



# IRON RANGE RESOURCES & REHABILITATION BOARD

POPULATION, AGE, COMMUTING, INCOME, EDUCATION AND INDUSTRY  
ANALYSIS FOR THE CITY OF SILVER BAY, MN  
DECEMBER 14, 2016

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NORTH POINT GEOGRAPHIC SOLUTIONS

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# A DEMOGRAPHIC ANALYSIS FOR THE CITY OF SILVER BAY, MN

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## OVERVIEW

The Iron Range Resources and Rehabilitation Board (IRRRB) mission is to promote and invest in businesses, community and workforce development for the betterment of northeastern Minnesota. As such, the IRRRB utilizes a variety of techniques to acquire data that is utilized for informing their planning and decision-making, or for providing informational resources to various stakeholders. As part of their data acquisition process, the IRRRB at times makes use of external vendors such as North Point Geographic Solutions (NPGS) in Duluth, Minnesota to assist with their data gathering and analysis.

The following report represents a data gathering and analysis project the IRRRB tasked NPGS to implement for determining requested demographic data within specified buffered regions surrounding the city of Silver Bay, Minnesota. The specific data analyzed included population, age, commuting, income, education and industry. The purpose of the project was to provide the IRRRB with a set of reference information that could be utilized by staff and stakeholders for general inferences regarding demographic data in the specified geographic regions.

## APPROACH

The IRRRB requested NPGS focus their data gathering and analysis on the following three tasks:

1. Identify the total population, age, household income, educational attainment, and industry of employment of residents within both a 25-mile and a 45-mile buffer from the city of Silver Bay.
2. Within a 45-mile buffer, identify information regarding resident's commuting patterns. Specifically focused on:
  - a. How many people commute less than or equal to 25 miles to work.
  - b. How many people commute at least 45 miles to work.
3. Within a 45-mile buffer, of those residents who commute more than 25-miles to work, identify their income breakdown.

NPGS utilized the American Community Survey (ACS) data from the U.S. Census Bureau, along with the following tools:

- ArcMap Version 10.4.1 - Geographic Information Systems (GIS) analysis software
- Microsoft Excel – For calculating data and generating graphs
- Microsoft Word – For reporting analysis results

ArcMap was used to create buffer zones of 25-miles and 45-miles around the city of Silver Bay. In order to summarize the census data using the 25-mile and 45-mile buffers, a weighting factor was determined for each census block based on its relationship to each of the buffers. ArcMap was again utilized to derive a Boolean developed cover type raster from the NLCD 2011 Land

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Cover raster by reclassifying the value of all developed cover types to “1” (True) and non-developed cover types were set to “0” (False). The census block groups were then used to define the zones in a zonal statistics operation, with the output being a table that lists the total number of developed cover type cells that fall within each census block group. The census block groups were then clipped according to the 25 and 45-mile buffers. From there, the clipped census block groups were used as zones for additional zonal statics operations. The resulting tables identified the number of developed land cover type cells that fell within each of the clipped census block groups. Each census block group was then factored into the analysis based upon the percentage of the number of developed cover type cells that remain after being clipped by the buffer layer. For example, a census block group with a total population of 1,000 and 100 developed cover type cells but only 25 of the block group’s developed, the cover type cells located within the analysis buffer, would contribute 25% (or 250 people) of its population to the total population within the buffer region. The data was then exported to Microsoft Excel where a pivot table used to create a summary and to generate the necessary charts and graphs. This same methodology was used for calculating the total population, resident commute time, household median income, industry, and education summaries.

### DATA RESOURCES

The following data sources were used as reference for this project:

Multi-Resolution Land Characteristics Consortium, National Land Cover Database 2011

- NLCD 2011 Land Cover

U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

- B01003
  - Total Population
  - Universe: Total Population
- B01001
  - Sex by Age
  - Universe: Total Population
- B19001
  - Universe: Household Income in the Past 12 Months (In 2014 Inflation-Adjusted Dollars)
  - Universe: Households
- B08303
  - Travel Time to Work
  - Universe: Workers 16 years and over who did not work at home
- B15003
  - Educational Attainment for the Population 25 Years and Over
  - Population 25 years and over

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- C24030
  - Sex by Industry for the Civilian Employed Population 16 Years and Over
  - Universe: Civilian employed population 16 years and over

### ASSUMPTIONS

The public census data NPGS utilized is based on geographic boundaries broken down by census block groups of varying size. From a data analysis perspective, the U.S. census data is assumed to be generalized information with a high degree of variability and potential inaccuracy, however it can be useful for interpreting general trends or patterns. Since the data is associated with specific census block groups, there are additional assumptions that were made for this project in order to extrapolate information associated with the requested buffer zones surrounding the city of Silver Bay. Specifically, NPGS assumed that census survey respondents were distributed only in the developed areas as defined by the NLCD 2011 Land Cover dataset within their respective census block groups. Figures 1, 2, and 3 display both the 25-mile and 45-mile analysis buffers as well as the census block groups.

## CITY OF SILVER BAY ANALYSIS

The data collection and analysis for the City of Silver Bay, MN focused on the census block groups located within a 25-mile and 45-mile buffer surrounding the city (Fig. 1). Unless the block group was entirely contained within the buffer zone, the factoring described in the project approach section was applied to the block group data.

