Puyallup Watershed Initiative
Active Transportation Community of Interest

Baseline Community Profile

June 2015
Acknowledgements

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Executive Summary

The Active Transportation Community of Interest (AT COI) formed in 2013 as part of the Russell Family Foundation’s Puyallup Watershed Initiative. This initiative is a ten year commitment to using a collective impact approach to improve the social and ecological health of the watershed. Our AT COI Data Workgroup formed to help meet the initiative’s evaluation, adaptive management, and learning requirements – and because we enjoy using data and share the AT COI vision:

We are working collaboratively to develop and maintain a system of trails, sidewalks, bike lanes and boulevards, local and regional pathways, and public transportation connecting all of the Puyallup River watershed’s communities, parks, schools, cultural sites, business districts, residential centers and other important public spaces. (www.pwi.org/collaboratives/active-transportation/)

The purpose and scope of this baseline data collection project is to create a baseline community profile for the Puyallup Watershed and Tacoma that includes health, demographic, and other data related to the AT COI’s work plan. The baseline data will be used to:
- Evaluate changes over time as the AT COI implements measures outlined in their work plan
- Prioritize needs and actions of the work plan
- Create more awareness of health needs

Our Data Workgroup includes representatives from Tacoma-Pierce County Health Department, ForeverGreen Trails, Bonneville Environmental Foundation, Pierce Transit, Washington State Department of Health, and the National Park Service. We created a logic model to show connections between the AT COI’s work plan and anticipated outcomes that could potentially be measured over time. We then created a community profile showing baseline conditions for as many of these indicators as we could find data. As can be seen in the logic model, once the AT COI implements its comprehensive work plan to engage leaders, build a connected active transportation system, and change the culture, the communities within the Puyallup Watershed will be healthier, safer, and more economically prosperous.

The following is a summary of anticipated outcomes along with key findings from the baseline community profile. Data sources are listed in the main body of the document.

<table>
<thead>
<tr>
<th>Policy, Funding, &amp; the Built Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Complete Streets Policy adopted in all towns and unincorporated Pierce County.</td>
</tr>
<tr>
<td>o Baseline: The City of Tacoma and Pierce County have passed Complete Streets Policies.</td>
</tr>
<tr>
<td>• Passage of an active transportation ballot measure and funding raised for active transportation in the Puyallup Watershed and Tacoma.</td>
</tr>
<tr>
<td>• Expanded and connected system of trails, sidewalks, bike lanes and boulevards, local</td>
</tr>
</tbody>
</table>
and regional pathways, and public transportation.

- Baseline: There are currently 55.7 miles of existing bicycle lanes, 3.6 miles of bicycle boulevards, and 61.7 miles of shared use paths in the Puyallup Watershed.

### Active Transportation Use Changes

- The number of people walking and biking in the Puyallup Watershed and Tacoma will increase.
  - Baseline: Between 2012 and 2014, the walking mode share increased 22% percent while the bicycling mode share increased 21%.

- Increase in the number of people commuting by walking and biking
  - Baseline: In 2012, 4.5% of people walked to work, 0.3% bicycled, and 11% used public transit in Pierce County.

- Increase in the number of trips using public transit
  - Baseline: In 2014, a total of 8.6 million transit trips were started and 8.2 million trips ended in the study area.

- Vehicle Miles Traveled (VMT) averted
  - Baseline: An estimated 12.5 million vehicle miles traveled (VMT) were averted from increased non-motorized trips between 2012 and 2014 relative to the 2012 baseline. This translates to 45,000 fewer car trips taken per day in 2014.

### Environmental and Economic Impacts

- The carbon footprint will be reduced and air quality improved by Puyallup Watershed and Tacoma citizens driving less and using active transportation choices.
  - Baseline: An estimated 5,000 metric tons of CO₂ pollution were saved in 2014 due to the increase in walking and biking between 2012 and 2014.

- Gas money saved
  - Baseline: An estimated $1.8 million of gas was saved in 2014 due to the increase in walking and biking between 2012 and 2014.

- Cost savings associated with physical activity and improved health
  - Baseline: Based on the added bicycling trips observed in 2014, the Health Economic Assessment Tool (HEAT) for bicycling and walking estimates the reduced economic cost due to mortality of $1.7 to $2.9 million from bicycling in 2014. Similarly, based on the added walking trips observed in 2014, the HEAT model estimates reduced economic cost due to reduced mortality of $5.1 to $8.5 million in 2014.

- Increased property values: As the active transportation system is expanded, it is expected that property values will increase especially in areas located next to new multi-use trails or in walkable/bikeable areas. Research has shown that homes near trails often have higher property values, with a price premium ranging from five to ten percent.

### Safety and Health Impacts
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Safety</strong></td>
<td>Fewer bike/pedestrian injuries: In the Federal Highway Administration’s pilot study, they found that after implementing active transportation system upgrades there was an average of a 20% decline in pedestrian fatalities and 28% decline in bike fatalities across the four pilot communities.</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>Baseline: In Pierce County in 2014, there were 10 pedestrian fatalities and one bicycle fatality. During that same period, there were 32 serious pedestrian injuries and nine serious bicyclist injuries.</td>
<td></td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td>U.S. cities with enhanced levels of active transportation experience 20% lower obesity and diabetes rates. In addition, studies show that even as few as 5 minutes spent outdoors has distinct mental health benefits, including reduction of stress and depression, as well as improvement in self-esteem, creativity, and life satisfaction.</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>Baseline: Physical inactivity rates, poor mental health days, overweight and obesity rates, diabetes rates, depressive disorder hospitalizations, diabetes hospitalizations, heart disease hospitalizations, and life expectancy especially need improvement in these area zip codes: South Tacoma, Central Tacoma, and South End Tacoma (98409, 98408, 98444, 98404, 98405), Orting (98360), Auburn (98002), and Federal Way (98003).</td>
<td></td>
</tr>
</tbody>
</table>

We recommend that the AT COI continue updating and improving this work by:

- Updating the Community Profile every other year. The plan includes methods and frequency instructions for updating this data.
- Increasing the count locations and placing trail counters in high traffic areas to improve the active transportation use data.
- Conducting surveys after active transportation measures are completed to evaluate their impact on nearby communities.
- Identifying and sharing data in partnership with other organizations, including other COIs, Tacoma-Pierce County Health Department, Pierce Transit, Bonneville Environmental Foundation, and ForeverGreen Trails. We recommend that the AT COI Manager take the lead in updating this data in partnership with other organizations.
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Figure 29: Heart Disease Hospitalizations (CHAT 2009-2013)
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Table 2: Bicycle Facilities and Shared Use Paths in the Puyallup Watershed Outside of Tacoma (Miles)
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Table 4: Model Results: Change between 2012 and 2014
Table 5: Air Quality Ozone, 2013
Table 6: Pierce County Serious Bicycle and Pedestrian Injuries and Fatalities from Motor Vehicles
Table 7: Standard Weight Categories Associated with BMI Ranges for Adults
Table 8: Summary of Recommend Methods and Frequency of Tracking Changes Over Time

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Appendix A: Data Spreadsheet
Appendix B: Count Data, Volpe Model, and Health Models spreadsheet
Appendix C: Estimated time involved to update this plan and data
**Background**

In 2013, the Russell Family Foundation launched a 10-year commitment to work with people in the Puyallup Watershed to support the development of individuals and groups who envision a healthier watershed. The Initiative supports self-organized “Communities of Interest” – defined as groups of individuals, organizations, and/or partnerships that share values, interests, or concerns related to the health of the watershed and its communities. The long-term nature of this initiative offers the opportunity to sustain and track progress over time and maintain a focus on long-term desired outcomes. As of winter 2014, there are nine communities of interest including the Active Transportation Community of Interest (AT COI).

