Montgomery County Bicycling Crash Data Analysis

Montgomery County Police Department

Department of Transportation

8/7/2012

CountyStat

CountyStat Principles

- Require Data-Driven Performance
- Promote Strategic Governance
- Increase Government Transparency
- Foster a Culture of Accountability

Meeting Goal

- **Meeting Goal:**
  - Review bicycle crash information of other jurisdictions including those with bike sharing programs to assess if Montgomery County should expect an increase in occurrences when establishing a bike share program
  - Review overall bicycle crash data in the County to inform the development of a bicycle safety strategy

- **How we measure success:**
  - Identify high incident areas for targeted monitoring.
  - Identify recommendations to improve bicycle safety and reduce risks of accidents.

Meeting Agenda

- **Bicycle Crash Statistics for the State of Maryland**
- **Montgomery County Bicycle Crash Data**
  - High Incident Areas
  - Identification of crash variables
- **Bike Sharing Program Comparisons**
- **Implementation of Montgomery County's Bike Share Program**
- **Summary of Recommendations**
- **Wrap-Up and Follow-Up Items**

Data Caveats

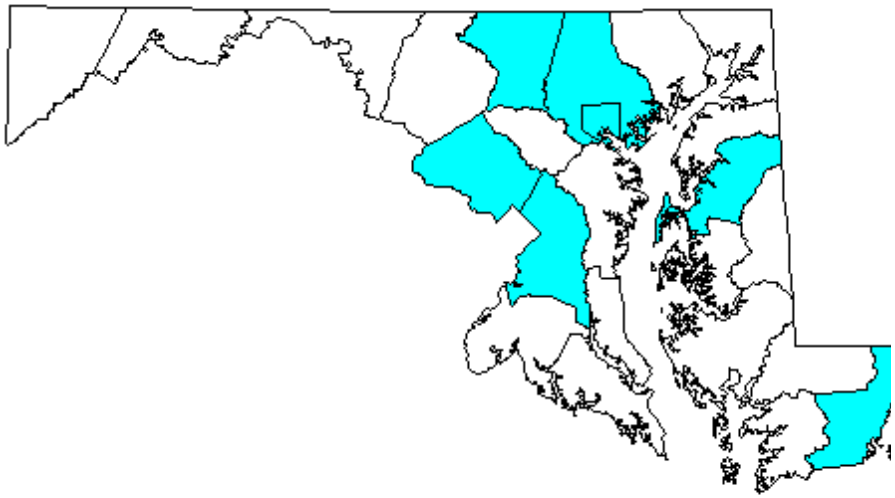
- **Bicycle Crash Data**
  - County crash data is from incidents reported to the police.
  - These incidents are usually more serious crashes involving car and bicyclist.
  - Often there are crashes not reported, leading to a apparently lower volume of incidents
    - Does not include pedestrian and bicycle incidences
    - Incidences not on a roadway are not usually reported, or captured by Park Police

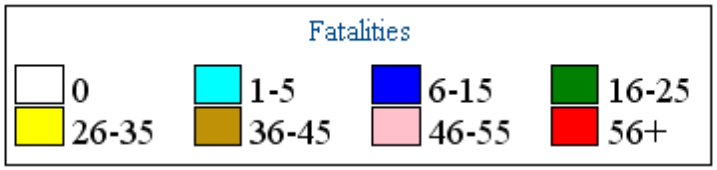
- **Bicycle Usage in Montgomery County**
  - Montgomery County's last count for bicycle usage was in FY2009.
  - Methodologies can vary between physical automated counters and using volunteers.

Analysis of bicycle crash data will not meet all standards of statistical rigor due to small sample sizes, but comparison over time will yield meaningful results

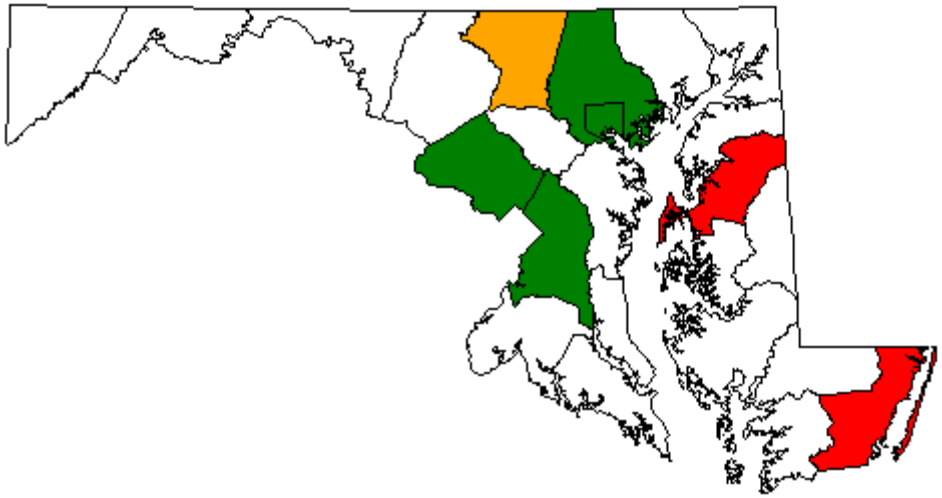
Maryland Pedalcyclist Fatalities by County for 2010

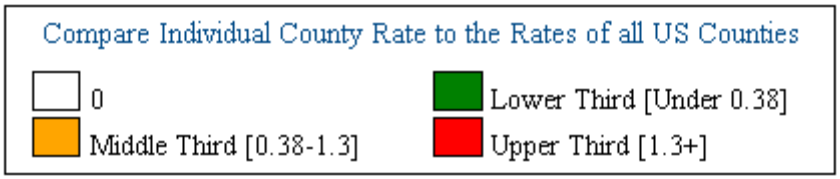
Pedalcyclist Fatalities





Pedalcyclist Fatalities per 100,000
(National Comparison)





Compared to National rates, Montgomery County is in the lower third tier of pedalcyclist fatalities

Source: National Highway Traffic Safety Administration

Maryland Pedalcyclist Fatalities by County

	2006	2007	2008	2009	2010	Total
Baltimore	0	1	2	0	1	4
Worcester	0	1	0	2	1	4
Carroll	2	0	0	0	1	3
Montgomery	0	1	0	1	1	3
Prince Georges	0	1	0	1	1	3
Anne Arundel	1	0	0	1	0	2
Calvert	1	0	1	0	0	2
Harford	0	1	1	0	0	2
Howard	1	0	0	1	0	2
Queen Anne	0	0	0	0	2	2
St. Mary	0	0	0	2	0	2
Charles	0	1	0	0	0	1
Frederick	1	0	0	0	0	1
Talbot	0	1	0	0	0	1
Wicomico	0	0	1	0	0	1

*** Jurisdictions with zero reported fatalities are omitted**

Source: National Highway Traffic Safety Administration

State of Maryland Data on Total Bicycle Crashes (1 of 2)

Jurisdiction	2006	2007	2008	2009	2010	Avg	Total	2010 Population	2010 Rate (per 100,000)
Worcester	25	30	40	18	22	27	162	51,454	43
Talbot	5	7	4	6	13	7	42	37,782	34
Baltimore City	180	170	192	170	168	176	1,056	620,961	27
Wicomico	18	21	16	25	24	21	125	98,733	24
Dorchester	9	15	4	6	6	8	48	32,618	18
Washington	25	21	23	16	23	22	130	147,430	16
Somerset	3	4	2	0	4	3	16	26,470	15
Cecil	9	8	12	9	13	10	61	101,108	13
Anne Arundel	85	87	88	80	69	82	491	537,656	13
Baltimore County	114	119	102	85	101	104	625	805,029	13