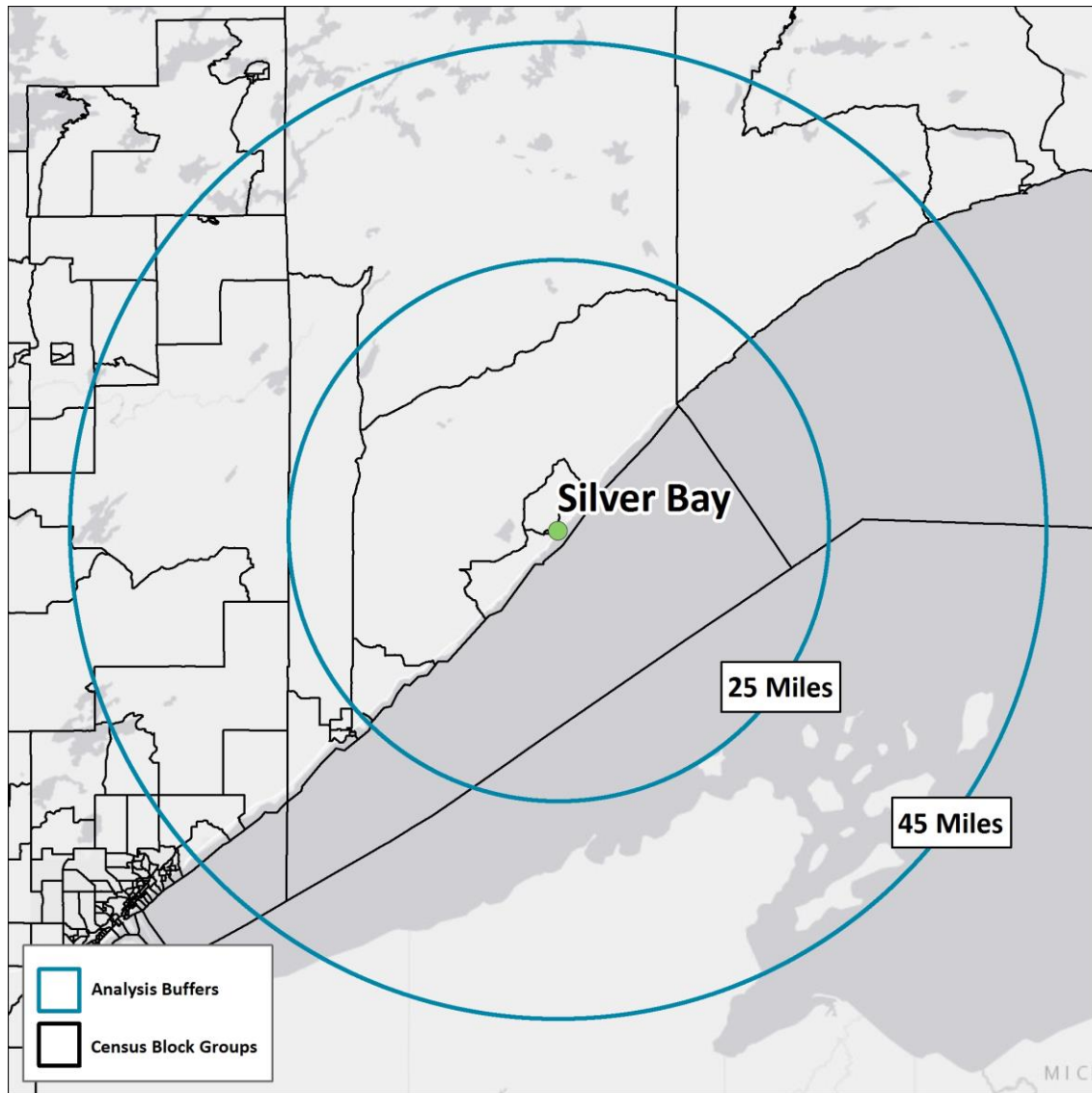


Figure 1 : Silver Bay Analysis Buffers

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### SILVER BAY POPULATION DATA

The following table indicates the total population calculated within each of the specified buffers for the city of Silver Bay, MN. The 45-mile buffer region population is inclusive of the 25-mile region.

Total Population Within 25 miles	Total Population Within 45 Miles
4,879	21,253

*Table 1: Population Surrounding Silver Bay*

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## SILVER BAY AGE DATA

The following graph displays the estimated age by sex breakdown for residents living within 25-miles of the city of Silver Bay, MN.