The vision of the AT COI is to work together over the next 20 years to establish a system that connects all of the Puyallup River Watershed’s communities, parks, schools, cultural sites, business districts, residential centers and other important public spaces. The system will link trails, sidewalks, bike lanes and boulevards, local and regional pathways, and public transportation into an integrated network for safe, convenient, human powered travel throughout the Puyallup River Watershed from Mt. Rainier to Puget Sound and will connect with similar systems at the watershed boundaries. This active transportation system will lead to desired benefits by providing opportunities for improved health of the watershed’s people, environment and economy. Use of the system combined with education and outreach will create a sense of community stewardship and ownership. The system will be accessible and equally available to everyone regardless of race/ethnicity, age, abilities, income, or other factors. The system will provide opportunities for safe, affordable and health recreational walking, bicycling, skate boarding and public transit use.

**Purpose and Scope**

The purpose and scope of this health baseline data collection project is to:

- Create a baseline community profile for the Puyallup Watershed and Tacoma that includes health, demographic and other data related to AT COI’s work plan.

- The baseline data will be used to:
  - Evaluate changes over time as the Active Transportation COI implements measures outlined in their work plan
  - Prioritize needs and actions of the work plan
  - Create more awareness of health needs

Our AT COI Data Workgroup included representatives from Tacoma-Pierce County Health Department, ForeverGreen Trails, Bonneville Environmental Foundation, Washington State Department of Health, Pierce Transit, and the National Park Service through a technical assistance grant from the Rivers, Trails, and Conservation Assistance Program.
Work Plan and Outcomes

Products we produced include:
- Logic Model.
- Report with a community profile describing baseline data collected, future data needs, partnership opportunities and data wish lists.
- Fact Sheet.

This draft plan summarizes the work the data subgroup has completed to date and captures recommendations for future data collection and partnership opportunities.

Logic Model

We developed a logic model (see Figure 1) to show the connections between the AT COI’s work plan and anticipated outcomes that could potentially be measured over time. As can be seen in the logic model, once the AT COI implements its comprehensive work plan to engage leaders, build a connected active transportation system, and change the culture, the communities of the Puyallup Watershed will be healthier, safer, and more economically prosperous.

Evaluation Data Themes

We identified the following key outcomes that could potentially be measured to evaluate changes over time as the AT COI work plan is implemented:
- Policies and Funding Changes
  - Number of towns who have adopted complete streets policies
  - Passage of ballot measure for dedicated funding
  - Amount of funding raised
- Built Environment Changes
  - Number of additional miles of trails, sidewalks, bike lanes and boulevards, local and regional pathways, and public transportation built
  - What’s in our neighborhood? Number of residents living within a ½ mile of neighborhood components
  - Walkability
  - Bikeability
- Trail & Transit Use
  - Change in the number of people walking and biking (bike/ped counts)
  - Change in the number of people commuting by walking, biking, transit
  - Vehicle Miles Traveled (VMT) averted
- Environmental Impacts
  - The CO2 emissions saved based on VMT averted
  - Air Quality changes
- Economic Impacts
  - Savings from gas spending from VMT averted
  - Health care savings
  - Number of additional businesses catering to pedestrians and bicyclists
### Figure 1: Puyallup River Watershed Active Transportation COI Logic Model

**Legend:**
- **Black = actions**
- **Red = outcomes that can be measured**
- **Orange = outcomes that can possibly be measured**

**Strategies:**
1. **Engage Leaders & Change Local Officials, with a focus on public health and transportation.**
   - Build political will
   - Leverage political will

2. **Change the Built Environment:**
   - Establish a network of trails within and outside the watershed
   - Secure right-of-way
   - Establish technical expertise and capacity needed to build and manage the trail system

3. **Change the Culture and Behavior:**
   - Increase technical skills and abilities of community members to use active transportation

**Activities:**
- Design and conduct public opinion poll
- Engage local and state elected officials
- Identify and inform advocates
- New Community Organizer
- Develop communication materials

**Outcomes:**
- Bond Passed
- Funding
- Complete Streets policies adopted
- Trail construction office set up with BMPs, design & engineering, construction management, etc.
- A system of trails, sidewalks, bike lanes, and bus shelters
- Less crime, including drug-related
- Increased economic activity
- More businesses catering to pedestrians and cyclists
- Improved health outcomes (increased property values)
- Increased quality of life
- Improved public health
- Increased community interest
- Increased physical activity
- Improved environmental quality
- Increased CO2 emissions
- Improved air quality

**Assumptions:**
- If trails are built, they will be used...

**External Factors:**
- Economic conditions, competing priorities...
This thematic map layer summarizes racial and ethnic diversity in the United States. The Diversity Index shows the likelihood that two persons chosen at random from the same area, belong to different race or ethnic groups. The index ranges from 0 (no diversity) to 100 (complete diversity).
Figure 3: Puyallup Watershed Medium Income by Census Block Group

Legend
- Cities and Towns
- Highways
- Study area
- $ 0 - 10,000
- $ 10,000 - 42,000
- $ 42,000 - 73,000
- $ 73,000 - 105,000
- $ 105,000 - 200,001

Pierce County Median Income (2013): $59,204
WA State Median Income (2013): $59,478
US Median Income (2013): $51,139

Source: ESRI 2014, U.S. Census Bureau
This map layer shows the median household income in the U.S. in 2014 in a multiscale map by state, county, ZIP Code, tract and block group. Median household income is estimated for 2014 in current dollars, including an adjustment for inflation or cost-of-living increases.
Figure 4: Puyallup Watershed Poverty Rate by Census Tract

Source: ESRI, Census Bureau, 2013
Figure 5: Puyallup Watershed Population Under 18 by Census Block Group

Legend
- Cities and Towns
- Highways
- Study area

Block Groups
2012 % Population < 18 Years Old (Esri)
- 33.1% or more
- 26.1% to 33%
- 20.1% to 26% (US Avg: 23.6%)
- 13.1% to 20%
- 13% or less
- No population

Source: ESRI 2012, U.S. Census Bureau

This map layer shows the percentage of the population under 18 in the United States in 2012 by state, county, ZIP Code, tract and block group.
Figure 6: Puyallup Watershed Population Over 64 by Census Block Group

Legend
- Cities and Towns
- Highways
- Study area

Block Groups
2012 % Population 65+ Years Old (Esri)
- 27.1% or more
- 19.1% to 27%
- 10.1% to 19% (US Avg: 13.5%)
- 2.1% to 10%
- 2% or less
- No population

Source: ESRI 2012, U.S. Census Bureau

This layer shows the U.S. population over the age of 64 by block groups, tracts, counties, and state.
Figure 7: Puyallup Watershed Population Density by Census Block Group

Legend
- Cities and Towns
- Highways
- Study area
- State Boundaries
- County Boundaries
- 0 - 1,000 persons per sq mi
- 1,000 - 4,000 persons per sq mi
- 4,000 - 22,000 persons per sq mi
- 22,000 - 116,000 persons per sq mi
- 116,000 - 618,000 persons per sq mi

Source: ESRI 2014, U.S. Census Bureau

This map layer shows the population density in the United States in 2014 by state, county, ZIP Code, tract and block group. Population density is expressed as persons per square mile.
Figure 8: Puyallup Watershed Population Growth by Census Block Group

Legend
- Cities and Towns
- Highways
- Study area
- State Boundaries
- County Boundaries
- -2.56% to -1.9%
- -1.9% to -1.25%
- -1.25% to 0%
- 0% to 1.25%
- 1.25% to 1.9%
- 1.9% to 5.36%

Source: ESRI 2014, U.S. Census Bureau

This map layer shows the estimated annual growth rate of population in the United States from 2014 to 2019 in a multiscale map by state, county, ZIP Code, tract and block group.
Figure 9: Puyallup Watershed 2010 Employment Rates