Source: State of Maryland; Population data from US Census Bureau

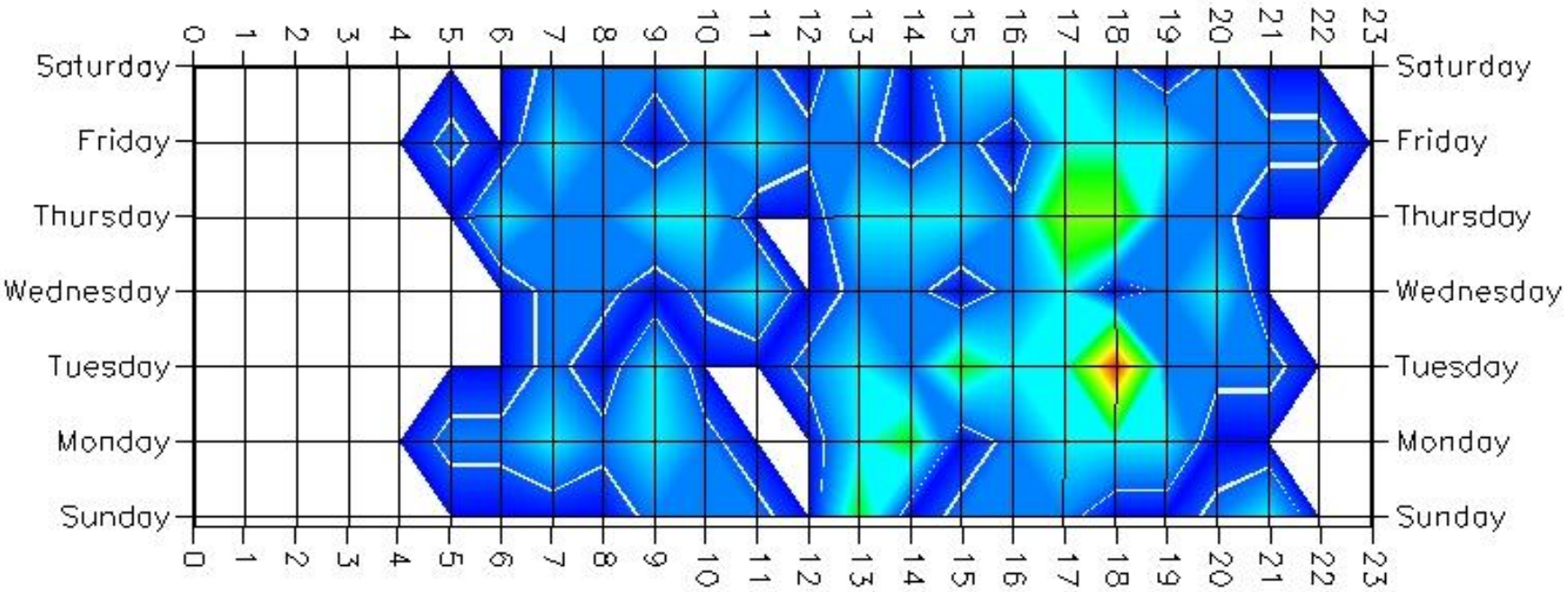
State of Maryland Data on Total Bicycle Crashes (2 of 2)

Jurisdiction	2006	2007	2008	2009	2010	Avg	Total	2010 Population	2010 Rate (per 100,000)
Montgomery	121	121	105	111	117	115	690	971,777	12
Howard	18	30	15	15	27	21	126	287,085	9
Harford	25	21	21	12	23	20	122	244,826	9
Prince George's	98	99	104	78	75	91	545	863,420	9
Queen Anne's	4	3	3	3	4	3	20	47,798	8
Charles	9	8	10	14	12	11	64	146,551	8
St. Mary's	6	5	15	5	8	8	47	105,151	8
Allegany	3	0	3	1	4	2	13	75,087	5
Frederick	16	16	16	18	12	16	94	233,385	5
Calvert	8	8	8	2	4	6	36	88,737	5
Carroll	12	11	8	8	5	9	53	167,134	3
Kent	1	4	3	1	0	2	11	20,197	0
Caroline	0	1	3	2	0	1	7	33,066	0
Garrett	0	0	2	1	0	1	4	30,097	0

Source: State of Maryland; Population data from US Census Bureau

Police Analysis of 2011 Montgomery County Bike Crash Data: Time of Day / Day of Week

Most bicycle collisions occur afternoon to early evening on weekdays, with the greatest cluster seen on Tuesdays around 6 PM

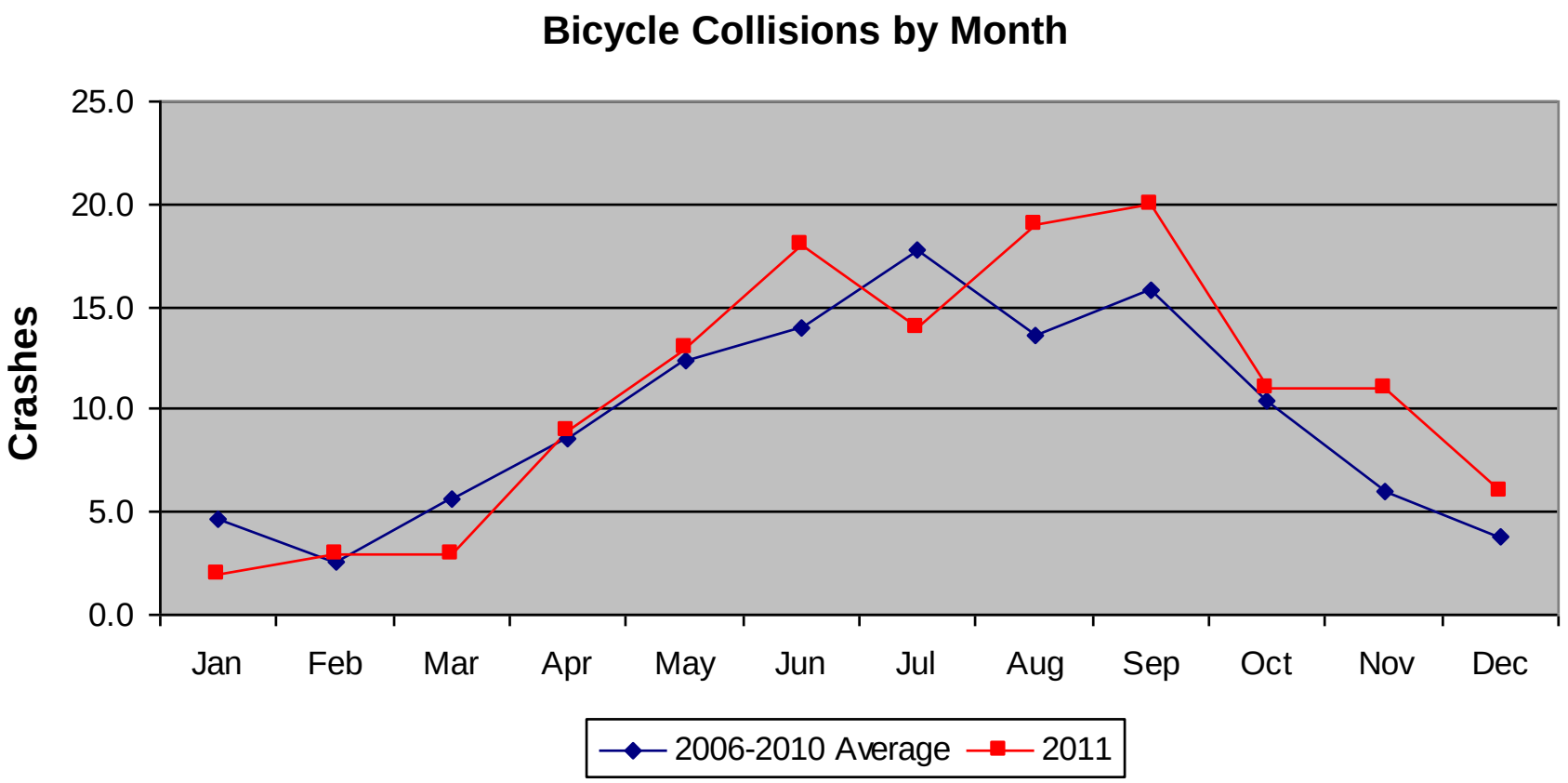


In 2011, 76.7% of bicycle collisions occurred during daylight hours

Source: Montgomery County Police Department, 2011 Bicycle Collisions

Police Analysis of 2011 Montgomery County Bike Crash Data: Time of Year

Summer months have higher occurrences of crashes.
This corresponds with reports from other jurisdictions.



