Appendix E

Demographic Trends and Projections

This update of demographic trends and projections for the Duluth-Superior metropolitan area was prepared by AECOM for the Metropolitan Interstate Council (MIC).

Trends & Projections Update

Introduction

An assessment of the current and future transportation needs in the Duluth-Superior metropolitan area begins with a look at trends in population growth, demographics, employment, land use, and travel behavior. The size, makeup, and characteristics of the population exhibit a wide range of demands throughout the transportation system. Together, these characteristics influence travel patterns, future growth, and subsequent decisions in transportation investment.

Geographic Definitions

Trends regarding population, demographics, economics, and other characteristics are tracked using data published by the U.S. Census Bureau and other agencies. For metropolitan areas like Duluth- Superior, such data is collected and delivered according to at least one of three geographic levels: the metropolitan statistical area (MSA), the urbanized area (UZA), or the individual municipalities that comprise the metropolitan planning organization (MPO).

Metropolitan Planning Organization (MPO)

The Duluth-Superior Metropolitan Interstate Council (MIC) is the federally designated MPO for the area. It is a bi-state MPO comprised of three cities and seven townships on the Minnesota side of the harbor and one city, two villages, and three towns on the Wisconsin side. Census data regarding population, demographics, and jobs can be assessed in terms of this boundary, but some economic and transportation-related data cannot. Throughout ***Sustainable Choices 2045***, this geographical unit will be referred to as the "metropolitan area," "metro area," "MIC area," or "MPO."

Urbanized Area Boundary (UZA)

The Duluth-Superior UZA boundary delineates the portion of the MPO considered to be "urban" based on the population density. This is the smallest unit with which some employment and transportation-related data are delivered.

Metropolitan Statistical Area (MSA)

The Duluth-Superior MSA is a much larger geography that contains the MPO. It includes counties with close economic ties to the metropolitan area. Trends in population, workforce, and transportation are all available for this geographic area and can be easily compared.

Population & Demographics

Historical Population Trends

According to US census data, the population of the Duluth-Superior area has remained relatively stable. After a significant drop in population between 1980 and 1990, modest population gains occurred between 1990 and 2010. In the inter-decennial period 2010-2015, American Community Survey five-year estimates show no significant change for the MIC area (147,541 in 2015 and 147,628 in 2010, as summarized in Table 1).

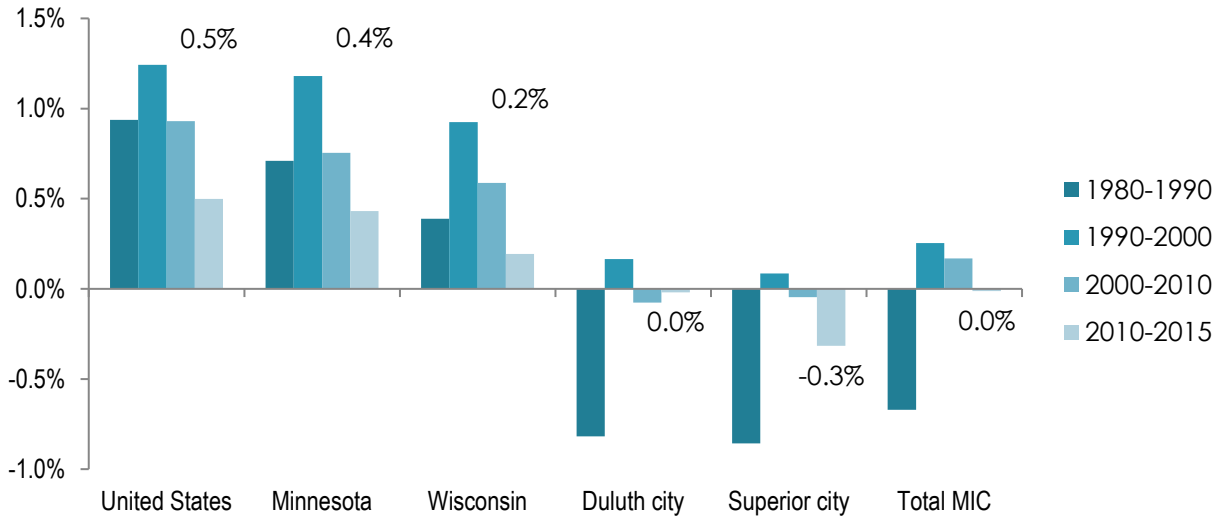
Much of the area's growth has continued to occur outside of the urban centers of Duluth and Superior, which both lost population between 2010 and 2015. In the past five years, Lakewood Township and the City of Hermantown experienced the most growth, adding over 200 people each. However, this is a much slower rate of growth for Hermantown than it experienced previously (i.e., over 2,000 new residents between 2000 and 2010). A representation of annualized growth rates over time is displayed in Figure 1 and Figure 2.

Table 1: Population History

	1980	1990	2000	2010	2015	2010-15 Growth
United States	226,545,805	248,709,873	281,421,906	308,745,538	316,515,021	7,769,483
Minnesota	4,075,970	4,375,099	4,919,479	5,303,925	5,419,171	115,246
Wisconsin	4,705,767	4,891,769	5,363,675	5,686,986	5,742,117	55,131
St. Louis County, MN	222,229	198,213	200,528	200,226	200,506	280
Douglas County, WI	44,421	41,758	43,287	44,159	43,799	-360
MIC (MN)	**116,944**	**109,841**	**113,033**	**115,242**	**115,719**	**477**
Duluth city	*92,811*	*85,493*	*86,918*	*86,265*	*86,178*	*-87*
Hermantown city	*6,759*	*6,761*	*7,448*	*9,414*	*9,627*	*213*
Proctor city	*3,180*	*2,974*	*2,852*	*3,057*	*3,060*	*3*
Rice Lake township	*3,861*	*3,883*	*4,139*	*4,095*	*4,119*	*24*
Grand Lake township	*2,166*	*2,355*	*2,621*	*2,779*	*2,789*	*10*
Lakewood township	*1,680*	*1,799*	*2,013*	*2,190*	*2,449*	*259*
Canosia township	*1,562*	*1,743*	*1,998*	*2,158*	*2,213*	*55*
Solway township	*1,665*	*1,772*	*1,842*	*1,944*	*1,919*	*-25*
Duluth township	*1,604*	*1,561*	*1,723*	*1,941*	*1,872*	*-69*
Midway township	*1,656*	*1,500*	*1,479*	*1,399*	*1,493*	*94*
MIC (WI)	**34,437**	**31,686**	**32,133**	**32,386**	**31,822**	**-564**
Superior city	*29,571*	*27,134*	*27,368*	*27,244*	*26,817*	*-427*
Superior town	*2,065*	*1,911*	*2,058*	*2,166*	*2,035*	*-131*
Parkland town	*1,496*	*1,326*	*1,240*	*1,220*	*1,330*	*110*
Lakeside town	*572*	*569*	*609*	*693*	*581*	*-112*
Superior village	*480*	*481*	*500*	*664*	*700*	*36*
Oliver village	*253*	*265*	*358*	*399*	*359*	*-40*
Total MIC	**151,381**	**141,527**	**145,166**	**147,628**	**147,541**	**-87**

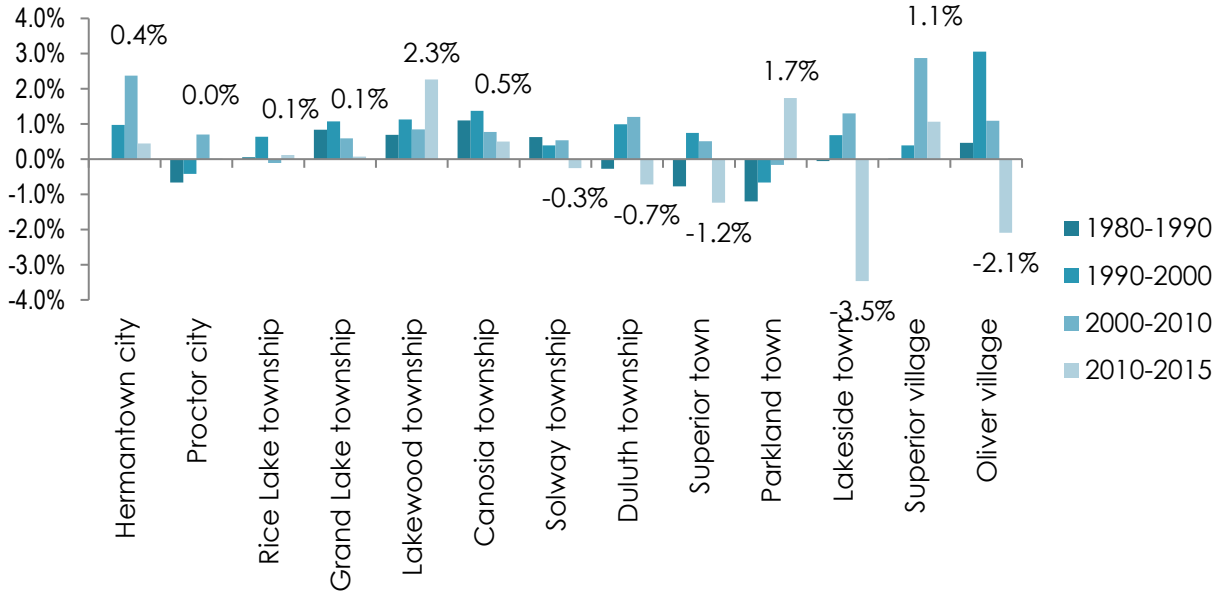
Source: Census (2000, 2010), ACS (2015).

Figure 1: Annualized Population Growth in Major Population Centers & Benchmark Regions



Source: Census (2000, 2010), ACS (2015).

Figure 2: Annualized Population Growth in MIC Cities, Towns, and Villages



Source: Census (2000, 2010), ACS (2015).

While population in the metro area appears to be decentralizing from the core cities of Duluth and Superior, the changes have not been large enough to bring about a substantial change in population density over the past five years (Table 2). MIC population density remains around 230 people per square mile. The largest change has been in the City of Superior, which dropped from 490 to 481 people per square mile over the 5-year period. The densest areas remain the Cities of Proctor, Duluth, Superior, and the Village of Superior.

Table 2: Population Density

Geography	Sq. Mile	Population (2015)	People per sq. mile (2015)	People per sq. mile (2010)	People per sq. mile (2000)	Change 2010-2015
United States	3,797,000	316,515,021	83	81	74	2
Minnesota	86,943	5,419,171	62	61	57	1
Wisconsin	65,498.0	5,742,117	88	87	82	1
St. Louis County, MN	6,860	200,506	29	13	13	17
Douglas County, WI	1,480.0	43,799	30	6	5	23
MIC (MN only)	**398.8**	**115,719**	**290**	**289**	**283**	**1**
Duluth city	*87.4*	*86,178*	*986*	*987*	*994*	*-1*
Hermantown city	*34.4*	*9,627*	*280*	*274*	*217*	*6*
Proctor city	*3.0*	*3,060*	*1,020*	*1,019*	*951*	*1*
Rice Lake township	*33.5*	*4,119*	*123*	*122*	*124*	*1*
Grand Lake township	*71.5*	*2,789*	*39*	*39*	*37*	*0*
Lakewood township	*27.8*	*2,449*	*88*	*79*	*72*	*9*
Canosia township	*35.7*	*2,213*	*62*	*60*	*56*	*2*
Solway township	*35.7*	*1,919*	*54*	*54*	*52*	*0*
Duluth township	*51.8*	*1,872*	*36*	*37*	*33*	*-1*
Midway township	*18.0*	*1,493*	*83*	*78*	*82*	*5*
MIC (WI only)	**242.2**	**31,822**	**131**	**134**	**133**	**-3**
Superior city	*55.7*	*26,817*	*481*	*490*	*492*	*-9*
Superior town	*107.8*	*2,035*	*19*	*20*	*19*	*-1*
Parkland town	*35.5*	*1,330*	*37*	*34*	*35*	*3*
Lakeside town	*39.9*	*581*	*15*	*17*	*15*	*-2*
Superior village	*1.2*	*700*	*561*	*535*	*403*	*26*
Oliver village	*2.1*	*359*	*173*	*192*	*172*	*-19*
Total MIC	**641.0**	**147,541**	**230**	**230**	**226**	**0.2**

Source: Census (2000, 2010), ACS (2015).

Population Projections (2045)

The historical population trends, as displayed in US Census data in Table 1, serve as the basis for developing the 2045 population projections that were used to model future year conditions for the LRTP scenarios. According to the American Community Survey five-year estimates the 2015 population for the MIC area is 147,541. Table 13, which appears later in this document, shows the number of households located within the MIC area at 60,219, and an average household size of 2.30. The table also shows the average household size by geographic subarea. When the subarea households are multiplied by the subarea average household size the result is a population estimate of 138,565, or close to 9,000 fewer than the population presented in Table 1. This approximately 9,000 difference between the two U.S. Census datasets represents individuals living in group quarters, not in housing units.

For the purpose of the LRTP travel demand model and for planning purposes, the only factor used to generate trips is households so it was assumed that the number of individuals living in

group quarters would be counted as households. The model is also intended to reflect as current conditions as reasonably possible and the total calculated households are 70,439 – slightly higher than the 9,000 difference observed when using the 2015 household data. Furthermore, in preparing for the 2045 LRTP update, MIC staff reviewed and updated select TAZs to better reflect changes since the last model update.

Table 3 presents the projected 2045 future year population calculated based on projected households and average household size. The 70,439 model households represent a current population of approximately 147,600. In 2045, it is estimated that there will be 72,868 households which equals an approximate population of 152,700, a 5,100 (3.5%) increase from current year to 2045. While not a significant level of growth, this is consistent with historical population trends that show a 2.6% increase in population between 1990 and 2000, and a 1.7% increase in population between 2000 and 2010.

Table 3: Projected 2045 Population

	Population			
Geography	**2015 US Census**	**2045 Projected**	**Change**	**Percent Change**
MIC (MN)	**115,719**	**120,053**	**4,334**	**3.7%**
Duluth city	86,178	89,126	2,948	3.4%
Hermantown city	9,627	10,672	1,045	10.9%
Proctor city	3,060	3,400	340	11.1%
Rice Lake township	4,119	4,119	-	-
Grand Lake township	2,789	2,789	-	-
Lakewood township	2,449	2,449	-	-
Canosia township	2,213	2,213	-	-
Solway township	1,919	1,919	-	-
Duluth township	1,872	1,872	-	-
Midway township	1,493	1,493	-	-
MIC (WI)	**31,822**	**32,534**	**712**	**2.2%**
Superior city	26,817	27,529	712	2.7%
Superior town	2,035	2,035	-	-
Parkland town	1,330	1,330	-	-
Lakeside town	581	581	-	-
Superior village	700	700	-	-
Oliver village	359	359	-	-
Total MIC	**147,541**	**152,587**	**5,046**	**3.4%**

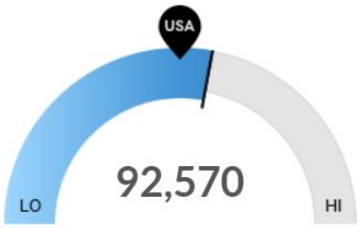
Source: ACS (2015); MIC Travel Model Socioeconomic data.

Population Diversity

Similar to size and density of Duluth-Superior, the age, race, and income profiles also have important implications for transportation planning decisions. Different subsets of a population tend to have different needs when it comes to the provision of transportation services or the design of transportation infrastructure. Changes in these demographic profiles may signal needed shifts in transportation policy and investments. The following is a summary of trends regarding these socioeconomic metrics in the Duluth-Superior area.

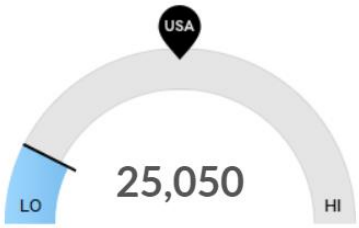
Millennials

The MSA has slightly more Millennials (ages 20-34) than the nationwide average for an area this size.



Retiring Soon

Retirement risk is high in the Duluth-Superior MSA. There are 18% more people 55 or older than the U.S. average for an area this size.



Racial Diversity

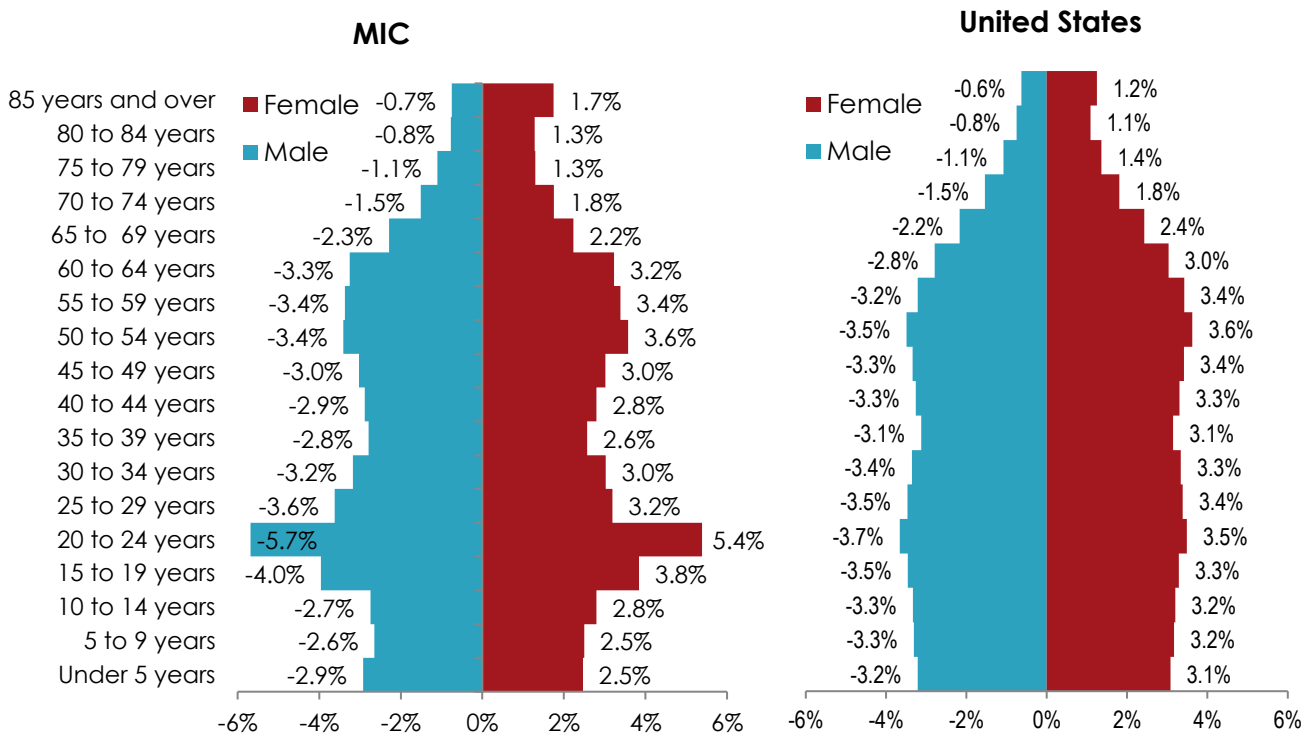
Racial diversity is very low—less than a quarter of the national average for an area this size.

Source: Emsi (2018).

Age

The population of the Duluth-Superior area is characterized by its Baby Boomer and college-aged populations, which can be seen in Figure 3 below. MIC's population pyramid illustrates there is a concentration of people in the 20 to 24 age range – primarily due to a large population of young adults in Duluth – as well as typically larger shares of individuals in the older cohorts, starting at age 55. In the MIC, 28.0% of the population is at least 55 years or older, compared to 26.5% across the U.S. In contrast, the U.S. share of population that is 25 to 54 (i.e., prime working age adults) is 40.3%, compared to 37.1% in the MIC. This can have implications for the economy, the finances of local administrative agencies, and demand for services.

Figure 3: Population Pyramids (2015)



Source: ACS (2015).

In the future, the large Baby Boomer population will be entering their senior years while the size of college-aged population is expected to remain relatively constant. According to American Public Transportation Association's (APTA) Millennials & Mobility: Understanding the Millennial Mindset report, the age group identified as "Millennials" (born between 1982 and 2000) are showing increasing demand for ride-sharing, public transit, and non-motorized options. The increasing number of seniors may also translate into increased demand for more accessible environments and increased transit service. Given age population trends, an increasing percentage of the area's population will likely be needing transportation assistance in coming years. Projections from the Minnesota State Demographer's Office indicate that statewide, the proportion of population aged 55 or older will rise from 30% to 36% between 2020 and 2045 and will top out at 40% in 2070; those figures are 11%--18%--19% for the population aged 70 or older. In contrast, St. Louis County projects an earlier peak and decline in the share of people 55 and older: 36% in 2020, 38% in 2035, and 34% by 2050 (Table 4).

Table 4: Projections of Population 55 years and over

	2020	2025	2030	2035	2040	2045	2050
Minnesota	30%	32%	33%	34%	35%	36%	36%
St. Louis County	36%	38%	38%	38%	37%	36%	34%

Source: Minnesota State Demographer's Office (December 2017).

Historical and projected population data from the economic modeling firm Emsi for the Duluth-Superior MSA is provided in Table 5 and Table 6.[1] These tables illustrate how the concentration of people in their late teens and early twenties is a constant figure over time, due to the presence of University of Minnesota Duluth, as well as University of Wisconsin-Superior, Lake Superior College, The College of St. Scholastica, and other educational institutions. Meanwhile, one can observe other age clusters (i.e., the Baby Boomers) moving through the age cohorts over time. By 2028, the Boomers are expected to be well into retirement (denoted by the 65-year line). Map E-1 depicts the distribution of the population older than 65 across the MIC area.