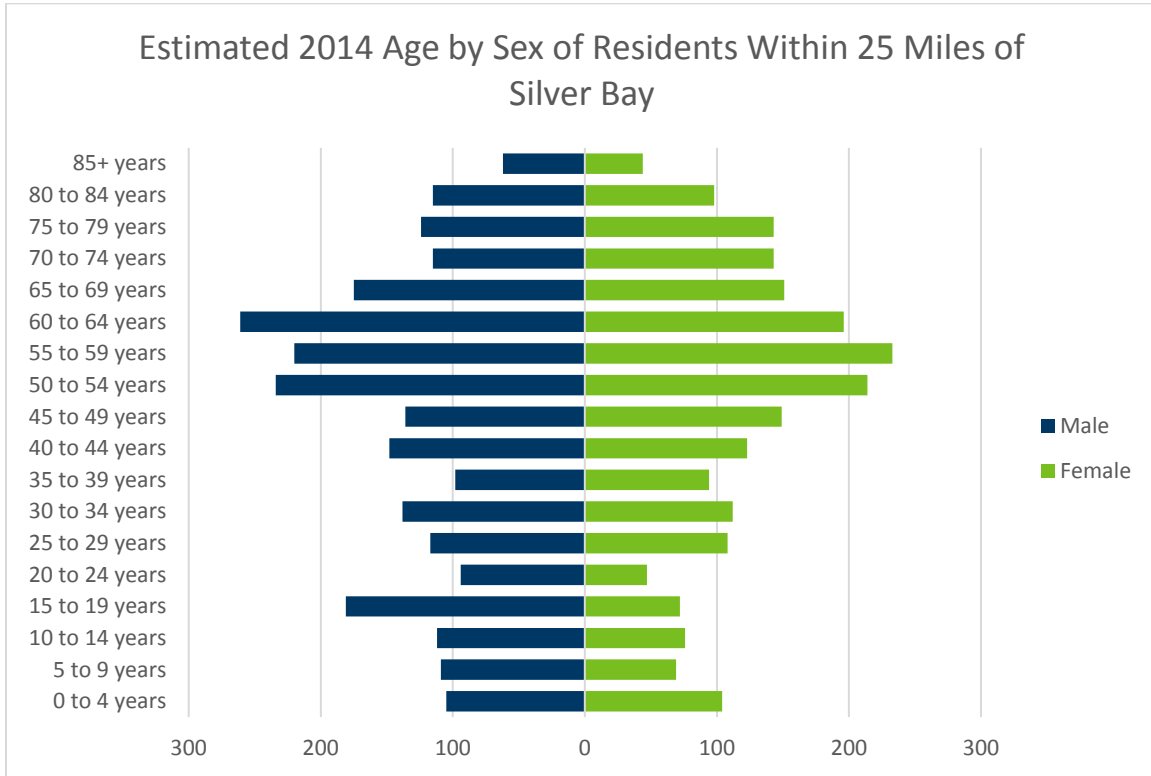


Figure 2: Estimated 2014 Age by Sex of Residents Within 25 Miles of Silver Bay



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The following graph displays the estimated age by sex breakdown for residents living within 45-miles of the city of Silver Bay, MN.

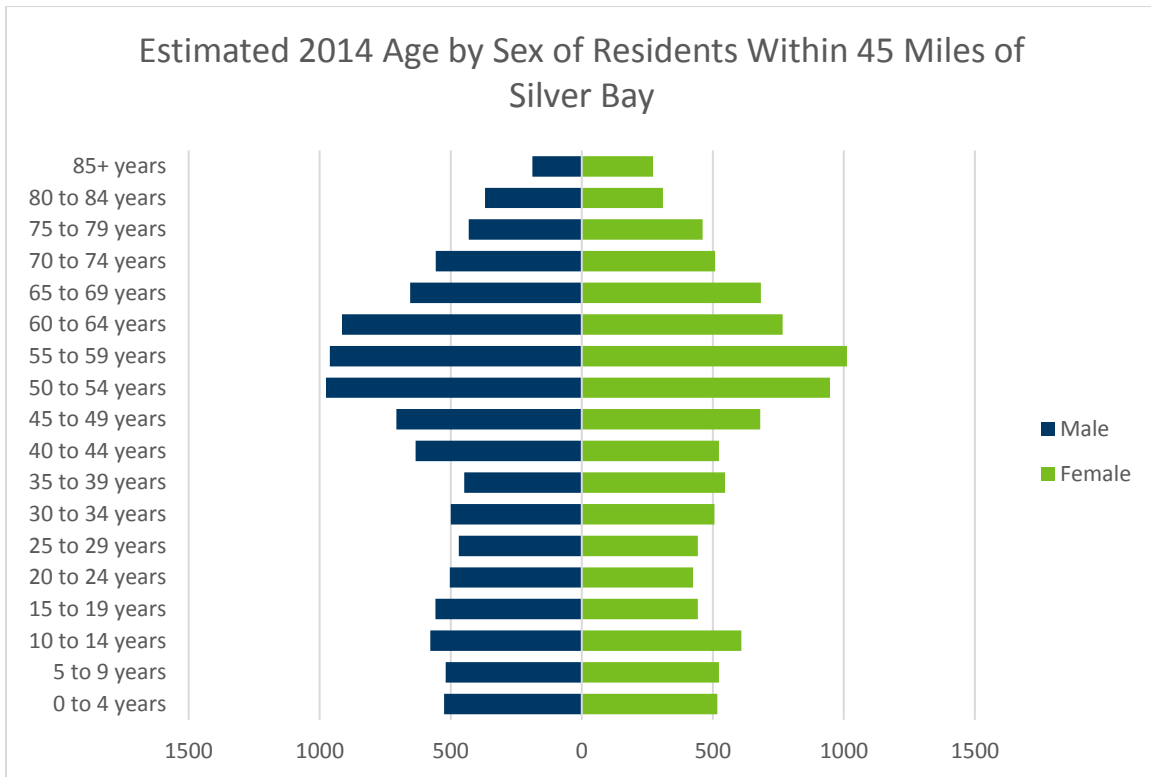


Figure 3: Estimated 2014 Age by Sex of Residents Within 45 Miles of Silver Bay

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## SILVER BAY INCOME DATA

The following graph displays the estimated household income breakdown for residents living within 25-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, the majority of households (59%) have an income of at least \$40K.

