

Atlas 14 Regionalization

Methodology

Statewide precipitation depth raster data was obtained from NOAA's Atlas 14 Precipitation Frequency Data Server for the 10 year-10 minute, 50 year-30 minute, and 50 year-60 minute storms. The data was then divided by county in ArcMap 10. The minimum and maximum values of each county were computed. Counties were combined if the region's absolute minimum was within 10% of the region's absolute maximum for each of the 3 chosen storms. The combined counties had to be contiguous. There were some counties that did not fit the criteria within the county borders. In these cases the county was left intact as a single region.

Precipitation data was then downloaded for following storms:

2 year-	5 minute, 10 minute, 15 minute, 30 minute, 60 minute, 120 minute
5 year-	5 minute, 10 minute, 15 minute, 30 minute, 60 minute, 120 minute
10 year-	5 minute, 15 minute, 30 minute, 60 minute, 120 minute
25 year-	5 minute, 10 minute, 15 minute, 30 minute, 60 minute, 120 minute
50 year-	5 minute, 10 minute, 15 minute, 120 minute
100 year-	5 minute, 10 minute, 15 minute, 30 minute, 60 minute, 120 minute

This data was split by region using ArcMap 10. The maximum value for each storm was chosen as the region's precipitation depth. IDF Tables for each region were then interpolated on a log-log scale for minutes 7 through 120.

Regions

Region Name	County(ies) Included
Aitkin-Crow Wing- Pine	Aitkin, Crow Wing, Pine
Beltrami	Beltrami
Big Stone	Big Stone
Carlton	Carlton
Cass	Cass
Central	Anoka, Benton, Chisago, Isanti, Kanabec, Kandiyohi, Meeker, Mille Lacs, Morrison, Sherburne, Stearns, Todd, Wright
Clearwater	Clearwater
Cook	Cook
Hennepin	Hennepin
Hubbard	Hubbard
Itasca	Itasca
Jackson-Murray-Nobles	Jackson, Murray, Nobles
Koochiching	Koochiching
Lake	Lake
Lyon	Lyon
Marshall	Marshall
Norman	Norman
Northwest	Kittson, Lake of the Woods, Roseau
Otter Tail	Otter Tail
Pennington-Red Lake	Pennington, Red Lake
Pipestone-Rock	Pipestone, Rock
Polk	Polk
Ramsey	Ramsey
Redwood	Redwood
Renville	Renville
Saint Louis	Saint Louis
South	Blue Earth, Brown, Carver, Cottonwood, Martin, McLeod, Nicollet, Sibley, Watonwan
South Central	Dakota, Dodge, Faribault, Freeborn, Goodhue, Le Sueur, Rice, Scott, Steele, Wabasha, Waseca
Southeast	Fillmore, Houston, Mower, Olmsted, Winona

Washington	Washington
West	Becker, Clay, Grant, Mahnomen, Traverse, Wadena, Wilkin
West Central	Chippewa, Douglas, Lac Qui Parle, Lincoln, Pope, Stevens, Swift, Yellow Medicine

Statistics

The tables on the following pages show the minimum, maximum, and percent difference between the two for each storm, for each region. Values between 10% - 15% are highlighted in yellow. Values that exceeded 15% are highlighted in red. These are regions that have a greater variability between the minimum and maximum precipitation depth.

ArcMap Tools

- Upper Midwest Environmental Sciences Center (USGS) Raster Split Tool – Used to split the statewide storm data by county for 10 year-10 minute, 50 year-30 minute, and 50 year-60 minute events
http://www.umesc.usgs.gov/management/dss/raster_split_tool.html
- Merge – Used to combine counties to create the 32 regions
- Zonal Statistics as Table – Used to calculate minimum, maximum, and percent difference for all storms by region