Source: Montgomery County Police Department, 2011 Bicycle Collisions

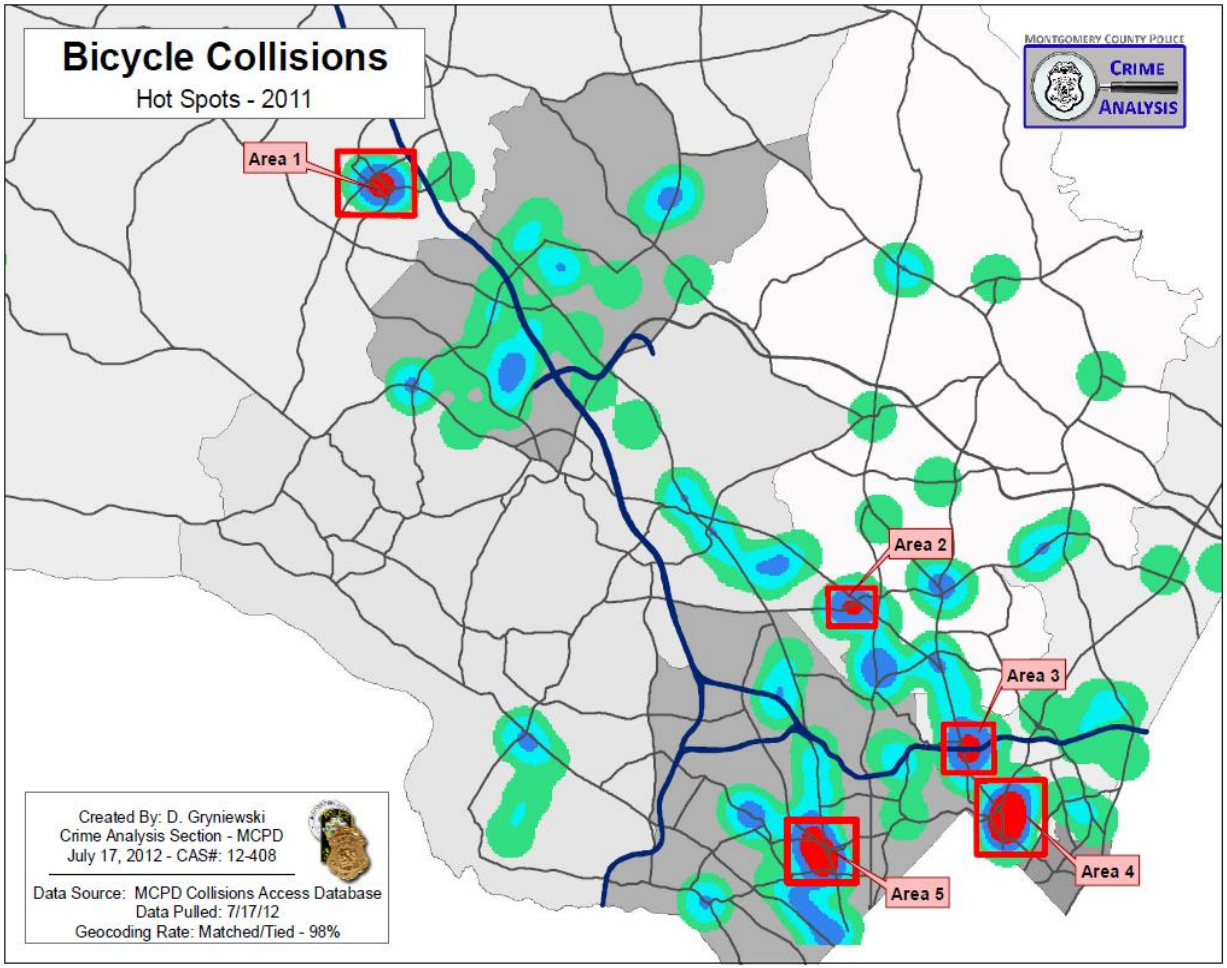
Police Analysis of 2011 Montgomery County Bike Crash Data: Fault

At Fault Units	2006	2007	2008	2009	2010	2011
Driver	64	43	40	45	69	57
% of Total	53.33%	36.75%	42.11%	42.86%	49.64%	44.19%
Bicyclist	54	71	53	59	57	57
% of Total	45.00%	60.68%	55.79%	56.19%	41.01%	44.19%
Both	2	3	2	1	4	11
% of Total	1.67%	2.56%	2.11%	0.95%	2.88%	8.53%
Not Determined	0	0	0	0	9	4
% of Total	0.00%	0.00%	0.00%	0.00%	6.47%	3.10%
Total	120	117	95	105	139	129

The percentage of incidents in which both the driver and bicyclist are determined to be at fault has increased significantly since 2006.

Source: Montgomery County Police Department, 2011 Bicycle Collisions

Police Identification of Montgomery County High Incident Areas



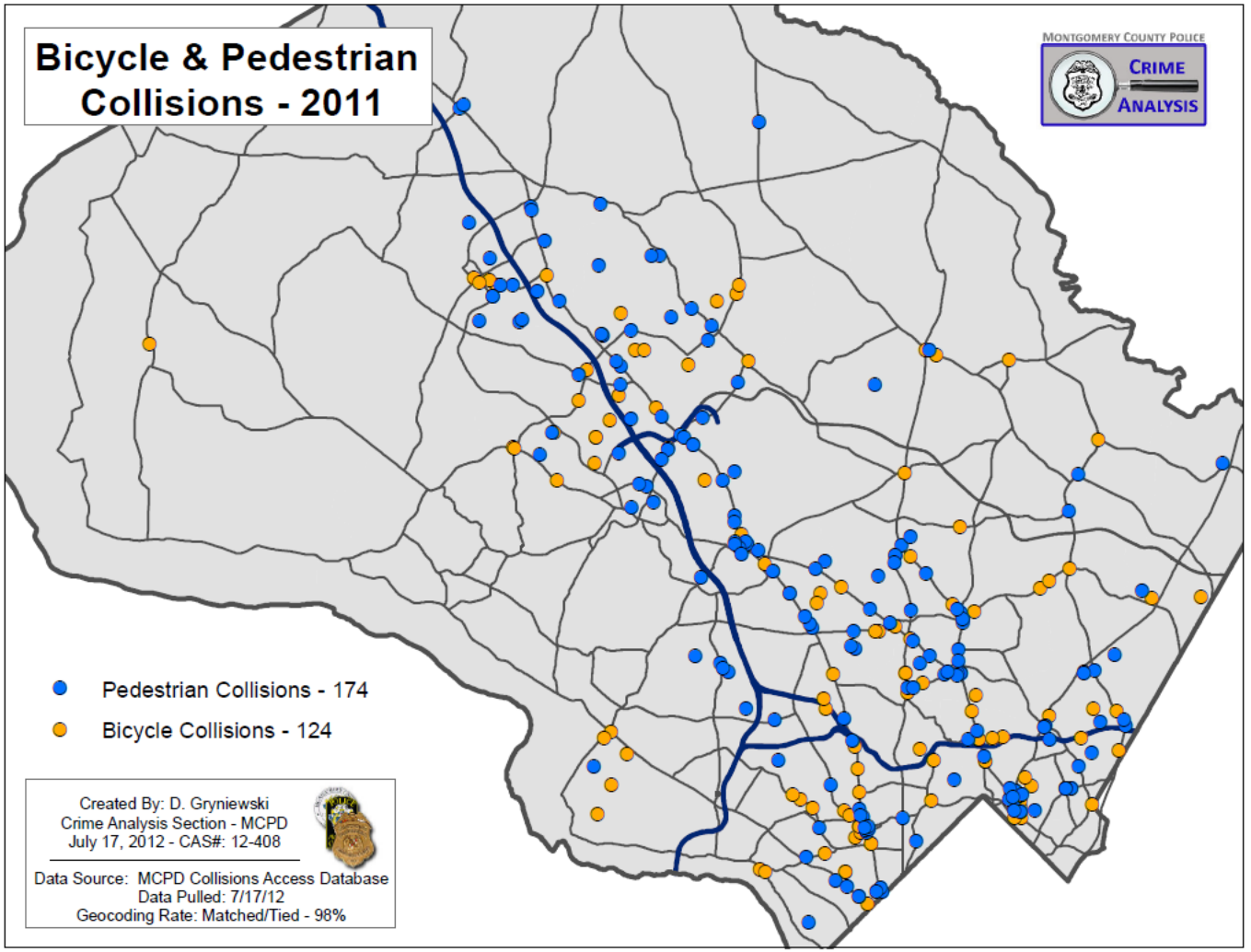
Through geospatial analysis of CY2011 data, Police identified 5 bicycle crash hotspots

