Analysis of Texas Fatal Traffic Accidents

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Summary

A study released July 2009 by the Pacific Institute for Research and Evaluation (PIRE) found that more than half of roadway fatalities in the U.S. are related to deficient roadway conditions, a percentage larger than both the impacts of drunk driving and speeding in the number of fatalities produced (Miller & Zaloshnja, 2009). Deficient roadway conditions have led to 22,000 fatalities in the U.S. and have cost the nation on average $217 billion (Miller & Zaloshnja, 2009). Texas roadways are some of the deadliest in the country. As compared with the national average when examining the number of traffic fatalities per 100,000 people, in 2004 Texas averaged 16.50 deaths as opposed to the national average of 14.63. By 2007 the national average had fallen to 13.69 traffic fatalities per 100,000 people, but the number of traffic fatalities in Texas, although it too fell to a rate of 14.54 deaths per 100,000 people, it still exceeded the national average. It is important that the issue of the high automobile fatality rate be examined so as to find effective countermeasures that will help to significantly reduce the number of fatal accidents occurring on Texas roadways annually.

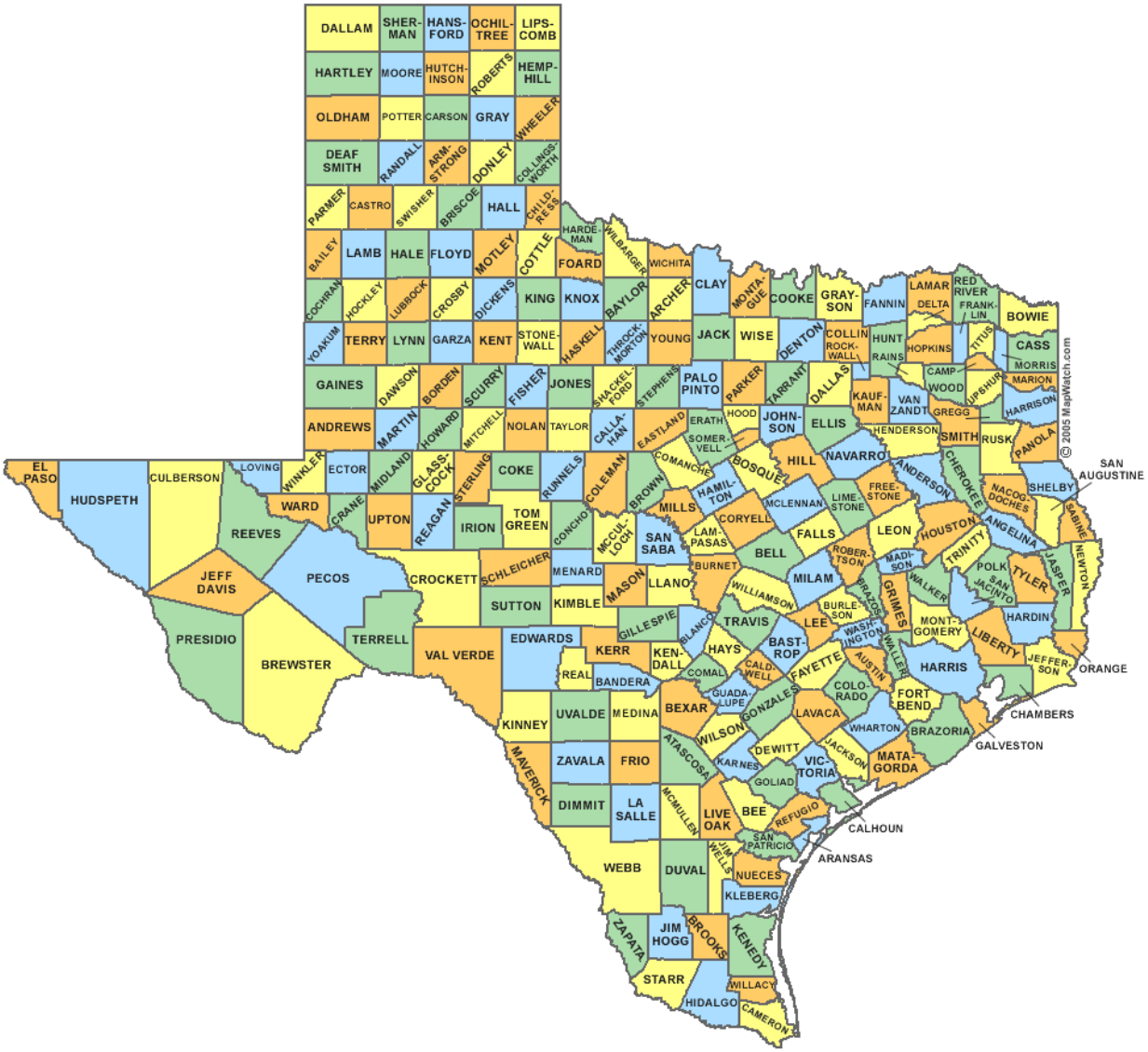
There is a nationwide database called the Fatality Analysis Reporting System (FARS) that contains data on fatal auto accidents over time. We can use this data to analyze which counties in Texas have the highest traffic fatalities and which road conditions, scenarios, and age groups contribute to those fatalities. With this information EMT and Emergency room personnel can be better prepared in responding to these types of accidents. The National Highway Traffic Safety Administration (NHTSA), state governments, city planners, private organizations, and others can also use this data to develop preventive measures and plan accordingly as to which roadways are in need of the greatest amount of attention in order to counteract the number of accident fatalities. By reducing the number of annual traffic fatalities, this will additionally help to greatly reduce the annual cost that traffic accidents implicitly have on the state of Texas budget.