Group Name	2 year 5 min			2 year 10 min			2 year 15 min			2 year 30 min			2 year 60 min			2 year 120 min		
	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.
Aitkin-Crow Wing-Pine	0.386	0.434	11.1	0.565	0.636	11.2	0.689	0.776	11.2	0.965	1.059	8.9	1.377	1.438	9.2	1.509	1.666	9.4
Beltrami	0.367	0.401	8.5	0.537	0.587	8.5	0.655	0.715	8.4	0.904	0.978	7.6	1.371	1.384	7.0	1.430	1.535	6.8
Big Stone	0.39	0.4	2.5	0.571	0.586	2.6	0.697	0.715	2.5	0.967	0.985	1.8	1.162	1.323	2.2	1.485	1.527	2.8
Carlton	0.381	0.414	8.0	0.558	0.607	8.1	0.681	0.740	8.0	0.934	1.019	8.3	1.380	1.491	8.0	1.472	1.598	7.9
Cass	0.371	0.423	12.3	0.543	0.619	12.3	0.662	0.755	12.3	0.949	1.037	8.5	1.281	1.394	8.2	1.470	1.606	8.5
Central	0.403	0.451	10.6	0.590	0.661	10.7	0.719	0.806	10.8	1.008	1.096	8.0	1.251	1.299	8.1	1.545	1.710	9.6
Clearwater	0.383	0.4	4.3	0.561	0.586	4.3	0.684	0.714	4.2	0.959	0.981	2.2	1.360	1.510	2.1	1.498	1.535	2.4
Cook	0.326	0.39	16.4	0.477	0.571	16.5	0.582	0.697	16.5	0.764	0.924	17.3	1.082	1.289	18.6	1.088	1.384	21.4
Hennepin	0.418	0.436	4.1	0.612	0.639	4.2	0.746	0.779	4.2	1.055	1.074	1.8	1.229	1.297	2.5	1.648	1.706	3.4
Hubbard	0.372	0.389	4.4	0.545	0.569	4.2	0.665	0.694	4.2	0.950	0.978	2.9	1.241	1.380	3.4	1.482	1.545	4.1
Itasca	0.364	0.414	12.1	0.533	0.606	12.0	0.650	0.739	12.0	0.900	1.031	12.7	1.325	1.388	12.2	1.424	1.616	11.9
Jackson-Murray-Nobles	0.432	0.466	7.3	0.633	0.682	7.2	0.771	0.832	7.3	1.077	1.167	7.7	1.168	1.256	7.4	1.665	1.818	8.4
Koochiching	0.346	0.382	9.4	0.507	0.559	9.3	0.618	0.682	9.4	0.870	0.941	7.5	1.336	1.385	8.4	1.365	1.502	9.1
Lake	0.332	0.397	16.4	0.486	0.582	16.5	0.593	0.710	16.5	0.784	0.934	16.1	1.214	1.322	17.9	1.173	1.449	19.0
Lyon	0.396	0.463	14.5	0.580	0.678	14.5	0.708	0.827	14.4	1.021	1.102	7.4	1.149	1.280	4.5	1.628	1.687	3.5
Marshall	0.379	0.407	6.9	0.555	0.596	6.9	0.677	0.727	6.9	0.909	0.993	8.5	1.365	1.524	10.0	1.349	1.514	10.9
Norman	0.397	0.406	2.2	0.581	0.594	2.2	0.708	0.725	2.3	0.994	1.016	2.2	1.226	1.254	3.7	1.508	1.583	4.7
Northwest	0.362	0.395	8.4	0.530	0.578	8.3	0.646	0.705	8.4	0.869	0.958	9.3	1.319	1.387	11.5	1.307	1.502	13.0
Otter Tail	0.388	0.413	6.1	0.568	0.605	6.1	0.693	0.738	6.1	0.971	1.019	4.7	1.237	1.362	4.3	1.499	1.564	4.2
Pennington-Red Lake	0.399	0.408	2.2	0.584	0.598	2.3	0.712	0.729	2.3	0.958	0.994	3.6	1.354	1.389	4.4	1.442	1.523	5.3
Pipestone-Rock	0.416	0.449	7.3	0.609	0.657	7.3	0.742	0.801	7.4	1.071	1.119	4.3	0.939	1.154	4.2	1.682	1.757	4.3
Polk	0.393	0.406	3.2	0.575	0.595	3.4	0.701	0.726	3.4	0.925	1.004	7.9	1.368	1.396	10.2	1.372	1.563	12.2
Ramsey	0.419	0.426	1.6	0.613	0.624	1.8	0.748	0.761	1.7	1.057	1.070	1.2	1.218	1.261	0.9	1.684	1.698	0.8
Redwood	0.403	0.463	13.0	0.590	0.677	12.9	0.720	0.826	12.8	1.032	1.100	6.2	1.200	1.255	3.5	1.635	1.678	2.6
Renville	0.385	0.45	14.4	0.564	0.660	14.5	0.688	0.804	14.4	1.012	1.094	7.5	0.978	1.191	4.9	1.625	1.682	3.4
South	0.42	0.474	11.4	0.616	0.694	11.2	0.751	0.847	11.3	1.061	1.171	9.4	1.129	1.254	9.9	1.654	1.850	10.6
South Central	0.419	0.476	12.0	0.613	0.697	12.1	0.748	0.849	11.9	1.052	1.172	10.2	1.118	1.220	10.4	1.678	1.878	10.6
Southeast	0.427	0.453	5.7	0.625	0.664	5.9	0.763	0.810	5.8	1.062	1.143	7.1	1.088	1.230	8.0	1.699	1.857	8.5
St. Louis	0.344	0.407	15.5	0.503	0.596	15.6	0.614	0.727	15.5	0.843	1.004	16.0	1.380	1.500	16.1	1.313	1.576	16.7
Washington	0.421	0.429	1.9	0.617	0.628	1.8	0.753	0.766	1.7	1.055	1.083	2.6	1.203	1.308	2.0	1.681	1.711	1.8
West	0.381	0.407	6.4	0.557	0.596	6.5	0.680	0.726	6.3	0.960	1.015	5.4	1.235	1.291	5.2	1.492	1.582	5.7
West Central	0.382	0.43	11.2	0.559	0.630	11.3	0.682	0.768	11.2	0.967	1.074	10.0	1.230	1.257	10.1	1.495	1.685	11.3

