

# City of Flagstaff Pedestrian Bicycle FUTS Master Plans



## DRAFT Working Paper 3 Mode share trends and peer cities comparison

July 2015



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## Introduction

This Working Paper provides information and analysis of mode share as an indicator of the status of walking and biking and biking in Flagstaff.

Mode share, which is also called modal share or mode split, is a measure of the number or percentage of trips that are made by different modes of travel. These modes typically include private vehicles, transit, walking, and biking. Private vehicle use may be further divided into single-occupant vehicles and multiple-occupant vehicles (car pools).

Mode share is a direct measure of the status of walking and biking. There are a variety of other ways to assess walking and biking, notably pedestrian and bicycle counts. However, at this time other sources of information are not consistently available in Flagstaff.

As Flagstaff works to enhance the pedestrian and bicycle environment, it will be increasingly necessary to track pedestrian and bicycle activity via mode share, counts, and other measures:

- At the community level, monitoring trend data is the best indication of improvement in the overall environment for walking and biking
- At specific locations, before and after counts directly measure the effectiveness of new facilities and other improvements
- As funding becomes increasingly competitive, detailed bicycle and pedestrian data helps to build empirical support for additional investment in pedestrian and bicycle projects and programs

Throughout implementation of the pedestrian and bicycle master plan, it will be important to set targets and measure performance to assess the success of the City's efforts.

## Summary of findings

- Mode share is an important and direct measure of the status of walking and biking in Flagstaff.
- Mode share data comes from two primary sources, the FMPO Trip Diary Survey and the American Community Survey.
- As Flagstaff works to enhance the environment for walking and biking, it will become increasingly important to use other methods to measure the health of walking and biking and track bicycle and pedestrian activity.
- Although trend data for mode share is limited, there is some evidence that the walking and transit mode share are increasing, while bicycling is decreasing.
- There is a vast difference in mode share by geographic area. In the Core of Flagstaff, combined walk-bike-transit mode share is near 60 percent, but less than 5 percent in the outlying areas of the FMPO region.
- Overall mode share trends for Flagstaff are the composite of two divergent trends. In the Core area, mode share for walking, biking, and transit all increased significantly between 2006 and 2012, but decreased for all modes in the rest of Flagstaff outside of the Core.
- Walking, biking, and transit mode share for NAU students are much higher than the general population of Flagstaff, and increased between 2006 and 2012. Walking, biking, and transit are the predominant means for students to commute to campus
- Flagstaff's walking and biking mode share is significantly higher than state and national averages, based on estimates of means of transportation to work.
- Among its peer communities, Flagstaff consistently lands in the middle of rankings for walk, bike, and transit mode share. Flagstaff falls below the mode share average of its peer communities for all travel modes except walking.

## Data sources

Mode share information for Flagstaff comes from two primary sources, the FMPO Trip Diary Survey, and the American Community Survey.

### FMPO Trip Diary Survey

This detailed survey of regional travel patterns asks randomly-selected participants to keep a log or “diary” of their travel for one assigned day. The resulting data measures mode share – the percentage of trips made by walking, biking, and transit.

The FMPO has conducted the survey twice, the first time in 2006 and again in 2012, and intends to conduct the survey every five years or so to provide trend data and assess changes in mode share. The Trip Diary Survey is the most direct and comprehensive measure of mode share in Flagstaff. Results are further divided into three geographic areas based on where respondents live, core of Flagstaff, Flagstaff, and the region, allowing an additional level of analysis.

Although the Trip Diary Survey provides a direct measure of mode share, the information has several limitations:

- The sample size is fairly small, so the margin of error tends to be high, and the ability to examine travel behavior for small subgroups is limited.
- To date only two surveys have been conducted, so there is not much trend data
- Few communities conduct surveys of this type, so comparisons to other communities is not possible

### American Community Survey

The American Community Survey (ACS) is an on-going statistical survey by the U.S. Census Bureau that collects detailed information about the population, including the means of transportation to work for workers over the age of 16.

Data from the ACS is typically provided in the form of 1, 3, and 5-year estimates. One-year estimates are based on 12 months of collected data, so the information is more current than either the 3-year or 5-year estimates, but it may also be less precise because the sample size is smaller. At the other end, 5-year estimates include 60 months of collected data, so may be more accurate due to the larger sample size, but are also less current than either the 1-year or 3-year estimates.

One-year estimates are available only for areas with a population of 65,000 or more. Flagstaff first reached this threshold in 2012. Three-year estimates are available for areas with a population of at least 20,000; and five-year estimates are available for all locations.

Means of transportation to work covers only the work commute, so it may not be exactly representative of mode share for all trips. This limitation notwithstanding, ACS data makes it possible to directly compare Flagstaff's work trip mode share to other communities and locations. ACS transportation to work data also provides additional points for trends over time.