The Location Quotient data show how, compared to nationwide figures, the MSA has historically had above average proportions aged 15-24 from 2001 through projected 2028, but that it has slowly been losing its comparative concentration of older populations. In 2001, the MSA had an above average concentration of all age cohorts over 40; this dropped to cohorts over 50, and so on down the line. By 2028, the MSA is expected to have below average concentrations of ages roughly 25 to 59.

Table 5: Historical and Projected MSA Population by Age Cohort

Demographic	2001 Population	2010 Population	2017 Population	2028 Population
Under 5 years	14,785	15,717	14,532	14,800
5 to 9 years	16,436	15,631	15,326	15,588
10 to 14 years	18,781	15,659	15,912	15,355
15 to 19 years	23,322	20,034	18,074	17,884
20 to 24 years	20,278	22,532	22,865	20,484
25 to 29 years	13,767	17,391	16,479	14,175
30 to 34 years	15,929	15,787	16,774	16,548
35 to 39 years	19,092	15,040	16,694	17,318
40 to 44 years	22,449	16,361	14,911	17,286
45 to 49 years	22,926	20,237	15,743	17,162
50 to 54 years	20,189	22,359	18,219	15,290
55 to 59 years	14,139	21,799	21,183	15,075
60 to 64 years	11,636	17,638	20,975	16,566
65 to 69 years	10,292	12,412	18,150	18,446
70 to 74 years	10,074	9,562	11,946	17,500
75 to 79 years	8,952	7,893	8,359	14,112
80 to 84 years	7,329	6,616	6,133	8,255
85 years and over	6,571	7,065	6,886	6,659

Source: Emsi(2018).

[1] These projections are based on data from the US Census Bureau, birth and mortality rates from the US Health Department, as well as state-level data from the MN Department of Employment & Economic Development; Wisconsin Department of Workforce Development, and Bureau of Workforce Information.

Map E-1: Duluth-Superior Population Age 65+

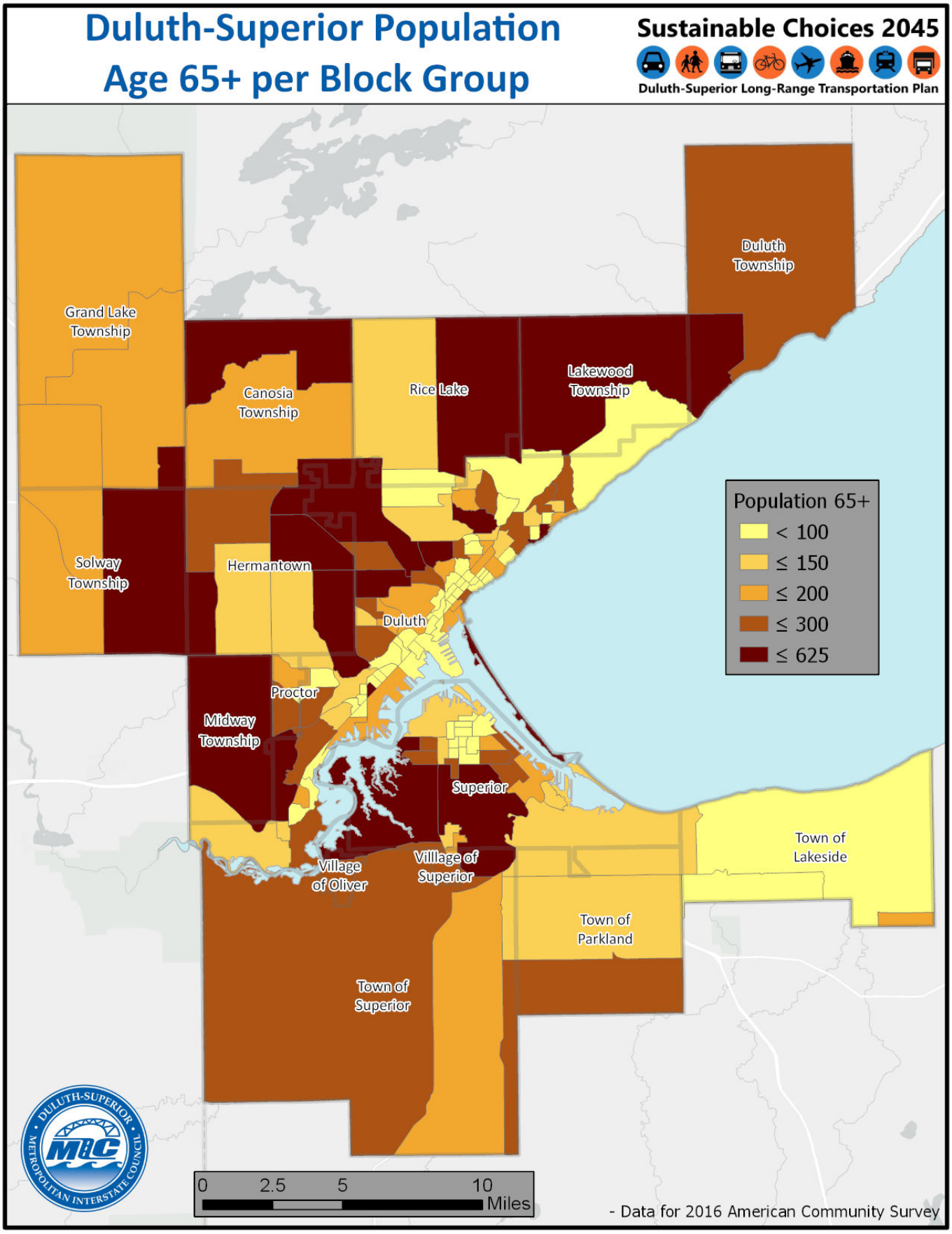


Table 6: Historical and Projected MSA Population Location Quotient by Age Cohort

Demographic	2001 Location Quotient	2010 Location Quotient	2017 Location Quotient	2028 Location Quotient
Under 5 years	0.79	0.86	0.84	0.84
5 to 9 years	0.84	0.85	0.87	0.89
10 to 14 years	0.92	0.84	0.90	0.91
15 to 19 years	1.17	1.01	1.00	1.05
20 to 24 years	1.06	1.15	1.20	1.17
25 to 29 years	0.75	0.91	0.83	0.80
30 to 34 years	0.79	0.87	0.88	0.90
35 to 39 years	0.88	0.83	0.93	0.91
40 to 44 years	1.01	0.87	0.88	0.96
45 to 49 years	1.14	0.99	0.89	1.02
50 to 54 years	1.11	1.11	0.98	0.98
55 to 59 years	1.04	1.22	1.12	0.96
60 to 64 years	1.08	1.15	1.23	1.02
65 to 69 years	1.11	1.10	1.22	1.13
70 to 74 years	1.18	1.13	1.12	1.24
75 to 79 years	1.24	1.19	1.13	1.26
80 to 84 years	1.47	1.27	1.20	1.17
85 years and over	1.57	1.41	1.27	1.15

Source: Emsi(2018).

As shown in Table 7, the median age across the MIC is 36.4, which is lower than State and U.S. medians (37.6 to 39.0). This is driven primarily by the much younger population in the City of Duluth (median age 33.6). Other cities and townships typically range in median age from about 40 to 50—well above surrounding municipalities.

Table 7: Median Age

Geography	Median Age
United States	37.6
Minnesota	37.7
Wisconsin	39.0
St. Louis County, MN	40.9
Douglas County, WI	40.6
Total MIC	**36.4**

Source: ACS (2015).

Geography	Median Age
MIC (MN)	**36.1**
Duluth city	*33.6*
Hermantown city	*41.8*
Proctor city	*44.9*
Rice Lake township	*44.2*
Grand Lake township	*45.6*
Lakewood township	*39.9*
Canosia township	*44.3*
Solway township	*44.0*
Duluth township	*49.0*
Midway township	*42.9*
MIC (WI)	**37.5**
Superior city	*36.2*
Superior town	*45.6*
Parkland town	*40.1*
Lakeside town	*43.1*
Superior village	*50.6*
Oliver village	*41.8*

Source: ACS (2015).

Migration

The U.S. Census publishes, as part of its Population Estimates Program, the components of population change at the county level (Table 8). This data indicates the largest component of change has been net domestic emigration from Douglas County, Wisconsin. In the case of St. Louis County, Minnesota, the net domestic emigration is similar in absolute size (though not proportion), but it is offset entirely by net international immigration to yield positive net migration figure of 267, compared to -958 for Douglas County. Natural increase, however, is negative for St. Louis County, as there are 316 more deaths than births.

Table 8: Components of Population Change (2010-2017)

	July 1, 2017 Population	Population Change since 2010	Natural Increase	Births	Deaths	Total Net Migration	Net International Migration	Net Domestic Migration
St. Louis County, MN	200,000	(226)	(316)	14,688	15,004	267	1,279	(1,012)
Douglas County, WI	43,284	(875)	107	3,144	3,037	(958)	188	(1,146)

Source: U.S. Census Population Estimates.

Provided in Table 9 is a history of migration over the previous year as of 2015. ACS data indicates 81% of people within the MIC area remained in their home over the previous year – lower than US and state averages. The largest share of population who did move, moved within the same county, followed by those who moved from a different county but within the same state. Duluth City residents appear to account for the largest share of migration, followed by the Township of Parkland and City of Superior.

Table 9: Migration over the Previous Year (2015)

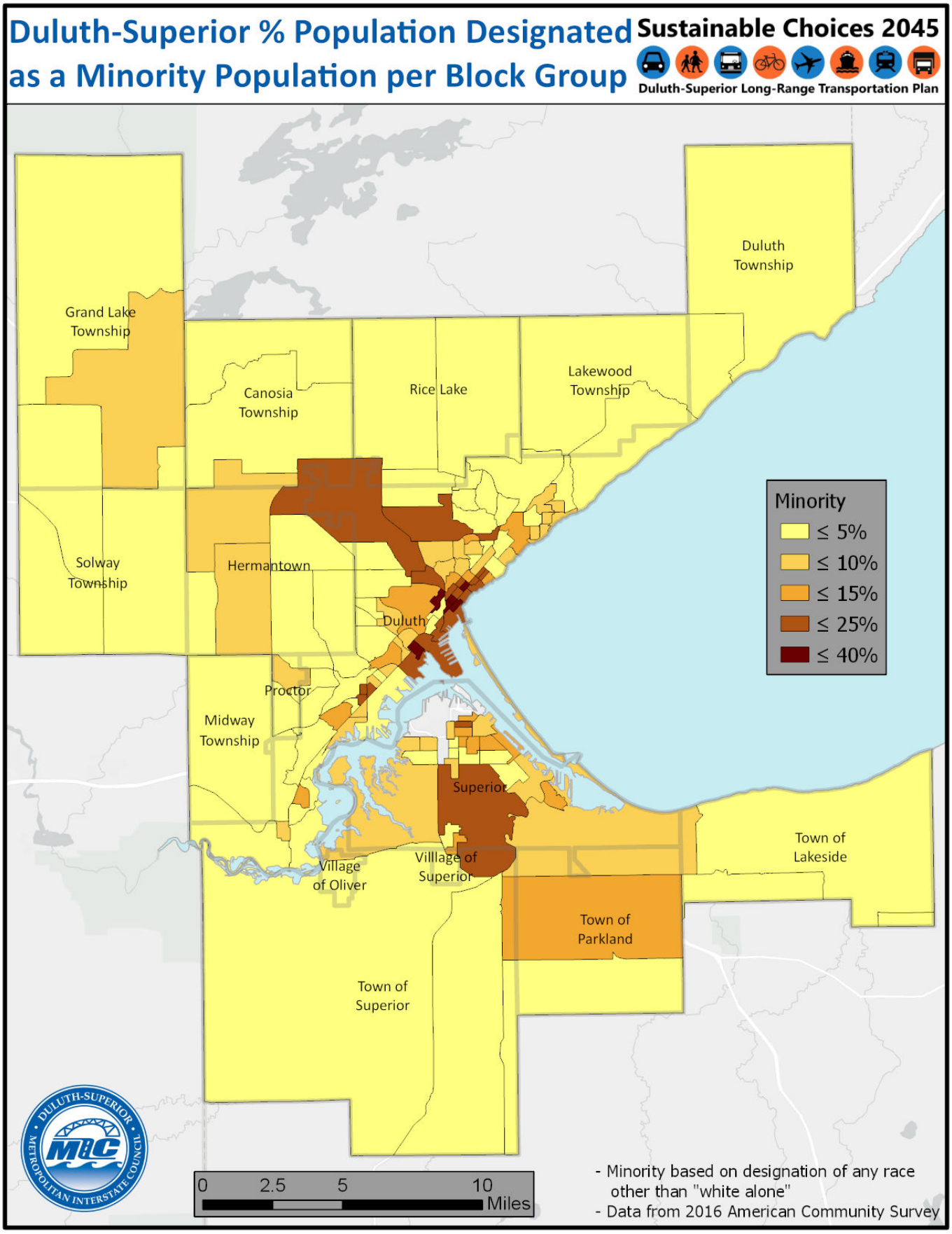
Geography	Did not move in past year	Moved within County	Moved from different County	Moved from different State	Moved from Abroad
United States	85%	9%	3%	2%	1%
Minnesota	86%	7%	5%	2%	1%
Wisconsin	86%	9%	3%	2%	0%
St. Louis County, MN	84%	10%	4%	2%	0%
Douglas County, WI	85%	8%	2%	5%	0%
MIC (MN only)	**80%**	**12%**	**5%**	**2%**	**0%**
Duluth city	*78%*	*14%*	*6%*	*2%*	*0%*
Hermantown city	*81%*	*9%*	*6%*	*3%*	*1%*
Proctor city	*87%*	*9%*	*2%*	*0%*	*0%*
Rice Lake township	*91%*	*7%*	*2%*	*0%*	*0%*
Grand Lake township	*93%*	*4%*	*1%*	*1%*	*0%*
Lakewood township	*92%*	*5%*	*1%*	*2%*	*0%*
Canosia township	*96%*	*3%*	*1%*	*0%*	*0%*
Solway township	*94%*	*4%*	*1%*	*1%*	*1%*
Duluth township	*91%*	*4%*	*4%*	*1%*	*0%*
Midway township	*95%*	*3%*	*0%*	*1%*	*1%*
MIC (WI only)	**83%**	**10%**	**2%**	**5%**	**0%**
Superior city	*81%*	*10%*	*2%*	*6%*	*0%*
Superior town	*90%*	*5%*	*1%*	*4%*	*0%*
Parkland town	*86%*	*12%*	*0%*	*2%*	*0%*
Lakeside town	*93%*	*6%*	*0%*	*1%*	*0%*
Superior village	*91%*	*9%*	*0%*	*0%*	*0%*
Oliver village	*81%*	*9%*	*0%*	*11%*	*0%*
Total MIC	**81%**	**11%**	**4%**	**3%**	**0%**

Source: ACS (2015).

Race

The Duluth-Superior metropolitan area is not racially diverse compared to other metro areas nationwide. The area's population is predominately White (MAP E-3 and Table 10). There are signs, however, that the Duluth-Superior metro is slowly becoming more racially diverse. For instance, in 2010 and 2015, Whites represented 92% of the population, as opposed to 94% in 2000. Those identified as Hispanic or Latino represent only 2% of total population in 2015 (Table 11), but this is a slight increase from 2010, when the Hispanic or Latino population was 1%. Map E-2 depicts the distribution of minority population across the MIC area. It has been reported that 2% of the area's population speaks English less than "very well" (Table 11), which is lower than the 3%-4% statewide figures for Minnesota and Wisconsin, and much lower than the 9% seen nationwide. Thus the MIC is more English monolingual than average. Map E-3 depicts the distribution of the population that speaks English "less than very well" across the MIC area.

Map E-2: Duluth-Superior Minority Population



Map E-3: Duluth-Superior Population that Speaks English "Less than Very Well"

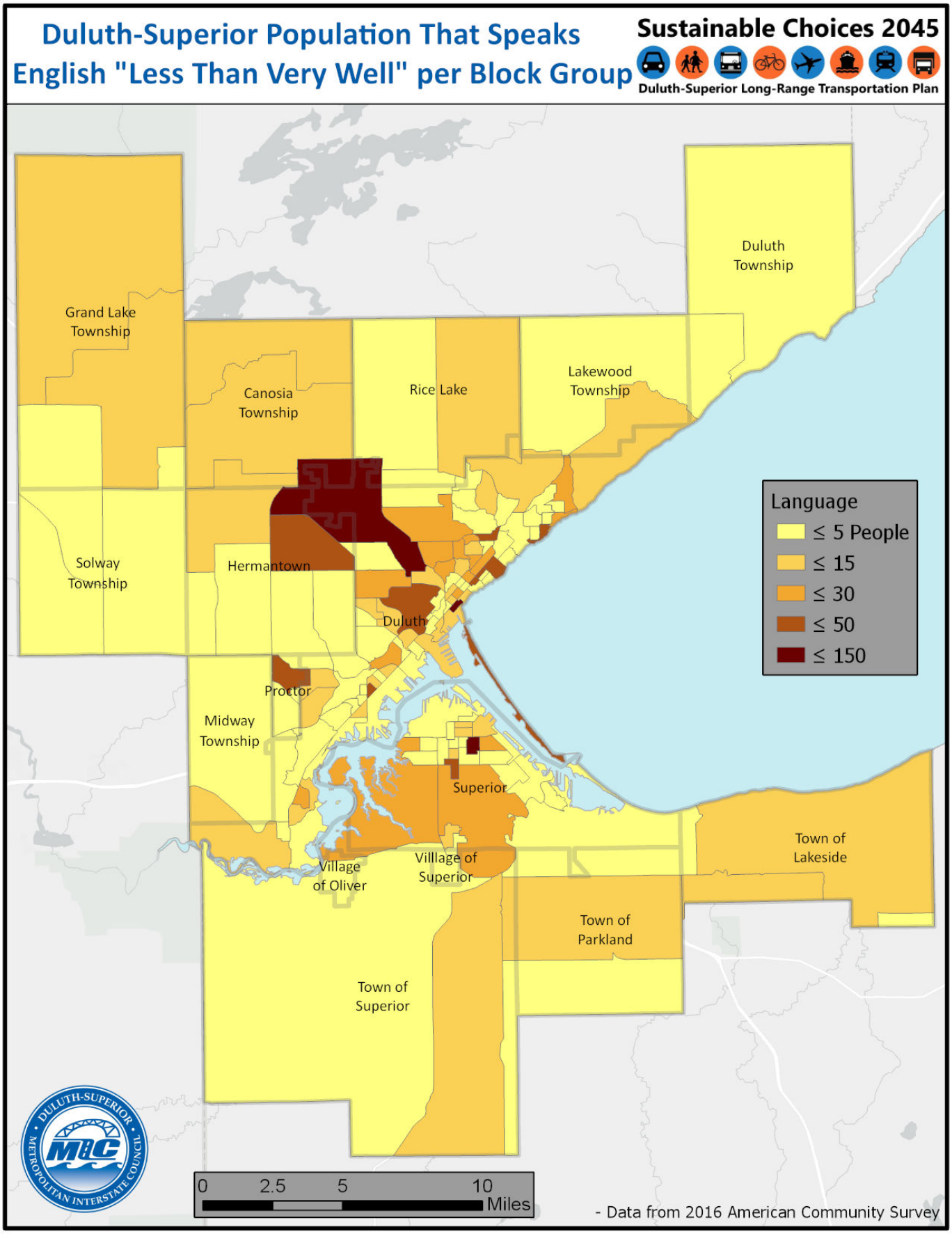


Table 10: Population by Race (2015)

Geography	Total	White	Black or African American	American Indian & Alaska Native	Asian	Native Hawaiian & Pacific Islander	Some other race	Two or more races:
United States	316,515,021	232,943,055	39,908,095	2,569,170	16,235,305	546,255	14,865,258	9,447,883
		74%	13%	1%	5%	0%	5%	3%
Minnesota	5,419,171	4,594,367	299,176	56,561	240,786	1,970	82,085	144,226
		85%	6%	1%	4%	0%	2%	3%
Wisconsin	5,742,117	4,967,124	360,792	50,449	143,732	1,233	96,057	122,730
		87%	6%	1%	3%	0%	2%	2%
St. Louis County, MN	200,506	185,808	3,101	3,831	2,066	81	429	5,190
		93%	2%	2%	1%	0%	0%	3%
Douglas County, WI	43,799	40,710	483	709	498	2	116	1,281
		93%	1%	2%	1%	0%	0%	3%
MIC (MN)	**115,719**	**106,208**	**2,735**	**1,709**	**1,536**	**57**	**302**	**3,172**
		92%	**2%**	**1%**	**1%**	**0%**	**0%**	**3%**
Duluth city	*86,178*	*78,034*	*2,321*	*1,465*	*1,376*	*47*	*159*	*2,776*
		91%	*3%*	*2%*	*2%*	*0%*	*0%*	*3%*
Hermantown city	*9,627*	*8,920*	*331*	*136*	*18*	*0*	*116*	*106*
		93%	*3%*	*1%*	*0%*	*0%*	*1%*	*1%*
Proctor city	*3,060*	*2,958*	*8*	*0*	*69*	*10*	*0*	*15*
		97%	*0%*	*0%*	*2%*	*0%*	*0%*	*0%*
Rice Lake township	*4,119*	*3,982*	*15*	*49*	*19*	*0*	*0*	*54*
		97%	*0%*	*1%*	*0%*	*0%*	*0%*	*1%*
Grand Lake township	*2,789*	*2,673*	*22*	*10*	*16*	*0*	*8*	*60*
		96%	*1%*	*0%*	*1%*	*0%*	*0%*	*2%*
Lakewood township	*2,449*	*2,360*	*0*	*22*	*30*	*0*	*5*	*32*
		96%	*0%*	*1%*	*1%*	*0%*	*0%*	*1%*
Canosia township	*2,213*	*2,129*	*16*	*4*	*0*	*0*	*10*	*54*
		96%	*1%*	*0%*	*0%*	*0%*	*0%*	*2%*
Solway township	*1,919*	*1,882*	*0*	*11*	*8*	*0*	*0*	*18*
		98%	*0%*	*1%*	*0%*	*0%*	*0%*	*1%*
Duluth township	*1,872*	*1,818*	*22*	*0*	*0*	*0*	*4*	*28*
		97%	*1%*	*0%*	*0%*	*0%*	*0%*	*1%*
Midway township	*1,493*	*1,452*	*0*	*12*	*0*	*0*	*0*	*29*
		97%	*0%*	*1%*	*0%*	*0%*	*0%*	*2%*
MIC (WI)	**31,822**	**29,402**	**441**	**508**	**452**	**0**	**94**	**925**
		92%	**1%**	**2%**	**1%**	**0%**	**0%**	**3%**
Superior city	*26,817*	*24,653*	*409*	*379*	*436*	*0*	*85*	*855*
		92%	*2%*	*1%*	*2%*	*0%*	*0%*	*3%*
Superior town	*2,035*	*1,959*	*0*	*59*	*0*	*0*	*5*	*12*
		96%	*0%*	*3%*	*0%*	*0%*	*0%*	*1%*
Parkland town	*1,330*	*1,237*	*28*	*54*	*8*	*0*	*0*	*3*
		93%	*2%*	*4%*	*1%*	*0%*	*0%*	*0%*
Lakeside town	*581*	*557*	*2*	*6*	*0*	*0*	*0*	*16*
		96%	*0%*	*1%*	*0%*	*0%*	*0%*	*3%*
Superior village	*700*	*678*	*2*	*10*	*4*	*0*	*4*	*2*
		97%	*0%*	*1%*	*1%*	*0%*	*1%*	*0%*
Oliver village	*359*	*318*	*0*	*0*	*4*	*0*	*0*	*37*
		89%	*0%*	*0%*	*1%*	*0%*	*0%*	*10%*
Total MIC	**147,541**	**135,610**	**3,176**	**2,217**	**1,988**	**57**	**396**	**4,097**
		92%	**2%**	**2%**	**1%**	**0%**	**0%**	**3%**

Source: ACS (2015).

