OKLAHOMA

ANNUAL SUMMARY

1988

CONTENTS

1988 IN PERSPECTIVE

SUMMARY OF THE YEAR

Extremely low temperatures (-17°F at Alva reported on January 8), unusually warm temperatures (75°F reported throughout south central Oklahoma on January 31), and a record-breaking snowstorm highlighted January 1988 weather. On January 6-7 snowfall ranged from 7" at Clinton to 13" of snow at Duncan.

Generally cool, dry February weather included 24-hour temperature swings of 40 degrees, icy road conditions and numerous grass fires. The Oklahoma City Fire Department reported 22 grass fires in one 15-hour period on February 22. Firefighters battled a 4000 acre grass fire for seven hours near the Greer-Beckham county line.

March, Oklahoma's traditional winter-to-spring transition month, contained numerous weather events of note including destructive hailstorms, a fatal tornado, heavy snowfall, freezing cold and widespread grass fires. Maximum snowfall ranged from 2" at Hennessey to 16" at Cherokee. Hail and a 100-foot diameter tornado reported in Midwest City on March 27 claimed one life and delivered approximately $1 million of damages to Oklahoma City area auto dealerships and nearly $6 million of damage to Tinker Air Force Base vehicles and buildings.

April weather was cooler and wetter than long-term averages. Above average precipitation in the northwestern two-thirds of the State resulted from a strong storm system that entered the State on the 1st and a steady intrusion of fronts throughout most of the month. The month ended with south central and southeastern areas of the State in need of moisture.

May 1988 was one of the driest May's ever recorded in Oklahoma. All stations but one recorded below average precipitation. May precipitation was the lowest in 39 years at many stations. By the middle of the month, dry weather resulted in the lowest soil moisture supplies since summer, 1987.

Few rain days and scattered thunderstorms resulted in June rainfall totals ranging from 96% (northwest) to less than 25% (northeast) of normal. Extreme moisture deficits continued to build in southeastern Oklahoma which received only 44% of its average June precipitation. Above average temperatures in eastern Oklahoma aggravated these dry conditions. Altus Air Force Base reported a high temperature of 115°F on June 8, the highest in the nation for that day. Dry conditions in eastern Oklahoma also contributed to a record 169 grass and forest fires. These fires consumed 2579 acres. This is nearly three times the previous record acreage lost to June fires.

In July, several days of isolated thunderstorms delivered above average precipitation to most of the State. Unfortunately, these rains were insufficient to alleviate long-established moisture deficit conditions. Deep moisture reserves continued to be depleted. By month's end, 50% of topsoil and 70% of subsoil moisture supplies were reported to be inadequate.

August was slightly warmer and drier than normal. Hot summertime conditions most of the month were moderated by a record breaking cool air mass which entered the State near the end of the month. Monthly precipitation ranged from about one-third of normal in the western two-thirds of the State, to nearly 100% of normal in the southeast.

Above average precipitation over most of the State during September provided moisture vitally needed for agriculture. Early in the month Oklahoma Department of Agriculture reports indicated that 93% of topsoil and 80% of subsoil moisture supplies throughout the State were inadequate. These figures improved to 25% and 40% by the end of the month.

Persistent northwesterly flow in the upper atmosphere over Oklahoma resulted in the 15th coolest and 26th driest October in the last 97 years. Most stations reported more raindays than normal, but monthly totals were generally less than the long-term average.

November weather provided a mix of large hail, destructive winds, duststorms and snow. An unusual storm system struck the State on the 15th as an intense upper-level low approached. A surface cold front ahead of the low generated winds over 60 mph over much of the State and produced a visibility-reducing duststorm. Strong winds fanned a devastating fire in Altus which destroyed over $2 million of cotton and 29 houses and businesses. Strong winds caused $250,000 damage in Hennessey and approximately $150,000 in Leflore County. In spite of the storm's vigorous nature, rainfall amounts averaged less than .5" Statewide.

1988 ended on an unseasonably warm note, with December ranking in the warmest 10 of the last 40 years of record in Oklahoma. Precipitation was notably below average in western and north central portions of Oklahoma. The Panhandle received only 13% of its average December precipitation.

IMPACTS OF THE 1988 DROUGHT IN OKLAHOMA

Weather

Statewide, 1988 ranks in the coolest one-third and driest one-third of the last 90 years. From a geographic coverage and duration point of view, the six worst drought years (as defined by the Palmer Drought Severity Index, PDSI) between 1892 and 1988 were 1895-96, 1911, 1917-18, 1954, 1955 and 1956. Of these six periods, five can be clearly categorized as being hot and dry (1895-96, 1911, 1954, 1955 and 1956). 1917-18 was very cool and very dry, far more so than 1988. It can be stated then, that most large-scale, long-lasting droughts in Oklahoma are characterized by hot and dry weather conditions, but cool and dry drought episodes such as occurred during 1988 have been reported during the historical record as well.

The majority of precipitation shortages were felt in the cattle and forage areas of the eastern one-third of the State. These were also the areas of most persistent drought. Later in the summer, dry conditions spread to the southwest and affected non-irrigated row-crop production. September proved to be an extremely wet month for the State which permitted the wheat crop to get off to a promising start, but this was followed by three consecutive months of further moisture shortages in northwestern Oklahoma. In summary, PDSI drought conditions first became established in southeastern Oklahoma during early spring, 1988, spread westward and ended the year in the northwest.

PDSI values during 1988 ranged from extremely moist (values larger than 4.0) during the early summer in the Panhandle, north central and west central portions of the State, to severe drought in southeastern Oklahoma (values more negative than -4.0). The last date "near normal" range PDSI values (.4 to -.4) were reported by the Climate Analysis Center for southeastern Oklahoma was the week ending February 20, 1988. Duration of drought conditions during 1988 are presented in the table below. To summarize, southeastern Oklahoma was characterized as experiencing some level of PDSI drought 84% of 1988. Severe PDSI drought was reported in this area 36% of 1988. Other areas of the State experiencing PDSI drought conditions for more than 50% of 1988 were east central and south central Oklahoma.

