier, the color of the text makes it more or less readable. The color choices for a map make it more or less understandable. The color of the temperature markings or snowfall predictions may or may not help to delineate predicted changes or geographic differences. Color can be your best design friend, if used correctly.

### #18: Here are some general color tips:

*Make sure there is enough contrast such that the text is readable (See story number 1).*

*Make sure the color makes sense. Have you ever seen orange snow? Why do the symbols in story 2 have orange snowflakes?*

*Make sure the colors are consistent. For example, all temps in the 40s are dark blue; all temps in the 50s are light green, etc. Why are some boxes blue versus purple in story 3? The temps do not seem to have consistent coloring.*

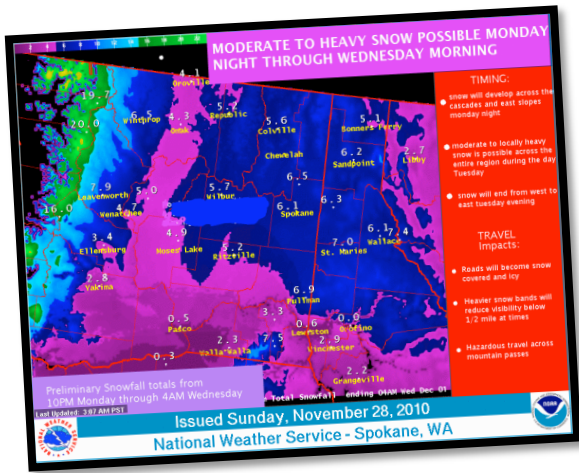
*Make sure the important content is a color you will notice. Your eyes naturally move to bright colors or color contrast. Story 4 does a good job to shadow the landmass that is unimportant while drawing the viewer into the forecast area. Some focus group participants, however, didn't like the brightness of the ocean. The ocean seemed unimportant, and thus, too bright. Make sure you use color to your advantage to draw the viewer into the important part of your weather story.*

*Make sure the color matches your text. You want the color to help the viewer not confuse them. For example, does the color background correspond to the snowfall totals in story 5? If not, what are the colors representing, and why are they there?*

*Make a legend. Why leave your colors up for interpretation? A simple legend can help explain! Even the watch, warning, advisory map (see #6) on weather.gov has a legend to explain the colors.*



# Adding Value: Why are you making a weather story?



Have you ever wondered why you are making a weather story? Have you ever compared your weather story to the text forecast or icons for the 5-day forecast? Have you seen a difference between the two? Weather stories offer a unique form of communication for NWS Western Region forecasters. They allow the forecaster to convey the daily weather risk, the impacts, timing and location. These features are not necessarily found in a text forecast or with weather icons. Perhaps some of these features are found in a severe weather watch or warning, but only when the timing is appropriate to issue one. Weather stories offer the forecaster an opportunity to creatively and visually depict the daily forecast, but only if the forecaster takes advantage of said opportunity.

Let's play a little game. Read the following three passages. Is each a text forecast or a weather story?

*Example #1:*

Occasional snow flurries today.  
 Gradual warming trend by Thursday.  
 Mostly cloudy on Thanksgiving, highs 35-40.  
 Rain expected Friday.

*Example #2:*

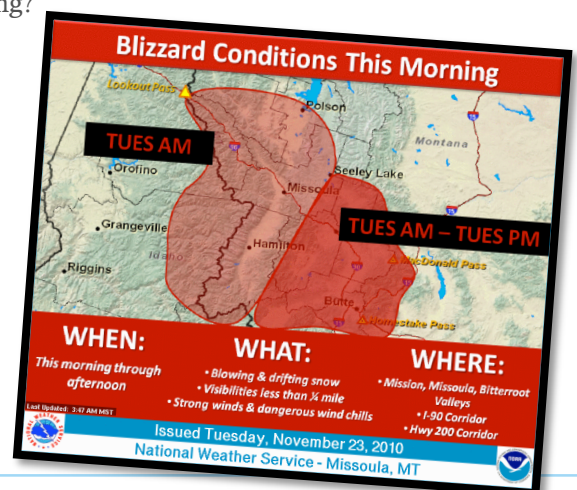
Steady light precipitation Saturday morning with cold frontal passage.  
 Scattered showers Saturday afternoon/overnight behind the front.  
 Expect a break in the weather for late Sunday and Monday.  
 Unsettled weather returns on Tuesday with several systems bringing rain to the region through the remainder of the week.

