

Safer Streets Priority Finder (SSPF)

An opensource tool to estimate crash risk for pedestrians and bicyclists

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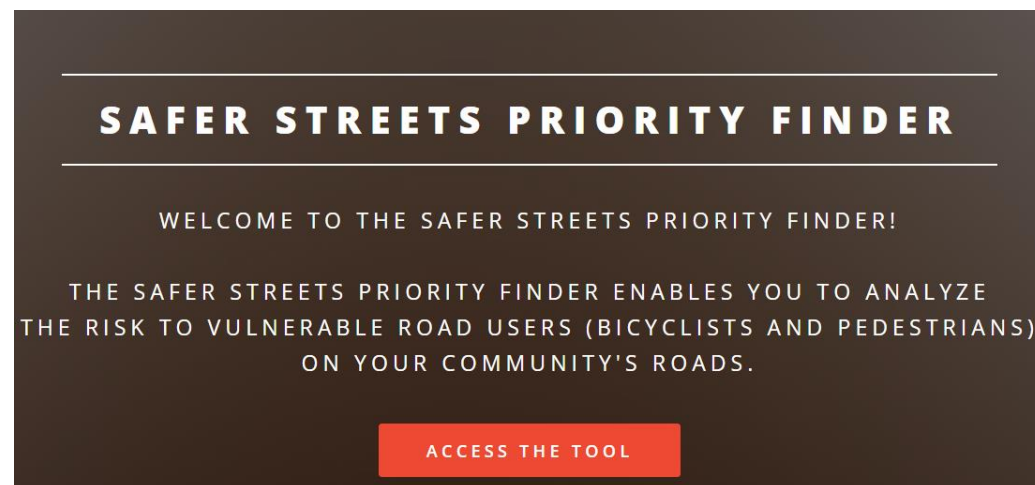
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What are we trying to solve with SSPF?

- Vision Zero is a **data-driven framework**. Existing methods are very data-intensive and require technical expertise to use
- Need a tool for assessing safety priorities that
 - is open-source
 - is easy to use without complex GIS knowledge
 - goes beyond just crash history
 - can be linked to the planning process

Overview of SSPF

- Browser-based tool to estimate segment-level crash risk
- Accessible at <https://www.saferstreetspriorityfinder.com/>
- Funded by USDOT's Safety Data Initiative Grant
- Project Team
 - Toole Design
 - City of New Orleans
 - New Orleans Regional Transit Authority
 - University of New Orleans Transportation Institute



Overview of SSPF



2022 Excellence in Transportation Awards

TRANSPORTATION ACHIEVEMENT AWARD — SAFETY

TOOLE DESIGN FOR THE DEVELOPMENT AND USE OF THE SAFER STREETS PRIORITY FINDER (SSPF)

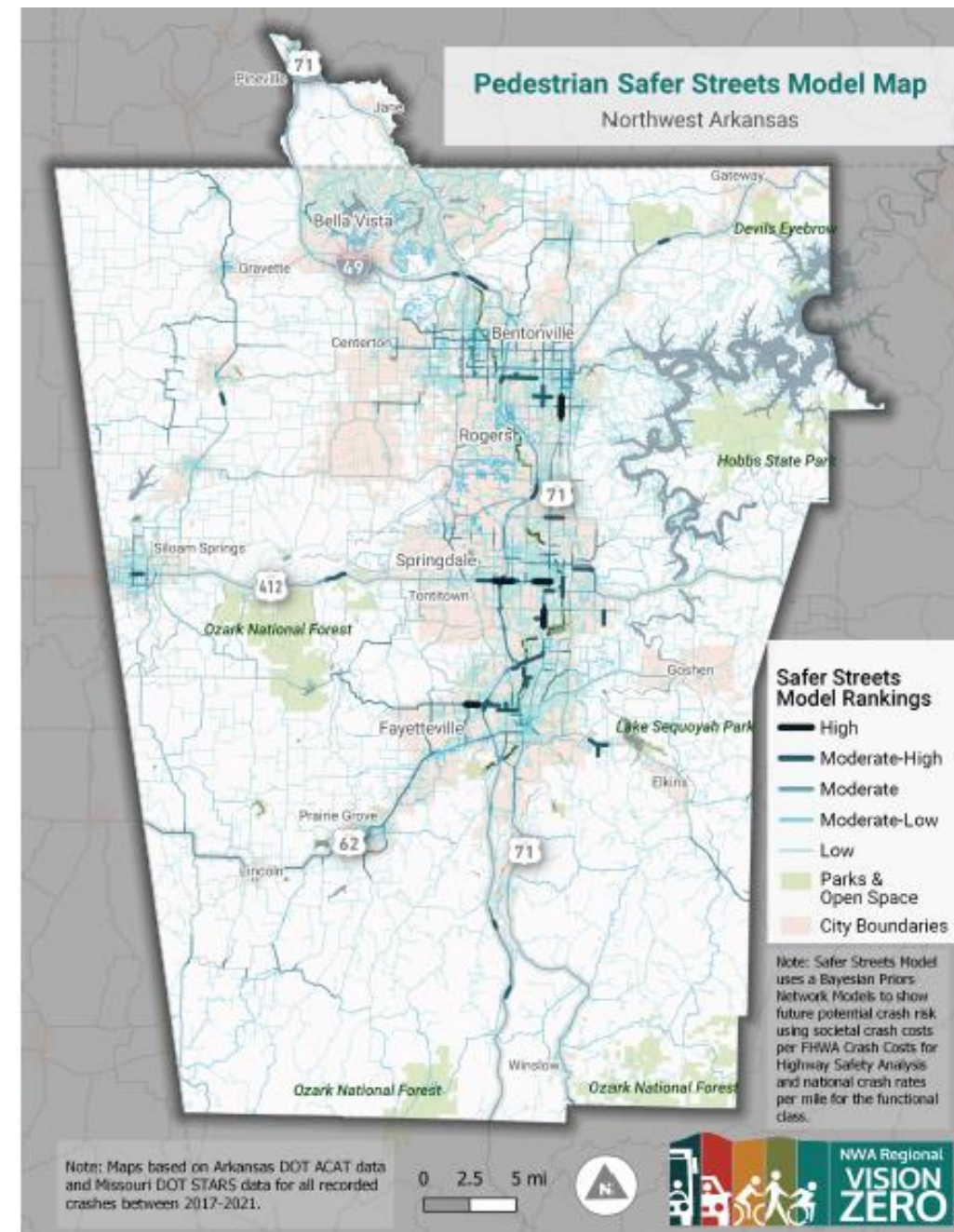


Toole Design has received a 2022 Transportation Achievement Award in the Safety Category for the Development and Use of the Safer Streets Priority Finder (SSPF), an open-source tool to conduct analysis using highly complex approaches for identifying unsafe locations to vulnerable road users. The



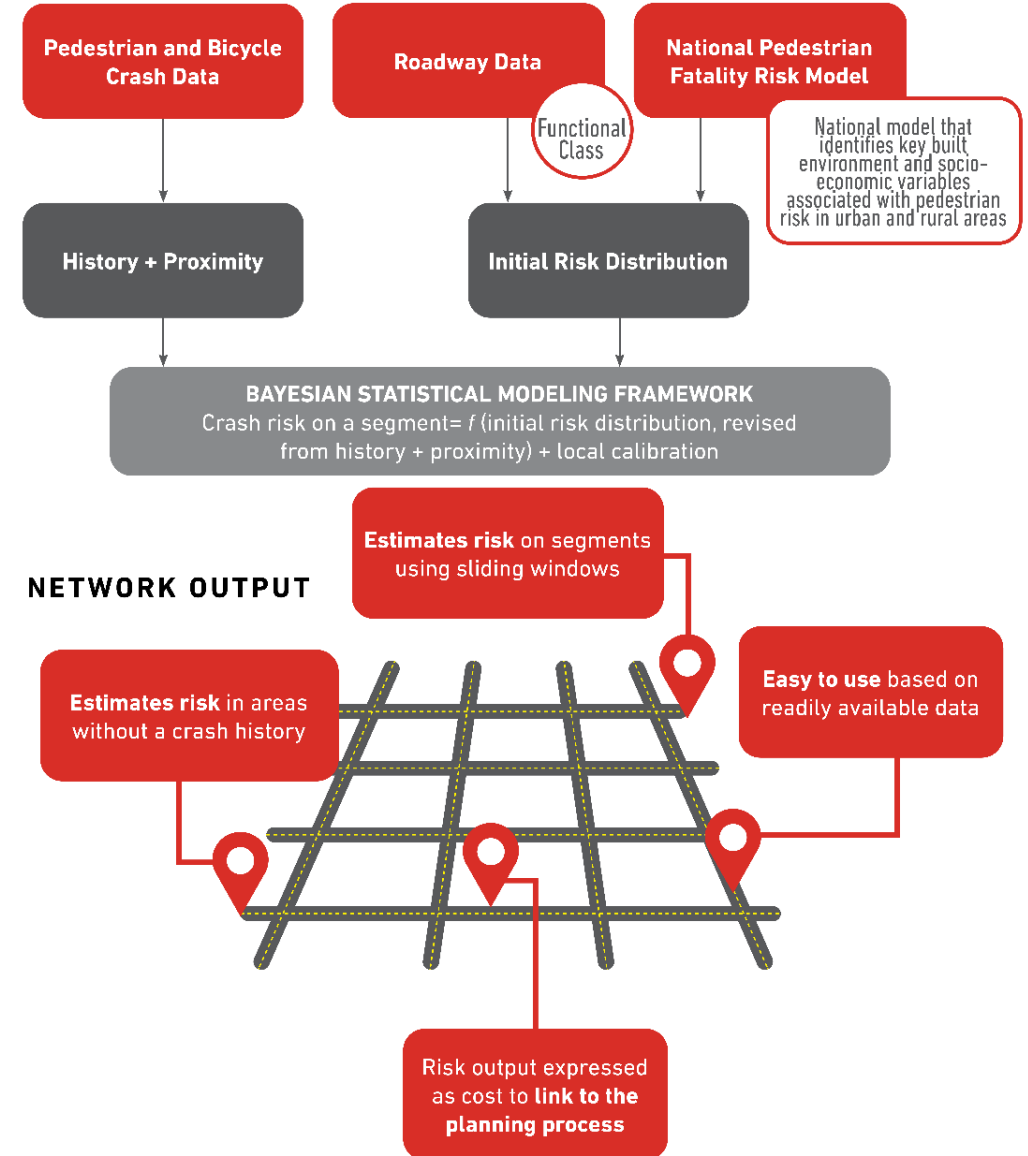
Usage of the Tool

- 1045 distinct email addresses
- 1729 distinct studies
- Users are from all over the nation, including researchers, consultants, agency staff, etc.