PERCENTAGE OF 1988 REPORTING PDI DROUGHT CONDITIONS

AREA	MILD	MODERATE	SEVERE	TOTAL
Panhandle	2	0	0	2
North Central	23	0	0	23
Northeastern	15	23	10	48
West Central	13	10	0	23
Central	17	29	0	46
East Central	21	31	0	52
Southwestern	23	6	0	29
South Central	31	33	0	64
Southeastern	19	29	36	84

There were 5 heat related deaths reported during 1988 (Figure 1). Eighteen tornadoes were reported as compared to a 30-year annual average of 61 (Figure 2). There were 41 hail days reported during 1988. This compares to a 1959-1982 average of 76 hail days per year. These statistics are not unexpected since drought years are usually associated with a drop in the number of realized precipitation and severe weather opportunities. The overall result of relatively low frequencies of extreme weather in Oklahoma during 1988 (tornadoes, hail, winds, flood, lightning, blizzards and heat) are direct economic losses to the State that are significantly smaller than those of 1987 (Figure 3). Figure 3 estimates do not explicitly contain the costs of drought. Such dollar estimates are extremely difficult to assemble across the wide range of impact areas in Oklahoma. The discussion that follows represents a mixture of qualitative and quantitative assessments provided to the Survey by the following agencies: Oklahoma Department of Agriculture, Oklahoma Wildlife Commission, Oklahoma Department of Pollution Control and the Oklahoma Water Resources Board.

Agriculture

Drought associated agricultural costs during 1988 were the highest in the southeastern one-third of Oklahoma. Severe hay and forage shortages were reported in these areas and ranchers were forced to purchase feed for their cattle throughout most of 1988. In many cases there was inadequate moisture for natural forage grasses to become established. Farmers and ranchers in this area were most greatly impacted by high hay prices.

Moisture conditions elsewhere in the State were adequate until July. At this time dryland cotton in the southwest began to exhibit moisture stress, but irrigated cotton produced record yields as a result of favorably cool summertime temperatures.

1988 winter wheat and peanut yields were up from 1987 levels (70% of all Oklahoma peanuts are irrigated). Southwestern peanut yields were hurt, but this was more than made up by good irrigated yields in south central and southeastern Oklahoma. All other crops (corn, sorghum, cotton, hay and soybeans) showed yield declines over 1987 levels. In spite of these declines, Oklahoma agricultural production value was 137% of the 1987 level. This is the result of good wheat and peanut harvests and price increases in response to supply shortages of the other crops. Therefore, although yields were down, prices were up and the aggregate State-level economic impact of the drought on the agricultural sector during 1988 is likely to be negligible.

Wildfire

The following table illustrates the impact of dry 1988 conditions in eastern Oklahoma characterized by wildfire events and losses. May and June 1988 witnessed new records for the number of wildfires reported in eastern Oklahoma.

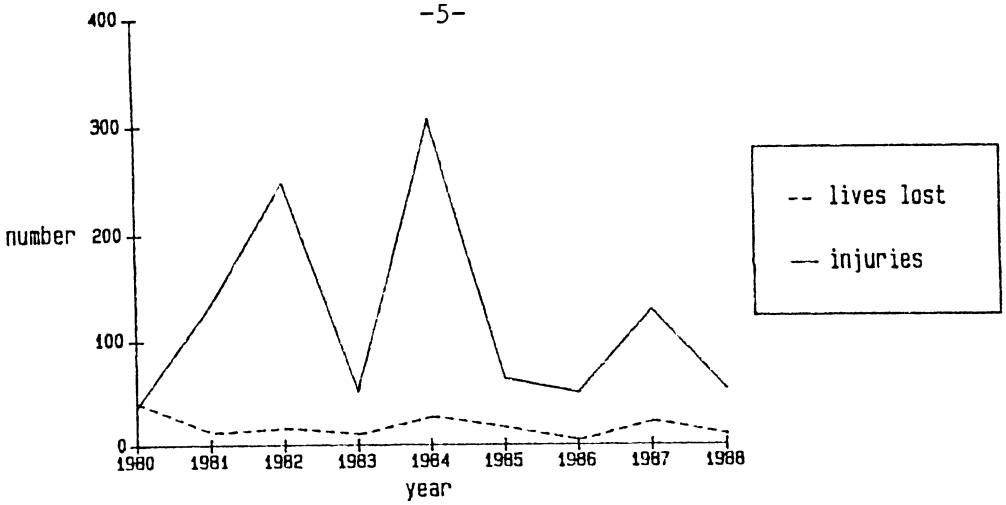


Figure 1. The cost in lives lost and injuries resulting from extreme Oklahoma weather events. (Source: NOAA, Storm Data)

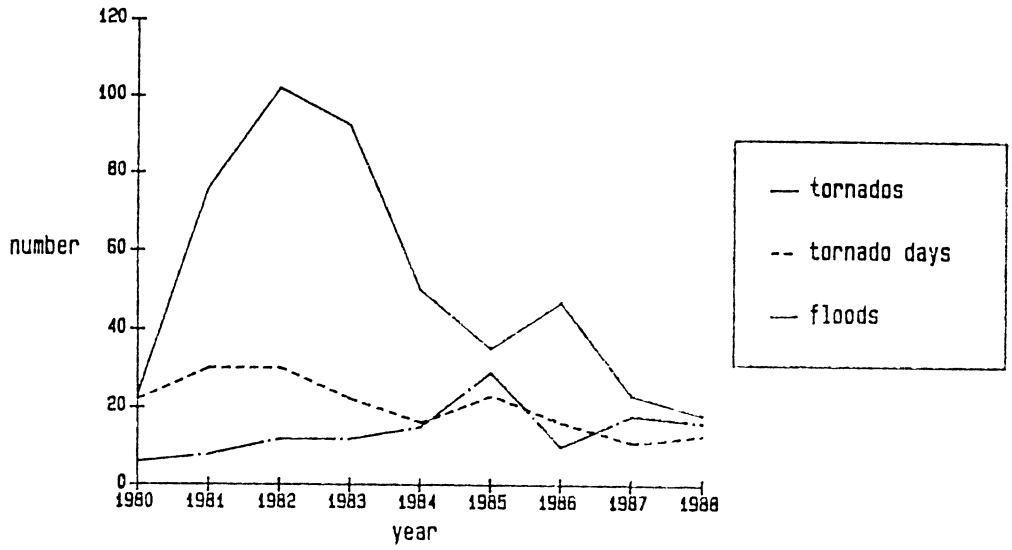


Figure 2. Occurrence of selected extreme weather events. (Source: NOAA, Storm Data)