Group Name	5 year 5 min			5 year 10 min			5 year 15 min			5 year 30 min			5 year 60 min			5 year 120 min		
	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.
Aitkin-Crow Wing-Pine	0.488	0.545	10.5	0.715	0.799	10.5	0.689	0.776	11.2	1.221	1.337	8.7	1.576	1.744	9.6	1.931	2.151	10.2
Beltrami	0.469	0.509	7.9	0.687	0.745	7.8	0.655	0.715	8.4	1.155	1.248	7.5	1.480	1.601	7.6	1.804	1.962	8.1
Big Stone	0.494	0.511	3.3	0.724	0.748	3.2	0.697	0.715	2.5	1.222	1.259	2.9	1.547	1.656	6.6	1.872	2.060	9.1
Carlton	0.475	0.522	9.0	0.696	0.765	9.0	0.681	0.740	8.0	1.165	1.289	9.6	1.505	1.668	9.8	1.844	2.048	10.0
Cass	0.473	0.532	11.1	0.692	0.779	11.2	0.662	0.755	12.3	1.212	1.308	7.3	1.560	1.696	8.0	1.880	2.085	9.8
Central	0.516	0.566	8.8	0.756	0.829	8.8	0.719	0.806	10.8	1.29	1.382	6.7	1.654	1.777	6.9	2.015	2.183	7.7
Clearwater	0.493	0.508	3.0	0.721	0.744	3.1	0.684	0.714	4.2	1.237	1.254	1.4	1.584	1.636	3.2	1.926	2.018	4.6
Cook	0.414	0.470	11.9	0.606	0.688	11.9	0.582	0.697	16.5	0.974	1.126	13.5	1.194	1.427	16.3	1.382	1.728	20.0
Hennepin	0.526	0.546	3.7	0.770	0.800	3.8	0.746	0.779	4.2	1.331	1.366	2.6	1.710	1.788	4.4	2.088	2.211	5.6
Hubbard	0.475	0.498	4.6	0.696	0.730	4.7	0.665	0.694	4.2	1.217	1.261	3.5	1.567	1.642	4.6	1.912	2.023	5.5
Itasca	0.466	0.522	10.7	0.682	0.764	10.7	0.650	0.739	12.0	1.153	1.305	11.6	1.483	1.674	11.4	1.814	2.043	11.2
Jackson-Murray-Nobles	0.546	0.588	7.1	0.799	0.860	7.1	0.771	0.832	7.3	1.361	1.44	5.5	1.741	1.840	5.4	2.112	2.248	6.0
Koochiching	0.442	0.493	10.3	0.648	0.722	10.2	0.618	0.682	9.4	1.107	1.218	9.1	1.420	1.557	8.8	1.726	1.909	9.6
Lake	0.421	0.497	15.3	0.617	0.728	15.2	0.593	0.710	16.5	1.002	1.171	14.4	1.261	1.484	15.0	1.520	1.815	16.3
Lyon	0.503	0.586	14.2	0.737	0.857	14.0	0.708	0.827	14.4	1.301	1.397	6.9	1.681	1.760	4.5	2.059	2.125	3.1
Marshall	0.477	0.518	7.9	0.698	0.758	7.9	0.677	0.727	6.9	1.147	1.266	9.4	1.435	1.607	10.7	1.724	1.948	11.5
Norman	0.499	0.507	1.6	0.731	0.742	1.5	0.708	0.725	2.3	1.233	1.297	4.9	1.567	1.685	7.0	1.901	2.073	8.3
Northwest	0.460	0.500	8.0	0.674	0.732	7.9	0.646	0.705	8.4	1.104	1.216	9.2	1.398	1.555	10.1	1.681	1.894	11.2
Otter Tail	0.495	0.536	7.6	0.724	0.785	7.8	0.693	0.738	6.1	1.235	1.321	6.5	1.568	1.693	7.4	1.901	2.066	8.0
Pennington-Red Lake	0.506	0.519	2.5	0.741	0.760	2.5	0.712	0.729	2.3	1.214	1.267	4.2	1.539	1.612	4.5	1.865	1.974	5.5
Pipestone-Rock	0.522	0.564	7.4	0.764	0.826	7.5	0.742	0.801	7.4	1.347	1.413	4.7	1.736	1.809	4.0	2.118	2.214	4.3
Polk	0.496	0.515	3.7	0.726	0.754	3.7	0.701	0.726	3.4	1.174	1.272	7.7	1.464	1.660	11.8	1.755	2.052	14.5
Ramsey	0.526	0.535	1.7	0.771	0.784	1.7	0.748	0.761	1.7	1.34	1.353	1.0	1.736	1.768	1.8	2.131	2.183	2.4
Redwood	0.512	0.585	12.5	0.750	0.857	12.5	0.720	0.826	12.8	1.309	1.395	6.2	1.694	1.775	4.6	2.077	2.170	4.3
Renville	0.490	0.566	13.4	0.717	0.829	13.5	0.688	0.804	14.4	1.279	1.383	7.5	1.657	1.775	6.6	2.035	2.169	6.2
South	0.535	0.596	10.2	0.783	0.872	10.2	0.751	0.847	11.3	1.341	1.472	8.9	1.724	1.912	9.8	2.099	2.351	10.7
South Central	0.533	0.597	10.7	0.781	0.873	10.5	0.748	0.849	11.9	1.345	1.473	8.7	1.751	1.919	8.8	2.148	2.368	9.3
Southeast	0.536	0.568	5.6	0.786	0.832	5.5	0.763	0.810	5.8	1.339	1.427	6.2	1.734	1.886	8.1	2.128	2.349	9.4
St. Louis	0.435	0.512	15.0	0.637	0.749	15.0	0.614	0.727	15.5	1.067	1.269	15.9	1.373	1.636	16.1	1.665	2.004	16.9
Washington	0.528	0.540	2.2	0.773	0.790	2.2	0.753	0.766	1.7	1.342	1.37	2.0	1.739	1.780	2.3	2.135	2.195	2.7
West	0.484	0.520	6.9	0.708	0.762	7.1	0.680	0.726	6.3	1.223	1.3	5.9	1.555	1.684	7.7	1.885	2.072	9.0
West Central	0.486	0.544	10.7	0.712	0.796	10.6	0.682	0.768	11.2	1.24	1.358	8.7	1.597	1.746	8.5	1.947	2.135	8.8