2011 Bicycle Crash High Incident Areas

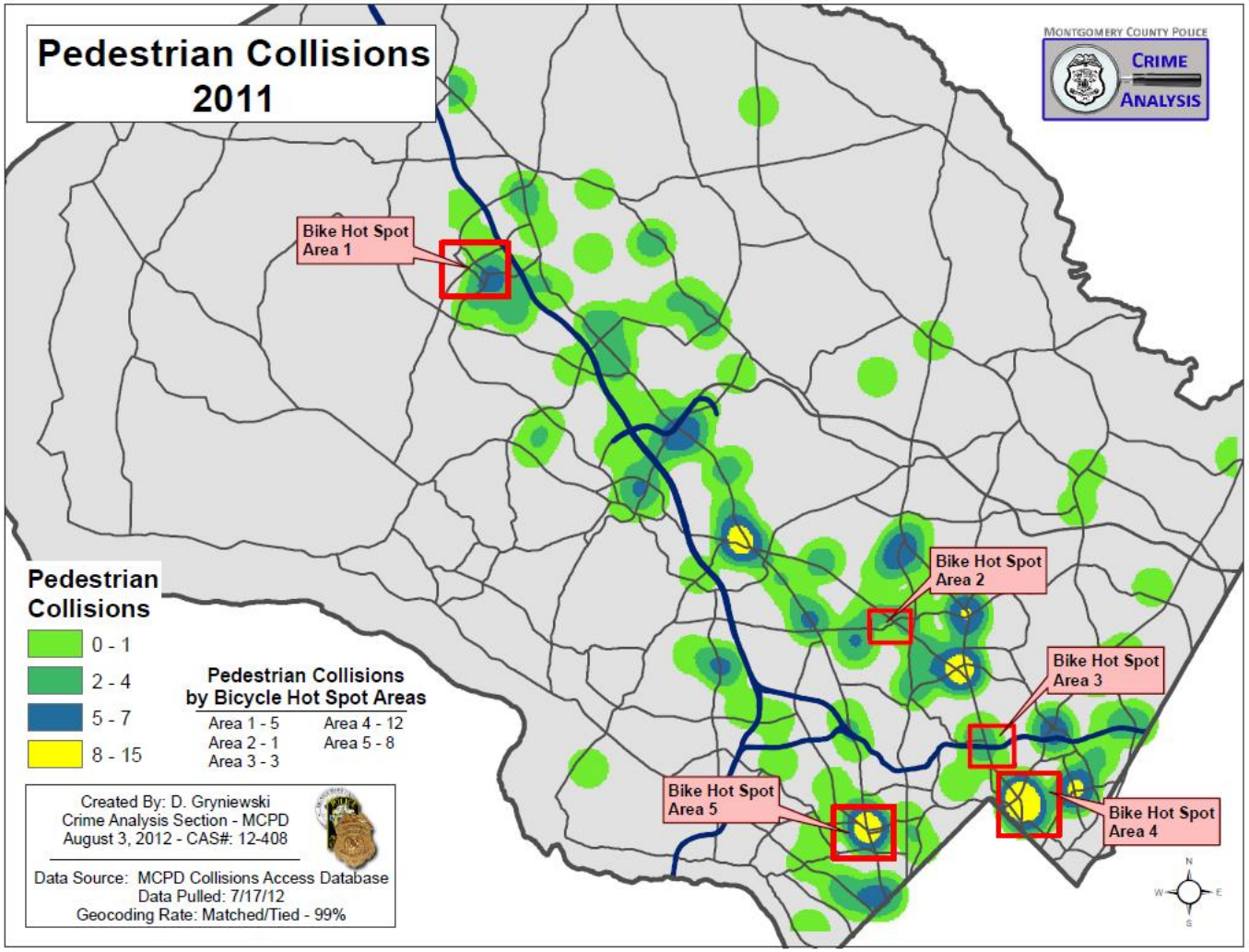
	Region	Streets	Reported Incidents
Area 1	Germantown	Middlebrook Rd Wisteria Dr	5
Area 2	Wheaton-Glenmont	Veirs Mill Rd Randolph Rd	4
Area 3	Forest Glen	Georgia Ave Forest Glen Rd	6
Area 4	Silver Spring	Georgia Ave Fenton St Dartmouth Ave Mayfair Pl	9
Area 5	Bethesda	Old Georgetown Rd Woodmont Ave Arlington Rd	8

The five high incident areas identified by Police appear in more densely populated regions of the County, near busy County roads and intersections.

Police Geospatial Comparison of Bicycle and Pedestrian Collisions 2011



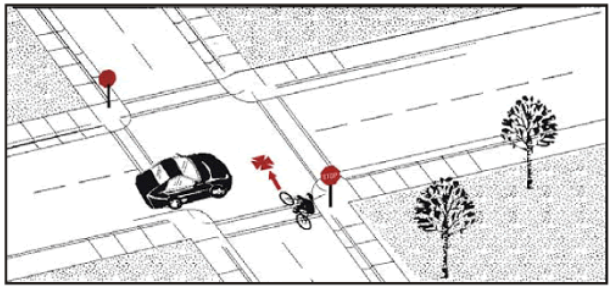
Police Geospatial Comparison of Pedestrian Collisions to Bicycle Collision High Incident Areas

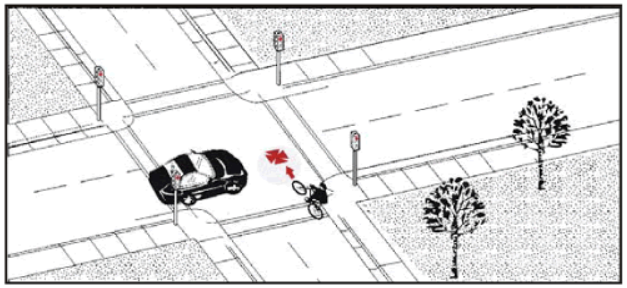


Typical Reported Bicycle Crash Types

Bicyclists rides out at stop signal or stop sign.

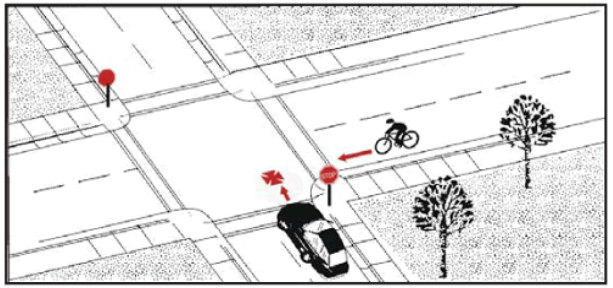
The crash occurred at an intersection (signaled or uncontrolled) at which the bicyclist failed to yield.





Motorist drives out at stop sign.

The crash occurred at an intersection at which the motorist was facing a stop sign/signal.

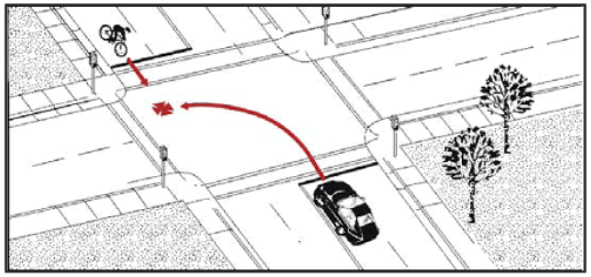


Source: http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt3.cfm

Typical Reported Bicycle Crash Types

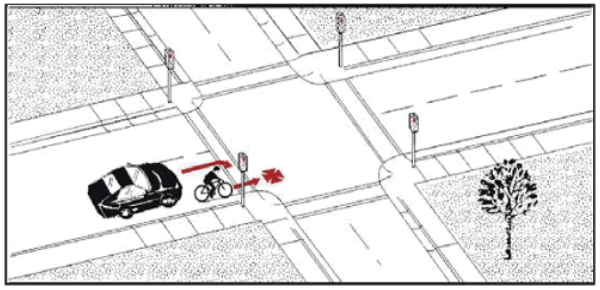
Motorist left turn, facing bicyclist.

The motorist made a left turn while facing the approaching bicyclist.



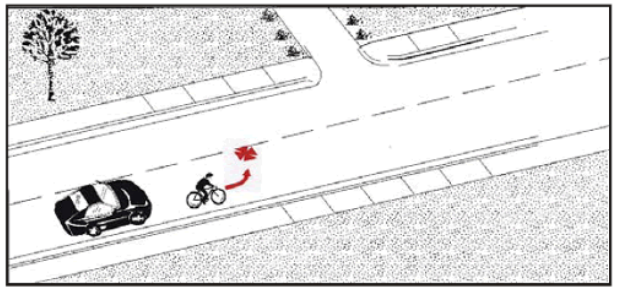
Motorist right turn.

The motorist was making a right turn and the bicyclist was riding in either the same or opposing direction



Bicyclist left turn in front of traffic.

The bicyclist made a left turn in front of traffic traveling in the same direction..