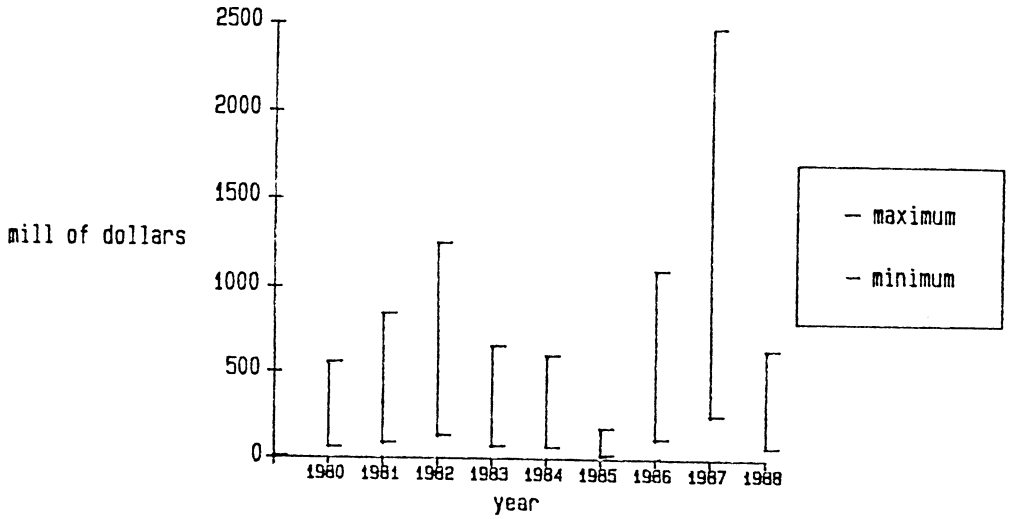


Figure 3. Direct economic costs of Oklahoma extreme weather events. (Source: NOAA, Storm Data)

Wildfire Statistics for Eastern Oklahoma Counties

Month	1988	1988 Acres	10-yr Avg	10-yr Avg Acres
January	121	1354	170	2823
February	537	12973	215	5579
March	595	16280	390	12456
April	189	3360	185	5451
May	110	1737	18	377
June	168	2354	16	105
July	103	970	90	1126
August	48	450	131	2580
September	32	198	99	1490
October	46	125	90	1680
November	137	1588	92	1484
December	175	2477	91	1396
TOTAL	2261	43864	1588	36484
Cost ($85/ac)		$3.7 mill		$3.1 mill

Wildlife

No major wildlife impacts have been reported as yet, but Wildlife Commission personnel expected to receive such reports during the 1989 big game hunting season (May-June). As a result of reduced forage all through the summer, deer reproduction has been affected. Fewer fawns have been born and those that were born, arrived late. A poor survival rate is expected. The area of most severe impact is expected to be eastern Oklahoma. Mild winter conditions have been a blessing for the deer. Even though they entered the winter season in poor physical condition, they should have a better than expected survival rate. The dry weather has been beneficial in terms of parasite control, but the herd concentration resulting from limited natural forage may enhance the spread of those surviving parasites. Impacts on smaller game are more difficult to detect because of fairly high natural rates of population turn-over.

Water Quality

The Department of Pollution Control reported that a higher than average number of complaints were received during the summer of 1988. Most of this increase is attributed to fish-kill and surface water complaints. No information is available that would directly relate the surface water complaints to drought (unusual low-flow) conditions.

Water Quantity

Surface water supply data were provided by the Oklahoma Water Resources Board for 36 major lakes and reservoirs throughout the State. These data indicate that although below normal precipitation was reported in east central and southeastern portions of Oklahoma over an extended period of time, lake levels (with the exception of those used for water transfer or with controlled pools) were never drawn below 90% of capacity. No data are available for lake levels in the northwest or west central portions of the State.

Lake Keystone in north central Oklahoma functions as the headwaters of the Kerr-McClellan Navigation System. Significant draw-downs were not begun until July, 1988. Capacity returned to near 100% (normal levels) during September 1988. The 1988 minimum percent of capacity during this

time was 87.9 reported during August. Lake Eucha, a major source of water for Lake Spavinaw and, subsequently, the City of Tulsa, was tracked as an indicator of municipal demands in northeastern Oklahoma. Significant draw-down began during July, 1988. A minimum capacity of 73.9% was reported during November, 1988. The lake had not fully recovered as of January 1989 and is reported at 87.3% of capacity.

Potentially serious conditions were reported in central and southwestern Oklahoma (see table which follows). Lake Altus, in southwestern Oklahoma has a primary use of providing irrigation water for row crop production in the area. Although municipal supply lakes remained at adequate levels, larger 1988 draw-downs and slower recovery of Lake Altus than during 1987 were noted. Minimum capacity occurred in August, 1988 (52.1%). Recovery has begun but levels were reported at 75.2% of capacity as of January 1989. If full recovery is not achieved and another precipitation deficit year similar to 1988 were to occur, surface water supplies for irrigation agriculture in southwestern Oklahoma could be limited.