Table 11: Hispanic or Latino Origin; Other Languages Spoken at Home (2015)

Geography	Total	Hispanic or Latino		Population speaking English less than "very well"
United States	316,515,021	54,232,205	*17%*	*9%*
Minnesota	5,419,171	270,984	*5%*	*4%*
Wisconsin	5,742,117	364,558	*6%*	*3%*
St. Louis County, MN	200,506	2,851	*1%*	*1%*
Douglas County, WI	43,799	588	*1%*	*1%*
Total MIC	**147,541**	**2,493**	***2%***	***2%***

Source: ACS (2015).

Considerations of race, ethnicity, and language are important in the planning and provision of transportation services. These populations have historically been underserved by public transportation policy and have had limited or no input into major transportation decisions that significantly impact neighborhoods.

These considerations fall under "Environmental Justice" (EJ), which is the public policy goal of ensuring that low-income or minority populations do not bear disproportionately high or negative impacts as a result of government activities – which includes publicly funded transportation projects.

Poverty

The most recent estimates from the U.S. Census Bureau show that 18% of the MIC area's 2015 population is living below the national poverty line (Table 12). This represents no change from the 2010 Census, which exhibited a four percent increase from the 2000 Census. During that 2000-2010 change, the City of Duluth experienced the largest increase in population living in poverty.

People living in poverty face transportation challenges. They often lack the means to transport themselves to and from work and other destinations and have difficulty accessing jobs and services. Often they are reliant on public transit or other services that do not always provide the flexibility they need to effectively chain different trips together (work, daycare, medical, shopping, etc.).[2] Areas of concentrated poverty are important to consider in the planning and provision of transportation services. Efforts should be made to tailor transportation projects in ways that improve access and mobility for low-income individuals and families.

[2] Further information on the transportation means used by the working population living in poverty is provided in the "Land Use and Transportation Patterns" section below.

Table 12: Population by Poverty Level (2015)

Geography	Population With Income Data	Below Poverty Level	% Below Poverty (2015)
United States	308,619,550	47,749,043	15%
Minnesota	5,295,613	596,662	11%
Wisconsin	5,589,889	724,348	13%
St. Louis County, MN	192,546	30,869	16%
Douglas County, WI	42,376	6,713	16%
MIC (MN)	**109,103**	**19,201**	**18%**
Duluth city	*80,675*	*17,331*	*21%*
Hermantown city	*8,799*	*643*	*7%*
Proctor city	*2,950*	*267*	*9%*
Rice Lake township	*4,110*	*324*	*8%*
Grand Lake township	*2,656*	*122*	*5%*
Lakewood township	*2,431*	*224*	*9%*
Canosia township	*2,213*	*44*	*2%*
Solway township	*1,917*	*65*	*3%*
Duluth township	*1,866*	*146*	*8%*
Midway township	*1,486*	*35*	*2%*
MIC (WI)	**30,633**	**5,760**	**19%**
Superior city	*25,636*	*5,320*	*21%*
Superior town	*2,035*	*99*	*5%*
Parkland town	*1,330*	*168*	*13%*
Lakeside town	*578*	*41*	*7%*
Superior village	*695*	*61*	*9%*
Oliver village	*359*	*71*	*20%*
Total MIC	**139,736**	**24,961**	**18%**

Source: ACS 2015.

Households

Data from ACS shows that average household size is lower in the MIC (2.30) than state and national averages of 2.43 to 2.64, respectively. Over the past five years since the 2010 Census, average household size across the MIC (weighted by household counts) has not changed, while the national and state averages have risen slightly (Table 13). Map E-4 depicts both the number of households and household growth across the MIC area.

Map E-4: Duluth-Superior Model Inputs - Households

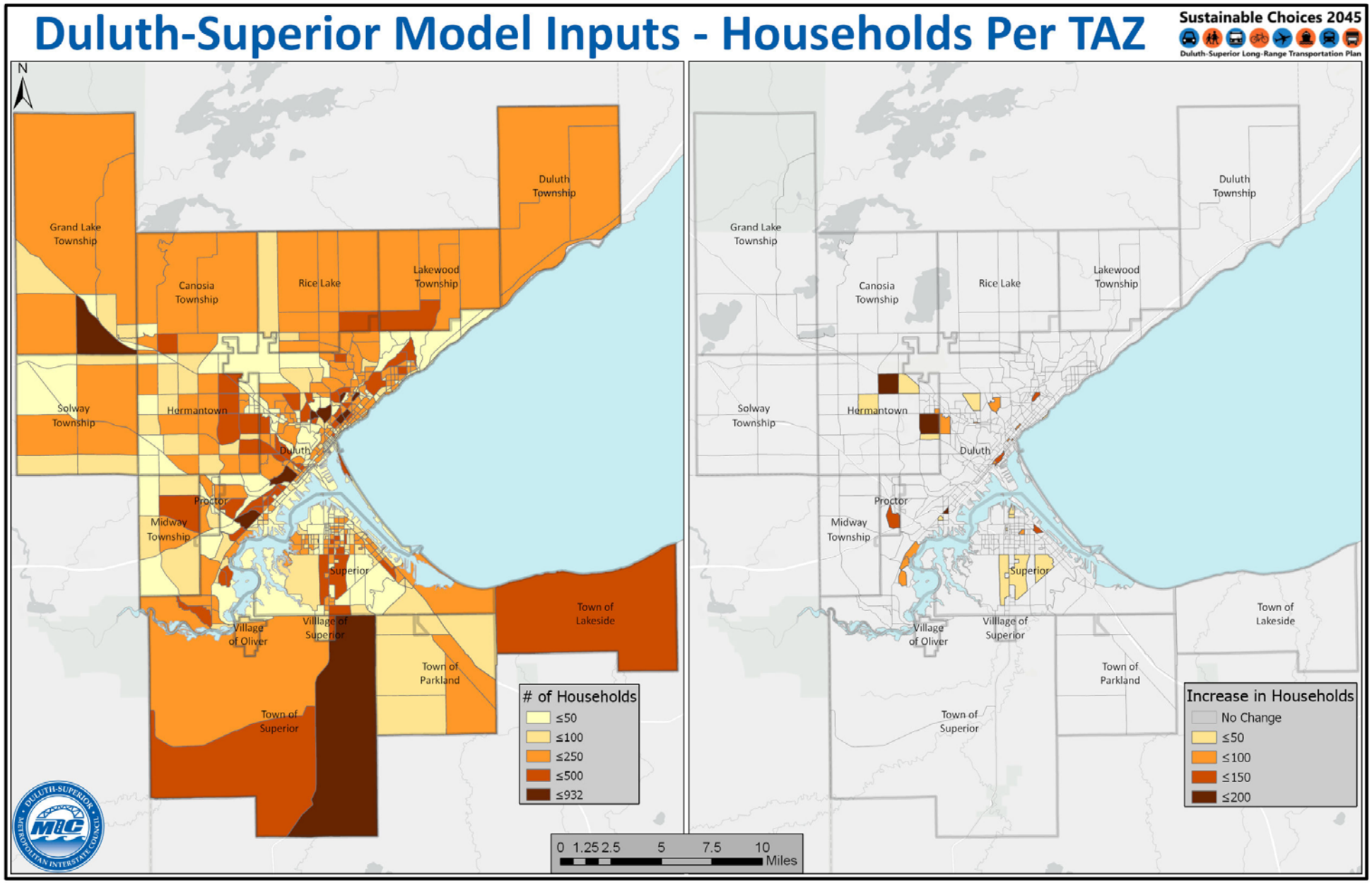


Table 13: Total Households and Average Households Size (2015)

Geography	Households (2015)	Average HH Size (2015)	Average HH Size (2010)	Average HH Size (2000)
United States	116,926,305	2.64	2.59	2.59
Minnesota	2,124,745	2.49	2.45	2.52
Wisconsin	2,299,107	2.43	2.41	2.50
St. Louis County, MN	84,545	2.26	2.25	2.32
Douglas County, WI	18,581	2.28	2.31	2.36
MIC (MN)	**46,686**	**2.31**	**2.30**	
Duluth city	*35,410*	*2.25*	*2.23*	*2.26*
Hermantown city	*3,497*	*2.49*	*2.55*	*2.67*
Proctor city	*1,241*	*2.36*	*2.34*	*2.38*
Rice Lake township	*1,668*	*2.46*	*2.54*	*2.77*
Grand Lake township	*1,077*	*2.44*	*2.52*	*2.66*
Lakewood township	*819*	*2.99*	*2.74*	*2.84*
Canosia township	*863*	*2.53*	*2.58*	*2.66*
Solway township	*777*	*2.47*	*2.57*	*2.74*
Duluth township	*745*	*2.51*	*2.59*	*2.58*
Midway township	*589*	*2.51*	*2.53*	*2.66*
MIC (WI)	**13,533**	**2.27**	**2.27**	
Superior city	*11,506*	*2.23*	*2.23*	*2.26*
Superior town	*809*	*2.52*	*2.54*	*2.69*
Parkland town	*547*	*2.43*	*2.44*	*2.68*
Lakeside town	*244*	*2.38*	*2.68*	*2.69*
Superior village	*289*	*2.42*	*2.22*	*2.39*
Oliver village	*138*	*2.60*	*2.51*	*2.82*
Total MIC	**60,219**	**2.30**	**2.30**	

Source: Census 2000, 2010, ACS 2015.

Household Income

Median household income in the Duluth-Superior area rose by an annualized rate of 1.4% between 2010 and 2015, as shown in Table 14. The median household income (weighted by 2015 household counts) was $45,367 in 2010 and $48,690 in 2015. Median income levels varied from roughly $40,000 to $80,000 across municipalities in 2015.[3] Household income in the MIC remains below the state and national benchmarks, though they are growing more rapidly than US averages. Map E-5 depicts the distribution of low-income concentrations across the MIC area.

[3] However, due to the small size of many of these municipalities, these values have a large margin of error and should be treated with caution.

Map E-5: Duluth-Superior Low-Income Concentrations

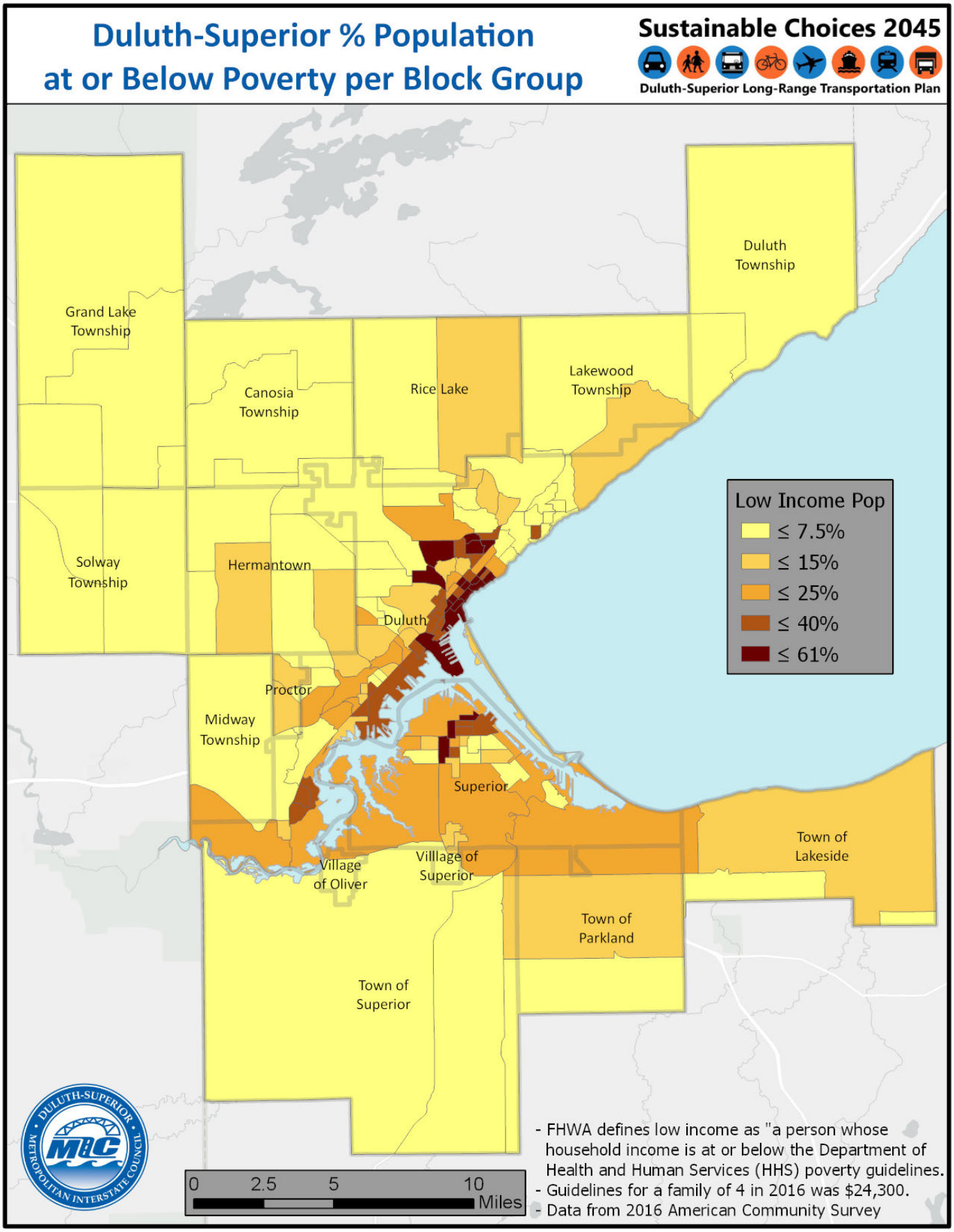


Table 14: Median Household Income (2010, 2015 Inflation Adjusted Dollars)

Geography	2010	2015	Annualized Growth
United States	$51,914	$53,889	0.7%
Minnesota	$57,243	$61,492	1.4%
Wisconsin	$51,598	$53,357	0.7%
St. Louis County, MN	$44,941	$48,331	1.5%
Douglas County, WI	$43,127	$47,095	1.8%
MIC (MN)	**$46,447**	**$50,344**	**1.6%**
Duluth city	$41,092	$45,034	1.8%
Hermantown city	$64,330	$65,662	0.4%
Proctor city	$52,665	$54,871	0.8%
Rice Lake township	$66,086	$66,250	0.0%
Grand Lake township	$65,817	$67,569	0.5%
Lakewood township	$71,125	$79,219	2.2%
Canosia township	$61,957	$81,402	5.6%
Solway township	$60,028	$63,542	1.1%
Duluth township	$59,632	$65,791	2.0%
Midway township	$66,480	$69,934	1.0%
MIC (WI)	**$41,639**	**$42,987**	**0.6%**
Superior city	$39,171	$40,198	0.5%
Superior town	$55,938	$66,354	3.5%
Parkland town	$47,143	$48,750	0.7%
Lakeside town	$53,977	$61,786	2.7%
Superior village	$71,042	$56,875	-4.4%
Oliver village	$58,393	$53,333	-1.8%
Total MIC	**$45,367**	**$48,690**	**1.4%**

Source: ACS 2010, 2015.

Ambulatory Difficulty

The U.S. Census Bureau defines ambulatory difficulty as those who have "serious difficulty walking or climbing stairs." This subset of the population is important to consider in transportation planning as they represent those with potentially greater mobility needs both in terms of services and infrastructure design.

It is estimated that 6.4% of the MIC area's population age 5 and up have ambulatory difficulty. This is lower than the national average of 7.0%. Some municipalities, however, have estimates above the national average (see Table 15, which provides total figures as well as for older age cohorts, who are more likely to be hampered by ambulatory difficulty). As people age, their ambulatory abilities begin to decline. As would be expected, those over age 65 represent a greater percentage of those facing ambulatory difficulty, as the table shows. Map E-6 depicts the distribution of the population with ambulatory difficulties across the MIC area.