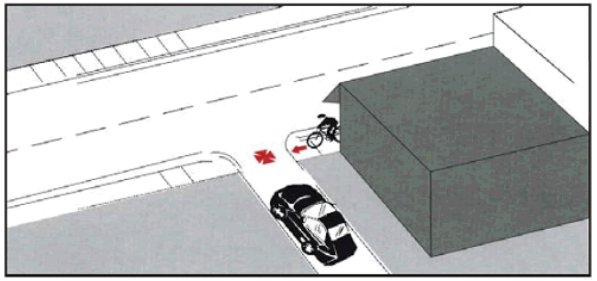


Source: http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt3.cfm

Typical Reported Bicycle Crash Types

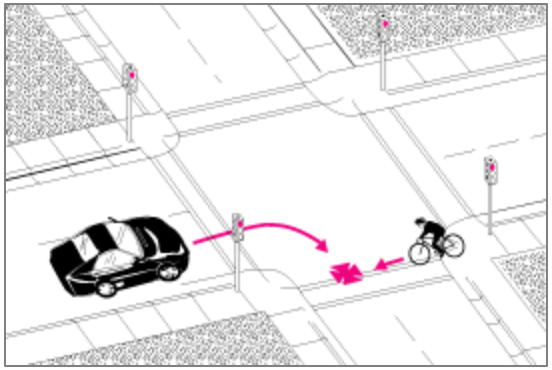
Motorist Drives Out at Midblock

The motorist was entering the roadway from a driveway or alley.



Motorist Turned or Merged Right into Path of Bicyclist

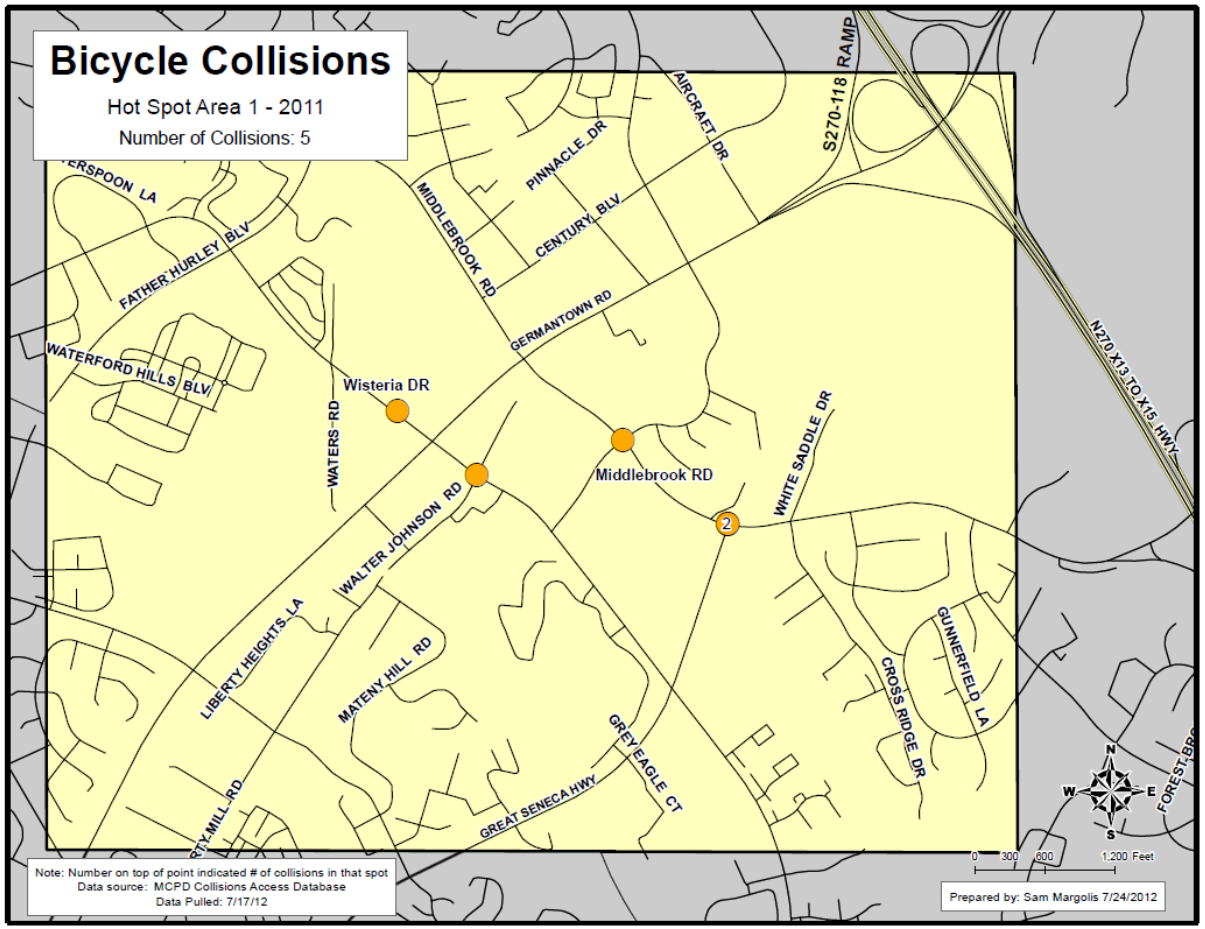
A motorist turns right, striking a bicyclist which was approaching from the opposite direction. The bicyclist is most likely riding the wrong way, against traffic, but could be legally riding on the sidewalk or an adjacent shared-use path.



Source: http://www.fhwa.dot.gov/publications/research/safety/pedbike/05085/chapt3.cfm

High Incident Area #1: Germantown

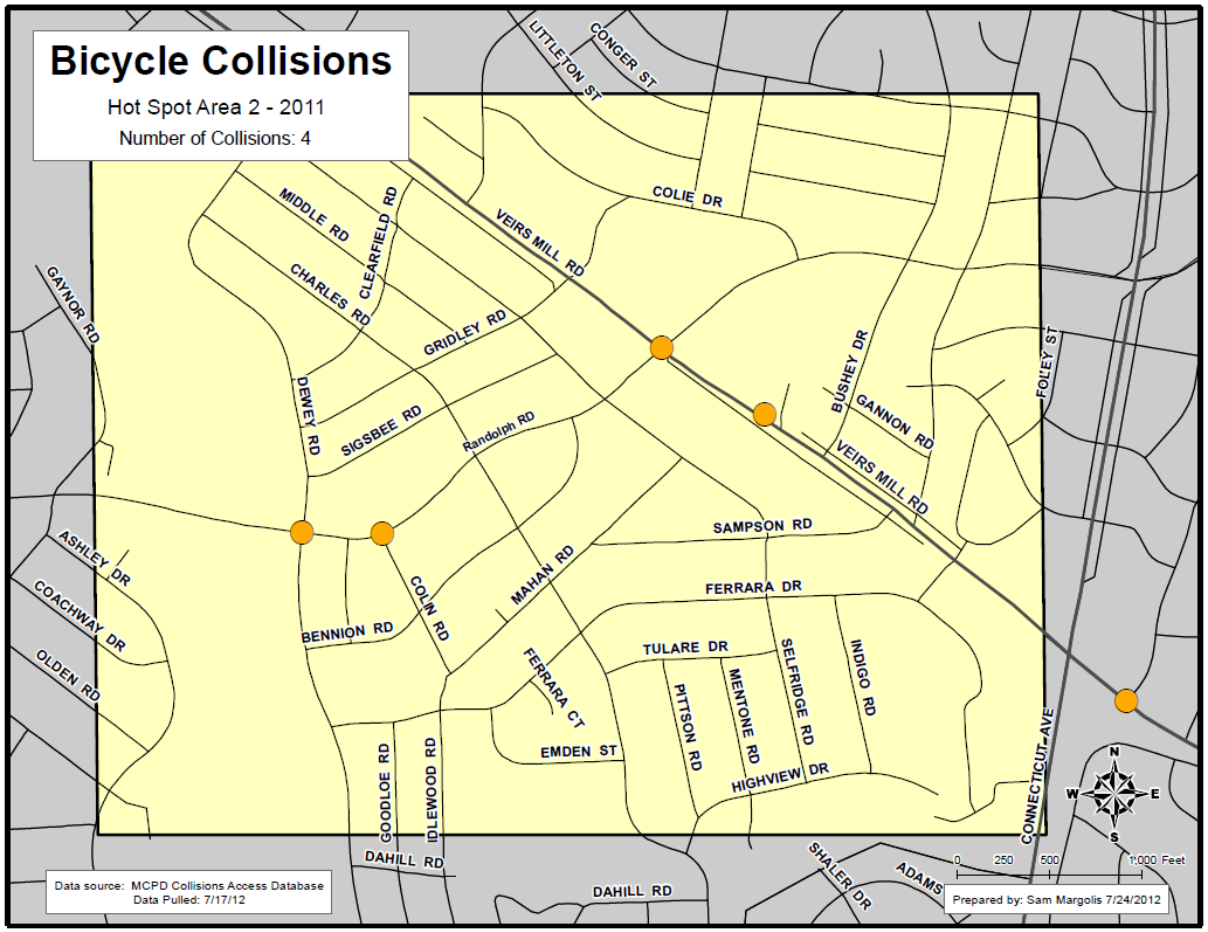
Language in Reports	#	%
Crosswalk	5	100%
Sidewalk	1	20%
Intersection	1	20%
Yield	2	40%
Driveway	0	0%
Parking Lot	0	0%
Turn	3	60%
Right	4	80%
Left	2	40%
Turn + "Left" or "Right"	4	80%
Crosswalk + "Turn"	3	60%
Sidewalk + "Turn"	0	0%
Intersection+ "Turn"	1	20%



All of the incidents which occurred in Area 1 involved crosswalks, and most involved turning vehicles.