## Mode share

### Trends

Tables 1 through 3 and Figures 1 through 4 below illustrate mode share for Flagstaff and trends over time from three different data sources. Tables 2 and 3 include mode share only for work commutes, whereas Table 1 encompasses all trips.

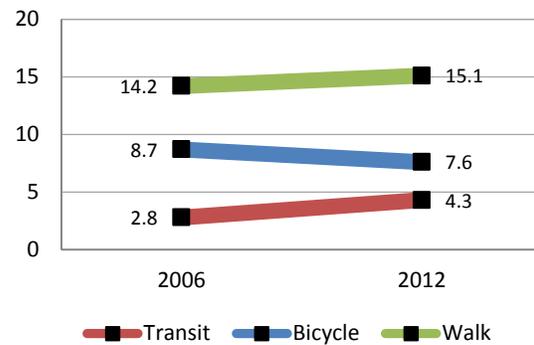
Information in Table 1 and Figures 1 and 2 is taken from the FMPO Trip Diary Surveys of 2006 and 2012, and represents the modal split for all trips made by respondents who reside in the city of Flagstaff.

**Table 1 Mode share of all trips for Flagstaff**

Mode	2006	2012	Change
Private vehicle	74.3	73.0	(1.3)
Transit	2.8	4.3	1.5
Bicycle	8.7	7.6	(1.1)
Walk	14.2	15.1	0.9
Walk-bike	22.9	22.7	(0.2)
Walk-bike-transit	25.7	27.0	1.3

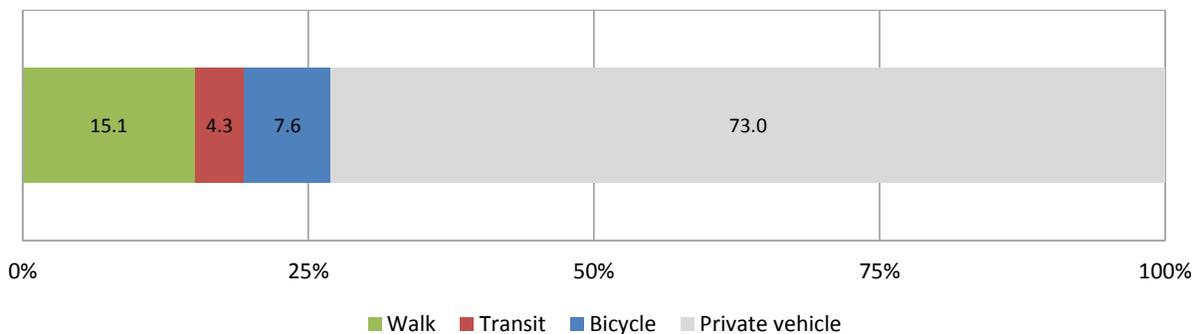
Source: FMPO Trip Diary Survey

**Figure 1 Mode share of all trips for Flagstaff**



Source: FMPO Trip Diary Survey

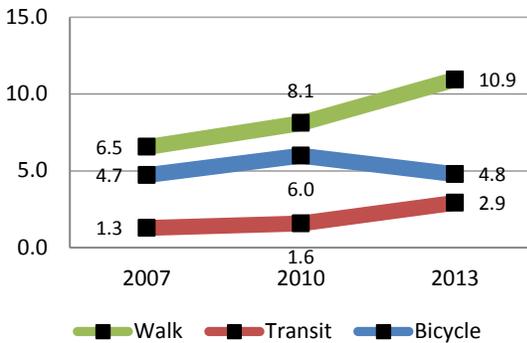
**Figure 2 Mode share of all trips for Flagstaff in 2012**



Source: FMPO Trip Diary Survey

Table 2 and Figure 3 uses information from the American Community Survey, in particular 3-year estimates for the means of transportation to work for the city of Flagstaff. Data listed for each year (2007, 2010, and 2013) represents survey data collected over a three-year period ending with that year.

**Figure 3 Means of transportation to work for Flagstaff – ACS 3-year estimates**



Source: ACS 3-Year Estimates

**Table 2 Means of transportation to work for Flagstaff – ACS 3-year estimates**

Mode	2007	2010	2013
Private vehicle	81.1	79.2	68.2
Transit	1.3	1.6	2.9
Bicycle	4.7	6.0	4.8
Walk	6.5	8.1	10.9
Walk-bike	11.3	14.1	15.7
Walk-bike-transit	12.5	15.7	18.6

Source: ACS 3-Year Estimates

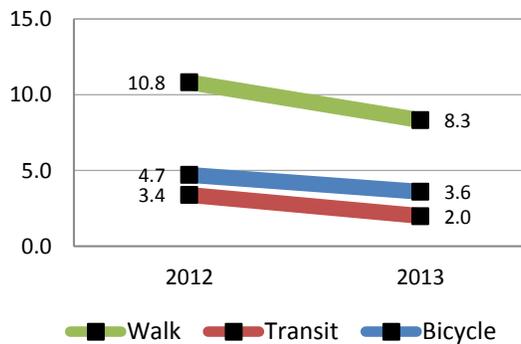
Table 3 and Figure 4 are also based on American Community Survey data, but includes survey data for a 12-month period. One-year estimates are available only for communities of 65,000 or larger in population. Flagstaff surpassed this threshold in 2012, so information is only available for 2012 and 2013.

