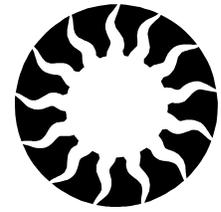


The Weather Watcher

of the Inland Northwest

www.wrh.noaa.gov/Spokane



Flash Flooding Strikes in the Okanogan Highlands

On Thursday evening July 12th, persistent thunderstorms brought copious amounts of rain to a rather small area east of the town of Oroville in north central Okanogan County. Heavy rainfall developed in a short period of time. This combined with the steep terrain and sparse vegetation in the area led to a rare flash flood that claimed the life of a 56 year-old woman.

The overall weather pattern this day had a ridge of high pressure over the entire western U.S. with a trough of low pressure off the Pacific Northwest coast. Southerly flow over the region had led to very hot temperatures, as well as the arrival of monsoon moisture. At the same time, a fairly strong disturbance moved from Oregon to the Okanogan Highlands. By afternoon, scattered thunderstorms had erupted across eastern Washington. In the late afternoon and early evening, one area of thunderstorms tracked across the Okanogan Highlands and east of the town of Oroville. Radar images revealed that this band of storms was nearly stationary during the evening hours; this prompted the issuance of a flash flood warning.

Although the atmosphere did not show the signs of an ideal flash flood pattern, some

necessary ingredients were present. An unstable air mass and monsoon moisture helped fuel the thunderstorms. Light winds aloft caused the storms to move very slowly. The terrain and a favorable wind direction caused continuous redevelopment or "training" of the thunderstorms. In other words, a thunderstorm would develop over the higher terrain southwest of Oroville, and then slowly move north and weaken as it crossed the Canadian border. Then another storm would develop in the same spot and follow the similar path. None of the storms by themselves were particularly strong, but this ongoing cycle of decay and re-birth which lasted over 3 hours, eventually led to the flash flooding.

A team from the National Weather Service visited this area a few days later. It was determined that the flash flood was confined to an area east of Oroville, along and close to Chesaw Road. Radar estimates from the NWS Doppler radar in Spokane, indicated 4+ inches of rain fell across the area. After talking with local residents, they estimated up to three inches of rainfall, and as much as four inches atop of nearby Fletcher Mountain. The duration of the heaviest rain appeared to last about two hours, from 6:45 pm until 8:45 pm. This flash flood event caused widespread damage to roads, bridges and culverts with an early estimate of \$1.5 million dollars. According to several rainfall studies and reports, this storm is gauged to be a 100+ year rainfall event. ☼
Charles Ross, Paul Bos & Ken Holmes



Debris left from the flash flooding episode of July 12th on the Oroville-Chesaw Road.

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Editor's Notes

A big THANKS to all the spotters! I realize that this summer has lacked exciting thunderstorms, but there have been several small events that your reports of rainfall, hail and wind have been quite useful. Despite the fancy computers and technology in the weather office, we still need ground truth to verify and adjust our forecasts and warnings. Keep up the good work!

If there is something you would like to see in the next newsletter or if you have comments about a previous issue, please contact Robin Fox or Ken Holmes at (509) 244-0110.

The main purpose of this publication is to keep our readers informed about our services and programs, and to recognize those who help us accomplish our mission, including weather spotters, coop observers, media and emergency management.

All articles are written by the NWS staff. A special thanks to Charles Ross, Ron Miller, Ken Holmes, Paul Bos and John Livingston for their contributions. ☼



TRIVIA ANSWER:
Spokane received
1.4" of snow on
Sept. 23, 1926.

A Dry but Seasonal Summer

With Labor Day past, it's time to take a look back at the Summer of 2001. Our winter and spring drought continued into the summer. Except for Wenatchee in June, all sites were below their normal precipitation amount. For the period 1 Oct - 31 Aug, here's how this year compares to normal and ranks (# in parentheses) with the driest year on record:

	2000-2001	Norm	Driest Ever
Wenatchee	5.16" (5th)	8.16"	3.23"('76-77)
Lewiston	9.21" (11th)	12.36"	6.86"('65-66)
Spokane	9.50" (6th)	15.51"	8.48"('76-77)

The summer got off to a cool start in the month of June. Daytime highs were 4° or more below normal. Interestingly, this is the 3rd consecutive cool June. In fact, 8 out of the last 9 Junes have been cooler than normal. One of the more noteworthy events in the month was a severe thunderstorm episode on the 27th. Storms developed in the southwest end of the Basin and moved off to the north-

east. Wind gusts to 59 mph and 1" hail were reported, along with heavy rainfall.