Group Name	10 year 5 min			10 year 10 min			10 year 15 min			10 year 30 min			10 year 60 min			10 year 120 min		
	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.
Aitkin-Crow Wing-Pine	0.574	0.637	9.9	0.841	0.933	9.9	1.025	1.137	9.9	1.437	1.564	8.1	1.869	2.060	9.3	2.300	2.555	10.0
Beltrami	0.558	0.601	7.2	0.818	0.880	7.0	0.997	1.073	7.1	1.373	1.487	7.7	1.745	1.927	9.4	2.117	2.370	10.7
Big Stone	0.589	0.613	3.9	0.862	0.898	4.0	1.051	1.095	4.0	1.456	1.514	3.8	1.842	2.025	9.0	2.228	2.538	12.2
Carlton	0.555	0.611	9.2	0.813	0.894	9.1	0.992	1.091	9.1	1.362	1.51	9.8	1.768	1.971	10.3	2.173	2.431	10.6
Cass	0.558	0.623	10.4	0.818	0.912	10.3	0.997	1.113	10.4	1.429	1.535	6.9	1.848	2.008	8.0	2.225	2.482	10.4
Central	0.610	0.665	8.3	0.893	0.973	8.2	1.090	1.187	8.2	1.521	1.627	6.5	1.965	2.119	7.3	2.402	2.611	8.0
Clearwater	0.588	0.601	2.2	0.861	0.880	2.2	1.050	1.073	2.1	1.464	1.496	2.1	1.872	1.977	5.3	2.275	2.457	7.4
Cook	0.491	0.541	9.2	0.719	0.792	9.2	0.877	0.966	9.2	1.158	1.302	11.1	1.410	1.670	15.6	1.641	2.037	19.4
Hennepin	0.617	0.641	3.7	0.904	0.939	3.7	1.102	1.145	3.8	1.567	1.632	4.0	2.031	2.165	6.2	2.495	2.697	7.5
Hubbard	0.562	0.593	5.2	0.824	0.869	5.2	1.004	1.060	5.3	1.441	1.508	4.4	1.865	1.982	5.9	2.283	2.460	7.2
Itasca	0.554	0.613	9.6	0.811	0.897	9.6	0.989	1.094	9.6	1.373	1.528	10.1	1.759	1.966	10.5	2.145	2.405	10.8
Jackson-Murray-Nobles	0.645	0.693	6.9	0.944	1.015	7.0	1.151	1.238	7.0	1.609	1.682	4.3	2.057	2.151	4.4	2.505	2.640	5.1
Koochiching	0.529	0.586	9.7	0.775	0.859	9.8	0.945	1.047	9.7	1.318	1.452	9.2	1.672	1.844	9.3	2.019	2.252	10.3
Lake	0.498	0.584	14.7	0.730	0.855	14.6	0.890	1.043	14.7	1.191	1.377	13.5	1.512	1.741	13.2	1.833	2.138	14.3
Lyon	0.602	0.692	13.0	0.882	1.013	12.9	1.075	1.236	13.0	1.556	1.655	6.0	2.023	2.092	3.3	2.482	2.529	1.9
Marshall	0.561	0.612	8.3	0.822	0.896	8.3	1.002	1.092	8.2	1.352	1.498	9.7	1.704	1.909	10.7	2.057	2.319	11.3
Norman	0.583	0.599	2.7	0.854	0.877	2.6	1.041	1.069	2.6	1.44	1.535	6.2	1.846	2.017	8.5	2.248	2.499	10.0
Northwest	0.544	0.589	7.6	0.796	0.862	7.7	0.971	1.051	7.6	1.305	1.436	9.1	1.651	1.828	9.7	1.988	2.220	10.5
Otter Tail	0.589	0.640	8.0	0.863	0.938	8.0	1.052	1.144	8.0	1.472	1.582	7.0	1.875	2.049	8.5	2.278	2.517	9.5
Pennington-Red Lake	0.598	0.614	2.6	0.875	0.899	2.7	1.068	1.096	2.6	1.435	1.501	4.4	1.830	1.922	4.8	2.226	2.362	5.8
Pipestone-Rock	0.611	0.659	7.3	0.895	0.965	7.3	1.091	1.176	7.2	1.574	1.653	4.8	2.049	2.119	3.3	2.499	2.597	3.8
Polk	0.586	0.609	3.8	0.857	0.892	3.9	1.046	1.088	3.9	1.387	1.507	8.0	1.741	1.992	12.6	2.091	2.479	15.7
Ramsey	0.618	0.632	2.2	0.905	0.925	2.2	1.103	1.128	2.2	1.573	1.608	2.2	2.059	2.129	3.3	2.544	2.650	4.0
Redwood	0.612	0.692	11.6	0.896	1.013	11.5	1.092	1.236	11.7	1.563	1.653	5.4	2.033	2.123	4.2	2.503	2.612	4.2
Renville	0.586	0.668	12.3	0.857	0.978	12.4	1.046	1.193	12.3	1.527	1.636	6.7	1.986	2.121	6.4	2.446	2.610	6.3
South	0.635	0.698	9.0	0.930	1.022	9.0	1.134	1.247	9.1	1.586	1.72	7.8	2.049	2.255	9.1	2.498	2.789	10.4
South Central	0.630	0.698	9.7	0.922	1.022	9.8	1.125	1.247	9.8	1.597	1.739	8.2	2.095	2.278	8.0	2.561	2.819	9.2
Southeast	0.630	0.666	5.4	0.922	0.975	5.4	1.125	1.189	5.4	1.578	1.682	6.2	2.050	2.225	7.9	2.521	2.783	9.4
St. Louis	0.516	0.598	13.7	0.756	0.876	13.7	0.922	1.068	13.7	1.266	1.487	14.9	1.628	1.930	15.6	1.973	2.375	16.9
Washington	0.615	0.638	3.6	0.901	0.935	3.6	1.099	1.140	3.6	1.567	1.622	3.4	2.054	2.139	4.0	2.542	2.656	4.3
West	0.575	0.620	7.3	0.842	0.908	7.3	1.027	1.107	7.2	1.453	1.548	6.1	1.849	2.017	8.3	2.240	2.504	10.5
West Central	0.583	0.643	9.3	0.853	0.941	9.4	1.041	1.147	9.2	1.496	1.605	6.8	1.920	2.074	7.4	2.341	2.567	8.8

