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One Small Problem with Administrative Driver's License Suspension Laws: They Don't Reduce Drunken Driving

Steve R Darnell



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**One Small Problem with Administrative Driver's License Suspension
Laws: They Don't Reduce Drunken Driving**

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Abstract

Only eight states continue to rely on the judicial system to suspend a drunken driver's license instead of an administrative process. Federal agencies and special interest groups such as Mothers Against Drunk Driving (MADD) and the Insurance Institute for Highway Safety press for Administrative License Suspension (ALS) laws arguing these laws reduce drunken driving. While some research supports this view, there is an equally and more compelling literature indicating ALS laws are not effective in reducing drunken driving.

This study analyzed data from eight states that have adopted ALS laws to determine if the ALS laws reduced drunken driving. A selection process was employed that identified eight diverse states without factors that might confound the results. For each of the eight states, single vehicle nighttime (SVN) crash fatalities and driver fatalities with blood alcohol concentration of .01 or greater (BAC .01 \uparrow) were analyzed. An auto-regressive with an integrated moving average (ARIMA) statistical model was used to compare 36 months of pre-ALS law data to 36 months of post-ALS law data for each state.

If the ALS laws reduce drunken driving, then a statistically significant change should be observed in the data at the ALS law's intervention date. However, only one state showed a potential reduction in drunken driving in just one of its major drunken driving proxies. The remaining states' data indicate the ALS laws had no effect on drunken driving. The analyses as a whole support the conclusion that ALS laws do not deter drunken drivers.

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I. INTRODUCTION

The advent of the automobile brought with it the need to regulate drunken driving. The first documented drunken driving conviction is traced to London cab driver George Smith who on September 10, 1897, drove his taxi into the front entrance of a building after drinking “two or three glasses of beer.”¹ Today there are more than one billion registered automobiles worldwide and nearly 240 million in the United States alone.² An alcohol related automobile crash injures someone every two minutes and kills someone every 31 minutes.³ In the United States, drunken driving accounts for one-third of all automobile crashes,⁴ and on average kills 11,000 people annually.⁵ The number of fatalities reached 12,744 in 2009.⁶ The economic and societal cost of drunken driving is estimated at \$132 billion dollars each year⁷ with medical cost alone exceeding \$5 billion dollars annually.⁸

¹ Patrick Robertson, *The New Shell Book of First*, Headline Books, (1995), at 232. England’s Licensing Act of 1872 made it an offense to be “drunk in charge on any highway or other public place of any carriage, horse, cattle or steam engine.” England’s courts interpreted “carriage” to include automobiles.

² John Sousanis, *World Vehicle Population Tops 1 Billion Units*, Wards AutoWorld, Accessed April 2, 2012: http://wardsauto.com/ar/world_vehicle_population_110815/

³ Centers for Disease Control and Prevention (CDC), *Unintentional Injury Activities – 2004*, National Center for Injury Prevention and Control (NCIPC), DC’s CDC, NCIPC (2005).

⁴ Centers for Disease Control, *Vital Signs: Alcohol Impaired Driving Among Adults - United States, 2010*, Morbidity and Mortality Weekly Report (2011), Accessed July 9, 2013: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6039a4.htm>

⁵ National Highway Traffic Safety Administration (NHTSA), *Persons Killed, by State and Highest Driver Blood Alcohol Concentration (BAC) in Crash - State: USA*, FARS Data, Accessed July 9, 2013: <http://www-fars.nhtsa.dot.gov/States/StatesAlcohol.aspx> Driver fatalities with a .01 or greater BAC were 11,510 in 2011 and 11, 948 in 2010.

⁶ National Highway Traffic Safety Administration (NHTSA), *Persons Killed, by State and Highest Driver Blood Alcohol Concentration (BAC) in Crash, (2009)*, 2009 FARS Data, Accessed July 9, 2013: <http://www-fars.nhtsa.dot.gov/States/StatesAlcohol.aspx>

⁷ MADD, *Fifth Anniversary Report to the Nation: Campaign to Eliminate Drunk Driving*, Accessed July 9, 2013: <http://www.talklikemadd.org/books/statereport/> (Quoting findings by the Pacific Institute for Research and Evaluation based on 2009 data at page 3.)

A national campaign against drunken driving was launched in the early 1980s and included the formation of Mothers Against Drunk Driving (MADD), creation of the President's Commission on Drunk Driving, passage of the Alcohol Traffic Safety Act of 1983, a national mass media campaign, and adoption of 729 state-level laws pertaining to DUI.⁹ These governmental and private efforts led to a reduction in drunken driving nationwide with the greatest declines occurring in 1982 and 1983.¹⁰ At the federal level, Congress acted by passing the Drunk Driving Prevention Act (DDPA) in 1988.¹¹ The DDPA encouraged states to implement anti-DUI polices such as check point saturation patrols, lower permissible blood alcohol concentration (BAC), increased punishment for high risk drivers, DUI courts, underage drinking programs, and administrative license suspension¹² (ALS) laws in exchange for federal grant money.

Since 1982, these initiatives reduced the number of driver fatalities with BAC of at least .08 by 42%. Fatalities of "hardcore" drunken drivers,¹³ those with a BAC of .15

⁸ Centers for Disease Control (CDC), *Current Trends: Drivers with Repeat Convictions or Arrests for Driving While Impaired - United States*, 41-43 Morbidity and Mortality Weekly Report (1994).

⁹ W. Evans, D. Neville & J. Graham, *General Deterrence of Drunk Driving: Evaluation of Recent American Policies*, 11(2) Risk Analysis 279-289 (1991).

¹⁰ Paul L. Zador, Adrian K. Lund, Michelle Fields & Karen Weinburg, *Fatal Crash Involvement and Laws Against Alcohol-Impaired Driving*, 10(4) Journal of Public Health Policy 467-85 (1989).

¹¹ Drunk Driving Prevention Act, 23 U.S.C.A. §410.

¹² Many state statutes and the literature on the subject refer to these laws as administrative license revocation statutes. For simplicity, this article refers to these laws collectively as administrative license suspension (ALS) laws.