Legend
- Cities and Towns
- Highways

Jobs per acre in 2010
- Red: 544 - 2448
- Orange: 2448 - 3701
- Light Orange: 3701 - 4825
- Yellow: 4825 - 5968
- Light Yellow: 5968 - 6975
- Light Green: 6975 - 10425
- Green: 10425 - 16332
- Dark Green: 16332 - 22940
- Darker Green: 22940 - 36737
- Lightest Green: 36737 - 67051

Source: Longitudinal Employer-Household Dynamics, United States Census Bureau & Puget Sound Regional Council, 2015
Figure 10: Puyallup Watershed 2040 Projected Employment Rates

Legend
- Cities and Towns
- Highways

Jobs per acre in 2040
- 544 - 2448
- 2448 - 3701
- 3701 - 4825
- 4825 - 5968
- 5968 - 6975
- 6975 - 10425
- 10425 - 16332
- 16332 - 22940
- 22940 - 36737
- 36737 - 67051

Source: Longitudinal Employer-Household Dynamics, United States Census Bureau & Puget Sound Regional Council, 2015
- Expenditures by local commuters and recreationists as well as visitors on equipment, rentals, food and drink, lodging, transportation
- Increased property values
- Tax revenue (sales, property)
- Employee and employer attraction
- Reduction in absenteeism in the work place

- Safety
  - Perception of community safety
  - Bike/pedestrian injuries

- Health Outcome Changes
  - Body Mass Index
  - Cancer rates
  - Depressive Disorder rates
  - Physical activity rates
  - Obesity rates
  - Diabetes rates
  - Heart Disease rates
  - Poor mental health days rate

**Prioritization Data Themes**
In addition to the outcomes that can be measured over time, we also identified other datasets that would be useful in prioritizing needs including demographic data (see figures 2 to 8 for maps displaying diversity, median income, poverty, younger and older populations, population growth); and health data (Figures 23-31). The spreadsheet (Appendix A) provides more details on what data sets were used to create the maps.

The demographic data and health data can be analyzed to identify areas of high need to consider in prioritization of new active transportation elements. The poverty and low income maps show the highest poverty rates in South and East Tacoma, Pacific, portions of Federal Way, sections of Puyallup, Buckley, Orting, South Prairie, Sumner, and Algona. These maps could be overlaid with the existing trail system, transit system, and education/outreach programs to identify where there are gaps and what areas have the highest need.

The employment density for 2010 and projections for 2040 were obtained from the Pierce Transit for Pierce County (see figures 9-10). The areas projected to have the greatest job density are South and East Tacoma, Fife, the area between South Puyallup and west of Orting, and Sumner area. This data set did not include Federal Way, but it is anticipated that this would also be an area of high growth. These data could be looked at for priority areas to expand the trails, bike facilities, and transit to provide residents methods for commuting to work through a connected active transportation system. Likewise areas with high population density and expected growth should be considered as priority areas to connect to. The existing
active transportation system could be overlaid with these data sets to look for community needs, gaps in connectivity and opportunities for growth.

**Community Profile: Expected Outcomes, Baseline Information, and Recommended Measures**

We narrowed the list in the evaluation section above to focus on readily available data that could be tracked over time which has the greatest ties to the expected AT COI work plan outcomes. This section summarizes each of the data sets used and outlines the expected outcomes, baseline data collected, and recommendations for tracking changes over time.

**Policy and Funding**

**Expected Outcomes**

Once the AT COI work plan is implemented, it is anticipated that more towns will adopt complete streets policies, a ballot measure will be passed, and funding will be secured through the approved measure as well as from other private and public fund sources.

**Baseline Information**

The policy and funding measures include the number of towns that have adopted complete streets policies, ballot measure, and amount of funding raised. So far the City of Tacoma and Pierce County have both adopted Complete Streets Policies. This is a major milestone and represents the two largest areas in the watershed. A goal of the AT COI is to assist all towns in the study area to adopt Complete Streets Policies. As of May 2015, the following towns have not passed a Complete Streets Policy: Federal Way, Fife, Milton, Edgewater, Pacific, Algona, Puyallup, Sumner, Bonney Lake, South Prairie, Buckley, Orting, Wilkeson, and Carbonado.

**Tracking Changes**

The number of towns that adopt Complete Streets Policies and the ballot measure passage will be tracked and celebrated as they occur. In addition, before a ballot measure is passed, public polling will occur and will be tracked to see how the public’s opinion shifts on active transportation issues over time. See the built environment section below for recommendations on tracking funding spent.

**Built Environment**

**Existing Active Transportation System**

**Expected Outcomes**

As the AT COI work plan is developed, the active transportation system will be expanded and connected.
**Baseline Data**

Two data sources, the City of Tacoma and the Puget Sound Regional Council, were used to quantify the number of miles of bike lanes, bike boulevards, cycle tracks, and shared use pathways. Figures 11 to 13 display the existing trails, bicycle, and transit facilities in the Puyallup Watershed.

The number of miles for each type of bicycle and/or pedestrian facility was calculated in Arc GIS using the calculate geometry tool.

The total miles are:

<table>
<thead>
<tr>
<th>Type</th>
<th>Existing</th>
<th>To be built by 2015</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Lanes</td>
<td>29.0</td>
<td>36.4</td>
<td>66.4</td>
</tr>
<tr>
<td>Bicycle Boulevard</td>
<td>3.6</td>
<td>26.4</td>
<td>29.9</td>
</tr>
<tr>
<td>Cycle Tracks</td>
<td>0.0</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Shared Use Paths</td>
<td>15.8</td>
<td>9.9</td>
<td>25.7</td>
</tr>
</tbody>
</table>

Table 1: Bicycle Facilities and Shared Use Paths in the City of Tacoma (Miles)

<table>
<thead>
<tr>
<th>Type</th>
<th>Existing</th>
<th>To be built by 2015</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Lanes</td>
<td>25.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared Use Paths</td>
<td>45.9</td>
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Table 2: Bicycle Facilities and Shared Use Paths in the Puyallup Watershed Outside of Tacoma (Miles)

<table>
<thead>
<tr>
<th>Type</th>
<th>Existing</th>
<th>To be built by 2015</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Lanes</td>
<td>55.7</td>
<td>36.4</td>
<td>92.1</td>
</tr>
<tr>
<td>Bicycle Boulevard</td>
<td>3.6</td>
<td>26.4</td>
<td>29.9</td>
</tr>
<tr>
<td>Cycle Tracks</td>
<td>0.0</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Shared Use Paths</td>
<td>61.7</td>
<td>9.9</td>
<td>71.6</td>
</tr>
</tbody>
</table>

Table 3: Bicycle Facilities and Shared Use Paths in the Puyallup Watershed (Miles)

Sidewalk data was not available and therefore was not quantified.

Pierce Transit operates 1733 bus stops in the study area. A total of 24 bus stops have some bike facilities available at the stops. Out of these stops, four have both bike racks and lockers, 22 have bike racks, and six have bike lockers. The number of bike lockers range from two to 28.

To understand the relationship of existing bikeways and shared use paths, the number of miles outside a half-mile corridor around the existing bus stops was calculated. Out of the total of 61.7 miles of shared use paths, 17.2 miles or 28% are outside the half-mile corridor. Of the 55.7 miles of bike lanes in the study area, 11 miles or 20% are outside the half-mile corridor. Most of the pathways and bike lanes that are outside the half-mile corridor are located outside of Pierce Transit’s service area.
Pierce Transit further analyzed the relationship between trails and transit. The intent of this analysis is to determine access to a transit route leading to an existing trail by residents within the Puyallup Watershed. “Trail Access” was defined under three assumptions. First, it was assumed that any transit route that intersected with a trail meant that there was a means for which someone is able to get off the bus and onto a path, and vice versa. This was largely due to the lack of shapefiles of trailheads within the watershed and we highly recommend the AT COI build this data for future evaluation. Second, it was assumed that for routes that intersected with the trail, each stop along the route was equivalent to a stop that provided trail access. Finally, a quarter mile walkshed (vs a ¼ ring buffer) was used to capture the population base. For future analysis we recommend including a bicycle-shed as well to exploring bicycle access to trails. The following was analyzed in this work:

- Number of routes within the watershed
- Number of routes that provide trail access
- Percentage of bus stops along routes within the watershed
- Average ridership within these stops vs system wide
- Percent of people who live within a census block a ¼ mile from a bus stop along a route that provides trail access

Pierce Transit has 34 of 39 routes within the Puyallup Watershed. Of the 34 within the watershed, 17 routes intersected with a trail. With regards to bus stops, the 17 routes have a total of 1068 bus stops within the watershed- this is about 40% of all Pierce Transit bus stops in the system.

