

## 1999 Fire Season Outlook

Climatic outlooks for the summer of 1999 combined with recent weather conditions of this spring imply that the eastern Washington fire season will be slow to start, but should be in high gear by August.

The 30-day outlook for June is calling for temperatures near normal and precipitation slightly above normal. However, the 90-day outlook for June, July and August is calling for temperatures slightly above normal with near normal precipitation. In order for the 90-day outlook to verify, July and August will have to be very warm and dry. With precipitation slightly above normal, the outlook for June indicates a delay in the drying of fine fuels which would suppress fire starts.

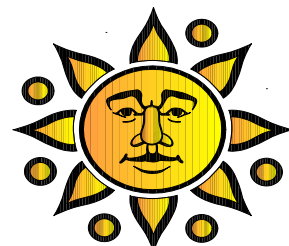
Another delaying factor affecting the fire season is the snow pack in the Cascades which continues to be unseasonably high. Mountain snow pack measurements this spring are about 165% above normal with snowfall records being broken at several locations. As of May 12<sup>th</sup>, Mount Baker unofficially broke the all time snowfall record (1122.5 inches, Paradise Ranger Station, Mount Rainier) with 1124 inches being recorded.

At this time, the 1999 eastern Washington fire season looks to be in check for the first half of the summer. However, by August, significant warming and drying combined with an abundance of fine fuels, should make for ideal wild fire conditions.

## Lightning Facts

- \* Most lightning occurs within the cloud or between the cloud and ground.
- \* The air near a lightning strike is heated to 50,000° F, much hotter than the sun.
- \* The average flash could light a 100-watt light bulb for more than 3 months.
- \* In the Western U.S., the largest danger from lightning are fires.
- \* Your chances of being struck by lightning are estimated to be 1 in 600,000.
- \* Lightning can and sometimes does strike the same place twice.
- \* If caught outside during a thunderstorm and your hair feels like it's standing on end, lightning may be about to strike you. Crouch immediately to the ground, forming a ball with your body. Stand on the balls of your feet. Duck your head to your knees.

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# WEATHER WATCHER

National Weather Service Quarterly Report

May 1999

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Issue # 2 Vol. 4

### Editor's Notes

We are excited to release the spring edition of the *Weather Watcher*. In this issue, we highlight the types of weather that can be expected from late spring through the summer. The topics range from convection to heat and snowmelt flooding. Outlooks for this summer are also included.

The main purpose of this publication is to keep weather spotters and others informed about our services and programs, and to recognize spotters and others who help us accomplish our mission. We will continue to see many exciting changes in weather observing and forecasting over the coming months and years. Weather spotters and our friends in the emergency management and media communities will continue to be an extremely valuable part of our mission.

If there is something you would like to see in the next newsletter or have comments about a previous issue, please let us know.

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## Thunderstorms and Lightning

A flash of light, followed by a low rumble or loud crash; a thunderstorm is in the area. What makes an ordinary rain shower a thunderstorm is the presence of thunder and lightning. A thunderstorm has an intense updraft and downdraft within a cumulonimbus cloud. Water and ice particles circulate within the storm. The combination of the storm vertical motions and particles help create differing electrical charges within the cloud and between the cloud and the ground. Lightning occurs when electricity travels between areas of opposite electrical charge.

A flash of lightning can be seen when the attraction of the positive and negative charges becomes strong enough to overcome the air's high resistance to electrical flow. In cloud to ground lightning, negative charges build up in the base of the cloud, while positive charges at the ground accumulate atop taller objects such as trees. When the attraction of the charges becomes too great, negative charges zigzag their way to the ground as a "stepped leader." When the two different charges meet, a powerful electric current begins to flow. A return stroke of positive charges travel rapidly up the leader to the cloud, and this creates the flash of lightning. This process can repeat itself several times along the same path in less than half a second, making lightning flicker.