¹³ The term "hardcore" drunken driver is used in the literature to identify "those who drive with a high blood alcohol concentration of .15 or above, who do so repeatedly, as demonstrated by having more than one drunk driving arrest, and who are highly resistant to changing their behavior despite previous sanctions, treatment or education." National Association of State Judicial Educators and The Century Council, *Hardcore Drunk Driving Judicial Guide, A Resource Outlining Judicial Challenges, Effective Strategies and Model Programs*, Accessed July 9, 2013: http://www.centurycouncil.org/sites/default/files/files/HCDD_JudicialGuide.pdf

or higher, have also seen substantial declines.¹⁴ However, the progress began to slow¹⁵ and plateaued in the mid-1990s.¹⁶ This left the states seeking new and innovative methods of reducing drunken driving. Policies designed to catch drunken drivers in the act are not optimal since it is estimated the typical first time DUI offender has driven drunk 80 times before being apprehended behind the wheel.¹⁷ Policies that deter drunken driving are considered ideal since they dissuade potential offenders from getting behind the wheel in the first place.¹⁸

ALS laws are largely an American and Canadian development¹⁹ and are in place in 42 U.S. states, Washington, D.C.,²⁰ and all Canadian provinces and territories.²¹ The first ALS laws were passed in the United States in the 1970s.²² These laws come with

¹⁴ Insurance Institute for Highway Safety, Highway Loss Data Institute, *Alcohol Fatality Facts 2009*, Accessed November 9, 2011: http://www.iihs.org/research/fatality_facts_2009/alcohol.html

¹⁵ T.S. Zobeck, B.F. Grant, G.D. Williams & D. Bertolucci, *Trends in Alcohol-Related Fatal Traffic Accidents, United States, 1977-1986*, National Institute on Alcohol Abuse and Alcoholism, Surveillance Report No. 9 (1988).

¹⁶ National Highway Transportation Safety Administration (NHTSA), *Countermeasures That Work, A Highway Safety Countermeasure Guide For State Highway Safety Offices*, 1-12, 5th ed. (2010).

¹⁷ MADD, *Vital Signs: Alcohol-Impaired Driving Among Adults-United States, 2010, Morbidity and Mortality Weekly Report* (2011), at: <http://www.madd.org/statistics/> (citing, CDC data).

¹⁸ NHTSA, note 19 *supra*.

¹⁹ Davis W. Soole, Narelle L. Haworth & Barry C. Watson, *Immediate Licence Suspension to Deter High-risk Behaviours*, Centre for Accident Research and Road Safety, Queensland University of Technology, 163-176 (2008). (Stating that many other countries have since implemented ALS law systems), Accessed August 30, 2013: <http://eprints.qut.edu.au/15397/1/15397.pdf>

²⁰ MADD, note 22 *supra*.

²¹ Transport Canada, *Road Safety in Canada: Rethink Road Safety*, 19 (2011), Accessed August 30, 2013: <http://www.tc.gc.ca/eng/roadsafety/tp-tp15145-1201.htm#s35> (Stating that all jurisdictions have 90 day administrative license suspension).

²² John H. Lacey, *Assessment of Hawaii's Administrative Driver's License Revocation Process for Driving Under the Influence*, Pacific Institute for Research and Evaluation, 4 (2006), Accessed August 30, 2013: http://www.solutionsislandhawaii.com/downloads/adlro_2006.pdf

“theoretical and common sense expectations” that they reduce drunken driving.²³ The effectiveness of ALS laws in reducing drunken driving is an empirical question, however, the literature on their effectiveness reveals inconsistent findings. Stakeholders charged with reducing drunken driving propagandize the findings supporting their position while ignoring the contrary literature. For example, the Insurance Institute for Highway Safety (IIHS) reports that ALS laws reduce drunken driving by 5% to 9%²⁴ and MADD publicizes that ALS laws reduce drunken driving by 9%.²⁵ The National Transportation Safety Board (NTSB) also reports ALS laws are responsible for a decline in drunken driving of 9%,²⁶ while the National Highway Traffic Safety Administration (NHTSA) declares the reduction is actually between 9% and 12%.²⁷ NHTSA identifies 35 private companies, special interest groups, and governmental agencies that support ALS laws.²⁸ Numerous stakeholders in the war on drunken driving report positive findings associated with ALS laws.²⁹ The one thing all these proponents of ALS laws have in common is a

²³ H. Laurence Ross, *Deterring Drunken Driving: An Analysis of Current Efforts*, Supp. No. 10 Journal of Studies on Alcohol 126 (1985).

²⁴ Insurance Institute for Highway Safety, Accessed June 1, 2013: http://www.iihs.org/research/qanda/alcohol_als.aspx

²⁵ MADD, *Administrative License Revocation*, Accessed June 1, 2013: http://www.madd.org/laws/law-overview/Administrative_License_Revocation_Overview.pdf

²⁶ National Transportation Safety Board, *Reaching Zero: Actions to Eliminate Alcohol-Impaired Driving*, NTSB/SR-13/01, PB2013-106566, (2013), Accessed July 9, 2013: <http://www.nts.gov/doclib/reports/2013/SR1301.pdf>

²⁷ NHTSA, *Administrative License Revocation (Suspension)*, 1(1) Traffic Safety Facts (2003), Accessed June 1, 2013: <http://www.nhtsa.gov/people/injury/New-fact-sheet03/AdminLicenseRevocn.pdf>

²⁸ *Id.*

²⁹ See generally, Advocates for Highway and Auto Safety, *Stuck in Neutral: Recommendations for Shifting the Highway and Auto Safety Agenda into High Gear: A Comprehensive Report on the Major Highway and Auto Safety Issues Facing America*, (1999), Accessed June 1, 2013: <http://saferoads.org/stuck-neutral>, See also Automobile Association of American (AAA), *License Suspension/Revocation*, (2010), Accessed June 1, 2013: <http://duijusticelink.aaa.com/issues/sanctions/administrative-license-suspensionrevocation-alr-judicial->

failure to even acknowledge the equivalent body of literature finding ALS laws to be ineffective.

A closer examination of the literature urged on the public and politicians reveals that most of the research is flawed methodologically. Additionally, scholarly journals are biased towards publishing research showing DUI deterrence policies to be effective, and also, publishing major findings.³⁰ These influences have created a widespread belief that ALS laws are an effective deterrent of drunken driving and are directly responsible for reducing drunken driving. This article posits that ALS laws are not an effective deterrent to drunken driving which is evident by their failure to reduce drunken driving after their effective dates.