Purpose

The purpose of the project is to identify spatial trends and patterns of traffic fatality accidents among varying age groups in the state through the use of Geographic Information Systems (GIS). The study will identify the counties with the highest rate of automobile fatalities based on age and will also examine whether any urban/rural patterns exist in the frequency of fatal traffic accidents. The study will also examine driver factors, roadway conditions, and types of roads involved in the fatal accidents. Maps showing all of the above factors and criteria will be produced in order to provide a visual representation of the FARS data that would make evident the factors involved in accidents and identify the most deadly roadways in Texas. This would allow preventative measures to be developed that would work to both assist EMT and Emergency room personnel to better prepare to respond to automobile accidents occurring in their service areas, and to make evident the roadways that are in need of the most attention/ improvement.

Scope

The geographic extent of our study area will include all of the counties in Texas. If significant spatial trends are discovered within a particular county, a pilot study of the particular county may be performed in order to examine the county in greater detail than a statewide examination would allow. The time period we will be working with is 2008.



Data

The data for this study will be collected from many different sources. Much of the data is available for download through government and agency websites. The data will be compiled and organized through the use of MS Office Excel. Then the data will be imported to ArcMap 9.3 (ESRI) to be spatially organized and analyzed.

Fatal Traffic Accident Geospatial Dataset Source List

The National Highway Traffic Safety Administration (NHTSA) provides a public web-based query system containing the FARS data, which is compiled through the following list of sources.

FARS (Fatality Analysis Reporting System)

- Police Accident Reports (PARS) (.xls,.txt,charts)
- State Vehicle Registration Files(.xls,.txt,charts)
- State Driver Licensing Files(.xls,.txt,charts)
- State Highway Department Data(.xls,.txt,charts)
- Vital Statistics(.xls,.txt,charts)
- Death Certificates (.xls,.txt,charts)
- Coroner/Medical examiner reports(.xls,.txt,charts)
- Hospital Records(.xls,.txt,charts)
- Emergency Medical Service Reports(.xls,.txt,charts)

Supplementary Geospatial Dataset Source List

Texas GLO (General Land Office)

- County/State Boundaries (.shp)
- Place Names (.shp)
- Roads/Highways (.shp)
- Urban Areas (.shp)

US Census Bureau

- Population Data (.xls,.cvs.txt)

Other Legacy

- Accident related geospatial data from government agencies, universities, private firms or non profits organizations will be cited upon research and discovery.

