Traffic crashes and GIS science

MPOWER GIS Collaboration Planning Retreat

Osprey Point Retreat and Conference Center

May 26 – 27, 2015

Gordon Smith MD(MB.ChB., Otago), M.P.H.

Collaborators: Pat Dischinger, Tim Kerns, Abree Johnson, Shiu Ho

National Study Center for Trauma & EMS

STAR-ORC, University of Maryland, Baltimore

gssmith@som.umaryland.edu

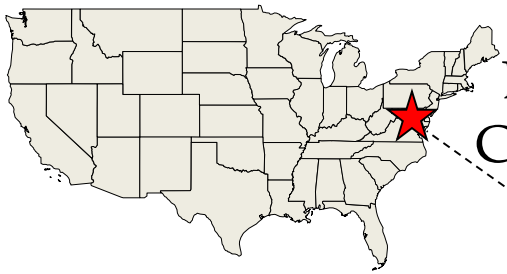
410 328 3847

Data used in traffic safety studies: GIS and linkage . Crashes before and after Casino opening

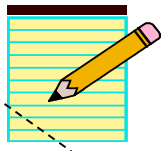
- Statewide Crash File
  - All police reported crashes in an electronic file
  - Location information is geocoded based on a log mile reference system
  - Has drivers license # enables link with drivers license file
  - Can be linked to hospital data
- MVA License File
  - Maintained by MVA through online/in-person registrations & renewals
  - Individuals are identifiable by a drivers license or Soundex number
  - Has zip code of driver residence
- EMS file
  - Electronic systems (eMEDS ® for the majority of the state and EMAIS for Montgomery County) integrated into one file
  - Has location patient transported from
- Trauma Center Hospital Data

Zip code in registry but could get patient residential address
Blood alcohol and urine drug screening results available