**Table 3 Means of transportation to work for Flagstaff - ACS 1-year estimates**

Mode	2012	2013
Private vehicle	74.7	82.3
Transit	3.4	2.0
Bicycle	4.7	3.6
Walk	10.8	8.3
Walk-bike	15.5	11.9
Walk-bike-transit	18.9	13.9

Source: ACS 1-Year Estimates

**Figure 4 Means of transportation to work for Flagstaff - ACS 1-year estimates**



Information from the Trip Diary Survey and the American Community Survey 3-Year Estimates indicates that the mode share for walking and transit are increasing, while bicycling mode share is in decline. The combined mode share for walking, bicycling, and transit increased according to both data sources.

The American Community Survey 5-Year Estimates show a decline for all three modes between 2012 and 2013, and a five-point decline in combined walk-bike-transit share.

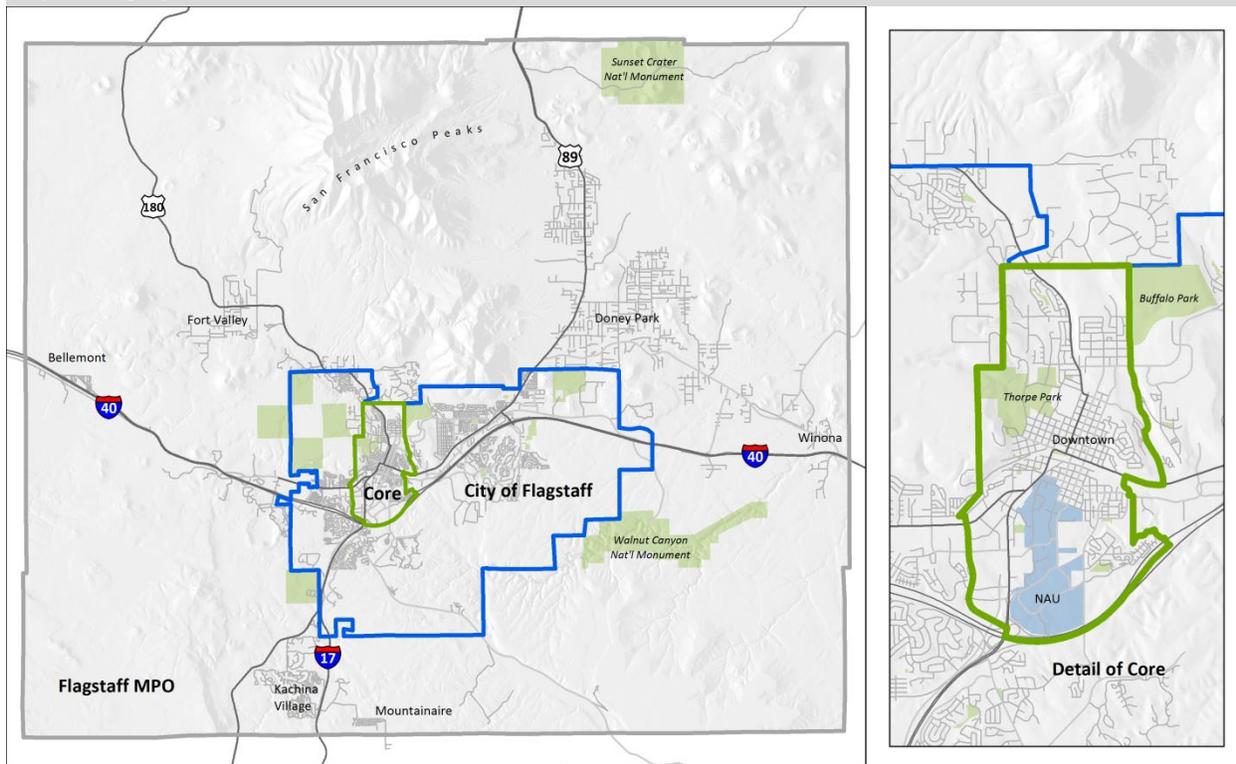
There is not much trend data available from these three sources; one source includes only three data points, and the other two have only two data points. As a result it is not possible to determine if this data is indicative of long-term, meaningful trends, and it is difficult to draw important conclusions.

