

Montana Cup Regional 2010 Populations and Re-Districting Proposal

By Erik Makus

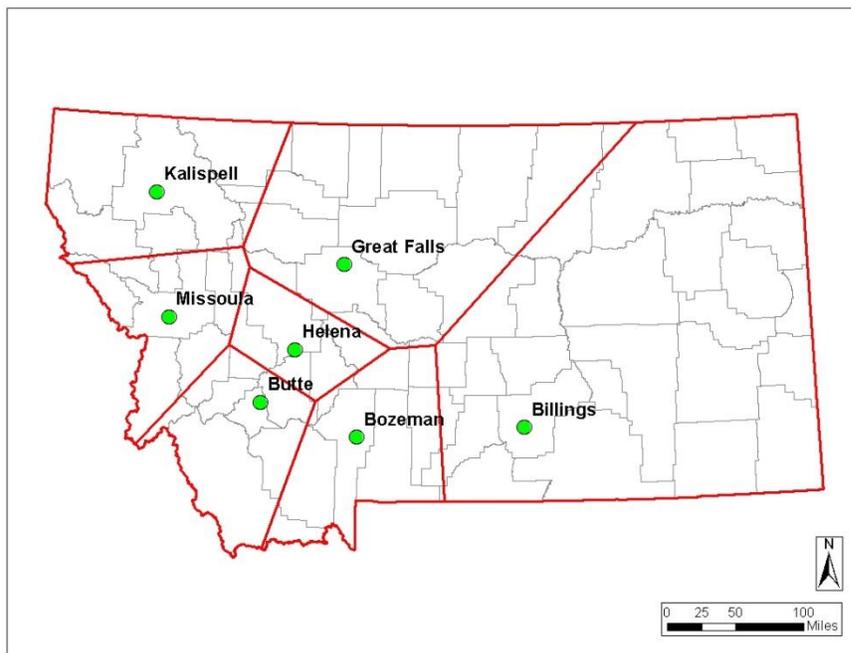
Methodology:

The spatial locations of city courthouses were used to determine regional central points (Table 1). Thiessen polygons were then created dividing Montana between these seven points. A Thiessen polygon is created using the perpendicular bisectors of the lines between all points (Figure 1). This resulted in no discernable change from the existing map on the Montana Cup website.

Table 1. Locations of city courthouses

City	Location	Address	X-coordinate (Montana State Plane, meters)	Y-coordinate (Montana State Plane, meters)
Billings	Billings City Courthouse	220 N 27th St.	677,239	170,975
Bozeman	Bozeman City Courthouse	615 S 16th Ave.	478,531	159,401
Butte	Butte Justice Court	155 W. Granite St.	364,831	200,669
Great Falls	Great Falls Municipal Court	2 Park Dr. S.	463,977	363,295
Helena	Helena City Courthouse	228 E Broadway St.	405,768	262,725
Kalispell	Kalispell City Court	312 1st Ave. E.	242,674	449,397
Missoula	Missoula City Municipal Court	435 Ryman St.	257,719	301,455

Figure 1. Montana Cup Regions



To determine populations within each region, 2010 US Census Bureau data was used. The US Census Bureau has population estimates for all Montana counties, several hundred Montana cities and towns, and several hundred Montana “census designated places” (CDPs). A CDP is typically a region or area that is not an actual city/town but is recognized as a place (e.g., Helena Valley, Orchard Homes). These three categories were used to determine regional totals. The population of Montana in 2010 was 989,415 people.

Populations were calculated in two separate steps – an ‘urban’ population, and a ‘rural’ population. To calculate the urban population, cities, towns, and CDPs defined by the US Census Bureau were spatially located and input into GIS as a point value with their entire 2010 population. Additionally, the area (in square miles) of each city, town, and CDP was estimated based on a simple regression. Both the population and area of each city/town/CDP was removed from the county it was in to completely separate the urban/rural populations. Then these urban population centers were assigned to the region they fell within and these values were summed to get each region’s urban population. In the case of the cities of Boulder, Harlowton, Harrison, and Ronan, the city population was divided equally between the two regions that it falls between (as per the Montana Cup website).^{*} No other significant urban populations fell along regional lines.