Section I of this paper discusses deterrence theory in general and the effectiveness of specific drunken driving deterrence policies. Section II reviews the prior research on the effectiveness of ALS laws in reducing drunken driving. Section III provides an overview of this paper's empirical research. Section IV explains the methods and statistical analyses employed. Section V presents the results of the analyses. Section VI discusses the findings, and finally, Section VII concludes the paper.

II. DETERRING DRUNKEN DRIVERS

Before considering whether ALS laws are a deterrent, it is necessary to understand the principles of deterrence theory and its limitations. Criminal laws seek to control conduct society deems harmful by punishing offenders and providing methods of

license---suspensionrevocation

³⁰ Alexander C. Wagenaar, Terry S. Zobeck, Gerald D. Williams & Ralph Hingston, *Methods Used in Studies of Drink-Drive Control Efforts: A Meta-Analysis of the Literature From 1960 to 1991*, 27(3) *Accident Analysis and Prevention* 307-316, at 312 (1995); *See also*, D. Lindsey, *The Scientific Publication System in Social Science*, Jossey-Bass Pub. (1978).

retribution, rehabilitation, incapacitation, and deterrence of crime.³¹ Deterrence, the preventive effect actual or threatened punishment has upon potential offenders,³² is at the heart of criminal law.³³ Society is served best by criminal laws deterring “the harm from taking place in the first instance ... To accomplish this end, the offender must expect that the cost of the crime committed will exceed its benefit.”³⁴ In general, the research concludes that drunken driving is a crime that can be deterred through appropriate policies.³⁵

Deterrence policies are either specific or general. Specific deterrence policies seek to deter offenders from repeating their conduct after apprehension.³⁶ Specific deterrents for repeat DUI offenders include enhanced jail sentences,³⁷ electronic monitoring,³⁸ DUI

³¹ Darren Bust, *Law and Economics of Restorative Justice: Why Restorative Justice Cannot and Should not be Solely About Restoration*, 2003(1) Utah Law Review 439, 452-455 (2003).

³² J.C. Ball, *The Deterrence Concept in Criminology and Law*, 46 Journal of Criminal Law, Criminology & Police Science 347 (1955-1956).

³³ Jerome S. Legge, Jr. & Joonghoon Park, *Policies to Reduce Alcohol-Impaired Driving: Evaluating Elements of Deterrence*, 75(3) Social Science Quarterly 594 - 606 at 595 (1994), citing Franklin E. Zimring & Gordon J. Hawkins, *Deterrence: The Legal Threat in Crime Control*, University of Chicago Press (1973).

³⁴ *Id.* at 450, Deterrence theory is typically credited to philosophers Cesare Beccaria and Jeremy Bentham.; *See generally*, Cesare Beccaria, *On Crimes and Punishment*, Bobbs-Merrill (1963), *See also*, Jeremy Bentham, *The Works of Jeremy Bentham*, vol. I. Bowring Edition, 1963.

³⁵ Donald S. Kenkel, *Drinking, Driving, and Deterrence: The Effectiveness and Social Cost of Alternative Policies*, 36(2) Journal of Law and Economics 877-913 (1993).

³⁶ James D. Stuart, *Deterrence, Desert, and Drunk Driving*, 3(1) Public Affairs Quarterly 105-115, at 105 (1989).

³⁷ A. Goodwin, B. Kirley, L. Sandt, W. Hall, L. Thomas, N. O'Brien & D. Summerlin, National Highway Traffic Safety Administration, *Countermeasures that Work: A Highway Safety Countermeasures Guide for State Highway Safety Offices*. Report No. DOT HS 811 727. 28-44 (7th ed. 2013), Accessed July 9, 2013: <http://www.ghsa.org/html/publications/countermeasures.html>, *See also*, Mann, *et al. Sentence Severity and the Drinking Driver: Relationships with Traffic Safety Outcome*, 23(6) Accident Analysis and Prevention 483-491 (1991).

³⁸ *See e.g.*, W. Harding, *User's Guide to New Approaches and Sanctions for Multiple DWI Offenders*, NHTSA, DOT HS 807, 571 (1989).

courts,³⁹ ignition interlocks,⁴⁰ and others.⁴¹ While these policies are effective, specific deterrence in the DUI arena is not optimal; punishing a drunken driver after a fatal crash does not provide the protection the public expects.

In contrast, general deterrence is designed to discourage the citizenry from offending in the first place and is “considered to be the main social benefit of punishment.”⁴² General deterrence policies are only effective if potential offenders perceive the certainty of punishment, severity of punishment, and celerity of punishment to outweigh the benefit of the offense.⁴³ Severity of punishment is most effective when potential offenders perceive the anticipated punishment to outweigh the benefits of offending.⁴⁴ Certainty of punishment is realized when potential offenders believe there is a high probability of arrest, prosecution, and conviction.⁴⁵ Celerity of punishment indicates the offender understands punishment will be administered quickly after the

³⁹ See e.g., Tauber & Helander, *DUI/Drug Courts: Defining a National Strategy*, National Drug Court Institute (1999).

⁴⁰ See e.g., Voas et. al., *The Alberta Interlock Program: The Evaluation of a Province-Wide Program on DUI Recidivism*, 94(12) *Addiction* 1849 (1999).

⁴¹ NHTSA, *A Guide to Sentencing DWI Offenders*, DOT HS 810 555 (2nd ed. 2006), Accessed July 9, 2013: <http://www.nhtsa.gov/people/injury/alcohol/dwioffenders/>

⁴² James D. Stuart, *Deterrence, Desert, and Drunk Driving*, 3(1) *Public Affairs Quarterly* 105-115, at 106 (1989).

⁴³ A. Schneider & H. Ingram, *Behavioral Assumptions of Policy Tools*, 52 *Journal of Politics* 510-529 (1999).

⁴⁴ Anthony N. Doob & Cheryl M. Webster, *Sentence Severity and Crime: Accepting the Null Hypothesis*, 30 *Crime and Justice* 143-195 (2003).

⁴⁵ Charles R. Tittle & Alan R. Rowe, *Certainty of Arrest and Crime Rates: A Further Test of the Deterrence Hypothesis*, 52(4) *Social Forces* 455-462 (1974).

offense is committed.⁴⁶ DUI deterrence policies attempt to increase the levels of these three components until maximum deterrence is achieved.