However, because all three sources indicate declines in one or more modes, there is some cause for concern. Future mode share data should be monitored closely as it becomes available.

### By geographic area

The FMPO Trip Diary Survey breaks mode share results into three geographic subareas, based on the location of the residence of respondents, and allows for a more detailed analysis of changes in mode share.

Map 1 Geographic sub-areas



Map 1 depicts the three geographic subareas. The *Core* area generally covers neighborhoods in the central part of Flagstaff, including Downtown, Southside, the NAU campus, Woodlands Village, Brannen Homes, Cherry Hill, north of downtown, Noho, Coconino Estates, Townsite, and La Plaza Vieja.

*Rest of Flagstaff* covers the remainder of Flagstaff within City limits but outside the Core, and *Rest of the FMPO* comprises the area within the FMPO boundaries but outside of City limits, including the communities of Kachina Village, Mountainaire, Winona, Cosnino, Doney Park, Timberline, Fort Valley, and Bellemont.

Table 4 shows modal split for the three geographic subareas from the 2012 survey, and clearly demonstrates how significantly mode share varies by geography. Respondents who live in the Core area are much more likely to walk, bicycle, or take transit than are residents in the rest of the FMPO.

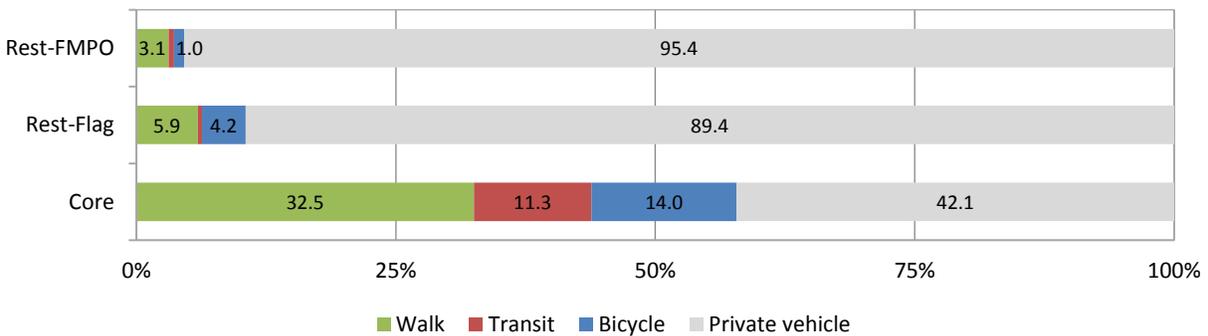
Combined walk-bike-transit mode share in the Core was 57.8 percent in 2012, but less than 5 percent in the rest of the FMPO region. This vast difference is likely due to conditions in the Core that are more conducive to walking, biking, and taking the bus, including a more compact urban form, greater mix of residential and non-residential uses, and higher densities.

**Table 4 Mode share of all trips by area, 2012**

Mode	Core	Rest-Flag	Rest-FMPO
Private vehicle	42.1	89.4	95.4
Transit	11.3	0.4	0.5
Bicycle	14.0	4.2	1.0
Walk	32.5	5.9	3.1
Walk-bike	46.5	10.1	4.1
Walk-bike-transit	57.8	10.5	4.6

Source: FMPO Trip Diary Survey 2012

**Figure 5 Mode share of all trips by area, 2012**



Source: FMPO Trip Diary Survey 2012

Table 5 and Figure 6 provide the change in mode share percentage points between 2006 and 2012 for each mode and geographic subarea, and reveals that Flagstaff’s overall mode share figures are the composite of two divergent trends. In the Core area, mode share for walking, biking, and transit all increased dramatically, whereas mode share declined for all three modes in the rest of Flagstaff outside of the Core.

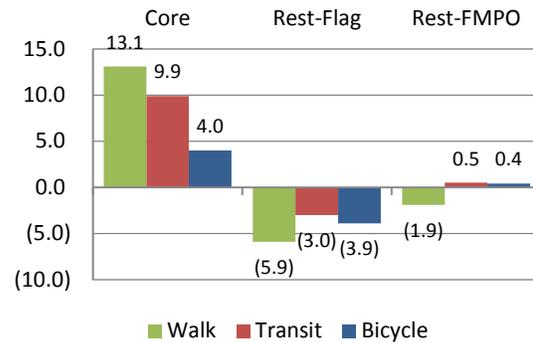
More share increases in the Core are attributable to several changes. NAU enrollment increased from about 11,000 in 2006 to 17,760 in 2012, and was accompanied by construction of almost 1,400 multi-family housing units in the Core area. Most of the new housing is student-oriented and in proximity to the NAU campus. Mountain Link bus service was launched in 2010 and introduced high-frequency transit to the Core area.