To calculate rural populations, the methodology was a bit more complex. Once cities were apportioned, the remaining county populations and the total distribution of private land area within the county (not total land area – public lands such as national forest and wilderness do not contain permanent human population) were used to determine an average private land population density for each county. If a county fell entirely within one region, then the remaining population of that county was counted towards that region (30 counties were entirely within one region). However, if a county was divided between two or more regions (e.g., Lewis & Clark County was divided between four regions), then the rural population was divided up based on the percentage of private land in that county that fell within each region.

As an example, Beaverhead County had a 2010 population of 9,246 people. The census lists three towns – Dillon, Lima, and Wisdom – totaling 4,453 people. This leaves 4,793 people as the rural population. Beaverhead County has 1,717 square miles of private land (*after* removing the town footprints), and thus a rural population density of 2.79 people per square mile (rural populations were assumed to be evenly distributed across all private lands in the county). Beaverhead County is divided between the Butte region and the Bozeman region - 89% (1,536 square miles) of private land within Beaverhead County is in the Butte region (and all three towns are within the Butte region), and 11% (181 square miles) is in the Bozeman region. So Butte’s total population is 4,453 urban + 4,286 rural (1,536 x 2.79) for a total of 8,739 people. Bozeman’s total was 0 urban + 507 rural (181 x 2.79) for a total of 507 people. 8,739 plus 507 totals 9,246 people total in Beaverhead County.

^{*}Although these four cities are divided between regions per the Montana Cup website, in reality each one falls almost entirely within one region. Based on aerial photo interpretation, Boulder is approximately 99% within the Helena region, Harlowton is about 95% Billings, Harrison is 100% Bozeman, and Ronan is about 99.9% Missoula.

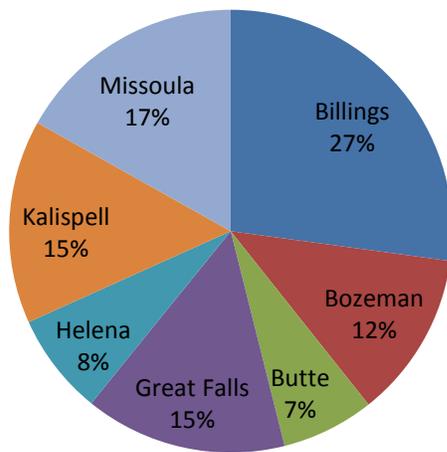
Results:

When this methodology was applied to the entire state and regional totals were tallied, it shows that Billings and Missoula have the largest populations to pull from, while Helena and Butte have the smallest (Table 2 and Figure 2). The average regional population is 141,345. For comparison, Billings has about 4 times, and Missoula about 2.5 times, the number of people that Butte does.

Table 2. Montana Cup Regional Population Estimates in 2010

Region	Regional Areas (square miles)	Urban Population	Rural Population	Total Population	% of State Population
Billings	63,804.4	190,055	75,800	265,855	26.9%
Bozeman	12,003.2	72,875	42,781	115,656	11.7%
Butte	10,176.1	55,609	10,763	66,372	6.7%
Great Falls	29,974.0	112,945	35,374	148,319	15.0%
Helena	5,741.7	65,818	10,528	76,346	7.7%
Kalispell	15,990.5	82,343	67,993	150,336	15.2%
Missoula	9,233.0	103,761	62,770	166,531	16.8%
Totals	146,922.9			989,415	100.0%