Group Name	25 year 5 min			25 year 10 min			25 year 15 min			25 year 30 min			25 year 60 min			25 year 120 min		
	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.
Aitkin-Crow Wing-Pine	0.736	0.789	6.7	1.078	1.155	6.7	1.314	1.408	6.7	1.889	1.979	4.5	2.469	2.547	3.1	3.033	3.130	3.1
Beltrami	0.748	0.773	3.2	1.095	1.132	3.3	1.335	1.381	3.3	1.901	1.979	3.9	2.539	2.681	5.3	3.178	3.383	6.1
Big Stone	0.680	0.743	8.5	0.996	1.088	8.5	1.215	1.327	8.4	1.692	1.828	7.4	2.152	2.371	9.2	2.611	2.918	10.5
Carlton	0.779	0.846	7.9	1.141	1.239	7.9	1.392	1.511	7.9	1.955	2.029	3.6	2.500	2.598	3.8	3.044	3.222	5.5
Cass	0.730	0.804	9.2	1.069	1.178	9.3	1.304	1.437	9.3	1.84	1.984	7.3	2.403	2.622	8.4	2.956	3.287	10.1
Central	0.705	0.730	3.4	1.032	1.069	3.5	1.258	1.303	3.5	1.741	1.866	6.7	2.255	2.492	9.5	2.759	3.118	11.5
Clearwater	0.781	0.846	7.7	1.143	1.239	7.7	1.394	1.511	7.7	1.937	2.108	8.1	2.520	2.773	9.1	3.093	3.439	10.1
Cook	0.636	0.716	11.2	0.931	1.049	11.2	1.135	1.279	11.3	1.557	1.784	12.7	1.995	2.347	15.0	2.420	2.910	16.8
Hennepin	0.707	0.765	7.6	1.036	1.120	7.5	1.263	1.365	7.5	1.771	1.9	6.8	2.295	2.505	8.4	2.781	3.140	11.4
Hubbard	0.730	0.790	7.6	1.069	1.156	7.5	1.304	1.410	7.5	1.866	1.983	5.9	2.402	2.597	7.5	2.938	3.283	10.5
Itasca	0.753	0.846	11.0	1.103	1.239	11.0	1.345	1.511	11.0	1.946	2.029	4.1	2.514	2.592	3.0	3.066	3.195	4.0
Jackson-Murray-Nobles	0.688	0.733	6.1	1.007	1.073	6.2	1.229	1.309	6.1	1.689	1.832	7.8	2.121	2.408	11.9	2.553	2.984	14.4
Koochiching	0.761	0.846	10.0	1.115	1.239	10.0	1.360	1.511	10.0	1.947	2.028	4.0	2.562	2.631	2.6	3.131	3.263	4.0
Lake	0.678	0.751	9.7	0.992	1.099	9.7	1.210	1.340	9.7	1.729	1.851	6.6	2.249	2.440	7.8	2.709	3.030	10.6
Lyon	0.715	0.745	4.0	1.047	1.091	4.0	1.277	1.330	4.0	1.695	1.845	8.1	2.142	2.473	13.4	2.582	3.101	16.7
Marshall	0.769	0.847	9.2	1.126	1.240	9.2	1.373	1.513	9.3	1.955	2.134	8.4	2.587	2.804	7.7	3.182	3.528	9.8
Norman	0.731	0.771	5.2	1.071	1.129	5.1	1.306	1.377	5.2	1.808	1.916	5.6	2.292	2.577	11.1	2.773	3.239	14.4
Northwest	0.732	0.813	10.0	1.071	1.191	10.1	1.307	1.452	10.0	1.905	1.997	4.6	2.510	2.627	4.5	3.115	3.258	4.4
Otter Tail	0.695	0.764	9.0	1.018	1.119	9.0	1.241	1.365	9.1	1.741	1.872	7.0	2.289	2.484	7.9	2.838	3.100	8.5
Pennington-Red Lake	0.747	0.791	5.6	1.094	1.158	5.5	1.334	1.412	5.5	1.9	2.024	6.1	2.505	2.742	8.6	3.110	3.459	10.1
Pipestone-Rock	0.600	0.646	7.1	0.878	0.945	7.1	1.071	1.153	7.1	1.423	1.558	8.7	1.743	2.028	14.1	2.056	2.500	17.8
Polk	0.736	0.782	5.9	1.078	1.145	5.9	1.315	1.397	5.9	1.877	1.992	5.8	2.504	2.686	6.8	3.130	3.381	7.4
Ramsey	0.685	0.729	6.0	1.003	1.068	6.1	1.223	1.303	6.1	1.753	1.863	5.9	2.288	2.487	8.0	2.817	3.120	9.7
Redwood	0.729	0.748	2.5	1.068	1.096	2.6	1.302	1.337	2.6	1.751	1.831	4.4	2.244	2.368	5.2	2.711	2.918	7.1
Renville	0.610	0.707	13.7	0.894	1.035	13.6	1.090	1.262	13.6	1.461	1.67	12.5	1.882	2.112	10.9	2.302	2.606	11.7
South	0.682	0.744	8.3	0.998	1.090	8.4	1.218	1.329	8.4	1.645	1.825	9.9	2.097	2.335	10.2	2.550	2.846	10.4
South Central	0.657	0.718	8.5	0.962	1.051	8.5	1.173	1.282	8.5	1.631	1.778	8.3	2.040	2.245	9.1	2.439	2.738	10.9
Southeast	0.657	0.716	8.2	0.962	1.048	8.2	1.174	1.278	8.1	1.593	1.748	8.9	2.013	2.209	8.9	2.398	2.677	10.4
St. Louis	0.753	0.812	7.3	1.103	1.189	7.2	1.345	1.450	7.2	1.917	2.073	7.5	2.519	2.772	9.1	3.115	3.481	10.5
Washington	0.669	0.731	8.5	0.979	1.071	8.6	1.194	1.306	8.6	1.642	1.812	9.4	2.149	2.392	10.2	2.656	2.972	10.6
West	0.730	0.787	7.2	1.068	1.152	7.3	1.303	1.405	7.3	1.826	1.949	6.3	2.347	2.552	8.0	2.868	3.156	9.1
West Central	0.723	0.734	1.5	1.058	1.075	1.6	1.290	1.311	1.6	1.781	1.847	3.6	2.278	2.481	8.2	2.765	3.115	11.2