Looking at ridership, ridership for these routes average 19 boardings and 18 alightings a day, compared to the 13 and 12 respectively within Pierce Transit’s Service Area.

Finally, 40% of the population within the Puyallup Watershed live within a census block that is located within a ¼ mile of a stop that has a transit route that provides trail access. It should be noted that while there is relatively little overlap between Pierce Transit’s Service Area and the watershed, the majority of residents in this area live within the Pierce Transit’s Service area and it has the greatest population densities within the Pierce County (see Figure 14).

**Tracking Changes**

In order to track changes in the active transportation system over time, we recommend that the AT COI send a brief information request annually to park and transit managers asking them to quantify the amount of funding spent and miles built of trails, sidewalks, bike lanes, bike boulevards, local and regional pathways, and public transit. This would include a quantifiable number of miles as well as qualitative information about the value (connectivity, usage, etc.). In addition, the three data sets used to create the baseline data should be tracked for growth over time.
Figure 11: Existing Trails and Bikeways in the Puyallup Watershed

Legend
- Tacoma City Limits
- Bicycle Boulevard
- Bike Lane
- Shared Use Path
- Cities and Towns
- Highways
- Study area
- County Boundary

Mt. Rainier National Park
National Forest
Mt. Rainier National Park

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Copyright © 2014 Esri
Figure 12: Existing Trails and Bikeways in Tacoma

Legend
- Highways
- Tacoma City Limits
- Bicycle Boulevard
- Bike Lane
- Pedestrian Trail
- Shared Use Path
Figure 13: Bus Stops, Bike Facilities, Trails, and Bikeways

**Legend**

- **Bus Stops**
  - ▲ Bike Rack
  - ★ Bike Locker
  - ◇ Bike Rack and Locker
  - ● no facilities

- Tacoma City Limits
- Bicycle Boulevard
- Bike Lane
- Shared Use Path
- ● Cities and Towns
- Highways
- Study area

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, KadasterNL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community, Copyright © 2014 Esri
Figure 14: Percent of Population that Lives Within a ¼ of a Bus Stop that Takes You to a Trail
What is in our neighborhoods?

Number of residents living in a census tract within ½ mile of neighborhood destinations

Expected Changes
As the AT COI work plan is implemented it is expected that more people will be living within a ½ mile of bike routes, trails, and bus stops. Over the longer term, it is expected that other walkable/bikeable destinations will also increase. Public infrastructure investment that increases the numbers of bicyclists and pedestrians also stimulates local forms of compact, mixed-use development which results in destinations that are closer to each other, thereby shortening travel distances for all modes.¹

Baseline Data
Tacoma-Pierce County Health Department (TPCHD) tracks the number of Pierce County residents that live in census tracts within a half-mile of destinations including community gardens, bike routes, trails, parks, open space corridors, bus stops, convenience stores, grocery stores, farmers markets, schools, and libraries. This information is found in Figure 15.

Tracking Changes
TPCHD tracks changes in this measure over time and we recommend the AT COI use the TPCHD Pierce County Environmental Health indicators report as a data source to see the changes over time.
Trail and Transit Use

Expected Outcomes
As the AT COI builds a connected active transportation system, we expect that more people will bike, walk, and use transit. Half the trips in America can be completed within a 20-minute bike ride and a quarter of trips are within a 20-minute walk. As more people use the active transportation system, congestion on roadways from vehicle use will also be reduced.

Baseline Data
Cascade Bicycle Club conducts bike and pedestrian counts with volunteers following the National Bicycle and Pedestrian Documentation Project methodology. Annual counts are held in September and October. The count locations are shown in Figure 16. Heat maps were
developed to show the amount of pedestrians and bicycles counted at the various locations and are shown in Figures 17-20.

In the study area of the Puyallup Watershed and the City of Tacoma, bicycle and pedestrian counts were calculated for consistent locations in 2012 and 2014. Vehicle Miles Travel averted (VMT) was also calculated using a model developed by the Federal Highway Administration known as the Volpe model\(^2\). Counts from 2012 and 2014 were compiled to enable the calculation of VMT averted between 2012 and 2014. Only locations that were consistent between 2012 and 2014 were used to allow the comparison (see Figure 16). The VMT averted uses the population data from the Washington State Office of Financial Management Small Area Estimate Program and accounts for change in population. The census tract population was summarized for all census tracts at least partially within the study area. Between 2012 and 2014, using only count locations that were consistent between the two years, there was a 24% increase in pedestrian counts and a 23% increase in bicycle counts. The change in mode share was calculated using the model which resulted in 1.2% mode share for bicycling and 12.4% mode share for walking. Mode share is defined as the percent of trips taken using a particular type of transportation choice. The mode share for bicycling increased from .6% to .7%, an increase of 21%. Walking mode share increased 7.2% to 8.8%, an increase of 22%. Figure 21 and Table 4 show the results of the model for VMT averted and reduction in vehicle trips. 12.5 million VMT were averted, the vehicle mode share was decreased by 2%, and 16.3 million vehicle trips total or an average of 44,800 fewer vehicle trips/day occurred.

Bicycle and pedestrian counts collected in 2014 were extrapolated to annual estimates of pedestrian and bicycle activity for each shared-use path count location in the study area. These estimates are shown in Appendix B, 2014 Count Data. In cases where both an AM and PM count was conducted, annual estimates were averaged. Annual estimates were calculated using the National Bicycle and Pedestrian Documentation Project’s (NBPD) Extrapolation Workbook. The link to the workbook can be found [here](#). This methodology factors in the month, day of the week, time of day, and climate zone in which the count occurred. It is possible to extrapolate annual estimates for count locations in “higher density pedestrian and entertainment areas” in addition to on shared-use paths, but the group limited its calculation to shared-use paths because we were unsure of which locations qualified as a “higher density pedestrian and entertainment district.”
Figure 16: Puyallup Watershed Consistent 2012-2014 Bike/Ped Count Locations

Legend
- 2012-2014 Bike/Ped Count Locations
- Cities and Towns
- Highways
- Study area

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCan, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community. Copyright © 2014 Esri
Figure 17: Puyallup Watershed 2014 AM Pedestrian Counts

Legend
Number of Pedestrians Counted
- 6 - 10
- 11 - 18
- 19 - 45
- 46 - 142
- 143 - 219

- Cities and Towns
- Highways

Source: Cascade Bicycle Club, 2014.
Figure 19: Puyallup Watershed 2014 AM Bicycle Counts

**Legend**

Number of Bicycles Counted
- 2
- 2 - 7
- 8 - 11
- 12 - 18
- 19 - 24

Cities and Towns

Highways

Source: Cascade Bicycle Club, 2014.
Figure 20: Puyallup Watershed 2014 PM Bicycle Counts

Legend

Number of Bicycles Counted
- 3 - 8
- 9 - 23
- 24 - 31
- 32 - 40
- 41 - 64

Cities and Towns
Highways

Source: Cascade Bicycle Club, 2014.
Table 4: Model Results: Change between 2012 and 2014

<table>
<thead>
<tr>
<th>Measure</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Averted Vehicle Miles Traveled</td>
<td>12.5 million vehicle miles traveled averted</td>
</tr>
<tr>
<td>% Change in Vehicle Mode Share</td>
<td>2% reduction in vehicle mode share</td>
</tr>
<tr>
<td># Car trips reduced</td>
<td>16.3 million vehicle trips reduced</td>
</tr>
<tr>
<td># Car trips reduced per day</td>
<td>44,800 vehicle trips reduced per day on average</td>
</tr>
<tr>
<td>Carbon Dioxide Emissions Saved</td>
<td>5,240 metric tons of CO2 emissions saved</td>
</tr>
<tr>
<td>Money Saved in Gas</td>
<td>$1.8 million saved in gas money</td>
</tr>
</tbody>
</table>

The Census Bureau tracks the percentage of people over 16 that commute to work by bicycling, walking, and transit. In 2012, 0.3% of people bicycled, 2.8% walked, and 3.4% used transit in Pierce County. In King County, 1.5% bicycled, 4.5% walked, and 11% used transit. The link to the interactive map can be found here.