Figure 2. Montana Cup Regional Population Estimates in 2010



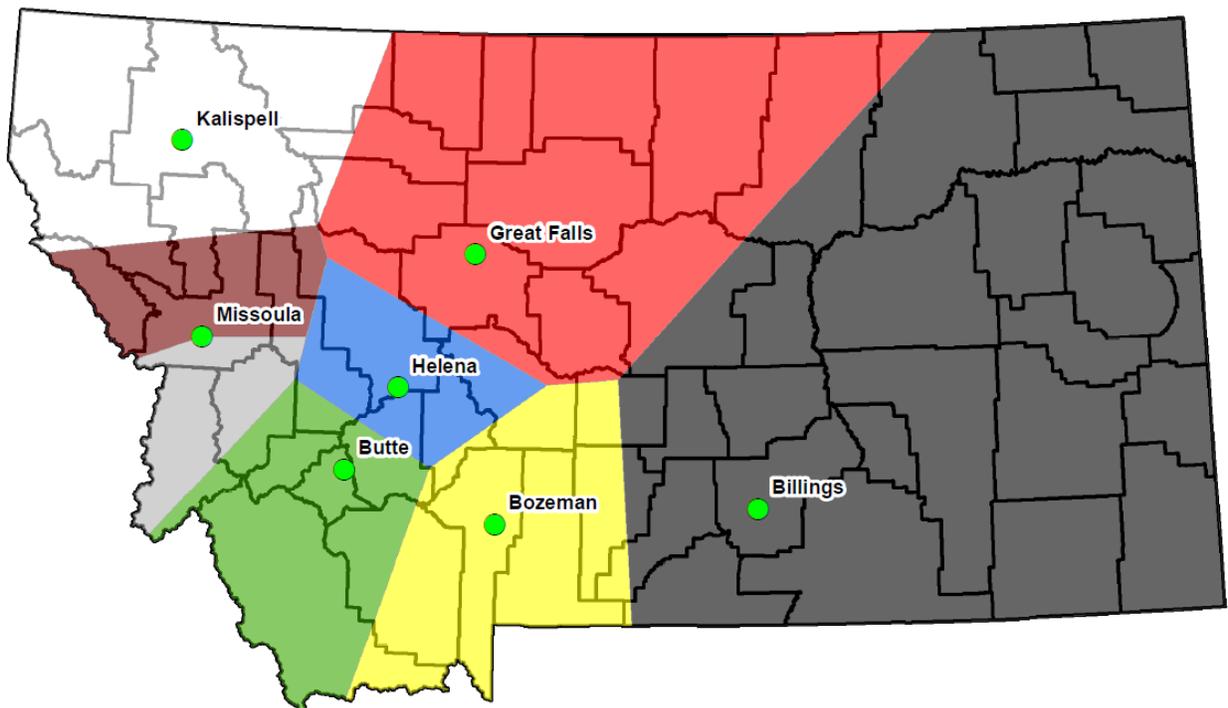
Population Estimate Assumptions:

1. Estimates are based on US Census Bureau data from 2010.
2. Assumption of evenly distributed rural populations across counties. There is more likely a gradual decrease in population density as one moves away from the larger cities. This probably slightly affects counties that are divided between two regions and that have large rural populations (Lewis & Clark, Ravalli, etc.), but the overall influence is likely minor.

Re-Districting Options:

As Table 2 above shows, there is a large disparity between regional populations. Billings is the largest team in the state, population-wise. However, their location far east of the rest of the regions (Figure 1) precludes them from showing up with a full team in most years, and furthermore, much of their population is scattered across eastern Montana, an area nearly the size of North Dakota. However, the 2nd largest region in Montana – Missoula - is centrally located and has a relatively concentrated population. Additionally, Missoula has dominated the Montana Cup Race since its inception, winning the men’s and women’s open races about 2 out of every 3 years. Therefore, to increase parity in the Montana Cup, and reduce some of the population inequality, it has been suggested to re-district the Missoula region into two regions: a Missoula-North (maroon), and Missoula-South (silver) (Figure 3).