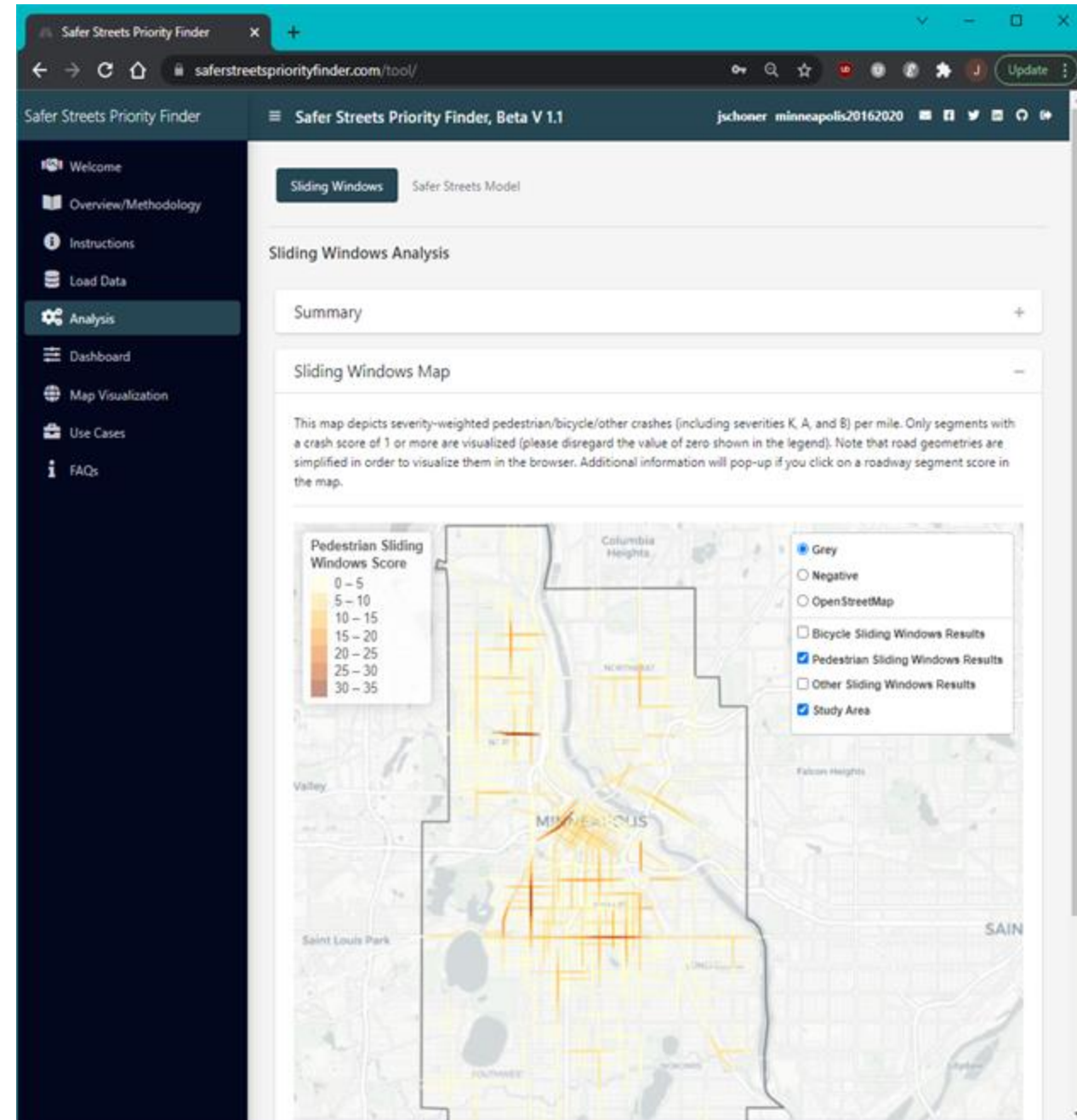
Main Components

1. Sliding Windows Analysis for identifying **historic crash density**
2. Bayesian Model for estimating **future crash risk**



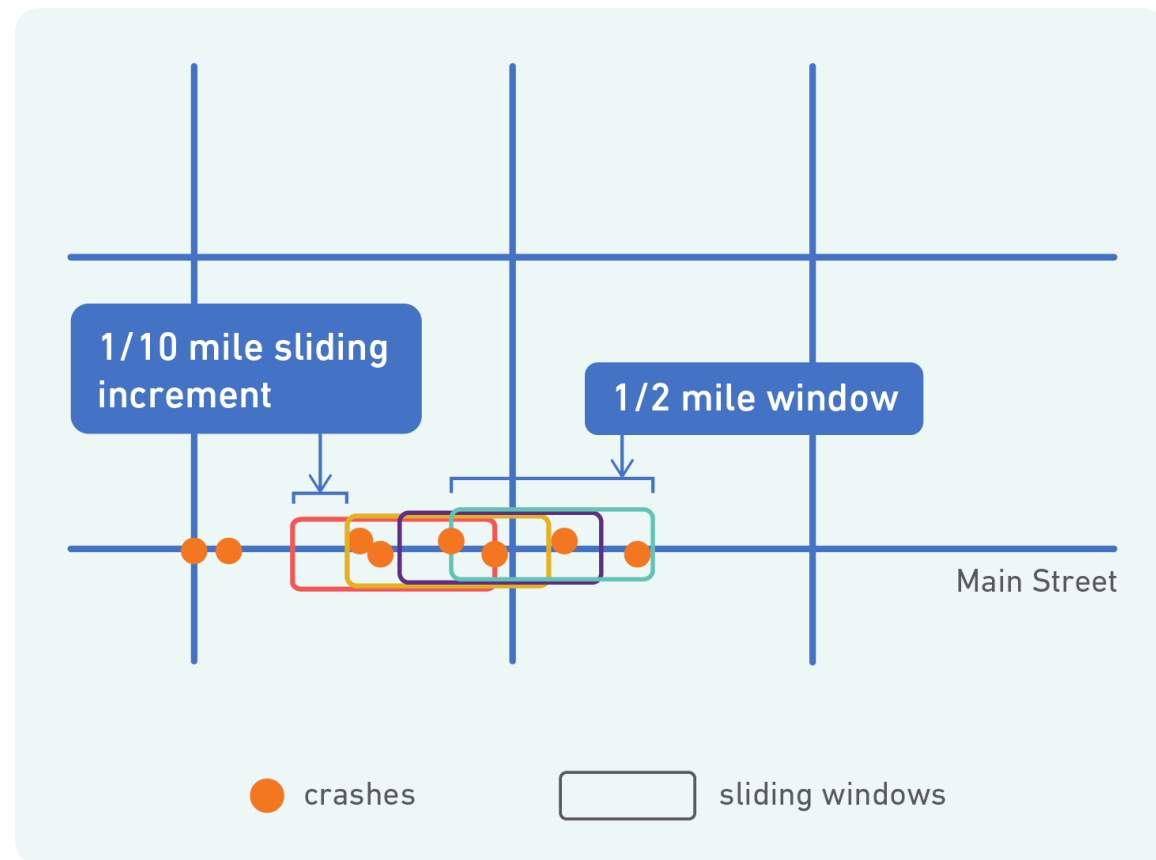
Sliding Windows Analysis

- This step uses users' crash data (or FARS data) to map severity-weighted crash density in sliding windows along the roadway network.
- This is the “foundation” of a **High Injury Network**
- This looks only at historical crashes.
- This analysis is available for all modes.