The tremendous energy released by the lightning is turned into heat and sound waves. Lightning heats the air to a temperature almost 5 times hotter than the sun in a fraction of a second. The air quickly expands and contracts. This causes air molecules to move rapidly, which creates sound waves - the thunder. Since the speed of sound is slower than the speed of light, lightning will always precede thunder even though they occur instantaneously. Sharp and loud cracks of thunder originate from a nearby thunderstorm, while low rumbles are generated by distant storms. One can roughly determine the distance from a thunderstorm by counting the seconds between the lightning and thunder; five seconds corresponds to about a mile.

Garden variety thunderstorms are common occurrence during the summer. Though they may appear benign and harmless, even the smallest storm contains dangerous lightning. The typical thunderstorm is about 15 miles in diameter and can last for about 30 minutes. Occasionally, a thunderstorm may grow to supercell strength, lasting several hours and having the potential to produce significant damage with strong winds, large hail, or heavy rain. These are called severe thunderstorms. The NWS defines a severe thunderstorm as a storm that produces hail 3/4 inch or larger (about the size of a dime) and/or wind gusts to 50kts (about 58 mph). A severe thunderstorm can sometimes produce tornadoes or waterspouts.

To advise the public on the potential for severe storms in the area, the NWS issues a **Severe Thunderstorm Watch**. When a severe thunderstorm is expected or has been sighted in a particular location, the NWS issues a **Severe Thunderstorm Warning**. The majority of all watches and warnings are broadcast on the NOAA Weather Radio or your favorite TV or radio source. More exciting lightning facts can be found on the back page.

All articles are written by the Spokane NWS staff. A special thanks to Robin Fox, Roger Buckman, Kenneth Holmes, Ron Miller, and Irv Haynes for their contributions.

**ON THE INSIDE .....**  
**Flood Outlook & Safety,**  
**Spring Recap, Trivia**  
**Coop News... and more**

## Summer Heat and Staying Cool

Despite the lingering cold and mountain snow showers this spring, summer heat will be upon us soon enough. By the 4th of July, average high temperatures will range in the lower to mid 80s. Hotter readings are expected well into August, reminding us of the sweltering memories of last summer.

The Heat Index is a measure of the apparent temperature of the air by factoring in the effects of relative humidity. For instance, an air temperature of 95 EF with a relative humidity of 50%, actually feels like it is 107EF! Though conditions this uncomfortable are rare across the Inland Northwest, they are more common in the eastern US. Readings exceeding 105-110EF are considered dangerously high levels.

The best way to handle this summer's heat is to know how to prepare for it before it arrives. Intense summer heat can lead to health problems ranging from minor heat cramps all the way to heat exhaustion and heat stroke, where medical attention is necessary. The elderly and the very young are more susceptible to heat related health problems. So when the mercury is rising this summer, remember these tips to keep cool and play it safe.

**\*SLOW DOWN...**Avoid strenuous activity, especially during the peak heating of the day.

**\*GET OUT OF THE HEAT...**and sun as much as possible. Stay indoors, especially in air conditioned or well ventilated places.

**\*DRESS FOR SUMMER...**Wear lightweight, light-colored clothing.

**\*DRINK PLENTY OF WATER...**regularly and often, even if you are not thirsty. Avoid alcoholic beverages.

**\*EAT SMALL MEALS...**Avoid foods that are high in protein, which increase metabolic heat.

## A Chilly Spring

After our mild and wet La Niña winter, residents of the Inland Northwest got a dose of cooler weather during this spring. This fits in well with the "typical" La Niña, which is mild and wet during the first half of the winter, turning colder during the second half of the winter and into spring. The table on the right shows that during February we were once again above normal in both temperature and precipitation. In fact, both Wenatchee and Spokane received twice the normal precipitation in February.

But this wet and mild pattern changed considerably. March temperatures at both Wenatchee and Lewiston

were below normal, while temperatures in Spokane remained above normal. By April though, all three sites had below normal temperatures. This trend persisted into the first part of May as unseasonably cold air masses continued to move into the area. Record low temperatures were set at both Spokane and Wenatchee on May 10<sup>th</sup>, with many locations receiving a dusting of snow over Mother's Day weekend.