Group Name	50 year 5 min			50 year 10 min			50 year 15 min			50 year 30 min			50 year 60 min			50 year 120 min		
	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.
Aitkin-Crow Wing-Pine	0.790	0.863	8.5	1.157	1.264	8.5	1.410	1.541	8.5	1.974	2.113	6.6	2.620	2.809	6.7	3.266	3.517	7.1
Beltrami	0.791	0.839	5.7	1.158	1.228	5.7	1.412	1.498	5.7	1.944	2.111	7.9	2.419	2.802	13.7	2.894	3.494	17.2
Big Stone	0.851	0.906	6.1	1.247	1.327	6.0	1.520	1.618	6.1	2.103	2.264	7.1	2.670	3.038	12.1	3.234	3.812	15.2
Carlton	0.758	0.823	7.9	1.110	1.206	8.0	1.354	1.471	8.0	1.864	2.042	8.7	2.458	2.721	9.7	3.051	3.399	10.2
Cass	0.771	0.850	9.3	1.129	1.245	9.3	1.377	1.518	9.3	1.962	2.1	6.6	2.560	2.774	7.7	3.090	3.452	10.5
Central	0.819	0.916	10.6	1.199	1.342	10.7	1.462	1.636	10.6	2.059	2.272	9.4	2.746	3.048	9.9	3.396	3.868	12.2
Clearwater	0.825	0.843	2.1	1.207	1.235	2.3	1.473	1.506	2.2	2.03	2.13	4.7	2.597	2.897	10.4	3.149	3.664	14.1
Cook	0.685	0.731	6.3	1.002	1.071	6.4	1.222	1.306	6.4	1.63	1.766	7.7	2.029	2.324	12.7	2.422	2.885	16.0
Hennepin	0.850	0.913	6.9	1.245	1.337	6.9	1.519	1.631	6.9	2.164	2.346	7.8	2.890	3.235	10.7	3.616	4.126	12.4
Hubbard	0.781	0.839	6.9	1.144	1.229	6.9	1.395	1.499	6.9	1.997	2.149	7.1	2.624	2.908	9.8	3.248	3.675	11.6
Itasca	0.782	0.843	7.2	1.146	1.234	7.1	1.397	1.505	7.2	1.951	2.066	5.6	2.465	2.686	8.2	2.979	3.326	10.4
Jackson-Murray-Nobles	0.882	0.971	9.2	1.291	1.421	9.1	1.575	1.733	9.1	2.192	2.332	6.0	2.846	2.992	4.9	3.470	3.707	6.4
Koochiching	0.762	0.821	7.2	1.115	1.202	7.2	1.360	1.466	7.2	1.89	2.033	7.0	2.341	2.558	8.5	2.775	3.116	10.9
Lake	0.701	0.804	12.8	1.026	1.178	12.9	1.252	1.436	12.8	1.679	1.902	11.7	2.186	2.412	9.4	2.692	2.983	9.8
Lyon	0.882	0.973	9.4	1.292	1.424	9.3	1.575	1.737	9.3	2.252	2.341	3.8	2.890	3.051	5.3	3.527	3.791	7.0
Marshall	0.779	0.849	8.2	1.140	1.244	8.4	1.391	1.517	8.3	1.879	2.083	9.8	2.418	2.674	9.6	2.957	3.265	9.4
Norman	0.803	0.834	3.7	1.176	1.222	3.8	1.434	1.490	3.8	1.985	2.123	6.5	2.590	2.871	9.8	3.179	3.620	12.2
Northwest	0.748	0.817	8.4	1.095	1.196	8.4	1.335	1.459	8.5	1.822	1.995	8.7	2.304	2.522	8.6	2.729	3.064	10.9
Otter Tail	0.844	0.903	6.5	1.235	1.322	6.6	1.506	1.612	6.6	2.121	2.239	5.3	2.750	2.951	6.8	3.378	3.664	7.8
Pennington-Red Lake	0.834	0.856	2.6	1.221	1.254	2.6	1.489	1.529	2.6	2.005	2.095	4.3	2.553	2.727	6.4	3.081	3.364	8.4
Pipestone-Rock	0.834	0.904	7.7	1.221	1.324	7.8	1.489	1.615	7.8	2.136	2.252	5.2	2.799	2.889	3.1	3.458	3.545	2.5
Polk	0.819	0.853	4.0	1.199	1.250	4.1	1.462	1.524	4.1	1.944	2.121	8.3	2.468	2.864	13.8	2.982	3.608	17.4
Ramsey	0.850	0.889	4.4	1.244	1.301	4.4	1.517	1.587	4.4	2.158	2.279	5.3	2.938	3.149	6.7	3.717	4.018	7.5
Redwood	0.887	0.971	8.7	1.299	1.422	8.6	1.584	1.735	8.7	2.263	2.34	3.3	2.969	3.058	2.9	3.645	3.810	4.3
Renville	0.855	0.931	8.2	1.253	1.364	8.1	1.527	1.663	8.2	2.226	2.295	3.0	2.966	3.045	2.6	3.685	3.798	3.0
South	0.887	0.970	8.6	1.299	1.420	8.5	1.584	1.731	8.5	2.207	2.421	8.8	2.902	3.211	9.6	3.586	4.083	12.2
South Central	0.881	0.973	9.5	1.290	1.425	9.5	1.573	1.737	9.4	2.239	2.455	8.8	2.993	3.285	8.9	3.702	4.181	11.5
Southeast	0.850	0.935	9.1	1.245	1.370	9.1	1.518	1.670	9.1	2.166	2.391	9.4	2.898	3.228	10.2	3.613	4.077	11.4
St. Louis	0.734	0.807	9.0	1.074	1.181	9.1	1.310	1.441	9.1	1.789	2.01	11.0	2.292	2.677	14.4	2.784	3.343	16.7
Washington	0.830	0.899	7.7	1.216	1.317	7.7	1.482	1.606	7.7	2.113	2.293	7.8	2.849	3.157	9.8	3.586	4.021	10.8
West	0.806	0.884	8.8	1.180	1.294	8.8	1.439	1.578	8.8	2.017	2.193	8.0	2.670	2.919	8.5	3.239	3.690	12.2
West Central	0.854	0.917	6.9	1.251	1.343	6.9	1.526	1.638	6.8	2.163	2.318	6.7	2.804	3.064	8.5	3.444	3.869	11.0