Map E-6: Duluth-Superior Ambulatory Difficulties

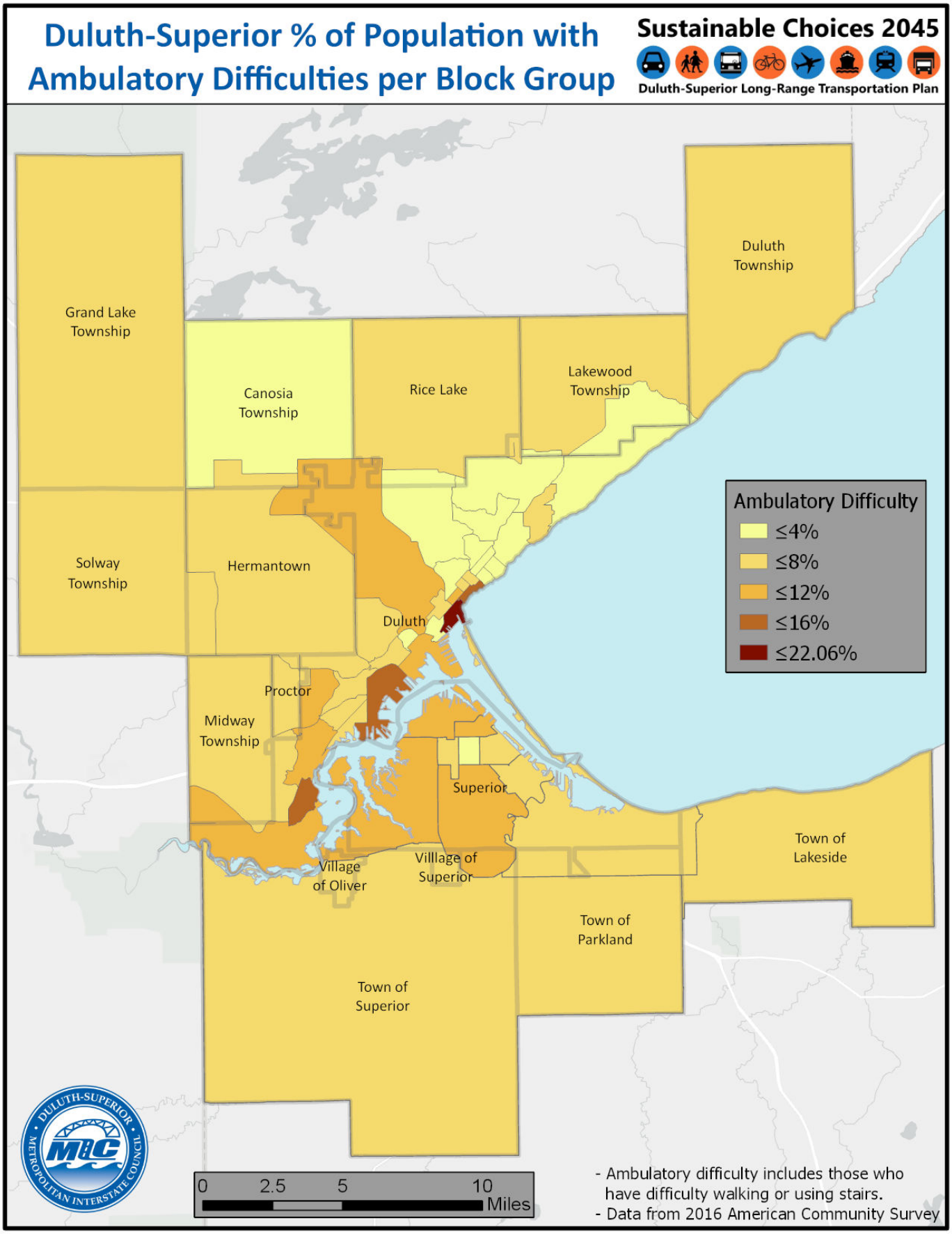


Table 15: 2015 Population with Ambulatory Difficulty

Geography	Total Age 5 and over	% with Amb. Difficulty	Age 35 to 64	% with Amb. Difficulty	Age 65 to 74	% with Amb. Difficulty	Age 75 and over	% with Amb. Difficulty
United States	20.4M	7.0%	9.0M	7.4%	3.9M	15.7%	6.1M	33.0%
Minnesota	253,113	5.1%	104,122	4.9%	45,662	11.2%	85,492	27.0%
Wisconsin	322,059	6.0%	141,366	6.2%	55,187	12.1%	103,639	28.6%
St. Louis County	12,939	6.9%	5,690	7.3%	2,293	12.9%	4,237	29.2%
Douglas County	2,721	6.7%	1,389	7.8%	432	11.2%	745	27.6%
MIC (MN)	**6,655**	**6.2%**	**2,735**	**6.5%**	**1,270**	**14.4%**	**2,283**	**31.0%**
Duluth city	5,275	6.6%	2,194	7.6%	976	15.8%	1,796	32.0%
Hermantown city	593	7.2%	121	3.4%	175	21.5%	297	39.9%
Proctor city	170	6.0%	105	7.8%	26	11.2%	13	5.9%
Rice Lake T	168	4.3%	90	4.5%	27	8.0%	51	23.6%
Grand Lake T	87	3.4%	42	3.5%	9	3.1%	32	23.9%
Lakewood T	56	2.4%	40	3.4%	6	4.0%	10	12.0%
Canosia T	56	2.6%	19	1.7%	17	7.1%	8	14.5%
Solway T	89	4.9%	46	5.1%	10	5.0%	20	24.7%
Duluth T	70	4.0%	26	3.2%	16	5.7%	25	23.6%
Midway T	91	6.3%	52	7.7%	8	6.3%	31	25.2%
MIC (WI)	**2,055**	**6.9%**	**1,029**	**8.4%**	**324**	**13.0%**	**575**	**30.5%**
Superior city	1,776	7.1%	874	8.7%	281	14.3%	496	30.7%
Superior town	93	4.9%	56	6.2%	21	7.4%	16	18.4%
Parkland town	93	7.3%	56	9.2%	13	13.8%	24	45.3%
Lakeside town	18	3.4%	10	3.4%	2	4.5%	6	24.0%
Superior V	57	8.5%	21	6.8%	7	8.0%	27	31.4%
Oliver V	18	5.3%	12	7.0%	-	0.0%	6	37.5%
Total MIC	**8,710**	**6.4%**	**3,764**	**7.0%**	**1,594**	**14.1%**	**2,858**	**30.9%**

Source: ACS (2015).

Economy & Employment

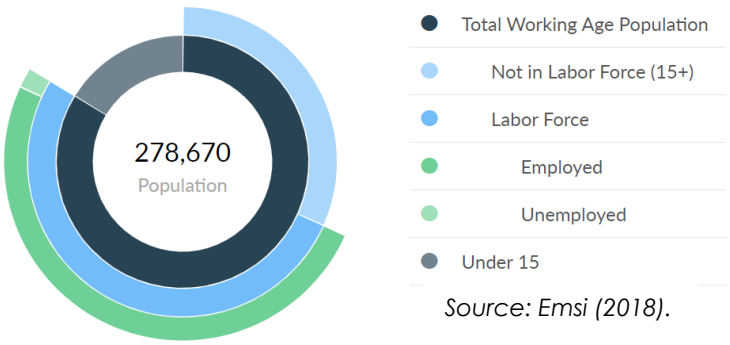
The Regional Economy

The Duluth-Superior metropolitan area is the regional trade center (RTC) for Northeast Minnesota and Northwest Wisconsin. It offers a wealth of opportunities for employment, shopping, tourism, trade, education, healthcare, and other services. It is also a major transportation hub for the movement of commodities and other freight throughout the region, nation, and internationally—especially because of its port facilities. Because of the concentration of economic activities and transport, the Duluth-Superior metro drives regional productivity.

Overview of Duluth-Superior MSA and Peer MSAs

From 2013 to 2018, jobs increased by 1.4% in the Duluth-Superior MSA from 138,633 to 140,553. This change fell well short of the national growth rate of 7.4%. As the number of jobs increased, the labor force participation rate increased from 61.5% to 62.1% between 2013 and 2018. The Duluth-Superior MSA is currently experiencing full employment, as seen in Figure 4.

Figure 4: Duluth-Superior MSA Labor Force and Employment



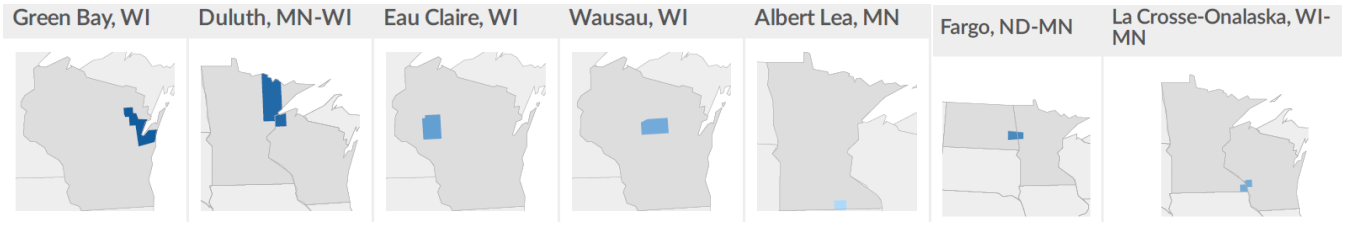
Source: Emsi (2018).

Concerning educational attainment, 17.4% of MSA residents possess a Bachelor's Degree (1.2% below the national average), and 12.0% hold an Associate's Degree (4.1% above the national average).

The top three industries in 2018 are General Medical and Surgical Hospitals, Local Government (Excluding Education and Hospitals), and Restaurants and Other Eating Places. Industries will be discussed in more detail below.

A selection of comparable MSAs in the region were analyzed as peers to the Duluth-Superior MSA to better gauge its relative performance outside of the typical state and national benchmarks. A snapshot of this comparison is provided in Table 16, and the geographic location of the peer MSAs is depicted in Figure 5. Duluth-Superior's negative population growth rate since 2010 (-0.4%) is below that of peers with over 100,000 population, and much lower than that of the two other comparably large MSAs, Green Bay and Fargo (5% and 17%, respectively). Duluth-Superior's employment growth rate (2.9% since 2010) also lags all but one peer MSA, and its unemployment rate (3.6%) is the highest—though it should be noted that the MSA is experiencing full employment. Duluth-Superior's cost of living index is lower that the other large MSAs, Green Bay and Fargo, and the median household income is also lower.

Figure 5: Peer MSAs



Source: Emsi (2018).

Table 16: MSA Regional Comparison

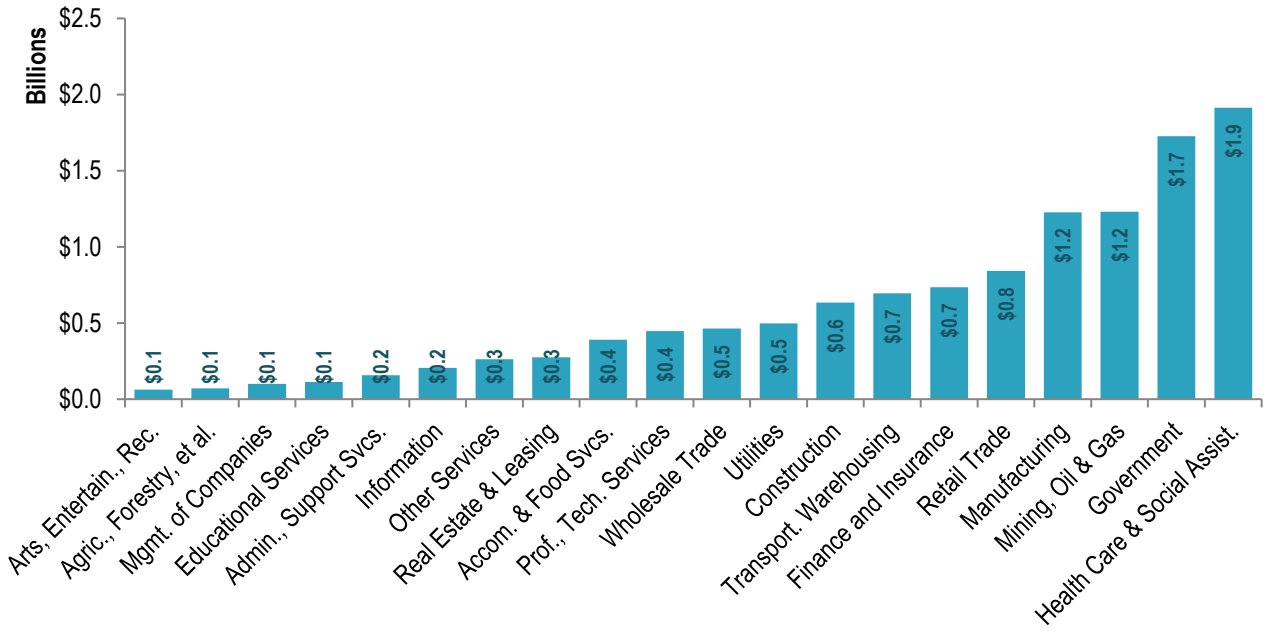
	Duluth-Superior	Green Bay	Fargo	Eau Claire	Wausau	La Crosse	Albert Lea
Population (2018)	278,670	321,811	245,714	168,214	135,923	137,286	30,377
% Change 2010-18	*-0.4%*	*4.9%*	*17.4%*	4.1%	*1.4%*	*2.5%*	*-2.7%*
Jobs (2018)	140,553	187,809	151,701	90,157	77,194	81,491	13,340
% Change 2010-18	*2.9%*	*7.5%*	*14.8%*	7.9%	*7.9%*	*5.5%*	*-2.9%*
Unemployment (2018)	3.6%	2.9%	2.2%	2.8%	2.8%	2.7%	2.9%
Cost-of-Living Index	96.8	99.9	101.9	98.1	99.3	102.2	99.2
Median HH Income	$50,078	$54,361	$55,941	$51,376	$54,227	$52,004	$48,827
Higher Education (%)	25.7%	25.2%	36.3%	25.6%	23.2%	31.1%	16.2%
Gross Regional Product	$13.1B	$19.1B	$15.2B	$8.1B	$7.6B	$7.2B	$1.2B
GRP per Worker	*$93.2K*	*$101.6K*	*$100.4K*	*$89.7K*	*$98.5K*	*$88.8K*	*$88.6K*
Exports	$15.2B	$21.9B	$15.9B	$9.0B	$9.4B	$8.0B	$1.8B
Imports	$14.8B	$20.1B	$13.9B	$9.0B	$9.0B	$8.2B	$2.1B

Source: Emsi (2018). Higher Education defined as completion of a Bachelor's degree or higher. Median household income is from the year 2016.

Industries

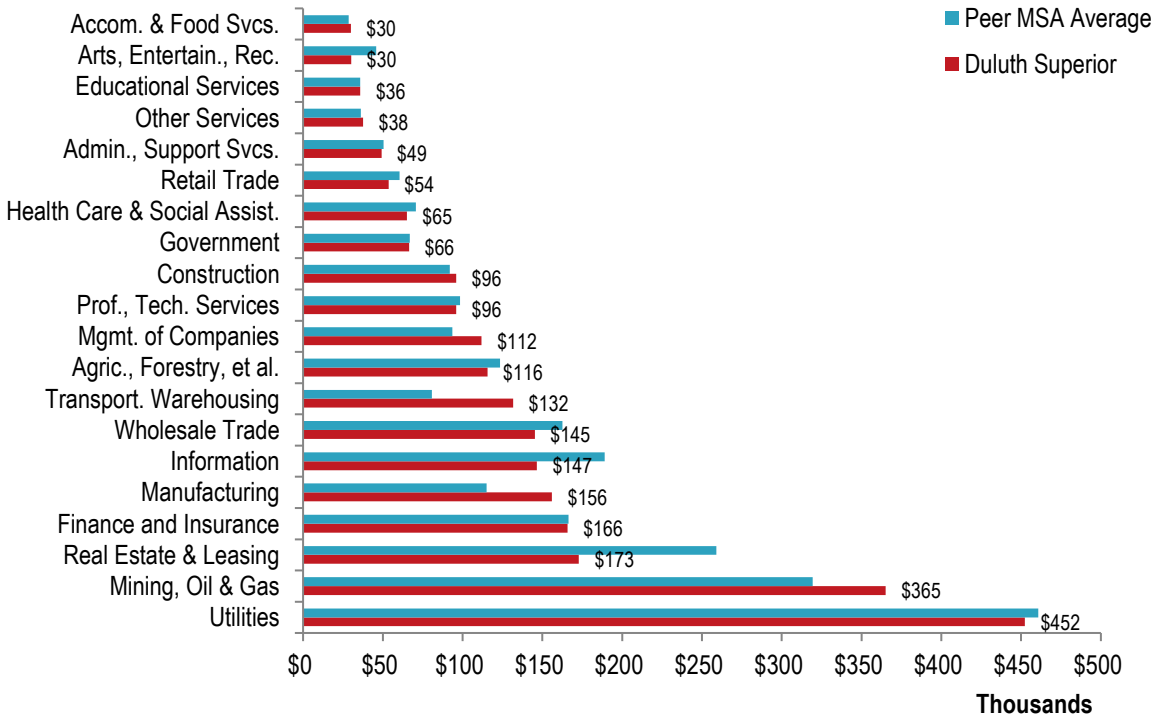
As shown in Figure 6, Health Care and Social Assistance, Government, Manufacturing, and Natural Resource Extraction are the four largest contributors to Duluth-Superior's Gross Regional Product (GRP) of $13.1 billion. Two of these are goods-producing industries with output available for export, while the others are primarily services for MSA residents. The GRP per worker by industry is provided in Figure 7, which is a useful point of comparison with the Duluth-Superior MSA average of $93,200 GRP per worker.

Figure 6: Duluth Gross Region Product (GRP) by Industry



Source: Emsi (2018).

Figure 7: Duluth-Superior MSA GRP per Worker by NAICS 2-Digit Industry



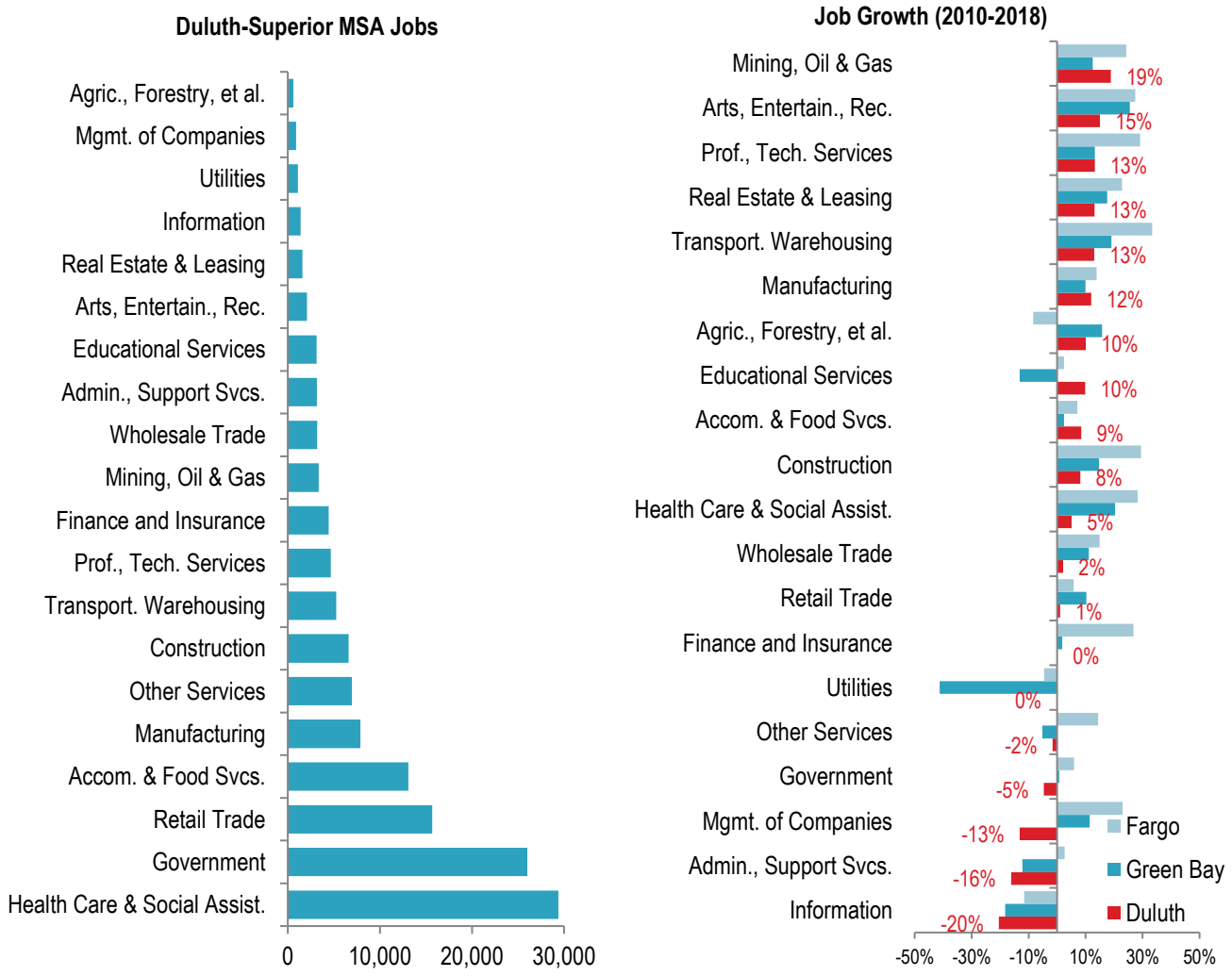
Source: Emsi (2018). The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies in classifying business establishments for the purpose of statistical data gathering and analysis.

Employment Trends

Job Growth

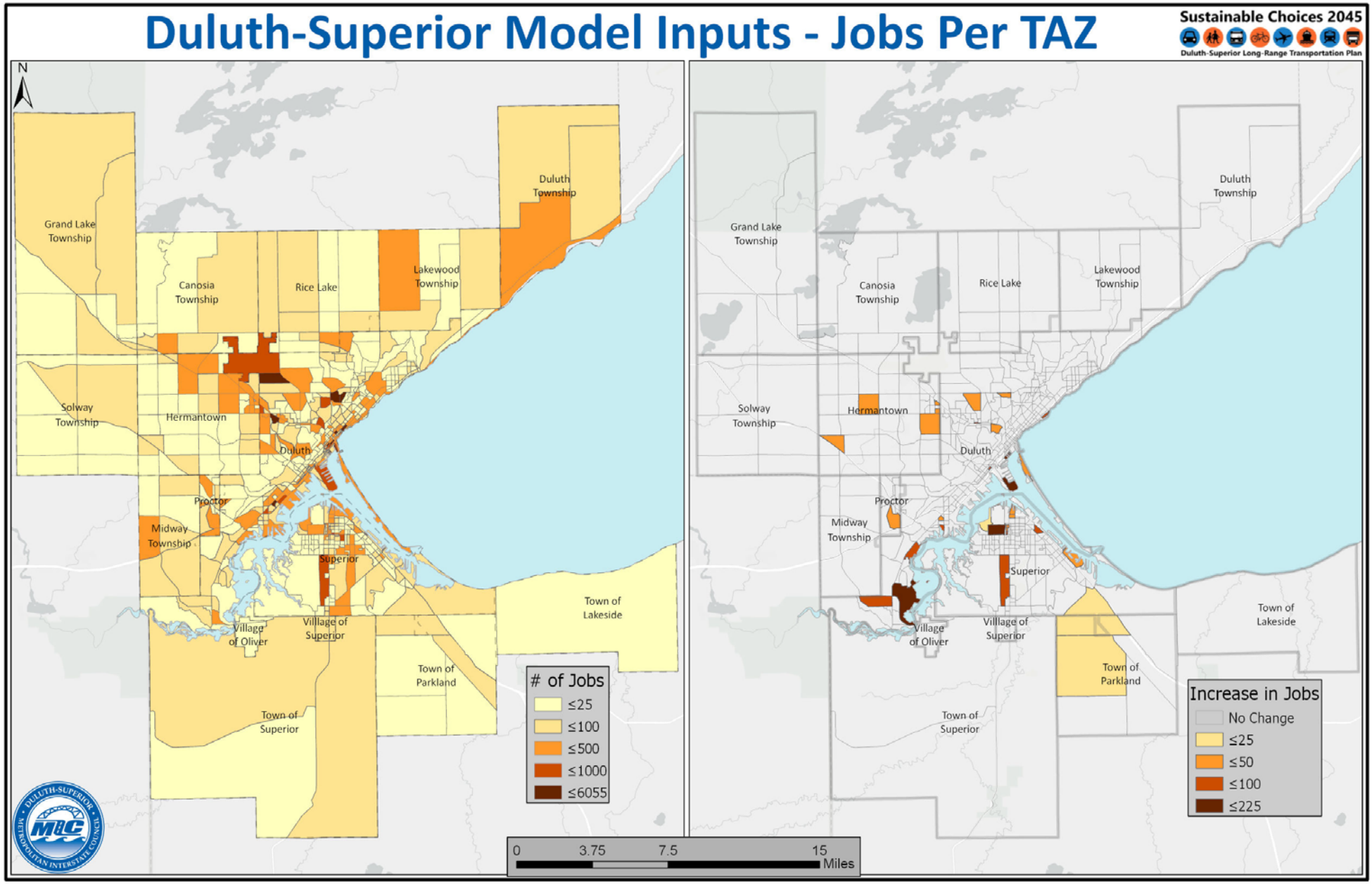
Map E-7 depicts the distribution of both job and job growth locations across the MIC area. Total MSA jobs by industry are provided in Figure 8, along with the growth rate since 2010 for Duluth-Superior MSA compared to comparably populous peer MSAs. The two largest contributors to the GRP (Health Care & Social Assistance & Government) are also the two largest employers, each employing over 25,000 workers. Each industry differs in trajectory as Government is losing jobs (-5% since 2010) and Health Care and Social Assistance is growing (+5%). Manufacturing is also a major industry (nearly 7,900 workers), and has grown by 12% since 2010, similar to peers. Mining, Oil & Gas is growing the fastest in proportional terms, but it is a smaller industry overall (3,370 workers), despite its outsize contribution to GRP (note above it had the second highest GRP per worker at $365,000 versus the MSA average of $93,200).