But while the below normal temperatures this spring have received most of the attention, an equally important story was the lack of precipitation. March was a bit drier than normal, but April was really dry. Wenatchee didn't even receive a tenth of an inch in April. Wenatchee and Spokane precipitation was 10% and 37% of normal, respectively.

The Climate Prediction Center (CPC) of the National Weather Service makes the long-range seasonal forecasts of the likelihood of above or below normal temperatures and precipitation. For the upcoming summer, the CPC says that temperatures will be slightly above normal with near normal precipitation. Their forecasts can be viewed on their website at [www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)

Wenatchee (Airport)	Feb	Mar	Apr	Total
Departure from Norm	+2.3	-1.9	-0.2	+0.2
Avg Low Temp	28.9	32.8	37.0	32.9
Departure from Norm	+2.3	-0.3	-2.5	-0.5
Total Precip	1.59	0.60	0.06	2.25
Departure from Norm	+0.83	-0.02	-0.56	+0.25

Lewiston (Airport)	Feb	Mar	Apr	Total
Avg High Temp	47.4	53.5	59.9	53.6
Departure from Norm	+0.8	-0.6	-2.1	-1.9
Avg Low Temp	33.7	33.8	37.4	35.0
Departure from Norm	+2.7	-0.9	-2.3	-0.5
Total Precip	1.31	1.02	0.71	3.04
Departure from Norm	+0.42	-0.07	-0.42	-0.07

Spokane (Airport)	Feb	Mar	Apr	Total
Departure from Norm	+1.6	+1.5	-0.1	+5.0
Avg Low Temp	28.7	30.7	32.9	27.3
Departure from Norm	+2.9	+0.8	-2.1	+6.5
Total Precip	3.26	0.72	0.44	4.42
Departure from Norm	+1.77	-0.77	-0.74	+0.26
Total Snow	13.1	3.7	2.2	19.0
Departure from Norm	+6.4	+0.1	+1.3	+7.8

## The Background of the Cooperative Weather Observer Program

There are approximately 11,700 Cooperative Weather Observers across the United States, who donate over a million hours each year to obtain daily weather records. These dedicated observers provide a public service which exceeds the benefits of any other government service. They provide the precious stream of weather information that is needed to forecast the weather, issue weather warnings and record the climates of the United States.

"All science begins with observation" is a phrase that is never more true than for the sciences of meteorology and hydrology. The National Weather Service's Cooperative Observer supplies a large share of available data in solving problems concerning nearly all aspects of weather related queries.

The present day Cooperative Observers can trace their tradition back to colonial days. The first known observations in the American Colonies were recorded by Reverend John Companius Holm, a Swedish chaplain in the Swedes Fort Colony near what is now Wilmington, Delaware. This was more than 350 years ago in 1644 and 1645.

Many famous Americans kept detailed daily weather records. We all know the fabled story of Ben Franklin flying his kite in a thunderstorm, but he did much more. Franklin was probably the first person to track a hurricane along the Atlantic Coast by using a network of observers. George Washington and Thomas Jefferson also kept countless weather records. Jefferson envisioned a nationwide network of weather observers as early as 1797. Many early homesteaders kept rain records in order to determine if it would be profitable to continue their agricultural pursuit.

A plan like Jefferson's was not established until almost 100 years later when, in 1891, the Weather Bureau was charged with the task of "taking such meteorological observations as may be necessary to establish and record the climatic conditions of the United States." In compliance with these directions, the Weather Bureau relied heavily, as it does to this day, on voluntary Cooperative Observers.

Cooperative Observers have a strong sense of duty. We salute the many individuals, families and institutions who tirelessly provide the valuable service of supplying the National Weather Service and citizens of the United States with valuable weather information that continues to acquire greater value with time.