**Table 5 Mode share change by area, 2006 to 2012**

Mode	Core	Rest-Flag	Rest-FMPO
Private vehicle	(27.1)	12.7	1.1
Transit	9.9	(3.0)	0.5
Bicycle	4.0	(3.9)	0.4
Walk	13.1	(5.9)	(1.9)
Walk-bike	17.1	(9.8)	(1.5)
Walk-bike-transit	27.0	(12.8)	(1.0)

Source: FMPO Trip Diary Survey, 2006 and 2012

**Figure 6 Mode share change by area, 2006 to 2012**



Source: FMPO Trip Diary Survey, 2006 and 2012

### NAU student trips

The Trip Diary Survey has also calculated the modal split for students at Northern Arizona University. NAU student trips are a significant component of travel in Flagstaff, particularly in the Core area.

Mode share for all trips made by NAU students in 2006 and 2012 is presented in Table 6.

Walking, biking, and transit mode share are much higher for NAU students than for the rest of Flagstaff's population. The combined mode share for trips by NAU students was 49.4 percent in 2012, compared to 27.0 percent for the entire population.

Mode share for each travel mode is higher as well. Walking mode share is 24.6 percent for NAU students compared to 15.1 percent for all of Flagstaff, bicycling is 17.7 for NAU students versus 7.6 for Flagstaff, and transit is 7.1 percent for NAU students versus 4.3 for Flagstaff.

Combined student mode share for all trips increased from 44.0 percent in 2006 to 49.4 percent in 2012. Among individual modes, transit increased dramatically by 6.5 percentage points, and walking increased slightly from 21.8 percent to 24.6 percent. Bicycling mode share diminished by almost 4 percentage points.

**Table 6 Mode share of all trips by NAU students**

Mode	2006	2012	Change
Private vehicle	55.9	50.5	(5.4)
Transit	0.6	7.1	6.5
Bicycle	21.6	17.7	(3.9)
Walk	21.8	24.6	2.8
Walk-bike	43.4	42.3	(1.1)
Walk-bike-transit	44.0	49.4	5.4

Source: FMPO Trip Diary Survey, 2006 and 2012

**Table 7 Mode share of school commute trips by NAU students**

Mode	2006	2012	Change
Private vehicle	36.6	23.1	(13.5)
Transit	3.1	12.0	8.9
Bicycle	29.4	43.2	13.8
Walk	30.9	21.7	(9.2)
Walk-bike	60.3	64.9	4.6
Walk-bike-transit	63.4	76.9	13.5

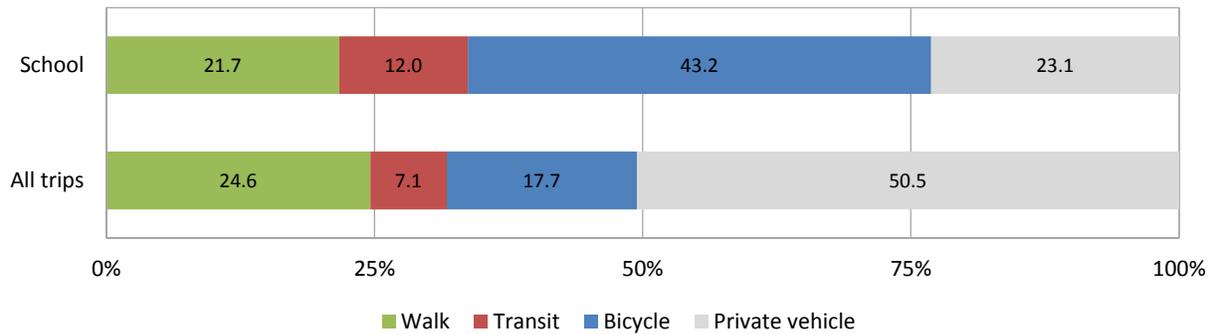
Source: FMPO Trip Diary Survey, 2006 and 2012

Table 7 narrows mode choice data for NAU students to only the commute to campus. For their school commute, the combined mode share for NAU students was 76.9 percent in 2012, meaning that only 23.1 percent of NAU students drive a private vehicle to campus. This represents an increase from 63.4 percent combined mode share in 2006

Among individual travel modes, transit and bicycling both increased dramatically between 2006 and 2012, by 8.9 and 13.8 percentage

points respectively. Walking declined by 9.2 percentage points for the same time period.

**Figure 7 Mode share for NAU students, school commute and all trips, 2012**



Source: FMPO Trip Diary Survey 2012

The increases may be due to several factors, including the launch of Mountain Link, increases on parking permit fees on campus, additional student-oriented housing in proximity to campus, and efforts by NAU to encourage alternate mode travel.