By start of July, the weather had turned noticeably warmer. The 4th of July weekend was quite hot, with readings between 95° and 105°. With the heat came the fire season. Dry lightning sparked the first major fires of the season on the 9th and 10th in Okanogan county. A cool and wet period by mid July helped contain those fires. This was short lived as temperatures heated up again by the end of the month.

August proved to be a hotter than normal month. Daytime highs were 2-4° warmer than usual. And while there weren't any severe thunderstorms in August, there was a considerable amount of dry lightning. By mid month, large wildfires were burning in many locations. But similar to the previous month, it turned cool and wet by the end of August which helped firefighters get a handle on the wildfires.

So, what kind of summer was it? Based on the average temperatures, it looked to be pretty close to normal. A cool June was offset slightly by a warm August, but average temperatures can be misleading. A couple of really cool or really hot days can skew the results. So another way to look at it is how many days did the high temperature make it into the 80s and/or 90s.

	+80°	+90°
Wenatchee	57(61)	26(29)
Lewiston	65(68)	39(40)
Spokane	49(51)	16(17)

In all cases, the number of days of +80° and +90°F were just shy of what we get on average (# in parentheses). In fact, this marks the 3rd summer in a row where our temperatures were near normal or slightly below normal.

☀ Ron Miller

Summer Weather Statistics

Wenatchee Airport	Jun	Jul	Aug	Total
Average High Temp	73.4	86.1	87.9	82.5
Departure from Normal	-5.7	-0.6	+2.2	-1.3
Average Low Temp	51.4	60.3	61.7	57.3
Departure from Normal	-3.0	+0.5	+1.8	-0.2
Total Precip	0.72	0.07	0.23	1.02
Lewiston Airport	Jun	Jul	Aug	Total
Average High Temp	75.8	87.1	92.4	62.6
Departure from Normal	-4.0	-1.9	+4.1	-0.6
Average Low Temp	50.8	60.1	60.6	57.2
Departure from Normal	-3.1	+0.9	+1.7	-0.2
Total Precip	1.12	0.59	0.14	1.85
Departure from Normal	-0.13	-0.08	-0.64	-0.85
Spokane Airport	Jun	Jul	Aug	Total
Average High Temp	70.7	82.6	86.0	79.8
Departure from Normal	-4.0	-0.5	+3.5	-0.3
Average Low Temp	46.6	54.2	56.2	52.3
Departure from Normal	-2.9	-0.5	+1.7	-0.6
Total Precip	1.10	0.28	0.26	1.64
Departure from Normal	-0.16	-0.39	-0.46	-1.01

Remember, to make a Weather Spotter Report, please call the NWS Spokane
(509) 244-0435



Fire Season 2001 Heats up in the Inland NW

The 2001 fire season in the Inland NW has lived up to the forecasts so far. Well below normal precipitation and snow pack over the winter and spring of 2000-2001 set the stage for very dry fuels, both small and large alike. Despite some sporadic rains this summer, dry and hot weather arrived in early July and remained through most of August.

NWS Spokane Incident Meteorologists (IMETs) Gary Bennett and Todd Carter have been busy since mid-June. IMETs are trained to travel to remote locations and give on-the-spot weather forecasts. Early this summer, on site assignments were mainly to pest spray projects, but this quickly gave way to July wildfires. The Spokane IMETs were quickly dispatched to the fire teams fighting the Libby Creek and Thirty Mile fires in Okanogan County.

The situation quieted down until early on the morning of Monday, August 13th when a well forecast dry lightning event started new fires across the region. Dry lightning, caused by high level thunderstorms that produce little if any rainfall but plenty of lightning, tracked along the Cascades into the Okanogan Valley and Highlands. Additional fires sparked up in north Idaho as well. By the following weekend, there were seven IMETs from across the

West working on fires in the Inland NW, including Gary Bennett assigned to the Area Command Center in Wenatchee and Todd Carter on the Tonasket Complex.