A. Efforts to Increase the Severity of Punishment:

Policies increasing the severity of punishment for drunken drivers include mandatory minimum jail sentences and increased fines.⁴⁷ While mandatory jail sentences deter first time DUI offenders,⁴⁸ the literature finds that longer jail sentences provide little or no deterrent effect.⁴⁹ Typically, the public believes that increasing the severity of the punishment is the means to decreasing crime. However, “once the severity of punishment reaches a moderate level, increases in the severity of a penalty are unlikely to add significantly to its deterrent effect.”⁵⁰ While tougher DUI sentencing has an initial

⁴⁶ H. Laurence Ross, *Social Control Through Deterrence: Drinking-And-Driving Laws*, 10 Annual Review of Sociology 21-35 (1984).

⁴⁷ Jerome S. Legge & Joonghoon Park, *Policies to Reduce Alcohol-Impaired Driving: Evaluating Elements of Deterrence*, 75(3) Social Science Quarterly 594 (1994); **See also**, Laurence Ross, *Deterring Drunken Driving: An Analysis of Current Efforts*, Supp. No. 10 Journal of Studies on Alcohol 122-128 (1985).

⁴⁸ C.L. Falkowski, *The Impact of Two-day Jail Sentences for Drunk Drivers in Hennepin County, Minnesota*, NHTSA, DOT HS 806 839 (1984); **See also**, R.K. Jones, H.C. Joksch, J. H. Lacey, H.J. Schmidt, *Field Evaluation of Jail Sanctions for DWI*, NHTSA, DOT HS 807 325 (1988); **See also**, P.L. Zador, A.K. Lund, M. Fields & K. Weinburg, *Fatal Crash Involvement and Laws Against Alcohol-Impaired Driving*, Institute for Highway Safety (1988); *Contra*, H. L. Ross, R. McCleary & G. LaFree, *Can mandatory Jail Laws Deter Drunk Driving? The Arizona Case*. 81(1) Journal of Criminal Law and Criminology 156-170 (1990).

⁴⁹ Legge & Park, note 58 *supra*, at 596

⁵⁰ James D. Stuart, *Deterrence, Desert, and Drunk Driving*, 3(1) Public Affairs Quarterly 105-115 (1989). Showing that harsh sentences lead to a “distortion of the criminal justice system.” This means “as penalties increase in severity, a smaller percentage of those arrested are convicted, the number of jury trials increases and jails become so overcrowded that many accused of drunken driving are released.” Additionally, research has shown that judges routinely fail to enforce minimum mandatory DUI sentences. Judges may perceive these mandates as a legislative intrusion into their judicial function. Other actors in the criminal justice system fail to enforce criminal penalties they perceive as “exceeding established and accepted levels of severity” with their social norms. Police may reduce the number of arrest, prosecutors may reduce the charges, judges and juries may fail to convict the offender, jailers may release inmates early; **See also**, Laurence Ross, *Deterring Drunken Driving: An Analysis of Current Efforts*, Supp. No. 10 Journal of Studies on Alcohol 122-128 (1985); H. Laurence Ross & James P. Foley, *Judicial Disobedience of the Mandate to Imprison Drunk Drivers*, 21(2) Law & Society Review 315-324 (1987); **See also**, H. Laurence Ross, *The Neutralization of Severe Penalties: Some Traffic Law Studies*, 10(3) Law & Society Review 403-413 (1976).

deterrent effect, this effect quickly wears off and the long term benefit is discouraging.⁵¹ State legislatures are faced with the reality that increasing the severity of punishment for DUI offenses is unlikely to further reduce drunken driving.

B. Efforts to Increase the Certainty of Punishment:

Policies increasing the certainty of punishment include sobriety checkpoints, implied consent laws, and illegal *per se* statutes.⁵² Illegal *per se* statutes criminalize the operation of a vehicle when a driver's BAC is over .08.⁵³ Illegal *per se* statutes increase the public's perception that being arrested and convicted of DUI is more certain since the issue is resolved with a simple blood or breath test.⁵⁴ Illegal *per se* statutes have been highly effective in reducing drunken driving by increasing the certainty of conviction.⁵⁵

Certainty of punishment is also increased by implied consent laws which deem anyone operating an automobile on the public roads to consent to BAC testing.⁵⁶ New

⁵¹ H. Laurence Ross, *Detering Drunken Driving: An Analysis of Current Efforts*, 10 *Journal of Studies on Alcohol* 122 (1984).

⁵² Insurance Institute for Highway Safety, *DUI/DWI Laws*, (2011), Accessed December 1, 2011: www.iihs.org/laws/dui.aspx

⁵³ Ralph B. Taylor & Patrick McConnell, *BAC and Beer: Operationalizing Drunk Driving Laws in a Research Methods Course Exercise*, 29(2) *Teaching Sociology* 219-228, 220 (2001). "[I]f you are pulled over and breathalyzed and your blood alcohol content exceed the maximum permitted in your state, you are per se guilty of drunk driving and subject to arrest. No guilty mind (*mens rea*) is required, nor is evidence that you were driving dangerously or poorly.... Prior to the introduction of per se DUI laws, drunk driving arrest depended on subject driving behavior, demeanor during a traffic stop, and performance on field sobriety tests such as waking a straight line. In court, the defendant could contest the officer's description in each of these three areas. Per se laws were intended to render these disputes irrelevant."

⁵⁴ Legge & Park, note 58 *supra*, at 595-596.

⁵⁵ H. Laurence Ross, *Social Control Through Deterrence: Drinking-And-Driving Laws*, 10 *Annual Review of Sociology* 21-35 (1984).

⁵⁶ Nina J. Sines & John Ekman, *Double Jeopardy: A New Tool in the Arsenal of Drunk Driving Defenses*, 68 *Wisconsin Lawyer* 14 (1995).

York adopted the first implied consent law in 1924.⁵⁷ By the early 1950s, 42 states allowed the use of chemical tests to determine a driver's BAC.⁵⁸ By 1972, pursuant to a federal government mandate, all states had implemented implied consent laws.⁵⁹

Post-conviction implied consent laws are ineffective in deterring drunk driving.⁶⁰ This is due to a lack of uniformity in the states, offenders knowing DUI conviction is less certain if the BAC test is refused, and many states simply allow first offenders to refuse the test.⁶¹ By refusing the BAC test request, offenders may be able to frustrate their DUI prosecution.⁶² Nationally, NHTSA estimates 22.4% of all DUI offenders refuse the test.⁶³ NHTSA reports high refusal rates in nearly all states with a rates as high as 81% in New Hampshire,⁶⁴ and a staggering 84.9% in Rhode Island.⁶⁵ NHTSA sums the situation up as:

⁵⁷ Richard A. Shupe, *Constitutional Law: Validity of New York Statute Setting out Motorists Implied Consent to Chemical Tests for Intoxication*, 51(8) Michigan Law Review 1195-1202, at fn.1 (1953).