Methodology

In order to understand the spatial distribution of traffic automobile fatalities and to examine what factors are creating the high concentration of fatalities in particular areas, we will identify the counties with the highest fatality issues relating to the study criteria and factors of urban/rural issues, driver factors, road conditions, and roadway types.

The following organization and spatial analyses will be performed and mapped for each age group:

- 70+ years age group:
  - Frequency of fatalities per county
  - Rate of fatalities per county
  - Fatalities related or due to the top 6 major driver factors - frequency/rate per county
  - Fatalities on different types of roadway types - frequency/rate per county
  - Fatalities on different types of roadway conditions - frequency/rate per county
  - Identify major roadway locations of major vehicle crashes in the state

- Under 70 years age group:
  - Frequency of fatalities per county
  - Rate of fatalities per county
  - Fatalities related or due to the top 5 major driver factors - frequency/rate per county
  - Fatalities on different types of roadway types - frequency/rate per county
  - Fatalities on different types of roadway conditions - frequency/rate per county
  - Identify major roadway locations of major vehicle crashes in the state

- 15 - 24 year old age group:
  - Frequency of fatalities per county
  - Rate of fatalities per county
  - Fatalities on different types of roadway types - frequency/rate per county
  - Fatalities on different types of roadway conditions - frequency/rate per county

Implications

The results of the study will provide an analysis with geographic visualizations that will aid in the development of preventive measures to counter the high frequency of fatal traffic accidents in Texas. This study will help EMT and Emergency room personnel better prepare what supplies should be readily available and stocked for when responding to traffic accidents occurring in their service areas. The report will provide a useful reference for the National Highway Traffic Safety Administration (NHTSA), state and local governments, research organizations, private citizens, auto and insurance industries, and the media.

Budget

We have three GIS Analysts who will be paid $20/hr and will work 10hrs/wk. We will be working on this project for 10 weeks.

- Cost: 10hrs X $20 X 10 weeks X 3 people = **$6,000**

We have a project manager who will be paid $40/hr and will work 5hrs/wk. The other 5 hrs/wk they will work as an analyst.

- Cost: 5hrs X $40 X 10 weeks = $2,000
  5hrs X $20 X 10 weeks = $1,000 = **$3,000**

We have an assistant manager who will be paid $30/hr and will work 3hrs/wk. The other 7 hrs/wk they will work as an analyst.

- Cost: 3hrs X $30 X 10 weeks = $900
  7hrs X $20 X 10 weeks = $1,400 = **$2,300**

Equipment:

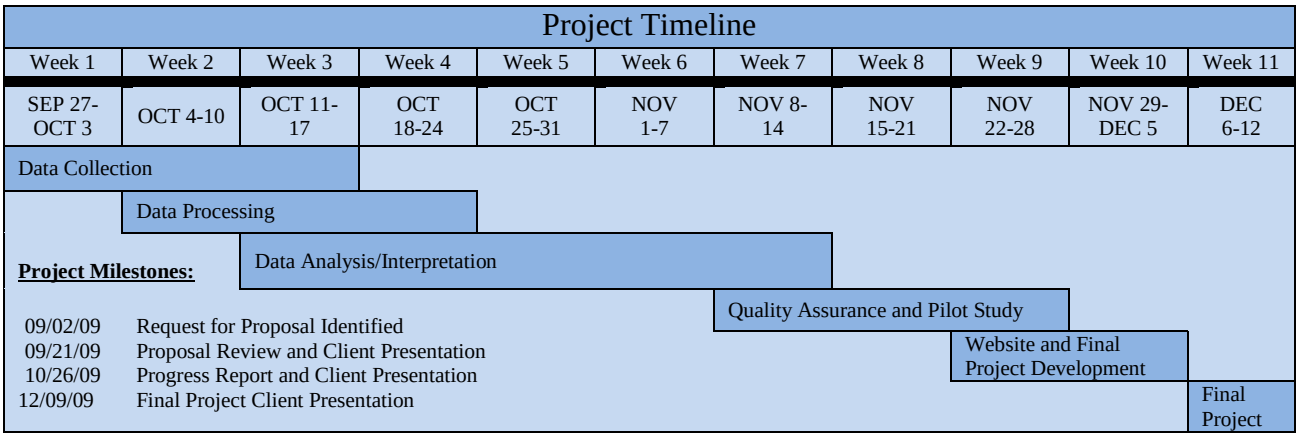
- Supplies $150/computer X 5 computers = $750
- Maintenance $200/ computer X 5 computers = $1,000
- Depreciation $1200/computer X 5 computers / 36 mo X 2.5 mo = $416.67 = **$2,166.67**