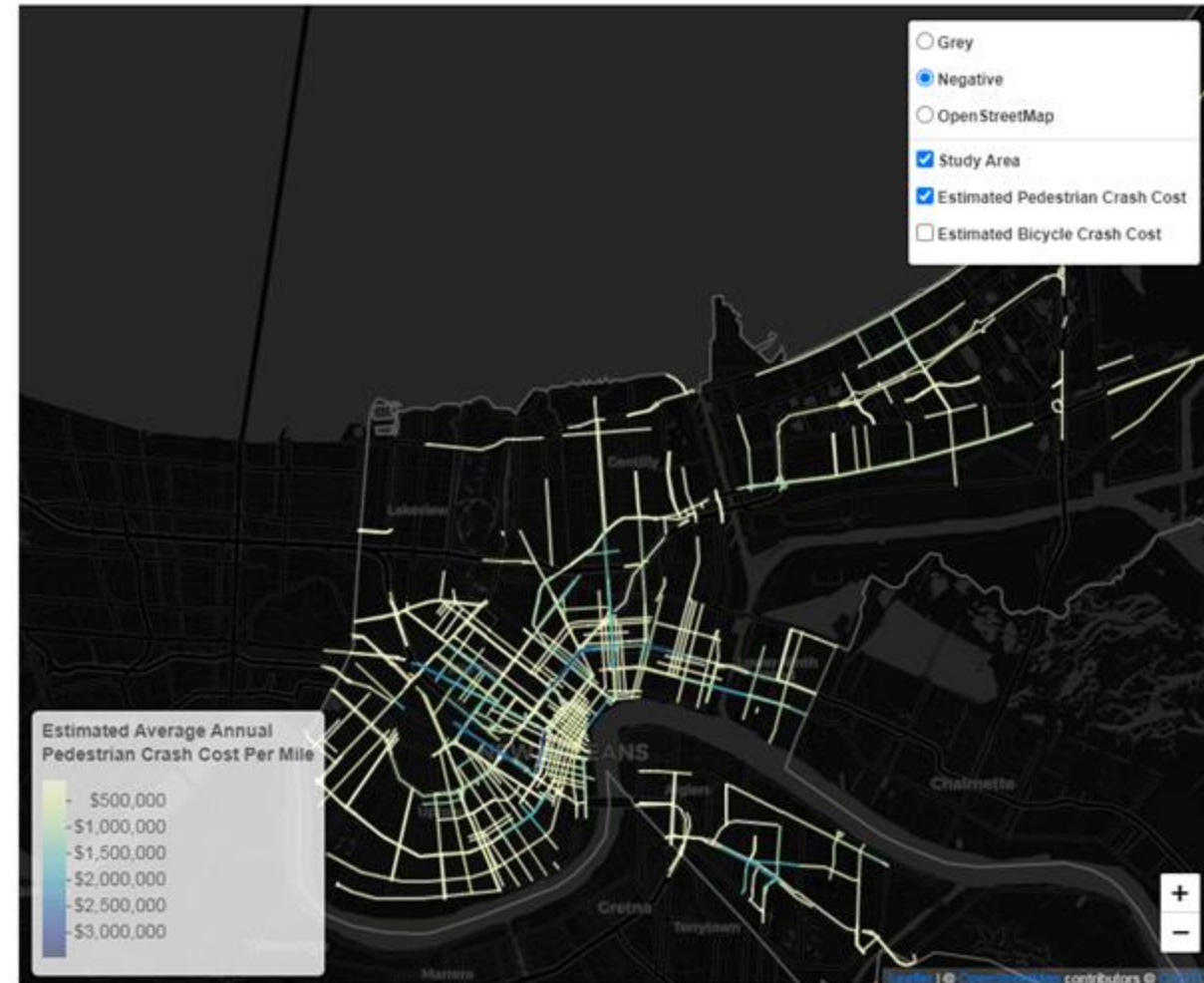
Sliding Windows Analysis

- Measuring crash density along network corridors
- If many fatal and serious injury crashes occur in close sequence along the roadway, underlying roadway characteristics that are shared along the corridor are likely contributing to the safety problem
- **Sliding Windows Analysis vs simple hotspot analysis:**
 - Hotspot analysis may miss underlying roadway conditions since crashes are stretched along a length of roadway rather than concentrated in a single discrete location
 - An analysis looking at road segments between intersections may also miss the pattern spanning across multiple intersections in sequence



Safer Streets Model

- Bayesian model **estimates possible future crash risk**, informed by two key pieces of information and user-submitted crash data:
 - Estimate the number of crashes within a Census tract, from the Pilot Fatality Risk Map Model (a prior USDOT effort)
 - National average rate of fatal crashes per mile on a roadway based on its functional class
- Results are available as the cost of crashes along the roadway network.
- The model highlights sections of the roadway that have a heightened risk, even if a crash hasn't happened yet.



SSPF Results

- Online Dashboard
- PDF Report
- Detailed output shapefiles

EXPLORE

Create descriptive statistics related to your crash data.

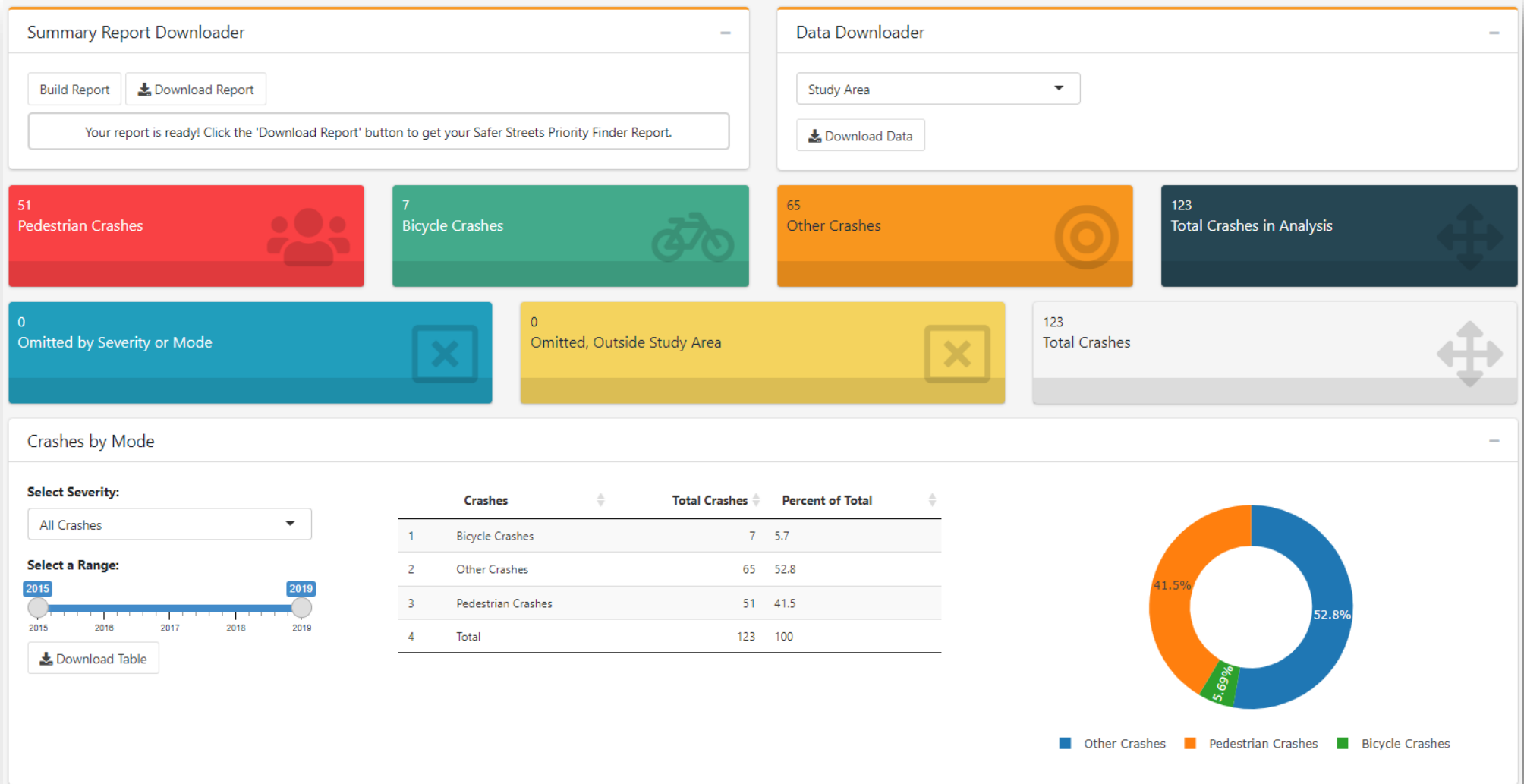
INSPECT

Develop a Sliding Windows Analysis using historical crash data to inform a High Injury Network.

ASSESS

Develop a Safer Streets model to estimate risk along your road network, even in areas that haven't had any reported crashes recently.

SSPF Results

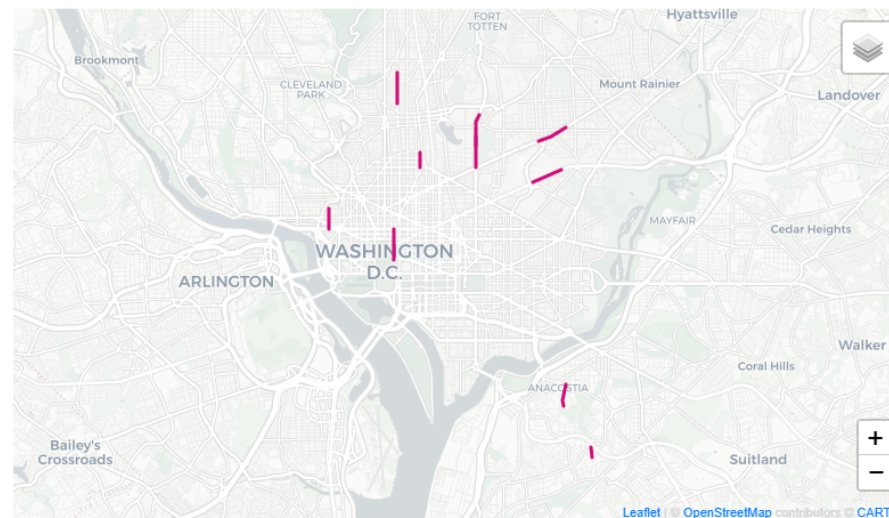


SSPF Results

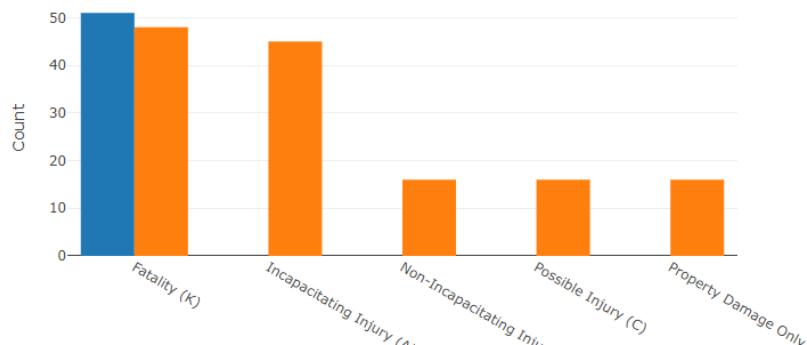
Top Ten by Pedestrian Sliding Windows Score

This analysis uses the sliding window output but only lists the segments with the highest observed score.