Traffic safety data and data linkage

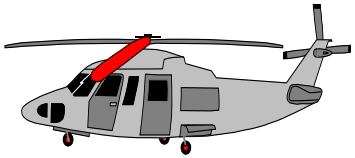


Driver Citations

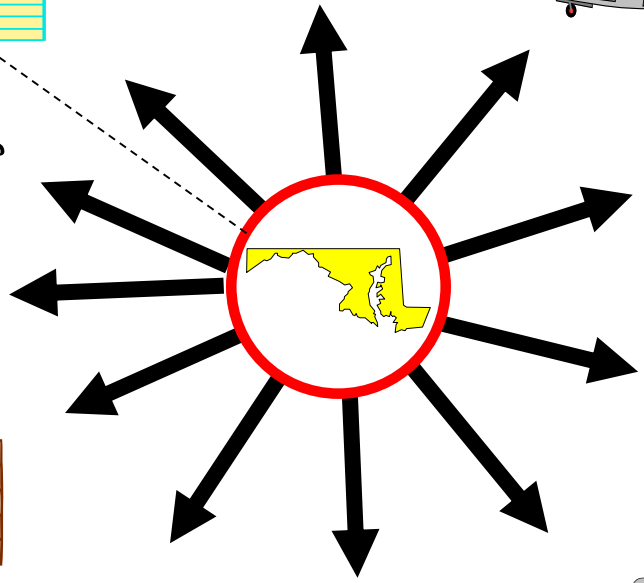


Police Crash Reports

Ambulance & EMS Logs



MVA Licensing



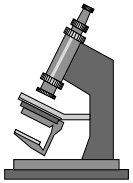
ED Data

Motorcycle Safety

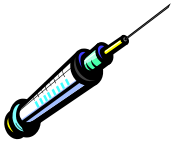
Hospital Records

Vital Statistics

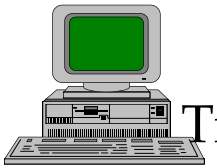
Autopsy Records



Toxicology



Statewide Trauma Registry



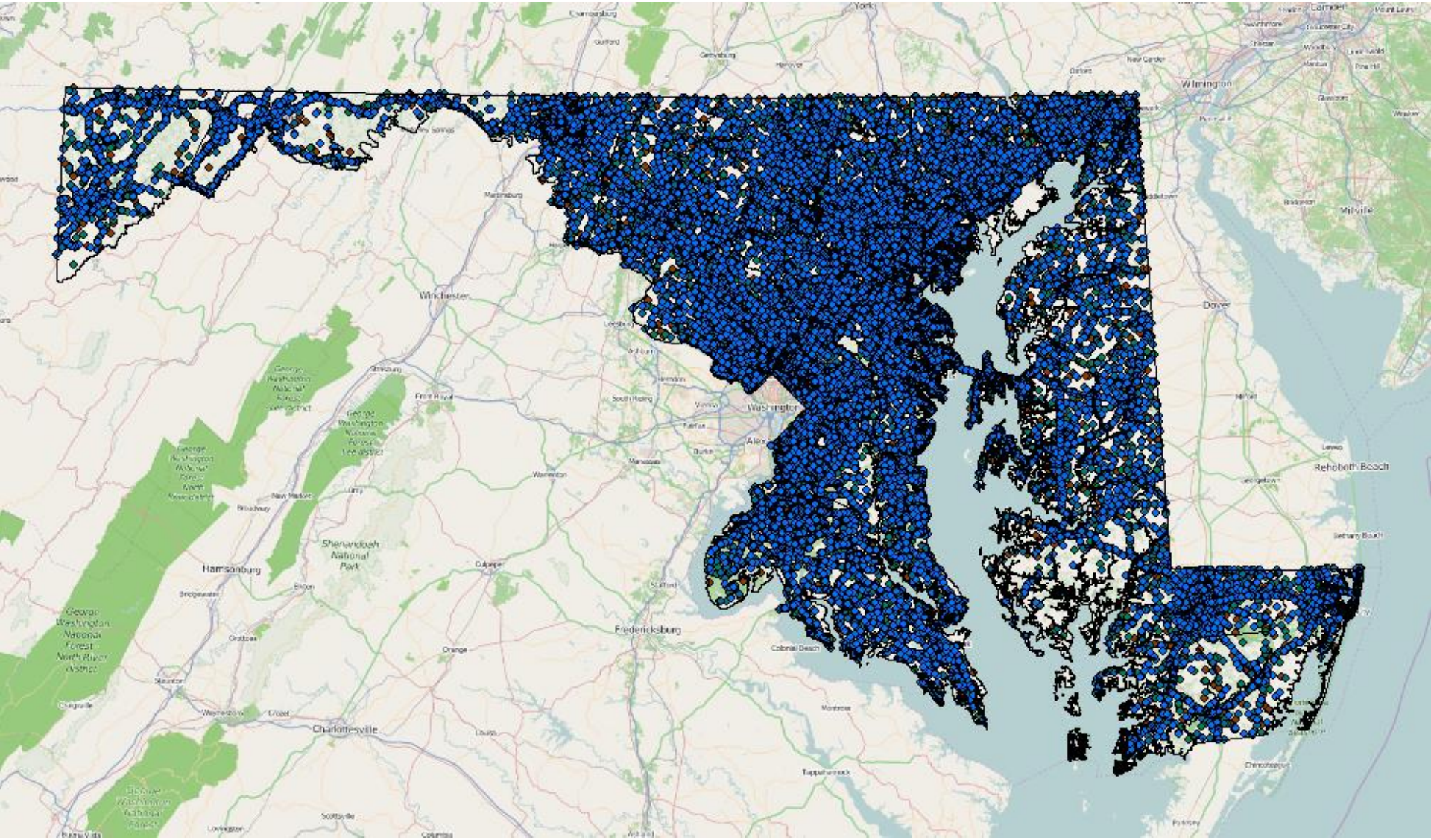
Example of approach used in evaluation impact casino opening on traffic crashes

- Police reported crashes obtained from State Police crash database (all police reported crashes MD)
- State Highway Administration (SHA) translates names of streets and mile marker locations to a spatial X/Y coordinate system using a geocoding program.
- SHA Safety Information Database (SHA-SID) used to map the geographic location of crashes using ArcGIS.
- Identified all crashes occurring within a concentric circle of 1 and 5 miles of the casino
- Crash data available 6 months after the casino opened (June 6 2012 – Dec 31 2012)compared to the same period in 2011(June 6, 2011- Dec 31 2011.
  - 2013 data available soon…gives 18 months either side