Pierce Transit tracks ridership use. In 2014, a total of 8.6 million trips were started and 8.2 million trips ended in the study area.

Tracking Changes

We recommend that the AT COI use the current count locations to identify any gaps in the locations and propose locations for additional sites to be used in 2015. Cascade Bicycle Club is willing to add additional sites to the count locations; AT COI group would need to help recruit volunteers to man the stations. These locations should be continuously counted annually throughout the 10-year Puyallup Watershed Initiative. The VMT averted should be calculated...
every two years to show the continuing impact that AT COI has on the community. The City of Tacoma has also expressed interest in obtaining trail counters. Trail counters would allow continuous year round monitoring of trail use and should be obtained and placed at popular trails and intersections where feasible. The AT COI should continue to use the National Bicycle and Pedestrian Documentation Project’s Extrapolation Workbook to estimate annual bicycle and pedestrian activity on shared-use paths in locations where there are no year round counters. If possible, the AT COI should also determine which count locations qualify as “higher density pedestrian and entertainment districts” and use the Extrapolation Workbook to estimate annual activity at these locations as well. In addition, intercept and on-line surveys should be conducted of users and residents in surrounding areas around newly built trails, sidewalks, and bikeways.

The Recommended Social Indicators for Puget Sound Partnership: A report summarizing lessons from three local case studies\(^8\) has an indicator documenting physical activity in terms of the average number of hours per week of outdoor activity (by activity: outdoor work, gardening/farming, walking, bicycling, swimming, etc.) If this indicator is collected for the Puget Sound region we recommend that this be tracked for the Puyallup Watershed.

We recommend collecting transit use data from Pierce County every other year to track changes over time.

Environmental Impacts

CO\(_2\) Emissions Saved Based on Miles Not Driven

Expected Changes

As more people use the built and connected active transportation system, it is expected that the average individual’s carbon footprint associated with transportation choices will decrease. TPCHD tracks CO\(_2\) emissions in Pierce County. Transportation accounts for approximately half of the CO\(_2\) emissions in Pierce County. In 2010, CO\(_2\) emissions in Pierce County for transportation were approximately 40 million metric tons. The CO\(_2\) emissions are similar to levels in 1990 even though the population has almost doubled\(^3\). By driving less and using active transportation choices, residents in the Puyallup Watershed can continue to reduce their carbon footprint.

Baseline Data

Using the VMT averted derived from the Volpe model described in the Trail and Transit use section above and the average CO\(_2\) metric ton emitted per VMT\(^1\), the amount of CO\(_2\) emissions saved were calculated from the change in VMT from 2012 to 2014. As shown in table 4, an estimated 5,240 metric tons of CO\(_2\) emissions were averted.

Tracking Changes

Similar to tracking of the VMT, the estimated CO\(_2\) emissions averted should be tracked every two years.
Air Quality Changes

Expected Outcomes
Gasoline and diesel powered vehicles are a major source of air pollution, including fine particulate matter (PM$_{2.5}$) and ozone. As people walk, bike, and take public transit more, and drive less, vehicle emissions are expected to decrease and air quality improve. TPCHD tracks PM$_{2.5}$, solid or liquid particles 2.5 micrometers or less in diameter. Washington State Department of Health tracks ozone. Improving air quality is good for environmental and human health, including lung and heart disease, cancer, strokes, chronic obstructive pulmonary disease, asthma attacks and other respiratory illnesses. PM$_{2.5}$ may also be an obesogen, predisposing some people to gain weight.

Baseline Data
TPCHD tracks PM$_{2.5}$ levels as part of their Pierce County Environmental Health indicators report. The latest version of this indicator is show in Figure 22.

Washington State Department of Health tracks ozone levels. Washington’s ground-level ozone (ozone) data comes from monitors around the state. The data can be found at this link and show the following main values:

- The number of days that ozone was recorded by a working monitor during the year in the geographic region chosen.
- The number of days the air quality was found to be good, moderate, unhealthy for sensitive individuals, unhealthy, or very unhealthy.
- The number of days that ozone air quality did not meet the standard. (The National Ambient Air Quality Standard for ozone is 75 part per billion (ppb) and is a daily maximum eight-hour average ozone concentration. The daily maximum is the highest of the 24 possible 8-hour averages for a day.)

In 2013, Pierce County was monitored for 143 days. The standard was met for all 143 days with 141 days rated as good and two rated as moderate. Table 5 shows the results for 2013.

Tracking Changes
The data subgroup recommends that the AT COI rely on TPCHD’s Pierce County Environmental Health indicator’s report for monitoring PM$_{2.5}$. These reports are produced every other year and track changes over time. Likewise, for ozone the information should be pulled from Washington State Department of Health’s database.
**Figure 22: Air Quality Fine Particulate Matter (PM\(_{2.5}\)) (Source: Tacoma-Pierce County Health Department Pierce County Environmental Health indicators report)**

Data Source: Puget Sound Clean Air Agency and Washington State Department of Ecology


<table>
<thead>
<tr>
<th>County</th>
<th># Days Monitored</th>
<th>Good</th>
<th>Moderate</th>
<th>Unhealthy for Sensitive Groups</th>
<th>Unhealthy</th>
<th>Very Unhealthy</th>
<th># Days Standard Not Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pierce</td>
<td>143</td>
<td>141</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Economic Impacts**

The economic impacts of trails and active transportation are vast. When asked how they would allocate transportation spending, Americans indicated that they would spend 22 percent of transportation funding on biking and walking infrastructure – about 15 times what is currently spent\(^1\).

According to the Economic Analysis of Outdoor Recreation Report by Earth Economics, Washington State’s recreation industry employs nearly 200,000 people and generates $21.6 billion dollars. Bicycle riding was the third largest activity by economic expenditures\(^4\). King County had the highest expenditure with $5.4 billion and Pierce County expenditures were $2.3 billion. The types of economic impacts resulting from active transportation investment include:
- Health care savings
- Savings from gas spending
- Expenditures by local commuters and recreationists as well as visitors on equipment, rentals, food and drink, lodging, transportation
- Increased property values
- Tax revenue (sales, property)
- Employee and employer attraction
- Reduction in absenteeism in the work place

For this analysis, the data group decided to focus on money saved from gas spending and health care savings. These measures are described below.

It is also recommended that information be collected from active transportation users through surveys on their expenditures habits as well as employee attraction (see survey sections for more information).

**Gas Money Saved from VMT averted**

*Expected Outcomes*
As more Puyallup Watershed residents and visitors use the active transportation system, fewer vehicles will be driven and money will be saved from fueling those vehicles.

*Baseline Data*
The funding saved from gas spending between 2012 and 2014 was calculated using the VMT averted derived from the Volpe model described in the Trail and Transit use section above, the average miles driven per gallon, and gas prices. It was found that an estimated $1.8 million in gas was saved in 2014.

*Tracking Changes*
Similar to tracking of the VMT, the fuel spending saved should be tracked every two years.

