GIS-Based Evaluation of Selective Law Enforcement Campaigns in Alabama

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Introduction

- Selective Enforcement Campaigns: Intensify law enforcement at targeted high crash frequency locations
- Attempt to change driver negative behaviors (speeding, DUI, seat belt use)
- In Alabama: 80,000 Electronic Citations (eCitations) issued per month
- Accurate location information is needed
- In Alabama: State Trooper's vehicle location polled every 30 seconds
- Citations, location tracks, and crashes can be analyzed together in one spatial-temporal map

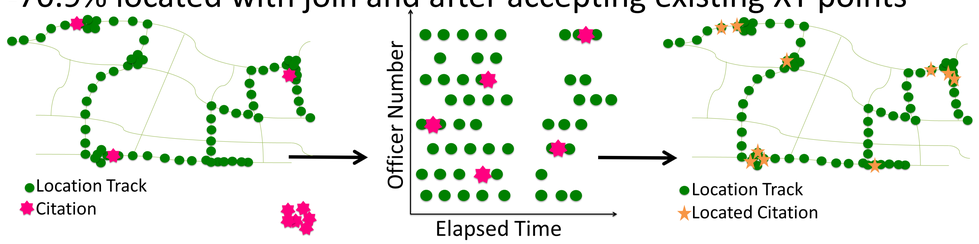
Objectives

Use Microsoft SQL Server Management Studio and Geographic Information Systems (GIS) to:

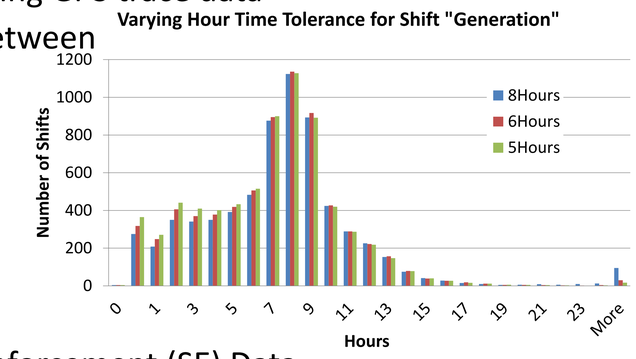
- Accurately locate citations
- Integrate officer patrol patterns, citations issued, and crash locations
- Evaluate crash reductions by citation counts before, during, and after selective enforcement periods along police driven routes

Methods

1. Obtain UserIDs for officers in Selective Enforcement data
2. Organize GPS trace data and eCitation data
3. Accurately locate eCitations using temporal analysis
   - -600 second tolerance
   - -70.9% located with join and after accepting existing XY points



4. Define hours worked using GPS trace data
   - -Calculate difference between successive GPS points
   - -Find beginning and ending of shift
   - -6921 generated shifts
   - -6 Hours was chosen



5. Incorporate Selective Enforcement (SE) Data
   - -Join SE Data to GPS shifts based on UserID and Day Worked
   - -Calculate cumulative time between GPS points and difference between GPS hrs. and SE hrs.
   - -Define a GPS point: Yes or No for during SE shift

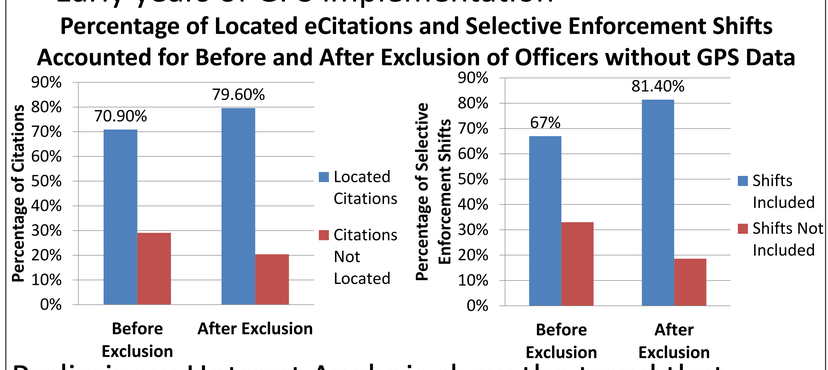
Scenario	Assumption	Query
Logged SE Hours < GPS Shift Hours Worked	The last 'x' hours of the GPS shift are the overtime selective enforcement hours	When Diff <= Cumulative Time, then 'Yes'
Logged SE Hours = GPS Shift Hours Worked	Within 0.5 hours is considered "equal"	When Diff Between -0.5 and 0.5, then 'Yes'
Logged SE Hours > GPS Shift Hours Worked	The whole shift is Selective Enforcement, and the discrepancy is due to loss of GPS signal	When Diff < 0, then 'Yes'

6. Perform cluster analysis to locate selective enforcement areas
7. Analyze frequency of citations and crashes before, during, and after selective enforcement time periods in the located areas

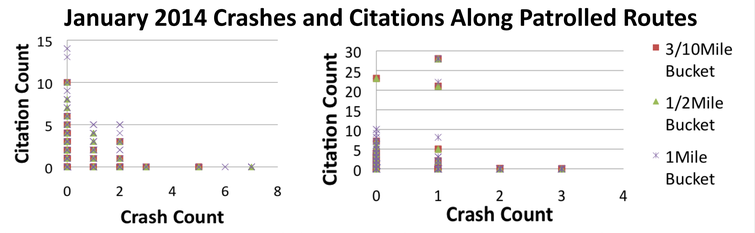
Conclusions and Results

15% of the officers had no GPS trace data so their data were not conclusive

-Early years of GPS implementation



Preliminary Hotspot Analysis show the trend that where there are more citations there are less crashes



Methodology is extensible to other states with location, citation, and crash data

Future Work

- Integrate crash severity data
- Perform Return on Investment studies for Selective Enforcement
- Develop Crash Modification Factors

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