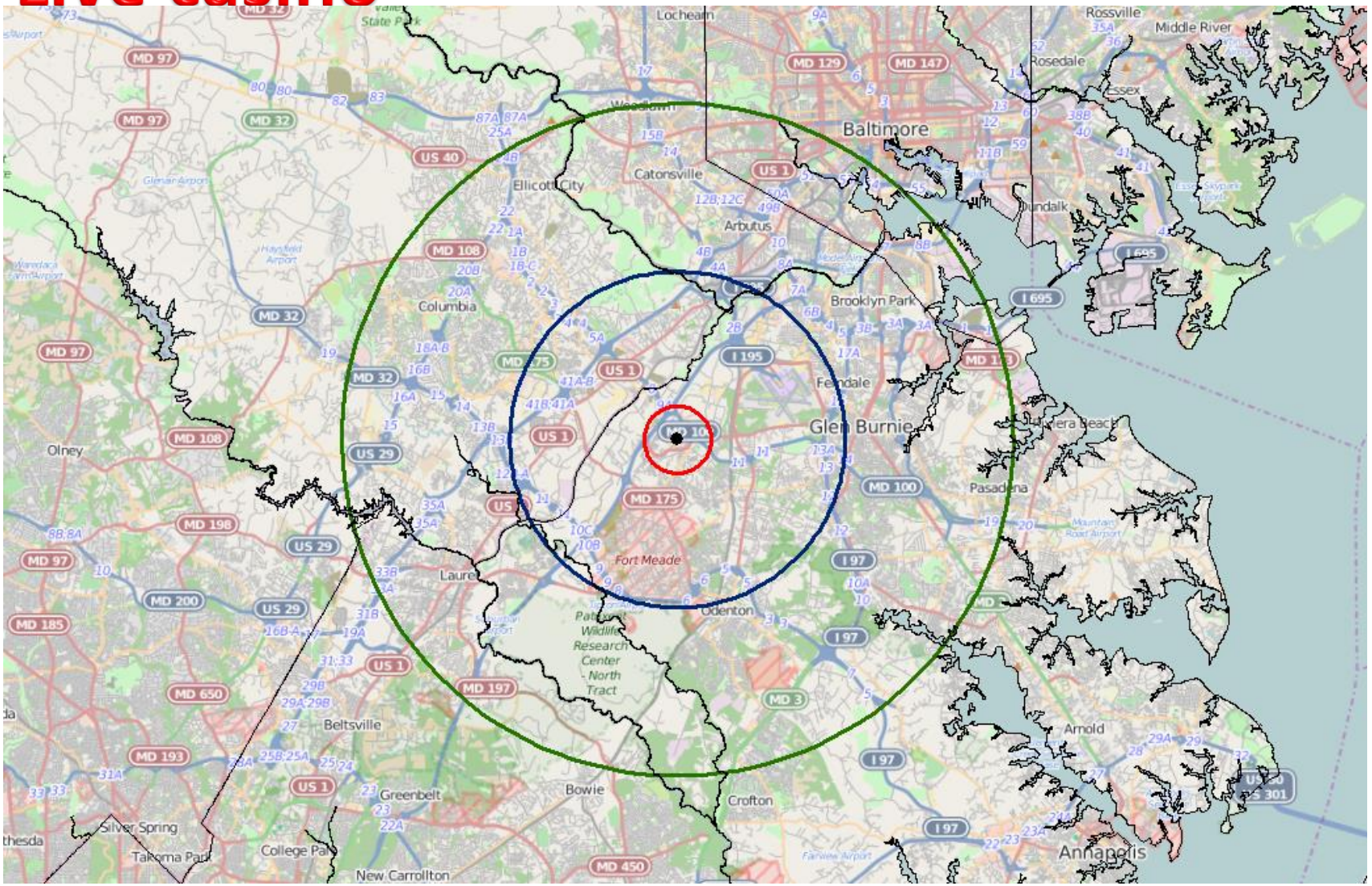
Residence of drivers Data linkage

- State of residence of drivers in crashes obtained from crash database
- Zip code of residence of the MD drivers obtained by linking drivers' license numbers in crash data with MD Department of Motor Vehicles Driver's License file.
- Zip codes mapped to 1 and 5 mile concentric circles around casino
- Drivers residence defined by zip code in proximity to casino
  - Near (zip code within 5 miles of the casino)
  - Moderately close (zip code within 5-10 miles of the casino)
  - Far (further than 10 miles) from the casino.