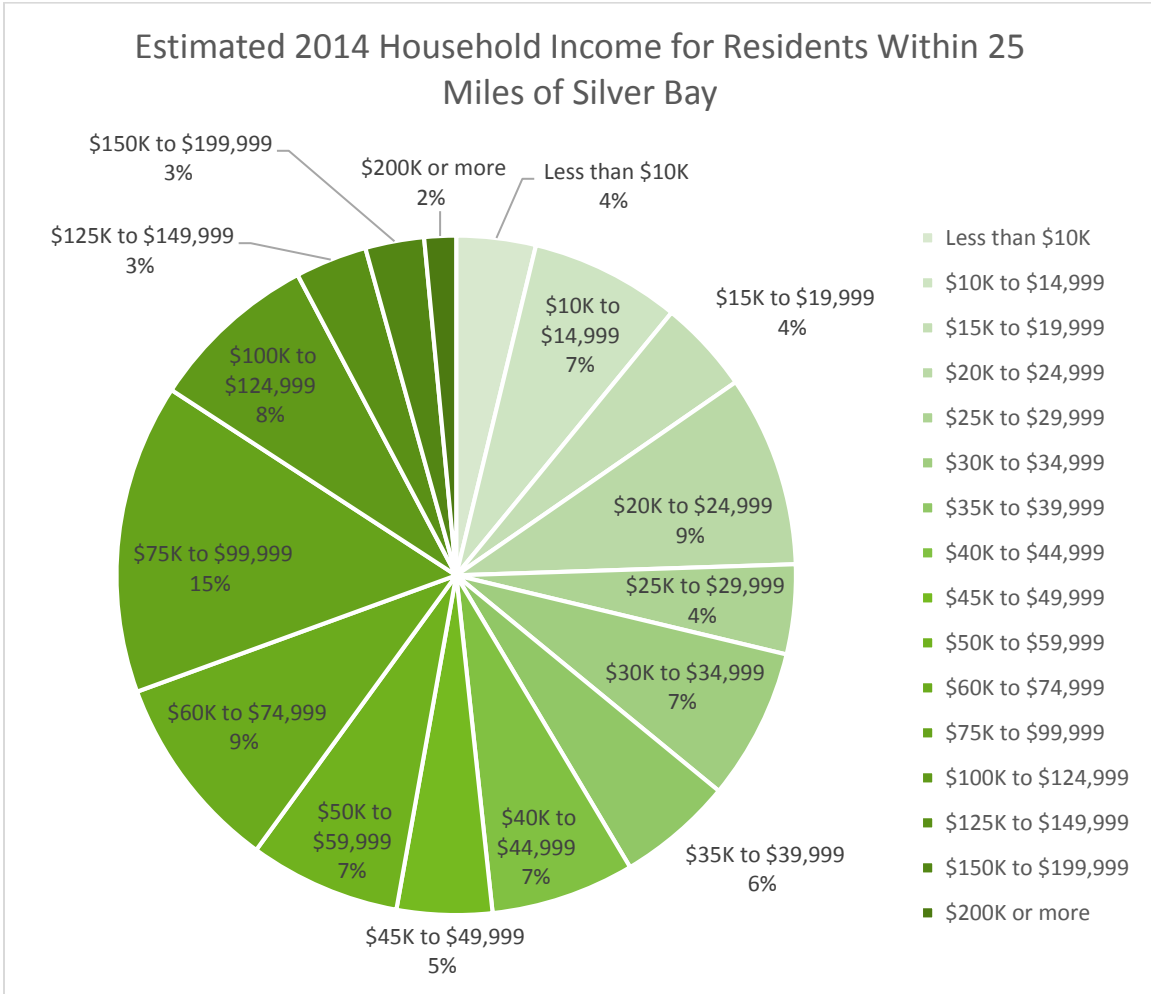


Figure 4: Estimated 2014 Household Income for Residents within 25 Miles of Silver Bay

## A DEMOGRAPHIC ANALYSIS FOR THE CITY OF SILVER BAY, MN

The following graph displays the estimated household income breakdown for residents living within 45-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, the majority of households (62%) have an income of at least \$40K.