A second impact area is major municipal water supply in central Oklahoma. All metropolitan Oklahoma City municipal supply lakes have provision for water transfers from other sources. For example, Lake Atoka, in southeastern Oklahoma serves as the primary source of water for Lake Draper, an Oklahoma City municipal reservoir. Lake Atoka levels (as percent of capacity) during 1987 were either approximately equal to or even higher than those of Draper Lake. This assures a ready supply of supplemental water when needed. By August, 1988 this role was reversed and has remained reversed through January, 1989 with Lake Atoka at 62.5% of capacity and Draper Lake at 88.5% of capacity. The Lake Atoka minimum, 51.5% of capacity, was reported during December. As in Lake Altus, although adequate supplies were reported during 1988, if southeastern Oklahoma does not receive adequate rainfall and runoff to refill a substantial volume of Lake Atoka, water supplies for summer municipal demands provided by Lake Draper could be limited.

Percent of Lake Capacity of Selected Oklahoma Lakes

	Southwestern Altus (irrigation)		Central Draper (municipal)		Southeastern Atoka (transfer)	
	1987	1988	1987	1988	1987	1988
J	100	94.1	90.0	70.3	75.4	100
F	100	64.2	90.0	68.2	85.8	100
M	100	100	86.6	68.2	100	98.6
A	100	99.7	84.5	76.9	99.4	100
M	98.0	100	80.9	78.7	98.0	96.2
J	100	90.9	100	80.4	99.5	82.2
J	100	83.1	78.2	81.0	99.0	81.2
A	81.9	52.1	70.7	81.0	93.9	73.4
S	82.2	61.0	73.3	83.1	88.5	65.5
O	84.0	-	73.3	-	80.7	-
N	-	66.2	-	85.1	-	55.9
D	-	71.3	-	88.5	-	51.5

STATE RESPONSE ACTIONS FOR THE 1988 DROUGHT

Brian Vance
Oklahoma Water Resources Board

In July, as last summer's nationwide drought became an increasing threat to Oklahoma, Governor Bellmon formed the State Drought Action Coordinating Council. The group was created to ensure that "the full capabilities of both State and Federal agencies - and affected areas of the private sector - are aware of the drought and are working together to minimize potential drought impacts in Oklahoma."

Members of the Drought Council were selected from various State and Federal agencies and from private agricultural groups. Each member contributed information as to how their agency or group is set up to mitigate the effects of drought.

The final result of the fact-finding mission was a report to the Governor which contains a general inventory of what programs are in place - or could be put into place - to deal with drought problems. The report is a likely precursor to an eventual drought contingency plan for Oklahoma.

At the Council's first meeting, they recommended the creation of a "Hay Hot-Line" to assist in locating available hay for drought-stricken areas. Subsequently, the State Department of Agriculture put that communication tool into operation.

Following several more meetings and an information-gathering period, the Council made nine recommendations to Governor Bellmon. First, the Council advised him to appoint a full-time Coordinator to coordinate drought-related program information among State and Federal organizations and act as a liaison with the Governor's Heat Task Force. As a result, the Governor appointed Glenn Sullivan, State Secretary of Natural Resources to the Drought Coordinator post. Also, bi-weekly reports were begun - a cooperative effort among the Oklahoma Climatological Survey, State Water Resources, Department of Health and Department of Agriculture - to update citizens on the increasing severity of the drought. These reports contained information on current drought conditions (rainfall and moisture data, including Palmer Drought Indices for all segments of the State), 30- and 90-day precipitation and temperature outlooks, and current drought impacts (crop conditions and reservoir and groundwater levels). The Council also recommended that the Drought Coordinator take the lead in developing a long-term drought mitigation plan to identify drought assistance programs and recommend actions resulting from the planning process.

Thirdly, the Council suggested that additional monies be appropriated to the Statewide Water Development Revolving Fund, administered by the Oklahoma Water Resources Board, so it can meet all of Oklahoma's water resources development needs. From an original appropriation of $25 million, the Revolving Fund has been depleted to approximately $5 million today. In the Governor's budget request to the Legislature, he requested a $5 million appropriation to the Fund.

Governor Bellmon indicated that he would not support the Council's fourth recommendation - to implement a State-funded, comprehensive weather modification program. He stated that cloud seeding technology has not advanced far enough.

Other recommendations included development of a "Red Flag Fire Warning" system to signal potential periods of fire danger and development of a burning permit system to regulate citizen use of fire outdoors. They also suggested that the Governor seek permission from the Secretary of Agriculture to allow all counties in Oklahoma to hay and graze on Crop Reserve Program protected acreage when 40 percent of the counties containing this acreage have been designated for Emergency Haying and Grazing. And the Governor should request the Secretary to designate available funds to help farmers and ranchers pay for transportation of livestock from drought areas to other areas where grazing land is available. The last recommendation was that advance deficiency payments received under wheat, feed grain, cotton and rice programs should not have to be refunded regardless of the market price.