Figure 8: Total Jobs and Job Growth by Industry



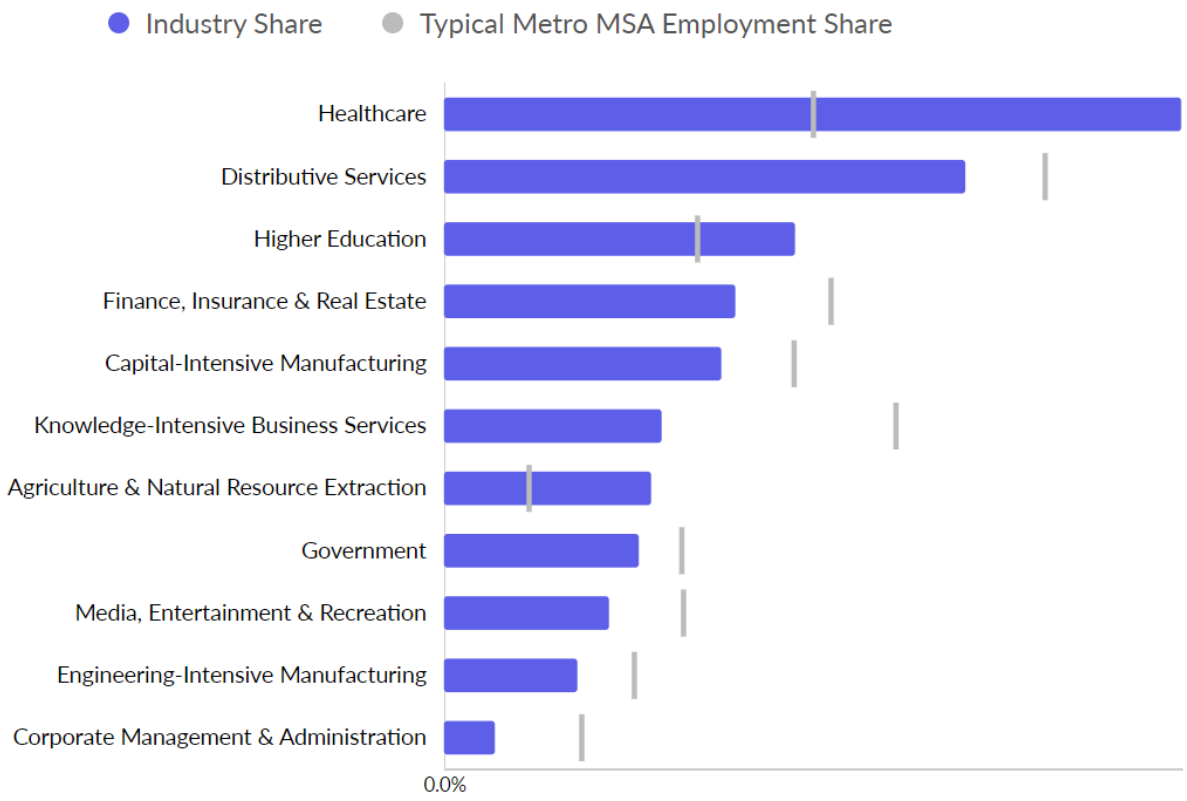
Source: Emsi (2018).

Map E-7: Duluth-Superior Model Inputs - Jobs



Comparing Duluth-Superior MSA's employment with MSAs nationwide, it ranks high (59 of 382) in terms of industry diversity—i.e., employment is distributed more evenly between industries compared to the typical MSA (Emsi 2018). A region with high diversity experience economic stability and more easily withstand economic pressures. Looking at the breakdown of industry clusters in Figure 9, we can see that it has above average proportions of Healthcare, Higher Education, and Agriculture and Natural Resource Extraction. On the other hand, it has significantly below average Knowledge-Intensive Business Services and Corporate Management and Administration. The location quotient[4] (LQ) breakdown by the NAICS 2-digit industries compared to a national benchmark is provided in Figure 10—reinforcing many of the trends already discussed. Similarly, the high performing industries in terms of earnings per worker (Figure 11) largely corroborate the above findings of GRP per worker by industry.

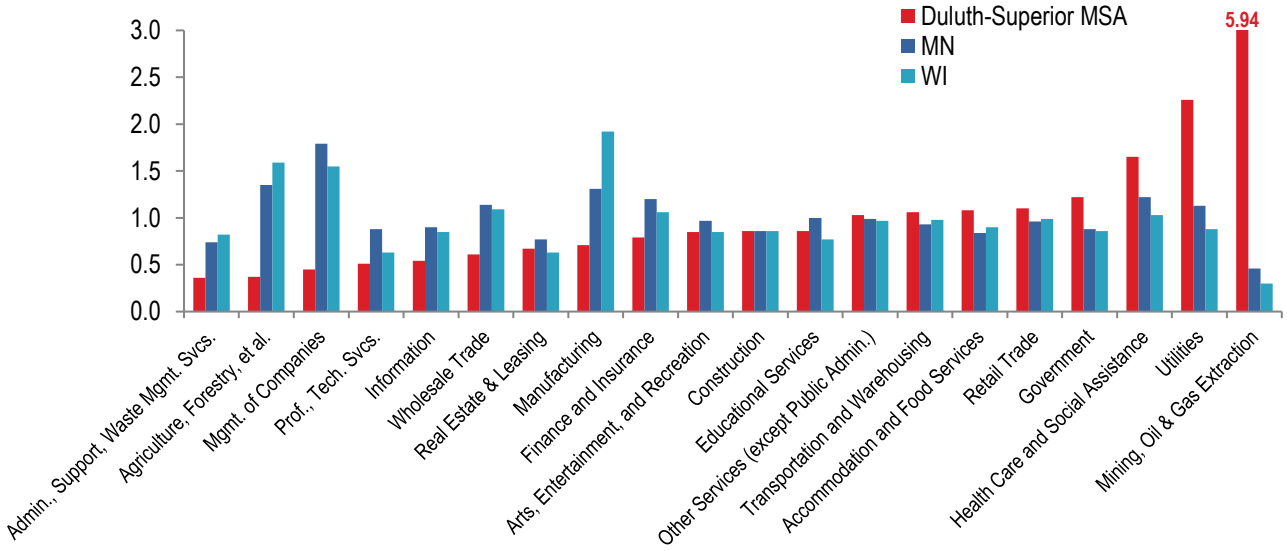
Figure 9: Industry Share of MSA Employment



Source: Emsi (2018).

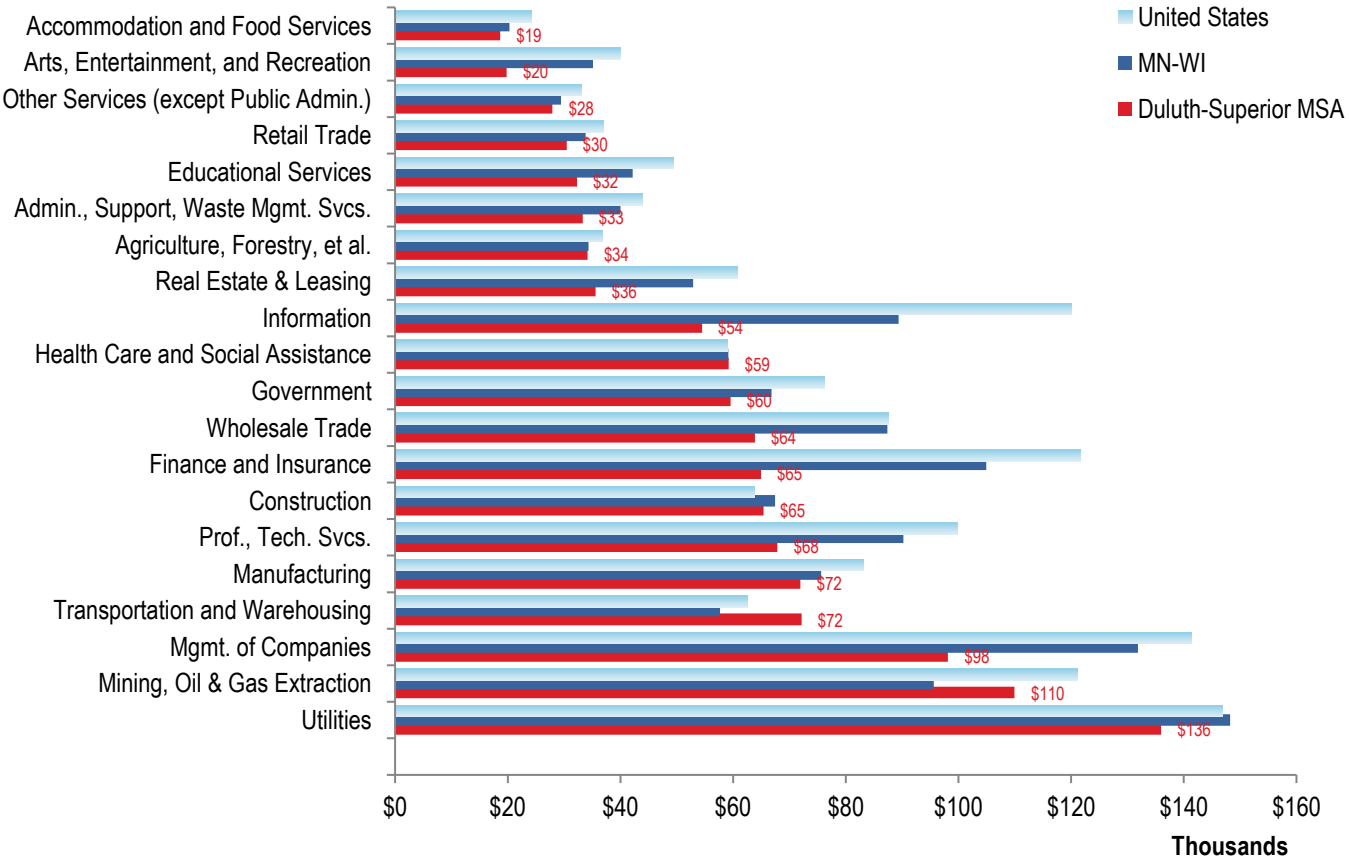
[4] Location quotient is an approach to quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to a benchmark region. An LQ above 1.0 is considered a concentration.

Figure 10: Industry LQ



Source: Emsi (2018). LQ values over 1.00 signify a local concentration.

Figure 11: Earnings per Worker by Industry



Source: Emsi (2018).

Employment Projections (2045)

Employment was estimated using the travel demand model socioeconomic data which showed a current year jobs total of approximately 78,100. MIC staff reviewed the model and primary growth areas and allocated an additional 2,100 jobs throughout the MIC area, bringing the 2045 jobs total to approximately 80,200. Table 17 displays a summary of the project employment growth.

Table 17: Employment Projections (2018 – 2045)

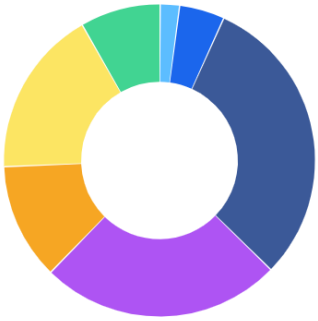
Geography	Estimated Jobs (2018)	Estimated Jobs (2045)
MIC (MN)	**67,424**	**68,893**
Duluth city	59,203	60,443
Hermantown city	4,837	5,016
Proctor city	1,069	1,119
Rice Lake township	579	579
Grand Lake township	330	330
Lakewood township	211	211
Canosia township	373	373
Solway township	134	134
Duluth township	312	312
Midway township	376	376
MIC (WI)	**10,651**	**11,315**
Superior city	10,257	10,871
Superior town	133	133
Parkland town	114	164
Lakeside town	15	15
Superior village	102	102
Oliver village	30	30
Total MIC	**78,075**	**80,208**

SOURCE: MIC Travel Demand Model Socioeconomic Data.

Education

The Duluth-Superior MSA has typical levels of higher education compared with peer MSAs (i.e., roughly a quarter of the population has a bachelor degree or higher). The share of population whose highest educational attainment is a Bachelor's degree is 1.2% lower than the national average. The complete educational breakdown for the MSA is provided in Figure 12.

Figure 12: Duluth-Superior MSA Educational Attainment



	% of Population	Population
Less Than 9th Grade	2.0%	3,864
9th Grade to 12th Grade	4.7%	9,060
High School Diploma	30.5%	58,817
Some College	25.0%	48,171
Associate's Degree	12.0%	23,195
Bachelor's Degree	17.4%	33,475
Graduate Degree and Higher	8.3%	16,059

Source: Emsi (2018).

In terms of the pipeline of college-educated local talent, there were roughly 6,600 graduates in the MSA in 2017, with the highest share coming from Liberal Arts and Sciences and Registered Nursing programs. This pipeline has shrunk by 4% over the last 5 years, primarily due to a declining trend at University of Minnesota-Duluth (Figure 13).

Figure 13: Enrollment & Graduates by Postsecondary School

School	Total Enrollment (2017)	Total Graduates (2017)	Graduate Trend (2013 - 2017)
University of Minnesota-Duluth	11,144	2,243	
The College of Saint Scholastica	4,263	1,439	
Lake Superior College	5,049	1,178	
University of Wisconsin-Superior	2,590	582	
Hibbing Community College	1,207	392	
Mesabi Range College	1,248	303	
Wisconsin Indianhead Technical College	380	280	
Fond du Lac Tribal and Community College	1,941	248	
Vermilion Community College	721	166	
Duluth Business University	42	36	
Cosmetology Careers Unlimited College of Hair Skin and Nails	26	13	

Certificate · Associate's · Bachelor's · Master's or Higher

Source: Minnesota Office of Higher Education, University of Wisconsin-Superior, Emsi (2018).

Land Use & Transportation Demand Patterns

Previous analysis presented information regarding trends in the numbers, types, and densities of people and jobs within the Duluth-Superior metropolitan planning area. These are important considerations for transportation planning, but trends in land use and travel behavior are also important to consider. Land use and transportation are inextricably linked as trends occurring in one generally influence patterns of the other. The demand for different modes of transportation can similarly influence the provision of transportation services and patterns of land development. This dynamic relationship makes it necessary to coordinate the planning of transportation improvements in the metro area with land use planning of the individual municipalities and vice versa. The following pages describe these trends in the Duluth-Superior area.

Land Use Patterns

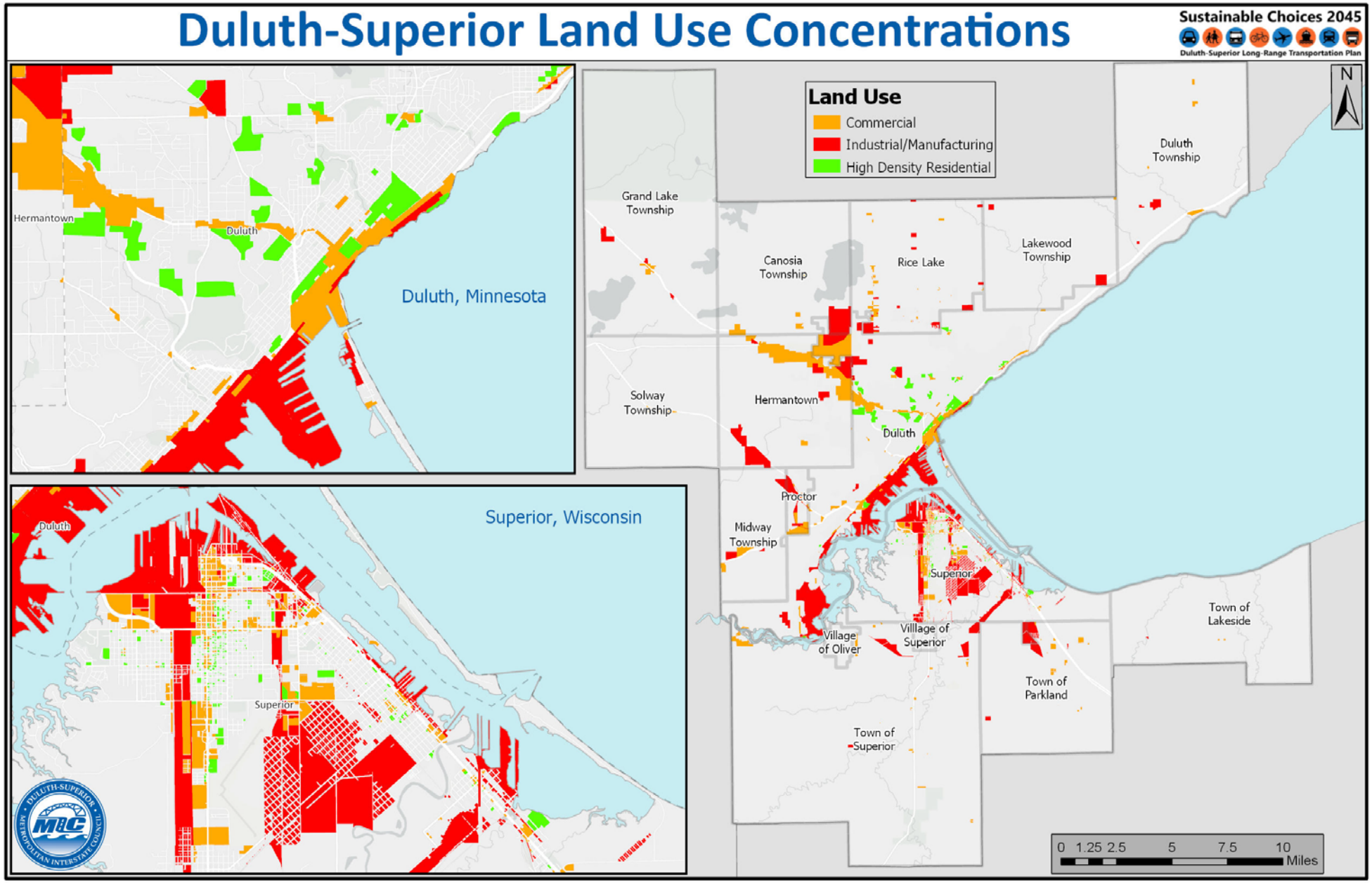
The shape and size of the Duluth-Superior area and its land uses are the result of the economic and industrial activities that have gathered around its harbors over time. Map E-8 depicts concentrations of land use types across the MIC area. The area's patterns of land use today largely remain that way: industrial activities are still concentrated near the ports, and employment and services are still concentrated in nearby central business districts. Over the past several decades, however, more of the area's population and commercial activities have migrated further from the central cities. As the urban boundary has expanded, large concentrations of commercial activity—such as the Miller Hill Mall—have developed further away from the largest concentrations of people.

Development in the Duluth-Superior metro continues to expand beyond the urbanized area. Signs of this can be seen in the population and employment estimates from the U.S. Census Bureau as changes in the number of jobs and employees in core cities versus the surrounding communities suggest the metropolitan area is growing in population but becoming less dense.

While the trend of spreading outward is typical of many metropolitan areas, the pattern seems more noteworthy for the Duluth-Superior area when comparing its population density to those of U.S. metro areas of similar size. Further, the U.S. Department of Transportation has compiled statistics in support of the Transportation and Health Tool, and this data shows that the MSA has a below-average land use mix (31 on a scale of 0 to 100).

Being a metro area with lower-than-average density implies accompanying trends of higher-than-average consumption of energy and resources. As the distances between population, commercial centers, jobs, and services become greater, they require greater extensions of infrastructure and service networks, and result in longer travel times.