Group Name	100 year 5 min			100 year 10 min			100 year 15 min			100 year 30 min			100 year 60 min			100 year 120 min		
	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.	Min	Max	% Diff.
Aitkin-Crow Wing-Pine	0.886	0.963	8.0	1.298	1.410	7.9	1.583	1.720	8.0	2.207	2.358	6.4	2.953	3.130	5.7	3.686	3.933	6.3
Beltrami	0.887	0.952	6.8	1.298	1.393	6.8	1.583	1.699	6.8	2.195	2.4	8.5	2.725	3.218	15.3	3.239	4.036	19.7
Big Stone	0.980	1.053	6.9	1.435	1.542	6.9	1.750	1.880	6.9	2.419	2.643	8.5	3.075	3.529	12.9	3.730	4.415	15.5
Carlton	0.850	0.915	7.1	1.245	1.339	7.0	1.518	1.633	7.0	2.092	2.269	7.8	2.780	3.053	8.9	3.468	3.836	9.6
Cass	0.865	0.951	9.0	1.267	1.392	9.0	1.545	1.697	9.0	2.196	2.36	6.9	2.874	3.120	7.9	3.475	3.920	11.4
Central	0.905	1.033	12.4	1.324	1.513	12.5	1.615	1.845	12.5	2.266	2.576	12.0	3.047	3.507	13.1	3.823	4.499	15.0
Clearwater	0.929	0.958	3.0	1.360	1.403	3.1	1.658	1.711	3.1	2.283	2.434	6.2	2.920	3.350	12.8	3.538	4.265	17.0
Cook	0.773	0.822	6.0	1.132	1.203	5.9	1.380	1.467	5.9	1.845	1.984	7.0	2.341	2.638	11.3	2.827	3.295	14.2
Hennepin	0.956	1.042	8.3	1.400	1.525	8.2	1.708	1.860	8.2	2.432	2.684	9.4	3.297	3.771	12.6	4.157	4.860	14.5
Hubbard	0.879	0.954	7.9	1.287	1.397	7.9	1.570	1.703	7.8	2.242	2.446	8.3	2.969	3.356	11.5	3.695	4.269	13.4
Itasca	0.887	0.943	5.9	1.298	1.380	5.9	1.583	1.683	5.9	2.22	2.317	4.2	2.787	3.005	7.3	3.354	3.747	10.5
Jackson-Murray-Nobles	0.982	1.100	10.7	1.437	1.611	10.8	1.753	1.964	10.7	2.421	2.649	8.6	3.194	3.423	6.7	3.908	4.218	7.3
Koochiching	0.873	0.926	5.7	1.278	1.356	5.8	1.558	1.653	5.7	2.165	2.292	5.5	2.656	2.874	7.6	3.122	3.498	10.7
Lake	0.795	0.904	12.1	1.165	1.324	12.0	1.420	1.615	12.1	1.905	2.141	11.0	2.504	2.723	8.0	3.072	3.376	9.0
Lyon	1.021	1.105	7.6	1.495	1.619	7.7	1.823	1.974	7.6	2.552	2.693	5.2	3.282	3.563	7.9	4.013	4.452	9.9