STORM SUMMARY REPORT

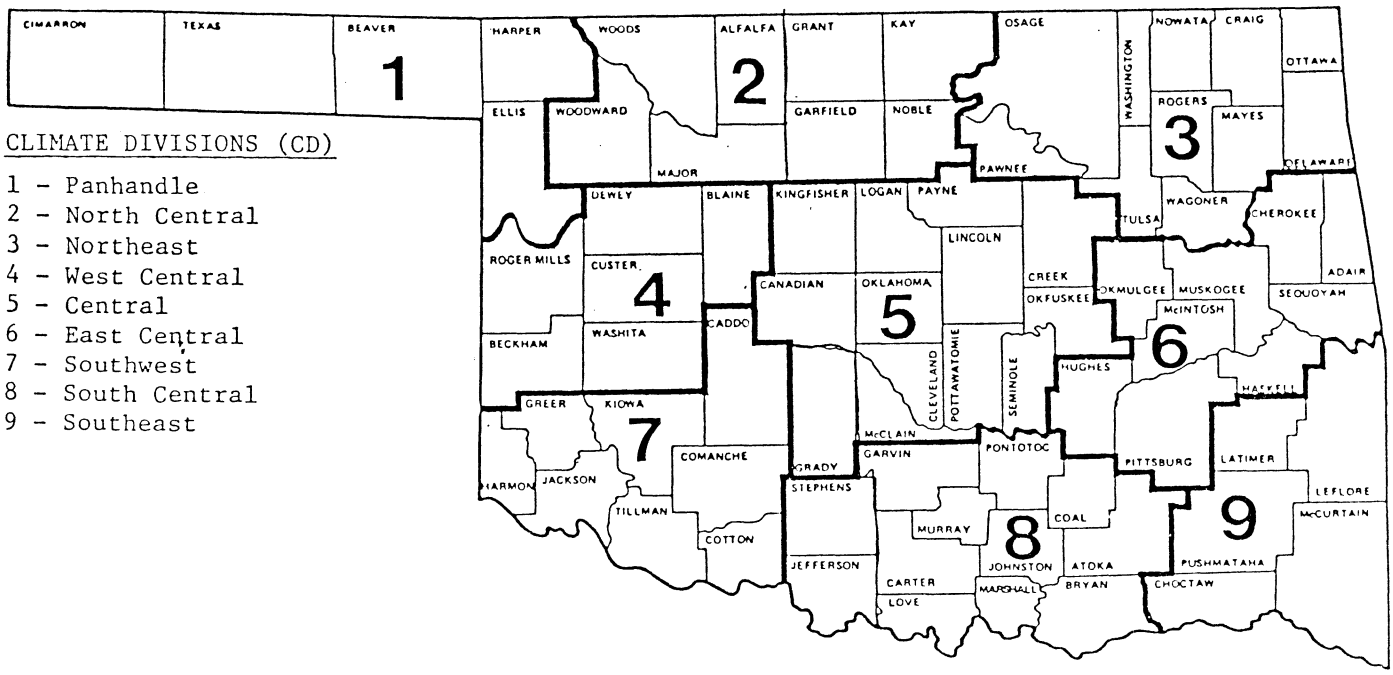
STATE OKLAHOMA MONTH _____ YEAR 1988

TYPE OF STORM	NUMBER	DAYS	DEATHS	INJURIES	DAMAGE*	
					PROPERTY	CROPS
TORNADOES	18	13	1	2	.565 mill to 5.65 mill	No Estimate
HAIL			0	1	55 mill to 550 mill	No Estimate
THUNDERSTORM WINDS			0	19	1.2 mill to 12 mill	No Estimate
HIGH WINDS			0	0	0	0
LIGHTNING			2	4	10,000 to 100,000	No Estimate
FLASH FLOODS	12		0	2	550,000 to 5.5 mill	No Estimate
FLOODS	4		0	0	50,000 to 500,000	No Estimate
HEAVY SNOWSTORMS AND BLIZZARDS			5	25	5 mill to 50 mill	No Estimate
ICE STORMS #			0	0	0	0
HURRICANES & TROPICAL STORMS			0	0	0	0
ALL OTHERS Heat/ Drought			5	0	No Estimate	See Drought Discussion

* Total damage for month, by categories.
\# Freezing drizzle and freezing rain, commonly known as glaze.

SOURCE: NOAA, STORM DATA.

O K L A H O M A



CLIMATE DIVISIONS (CD)

1 - Panhandle
2 - North Central
3 - Northeast
4 - West Central
5 - Central
6 - East Central
7 - Southwest
8 - South Central
9 - Southeast

1988 STATION SUMMARIES

The following tables contain summaries of the cooperative data received at the OCS during 1988. They represent a preliminary description of climate conditions across the State and have been initially quality controlled for accuracy. Even so, they may not always agree precisely with those final values published by the National Climatic Data Center. Asterisks indicate data are missing within the month or that 30-year "normals" were unavailable. A station is included in the table only if six or more months of complete data are available. Annual averages and totals are computed only if all twelve monthly values are present. Climate division averages and totals are based on complete monthly records.