High Incident Area #2: Wheaton-Glenmont

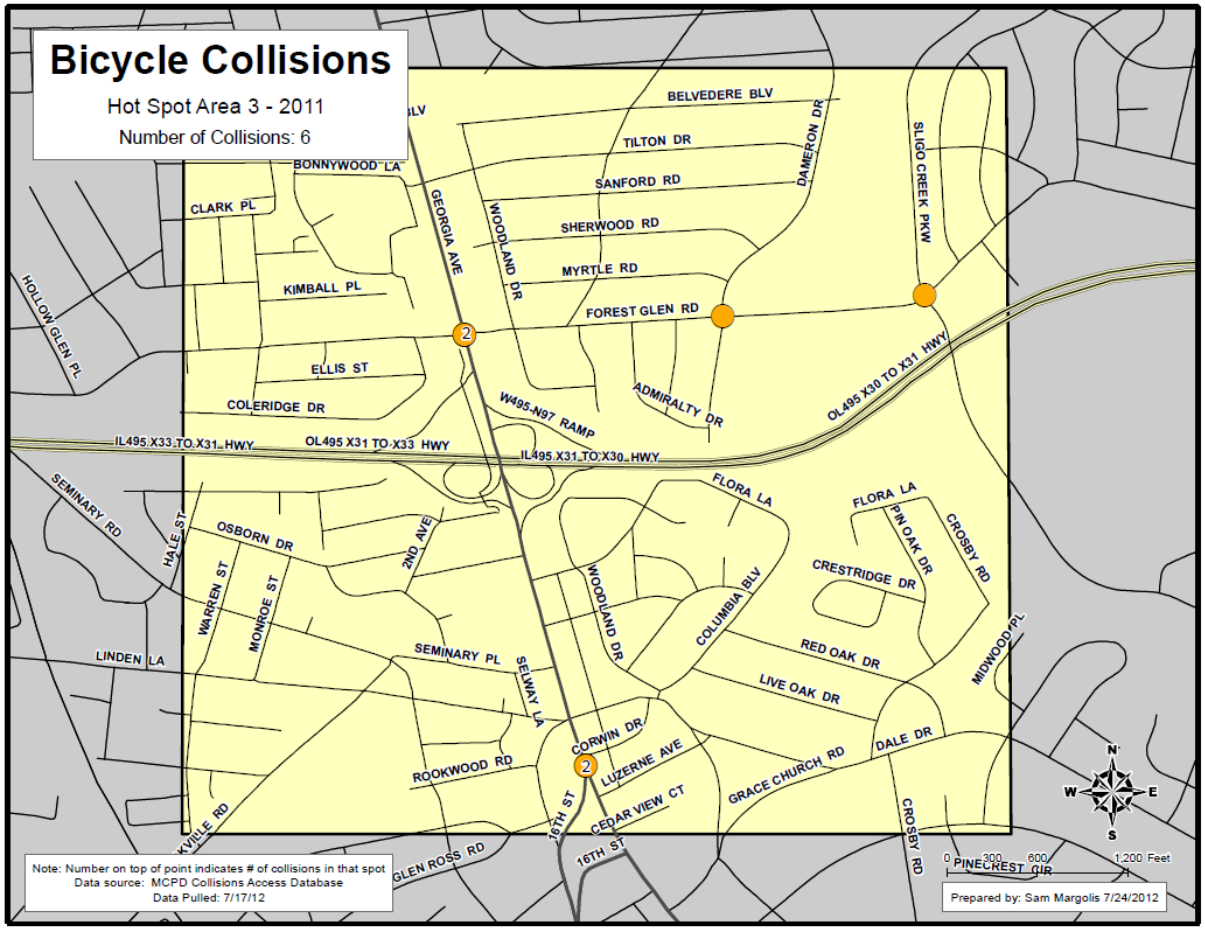
Language in Reports	#	%
Crosswalk	1	25%
Sidewalk	1	25%
Intersection	1	25%
Yield	0	0%
Driveway	0	0%
Parking Lot	0	0%
Turn	2	50%
Right	2	50%
Left	0	0%
Turn + "Left" or "Right"	2	50%
Crosswalk + "Turn"	0	0%
Sidewalk + "Turn"	0	0%
Intersection+ "Turn"	1	25%



Half incidents in Area 2 involved turning vehicles. All incidents occurred on Veirs Mill Road or Randolph Road.

High Incident Area #3: Forest Glen

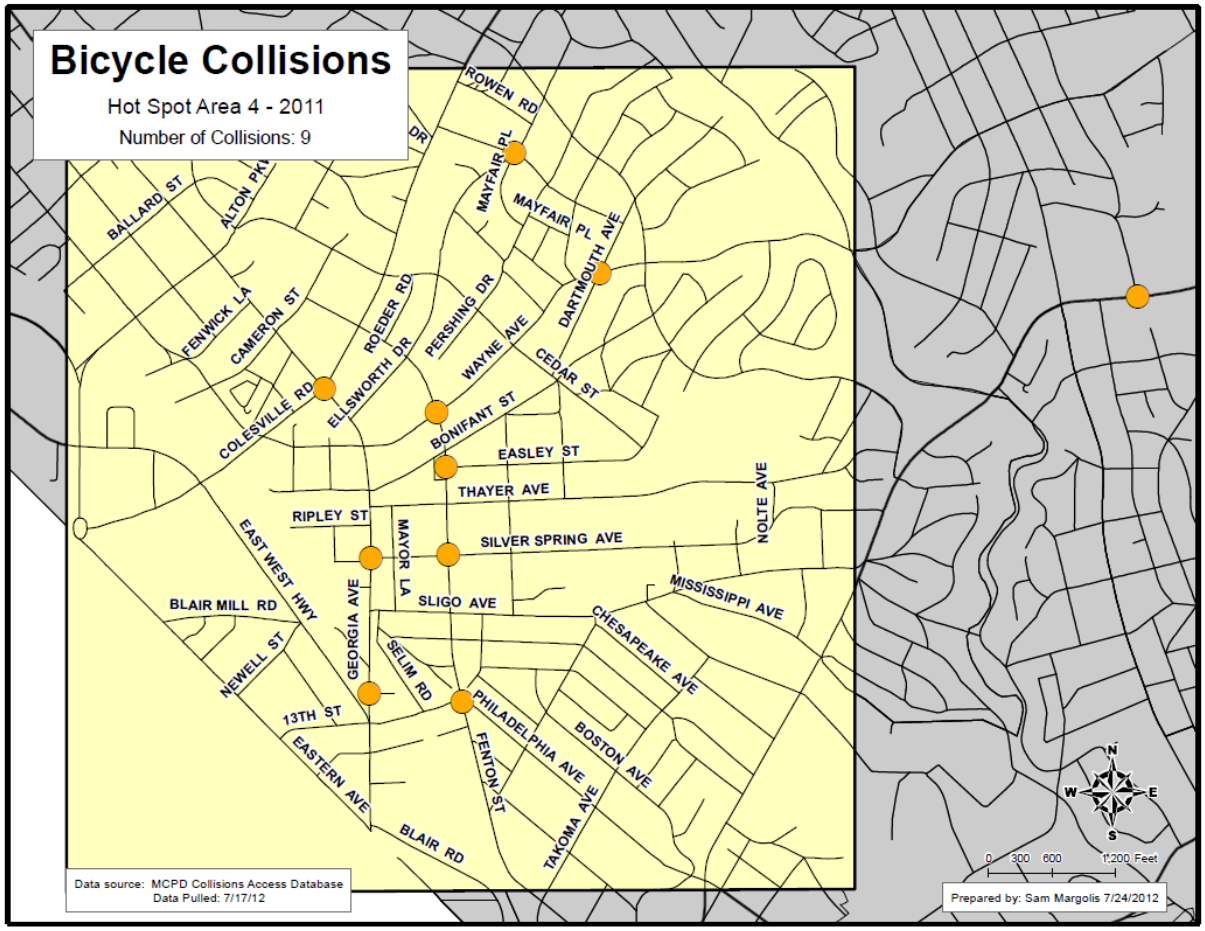
Language in Reports	#	%
Crosswalk	2	33%
Sidewalk	3	50%
Intersection	3	50%
Yield	0	0%
Driveway	2	33%
Parking Lot	0	0%
Turn	4	67%
Right	3	50%
Left	1	17%
Turn + "Left" or "Right"	3	50%
Crosswalk + "Turn"	2	33%
Sidewalk + "Turn"	2	33%
Intersection+ "Turn"	2	33%



The incidents in Area 3 occurred on Georgia Avenue or Forest Glen Road. More than half involved turning vehicles, and at least half involved either a crosswalk, sidewalk, or intersection.