Data:

- ArcInfo 12 month license $14,000/ 12mo X 2.5mo = $2916.67
  $2,500 per extension X 3 = $7500 = **$ 10,416. 67**

Total Cost: $23,883.34

Timetable



Qualifications

Project Manager: Mark Poitras

- Background in GIS, Cartography, Map Analysis, and Quality Assurance
- Past Projects and Experience
    - *The Proximity Relationship Between Crimes and Bars in Residential Neighborhoods in Austin, TX for 2008:* 5/09
    - Quality Assurance Technician for digital GIS Flood Insurance Rate Maps - 2008
    - Map Analyst - Determined flood zone status for properties - 2002 - 2008

Assistant Manager: Paul Head

- Background in GIS, Cartography, Regional and Community Planning
- Past Projects and Experience
    - *Drought Effects on Texas Crop Production for 2007-2008*: 5/09
    - GIS Technician, Texas General Land Office – 2009 - Present

GIS Analysts:

Frank Martin

- Background in Software Development and GIS
- GIS projects:
    - *Suitability of Wolf Restoration in Arizona:* 04/04

Catherine Perille

- Background in GIS and Quality Assurance
- Intern for Tobin/P2 Energy Solutions Summer 2007
- Part-time GIS Tech I at Tobin/ P2 Energy Solutions Aug 2007-May 2008
    - SuperBase Lots and Tracts

Larissa Matin

- Background in GIS and Cartography
- Production of two GIS projects:
    - *Sex Offenders in San Marcos: Too Close for Comfort?* 12/08
    - *Spatial distribution of crime rates in San Marcos*: 05/09

Final Deliverables

T.A.G.S will provide a progress report presentation midway through the study and a final presentation along with all of the following deliverables by December 9, 2009:

- Detailed final report including all maps
- Website dedicated to project
- Professional Poster
- CDs (2) that contain:
  - All data
  - Metadata
  - Reports
  - Poster
  - Presentations
  - Readme file (Instructions on how to use the CD)

Conclusion

Recent studies have found that deficient roadway conditions are the leading cause of roadway fatalities (Miller & Zaloshnja, 2009). Texas exceeded the national average for the number of traffic related fatalities, which accounted for the death of 3,363 people in 2007 (NHTSA, n.d.). By applying spatial analysis techniques, T.A.G.S. goal is to find countermeasures that can be applied that will enable the number of annual traffic related fatalities to be significantly reduced, saving lives and also reducing the amount of the state of Texas budget that must be allotted to roadway traffic fatality related costs. By examining the Texas counties and looking at the varying age groups involved in the fatal accidents, roadway settings (urban vs. rural), roadway conditions, and driver factors that were associated with the fatalities, we will produce a comprehensive analysis that can be used to both help better prepare EMT and Emergency room personnel in how to respond to the accidents occurring in their service areas, and to be able to pinpoint the roadways that are in the greatest need of attention and/or improvement.

References

Miller, T., and Zaloshnja, E. (2009). *More than half of highway fatalities are related to deficient Roadway conditions.* Retrieved September 11, 2009, from The Auto Channel Web site: http://www.theautochannel.com/news/2009/07/01/467846.html

National Highway Traffic and Safety Administration (NHTSA). (n.d.). *Fatality rates: Texas, U.S. and best state.* Retrieved September 11, 2009 from http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/STSI/48_TX/2008/48_TX_2008.htm

Participation

Mark Poitras – Logo, Summary, Purpose, Implications
Paul Head – Data Collection, Methodology
Catherine Perille – Summary, Purpose, Scope, Implications, Budget, Final Deliverables
Frank Martin – Timeline, Budget, Presentation
Larissa Matin - Conclusion, Summary, Purpose, Implications, Scope