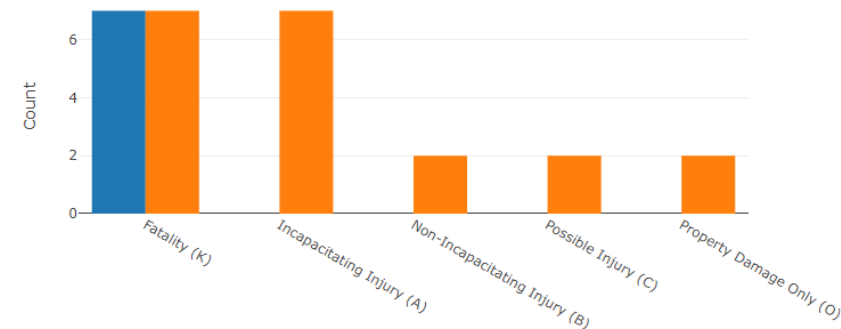
	Name	Functional Class	Crash Score
1	rhode island avenue northeast	Major Arterial	9
2	new york avenue northeast	Major Arterial	6
3	14th street northwest	Major Collector	6
4	north capitol street northwest	Major Arterial	6
5	north capitol street northeast	Major Arterial	6
6	22nd street southeast	Local Road	3
7	10th street northwest	Local Road	3
8	25th street northwest	Local Road	3
9	15th street northwest	Major Arterial	3
10	16th street southeast	Local Road	3



Safer Streets Model Fit: Pedestrian



Safer Streets Model Fit: Bicycle



Limitations

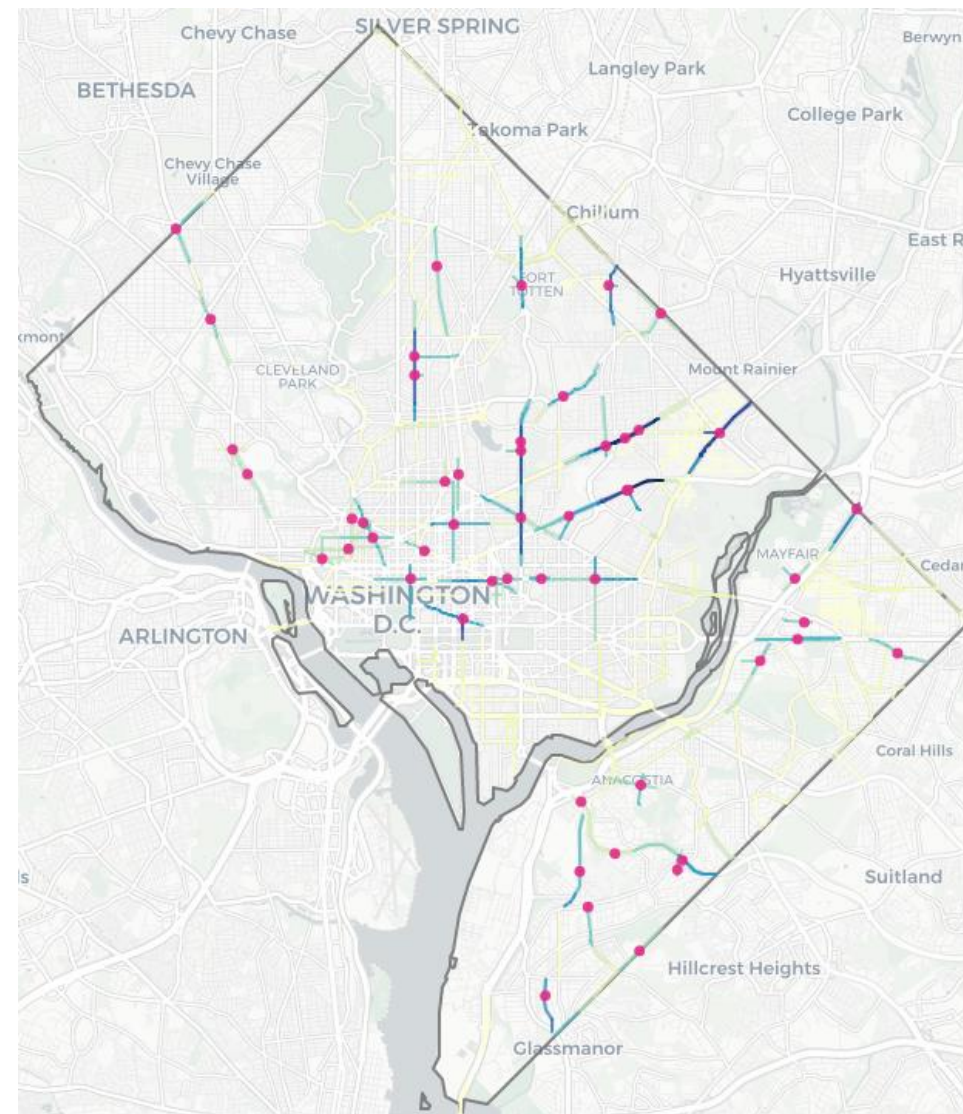
- The current Safer Streets Model is ONLY for pedestrian and bicycle, not other modes
- Not suitable for large areas (larger than a county typically)
- Does not explicitly measure context like lanes, AADT, etc
- Poor quality crash data can give inaccurate results (errors in geocoding, mislabeled mode/severity, etc)

Next Steps – SSPF Phase II

- Develop tract-level fatal crash models for all three modes (motor vehicle, bicycle, and pedestrian)
- Update Bayesian models for all three modes to estimate segment-level crash risks
- Refine rural validation and calibration
- Improve the stability of model runs
- **Tool Feature Update**
 - Dashboard enhancement
 - Customizable sliding window lengths
 - Customizable results export and reports
 - Additional input data validation
 - ...

What can you use SSPF for?

- **Leverage** local data or use open public data
- **Explore** crash summary statistics in your study area
- **Inspect** historical crash trends on your network using Sliding Windows Analysis to build a High Injury Network
- **Assess** risk estimates along the network using the Safer Streets model, even in areas that haven't had any reported crashes recently



Input Needs

- Crashes
 - 5 years of data
 - Separated by mode (bike, ped, other)
 - Severity of injury (KABCO scale)
- Street Network
 - Functional class
 - Street Name
- Study Area Boundary

The screenshot shows the 'Safer Streets Priority Finder' web application. The interface has a dark blue sidebar on the left with a menu containing: Welcome, Overview/Methodology, Instructions, Load Data (highlighted), Analysis, Dashboard, Map Visualization, Use Cases, and FAQs. The main content area has a top header 'Safer Streets Priority Finder, Beta V 0.40' and a navigation bar with buttons: 'Load Study Area →', 'Load Roads →', 'Load Crashes →', and 'Confirm Input Data'. Below this is an 'Introduction' section with a bullet point: 'You can either choose from a US Census county/parish or upload your own study area.' and an 'Instructions' button. The next section is 'Select a US Census county boundary or upload your own study area'. Under 'Make a choice:', there are two radio button options: 'Nationally Available County Boundary' (unselected) and 'Local Study Area Boundary' (selected). A 'Select This Source' button is located below these options.

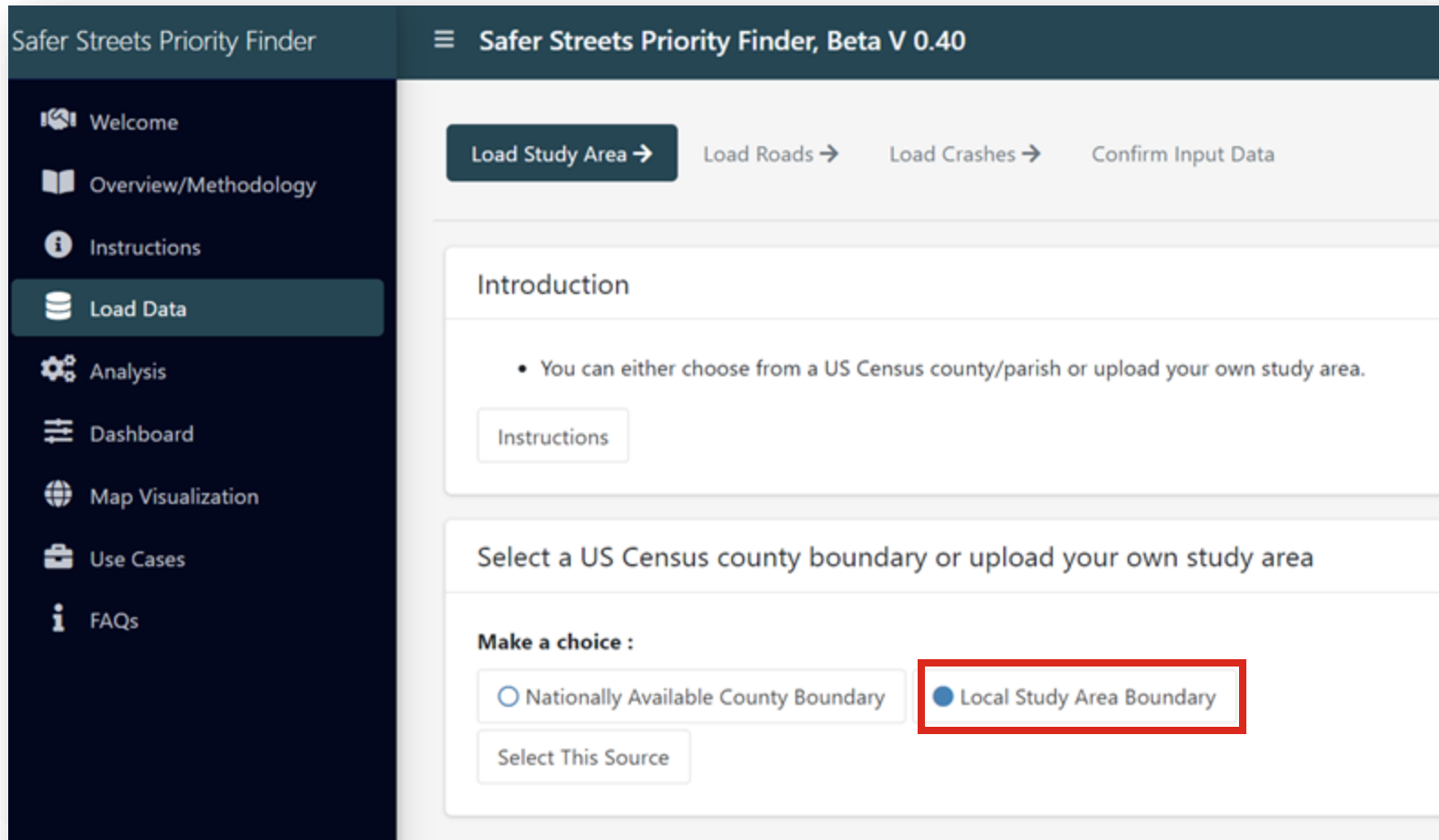
What if I don't have my own data?