High Incident Area #4: Silver Spring

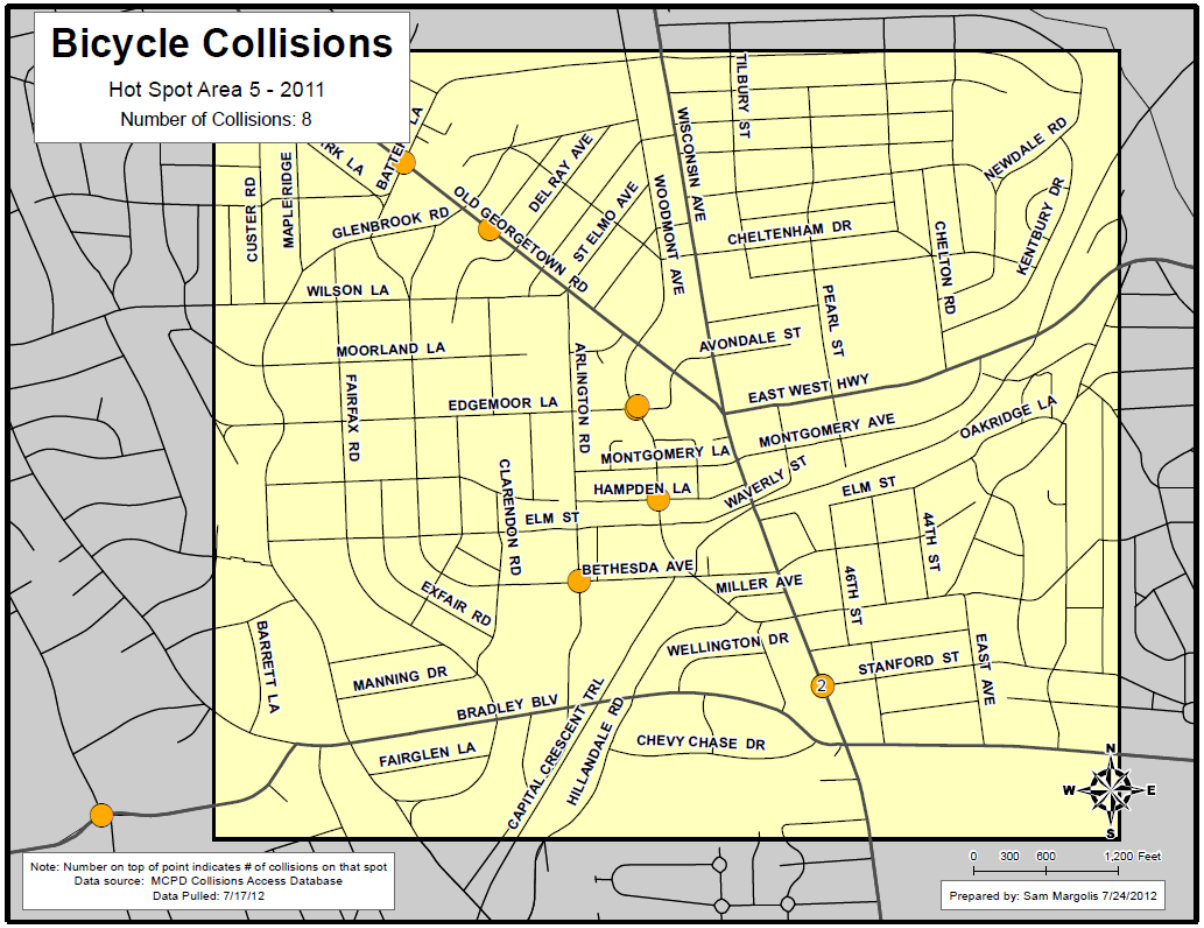
Language in Reports	#	%
Crosswalk	1	11%
Sidewalk	5	56%
Intersection	1	11%
Yield	0	0%
Driveway	2	22%
Parking Lot	3	33%
Turn	7	78%
Right	3	33%
Left	2	22%
Turn + "Left" or "Right"	3	33%
Crosswalk + "Turn"	1	11%
Sidewalk + "Turn"	5	56%
Intersection+ "Turn"	1	11%



The majority of incidents in Area 4 involved turning vehicles and sidewalks or crosswalks.

High Incident Area #5: Bethesda

Language in Reports	#	%
Crosswalk	5	63%
Sidewalk	2	25%
Intersection	1	13%
Yield	2	25%
Driveway	1	13%
Parking Lot	0	0%
Turn	6	75%
Right	4	50%
Left	3	38%
Turn + "Left" or "Right"	5	63%
Crosswalk + "Turn"	4	50%
Sidewalk + "Turn"	2	25%
Intersection+ "Turn"	1	13%



The majority of incidents in Area 5 involved turning vehicles and crosswalks or sidewalks.

Comparison of Crash Variables: Overall vs. High Incident: Location Variables

Location Variables	All Reported Crashes (400 incidents)		High Incident Areas (32 incidents)	
Crosswalk	112	28%	14	44%
Sidewalk	103	25%	12	38%
Intersection	77	19%	7	22%
Yield	71	17%	4	13%
Driveway	68	17%	5	16%
Parking Lot	38	9.5%	3	9%

Data from January 1, 2009-June 4, 2012, 400 recorded incidents

Crosswalks and sidewalks were the most common variable among all reported crashes; however, the prevalence of crashes involving crosswalks was higher within the high incident areas.

Sources: MCPD Police Reports

Comparison of Crash Variables: Overall vs. High Incident: Turning Variables

Turning Variables	All Reported Crashes (400 incidents)		High Incident Areas (32 incidents)	
Turn	191	47%	22	69%
Right	52	13%	16	50%
Left	62	15%	8	25%
Turn + "Left" or "Right" of any Combination	110	57%	17	53%
Crosswalk + Any "Turn"	69	61%	10	31%
Sidewalk + Any "Turn"	56	54%	9	28%
Intersection+ Any "Turn"	191	47%	6	19%

Data from January 1, 2009-June 4, 2012, 400 recorded incidents

The combination of the crosswalk/sidewalk/intersection and turn variables was more common in the total pool of incidents than those occurring in the high incident areas.

Sources: MCPD Police Reports

Comparison of Crash Variables: Overall vs. High Incident: Vehicle Movement Variables

Turning Variables	All Reported Crashes (400 incidents)		High Incident Areas (32 incidents)	
Moving at a Constant Speed	109	26%	7	22%
Making right-turn	69	16%	8	25%
Making left-turn	62	14%	5	16%
Walking/Riding w/traffic	89	23%	6	19%
Cross/Enter at intersection	131	34%	10	31%

Data from January 1, 2009-June 4, 2012, 400 recorded incidents

Relative to all reported crashes, there was a higher occurrence of the making a right-turn variable among the high incident area crashes.