## State and national comparison

Table 8 and Figure 5 compares Flagstaff’s mode share to state and national averages, based on information taken from the American Community Survey 3-year estimates for means of transportation to work.

The percentage of work commutes made by bicycling and walking is significantly higher in Flagstaff than in the rest of Arizona and the rest of the country.

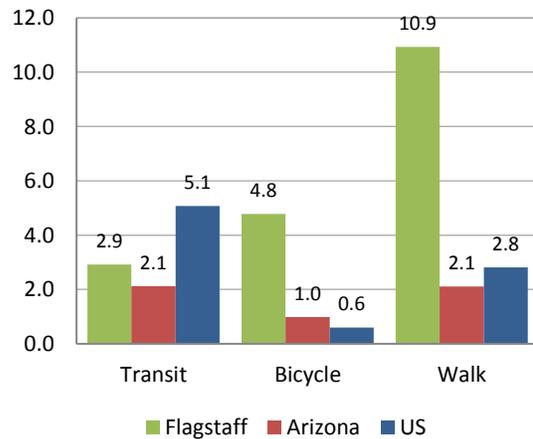
Walking to work comprised 10.9 percent of all work trips in Flagstaff, compared to 2.1 percent for Arizona and 2.8 percent for the entire country. Bicycling to work was 4.8 percent in Flagstaff compared to 1.0 percent for Arizona and 0.6 percent for the country. Transit as means of transportation to work was slightly higher in Flagstaff (2.9 percent) than for all of Arizona (2.1 percent), but less than the national average of 5.1 percent.

**Table 8 Means of transportation to work - state and national comparison**

Mode	Flagstaff	Arizona	US
Private vehicle	76.1	87.5	86.0
Transit	2.9	2.1	5.1
Bicycle	4.8	1.0	0.6
Walk	10.9	2.1	2.8
Walk-bike	15.7	3.1	3.4
Walk-bike-transit	18.6	5.2	8.5

Source: ACS 3-Year Estimates

**Figure 8 Means of transportation to work - state and national comparison**



Source: ACS 3-Year Estimates

## Peer cities comparison

To provide a wider context for Flagstaff’s mode share numbers, a group of 15 peer cities were selected for comparison. The 15 peer cities were chosen based on several factors that make comparison to Flagstaff relevant:

- Located in the western US
- Have a population generally between 25,000 and 105,000
- Home to a public university, with an enrollment of at least 10,000 students
- Geographically free-standing community, rather than a suburban community in a larger metropolitan area.

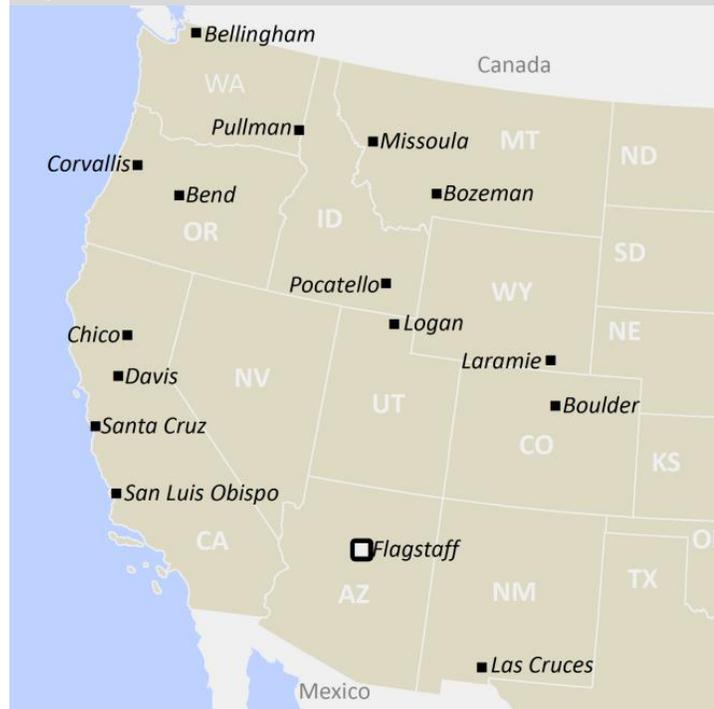
Table 9 lists the 15 peer cities, along with their estimated 2014 population, and Map 2 shows the location of the 15 communities.

**Table 9 Peer cities**

City	State	Population
Bellingham	WA	83,365
Bend	OR	84,080
Boulder	CO	105,112
Bozeman	MT	41,660
Chico	CA	89,180
Corvallis	OR	54,953
Davis	CA	66,742
Laramie	WY	32,081
Las Cruces	NM	101,408
Logan	UT	48,997
Missoula	MT	69,821
Pocatello	ID	54,292
Pullman	WA	31,682
San Luis Obispo	CA	46,730
Santa Cruz	CA	63,364
Average		64,898

Source: U.S. Census Bureau, Population Division, 2014

**Map 2 Peer cities**



All of the information for this comparison was taken from the American Community Survey 5-year estimates for means of transportation to work, which was derived from surveys conducted over a 60-month period ending at the close of 2013.