*Example #3:*

Late afternoon a slight chance of showers and thunderstorms.  
 Tonight a slight chance of showers and thunderstorms  
 Wednesday a chance of showers and thunderstorms mainly after noon.

Can you tell the difference? If so, why or why not? What does the weather story offer that's different? Does it have more information than a text forecast? Does it have different information than a text forecast? Does the "What do I do with this information" feature give a weather story its added value? Does it allow you to give the when, what and where of the risk, like the example below? Why is a weather story unique?

This weather story assessment cannot answer these questions. But, they are critical questions for each forecaster to consider when designing their weather story. If the public and emergency managers are the audience for these stories, then a forecaster must ask, "What does this weather story offer that a text forecast or 7-day icon image cannot offer?" What value are you adding?





# Final Suggestions

Communication is a key component in reaching the goals and mission of the National Weather Service to protect life and safety. The NWS Western Region through the use of weather stories is creating a unique medium to convey and communicate weather risks and potential impacts.

Communication is not a one size fits all concept. Weather stories alone or in combination with text forecasts, icon images, watches, warnings and advisories, and other NWS Western Region products are helping to create a comprehensive communication strategy. Below are some final comments and suggestions for improving the weather story component.

*Consistency:* Communication consistency is an important concept, especially when referring to risk communication. This is why the NWS issues the *official* severe weather watch and warnings. When it comes to weather stories, consistency from office to office is not as large of a concern. In fact, local NWS offices know their audience the best and can personalize their weather story to their audience. At this local scale, making risk personal is important.

*Does a forecaster need to become a graphic designer?:* First and foremost, a forecast forecasts the weather. However, as stated earlier, communication is a critical component in ensuring that an audience understands the weather risks and knows how to respond to those risks. Forecasters are responsible for staying aware of their audience's understanding of their products. Forecasters do not have time to interview or talk to everyone in their audience. Thus, forecasters need to develop the ability to take a larger look at their weather story and ask themselves, does this make sense? Can you separate yourself from the meteorological aspects of the visual and look at it how a member of the public would look at it?

*Definition of Terms:* The AMS Glossary is online (<http://amsglossary.allenpress.com/glossary>). Rather than developing a new glossary of terms, the NWS Western region could tag words in their weather story to the AMS Glossary page. (Note: The AMS may want to move toward a wiki model for the glossary to allow others in the community to add to it.)

*Glossary of Symbols:* The NWS Western Region office may want to create their own wiki to create a glossary of symbols. This way, all forecasters play a role in the glossary's development, and further, they are not confined to a certain amount of symbols, but rather they are allowed to influence how the glossary evolves based on their symbol usage.

*Legend Tool:* As noted in guideline #18, legends are an incredibly valuable tool, though incredibly under used. Legends allow the forecaster to define background, meaning of colors, symbols, terms, etc. Legends provide detailed information allowing a weather story reader to interpret your weather story with more ease. The NWS Western Region may want to consider the development of a legend designer where developed software would track the symbols, colors, background and terms used by the forecaster, and then by a click of a button, the software could create a legend. (Check out citing on Zotero.org. Their concept is that you are only one click away from a bibliography. Why can't we be one click away from a legend?)

*Using Facebook for Transactional Communication:* As the NWS Western Region rolls out the local offices' Facebook pages, each office may want to consider posting weather stories on Facebook. Right now, all of the NWS products use the transmission model of communication. In other words, the communication is only one-way. By posting the stories on Facebook, you can allow the "friends" of that page to comment and talk with one another creating transactional communication, or two-way communication. Forecasters do not necessarily have to monitor the discussion. In fact, if this is a concern, add a story "description" underneath the photo that says, "The NWS office in enter city is not responsible or the content of the comments."

The NWS Western Region has and continues to design creative weather stories to convey the daily forecast. This assessment aims to improve the current designs by having forecasters take a wider look at their stories and make sure they are explaining their visual features. This assessment does *not* measure a weather story's impact on perception of risk or intent to act. Future work could focus on audience interpretation, understanding, use, perception of risk and behavior.



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