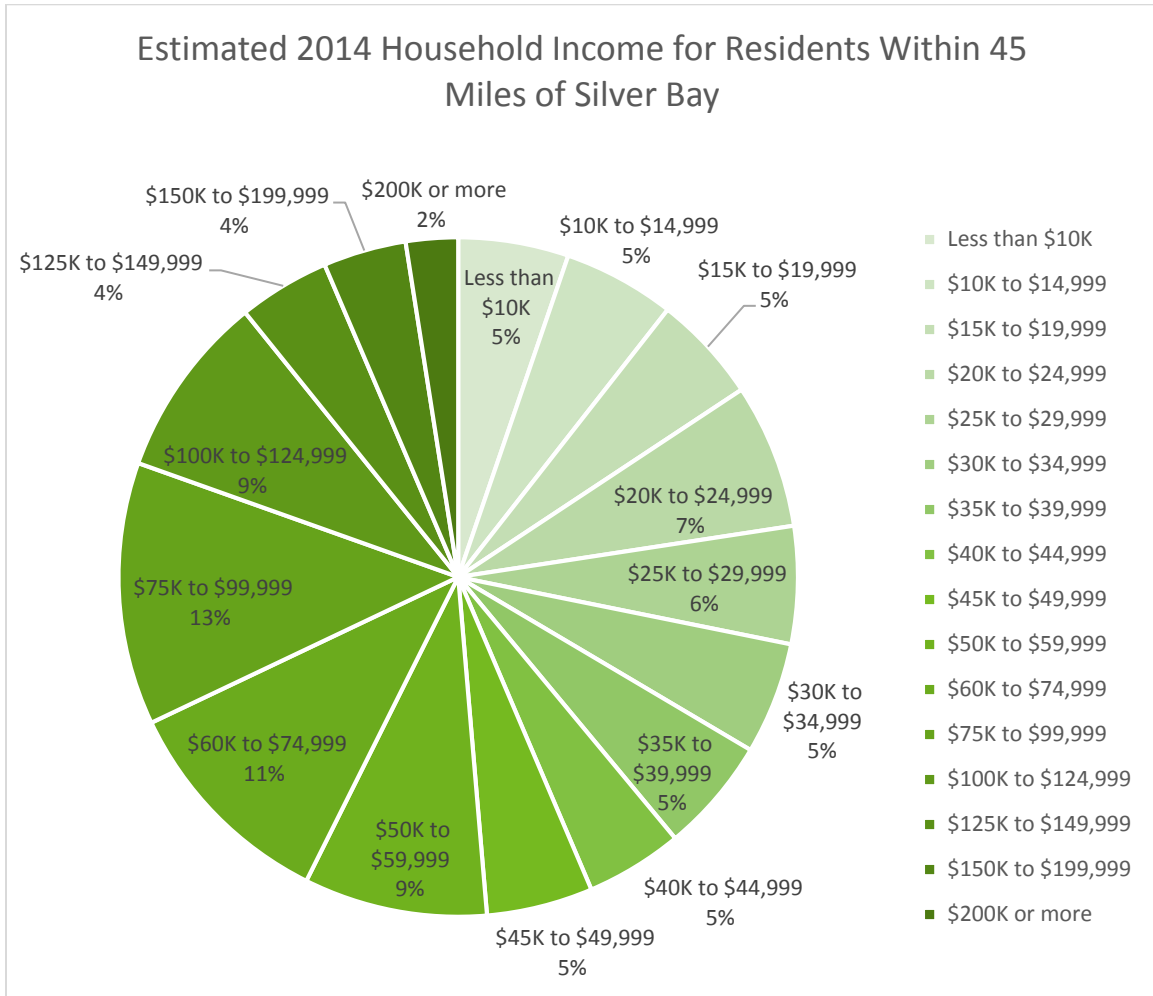


Figure 5: Estimated 2014 Household Income for Residents within 45 Miles of Silver Bay

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### SILVER BAY COMMUTING DATA

The following table displays the estimated number of people living within 25-miles and 45-miles respectively, of the city of Silver Bay, MN with reported commuting times of greater than or equal to 30 minutes (assumed approximately a 25-mile commute) and greater than or equal to 60 minutes (assumed approximately a 45-mile commute). Based on the reported data, 26% of the residents within 25-miles commute greater than or equal to 30 minutes, and 6% of the residents within 25-miles commute greater than or equal to 60 minutes. Additionally, 36% of the residents within 45-miles commute greater than or equal to 30 minutes, and 7% of residents within 45-miles commute greater than or equal to 60 minutes.

<b>Area (miles<sup>2</sup>)</b>	<b>(&gt;=30 mins)</b>		<b>(&gt;= 60 mins)</b>	
<b>25 Mile Buffer Population</b>	1,269	26%	293	6%
<b>45 Mile Buffer Population</b>	7,651	36%	1,488	7%

*Table 2: City of Silver Bay, MN Commuting Data*

## A DEMOGRAPHIC ANALYSIS FOR THE CITY OF SILVER BAY, MN

The following graph displays the reported commuting time for residents living within 25-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, the majority of commuters (62%) fall within a range of < 5 minutes to 15–19 minutes and only 6% of residents living within 25-miles commute 60 minutes (approximately 45 miles) or more. It should be noted the data does not account for the location of commuter destinations.