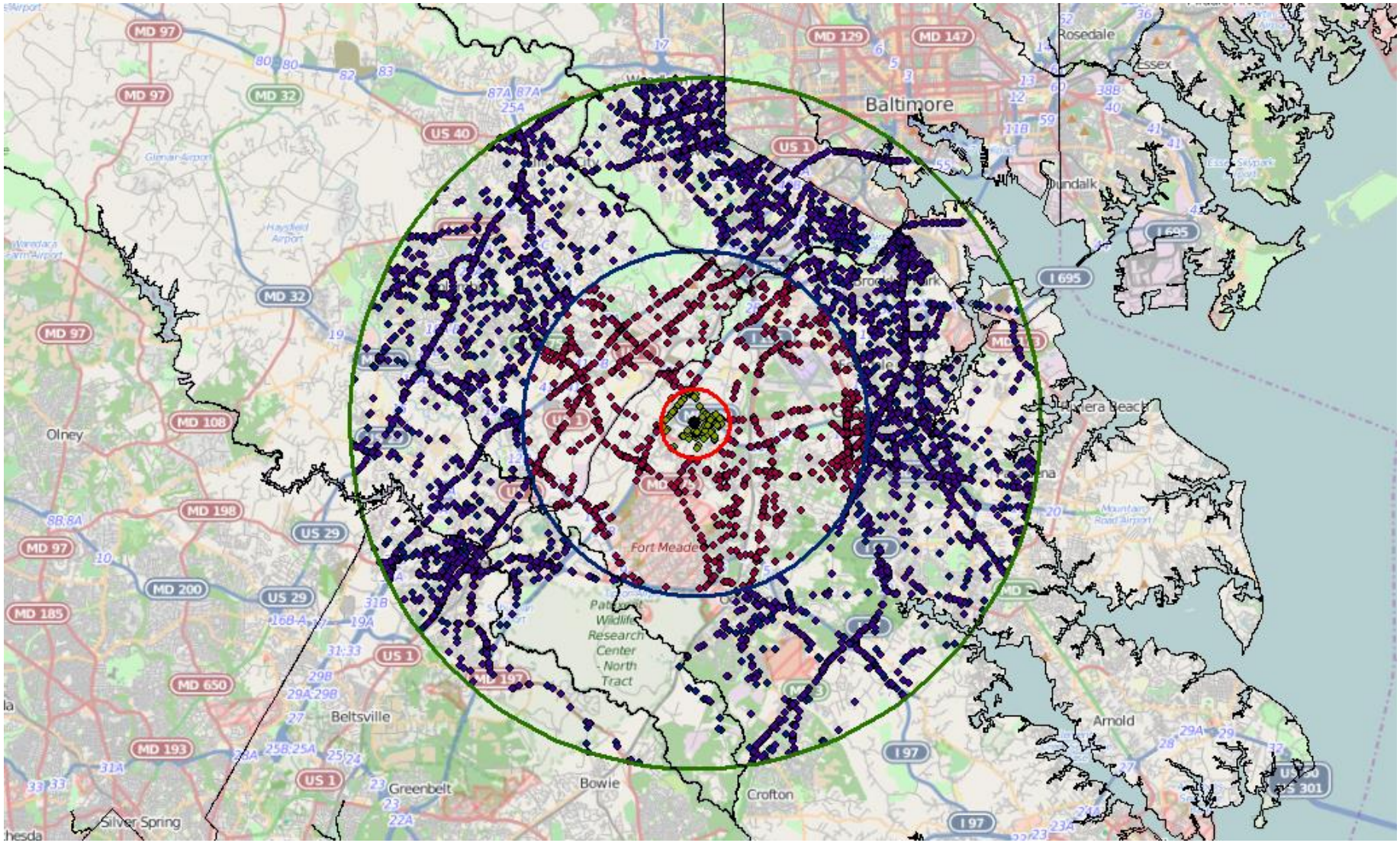
Added Crash File