**Health Care Savings**

*Expected Outcomes*
It is expected that as physical activity increases, money will be saved on health care costs. The annual medical costs of physical inactivity in the U.S. have been estimated at $76 billion, or close to 10 percent of all medical expenses.¹ Other studies have shown that $3 in health care costs can be saved for every $1 spent on trails/active transportation.¹⁰
Baseline Data
There is no way to directly measure health care savings from increased active transportation, but the data group used two models to estimate the potential health care savings associated with an expanded active transportation and trails system.

The first model was developed by East Carolina University and quantifies the cost of physical inactivity using local population, employment, and income data. It was found that the total cost of physical inactivity in the Puyallup Watershed in 2014 was $2 billion.

The Health Economic Assessment Tool (HEAT) was used to estimate the value of reduced mortality in the watershed based on the increase in walking and biking observed between 2012 and 2014. The model uses inputs of total walking and cycling trips per day calculated from the Volpe model (described in the Trail and Transit use section above), length of walking and biking trips from Puget Sound Regional Council’s Household Travel Survey, the Pierce County Mortality Rate, and an estimated value of a statistical life. It was found that the number of deaths per year that were prevented due to the increase in cycling between 2012 and 2014 ranged from 5 to 8 deaths prevented. The number of deaths per year that were prevented due to the increase walking between 2012 and 2014 ranged from 13 to 22 deaths prevented. Based on the added bicycling trips observed in 2014, the HEAT model estimates reduced economic cost of mortality of $1.7 to $2.9 million from bicycling in 2014. Similarly, based on the added walking trips observed in 2014, the HEAT model estimates reduced economic cost of mortality of $5.1 to $8.5 million in 2014. This does not include benefits from reduced economic costs of morbidity, which are likely higher than mortality.

Tracking Changes
Similar to tracking of the VMT, the HEAT model should be used to track the reduced economic cost of mortality from walking and biking in the watershed every two years. The East Carolina University model cannot be used to track physical inactivity changes over time.

Property Values

Expected Outcomes
As the active transportation system is expanded, it is expected that property values will increase especially in areas located next to new multi-use trails or in walkable/bikeable areas. Research has shown that homes near trails often have higher property value, with a price premium ranging from five to ten percent⁹. Pedestrian friendly areas also tend to have higher property values. The higher property values also raise property tax revenue generated by local municipalities.
**Tracking Changes Over Time**

Given the large study area and that many factors can influence property values, the data group does not recommend tracking property values at this time. This may be incorporated in the future data once trails are being implemented.

**Safety**

**Bike/Pedestrian Injuries and Fatalities**

**Expected Outcomes**

As the active transportation system is expanded, it is expected that walking and biking will be safer. In the Federal Highway Administration’s pilot study, they found that after implementing active transportation system upgrades there was an average of a 20% decline in pedestrian fatalities and 28% decline in bike fatalities across the four pilot communities.

**Baseline Data**

The 2013 and 2014 pedestrian and bicycle injuries and fatality data from vehicle crashes in Pierce County was obtained from the Washington State Department of Transportation and is shown in Table 6. In Pierce County there were an average of 7 pedestrian fatalities and one bicyclist fatality in 2013 and 2014. During that same period, there was an average of 31 serious pedestrian injuries and ten serious bicyclist injuries. Other pedestrian and bicycle injuries, including evident and possible injuries, are also shown in Table 6 below.

<table>
<thead>
<tr>
<th>Table 6: Pedestrian and Bicycle Injuries and Fatalities from Motor Vehicles in Pierce County and Federal Way (Source: WSDOT, 2013 -2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2013</strong></td>
</tr>
<tr>
<td>Pedestrian</td>
</tr>
<tr>
<td>Bicyclist</td>
</tr>
</tbody>
</table>

Smart Growth America maintains a [national map](#) and summary data on pedestrian fatalities from 2003 to 2012. The map can be used to see geospatially where pedestrian fatalities have occurred. Washington State Department of Health is also considering creating a map and summary data for pedestrian and bicycle injuries and fatalities. When this information is available, it would be a very useful tool to help understand where the injuries and fatalities are occurring and identify measures to improve safety.
**Tracking Changes**

We recommend tracking annual bicycle and pedestrian injuries and fatalities data, collecting and analyzing these data every other year. Washington State Department of Health has included bicycle and pedestrian injuries as one of their indicators and will be analyzing these data in the future. Relying on their data collection and analysis may be an option.

**Crime and Perception of Safety**

**Expected Outcomes**
In the long-term, as the active transportation system improves and more people use it, we expect more people to be walking, bicycling and skateboarding, providing “eyes on the streets,” and making communities safer.

**Baseline Data**
Safety perception is not currently available for baseline information.

**Tracking Changes**
We recommend that community members are surveyed about their perception of safety in the vicinity of new trails and other new active transportation facilities and activities.

The Puget Sound Institute’s *Recommended Social Indicators for Puget Sound Partnership: A report summarizing lessons from three local case studies* has an indicator documenting perceived safety of natural areas. If data for this indicator are collected for the Puget Sound region we recommend that this be tracked for the Puyallup Watershed. While this indicator measures perceived safety in natural areas, active transportation can take place in natural areas as well as along busy streets, therefore this indicator could be used to measure perceived safety in just one component of the entire active transportation system. If possible, modify or add to this measure to address how safe people feel on trails, sidewalks, bikeways and other elements of active transportation.

**Health**

**Expected Outcomes**
As more people incorporate physical activity into their lives using active transportation, the communities in the Puyallup Watershed will be healthier. U.S. cities with enhanced levels of active transportation experience 20% lower obesity and diabetes rates. In addition, studies show that even as few as 5 minutes spent outdoors has distinct mental health benefits, including reduction of stress and depression, as well as improvement in self-esteem, creativity, and life satisfaction. These feelings were heightened for those who exercised in a wilderness
area or near water\textsuperscript{6}. States where a higher percentage of people walk and bike to work have decreased rates of diabetes\textsuperscript{7}.

\section*{Baseline Data}
Rad Cunningham, epidemiologist with Washington State Department of Health, analyzed nine different health indicators for the Puyallup Watershed. Four datasets were based on hospital data from the Community Health Assessment Tool (CHAT) database and four datasets were from the Behavioral Risk Factor Surveillance System (BRFSS), a telephone survey that collects state data about U.S. residents regarding their health-related risk behaviors, chronic health conditions, and use of preventive services. It is important to note that BRFSS data is not randomized at the zip code level and there may be unknowable biases in selection. Additionally, the BRFSS data is from before the surveys used cell phone numbers in its random dialing methodology; it may under/mis-represent Millennials or anyone who did not have a landline between 2006 and 2010. Finally, the Age-Adjusted Body Mass Index (BMI) dataset was based on self-reported height and weight on driver’s licenses provided by the Washington State Department of Licensing. People often exaggerate their height and under-report their weight on their driver’s license, a phenomenon called self-report bias\textsuperscript{11}. Studies suggest that self-report bias does not vary much by location making the data useful for determining a community’s BMI relative to its neighbors\textsuperscript{12,13}.

The following measures were assessed and are displayed in the corresponding figures:

\begin{itemize}
  \item Physical Inactivity Rate (BRFSS 2006-2010), Figure 23
  \item Proportion of the Population that is Overweight or Obese (BRFSS 2006-2010), Figure 24
  \item Age Adjusted BMI (Body Mass Index) (Washington Department of Licensing, 2015), Figure 25
  \item Number of Poor Mental Health Days in the Last Month (BRFSS 2006-2010), Figure 26
  \item Proportion of the Population that Reported a Diabetes Diagnosis (BRFSS 2006-2010), Figure 27
  \item Diabetes Hospitalizations (CHAT 2009-2013), Figure 28
  \item Heart Disease Hospitalizations (CHAT 2009-2013), Figure 29
  \item Depressive Disorder Hospitalizations (CHAT 2009-2013), Figure 30
  \item Life Expectancy at Birth (CHAT 2013), Figure 31 (use for baseline only)
\end{itemize}

\textbf{Physical Inactivity Rate}: This is measured as the proportion of the population that, when asked on the telephone survey, did not exercise in the last 30 days. South Tacoma zip codes, 98444 and 98446, along with 98003 (Federal Way), and 98002 (Auburn) had the highest rates of physical inactivity, around 30%. North Tacoma zip codes 98406, 98407, and 98422, along with 98321 (Buckley), and 98022 (Enumclaw) had the lowest rates of physical inactivity, between 12%-15%.