- The tool has the following built-in data
 - Study area boundary – county level only
 - Road Network – OpenStreetMap data
 - Crashes – FARS data
 - ✓ Limited to fatal crashes from 2015 to 2019
 - ✓ Results can be of very limited use with this data

Entering user input data

- **Shapefile of study area boundaries**
 - No larger than 1 county (at a time)
- **Shapefile of crashes in your study area**
 - Must have fields describing mode, severity, year, and unique ID
- **Shapefile of roads in your study area**
 - Must have fields describing functional class, roadway name, and unique ID

Loading Local Study Area Boundary



The screenshot displays the 'Safer Streets Priority Finder, Beta V 0.40' web application. On the left is a dark sidebar with a menu containing: 'Welcome', 'Overview/Methodology', 'Instructions', 'Load Data' (highlighted), 'Analysis', 'Dashboard', 'Map Visualization', 'Use Cases', and 'FAQs'. The main content area has a top navigation bar with links: 'Load Study Area →', 'Load Roads →', 'Load Crashes →', and 'Confirm Input Data'. Below this is an 'Introduction' section with a bullet point: 'You can either choose from a US Census county/parish or upload your own study area.' and an 'Instructions' button. The next section is titled 'Select a US Census county boundary or upload your own study area'. Under the heading 'Make a choice:', there are two radio button options: 'Nationally Available County Boundary' and 'Local Study Area Boundary'. The 'Local Study Area Boundary' option is selected and highlighted with a red rectangular box. Below these options is a 'Select This Source' button.

Safer Streets Priority Finder

Safer Streets Priority Finder, Beta V 0.40

Load Study Area → Load Roads → Load Crashes → Confirm Input Data

Introduction

- You can either choose from a US Census county/parish or upload your own study area.

Instructions

Select a US Census county boundary or upload your own study area

Make a choice :

☐ Nationally Available County Boundary ☒ Local Study Area Boundary

Select This Source

Loading Road Data

More Risk	Minor Arterial
↕	Major Arterial
	Major Collector
	Minor Collector
Less Risk	Local Road

unique ID column	name column	functional class column
streetid	name	class
345	River	Primary Arterial
346	Rockpile	Local
347	Dutcher Creek	Major Collector
348	Asti Post Office	Local
349	Theresa	Local
350	Hot Springs	Local
351	Theresa	Local
352	Theresa	Local
353	Theresa	Local
354	Theresa	Local
355	Theresa	Local

Where do you get crash data?

- Texas: TxDOT CRIS Query Tool
 - <https://cris.dot.state.tx.us/public/Query/app/home>



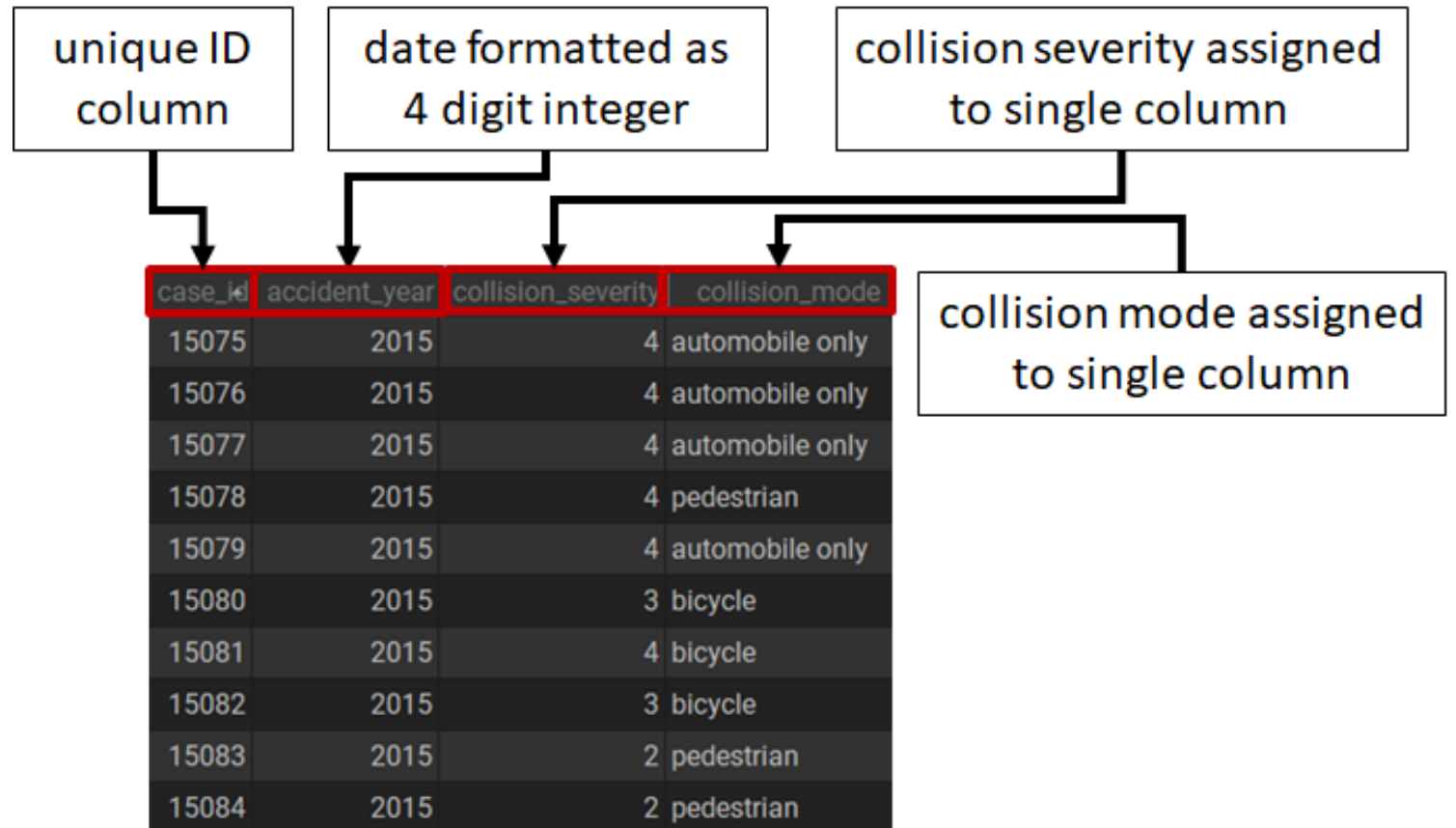
- Other states:
 - <https://www.saferstreetspriorityfinder.com/tool/crashdatasources/>

Crash Data Sources, by State

State	Crash Data Portal/Site	Geospatial Data Publicly Available	Notes
Alabama	AL Safety Portal	No	Dashboard and summary data only; spatial data available through CARE with signed data use agreement
Alaska	Alaska Highway Safety Office - Motor Vehicle Crash Data	No	PDF reports only
Arizona	ADOT Arizona Motor Vehicle Crash Facts	No	Detailed data available through public records request
Arkansas	ACAT (Arkansas Crash Analytics Tool)	Limited	Fatal and Serious Injury crashes mapped - downloadability unclear
California	SWITRS (Statewide Integrated Traffic Records System)	Yes	Comprehensive relational database files available with registration
Colorado	Colorado DOT Crash Data	Limited	Custom data available upon request only; limited spatial data
Denver	Denver Open Data Catalog	Yes	Tabular or Shapefile downloads available
Connecticut	Connecticut Crash Data Repository	Yes	Detailed data available through query tool with registration
Delaware	DeIDOT Dashboard	Limited	Crash data available by request with notarized data release agreement; request Portal under development as of 2019
Florida	FDOT State Safety Office	Yes	Shapefiles and tabular data available via Open Data Hub
Georgia	GDOT Crash Data Dashboard	No	Detailed data available through public records request

Loading Crash Data

Injury Severity	
Fatal	K
Incapacitating	A
Non-incapacitating	B
Possible	C
Property Damage Only	O



source: Statewide Integrated Traffic Records System

Loading Crash Data

Please select the severity, mode, year, and crash report ID attributes from your crash data.