A peer cities comparison puts Flagstaff’s mode share numbers in context with similar communities, and it allows establishment of realistic performance targets for modal split, based on what Flagstaff’s peers have been able to achieve. The information also provides direction where to find successful programs to emulate to increase walking, biking, and transit in Flagstaff.

Tables 10, 11, and 12 rank Flagstaff’s transit, walk, and bike mode share relative to the 15 peer cities. Table 13 combines the walk and bike modal split, and Table 14 combines transit with walk and bike shares. Figure 5 illustrates mode share numbers for all 16 communities.

Flagstaff rankings for all modes are consistently middle-of-the-pack, and its numbers are below the average of its peer communities in all but walking mode share:

- For transit, Flagstaff ranks 8 of 16 communities, and its mode share of 2.7 percent is lower than the average of 3.7 percent.
- For bicycling. Flagstaff ranks 10 of 16 communities, and its mode share of 4.5 percent is lower than the average of 6.6 percent.
- For walking, Flagstaff ranks 7 of 16 communities, and its mode share of 9.4 percent is higher than the average of 7.6 percent.
- For combined walking and biking, Flagstaff ranks 9 of 16 communities, and its mode share of 13.9 percent is slightly lower than the average of 14.2 percent.
- For combined walking, biking, and transit, Flagstaff ranks 10 of 16 communities, and its combined mode share of 16.6 percent is lower than the average of 17.8 percent.

This analysis indicates that there is an opportunity for Flagstaff to grow mode share to levels that are more closely aligned with the higher performers among its peer communities. For example, if Flagstaff were able to rank in the top 5 for each mode, its combined mode share would expand from 16.6 to 22.6 percent.

**Table 10 Transit mode share – peer cities**

<i>City</i>	<i>Pct</i>	<i>Rank</i>
Pullman	9.7	1
Boulder	9.0	2
Davis	6.5	3
Bellingham	5.8	4
Santa Cruz	5.4	5
Logan	3.4	6
Corvallis	2.9	7
Flagstaff	2.7	8
San Luis Obispo	2.7	9
Laramie	2.3	10
Missoula	2.0	11
Pocatello	1.9	12
Chico	1.3	13
Bozeman	1.3	14
Bend	0.7	15
Las Cruces	0.5	16
Average	3.7	

Source: ACS 5-Year Estimates (2009-2013)

**Table 11 Walking mode share – peer cities**

<i>City</i>	<i>Pct</i>	<i>Rank</i>
Pullman	22.9	1
Corvallis	12.2	2
Santa Cruz	9.9	3
Boulder	9.8	4
Bozeman	9.8	5
Laramie	9.6	6
<b>Flagstaff</b>	<b>9.4</b>	<b>7</b>
Bellingham	8.3	8
Missoula	7.5	9
San Luis Obispo	7.4	10
Logan	7.3	11
Chico	5.4	12
Pocatello	4.2	13
Bend	3.5	14
Davis	3.4	15
Las Cruces	2.7	16
Average	7.6	

Source: ACS 5-Year Estimates (2009-2013)

**Table 13 Walk-bike mode share – peer cities**

<i>City</i>	<i>Pct</i>	<i>Rank</i>
Pullman	25.3	1
Corvallis	24.7	2
Davis	24.1	3
Boulder	20.4	4
Santa Cruz	19.3	5
Laramie	16.5	6
Bozeman	15.6	7
San Luis Obispo	14.9	8
<b>Flagstaff</b>	<b>13.9</b>	<b>9</b>
Missoula	13.7	10
Bellingham	11.7	11
Logan	11.3	12
Chico	10.9	13
Pocatello	5.7	14
Bend	5.7	15
Las Cruces	3.8	16
Average	14.2	

Source: ACS 5-Year Estimates (2009-2013)

**Table 12 Biking mode share – peer cities**

<i>City</i>	<i>Pct</i>	<i>Rank</i>
Davis	20.7	1
Corvallis	12.5	2
Boulder	10.6	3
Santa Cruz	9.5	4
San Luis Obispo	7.4	5
Laramie	6.8	6
Missoula	6.2	7
Bozeman	5.8	8
Chico	5.5	9
<b>Flagstaff</b>	<b>4.5</b>	<b>10</b>
Logan	4.0	11
Bellingham	3.4	12
Pullman	2.4	13
Bend	2.2	14
Pocatello	1.5	15
Las Cruces	1.1	16
Average	6.6	