## Floods... Before, During and After

Floods are the most common and widespread of all natural disasters. Flooding along rivers is a natural and inevitable part of life. Keeping informed on river warnings and what they mean could save your life!

A **Flood Potential Outlook** is issued when forecast weather conditions indicate significant heavy rain, winds or intense

warming that may produce rapid snow melt and rising rivers. The flood potential outlook is generally issued 36 hours or more before the potential event. A **Flood Watch** is issued when weather conditions raise the threat of flooding, but occurrence is neither certain nor imminent. A flood watch is generally issued 12 to 36 hours before the potential event. A **Flood Warning** is issued when flooding is expected within 12 hours or is in progress.

Take action to protect lives and property immediately when a flood threatens your area. The following are recommendations for before, during, and after a flood:

*Before:* Find out if you live in a flood prone area  
 \*Ask your local emergency manager about official flood warning procedures  
 \*Know the terms...Flood Watch, Flood Warning...  
 \*Plan for evacuation  
 \*Consider flood insurance  
 \*Make a household inventory  
 \*Take photos of or videotape your belongings and home

*During:* Listen to NOAA Weather Radio, local radio or television for information  
 \*Be aware of streams, drainage channels and areas known to flood suddenly  
 \*If a flood watch is issued, be prepared to evacuate if instructed  
 \*Secure your home if time permits  
 \*If instructed, turn off utilities at the main switches or valves  
 \*Fill your car with fuel  
 \*Fill your bathtub with water in case water becomes contaminated or services are cut off  
 \*Stay away from flood waters  
 \*When deep flooding is likely, permit the flood waters to flow freely into your basement to avoid structural damage to the foundation  
 \*Do NOT attempt to drive over flooded roadways  
 \*Stay away from moving water. Moving water as little as six inches deep can sweep you off your feet.

*After:* Be aware of areas where flood waters may have receded and weakened roads  
 \*Stay away from and report downed power lines  
 \*Stay away from disaster areas.  
 \*Continue to listen to radio for event and assistance information

*Consider health and safety needs:* Wash frequently with soap and clean water if you come in contact with flood waters.  
 \*Throw away food that has come in contact with flood waters.  
 \*Don't throw away damaged goods until an official inventory has been taken

The best protection during a flood is to leave the area and go to shelter on higher ground!

## Spotter Corner

As the weather transitions to more summer-like conditions, we hope all weather spotters will be shifting gears toward thunderstorms and their resulting weather. We have already had several thunderstorm days this spring, especially in the Northeast Washington and Idaho Panhandle mountains. Spotter reports from these thunderstorms indicated mainly pea size hail and brief downpours. On April 27th, the NWS did receive a report of a very weak tornado just north of Spokane near Mead. Luckily, it descended in a field and no damage was reported. Good job, spotters! Keep those reports rolling in!

The NWS conducted a spotter training meeting on May 20th for the Spokane area ARES/RACES ham radio group. It was a great turnout with close to 25 in attendance. Additional spotter training meetings will be scheduled in the near future for portions of eastern Washington and north Idaho.

Remember, we welcome ALL reports. Don't be bashful on giving us a call even if the weather your experiencing doesn't exactly meet the checklist criteria. If you think it's significant, we would like to know.

**Trivia Question:** What is the driest location in our forecast area of eastern Washington and north Idaho?

## Weather Spotter Checklist

- ◆ **FUNNEL CLOUD or TORNADO**....Watch for rotation in cloud and damage
- ◆ **HAIL**....Pea-sized or larger
- ◆ **HEAVY RAIN**....1/2 inch in 1 hr; 1 inch in 12 hrs; 1.5 inches in 24 hrs.
- ◆ **HEAVY SNOW**...4 inches in 12 hrs; 6 inches in 24 hrs
- ◆ **FLOODING**...Of any kind. Is the water level rising or falling?
- ◆ **POOR VISIBILITY**....1/2 mile or less in blowing dust, rain, or snow.
- ◆ **TRAVEL PROBLEMS**...Any conditions where poor or hazardous travel conditions observed or reported.
- ◆ **STRONG OR DAMAGING WINDS**...Any winds estimated to be over 40 mph. Or winds that produce any damage. Estimate using Beaufort chart.
- ◆ **ANY DAMAGE, INJURY OR LOSS OF LIFE DUE TO WEATHER**...Be sure to include location, time and specific cause.