⁵⁸ *Id.* at 1196

⁵⁹ Tina W. Cafaro, *Fixing The Fatal Flaws in OUI Implied Consent Laws*, 34 Journal of Legislation 99, 104 and footnote 42 (2008). Provides that a federal mandate came in the National Uniform Standards for State Highway Safety Programs issued by the Secretary of the U.S. Department of Transportation.

⁶⁰ Mann, *et. al.*, *Sentence Severity and the Drinking Driver: Relationships with Traffic Safety Outcome*, 23(6) Accident Analysis and Prevention 483-491(1991).

⁶¹ Cafaro, note 70 *supra*, at 109-112. All states provide license suspension for refusing a BAC test request. Suspensions range from 90 days to 18 months. Some states provide no driving privileges during the suspension period, others provide for "hardship" licenses to attend work, church and school. Some states provide incentive for offenders to submit to BAC testing such as making it a criminal offense for refusal, providing civil penalties for refusal, admitting the refusal into evidence at the underlying DUI trial and in some instances at civil trials. Since punishment varies from state to state, DUI offenders cannot balance the risk of punishment against their refusal.; *See generally*, NHTSA, *Blood Alcohol Concentration Test Refusal Laws*, Traffic Safety Facts: Law, DOT HS 810-884W (2008).

⁶² R.B. Voas, A.S. Tippet & E. Taylor, *Impact of Ohio Administrative License Suspension*, 42 Annual Proceeding of the Association for the Advancement of Automotive Medicine 401-415 (1998).

⁶³ NHTSA, *Refusal of Intoxication Testing: A Report to Congress*, DOT HS 811 098 (2008), Accessed July1, 2013: <http://www.nhtsa.gov/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/811098.pdf>

⁶⁴ *Id.* at 5-6 (Based on 2005 data).

Generally, if a person refuses the BAC test, that person is more likely to contest the case. The lack of BAC test results clouds the case just enough to give the defense an advantage it does not have when there are test results. Defense attorneys usually attack the police reports and the behavioral cues reported by the officer or trooper. Without a BAC test, these reported cues are the only evidence the state has of the person's intoxication at the time of arrest.⁶⁶

ALS laws are another method of increasing the certainty of punishment.

License suspension becomes a near certainty once it is removed from the judicial process and assigned to an administrative process.⁶⁷

C. Efforts to Increase the Celerity of Punishment:

Policies authorizing administrative action, such as vehicle seizure,⁶⁸ vehicle and license plate impoundment,⁶⁹ and ALS laws,⁷⁰ operate quicker than the judicial system and increase the celerity of punishment. ALS laws are “intended to provide swift and certain license sanctions to impaired driving offenders who are lawfully apprehended and who are in violation of the impaired driving laws either through driving with a prohibited level of alcohol ... or refusal to submit to a chemical test to determine the presence and

⁶⁵ NHTSA, *Breath Test Refusals in DWI Enforcement: An Interim Report*, DOT HS 809-876 (2005), Accessed on July 9, 2013: <http://www.nhtsa.gov/staticfiles/nti/pdf/809876.pdf>

⁶⁶ *Id.* at 19.

⁶⁷ Voas, Tippetts & Taylor, note 78 *supra*.

⁶⁸ B.M. Sweedler & K. Stewart, *Vehicle Sanctions: An Effective Means to Reduce Impaired Driving*, Alcohol, Drugs and Traffic Safety - T 2000: Proceedings of the 15th International Conference on Alcohol, Drugs and Traffic Safety, National Transportation Safety Board, ICADTS May 22-26, 2000.

⁶⁹ David J. DeYoung, *An Evaluation of the Specific Deterrent Effect of Vehicle Impoundment on Suspended, Revoked and Unlicensed Drivers in California*, California Department of Motor Vehicles, Research and Development Branch, Licensing Operations Division, CAL-DMV-RSS-97-171 (1997).

⁷⁰ P.L. Zador, A.K. Lund & M. Fields; *Fatal Crash Involvement and Laws Against Alcohol-Impaired Driving*. 10 *Journal of Public Health Policy* 467-85 (1989), *See also*, T.M. Klein, *Changes in Alcohol-involved Fatal Crashes Associated with Tougher State Alcohol Legislation*. NHTSA, DOT HS-809-511. (1989).

level of the [alcohol].”⁷¹ ALS laws authorize the immediate suspension of an offender’s license as opposed to post-conviction laws which may take years before the offender’s license is suspended.⁷²

The typical ALS law authorizes law enforcement to immediately confiscate the offender’s driver’s license when a BAC test is refused or failed.⁷³ The officer issues the offender a notice advising him of his hearing rights. This notice serves as a temporary license until an administrative hearing. If the offender does not request a hearing, his driving privileges are automatically suspended for a specified period. If a hearing is requested, it is conducted by a non-judicial-branch official.⁷⁴ This hearing is convened quickly and unrelated to the underlying DUI charge.⁷⁵ Early studies in Minnesota,⁷⁶ Iowa,⁷⁷ and New Mexico⁷⁸ indicated the celerity effect of ALS laws reduced drunken

⁷¹ Lacey, note 30 *supra*, at 1.

⁷² Voas, Tippetts & Taylor, note 78 *supra*.

⁷³ David Dargatis, *Put Down That Drink!: The Double Jeopardy Drunk Driving Defense is Not Going to Save You*, 81 Iowa L. Rev. 775 (1996).

⁷⁴ Jeffery S. Sheridan, *Revoke First, Ask Questions Later: Challenging Minnesota’s Unconstitutional Pre-Hearing Revocation Scheme*, 31 William Mitchell Law Review 1461 (2005). Explains how Minnesota’s ALS law operates.

⁷⁵ Nina L. Sines & John Ekman, *Double Jeopardy: A New Tool in the Arsenal of Drunk Driving Defenses*, 68 Wisconsin Lawyer 14 (1995).