It has been a busy fire season so far for the IMETs in the field and the staff at the Spokane NWS office. And with 4-6 weeks still to go, it is likely that 2001 will go in the record books as one of the most memorable fire seasons across the region. ☀ *John Livingston*



Smoke plume from the Icicle Fire Complex near Leavenworth on August 17th.

A Look Back - 10 years since FIRE STORM

Strong winds with gusts as high as 62 mph swept across the Inland Northwest on Wednesday, October 16th 1991. These winds were responsible for 92 separate wildland fires in Spokane, Stevens, Ferry, Okanogan, and Pend Oreille counties. One hundred and fourteen homes and numerous other structures were destroyed. One resident died attempting to escape the flames. As the fire fighters extinguished the flames, they were also on alert through the weekend when a similar high wind event was forecast for Monday, October 21st.

The weather pattern in 1991 started wet during the first half of the year. Spring rains through June contributed to the abundant growth of grasses in the summer months. Then September turned dry with no measurable rainfall for 41 days prior to the fires that ignited on October 16th. Meanwhile, unseasonably warm temperatures were accompanied by low humidity, adding to the hazard presented by the cured grasses and dry fuels. This combination usually occurs during the summer months of fire season, but this late occurrence prolonged the season well into the fall. Finally,

a cold front dropped from Alaska on October 15th and brought rains to western Washington. East of the Cascades, this same front was accompanied by only high winds. Winds laden with

dust shielded many fires from quick discovery. Visibilities were reduced to almost zero with the wind blown aerosols of dust and eventually smoke.

Ponderosa pine and grasslands comprised 90% of the acreage burned. Its resin and needles are especially susceptible to fire because of their ease of ignition and burning intensity. The majority of the fires were started when winds blew down power lines or when trees or limbs fell into power lines. This caused numerous fires in a very short time, while the increased wind led to rapid fire growth and fire spread.

Fire events like this one have occurred for many years in the West, but now the fires are more disastrous because people have moved closer to the forest in "interface" areas. The Inland Northwest has experienced high population growth and development in its wildland interface areas since Fire Storm, but there has also been a tremendous amount of mitigation and planning to prevent a disaster of this caliber to happen again. Further more, it is important for homeowners and residents to take precautions and practice safe wildfire prevention around their homes. Visit www.nfpa.org and www.firewise.org for more background and information on Fire Storm and wildfire safety. ☀

Autumn Outlook

For the period of September through November 2001, expect near normal temperatures and precipitation for the Inland NW.



New NOAA Satellite

On July 23, 2001, the latest weather satellite, GOES-12, was successfully launched and placed into orbit. GOES-12 will remain in standby until needed as a replacement for the current satellites GOES-8 and GOES-10.



Practice Wildfire Safety

- After lightning, people are the #2 cause of most wildfires . . . find out how you can promote and practice wildfire safety.
- Contact your local fire department, health department, or forestry office for information on fire laws. Make sure that fire vehicles can get to your home. Clearly mark all driveway entrances and display your name and address.
- Report hazardous conditions that could cause a wildfire.
- Teach children about fire safety. Keep matches out of their reach.
- Post fire emergency telephone numbers.
- Plan several escape routes away from your home by car and by foot.
- Talk to your neighbors about wildfire safety. Plan how the neighborhood could work together during and after a wildfire. Make a list of your neighbors' skills, such as medical or technical. Consider how you could help neighbors who have special needs, such as elderly or disabled persons. Make plans to take care of children who may be on their own if parents can't get home. For more information, please visit www.redcross.org/distaster/safety/guide.html.



NWS at the FAIR

The NWS will have a booth at the Spokane County Interstate Fair during 7-16 September. We will be located in Bay #1 next to the carnival rides. The feature highlights this year include an inflated upper air balloon and "Twister, the Tornado Machine". Various types of weather equipment and displays will be on hand, along with a member of our knowledgeable staff. If you will be attending the Fair, stop by and say HI. ☀ *Robin Fox*

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TRIVIA: When was the earliest snowfall in Spokane?