<p>Select the Crash Severity Attribute</p> <p>Select the attribute associated with the highest severity of the crash (i.e., Fatality, Incapacitating Injury, etc).</p> <p>Crash Severity</p> <p>severity ▼</p>	<p>Select the Mode Attribute</p> <p>Select the attribute associated with the crash mode (i.e., Pedestrian, Bicyclist, Motor Vehicle).</p> <p>Crash Mode</p> <p>type ▼</p>
<p>Select the Report ID Attribute</p> <p>This must be unique for each crash.</p> <p>Report ID</p> <p>crash_id ▼</p>	<p>Select the attribute associated with the year</p> <p>Select the attribute associated with the crash year. This must be a four-digit integer value.</p> <p>Year Attribute</p> <p>year ▼</p>

[Go Back](#) [Next](#)

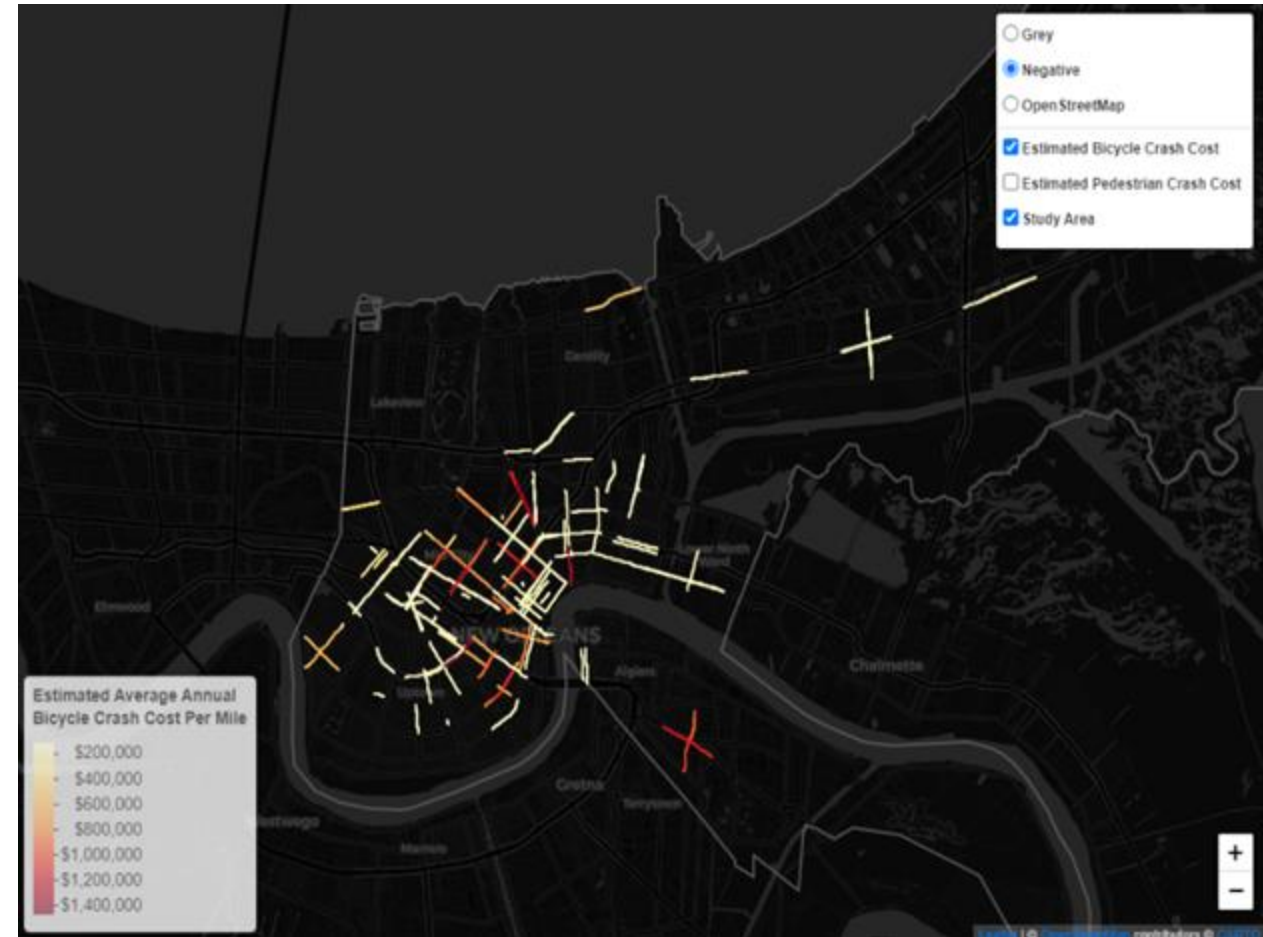
Project types that can use SSPF

- Any project that has a pedestrian and/or bicycle safety component, such as
 - Vision Zero Action Plan or Local Road Safety Plan
 - An annual report of a Vision Zero Action Plan
 - Active Transportation Plan
 - Transportation Master Plan
 - ...

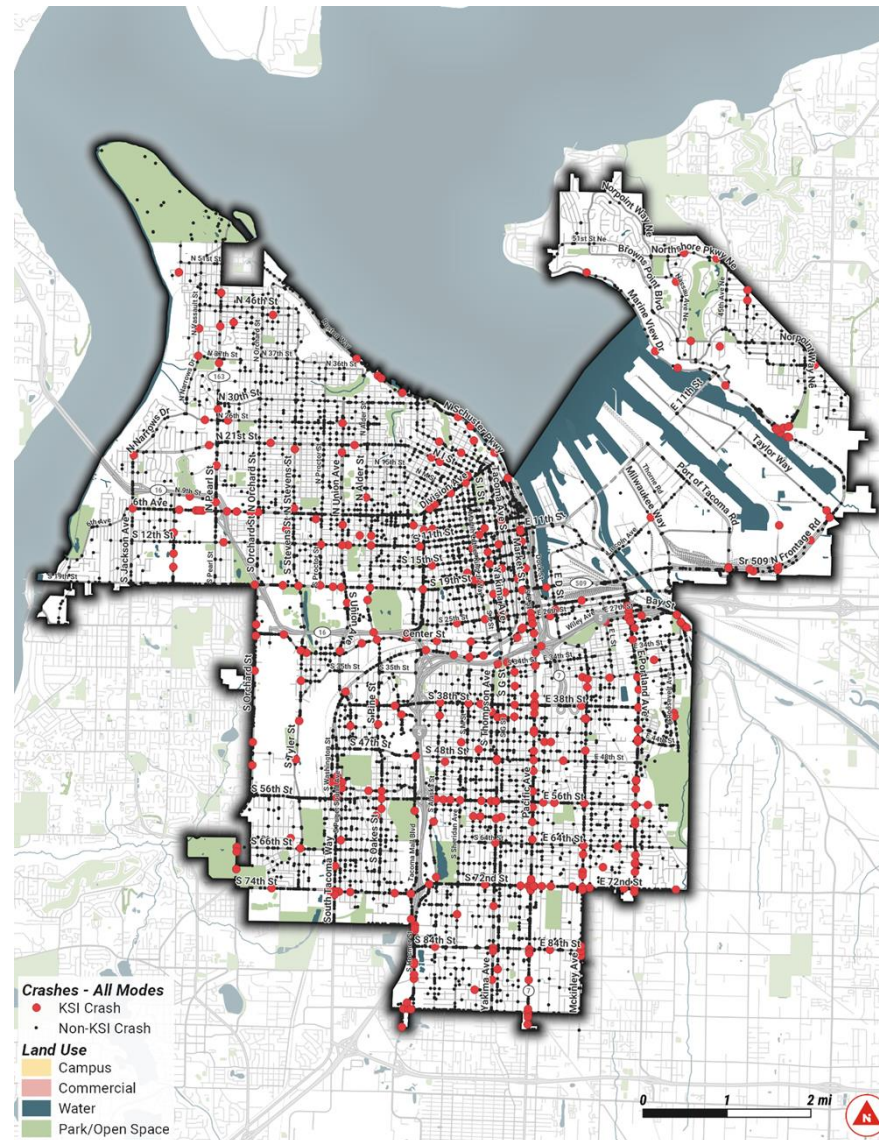


Use Case Example - City of New Orleans

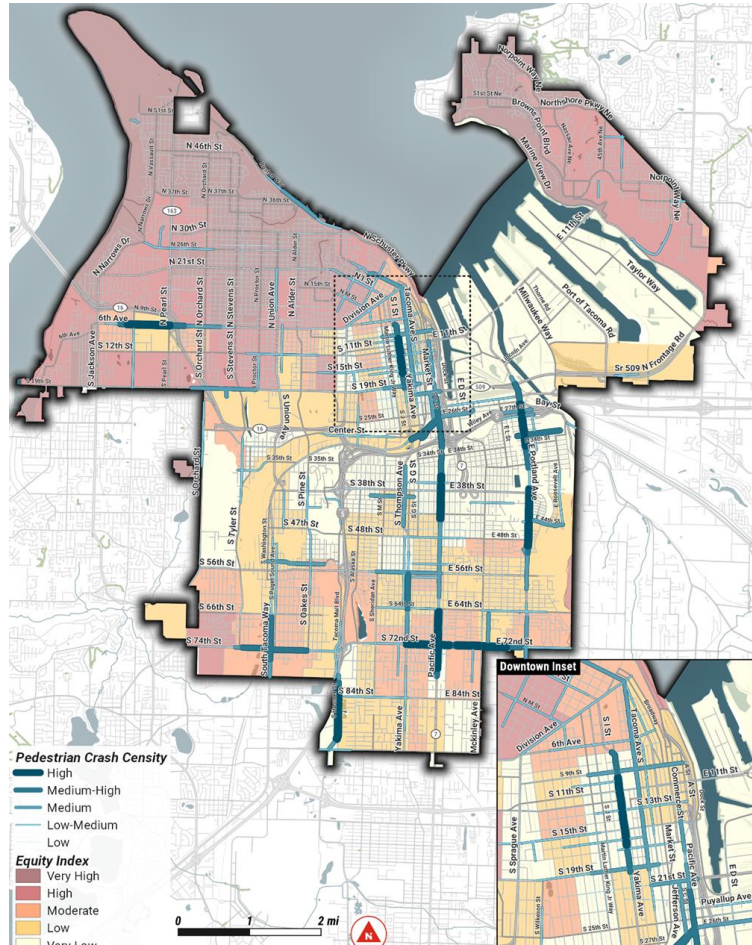
- Build on previous efforts that identified hotspots and intersections
- Foundation for advancing Mayor's Moving New Orleans Action Plan safety vision via high-injury network and Vision Zero plan
- Strengthen data-driven project identification and funding decisions among agencies and partners
- Baseline for project impact evaluation
- Estimate of “no action” alternative costs at corridor level, citywide