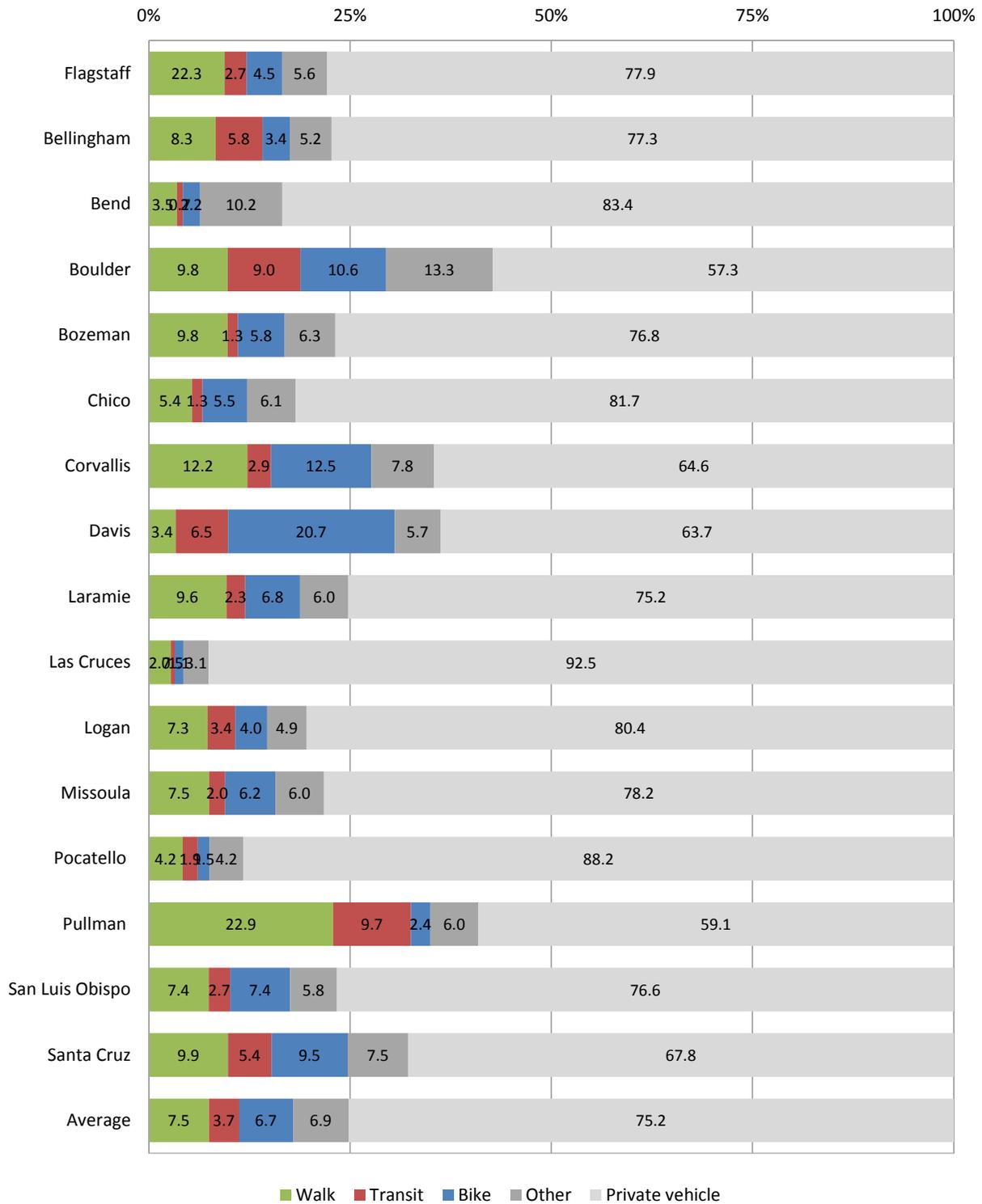
Source: ACS 5-Year Estimates (2009-2013)

**Table 14 Walk-bike-transit mode share – peer cities**

<i>City</i>	<i>Pct</i>	<i>Rank</i>
Pullman	35.0	1
Davis	30.5	2
Boulder	29.5	3
Corvallis	27.6	4
Santa Cruz	24.7	5
Laramie	18.8	6
San Luis Obispo	17.6	7
Bellingham	17.5	8
Bozeman	16.9	9
<b>Flagstaff</b>	<b>16.6</b>	<b>10</b>
Missoula	15.7	11
Logan	14.7	12
Chico	12.2	13
Pocatello	7.6	14
Bend	6.4	15
Las Cruces	4.3	16
Average	17.8	

Source: ACS 5-Year Estimates (2009-2013)

**Figure 9 Means of transportation to work – peer cities comparison**



Source: ACS 5-Year Estimates (2009-2013)