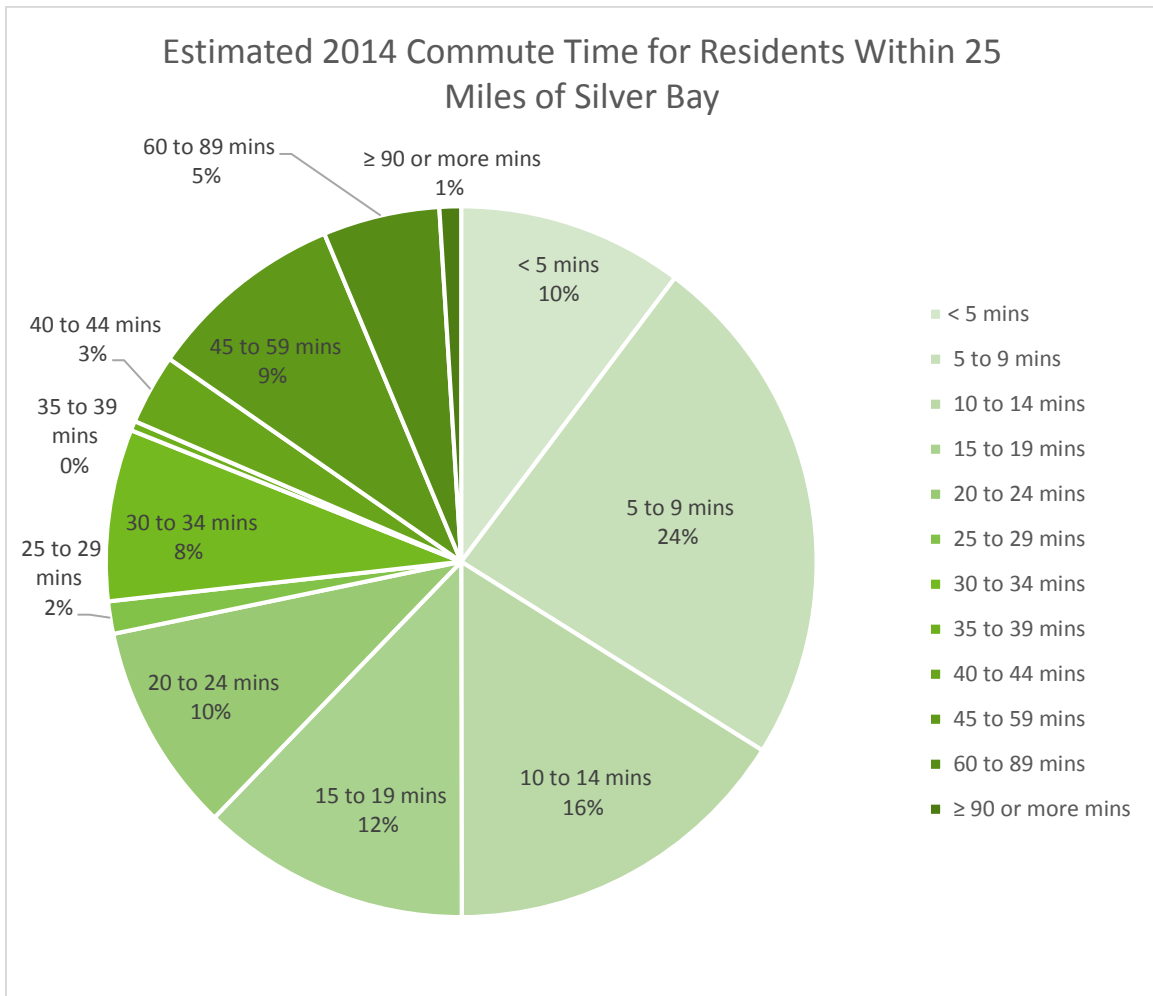


Figure 6: Estimated 2014 Commute Time for Residents Within 25 Miles of Silver Bay

## A DEMOGRAPHIC ANALYSIS FOR THE CITY OF SILVER BAY, MN

The following graph displays the reported commuting time for residents living within 45-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, the majority of commuters (59%) fall within a range of < 5 minutes to 20–24 minutes, and only 7% of residents living within 45-miles commute 60 minutes (approximately 45 miles) or more. It should be noted the data does not account for the location of commuter destinations and is inclusive of the commuting times reported for residents within the 25-mile buffer of Silver Bay.

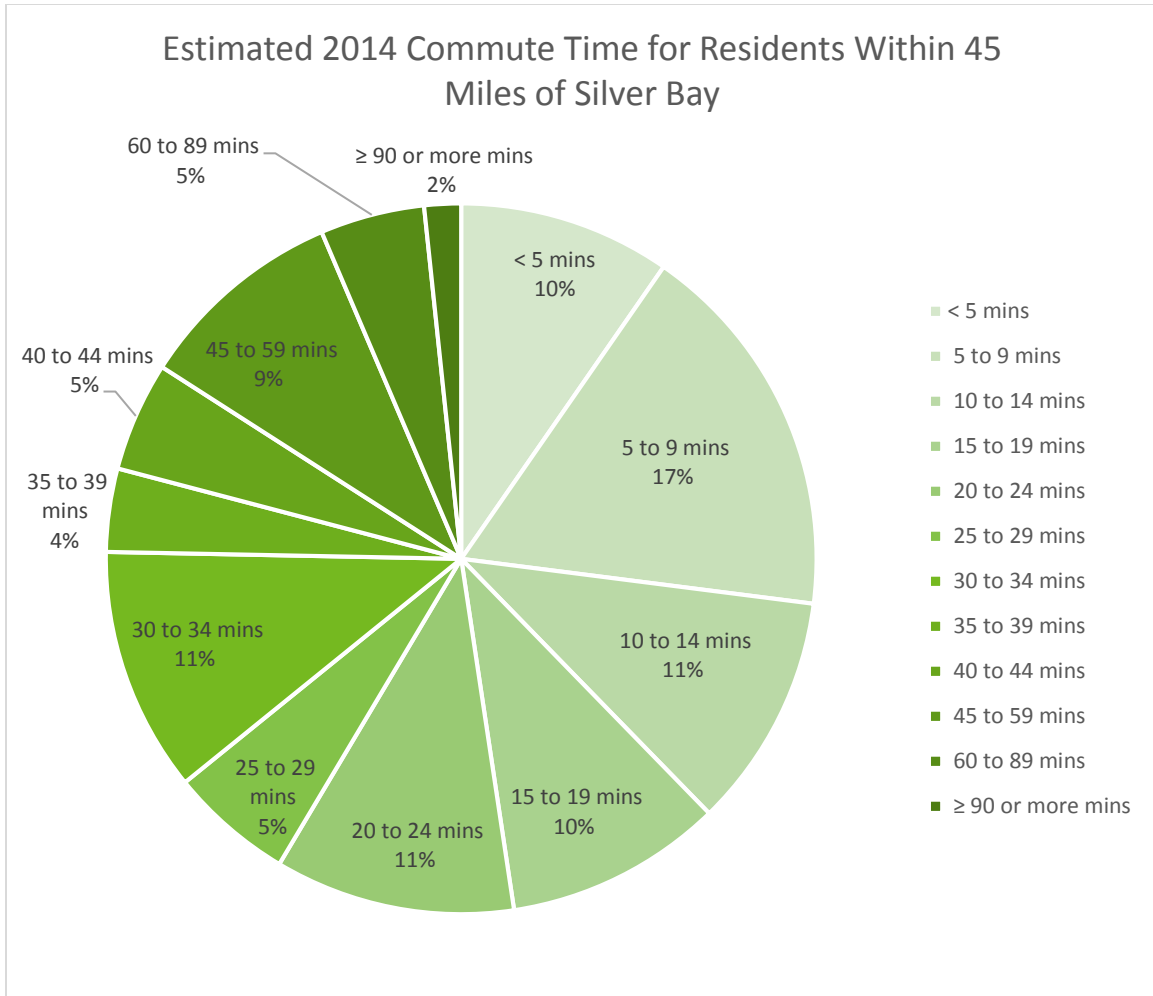


Figure 7: Estimated 2014 Commute Time for Residents within 45 Miles of Silver Bay

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### SILVER BAY EDUCATION DATA

The following graph displays the estimated educational attainment for residents living within 25-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, 31% of respondents have earned a degree higher than a high school diploma.