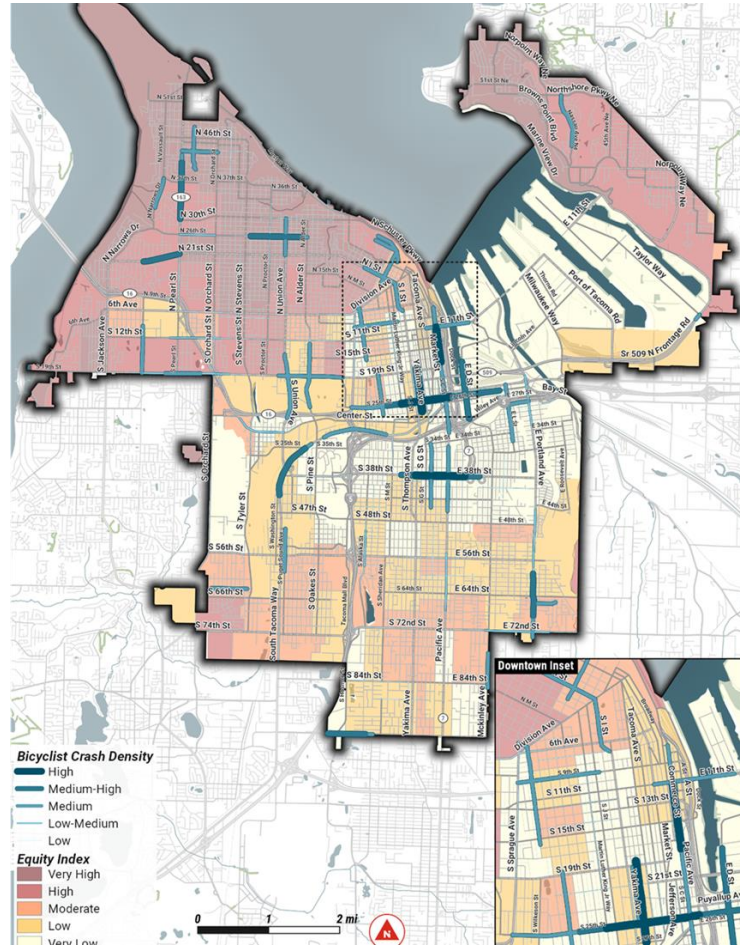
Use Case Example – Tacoma, Washington



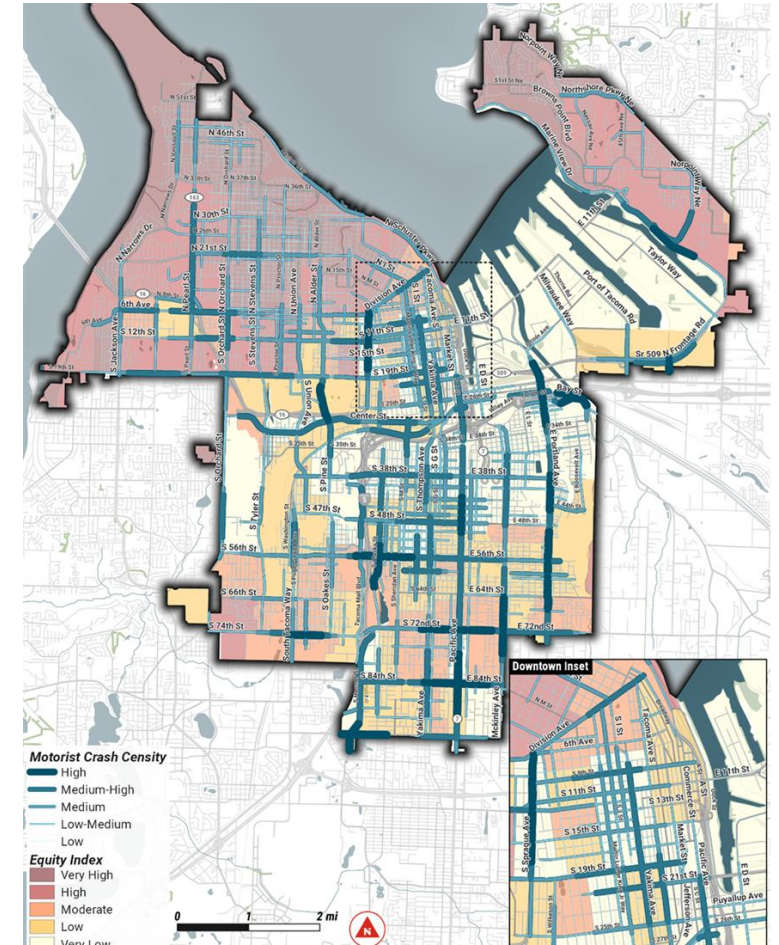
Pedestrian



Bicyclist

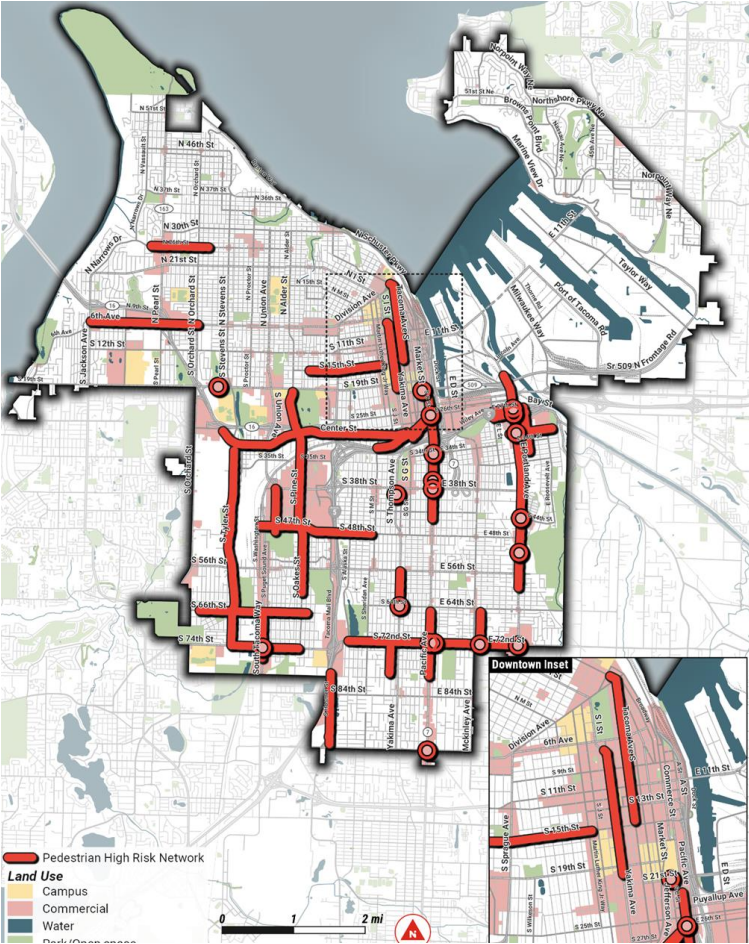


Motorist

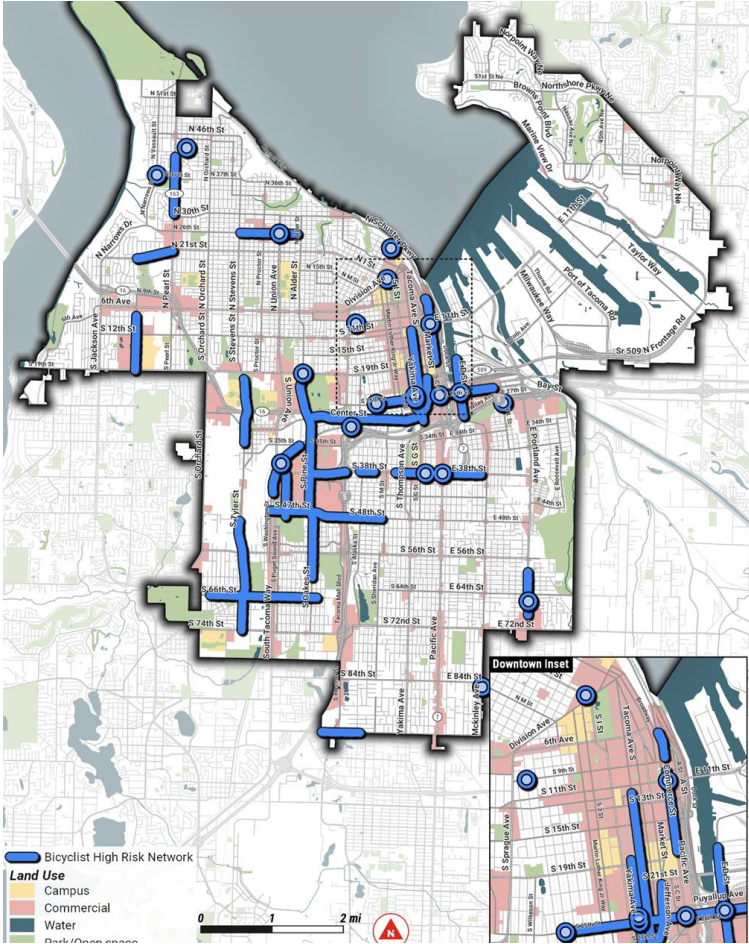


Sliding Windows Analysis – Weighted Crashes per Mile

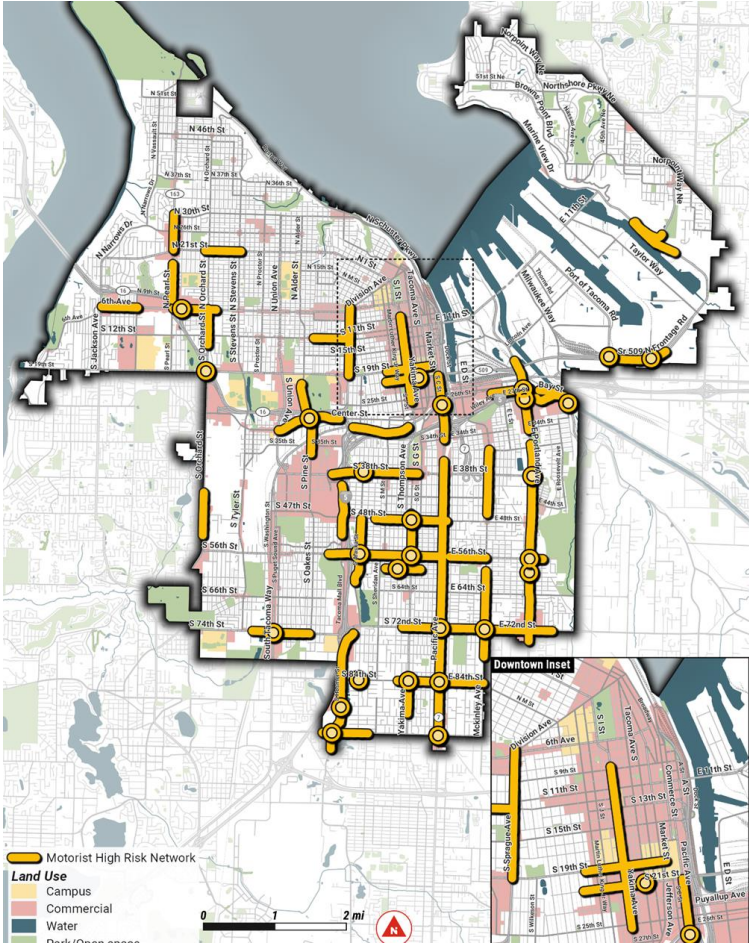
Pedestrian



Bicyclist

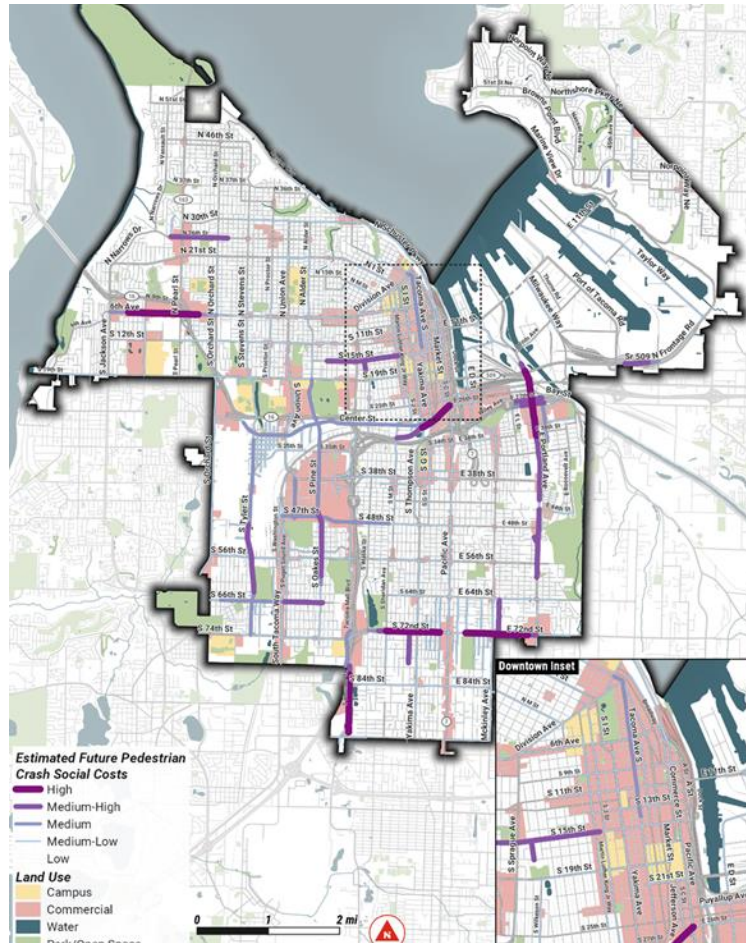


Motorist

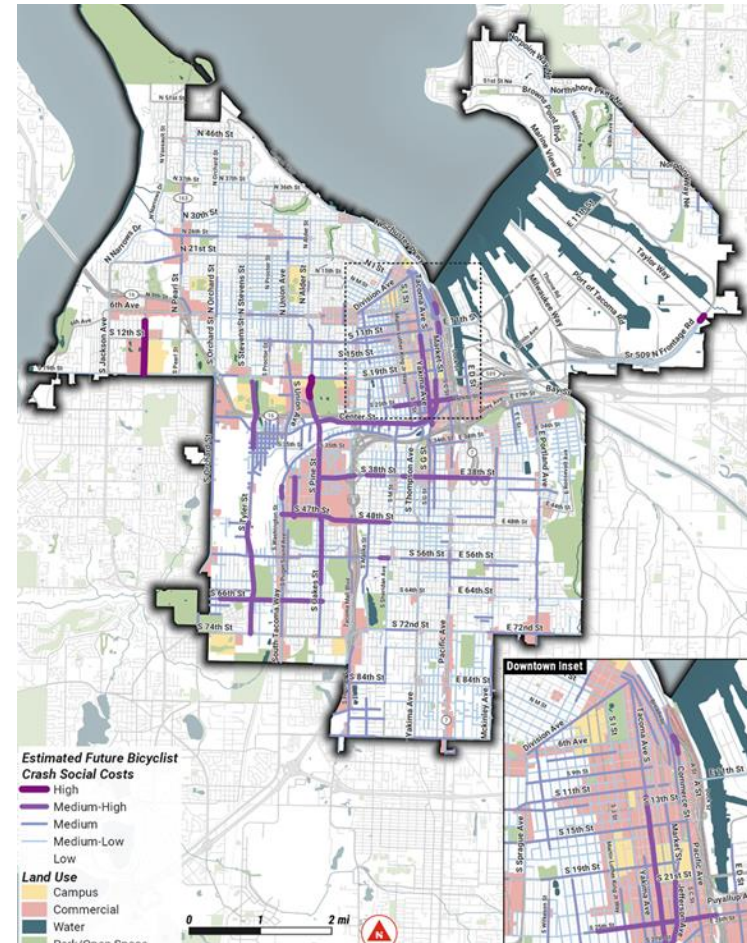


High Injury Network

Pedestrian



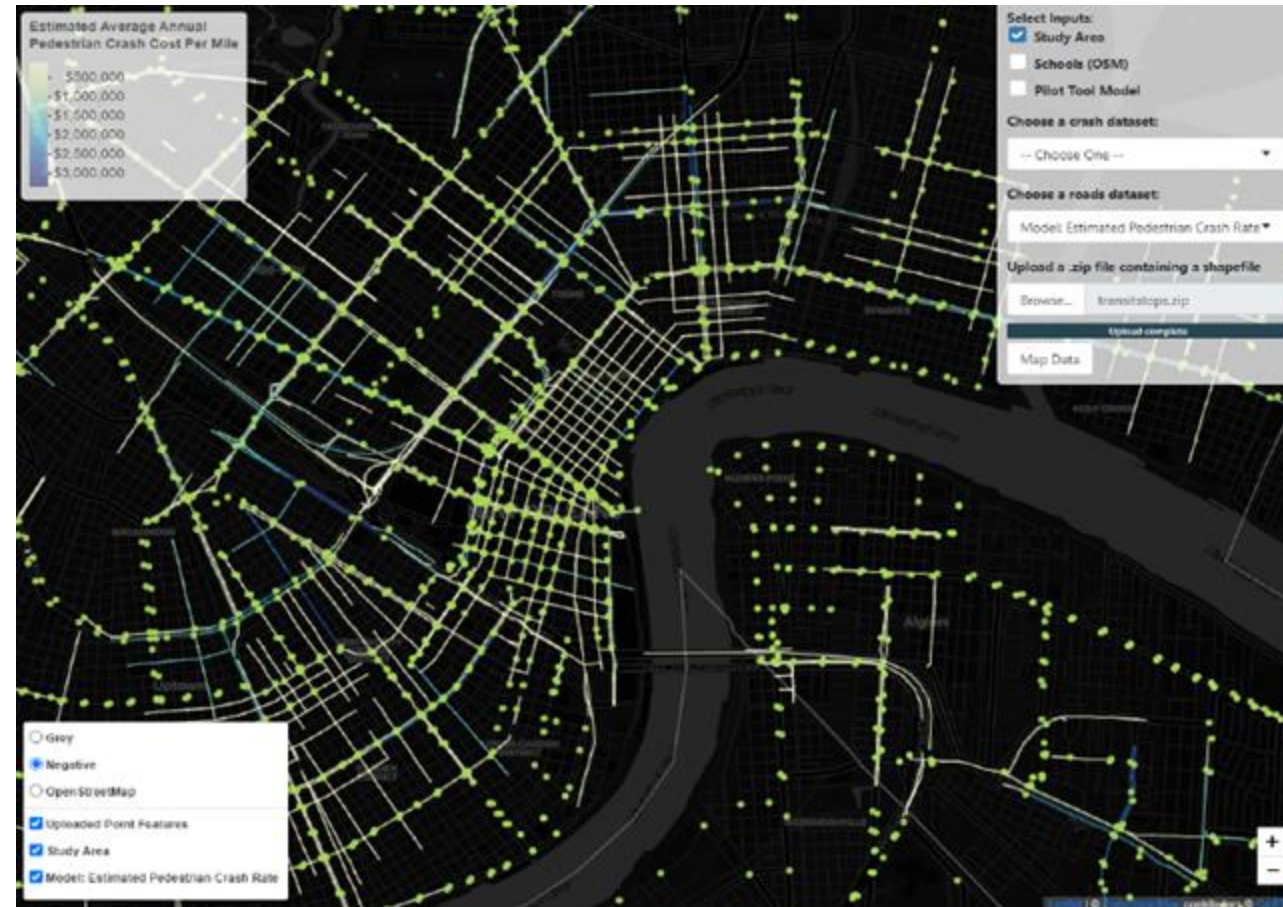
Bicyclist



Safer Street Model – Estimated Future Crash Risk / High-Risk Network

Use Case Example - New Orleans RTA Transit System Rider Safety and Operator Training

- Map crashes against transit ridership — areas of both high ridership and high crash frequency
- Prioritize systemic safety issues on transit routes, including crashes involving transit vehicles
- **Outputs:**
 - roadmap of high-priority areas to advocate for safety improvements for riders
 - framework for equitable investment and evaluation
 - analysis of systemic risks on transit routes & mitigation training for operators





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Thank you

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