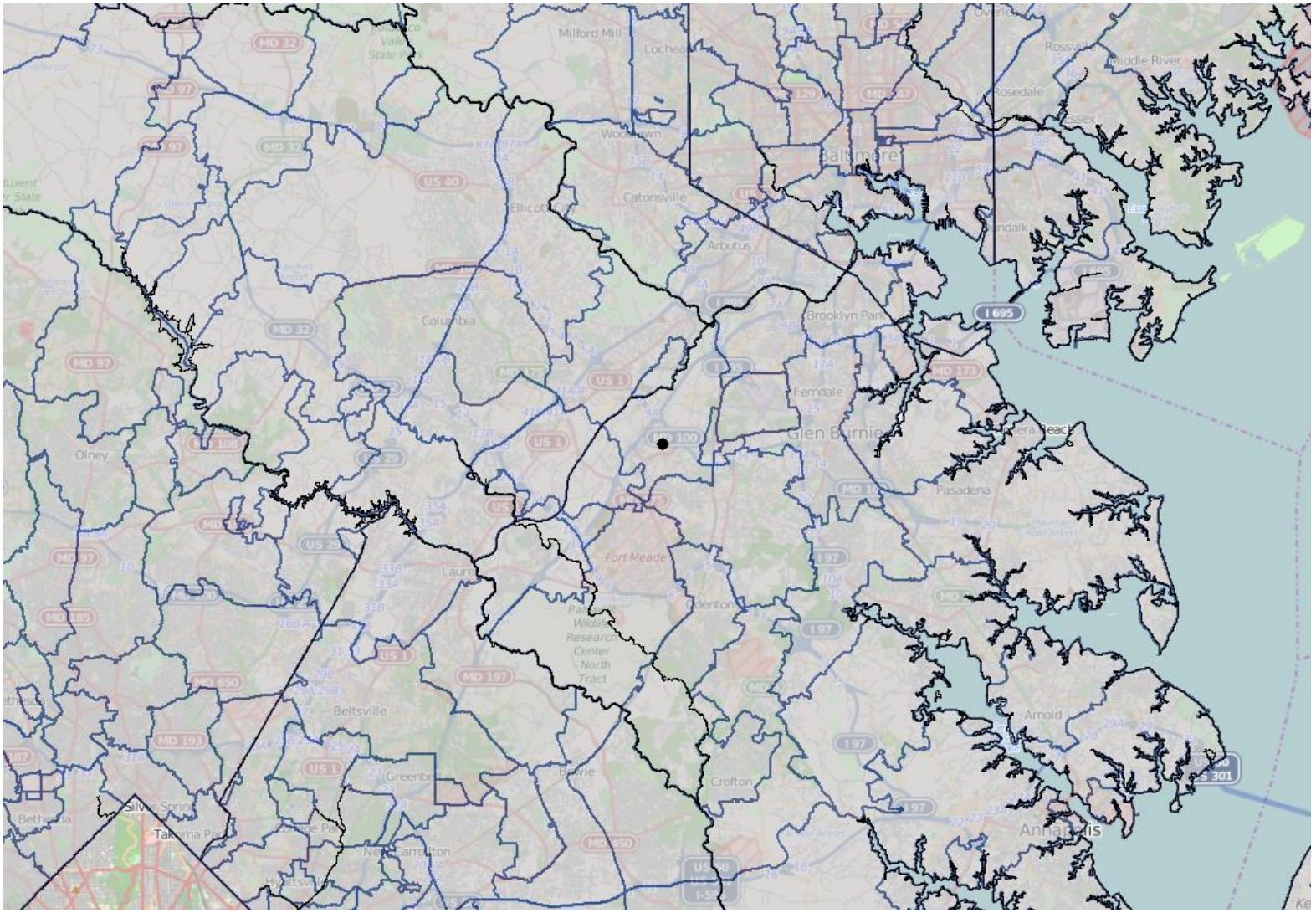
Created Buffer Zones around Maryland Live casino