Map E-8: Duluth-Superior Land Use Concentrations

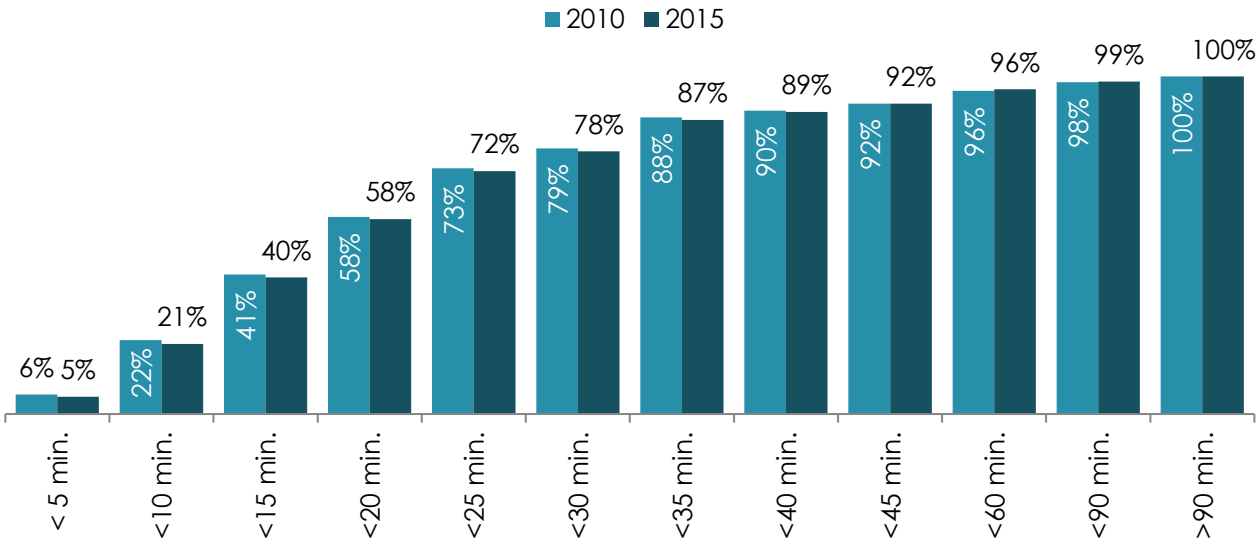


Local Travel Patterns and Modes

Travel Times

Continuing the trend seen from 2010 to 2015, travel times have been growing in the Duluth-Superior area. This is proven in the Travel-Time-to-Work data provided by the Census Bureau. While the majority of working residents have commute times under 20 minutes (Figure 14), commute times have been growing overall. This is driven primarily by a drop in the number of people with a very short commute (under 10 minutes), falling from 22% to 21%. Overall 78% of the population has a commute of less than 30 minutes (versus the MN-WI average of 73%), and 96% have a commute of less than one hour (versus MN-WI average of 95%).

Figure 14: Share of Duluth-Superior MSA by Commute Length (2010, 2015)

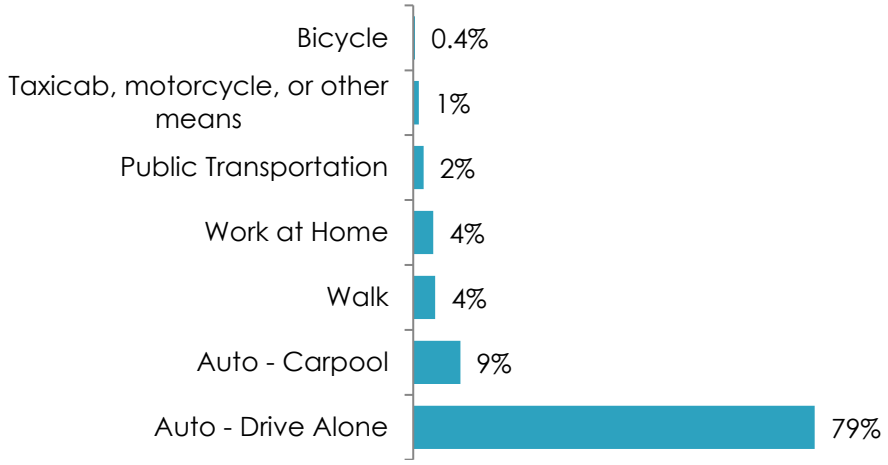


Source: ACS 2010, 2015.

Means of Travel

According to American Community Survey (ACS) Journey to Work data it is estimated that 79% of the working population in the Duluth-Superior MSA drives to work alone, while 9% carpool, 4% walk, 4% work at home, 2% take public transportation, and the remainder take some other means of travel to work (Figure 15). These mode shares are nearly identical to those seen at the MN-WI state average—no more than 1% difference in any given mode group. Since 2010, there has been a slight increase in the share of walkers (0.8%), but no substantive change (greater than half a percent) in other mode groups.

Figure15: Duluth-Superior MSA Commute Mode Share (2015)



Source: ACS 2015.

Between 2010 and 2015 there was a slight shift in commuter travel choice as the percentage of those traveling to work by automobile decreased by 2%, while those working from home or traveling by "other means" each increased by 1%. This shift was consistent with trends occurring throughout the country as telecommuting and bike commuting have increased. The economic recovery in recent years appears to have halted the decline of the automobile commute since 2010. During this period, only pedestrian commutes grew while bicycle commuting fell and telecommuting remained stable.

There are notable differences in means of travel to work across different income groups. For example, those below the poverty level comprise 9% of the MSA working population, but 8% of the solo driver commuters, 12% of the taxi, bike, or other commuters, 21% of the pedestrian commuters, and 35% of the public transportation commuters. The share of low-income workers using public transportation in the MSA is significantly higher than U.S. and state averages, ranging from 18% to 23%. Low-income population comprises 6% to 7% of the total working population.

In a MetroQuest Phase 1 survey conducted as part of the preparation of *Sustainable Choices 2045*, people were asked 'How often have you used the following modes (walk, bike, bus or shuttle, automobile) for transportation within the past year?" As a follow-up, people were asked, if identified barriers were removed would you personally use the mode more as a means of transportation? Results of these survey questions are listed in Table 18. It is important to note the number of people who said they would use a given mode more often if identified barriers to use of that mode were removed.

Table 18: How do you get around? Mode use responses to MetroQuest survey questions (2018)

		How often have you used each mode for transportation in the past year? (% of total)			# of people who would use this mode more often if identified barriers were removed
Mode	**n**	**Often**	**Sometimes**	**Never**	
Walk	475	43 %	46 %	11 %	173
Bike	467	16 %	32 %	52 %	191
Bus or Shuttle	467	25 %	28 %	47 %	156
Automobile	516	81 %	11 %	8 %	113

The responses gathered in the local MetroQuest survey are significantly higher than the corresponding mode values from ACS. This is not surprising for three reasons. One, the ACS values consider the entire MSA which includes a vast majority of very rural areas, not representative of the MIC area. Two, the ACS values represent the "primary" mode of travel, which very much differs from the MetroQuest survey question. Three, the ACS values are specific to travel to work, whereas the MetroQuest survey question was broader in regard to transportation or travel to any place. See Chapter 4 and Appendix G for additional information.

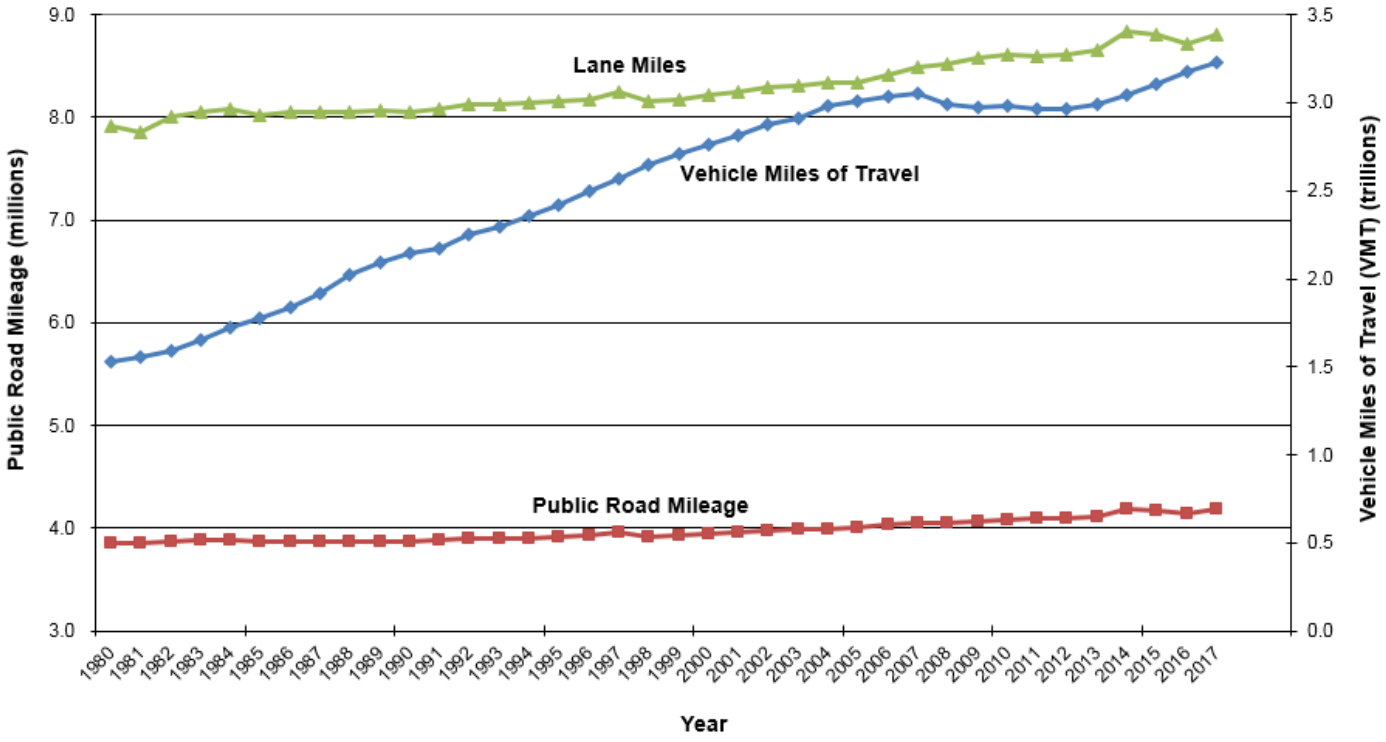
Overall, the majority of travel in the area still occurs in the form of automobile trips, and it is understood that this travel is occurring primarily within AM and PM commute periods. These are times when the area's transportation system is most congested and the efficiency of traffic operations at various locations throughout the network are most challenged.

VMT

As shown in Figure 16, after a post-recession period of decline and stabilization in vehicle miles traveled (VMT), miles of travel figures are on the rise nationwide despite number of lane miles falling. This trend suggests greater congestion facing the nation's road users translating to more time and money lost sitting in traffic. According to the United States Department of Transportation (USDOT), cost of delay (or travel time savings) in the US equals $14.80 per person-hour for all travel purposes in 2017.[5]

[5] USDOT: Benefit-Cost Analysis Guidance for Discretionary Grant Programs (June 2018).

Figure 16: Road Mileage and VMT (1980-2017)



Source: FHWA 2018. Public road mileage is the length of public roadway facilities based on the centerline length, and lane mileage is the centerline length multiplied by the number of lanes.

The overall amount of automobile travel in the area, however, appears to be holding steady. The number of total miles traveled by vehicles on an average day, or vehicle-miles- traveled (VMT), has remained roughly the same over the past decade for both the tri-county MSA and the Duluth-Superior urbanized area. This is consistent with VMT trends observed at both the state and national levels over the same period.

When looking more closely at VMT in the urbanized area versus the larger MSA, however, some differences are noticed in trend lines. Despite being relatively flat, the VMT for both geographies has been increasing slightly. For the MSA, daily travel has been trending upward by 0.1% every year, while VMT for the urban area has been averaging a 0.3% increase per year. VMT in the urbanized area has been decreasing consecutively, year after year, since 2008.

Other Modes

According to ridership figures from the Federal Transit Administration (FTA), the use of public transit grew by 20% serving 547,000 more riders in 2013 than in 2004. However, ridership totals have since declined by 12.5% from 2013 to 2017. Passenger miles traveled (PMT), or the total number of miles traveled by passengers, has also declined with a loss of 21.3% since 2013.

There are signs that bicycle use in the Duluth-Superior area is on the rise. Each Duluth Transit Authority (DTA) bus is equipped with front-end bike racks year-round and, as with passengers, the DTA also counts the numbers of bikes it transports. This data can be considered as somewhat of a proxy measure for non-motorized transportation demand in the area. Data collected by DTA shows that between the first year of data collection in 2006 and 2012, the annual number of bikes on buses increased by more than 14,000 trips – an average annual increase of 14%. This trend was reversed in 2013, which staff at the DTA has speculated was the result of a combination of a longer-than-average winter, more inclement weather days, and new housing opportunities opening up near college campuses in the area.

While the demand for walking and biking in the Duluth-Superior area is not something that can presently be measured system wide, there is anecdotal evidence of increasing demand. For instance, cyclists appear to be more present—especially in non- summer months—in and around downtown Duluth and Superior.

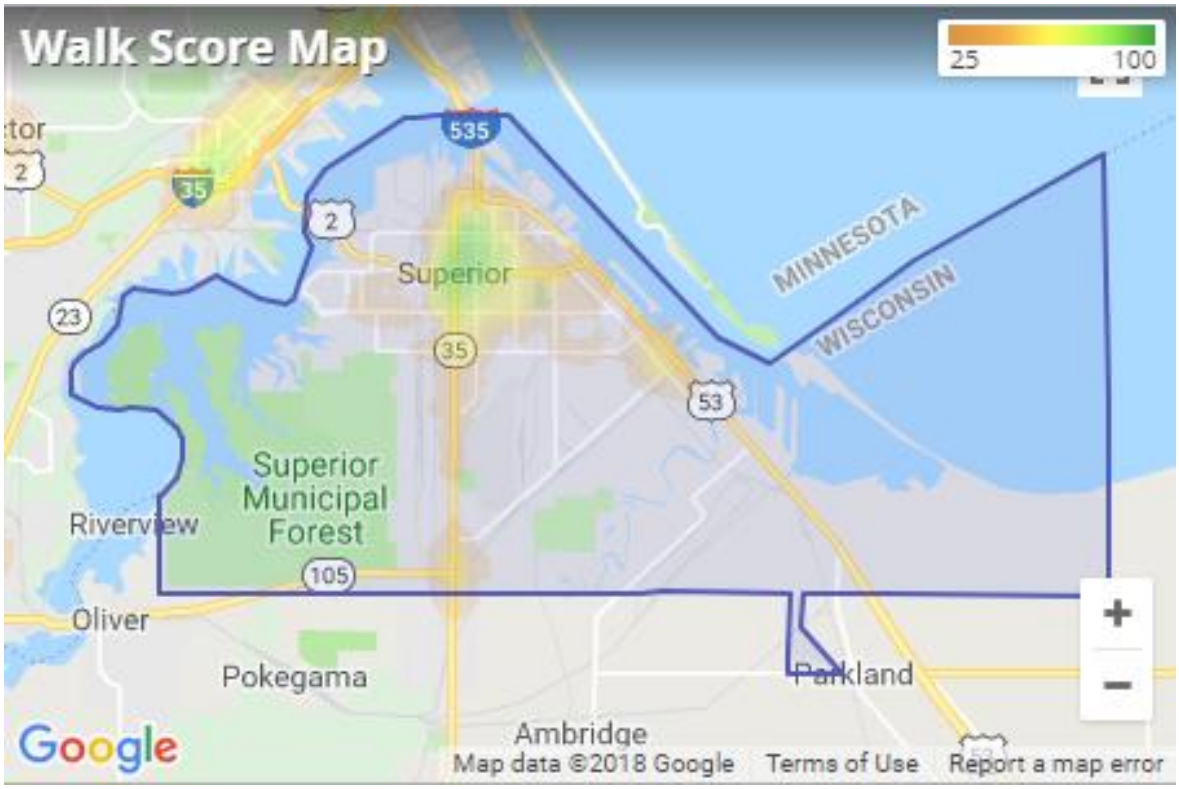
Walkability

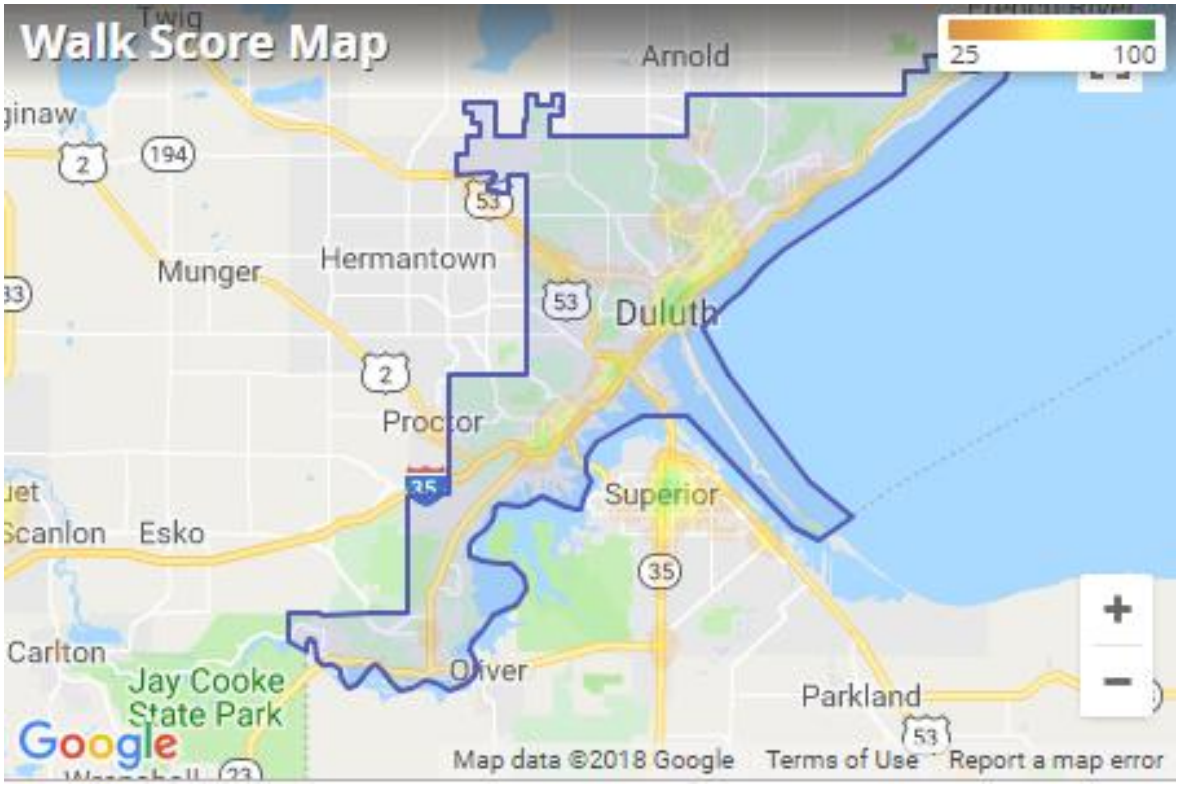
The most popular public measure of walkability is commonly the Walk Score provided by walkscore.com. This index ranges from 0 to 100, with 100 being a most desirable in terms of pedestrian infrastructure, amenities, and the range and quantity of destinations accessible on foot.

Both Duluth and Superior fall into the category of car-dependent cities with Walk Scores of 34 and 41, respectively, indicating most errands require a car. This is comparable with other cities in the area with similar population levels, such as Rochester (30), Bloomington (28), and Beloit (43). Larger metropolitan areas such as Minneapolis and St. Paul have Walk Scores of 69 and 59, respectively, which the site classifies as "Somewhat Walkable."

Of course, there is a significant amount of variation across neighborhoods, as seen Figure17. For example, in Duluth, Downtown has a Walk Score of 69, versus 55 in East End, 46 in West End, 38 in Chester Park, and 32 in Congdon.

Figure17: Walkability Maps (Duluth and Superior)



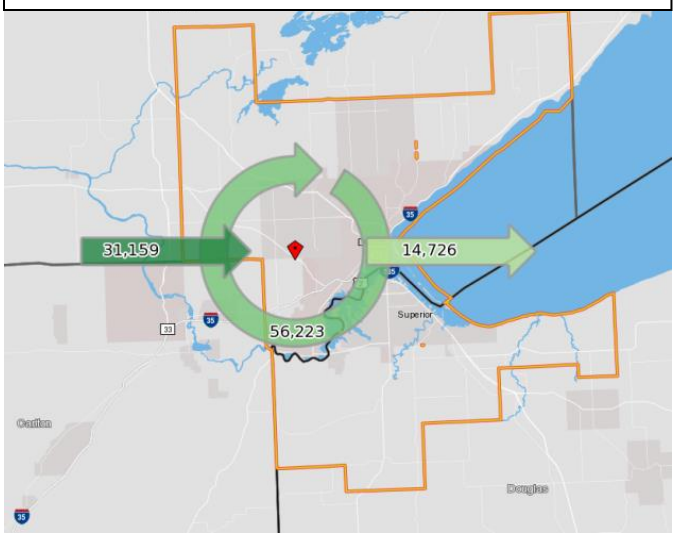


Source: Walk Score (www.walkscore.com).