1988 TOTAL PRECIPITATION AND DEVIATIONS FROM NORMAL (Inches)

CD	ID	STATION	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL	
			PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV
1	0332	ARNETT	1.15	0.7	0.05	-0.6	3.14	1.8	3.32	1.5	0.48	-3.6	4.91	1.6	1.21	-0.8	0.33	-2.0	4.72	2.8	1.31	-0.5	0.76	-0.3	0.04	-0.5	21.44	-0.3
1	0593	BEAVER	0.89	0.5	0.05	-0.5	2.65	1.4	3.58	2.3	1.59	-1.6	0.70	-2.1	9.84	6.9	0.00	-2.8	4.26	2.7	0.30	-0.9	0.04	-0.8	0.00	-0.4	23.90	4.6
1	0908	BOISE CITY	*	*	0.13	-0.3	0.51	-0.3	1.25	-0.1	6.21	3.7	6.10	4.1	1.32	-1.2	0.48	-1.9	4.10	2.5	0.13	-0.7	0.25	-0.3	0.00	-0.4	*	*
1	1243	BUFFALO	1.15	0.6	0.10	-0.8	3.80	2.0	4.06	1.9	1.24	-3.1	0.92	-2.6	3.65	0.3	1.43	-1.9	3.40	0.6	1.02	-0.9	0.20	-1.1	0.12	-0.5	21.09	-5.5
1	3070	FARGO	1.04	0.5	0.02	-0.8	4.74	3.4	3.48	1.6	0.54	-3.4	2.66	-0.5	4.31	2.1	1.54	-0.9	4.40	2.5	0.95	-0.7	0.64	-0.3	0.01	-0.6	24.34	2.9
1	3407	GAGE FAA	0.79	0.3	0.01	-0.8	3.50	2.3	3.10	1.2	0.42	-3.2	3.58	0.8	1.78	-0.3	1.42	-1.0	3.46	1.8	1.06	-0.5	0.40	-0.4	0.04	-0.6	19.58	-0.3
1	3489	GATE	1.64	*	0.00	*	3.88	*	2.35	*	1.42	*	1.46	*	2.94	*	1.24	*	2.23	*	0.62	*	0.06	*	0.08	*	17.92	*
1	3628	GOODWELL	0.34	0.0	0.03	-0.2	0.78	0.0	2.53	1.4	2.49	-0.3	3.19	0.8	3.00	0.1	0.49	-1.8	4.44	3.1	0.12	-0.8	0.03	-0.6	0.09	-0.1	17.54	1.5
1	4298	HOOKER	0.66	0.2	0.08	-0.3	0.75	-0.4	4.44	3.2	1.67	-1.7	1.02	-1.9	2.91	-0.0	1.30	-1.4	4.31	2.6	0.06	-1.0	0.10	-0.6	0.03	-0.3	17.33	-1.9
1	4766	KENTON	0.27	-0.0	0.17	-0.1	0.75	-0.0	1.34	0.0	2.51	0.0	2.02	0.2	5.49	2.6	1.87	-0.6	3.05	1.5	0.04	-0.8	0.10	-0.4	0.07	-0.2	17.68	2.1
1	5045	LAVERNE	1.12	0.4	0.05	-0.8	2.98	1.4	3.69	2.1	0.54	-2.8	2.29	-0.6	3.90	1.4	0.84	-2.1	2.84	0.8	0.82	-0.6	0.17	-0.8	0.09	-0.5	19.34	-2.2
1	6740	OPTIMA LK	0.74	*	0.00	*	1.03	*	3.87	*	1.59	*	0.68	*	7.13	*	0.09	*	3.00	*	0.01	*	0.09	*	0.06	*	18.29	*
1	7534	REGNIER	0.32	0.0	0.09	-0.1	0.56	-0.1	1.43	0.3	5.07	3.1	1.40	-0.4	0.69	-1.8	1.31	-0.6	6.08	4.6	0.00	-0.7	0.28	-0.2	0.02	-0.2	17.25	3.8
1	9017	TURPIN	0.62	*	0.00	*	1.67	*	4.40	*	1.84	*	1.81	*	6.80	*	1.81	*	3.73	*	0.08	*	0.00	*	0.07	*	22.83	*
2	0194	ALVA 1 ENE	0.99	0.4	0.18	-0.6	5.13	3.5	5.33	2.9	1.28	-2.7	2.13	-1.6	2.06	-0.5	*	*	1.44	-1.0	3.66	2.0	0.90	-0.3	0.21	-0.6	*	*
2	0302	VANCE AFB	0.65	*	*	*	2.54	*	4.45	*	0.48	*	4.38	*	4.74	*	0.49	*	6.82	*	1.74	*	*	*	0.34	*	*	*
2	0755	BILLINGS	0.94	0.0	0.30	-0.9	4.62	2.5	7.97	5.0	1.03	-3.5	2.34	-1.7	5.59	2.0	0.10	-2.7	4.93	0.7	1.60	-0.8	2.75	0.8	0.64	-0.5	32.83	0.7
2	0818	BLACKWELL	0.73	*	0.02	*	2.84	*	7.56	*	1.95	*	0.82	*	2.23	*	0.05	*	5.14	*	1.75	*	2.34	*	1.16	*	26.63	*