⁷⁶ H. Laurence Ross, *Detering Drunken Driving: An Analysis of Current Efforts*, 10 Journal of Studies on Alcohol 122, at 126 (1984), *citing*, F. Lowery, *Eating the Plastic-The Minnesota Two-Track System for Drinking Driver Control: A Report on Quick Driver License Revocation Based on Alcohol Test Result, Independent of Criminal Charge or Court Outcome*, Minnesota Department of Public Safety (1983).

⁷⁷ National Transportation Safety Board, *Deterrence of Drunk Driving: The Role of Sobriety Checkpoints and Administrative License Revocations*, Draft Report No. NTSB/SS-84/01 (1984).

driving more effectively than other DUI policy initiatives and were promising.⁷⁹ NHTSA quickly became an advocate for ALS laws⁸⁰ and established a grant program encouraging states to implement ALS law.⁸¹

D. Limitations on Deterring Drunken Driving:

There are limitations on deterring drunken driving. ALS laws, like most DUI deterrence laws, are ineffective in deterring “hardcore” drunken drivers. Alcohol is a highly addictive drug with a greater proclivity for dependence than LSD, marijuana, and amphetamines.⁸² It is an addiction characterized by a preoccupation with alcohol, over consumption, and the development of tolerance to its effects.⁸³ Long term use of alcohol likely alters neural function leaving those addicted to alcohol highly vulnerable to relapse when attempting to quit.⁸⁴ This is significant since it has been estimated that 54% of first offense DUI offenders regularly abuse alcohol and are referred to in the literature as

⁷⁸ H. Laurence Ross, *Administrative License Revocation in New Mexico: An Evaluation*, 9 Law and Policy 5 (1987).

⁷⁹ H. Laurence Ross, *Social Control Through Deterrence: Drinking-And-Driving Laws*, 10 Annual Review of Sociology 21-35 (1984).

⁸⁰ NHTSA, *Administrative License Revocation*, 1(1) Traffic Safety Facts (2003), Accessed June 1, 2013: <http://www.nhtsa.gov/DOT/NHTSA/Communication&ConsumerInformation/Articles/AssociatedFiles/810878.pdf>

⁸¹ NHTSA, *Blood Alcohol Concentration Test Refusal Laws*, DOT HS 810 884W (2008). To be eligible for these federal grants, the state’s ALS program must provide a minimum 90 day suspension for first offense DUI and no restricted license can be issued during the first 15 days. Second time offenders must suffer a one year suspension and no restricted license can issue during the first 45 days. The suspension must occur within 30 days of refusing or failing the BAC test.

⁸² David Nutt, *et al.*, *Development of a Rational Scale to Assess the Harm of Drugs of Potential Misuse*, 369 Lancet 1047-1053 (2007), David Nutt, *et al.*, *Drug Harms in the UK: A Multicriteria Decision Analysis*, 376 Lancet 1558-1565 (2010).

⁸³ Friedbert Weiss & Linda J. Porrino, *Behavioral Neurobiology of Alcohol Addiction: Recent Advances and Challenges*, 22(9) The Journal of Neuroscience 3332-3337 (2002).

⁸⁴ *Id.* at 3334; Jennifer M. Mitchell, *et al.*, *Alcohol Consumption Induces Endogenous Opioid Release in the Human Orbitofrontal Cortex and Nucleus Accumbens*, 4(116) Science Translational Medicine 116ra6 (2012).

either alcoholics or pre-alcoholics.⁸⁵ These hardcore drunken drivers exhibit pathological behaviors not subject to deterrence.⁸⁶ Accordingly, frequent drunken drivers, those who report drinking and driving six or more times per year, are undeterred by anti-DUI measures.⁸⁷

Before a potential drunken driver can be deterred, he must perceive an actual or moral benefit to avoiding the conduct.⁸⁸ These benefits fit into one of three categories. First, there is “mere deterrence” where the prospect of the specific punishment is so contrary to one’s self interest that it alone deters the conduct. Second, there is “normative validation” where the act is perceived as morally wrong and the conduct deterred. Third, there is “socially mediated deterrence” where the act and resulting punishment is so stigmatizing among the offender’s friends, colleagues, employer, and peers, that the conduct is avoided. These benefits are not present with hardcore drunken drivers who have a higher utility for their conduct, and therefore, willingly assume the risk of more

⁸⁵ Eric W. Fine, Pascal Scoles & Michael Mulligan, *Under the Influence: Characteristics and Drinking Practices of Persons Arrested the First Time for Drunk Driving with Treatment Implications*, 90(5) Public Health Reports 424-29, at 426 (1975). Offenders typically fit into one of two categories. The first group, frequently labeled pre-alcoholics in the literature, consume alcohol at least twice per week and on average consume either five quarts of beer, one fifth of wine, or two pints of liquor. The second group, frequently referred to as alcoholics in the literature, are individuals who consume five quarts of beer, or one fifth of wine, or three pints of liquor each day.

⁸⁶ *Id.*

⁸⁷ David J. Houston & Richard E. Lillard, Jr., *Drinking-and-Driving in America: A Test of Behavioral Assumptions Underlying Public Policy* 57(1) Political Research Quarterly 53-64 (2004). Deterrence measures are unnecessary for non-drunk drivers because they tend to be “responsive to the authoritative or educational component of policy that teaches “the right thing to do.” On the other extreme, “hardcore” drunk drivers “derive a higher level of utility” from their conduct and some may be exhibiting pathological behavior. “Hardcore” drunk drivers tend to be aware of governmental deterrence policies, but are likely to be the least responsive group to deterrents even when the cost is very high. However, the group that falls between these extremes, occasional drunk drivers, are aware of the governmental deterrence policies from their social groups. Unlike “hardcore” drunk drivers, occasional drunk drivers are connected to mainstream society and are deterred by the threat of punishment and the potential shame it will bring.

⁸⁸ M. Wenzel, *The Social Side of Sanctions: Personal and Social Norms as Moderators of Deterrence*, 28(5) Law and Human Behavior 547-567, at 550 (2004).

severe, certain, and swift punishment. Hardcore drunken drivers are also less likely connected to mainstream society, and therefore, assign little weight to the societal cost of their behavior.⁸⁹

Additionally, people are deterred only insofar as they perceive the legal sanctions as severe, certain, and swift.⁹⁰ This assumes that potential offenders know something about the existence of the legal sanctions and process.⁹¹ “An offender’s knowledge of [the] penalties logically precedes perceptions of the certainty and severity of penalties.”⁹² This does not mean the potential offender must have accurate knowledge of the penalties.⁹³ However, a potential offender must have at least some appreciation that the behavior is subject to punishment. Mass media campaigns effectively inform potential offenders of the consequences of drunken driving and they also stigmatize drunken driving by changing social norms.⁹⁴ On the national level, mass media campaigns through public service announcements have successfully educated the public about the risk of drunken driving.⁹⁵ These campaigns added terms like “designated driver” to the nation’s

⁸⁹ Houston and Lilliard, note 103 *supra*, at 55.