Montgomery County Bikeshare

Awarded two grants

- Job Access Reverse Commute Federal FTA Grant administered through MWCOG
  - **Quantity**: 200 bicycles, 20 stations
  - **Locations**: Rockville & Shady Grove Metro Stations, Greater Shady Grove TMD including Life Sciences Center, Rockville Town Center, employment centers along MD-355, Campuses of Montgomery College Rockville, the Universities at Shady Grove, Johns Hopkins.
  - **Status:** Procurement Contract
  - **After contract**
    - 4-6 months to order/receive equipment
    - Several weeks for installation of full system
- Maryland DOT Grant *[Possibly Federal Congestion Mitigation/Air Quality Funds (CMAQ)]*
  - **Quantity:** 204 bicycles, 29 stations
  - **Locations:** Silver Spring, Takoma Park, Friendship Heights (Chevy Chase), Bethesda, and the Medical Center area.
  - **Status:** Post-Award Stage with State
  - **After Contract/Procurement**
    - 4-6 months to order/receive equipment
    - Several weeks for installation of full system

Source: Montgomery County DOT

Bikesharing Program Benchmark Comparison

- **CountyStat conducted a nation-wide analysis of analysis of bike sharing programs**
- **The size and maturity of bikesharing programs varies greatly amongst jurisdictions**
- **Many jurisdictions conducted analysis of cycling volume to determine crash rates**

Capital Bikeshare station in Arlington, VA

- **In addition to the creation of bikesharing initiatives, some jurisdictions also pursued a Bicycle Friendly America Rating conducted by the League of American Bicyclists**

According to data pertaining specifically to bikesharing incidents, jurisdictions reported that these initiatives are not a large driver of cycling crashes or fatalities.

Bike Sharing Program Benchmark Data
Reported Bicycle-Vehicle Crash Data by Jurisdiction

Location	2006	2007	2008	2009	2010	2011
Denver, CO	209	215	N/A	N/A	N/A	N/A
Minneapolis, MN	241	326	252	270	273	N/A
San Antonio, TX	N/A	N/A	224	197	196	N/A
Madison, WI	95	118	95	115	141	N/A
Boulder, CO	N/A	N/A	166	148	173	N/A
Arlington, VA	45	55	39	45	60	58
Washington, DC	264	281	314	352	435	N/A
Montgomery County (Police Data)	120	117	95	105	139	129
Washing Council of Governments *(Accidents with Injuries)	682	653	666	650	687	N/A

Although Capital Bikeshare reports only 30 accidents related to the initiative since its start in September 2010, crashes were higher in 2010 for both Washington DC (24%) and Arlington VA (33%) than 2009

N/A: No Public Report available. **Sources:** Respective jurisdictions reports. ***Metro Washington COG Report:** www.mwcog.org/uploads/committee-documents/k11dWV1f20120716114902.pdf

Bike Sharing Program Benchmark Data

Location	Jurisdiction Pop. Size (Metro Area)	Start Date*	System Bike Size (Jan 2012)*	Reported Accidents **	Fatalities **	Total Trips (Jul 2012)*
Denver, CO B-cycle	600,158	2010, Apr	520	2	0	400,000
Minneapolis/St. Paul, MN Nice Ride	667,646	2010, Jun	960	3	0	450,000
Arlington, VA Capital Bikeshare	207,627	2010, Sep	1,200 (System Wide)	30	0	2,200,000
Washington, DC Capital Bikeshare	601,723					
Miami Beach, FL DecoBike	87,779	2011, Mar	800	0	0	1,000,000
San Antonio, TX B-Cycle	1,327,407	2011, Mar	230	1	0	50,311
Madison, WI B-Cycle	233,209	2011, May	280	0	0	N/R
Boulder, CO, B-cycle	97,385	2011, May	120	2	0	30,000
Boston, MA New Balance Hubway	617,594	2011, Jul	600	0	0	N/R
Broward County, FL B-Cycle	1,748,066	2011, Dec	275	0	0	15,200

*** Self-reported by jurisdiction*

** Sources: Mineta Transportation Institute, "Public Bikesharing in North America: Early Operator and User Understanding". 2012*

Bike Sharing Program Benchmark Data

Location	Jurisdiction Size	Have Counters for Volume of Cyclists Data	Bicycle Friendly America Rating (By League of American Bicyclists)
Denver, CO B-cycle	600,158	Stationary Counters	Silver
Minneapolis, MN Nice Ride	667,646	Stationary Automatic Counters/Volunteers	Gold
Arlington Capital Bikeshare	207,627	Stationary Automatic	Silver
Washington, DC Capital Bikeshare	601,723	None	N/A
Miami Beach, FL DecoBike	87,779	No Response	N/A
San Antonio, TX B-Cycle	1,327,407	None	Bronze
Madison, WI B-Cycle	233,209	Stationary Automatic Counters	Gold
Boulder, CO, B-cycle	97,385	Stationary Automatic Counters	Platinum
Boston, MA New Balance Hubway	617,594	Annual Counts in Sept/Oct	Silver
Broward County, FL B-Cycle	1,748,066	None	N/A

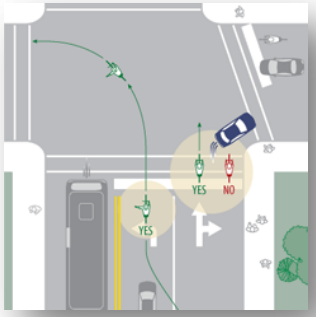
Some locations have counters but are often unable to do annual analysis on the data collected.

Sources: Local jurisdictions phone interviews;
Mineta Transportation Institute, "Public Bikesharing in North America: Early Operator and User Understanding". 2012

Overview of Strategies for Mitigating Bicycle Crashes

Road markings for a bike lane and "sharrows" currently used in the County.

Two bike-friendly signs currently used in the County



Safety education graphic from Nice Ride MN website

Strategy	Description
Shared Roadway:	The goal of an appropriately designed roadway should be to safely and efficiently accommodate all modes of travel, from bicyclists to pedestrians to motorists.
On-Road Bike Facilities:	Various kinds of on-road facilities, such as bike lanes, paved shoulders, and wide curb lanes, make bicyclists more comfortable.
Intersection Treatments:	Nearly half of all bicycle-motor vehicle crashes occur at intersections or other junctions.
Maintenance:	Maintenance of all kinds of bicycle facilities must be planned for and done routinely.
Traffic Calming:	Traffic calming is a way to design streets, using physical measures, to encourage people to drive more slowly.
Trails/Shared-Use Paths:	Bike paths or shared-use trails are complementary to the road network and serve recreational, child, and even commuter bicyclists.
Markings, Signs, Signals:	Traffic engineers have an arsenal of pavement markings, signs, and signals that can be used to inform, regulate, and warn both motorists and bicyclists.
Education and Enforcement:	Education and enforcement are key strategies in increasing bicyclist and motorist awareness and behavior.
Support Facilities and Programs:	The simple promotion of bicycling is a way to increase the amount of riding in a community.

http://www.bicyclinginfo.org/bikesafe/crash_analysis-types.cfm

DOT Engineering Highlights and Recommendations: Project Selection Criteria

- Prioritization of Projects
  - If the improvement is part of master plan
  - If project fills in or completes major gap along countywide bikeway
  - If there is large demand for project
  - If project is correcting an unsafe condition
  - If project promotes alternative modes of transportation to car
  - If project is cost-effective
  - If project connects major destinations
  - If project requires only signage improvements

- Avenues for Public Opinion
  - Montgomery County Bicycle Action Group (MCBAG)
  - Transportation Management District (TMD) Advisory Committees
  - Annual Commuter Survey – Surveys include opportunity for comments
  - Pedestrian Bicycle & Traffic Safety Advisory Committee
  - Communications via public email box, response to e-newsletter articles, & in-person events; feedback on bike maps, other bike information

Source: Montgomery County DOT, Council Hearing in Fall of 2011; Commuter Services Section, Div. of Transit Services.

DOT Engineering Highlights and Recommendations: Bikeways Creation

- **Ways to achieve Bikeways in Montgomery County**
  - Large CIP Projects
  - Stand Alone CIP Projects
    - Have completed Facility Planning
  - Private Developer Requirements and as part of the other Government projects
  - Annual Road Maintenance
  - Annual Bikeways Program

- **Typical Types of Bikeways:**


1) Marked Bike Lanes

2) Signed Shared Roadways


3) Shared Use Paths

Source: Montgomery County DOT

CountyStat Recommendations

- **Enforcement campaign should target both drivers and cyclists**
  - During a successful enforcement campaign in Boston, police issued 220 tickets to cyclists and 279 tickets to drivers, and distributed more than 700 helmets.
- **Crash variables should be used to create targeted mitigation strategies**
- **Bicycle safety campaign should have a strong education component**
  - Boston Bikes conducted a major outreach campaign to cyclists and drivers. Boston Public School interns took to the streets to flier 10,000 bicycles with safety information, and the City mailed fliers to every registered driver in Boston via excise tax mailings, totaling nearly 500,000.
  - In partnership with MassBike, the City also offered live bike safety education classes several times per month at multiple locations throughout the summer.
- **Bikeshare bikes should display safety tips and warnings both on the bicycle and via program documentation**
- **Continual monitoring of crash variables in both high incident areas and throughout the County**

Wrap-Up and Follow-Up Items