2	1075	BRAMAN	0.77	*	0.12	*	0.99	*	5.60	*	1.19	*	0.38	*	1.13	*	0.09	*	2.18	*	1.98	*	2.10	*	0.45	*	17.01	*
2	1620	CEDARDALE	1.43	*	0.00	*	6.06	*	4.59	*	0.63	*	2.97	*	2.89	*	1.78	*	4.34	*	1.16	*	1.18	*	0.02	*	27.07	*
2	1724	CHEROKEE	*	*	0.00	0.0	1.50	-0.4	3.27	0.7	1.50	-2.3	2.10	-1.8	4.08	1.3	0.00	-2.5	1.56	-1.1	2.32	0.5	1.30	0.0	0.20	-0.6	*	*
2	2912	ENID	1.55	0.6	0.19	-0.9	3.61	1.7	4.46	1.6	1.05	-3.9	2.47	-1.6	2.69	-0.4	0.43	-2.9	*	*	2.05	-0.7	1.74	-0.0	0.66	-0.3	*	*
2	3304	FT SUPPLY	0.77	0.2	0.00	-0.8	3.49	2.0	3.86	2.2	7.56	3.8	0.00	-2.9	1.52	-0.6	0.00	-2.5	4.85	2.8	1.67	0.2	0.86	-0.0	0.03	-0.5	24.62	4.1
2	3358	FREEDOM	1.01	*	0.13	*	3.94	*	4.05	*	0.38	*	2.46	*	4.96	*	1.06	*	1.01	*	1.22	*	0.37	*	0.00	*	20.59	*
2	3909	HARDY	0.49	*	0.25	*	6.63	*	3.28	*	2.16	*	0.41	*	3.51	*	1.87	*	6.15	*	1.72	*	2.07	*	0.82	*	29.38	*
2	4019	HELENA	1.48	0.7	0.01	-0.9	7.37	5.4	4.89	2.3	1.29	-3.0	4.41	0.4	3.02	-0.0	0.27	-2.3	3.06	0.1	2.79	0.6	0.91	-0.6	*	*	*	*
2	4573	JEFFERSON	1.33	0.6	0.06	-0.9	7.99	6.0	4.65	1.8	2.18	-1.7	2.31	-1.6	2.74	-1.1	0.42	-2.8	2.88	-0.2	2.38	-0.1	1.47	-0.4	0.47	-0.5	28.90	-1.1
2	5013	LAMONT	1.17	*	0.10	*	4.58	*	5.98	*	1.47	*	1.05	*	2.35	*	0.11	*	6.14	*	1.67	*	2.63	*	1.35	*	28.61	*
2	5768	MEDFORD	1.34	*	0.08	*	4.39	*	7.02	*	1.52	*	1.45	*	1.71	*	1.48	*	2.32	*	2.07	*	1.53	*	0.33	*	25.25	*
2	6065	MORRISON	0.44	*	0.45	*	4.34	*	*	*	2.24	*	1.00	*	1.94	*	*	*	8.69	*	1.43	*	2.82	*	0.83	*	*	*
2	6139	MUTUAL	0.94	0.4	0.02	-0.9	3.18	1.6	3.89	1.4	0.35	-3.9	2.52	-0.6	2.22	-0.3	0.81	-1.3	2.23	-0.2	1.30	-0.2	0.63	-0.5	0.01	-0.6	18.10	-5.4
2	6278	NEWKIRK	1.06	0.2	0.18	-0.9	4.03	2.0	10.48	7.5	1.06	-3.6	0.93	-3.6	4.88	1.3	0.20	-3.3	6.16	2.6	2.36	-0.4	2.92	0.9	0.38	-0.8	34.65	1.9
2	6751	ORIENTA	1.00	*	0.06	*	3.26	*	4.40	*	0.92	*	0.84	*	3.46	*	0.74	*	3.22	*	1.56	*	0.62	*	0.23	*	20.31	*
2	7012	PERRY	1.65	0.7	0.49	-0.8	4.45	2.0	5.69	2.9	2.07	-3.2	3.25	-0.8	6.00	2.4	0.64	-2.6	6.13	2.3	1.39	-1.2	2.53	0.7	0.78	-0.4	35.07	2.1
2	7505	RED ROCK	0.83	-0.0	0.20	-1.1	4.91	2.6	7.31	4.5	1.32	-3.3	1.62	-2.4	3.77	0.0	0.00	-2.9	6.38	2.6	1.77	-0.7	3.26	1.5	0.42	-0.8	31.79	0.0
2	7556	RENFROW	1.22	0.5	0.13	-0.8	3.80	1.8	6.22	3.6	1.11	-2.7	1.09	-2.8	1.58	-1.9	0.86	-2.0	1.74	-1.4	2.08	-0.2	1.96	0.2	0.42	-0.5	22.22	-6.3
2	9404	WAYNOKA	1.30	0.7	0.11	-0.8	3.73	2.1	4.51	2.3	0.53	-3.9	1.53	-2.2	1.93	-0.6	0.60	-2.1	2.26	-0.2	1.49	-0.2	0.75	-0.5	0.15	-0.6	18.89	-6.2
2	9760	WOODWARD	1.25	*	0.03	*	4.27	*	3.73	*	0.28	*	2.48	*	4.72	*	0.94	*	3.19	*	1.55	*	0.76	*	0.02	*	23.23	*