⁹⁰ Harold G. Grasmick & Donald Green, *Legal Punishment, Social Disapproval, and Internalization as Inhibitors of Illegal Behavior*, 71 *Journal of Criminal Law and Criminology* 325-335 (1980); H. Laurence Ross, *Detering the Drinking Driver: Legal Policy and Social Control*, Lexington Books, 4th ed. (1984).

⁹¹ Kirk R. Williams, Jack P. Gibbs & Maynard L. Erickson, *Public Knowledge of Statutory Penalties: The Extent and Basis of Accurate Perception*, 23(1) *The Pacific Sociological Review* 105-128, at 106 (1980).

⁹² Maynard L. Erickson, Jack P. Gibbs & Gary F. Jensen, *The Deterrence Doctrine and the Perceived Certainty of Legal Punishments*, 42(2) *American Sociological Review* 305-317 (1977); *See also*, William R. Kirk & Jack P. Gibbs, *Deterrence and Knowledge of Statutory Penalties*, 22(4) *The Sociological Quarterly* 305-317 (1981).

⁹³ Williams, Gibbs & Erickson, *supra* note 107, at 122.

⁹⁴ William DeJong & Charles K. Atkins, *A Review of National Television PSA Campaigns for Preventing Alcohol-Impaired Driving, 1987-1992*, 16(1) *Journal of Public Health Policy* 59-80, at 72 (1995).

⁹⁵ *Id.* at 63.

vernacular and informed the public that “friends don’t let friends drive drunk.”⁹⁶ Local efforts through newspaper, radio, and word of mouth, have also been highly effective in reducing DUI.⁹⁷ Anti-DUI campaigns targeting high school students have also been particularly beneficial.⁹⁸ An analysis of high school based campaigns in Minnesota, Illinois, Massachusetts, and Maine revealed substantial reductions in teen alcohol related behaviors.⁹⁹

In summary, two caveats apply to all DUI deterrence policies including ALS laws. First, even draconian levels of punishment will not deter all drunken driving. Some hardcore drunken drivers will always value the behavior greater than the punishment and will choose to offend. Second, there must be a corresponding effort to educate the public of the penalties for drunken driving before the public can weigh the risk of offending. If the public is not educated on the severity, certainty, and swiftness of the punishment, there will be no deterrent effect.

III. PRIOR RESEARCH

While there is a large body of literature on drunken driving deterrence policies, much of the research is flawed.¹⁰⁰ Studies on ALS laws are no exception, and there is far

⁹⁶ *Id.*

⁹⁷ Roy E. L. Watson, *The Effectiveness of Increased Police Enforcement as a General Deterrent*, 20(2) *Law and Society Review* 293-99, at 299 (1986).

⁹⁸ Centers for Disease Control and Prevention, *Teen Drivers: Fact Sheet*, Accessed July 9, 2013: http://www.cdc.gov/motorvehiclesafety/teen_drivers/teendrivers_factsheet.html Automobile accidents are the leading cause of deaths among teens and approximately one-fourth of teen fatalities are alcohol related.

⁹⁹ Kate Callen, *The Secretary’s Conference for Youth on Drinking and Driving: Special Report*, 98(4) *Public Health Reports* 336-43 (1983).

¹⁰⁰ Alexander Wagenaar, Terry S. Zobeck, Gerald D. Williams & Ralph Hingson, *Methods Used in Studies of Drink-Drive Control Efforts: A Meta-Analysis of the Literature From 1960 to 1991*, 27(3) *Accident Analysis and Prevention* 307-316 (1995). This meta-analysis identified 6500 peer reviewed/technical papers on drunken driving published between 1960 and 1991 including 815 empirical studies on DUI deterrence policies including ALS programs. The authors determined only 125 of the studies used valid methodologies.

from a consensus in the literature that these laws reduce drunken driving. The majority of the literature fails to control for spurious variables such as other DUI sanctions and enforcement efforts, heterogeneity of the variables, data selection, public awareness, and methodology. Moreover, when a decline in drunken driving is evident, it typically is short-lived. Unfortunately, special interest groups and government agencies charged with reducing drunken driving tend to generalize findings supporting their positions and disregard contrary findings.¹⁰¹ Publicity by special interest groups and the “theoretical and common sense expectations”¹⁰² that ALS laws work help explain why these laws are presumed to be effective.

Studies of ALS laws tend to be either single jurisdictional using interrupted times series models or multijurisdictional using regression models and pooled cross-sectional data.¹⁰³ Single jurisdictional studies typically fail to control for variables such as public awareness of the law, contemporaneous anti-DUI policies, and traffic conditions. Later multijurisdictional studies attempt to control for the numerous variables involved by considering cross sectional data. However, the literature demonstrates these multijurisdictional studies are tainted by omitted variable bias and are equally invalid. A limited number of more recent studies do a better job controlling for these deficiencies by

¹⁰¹ Insurance Institute for Highway Safety, *Q & A: Alcohol-Administrative License Suspension*, Accessed March 25, 2013: http://www.iihs.org/research/qanda/alcohol_als.aspx, *See also*, MADD, *Administrative License Revocation*, Accessed March 25, 2013: http://www.madd.org/laws/law-overview/Administrative_License_Revocation_Overview.pdf

¹⁰² H. Laurence Ross, note 31 *supra*, at 126 (1985).