Regional Travel Patterns

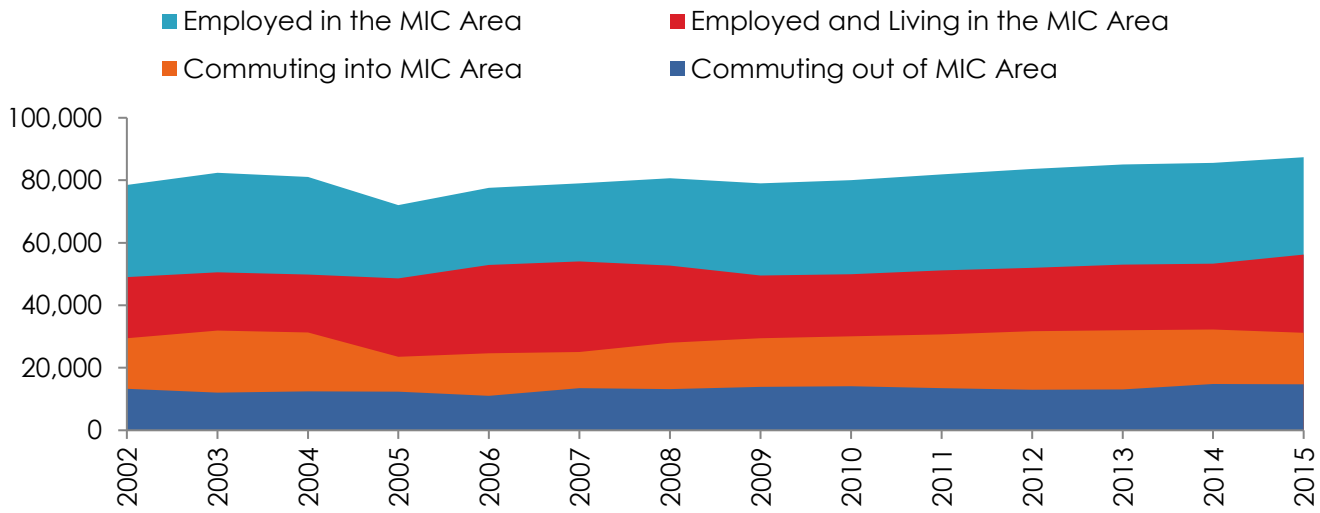
As the regional trade center (RTC) of Northeast Minnesota and Northwest Wisconsin, the Duluth-Superior area attracts regional traffic related commerce, both in terms of freight transfers and worker commutes who live beyond area boundaries. Data regarding freight movements is generally proprietary and difficult to track, but data regarding the location of workers' homes and jobs generally indicates stability in the numbers and distances of people commuting in and out of the area, which is reflected in Figure19.

Figure18: Commuting Into and Out Of the MIC Area



The Census Bureau's Longitudinal Employment-Household Dynamics (LEHD) data is one of the most comprehensive datasets available regarding employment and worker flow. The data is drawn from state unemployment insurance (UI) earnings records that provide a link between home location and job location. In some cases, the UI records may link employees to a payroll location they do not actually commute to. For these reasons, MIC planning staff previously estimated the LEHD employee count for the Duluth- Superior area is overrepresented by 12%. Once this is adjusted for, the 2015 data shows that 27,420 people are potentially commuting into the area for work on a daily basis, while 12,959 people are commuting outside the area (see Table 19 and Figure 18).

Figure19: Historical Commuter Inflow and Outflow



Source: LEHD 2015.

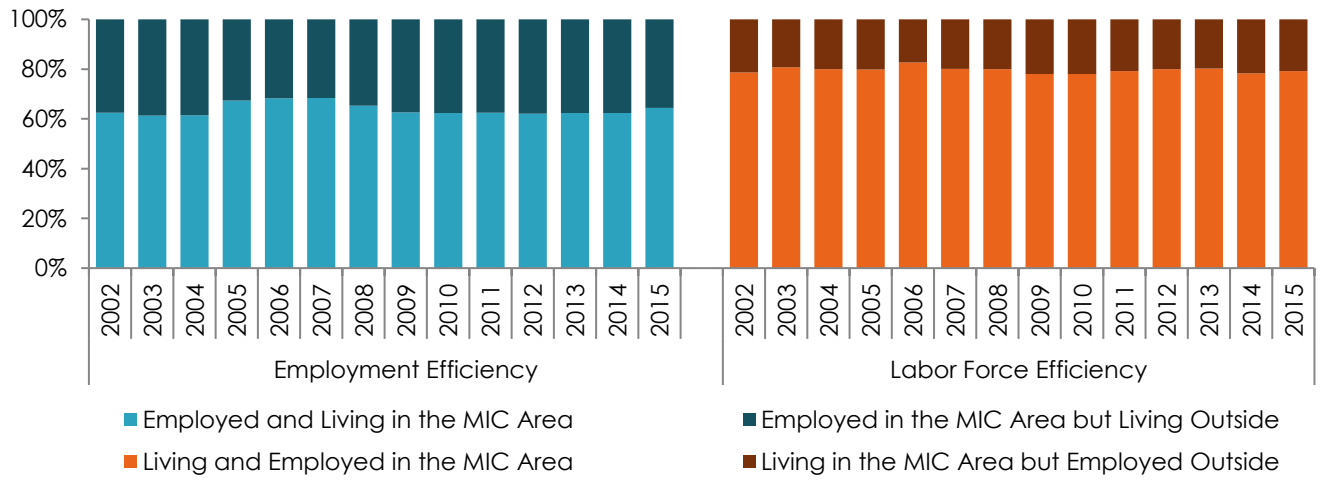
Table 19: MIC Area Commuter Inflow and Outflow (2002 – 2015)

	Employed in the MIC Area		Employed and Living in the MIC Area		Employed in the MIC Area but Living Outside		Living in the MIC Area but Employed Outside	
	LEHD	12% Adjustment	LEHD	12% Adjustment	LEHD	12% Adjustment	LEHD	12% Adjustment
2002	78,488	69,069	48,998	43,118	29,490	25,951	13,252	11,662
2003	82,423	72,532	50,551	44,485	31,872	28,047	12,076	10,627
2004	81,108	71,375	49,846	43,864	31,262	27,511	12,446	10,952
2005	72,078	63,429	48,584	42,754	23,494	20,675	12,321	10,842
2006	77,574	68,265	52,901	46,553	24,673	21,712	11,062	9,735
2007	79,016	69,534	54,009	47,528	25,007	22,006	13,478	11,861
2008	80,705	71,020	52,716	46,390	27,989	24,630	13,159	11,580
2009	78,988	69,509	49,491	43,552	29,497	25,957	13,885	12,219
2010	80,026	70,423	49,937	43,945	30,089	26,478	14,060	12,373
2011	81,901	72,073	51,192	45,049	30,709	27,024	13,444	11,831
2012	83,635	73,599	51,938	45,705	31,697	27,893	12,998	11,438
2013	85,071	74,862	53,041	46,676	32,030	28,186	13,073	11,504
2014	85,613	75,339	53,357	46,954	32,256	28,385	14,811	13,034
2015	87,382	**76,896**	56,223	**49,476**	31,159	**27,420**	14,726	**12,959**

Source: LEHD 2015.

LEHD data finds employment in the area grew by 9% during the post-recession period between 2010 and 2015 with rapid growth (13%) occurring among those living and working in the MIC area. Those crossing the metropolitan boundary for work grew by just 4-5% over the same period. This ratio of new resident to non- resident workers is slightly higher than in 2010, but it is lower than the pre-recession levels (2005-2008). This is depicted in Figure 20, which also shows how the labor force efficiency (i.e., the share of metro area workers who live in the area also work in there) has remained relatively constant.

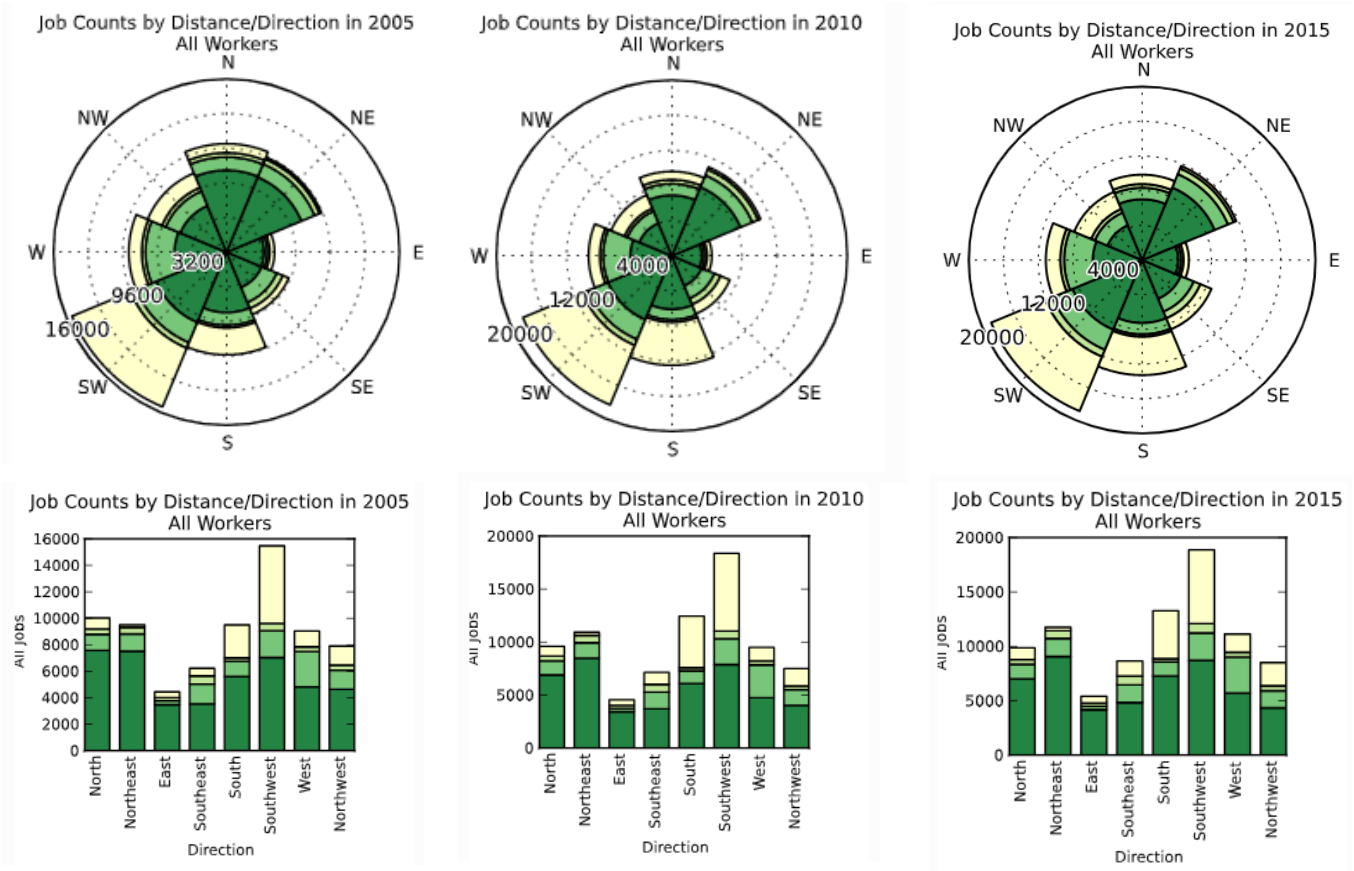
Figure 20: Historical Employment and Labor Force Efficiency



Source: LEHD 2015.

LEHD On the Map web application shows the proportion of employment-based commuter traffic by distance and direction. From this information, the overall pattern of regional traffic to and from the Duluth-Superior MIC area can be seen and concludes much of the long-distance commuting to and from Duluth–Superior is moving along the I-35 corridor, followed by travel to and from Wisconsin (Figure 21).

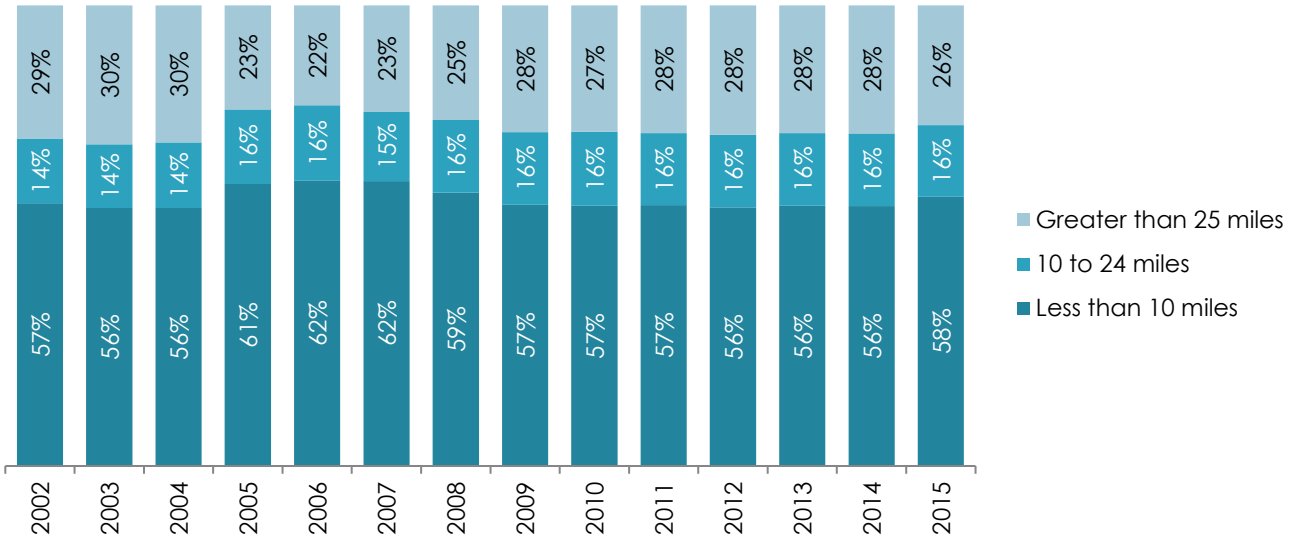
Figure 21: Historical Distance-Direction of Commuter Travel (MIC Area)



Source: LEHD 2015.

As indicated in Figure 22, as of 2015 there has been a slight reversal in the trend of longer distance commutes. Pre-recession, 62% of residents lived within 10 miles of their workplace. This figure fell to 56% in 2012, but rose to 58% in 2015. After many years above 28%, the number of people traveling more than 25 miles fell to 26% in 2015.

Figure 22: Historical Shares of Distance Traveled by Commuters



Source: LEHD 2015.

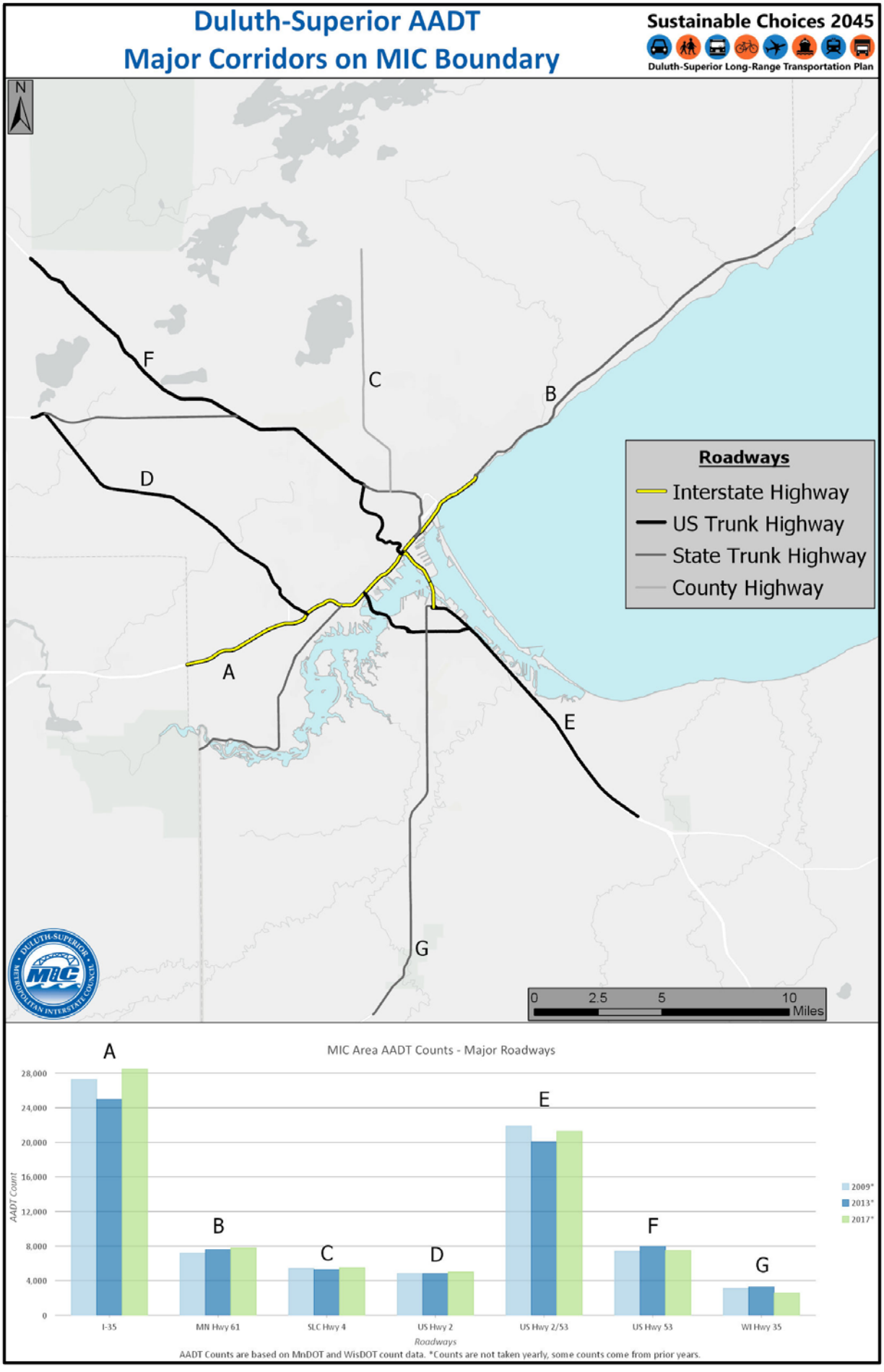
As seen in Table 20 below, the average annual daily traffic (AADT) on regional corridors at the MIC area's boundary has fluctuated between 2009 and 2017. Map E-9 depicts the geographic locations and AADTs of the seven corridors considered (2009-2017). There has been a general slight increase in traffic at these locations between 2009 and 2017, with much of the increase coming between 2013 and 2017. There was a very significant rebound in traffic along Interstate 35, especially between 2013 and 2017. The increase in traffic along Interstate 35 and MN Trunk Highway 61 is likely a result of the rebound of the economy from 2007-08. The exception to all of this is a significant decrease (-19.2%) in traffic along WI Trunk Highway 35, especially between 2013-2017 (-26.9%). The reason for this decrease is unclear.

Table 20: Daily Traffic at MIC Boundaries (2009, 2013, 2017)

		2009*	2013*	2017*	% change 2009-2013	% change 2013-2017	% change 2009-2017
A	Interstate 35	27,300	25,000	28,500	-9.2	12.3	4.2
B	MN Trunk Hwy 61	7,200	7,600	7,800	5.3	2.6	7.7
C	St. Louis County Hwy 4	5,400	5,300	5,500	-1.9	3.6	1.8
D	US Trunk Hwy 2	4,850	4,850	5,000	0.0	3.0	3.0
E	US Trunk Hwy 2/53	21,900	20,100	21,300	-9.0	5.6	-2.8
F	US Trunk Hwy 53	7,400	8,000	7,500	7.5	-6.7	1.3
G	WI Trunk Hwy 35	3,100	3,300	2,600	6.1	-26.9	-19.2

AADT Counts are based on MnDOT and WisDOT count data.
**Counts are not taken yearly, some counts come from prior years.*

Map E-9: Duluth-Superior AADT – Major Corridors on MIC Boundary



Air, Rail, and Water

In addition to the regional traffic facilitated by the area's network of highways and roads, Duluth-Superior is also home to major transportation facilities that serve interregional air, rail, and waterborne transportation.