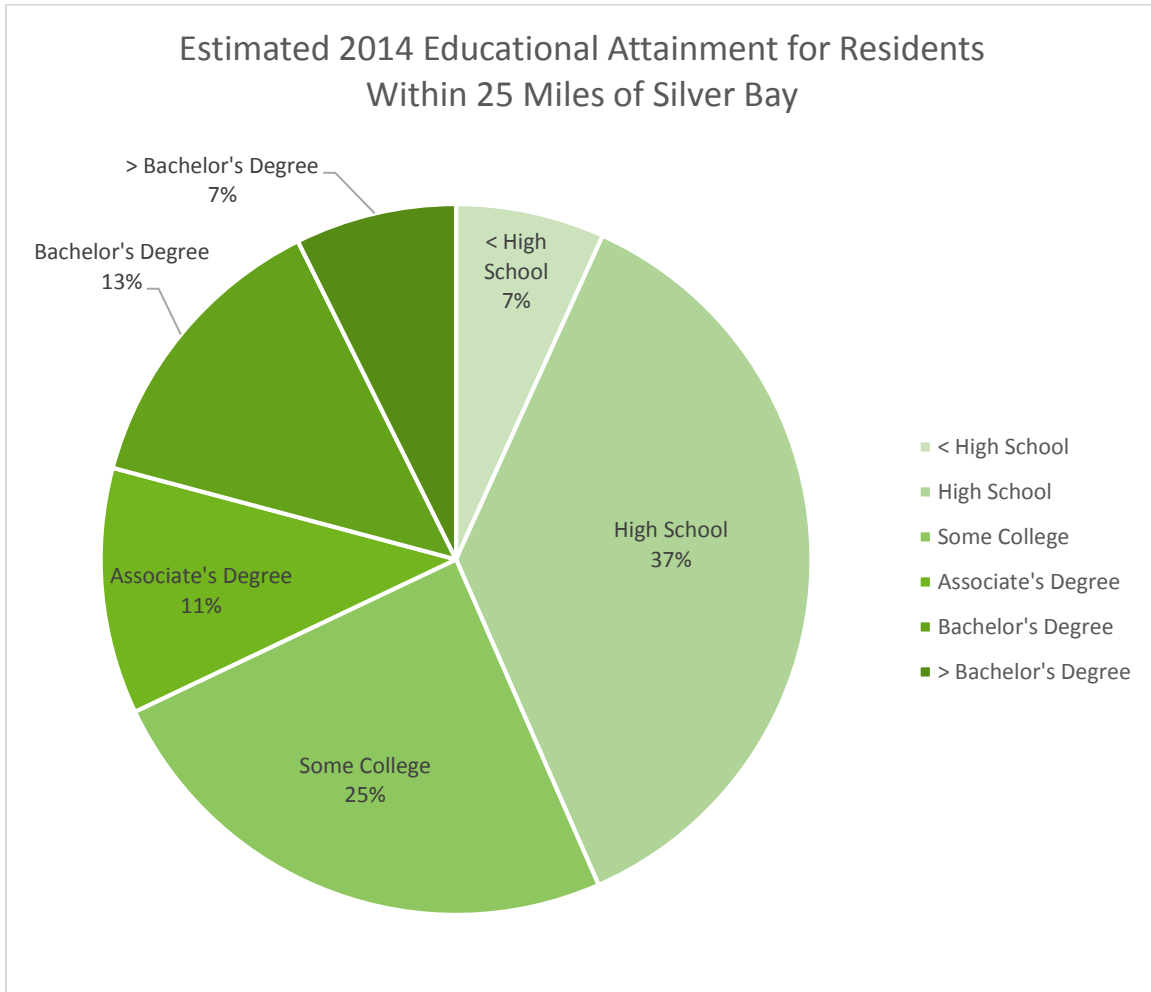


Figure 8: Estimated 2014 Educational Attainment for Residents within 25 Miles of Silver Bay

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The following graph displays the estimated educational attainment for residents living within 45-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, 38% of respondents have earned a degree higher than a high school diploma.