Marshall	0.879	0.957	8.2	1.287	1.401	8.1	1.570	1.709	8.1	2.122	2.346	9.5	2.755	3.021	8.8	3.335	3.695	9.7
Norman	0.906	0.942	3.8	1.326	1.379	3.8	1.617	1.682	3.9	2.24	2.383	6.0	2.942	3.263	9.8	3.622	4.143	12.6
Northwest	0.840	0.921	8.8	1.230	1.349	8.8	1.500	1.645	8.8	2.059	2.248	8.4	2.596	2.844	8.7	3.071	3.501	12.3
Otter Tail	0.957	1.022	6.4	1.402	1.496	6.3	1.710	1.825	6.3	2.408	2.536	5.0	3.186	3.362	5.2	3.937	4.222	6.8
Pennington-Red Lake	0.940	0.968	2.9	1.376	1.417	2.9	1.678	1.728	2.9	2.267	2.371	4.4	2.869	3.098	7.4	3.456	3.825	9.6
Pipestone-Rock	0.933	1.026	9.1	1.366	1.502	9.1	1.666	1.832	9.1	2.386	2.552	6.5	3.135	3.281	4.4	3.885	4.009	3.1
Polk	0.926	0.966	4.1	1.356	1.414	4.1	1.653	1.724	4.1	2.203	2.413	8.7	2.809	3.276	14.3	3.401	4.140	17.9
Ramsey	0.952	1.009	5.6	1.394	1.477	5.6	1.700	1.801	5.6	2.419	2.591	6.6	3.357	3.653	8.1	4.295	4.714	8.9
Redwood	1.022	1.104	7.4	1.496	1.616	7.4	1.825	1.971	7.4	2.541	2.685	5.4	3.384	3.549	4.6	4.196	4.427	5.2
Renville	0.989	1.056	6.3	1.448	1.547	6.4	1.766	1.886	6.4	2.522	2.625	3.9	3.371	3.521	4.3	4.220	4.417	4.5
South	0.981	1.097	10.6	1.437	1.606	10.5	1.753	1.958	10.5	2.437	2.745	11.2	3.297	3.734	11.7	4.091	4.795	14.7
South Central	0.998	1.105	9.7	1.461	1.618	9.7	1.781	1.973	9.7	2.53	2.791	9.4	3.421	3.833	10.7	4.259	4.928	13.6
Southeast	0.948	1.065	11.0	1.389	1.560	11.0	1.694	1.902	10.9	2.418	2.724	11.2	3.260	3.714	12.2	4.087	4.717	13.4
St. Louis	0.837	0.904	7.4	1.225	1.324	7.5	1.494	1.615	7.5	2.023	2.257	10.4	2.601	3.014	13.7	3.163	3.792	16.6
Washington	0.922	1.023	9.9	1.350	1.498	9.9	1.646	1.827	9.9	2.342	2.613	10.4	3.199	3.675	13.0	4.057	4.737	14.4
West	0.907	1.020	11.1	1.329	1.494	11.0	1.620	1.822	11.1	2.27	2.538	10.6	3.044	3.370	9.7	3.731	4.290	13.0
West Central	0.986	1.056	6.6	1.444	1.547	6.7	1.761	1.886	6.6	2.459	2.677	8.1	3.214	3.571	10.0	3.968	4.493	11.7