Air

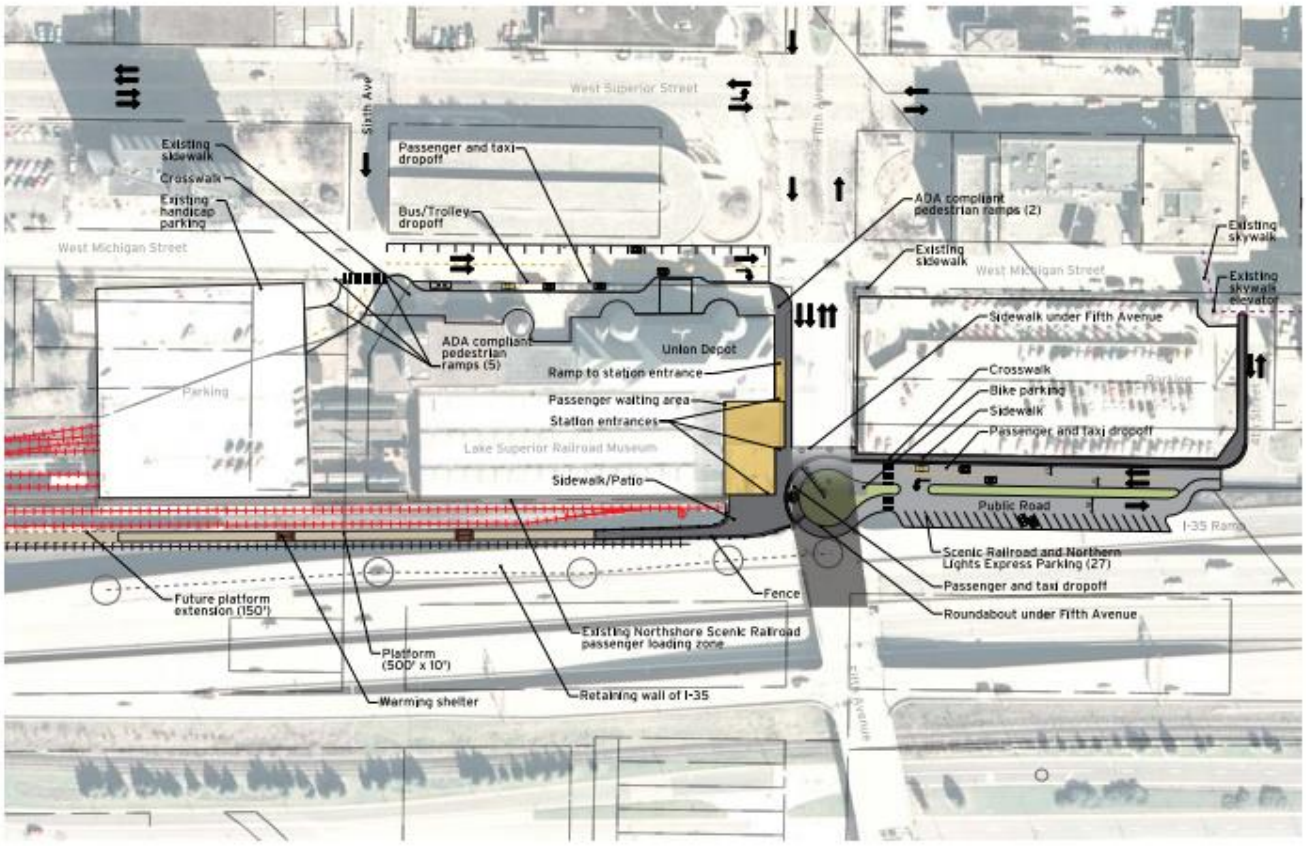
The area has three major airports of regional significance for passenger service, freight movements, and recreational flying: the Duluth International Airport (DLH), the Richard I. Bong Municipal Airport (SUW), and Duluth's Sky Harbor Airport (DYT). DLH generally experienced a rising trend in passenger volumes from 2000 to 2013, trending at an average 0.8% annual increase over that period. However, passenger volumes fell from 2014 to 2017 from about 302,000 to about 237,000, according to the Bureau of Transportation Statistics (BTS). As of fall 2018, there are nearly 250,000 passengers at DLH, indicating that the declining trend has been reversed—at least for the current year. Most flights are destined for either Minneapolis (MSP) or Chicago (ORD).

Freight and Passenger Rail

An extensive network of railways including four class 1 railroads exists in and around Duluth-Superior. At present, all railroad movements are exclusively freight trips, as passenger rail service to the area ended in 1980. There has, however, been increasing efforts in recent years to study the feasibility and demand potential for creating a higher-speed rail connection (Northern Lights Express) between Duluth-Superior and St. Paul, Minnesota. As of 2018, the Federal Railroad Administration (FRA) issued a Finding of No Significant Impact (FONSI) on the Tier 2 Project Level Environmental Assessment (EA), which means the project will not have a significant environmental impact. Further, Minnesota Department of Transportation (MnDOT) has issued the Findings of Fact and Conclusions indicating that a state Environmental Impact Statement (EIS) is not required.

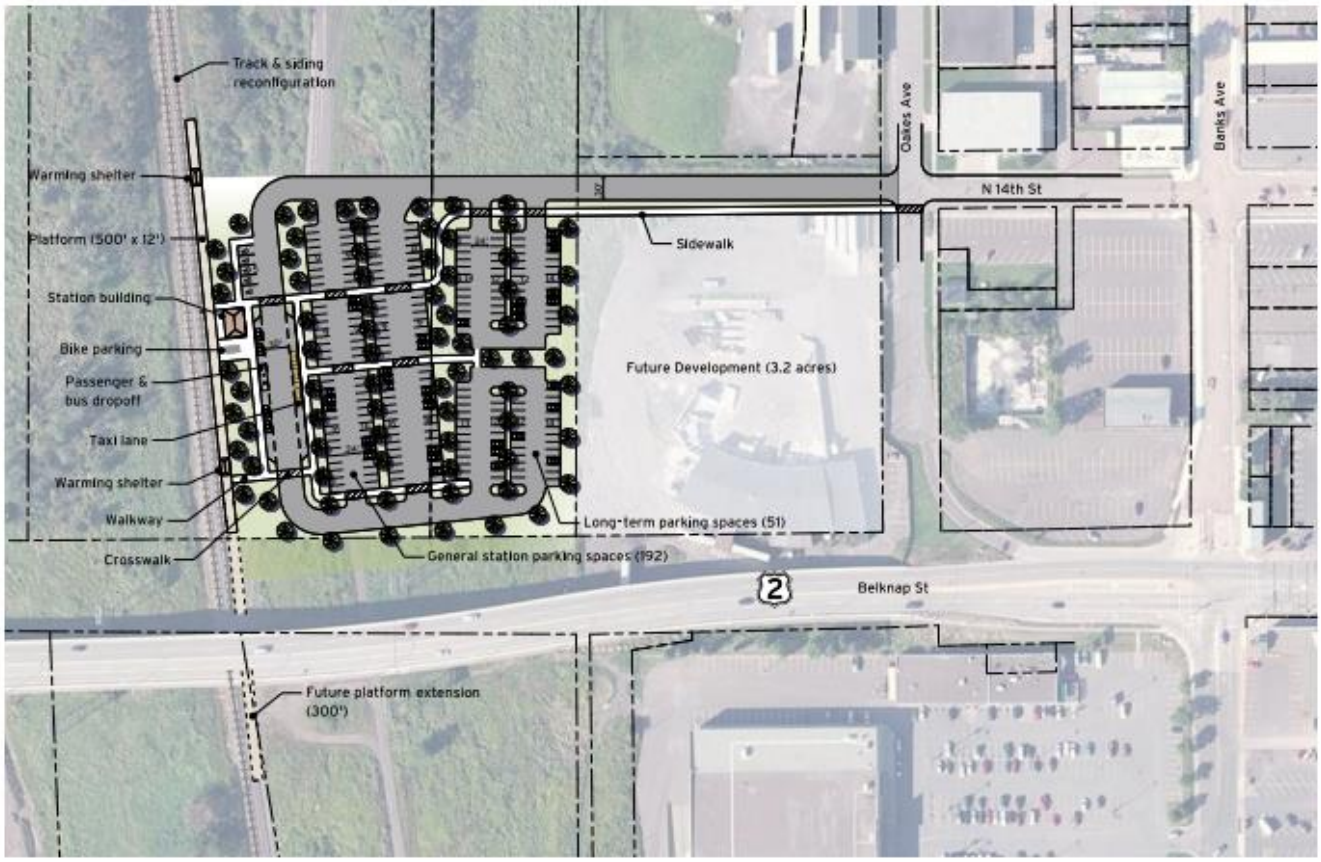
Next steps include assembling funds for construction, completing final design work, and completing negotiations with BNSF and other property owners regarding right-of-way and land acquisition. The project website states the first construction projects will likely be grade crossing improvements. Conceptual layouts for the Duluth and Superior stations have been created, as shown in Figure 23 and Figure 24. The project timeline indicates a potential service start date in mid-2020.

Figure 23: Northern Lights Express Duluth Station Conceptual Layout



Source: MnDOT Station Spotlights.

Figure 24: Northern Lights Express Superior Station Conceptual Layout



Source: MnDOT Station Spotlights.

Water

The Duluth-Superior harbor is the largest Great Lakes' port for bulk commodities shipping. According to the Duluth Seaway Port Authority the harbor averages 35 million short tons of cargo via approximately 900 vessel visits annually. Primary outbound cargo includes iron ore, coal, and grain. Primary inbound cargo includes limestone, cement, salt, and energy-related project cargo. Historically, the principal cargoes have been iron ore (40%), coal (40%), grain (5-10%), and others including wind power equipment (5-10%).

The highest tonnage totals on record from the Duluth-Superior harbor were from the decades of the 1920's, 1940's, and 1950's (decade averages of 49,113,832 tons, 64,214,093 tons, and 58,011,747 tons respectively), largely driven by significantly higher iron ore exports than today. By comparison, total decade average tonnages for the 2000's and 2010's were 42,685,623 tons and 35,759,548 tons, respectively. Table 21 shows tonnages and percent changes of principal cargoes since 2000. The past two years have been the highest tonnages for iron ore in 10 years. Coal tonnages have been steadily declining over the past 10 years, being less than half of what they were in 2008. Overall, coal tonnages are significantly less than in the

2000's. This is attributed to the change in electric power plant fuels away from coal and towards natural gas. This trend is expected to continue. Grain tonnages have been relatively consistent for the past 10 years, with one exception – the very high year of 2010. Overall grain tonnages are significantly less than they were in the early 2000's. The tonnages of "other" cargoes have been relatively consistent for the past 20 years. The number of vessel visits to the harbor over the past 4 years has been approximately 150-200 visits less than all other years back to 2000. However, despite less vessel visits, the overall total tonnage in the harbor has increased 16.2 % over the past 2 years, largely due to a significant increase in iron ore exports year over year.

Table 21: Tonnages and Percent Changes of Principal Cargoes in the Duluth-Superior Harbor (2000-2018)

Year	Total *	Ore *	Coal *	Grain *	Other *	Vessels
2000	41.2	16.2	16.6	4.9	3.6	1,107
2004	45.4	19.7	18.4	2.8	4.4	1,089
2008	45.8	18.4	22.1	1.2	3.966	1,127
2010	39.8	14.6	18.5	2.7	3.971	991
2014	37.6	17.8	14.1	1.3	4.3	901
2018	35.9	21.5	9.2	1.2	3.971	822

* = Millions of Net Tons (2,000 lbs)

Sources: U.S. Army Corps of Engineers, Lake Carrier's Association, Duluth Seaway Port Authority

Cruise ships carrying passengers have visited the area at times in the past, and interest has grown recently to facilitate higher passenger cruise ship volumes at the port while also meeting federal security requirements. This will require the construction of a cruise terminal where customs agents can clear passengers coming from a foreign port.

Appendix

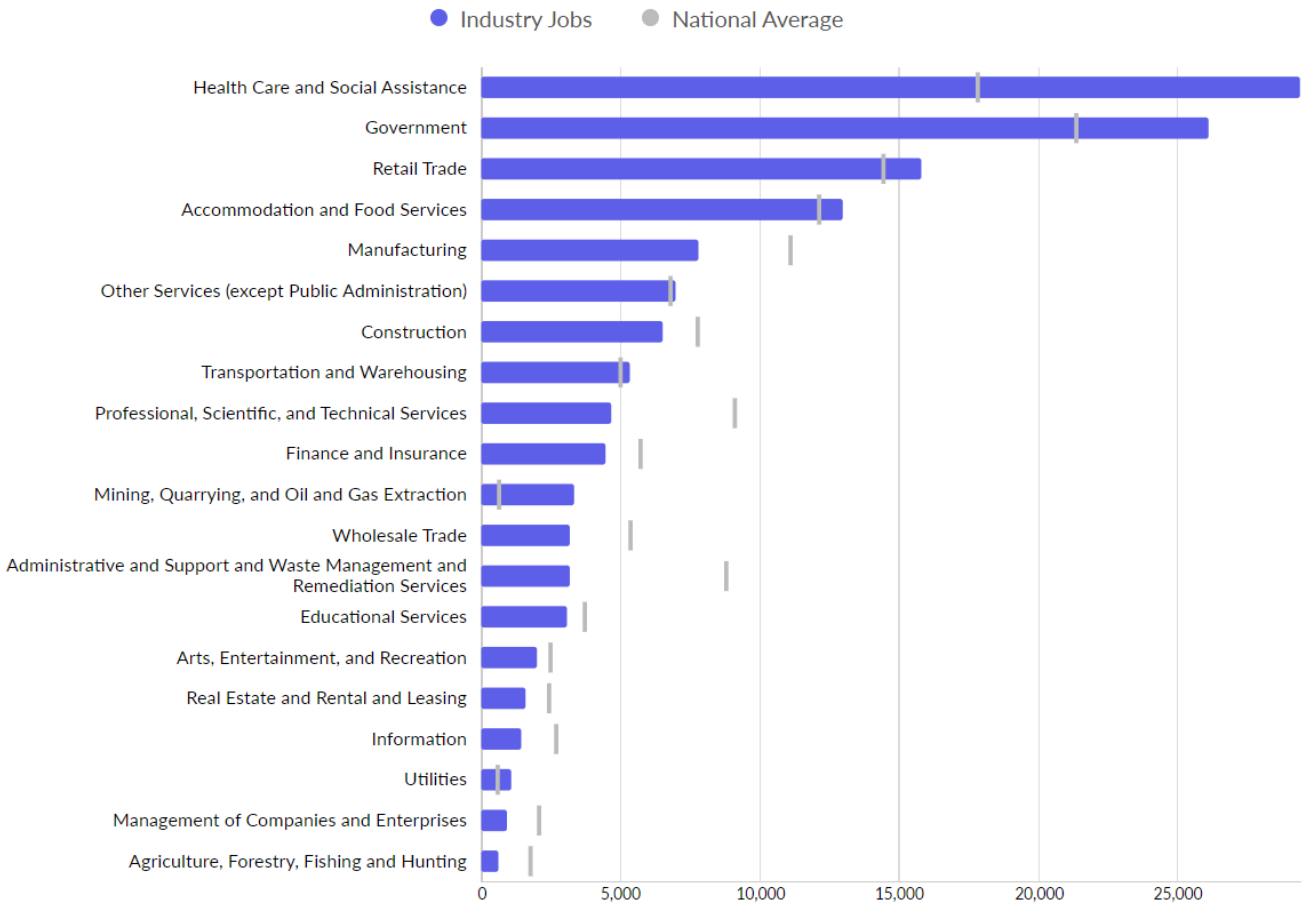
Table 22: Key GRP Indicators in Peer MSAs

Industry	Metrics	Duluth-Superior	Green Bay	Fargo	Eau Claire	Wausau	La Crosse	Albert Lea
Agriculture, Forestry, Fishing and Hunting	Gross Regional Product	$72M	$348M	$136M	$190M	$194M	$86M	$62M
	% Total GRP	*1%*	*2%*	*1%*	*2%*	*3%*	*1%*	*5%*
	% Demand met in-region	26%	28%	38%	45%	51%	25%	32%
	by imports	74%	72%	62%	55%	49%	75%	68%
Mining, Quarrying, and Oil and Gas Extraction	Gross Regional Product	$1,230M	$38M	$15M	$62M	$31M	$7M	$4M
	% Total GRP	*9%*	*0%*	*0%*	*1%*	*0%*	*0%*	*0%*
	% Demand met in-region	15%	8%	9%	30%	13%	9%	4%
	by imports	85%	92%	91%	70%	87%	91%	96%
Utilities	Gross Regional Product	$498M	$440M	$84M	$43M	$120M	$185M	$1M
	% Total GRP	*4%*	*2%*	*1%*	*1%*	*2%*	*3%*	*3%*
	% Demand met in-region	67%	57%	33%	32%	22%	47%	45%
	by imports	33%	43%	67%	68%	78%	53%	55%
Construction	Gross Regional Product	$633M	$877M	$965M	$409M	$291M	$317M	$51M
	% Total GRP	*5%*	*5%*	*6%*	*5%*	*4%*	*4%*	*4%*
	% Demand met in-region	62%	78%	88%	68%	66%	66%	53%
	by imports	38%	22%	12%	32%	34%	34%	47%
Manufacturing	Gross Regional Product	$1,228M	$3,711M	$1,326M	$1,198M	$1,773M	$950M	$277M
	% Total GRP	*9%*	*19%*	*9%*	*15%*	*23%*	*13%*	*23%*
	% Demand met in-region	14%	29%	16%	13%	23%	15%	19%
	by imports	86%	71%	84%	87%	77%	85%	81%
Wholesale Trade	Gross Regional Product	$464M	$1,410M	$1,590M	$518M	$586M	$583M	$69M
	% Total GRP	*4%*	*7%*	*10%*	*6%*	*8%*	*8%*	*6%*
	% Demand met in-region	21%	40%	51%	31%	28%	35%	13%
	by imports	79%	60%	49%	69%	72%	65%	87%
Retail Trade	Gross Regional Product	$843M	$1,056M	$1,062M	$677M	$482M	$496M	$120M
	% Total GRP	*6%*	*6%*	*7%*	*8%*	*6%*	*7%*	*10%*
	% Demand met in-region	34%	41%	45%	35%	34%	36%	27%
	by imports	66%	59%	55%	65%	66%	64%	73%
Transport. and Warehousing	Gross Regional Product	$695M	$630M	$531M	$273M	$173M	$309M	$31M
	% Total GRP	*5%*	*3%*	*3%*	*3%*	*2%*	*4%*	*3%*
	% Demand met in-region	52%	50%	58%	54%	47%	54%	32%
	by imports	48%	50%	42%	46%	53%	46%	68%
Information	Gross Regional Product	$205M	$375M	$733M	$163M	$79M	$217M	$14M
	% Total GRP	*2%*	*2%*	*5%*	*2%*	*1%*	*3%*	*1%*
	% Demand met in-region	22%	29%	50%	21%	15%	40%	11%
	by imports	78%	71%	50%	79%	85%	60%	89%
Finance and Insurance	Gross Regional Product	$736M	$2,206M	$1,597M	$614M	$1,060M	$480M	$67M
	% Total GRP	*6%*	*12%*	*10%*	*8%*	*14%*	*7%*	*6%*
	% Demand met in-region	40%	57%	68%	49%	51%	35%	36%
	by imports	60%	43%	32%	51%	49%	65%	64%
Real Estate and Rental and Leasing	Gross Regional Product	$274M	$418M	$702M	$223M	$146M	$213M	$25M
	% Total GRP	*2%*	*2%*	*5%*	*3%*	*2%*	*3%*	*2%*
	% Demand met in-region	52%	57%	83%	62%	54%	63%	40%
	by imports	48%	43%	17%	38%	46%	37%	60%

Industry	Metrics	Duluth-Superior	Green Bay	Fargo	Eau Claire	Wausau	La Crosse	Albert Lea
Professional, Scientific, and Tech. Services	Gross Regional Product	$447M	$840M	$744M	$271M	$225M	$240M	$15M
	% Total GRP	*3%*	*4%*	*5%*	*3%*	*3%*	*3%*	*1%*
	% Demand met in-region	39%	52%	63%	37%	37%	30%	13%
	by imports	61%	48%	37%	63%	63%	70%	87%
Management of Companies and Enterprises	Gross Regional Product	$101M	$572M	$373M	$276M	$194M	$123M	$0.0
	% Total GRP	*1%*	*3%*	*2%*	*3%*	*3%*	*2%*	*0%*
	% Demand met in-region	5%	27%	20%	12%	10%	12%	0%
	by imports	95%	73%	80%	88%	90%	88%	100%
Admin. & Support & Waste Mgmt. Svc.	Gross Regional Product	$156M	$353M	$292M	$187M	$109M	$131M	$17M
	% Total GRP	*1%*	*2%*	*2%*	*2%*	*1%*	*2%*	*1%*
	% Demand met in-region	38%	57%	52%	64%	46%	46%	36%
	by imports	62%	43%	48%	36%	54%	54%	64%
Educational Services	Gross Regional Product	$112M	$96M	$115M	$42M	$14M	$80M	$1M
	% Total GRP	*1%*	*1%*	*1%*	*1%*	*0%*	*1%*	*0%*
	% Demand met in-region	62%	42%	54%	23%	13%	58%	4%
	by imports	38%	58%	46%	77%	87%	42%	96%
Health Care and Social Assistance	Gross Regional Product	$1,913M	$1,727M	$1,490M	$1,094M	$746M	$1,162M	$137M
	% Total GRP	*15%*	*9%*	*10%*	*14%*	*10%*	*16%*	*12%*
	% Demand met in-region	79%	82%	85%	83%	87%	81%	62%
	by imports	21%	18%	15%	17%	13%	19%	38%
Arts, Entertainment, and Recreation	Gross Regional Product	$63M	$408M	$77M	$36M	$29M	$37M	$5M
	% Total GRP	*0%*	*2%*	*1%*	*0%*	*0%*	*1%*	*0%*
	% Demand met in-region	42%	55%	47%	36%	38%	37%	28%
	by imports	58%	45%	53%	64%	62%	63%	72%
Accom. and Food Services	Gross Regional Product	$391M	$383M	$416M	$212M	$138M	$188M	$27M
	% Total GRP	*3%*	*2%*	*3%*	*3%*	*2%*	*3%*	*2%*
	% Demand met in-region	81%	67%	86%	78%	59%	82%	57%
	by imports	19%	33%	14%	22%	41%	18%	43%
Other Services (except Public Admin.)	Gross Regional Product	$262M	$255M	$294M	$136M	$111M	$152M	$22M
	% Total GRP	*2%*	*1%*	*2%*	*2%*	*1%*	*2%*	*2%*
	% Demand met in-region	73%	64%	84%	73%	73%	75%	60%
	by imports	27%	36%	16%	27%	27%	25%	40%
Government	Gross Regional Product	$1,727M	$1,478M	$1,481M	$767M	$501M	$672M	$101M
	% Total GRP	*13%*	*8%*	*10%*	*9%*	*7%*	*9%*	*9%*
	% Demand met in-region	38%	33%	25%	36%	28%	30%	24%
	by imports	62%	67%	75%	64%	72%	70%	76%

Source: Emsi (2018).

Figure 25: Comparison of Employment Levels by NAICS 2-digit Industry with US Average



Source: Emsi (2018).