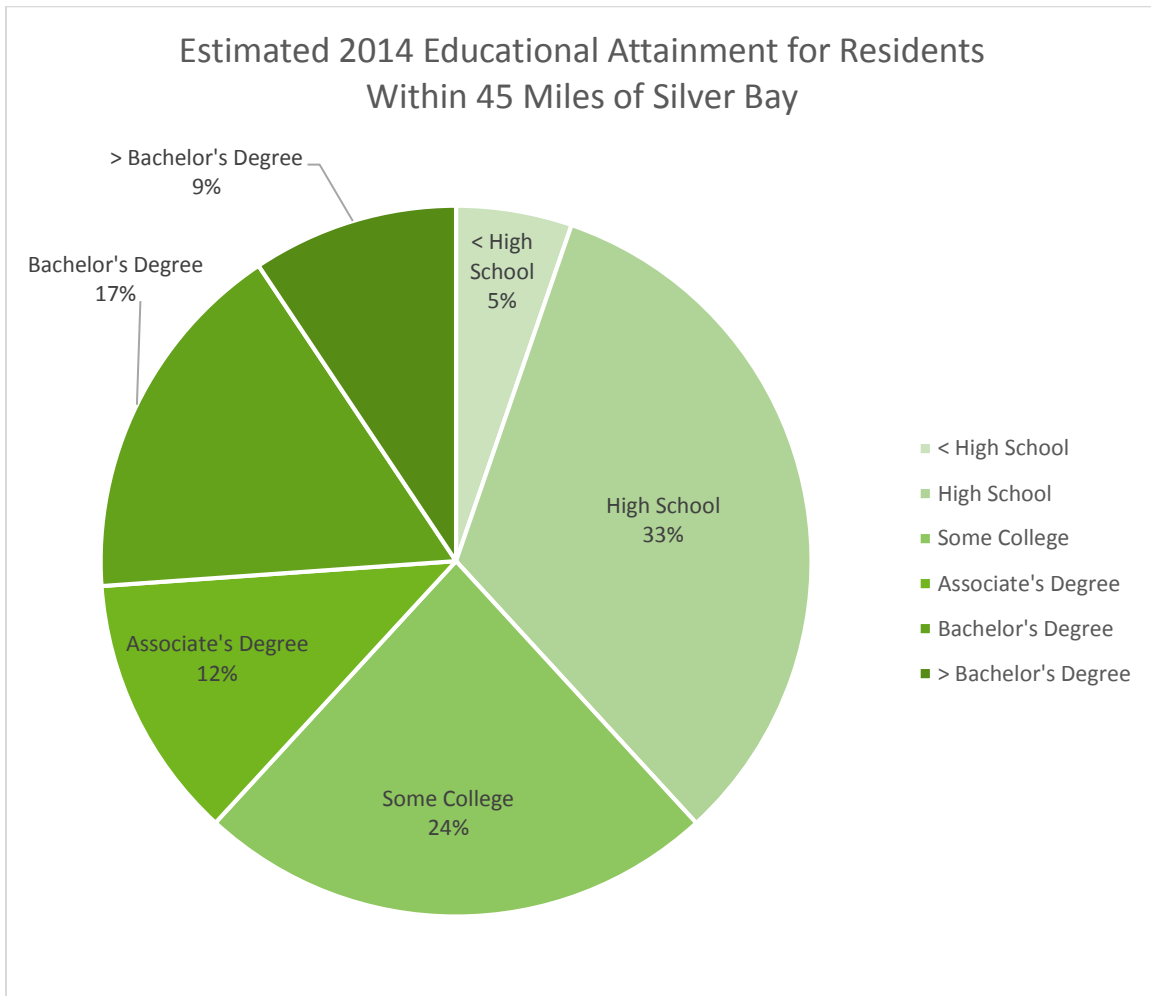


Figure 9: Estimated 2014 Educational Attainment for Residents within 45 Miles of Silver Bay



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### SILVER BAY INDUSTRY DATA

The following table displays the estimated industry breakdown of employed residents living within 25-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, the industry category employing the most respondents (roughly 19%) is health care and social assistance.

Industry	25 Mile Buffer	
Health care and social assistance	411	18.98%
Accommodation and food services	261	12.06%
Manufacturing	248	11.45%
Mining, quarrying, and oil and gas extraction	208	9.61%
Wholesale and retail trade	197	9.10%
Educational services	151	6.97%
Information, professional, scientific, and management, and administrative and waste management services	127	5.87%
Public administration	111	5.13%
Construction	92	4.25%
Finance and insurance, and real estate and rental and leasing	91	4.20%
Other services, except public administration	86	3.97%
Transportation and warehousing, and utilities	83	3.83%
Arts, entertainment, and recreation	69	3.19%
Agriculture, forestry, fishing and hunting	30	1.39%

*Table 3: Estimated 2014 Industry of Employment for Residents within 25 miles of Silver Bay*

## A DEMOGRAPHIC ANALYSIS FOR THE CITY OF SILVER BAY, MN

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The following table displays the estimated industry breakdown of employed residents living within 45-miles of the city of Silver Bay, MN. Based on the data sources utilized, and accounting for population distribution assumptions, the industry category employing the most respondents (roughly 20%) is health care and social assistance.

<b>Industry</b>	<b>45 Mile Buffer</b>	
Health care and social assistance	1887	19.84%
Accommodation and food services	1146	12.05%
Wholesale and retail trade	949	9.98%
Manufacturing	774	8.14%
Educational services	749	7.88%
Information, professional, scientific, and management, and administrative and waste management services	695	7.31%
Construction	686	7.21%
Public administration	460	4.84%
Transportation and warehousing, and utilities	457	4.81%
Mining, quarrying, and oil and gas extraction	442	4.65%
Finance and insurance, and real estate and rental and leasing	426	4.48%
Other services, except public administration	403	4.24%
Arts, entertainment, and recreation	234	2.46%
Agriculture, forestry, fishing and hunting	201	2.11%

*Table 4: Estimated 2014 Industry of Employment for Residents within 45 miles of Silver Bay*

### CONCLUSIONS

The purpose of this project was to provide a demographic data analysis to the IRRRB within specified distances for the city of Silver Bay, Minnesota. To accomplish this task, the IRRRB enlisted the resources of NPGS in Duluth, MN to gather, perform basic analysis, and report the data findings.

NPGS utilized the American Community Survey (ACS) 2010 – 2014, 5-year estimate data from the U.S. Census Bureau. NPGS chose census block groups vs. census blocks as the lowest common denominator. Ideally the census blocks would be the preferable geographical unit of measure since they are smaller scale and therefore more preferable for data distribution and accuracy (which would limit the effect one block could have on another block). However, the census data at the block level did not contain the information the IRRRB was interested in gathering; specifically, the travel time and median income data.

Regarding the 25-mile and 45-mile buffer data, due to the assumed population distributions, and the overlap among the buffers surrounding the city, there is a fairly high degree of subjectivity associated the outcome. It was determined that a direct correlation between income and commuting distance was not possible based on the limitations of the data. It should also be noted the census data did not contain specific commuting distances, rather commuting times were available, and from there assumptions were made regarding the approximate distance traveled in miles by respondents identified within each of the buffer regions. NPGS did attempt to provide a general picture of all the demographics of interest within the buffer regions with pie charts and tables, however this data can be made available.