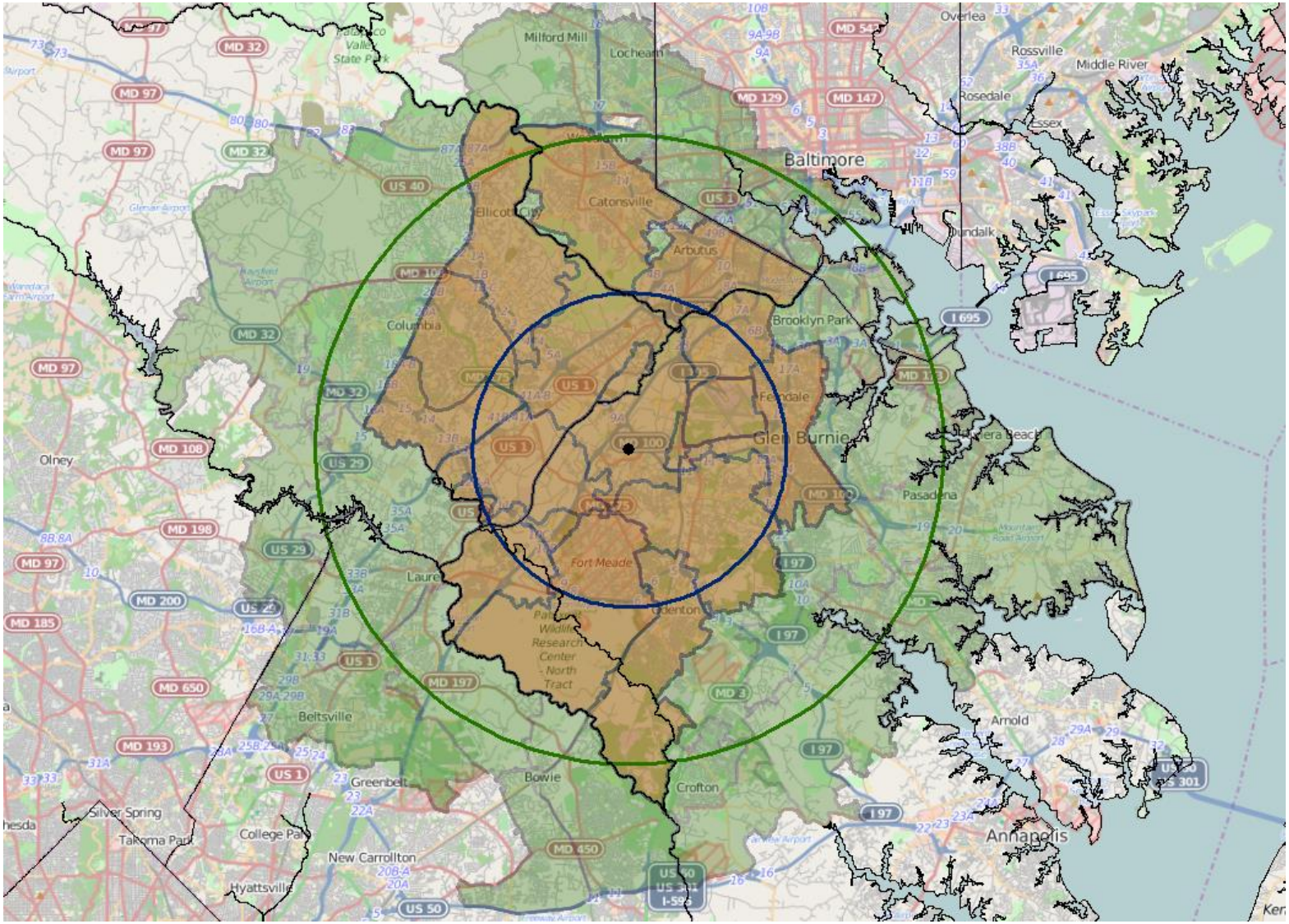
Joined & Extracted Crashes



Created Driver's Residential Zip Code Layer



Created Buffer Zones for Zip Code Layer



Conclusions

- Weekend crashes increased significantly within both 1 and 5 miles of the casino following casino opening.
  - Largest increases within 1 mile of casino
- Nighttime, single vehicle and impaired crashes appeared to increase within 1 mile
- Impaired driving of individual drivers also seems to have increased within a one mile radius of the casino but not within five miles
- Largest increase in crashes was among those living near the casino and among drivers from Virginia that does not have casino gambling

- Future ideas
  - Pedestrian crashes, built environment and alcohol
  - Location differences fatal vs. other pedestrian crashes
  - Methadone clinics, pedestrians and other traffic crashes