1988 TOTAL PRECIPITATION AND DEVIATIONS FROM NORMAL (Inches)

CD	ID	STATION	JAN		FEB		MAR		APR		MAY		JUN		JUL		AUG		SEP		OCT		NOV		DEC		ANNUAL	
			PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV	PCP	DEV
3	0535	BARNSDALL	0.75	-0.4	0.69	-0.7	3.71	0.6	5.33	2.0	1.20	-4.0	1.66	-2.8	5.14	1.9	0.77	-2.4	6.99	2.2	1.30	-1.7	5.31	2.9	0.87	-0.7	33.75	-3.1
3	0548	BARTLSVL	0.84	-0.3	0.69	-0.7	4.34	1.6	6.25	2.9	1.17	-3.5	0.38	-3.7	2.96	-0.0	3.25	0.2	7.55	3.4	1.35	-1.8	4.35	2.1	1.59	0.1	34.73	0.2
3	0782	BIXBY	1.30	-0.1	1.36	-0.2	5.80	3.1	2.53	-1.3	1.11	-3.5	1.11	-3.6	5.18	1.9	0.80	-1.9	6.35	2.0	1.12	-2.0	5.19	2.4	2.16	0.3	34.01	-3.1
3	1256	BURBANK	1.07	*	0.43	*	5.26	*	5.40	*	1.93	*	1.13	*	3.70	*	0.45	*	7.81	*	1.78	*	3.80	*	1.03	*	33.80	*
3	1717	CHELSEA	2.43	*	1.09	*	5.19	*	4.30	*	1.08	*	0.53	*	3.52	*	1.90	*	9.29	*	1.42	*	6.16	*	2.09	*	39.00	*
3	1828	CLAREMORE	2.43	1.0	1.27	-0.3	6.47	3.3	3.97	0.2	1.17	-3.5	1.00	-3.6	4.18	1.1	1.82	-1.0	7.77	3.8	1.13	-2.2	4.69	1.9	3.40	1.5	39.32	2.4
3	1902	CLEVELAND	1.42	*	*	*	4.08	*	*	*	3.53	*	0.57	*	4.21	*	2.23	*	8.20	*	1.50	*	*	*	1.21	*	*	*
3	3250	FORAKER	0.48	-0.5	0.47	-0.7	2.92	0.5	6.74	3.6	1.40	-3.4	0.17	-4.0	2.62	-0.8	0.57	-2.9	8.62	4.5	*	*	*	*	0.80	-0.5	*	*
3	4258	HOLLOW	0.84	-0.5	1.22	-0.3	5.55	2.4	4.78	1.0	1.21	-3.6	0.75	-3.8	3.47	-0.2	2.13	-1.1	7.52	2.6	1.26	-2.2	4.65	1.6	2.36	0.4	35.74	-3.7
3	4289	HOMINY	0.74	-0.3	0.99	-0.4	4.51	1.6	6.22	3.1	3.12	-1.5	1.30	-2.8	5.85	2.4	1.61	-1.4	7.22	2.7	2.09	-0.8	4.31	2.2	1.95	0.6	39.92	5.5
3	4567	JAY TOWER	1.39	*	2.14	*	5.07	*	4.02	*	1.42	*	0.49	*	3.41	*	4.35	*	6.84	*	1.49	*	3.70	*	3.31	*	37.63	*
3	4672	KANSAS	1.37	*	1.65	*	7.77	*	3.28	*	2.56	*	1.16	*	2.48	*	4.18	*	4.52	*	1.40	*	5.17	*	3.45	*	39.01	*
3	4812	KEYSTONE	*	*	*	*	7.30	*	4.22	*	1.31	*	0.32	*	6.12	*	1.52	*	7.21	*	*	*	4.29	*	*	*	*	*
3	5118	LENAPAH	1.17	*	1.00	*	4.95	*	7.74	*	1.17	*	0.40	*	1.69	*	0.60	*	5.73	*	1.07	*	5.59	*	1.78	*	32.89	*
3	5522	MANNFORD	1.12	0.0	1.02	-0.4	6.52	3.9	5.03	1.7	3.56	-1.2	0.40	-3.4	4.23	1.0	2.49	-0.5	4.97	0.7	1.32	-1.3	4.60	2.4	1.91	0.4	37.17	3.2
3	5540	MARAMEC	1.33	0.2	0.59	-0.8	5.18	2.7	7.22	4.2	3.42	-1.5	0.49	-3.4	4.03	0.9	1.72	-1.2	9.66	5.7	1.29	-1.8	5.26	3.2	1.16	-0.0	41.36	8.3
3	5855	MIAMI	0.81	-0.7	1.32	-0.5	6.07	2.6	4.72	1.0	1.87	-3.1	2.69	-2.1	5.36	1.4	2.49	-1.0	10.78	6.1	1.46	-2.2	5.01	2.0	4.22	2.0	46.80	5.4
3	6485	NOWATA	2.20	0.9	0.99	-0.6	6.40	3.1	5.02	1.5	1.49	-3.1	*	*	4.20	1.2	1.22	-2.1	9.02	4.7	1.00	-2.3	4.88	2.3	1.94	0.1	*	*
3	6713	ONETA	0.91	*	1.37	*	5.30	*	2.79	*	2.91	*	0.56	*	4.96	*	1.53	*	5.66	*	1.13	*	5.13	*	2.33	*	34.59	*
3	6935	PAWHUSKA	1.21	0.1	0.63	-0.6	5.98	3.3	7.52	4.4	3.78	-0.9	1.93	-2.3	3.96	0.5	0.72	-2.6	9.52	5.4	1.97	-0.9	4.32	2.2	1.26	-0.0	42.82	8.3
3	6937	PAWHUSKA	1.30	*	0.53	*	4.31	*	7.38	*	2.89	*	1.60	*	3.47	*	0.89	*	8.31	*	1.89	*	4.07	*	1.19	*	37.84	*
3	6940	PAWNEE	*	*	*	*	*	*	5.33	2.3	5.43	0.5	0.78	-3.2	6.51	3.3	0.60	-2.4	7.66	3.2	1.63	-1.0	3.67	1.7	0.66	-0.5	*	*
3	7309	PRYOR 6 N	0.78	-0.7	1.31	-0.4	*	*	5.64	1.7	2.07	-2.8	0.79	-3.8	*	*	1.99	-1.4	9.30	5.1	1.19	-2.5	4.71	1.8	2.54	0.5	*	*
3	7358	QUAPAW	1.06	-0.4	0.03	-1.7	7.17	3.8	0.69	-3.2	0.84	-4.3	2.45	-2.3	5.33	1.5	1.59	-1.8	10.02	5.2	0.51	-3.1	6.25	3.3	4.35	2.3	40.29	-0.8
3	7390	RALSTON	1.07	0.0	0.37	-0.9	3.63	1.1	7.22	4.2	3.25	-1.4	0.77	-3.6	6.60	3.1	1.17	-1.7	10.32	6.4	1.91	-0.7	2.64	0.6	1.10	-0.2	40.07	6.9
3	7394	RAMONA	0.96	*	0.92	*	3.80	*	4.82	*	1.68	*	0.24	*	6.15	*	4.05	*	7.05	*	1.48	*	3.48	*	1.79	*	36.42	*
3	8258	SKIATOOK	*	*	1.01	-0.6	4.62	1.7	3.75	0.2	1.45	-3.2	0.73	-3.5	2.71	-0.7	2.92	0.0	7.18	2.8	1.58	-1.6	4.82	2.4	2.12	0.6	*	*
3	8380	SPAVINAW	1.00	-0.5	1.50	-0.2	5.29	2.1	5.14	1.0	1.83	-3.2	0.42	-4.3	2.87	-0.8	3.17	-0.4	4.69	0.3	1.22	-2.4	4.56	1.3	2.83	-0.8	34.54	-6.4
3	8992	TULSA WSO	1.08	-0.2	1.03	-0.7	6.52	3.3	3.38	-0.7	1.18	-3.9	0.58	-3.9	4.20	0.6	2.43	-0.5	5.35	0.9	1.43	-1.9	4.38	1.8	1.84	0.0	33.43	-5.3
3	9101	U SPAVINAW	0.86	*	*	*	6.08	*	3.82	*	1.59	*	0.79	*	1.61	*	4.10	*	7.08	*	2.40	*	5.06	*	3.48	*	*	*
3	9203	VINITA 2 N	0.32	-1.2	1.32	-0.4	4.68	1.1	4.43	0.3	1.40	-3.9	0.72	-4.1	3.87	0.4	1.12	-2.4	9.03	4.2	1.53	-2.1	5.91	2.9	3.94	1.8	38.27	-3.4
3	9247	WAGONER	1.65	-0.0	1.64	-0.2	6.48	3.0	3.17	-1.5	2.73	-2.1	1.10	-3.9	7.28	3.7	3.32	0.4	4.29	0.2	1.47	-1.6	5.18	1.9	3.13	1.0	41.45	1.0
3	9298	WANN	1.00	*	0.60	*	4.24	*	8.67	*	1.39	*	1.38	*	4.15	*	*	*	4.78	*	1.08	*	4.54	*	1.79	*	*	*
3	9792	WYNONA	0.94	*	0.72	*	7.36	*	2.41	*	2.57	*	1.25	*	8.87	*	*	*	7.61	*	1.43	*	3.10	*	1.30	*	*	*