If you observe any of these conditions, please call the NWS in Spokane and make a report at

## Will it FLOOD this Spring???

By the time you receive this issue, the snow melt may finally have begun, and the rivers of eastern Washington and north Idaho may already be on the rise.

By mid May, the flood potential for rivers and lakes in north Idaho and east Washington remained high. The potential for flooding still depends on the pattern of warming as spring progresses. With cool temperatures so far this spring, the chances for sudden warming are increasing. This would cause the snow pack to melt quickly with greater possibility of high flows and flooding.

The Idaho Panhandle basins have high potential for spring flooding. This includes the Kootenai, Priest, Pend Oreille, Coeur d'Alene, and St Joe rivers. April's precipitation in this area was around 50% of normal, but deep snow packs still remain at mid and high elevation sites. Snow packs are especially high in Boundary and Bonner counties. Runoff is expected to be high in these basins with volume forecasts ranging from 105-135% of normal. Conditions near Lightning creek and Milo creek have improved, but still remain a definite concern.

Runoff from melting of the heavy snow pack on the east slopes of the Cascades will probably cause flooding on several rivers late this spring or early summer. Major flooding is possible, especially on the most flood prone rivers.

The rivers that face the greatest threat of flooding are the Pend Oreille and Spokane rivers in northeast Washington, the Similkameen, Okanogan and Methow rivers in north central Washington and the Naches rivers on the east slopes of the central Cascades. Flooding is also possible on rivers such as the Entiat, Wentachee, Yakima, and Snake.

This year's snow pack in basins east of the Cascades reached a maximum water content in mid April. At that time the snow pack ranged from 140- 190% of normal. The snow pack has decreased little since mid April due to generally cool weather. This year's snow pack is similar to the snow packs of late spring 1997 and 1972 that led to flooding, in some cases major flooding, on many of these rivers.

A period of hot weather in eastern Washington usually drives snow melt in late spring or early summer. If the cool spring weather continues to preserve the deep snow pack, the worse the flooding could be when warm weather rapidly set into the region. Heavy rain, winds or

an outbreak of thunderstorms could further increase peak flows of the rivers.

The extent and severity of flooding in eastern Washington and north Idaho this spring will greatly depend on the way spring unfolds in the area. The worst case scenario would be a rapid warm up with periods of warm rains and strong winds.

The good news is that county emergency officials and much of the public is probably better prepared to handle flooding than any time during the past several years. Plans are in place and equipment, supplies and personnel have been identified and organized. Several communities have even held preparedness drills. People along flood prone rivers should continue to prepare for the possibility of flooding during the next several weeks. Keep informed on the latest weather forecast and be ready to act quickly if the National Weather Service issues a flood watch or flood warning for your area.

Let's hope that Mother Nature treats us fairly and that the weather warms slowly without heavy rainfalls or strong warm winds.

## New Service Hydrologist

Brian Avery, who served as hydrologist and monitored the rivers of eastern Washington and north Idaho for the past several years, has transferred. He has taken the position as Service Hydrologist in Grand Junction, Colorado and is enjoying a much drier climate. A new Service Hydrologist will be coming on board at the Spokane office in June. He is Charles Ross, transferring from Boston, Massachusetts, though he has had many years of hydrologic experience in the West prior. We wish the best of luck to both Brian and Charles in their new positions.

### Trivia Answer:

Avg annual precip - Priest Rapids Dam - 6.87"

Driest year on record - 1976

Ephrata Airport - annual precip - 3.00"

Priest Rapids Dam - annual precip - 3.28"