Figure 3. Montana Cup Proposed Regional Re-Districting



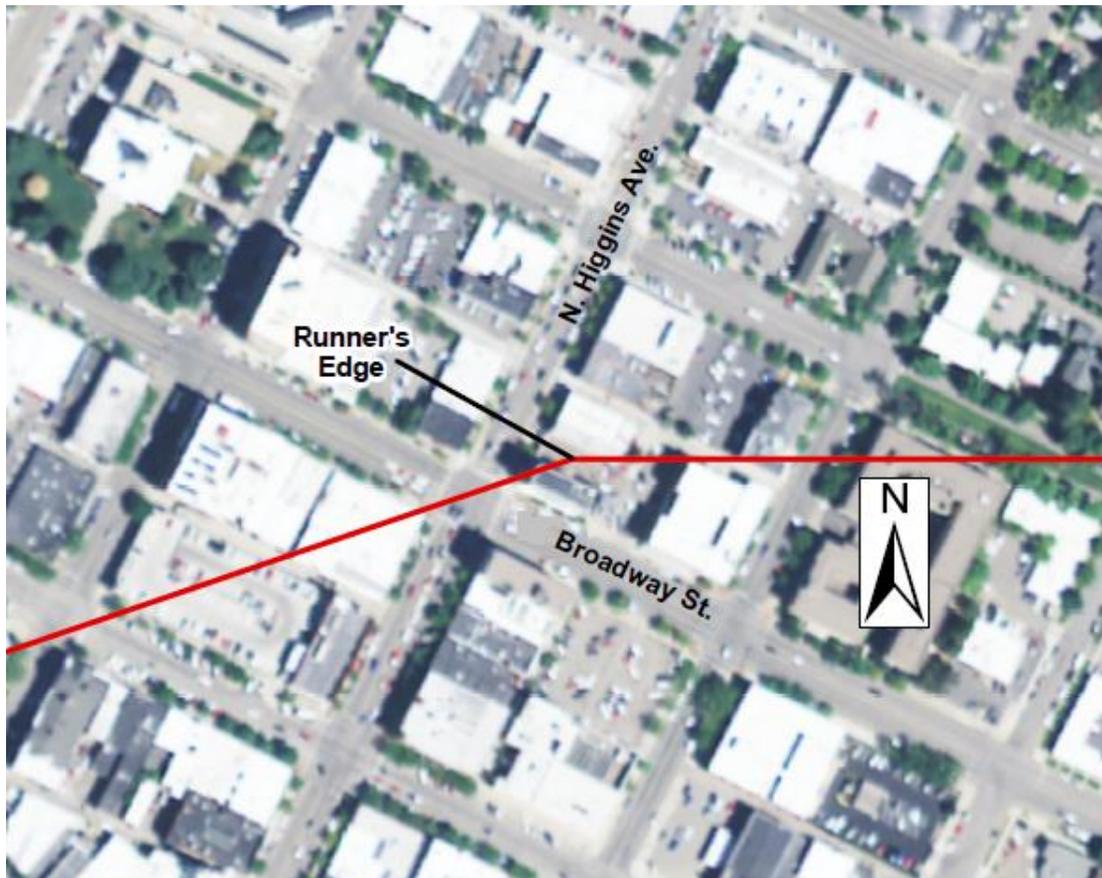
The proposed re-district line runs east-northeast from the Idaho border through downtown Missoula, and then due east to the Helena regional border. It would divide the towns/CDPs of Bonner, East Missoula, Missoula, and Orchard Homes roughly in half, and divides the population of the Missoula region exactly in half (Table 3).

Table 3. Missoula Re-Districting Summary

Region	Regional Areas (square miles)	Total Population	% of State Population
Missoula-North	5,532.6	83,266	8.4%
Missoula-South	3,700.4	83,266	8.4%
<i>Missoula Total</i>	<i>9,233.0</i>	<i>166,531</i>	<i>16.8%</i>

Coincidentally, the line of demarcation runs through the middle of Runner’s Edge in downtown Missoula (Figure 4). It is assumed that Runner’s Edge employees and patrons would have to go to the front of the store (or outside along Higgins Ave.) to discuss Missoula-North Montana Cup related items, and conversely go to the back of the store (or the alley) to discuss Missoula-South Montana Cup related items.

Figure 4. Coincidental Bisection of Runner’s Edge



References:

Montana Cup website: <http://www.montanacup.com>

US Census Bureau, 2012. *Montana: 2010, Population and Housing Unit Counts*, CPH-2-28:
<https://www.census.gov/prod/cen2010/cph-2-28.pdf>