\textbf{Proportion of the Population that is Overweight or Obese and Age-Adjusted BMI (Body Mass Index)}: Zip codes 98405, 98409, 98444, and 98404 in south and central Tacoma had the highest rates of overweight or obese adults, in addition to 98354 (Milton), 98047 (Pacific), and 98002
(Auburn). These high overweight and obese rates ranged between 69%-72%. Body mass index or BMI is a person’s weight in kilograms divided by the square of height in meters and is used as an approximate measure of body fatness in adult men and women. Table 7 shows the standard weight status categories associated with BMI ranges for adults. South Tacoma, Tacoma zip 98404, and areas of Auburn, Puyallup, northern Graham, South Hill, and Bonney Lake all had areas of higher age-adjusted average BMI, between 27.2 and 27.8. A BMI of 30 or greater indicates obesity, a BMI between 25 and 29.9 indicates overweight, and a BMI between 18.5 and 24.9 indicates a normal weight. In general, based on these two datasets, the majority of zip codes in Puyallup Watershed have, on average, an overweight population.

Table 7: Standard Weight Categories Associated with BMI Ranges for Adults

<table>
<thead>
<tr>
<th>BMI</th>
<th>Weight Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.5 – 24.9</td>
<td>Normal or Healthy Weight</td>
</tr>
<tr>
<td>25.0 – 29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>30.0 and Above</td>
<td>Obese</td>
</tr>
</tbody>
</table>

Number of Poor Mental Health Days in the Last Month: South Tacoma zip codes 98409, 98408, 98449, and 98444 had the highest number of poor mental health days (between 4.5 and 5.3 in the past month).

Proportion of the Population that Reported a Diabetes Diagnosis and Diabetes Hospitalizations: South Tacoma zip codes, 98499, 98408, 98404, and 98455, in addition to north Tacoma zip code 98403 and Auburn zip code 98002 had the highest rates of reported diabetes diagnosis, between 11%-13%. Most of Tacoma, especially South, East, Central and North Tacoma zip codes 98499, 98409, 98405, 98418, 98408, 98444, 98404, and 98424, had high diabetes hospitalization rates – between 165-549 hospitalizations per 100,000 people. Additionally, zip codes 98371 (Puyallup), 98390 (Sumner), 98002 (Auburn), 98360 (Orting), and 98321 (Buckley) had diabetes hospitalization rates between 164 and 294.

Heart Disease Hospitalizations: Most of the populated portions of the Puyallup Watershed had high heart disease hospitalization rates relative to the surrounding area (between 925 and 1313 hospitalizations per 100,000 people). The three zip codes with the highest heart disease hospitalizations (between 1314 and 2050 hospitalizations) were 98405 in Tacoma, 98354 (Milton), and 98390 (Sumner). Low heart disease hospitalization rates occurred in the eastern portion of the watershed, and then west and northeast Tacoma, western Federal Way, and western Auburn.

Depressive Disorder Hospitalizations: Tacoma zip codes 98409 and 98424, Auburn zip codes 98001 and 98002, in addition to 98371 (Puyallup) and 98003 (Federal Way) had the highest depressive disorder hospitalization rates, between 96 and 133 hospitalizations per 100,000 people.
Figure 23: Proportion of the Population who Did Not Exercise in the Last 30 Days, BRFSS 2006-2010

Data: Washington State BRFSS 2006-2010

Legend
- Watershed
- No Exercise
  - 0.12 - 0.15
  - 0.16 - 0.19
  - 0.20 - 0.23
  - 0.24 - 0.27
  - 0.28 - 0.31

Created by the Washington State Department of Health, May 2015

Note: Some data is suppressed because of unstable estimates. An unstable estimate was defined as a relative standard error greater than 30. Interpret data with caution: BRFSS data is randomized at the county level but not the zipcode level which could result in unintentional and unknown biases in the data.
Figure 24: Proportion of the Population That is Overweight or Obese, BRFSS 2006-2010

Legend

<table>
<thead>
<tr>
<th>Watershed</th>
<th>0.00 - 0.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight or Obese</td>
<td></td>
</tr>
<tr>
<td>0.16 - 0.47</td>
<td></td>
</tr>
<tr>
<td>0.48 - 0.63</td>
<td></td>
</tr>
<tr>
<td>0.64 - 0.68</td>
<td></td>
</tr>
<tr>
<td>0.69 - 0.72</td>
<td></td>
</tr>
</tbody>
</table>

Note: Some data is suppressed because of unstable estimates. An unstable estimate was defined as a relative standard error greater than 30. Interpret data with caution: BRFSS data is randomized at the county level but not the zipcode level which could result in unintentional and unknown biases in the data.
Figure 25: Age Adjusted BMI for the Puyallup Watershed, 2015

Legend

Age Adjusted BMI

- 24.8 - 25.6
- 25.5 - 26.2
- 26.1 - 26.7
- 26.6 - 27.2
- 27.2 - 27.8

Created by the Washington State Department of Health, May 2015

Data: WA Dept. of Licensing 2015
Figure 26: Number of Poor Mental Health Days in the Last 30 Days, BRFSS 2006-2010

Legend

- Watershed

N. of Poor Mental Health Days

- 1.7 - 2.0
- 2.1 - 3.0
- 3.1 - 3.6
- 3.7 - 4.4
- 4.5 - 5.3

Note: Some data is suppressed because of unstable estimates. An unstable estimate was defined as a relative standard error greater than 30. Interpret data with caution: BRFSS data is randomized at the county level but not the zipcode level which could result in unintentional and unknown biases in the data.
Figure 27: Proportion of the Population That Reported a Diabetes Diagnosis, BRFSS 2006-2010

Legend

Watershed

Diabetes

- 0.04 - 0.05
- 0.06 - 0.07
- 0.08
- 0.09 - 0.10
- 0.11 - 0.13

Created by the Washington State Department of Health, May 2015

Data: Washington State BRFSS 2006-2010

Note: Some data is suppressed because of unstable estimates. An unstable estimate was defined as a relative standard error greater than 30. Interpret data with caution: BRFSS data is randomized at the county level but not the zipcode level which could result in unintentional and unknown biases in the data.
Figure 28: Age-Adjusted Diabetes Hospitalizations per 100k People, 2009-2013

Contents may not reflect National Geographic's current map policy. Sources: National Geographic, Esri, DeLorme, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, Increment P Corp.

Legend
- Studyarea
- Diabetes
  - 0 - 55
  - 56 - 97
  - 98 - 163
  - 164 - 294
  - 295 - 549
  - Zip Codes (2013)

Created by the Washington State Department of Health, May 2015

Data Source: Dept of Health; Community Health Assessment Tool
Figure 29: Age-Adjusted Heart Disease Hospitalizations per 100k People, 2009-2013

Legend
- Study area
- Heart disease
  - 0
  - 1 - 632
  - 633 - 924
  - 925 - 1313
  - 1314 - 2050
- Zip Codes (2013)

Data Source: Dept of Health; Community Health Assessment Tool
Figure 30: Age-Adjusted Depressive Disorder Hospitalizations per 100k People, 2009-2013

Legend
- Orange: Study area
- Depression
  - Light blue: 0 - 32
  - Light gray: 33 - 74
  - Dark gray: 75 - 95
  - Yellow: 96 - 109
  - Red: 110 - 133
- Zip Codes (2013)

Created by the Washington State Department of Health, May 2015

Data Source: Dept of Health; Community Health Assessment Tool
Figure 31: Life Expectancy at Birth, 2013

Legend

- Study area

Tract 10

Life expectancy

- 89 - 111
- 84 - 88
- 80 - 83
- 77 - 79
- 55 - 76

Created by the Washington State Department of Health, May 2015

Data Source: Dept of Health; Community Health Assessment Tool
**Life Expectancy at Birth:** South Tacoma had the lowest life expectancies in addition to Buckley, parts of Federal Way, Auburn, Puyallup, and Graham (between 55 and 76).

**Health Trends:**
Key area zip code areas that show the greatest need for health improvements are:
- South Tacoma, Central Tacoma, and South End Tacoma (98409, 98408, 98444, 98404, 98405)
- Orting (98360)
- Auburn (98002)
- Federal Way (98003)

The King County zip codes were among the healthiest. In general, areas with high rates of overweight/obesity also had high rates of poor mental health days and high physical inactivity.

**Tracking Changes**
It is recommended that the health data be evaluated every two years. The group recommends working with Washington State Department of Health to obtain this data.

**Recommended Next Steps**
We recommend future data collection by the AT COI manager in partnership with the PWI COI backbone organization, the data subgroup, the AT COI, and the different COIs and their members:
- Surveys of community members near new active transportation facilities and activities.
- Re-collecting this baseline data every other year with annual data
- Consideration of other potential data and analysis in the future that takes into account other impacts, to better identify AT COI influences.

**Surveys**
As the active transportation system is implemented, we recommend that surveys be conducted in communities in the vicinity of the new sidewalks, bikeways, trails, and transit routes and stops. Both intercept survey and community-wide surveys are recommended to allow capturing information from active transportation users and the rest of the community. Inviting community members to help design and implement surveys is a great way to engage the broader community and ensure the surveys are meaningful to those outside the AT COI. We recommend partnering with school districts and youth organizations to get young people involved in developing and implementing the surveys.

Below is a list of types of potential questions to ask:
- Demographics (age, gender, where they live)
• Participation in AT activities (what type, frequency, time and length, purpose (commuting, recreation)
• Expenditures: How much money do they spend on food/drink, gear, lodging, etc.?
• Safety perception: how safe do they feel using active transportation system, do any conditions affect this?
• Why they live here and contribution of the active transportation system has on the quality of life/ employee attraction?
• If they don’t use the active transportation system, why?
• What changes would they like to see in their community to help facilitate active transportation?

Tracking Changes Summary
We recommend that updated data be compiled every other year. Table 8 below summarizes the recommended methods and frequency in updating the data. An estimate of the amount of time involved in conducting the data update is found in Appendix C. We recommend that the AT COI Manager take the lead in updating this data in partnership with other interested organizations including TPCHD, Pierce Transit, Bonneville Environmental Foundation, and ForeverGreen Trails, AT COI backbone organization, AT COI members, and other COIs.

Table 8: Summary of Recommend Methods and Frequency of Tracking Changes Over Time

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Method and Frequency of Tracking Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policies, Funding, &amp; Built Environment</td>
<td></td>
</tr>
<tr>
<td>Complete Streets Policies adopted</td>
<td>N/A – AT COI will celebrate this when it happens</td>
</tr>
<tr>
<td>Ballot measure passage</td>
<td>N/A – AT COI will celebrate this when it happens</td>
</tr>
<tr>
<td>Amount of funding spent &amp; miles built</td>
<td>Send a brief information request annually to park and transit managers asking them to quantify the amount of funding spent and miles built of trails, sidewalks, bike lanes and boulevards, local and regional pathways, and public transportation. This would include a quantifiable number of miles as well as qualitative information about the value (connectivity, usage, etc.). Analyze this data and changes in the City of Tacoma, PSRC, and Pierce Transit data every other year.</td>
</tr>
<tr>
<td>What’s in Our Neighborhoods?</td>
<td>Obtain the information from TPCHD’s Pierce County Environmental Health indicators report</td>
</tr>
<tr>
<td>Trail and Transit Use</td>
<td></td>
</tr>
<tr>
<td>Number of people walking and biking (bike/ped counts)</td>
<td>Obtain information from Cascade Bicycle Club and any permanent bike/pedestrian counters every year, analyze the data every other year.</td>
</tr>
<tr>
<td><strong>Number of people commuting by walking, biking, transit</strong></td>
<td>Use the Census Bureau’s website to obtain the new commute data every year, analyze the data every other year.</td>
</tr>
<tr>
<td><strong>Number of hours per week of outdoor activity (by activity: outdoor work, gardening/ farming, walking, bicycling, swimming, etc.)</strong></td>
<td>Use the Puget Sound Institute’s data on this indicator, if possible get data for just the Puyallup Watershed.</td>
</tr>
<tr>
<td><strong>Number of trips using transit</strong></td>
<td>Obtain information on use from Pierce Transit every year, analyze the data every other year.</td>
</tr>
<tr>
<td><strong>VMT Averted</strong></td>
<td>Calculate VMT averted every other year.</td>
</tr>
</tbody>
</table>

**Environmental**

| **The CO$_2$ emissions saved from VMT averted** | Calculate estimated CO$_2$ emissions saved from VMT averted every other year. |
| **Air Quality: PM$_{2.5}$ and ozone** | Obtain annual data from TPCHD’s Pierce County Environmental Health indicators report and Washington State Department of Health every other year. |

**Economic Impacts**

| **Gas money saved from VMT averted** | Calculate the estimated gas money saved from VMT averted every other year. |
| **Health care savings** | Calculate the estimated health care savings every other year. |
| **Economic expenditures by users** | Survey communities near newly implemented active transportation system facilities and activities. |

**Safety**

| **Perception of community safety** | Survey communities near newly implemented active transportation system facilities and activities. Contact the Puget Sound Institute to see if they are collecting data for this indicator. |
| **Bike/pedestrian injuries and fatalities** | Collect the bicycle and pedestrian annual data from Washington State Department of Health and analyze the data every other year. |

**Health Outcomes**

| **CHAT Data: Rates of diabetes rates, cancer rates, heart disease, depressive disorder, life expectancy** | Obtain updated data every other year from Washington State Department of Health |
| **BRFSS Data: Poor mental health days, Obesity, Diabetes** | Obtain updated data every other year from Washington State Department of Health. |
| **Drivers’ License Data: Body mass index** | Obtain updated data every other year from Washington State Department of Health. |

**Demographic Data**

Obtain updated demographic data as needed to evaluate priorities and needs.
Data and Analysis for Future Consideration

Long-term Data Wish List
This section lists data that are beyond the scope of this project to collect. However, if these data become available they should be considered for incorporating into the evaluation process because these measures are expected AT COI’s work plan outcomes.

- Walkability
- Bikeability
- Number of additional businesses catering to pedestrians and bicyclists
- Tax revenue (sales, property)
- Reduction in absenteeism in the work place
- Employee and employer attraction

Recommended Future Analysis
As data are tracked over time, we recommend comparing the baseline and future data to assess any possible changes and impacts the AT COI activities have had on the communities in the watershed. Since some data measures are influenced by a variety of factors, the data group also discussed comparing the changes in the Puyallup Watershed to other similar counties to try to assess what changes are due to the Puyallup Watershed Initiative. We identified Snohomish County and the entire Pierce County as candidates for comparing to the Puyallup Watershed.

When considering active transportation measures in the future, we recommend analyzing the use and density together. If an area has a high density of active transportation elements and low use of those facilities, we recommend considering programming, education, and outreach efforts to encourage more use. In addition, understanding any safety issues and perceptions of safety is also important. In areas where there are limited active transportation elements, we recommend that actions focus on improving the built environment and building a connected active transportation system.

Works Cited