¹⁰³ Alexander C. Wagenaar & Mildred M. Maldonado-Molina, *Effects of Drivers' License Suspension Policies on Alcohol-Related Crash Involvement: Long-Term Follow-Up in Forty-Six States*, 31(8) *Alcoholism: Clinical and Experimental Research* 1399-1406, at 1400 (2007).

using advanced statistical models, but these studies have also produced inconsistent findings.¹⁰⁴

A. Single Jurisdictional Studies:

Some of the earliest research, like Ross' (1988) examination of New Mexico's ALS law, produced inconsistent results.¹⁰⁵ Ross' study considered self-reported data from law enforcement, judicial officers, and the public along with an analysis of alcohol involved fatalities from 1980 to 1986. Ross found a decline in alcohol involved crash fatalities of 10% in the first 20 months after the program's implementation, *but* the self-reported data indicated the public continued to drink and drive at the same levels as before the ALS law.¹⁰⁶ Additionally, Ross found the public was "badly informed about the procedures and penalties of administrative license [suspension]."¹⁰⁷ Ross (1990) published another study of the effectiveness of the ALS laws in New Mexico, Delaware, and Minnesota.¹⁰⁸ This study analyzed alcohol related crash fatalities and nighttime vehicle crashes for each of these states from 1979 to 1989.¹⁰⁹ Contrary to his previous findings, this effort concluded New Mexico's ALS program had *no* effect on reducing

¹⁰⁴ Wagenaar and Maldonado-Molina used ARIMA models for 46 states then pooled the ARIMA estimates from all states and analyzed using inverse variance weighting methods. Ruhm used both fixed effect and econometric models. Noland and Karlaftis used a negative binomial regression approach with fixed effects specification.

¹⁰⁵ H. Laurence Ross, *Administrative License Revocation in New Mexico: An Evaluation*, 9 Law & Policy 5-16 (1985).

¹⁰⁶ *Id.* at 13.

¹⁰⁷ *Id.* at 12.

¹⁰⁸ H. Laurence Ross, *Administrative License Revocation for Drunk Drivers: Option and Choices in Three States*, AAA Foundation for Traffic Safety (1991).

¹⁰⁹ *Id.* at 43-48, Intervention dates were: Minnesota: August 1982, New Mexico: July 1984, and Delaware: January 1983. Minnesota's ALS program was effective in 1978. The law was strengthened in 1982. Crash data were not available for the period of the original enactment, so the 1982 date was used.

drunken driving.¹¹⁰ Ross found a 3.5% decline in drunken driving in Minnesota and 13.9% in Delaware. These studies are typical of early research which were essentially before and after comparisons of the ALS law's effect with no control for spurious variables.¹¹¹ Additionally, these studies are representative of early research that failed to account for the downward trend in drunken driving caused by changing public attitude towards drunken driving that began around 1980.¹¹²

Lacey (2006) improved on these methods when he sought to gauge the effectiveness of Hawaii's ALS law.¹¹³ To control for spurious traffic variables, Lacey used a ratio of nighttime injury crashes to daytime injury crashes. By using a ratio of the two data sets, the author was able to control for traffic and driving related variables, such as weather, road conditions, gas prices, enforcement patterns, and vehicle safety improvements present in both data sets. This pre-ALS law ratio of data was used to forecast the future rate of drunken driving. The forecasted data set was compared to the actual experience after the ALS law's effective date. This comparison indicated a significant initial reduction in nighttime injury crashes; however, this reduction only lasted for approximately four years before the data returned to the pre-ALS law trend.¹¹⁴ This is consistent with previous studies finding that DUI deterrence policies tend to be

¹¹⁰ *Id.* at 47.

¹¹¹ Both studies used statistical models that accommodated for the seasonal variations in the data.

¹¹² John R. Snortum & Dale E. Berger, *Drinking-Driving Compliance in the United States: Perceptions and Behavior in 1983 and 1986*, 50(4) *Journal of Studies on Alcohol* 306-319 (1989); Robert B. Voas, A. Scott Tippetts & James Fell, *The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes*, 32 *Accident Analysis and Prevention* 483-92 (2000).

¹¹³ Lacey, note 30 *supra*.

¹¹⁴ Lacey, note 30 *supra*, at 21.

short-lived.¹¹⁵ Lacey found the erosion of the law's effectiveness was likely correlated to a decline in publicity about the law.¹¹⁶ Oddly, these data also indicated an *increase* in drunken driving after the effective date of Hawaii's Youth Zero Tolerance Law and when Hawaii lowered its BAC limit from .10% to .08%.¹¹⁷ These findings may result from Lacey's use of nighttime injury *crashes* which are not as strongly correlated to drunken driving as nighttime *fatalities* crashes.¹¹⁸

Much of the literature is distorted by failing to account for the public's awareness of the sanctions and procedures imposed by the ALS law.¹¹⁹ Only a small percentage of DUI offenders are aware of the sanctions; therefore, to deter potential offenders these sanctions must be well publicized.¹²⁰ Lacey, *et al* (1990) confirmed this to be true with ALS laws when studying Nevada's experience.¹²¹ Nevada's ALS law became effective in 1983 along with other anti-DUI sanctions. It was selected for study because a preliminary survey found very low public awareness of the law. Beginning in 1986, in conjunction with the study, Nevada launched a 14-month media campaign about the ALS law and its strict enforcement objectives. This campaign included brochures, key chains, public

¹¹⁵ H. Laurence Ross, *Deterring the Drinking Driver: Legal Policy and Social Control*, Lexington Books, 4th ed. (1984).

¹¹⁶ Lacey, note 30 *supra*.

¹¹⁷ Lacey, note 30 *supra*, at 22.

¹¹⁸ Frank J. Chaloupka, Henry Saffer & Michael Grossman, *Alcohol-Control Policies and Motor-Vehicle Fatalities*, 22 *Journal of Legal Studies* 161-186, at 165 and footnote 13 (1993).

¹¹⁹ D.L. McArthur & J.F. Draus, *The Specific Deterrence of Administrative Per Se Laws in Reducing Drunk Driving Recidivism*, 16(1S) *American Journal of Preventive Medicine* 68-75 (1999).

¹²⁰ H. Laurence Ross, *Confronting Drunk Driving: Social Policy for Saving Lives*, Yale University Press, at 46 (1992).

¹²¹ J. J. Lacey, J.R. Stewart, L.M. Marchetti & R.K. Jones, *An Assessment of the Effects of Implementing and Publicizing Administrative License Revocation for DWI in Nevada*, U.S. Dept. of Trans., DOT HS 807 600 (1990), Accessed July 9, 2013: <http://ntl.bts.gov/lib/25000/25800/25894/DOT-HS-807-600.pdf>

service announcements on television and radio, billboards, and press releases.¹²² Direct educational efforts were also initiated by law enforcement, MADD, and Students Against Destructive Decisions (SADD). A follow-up survey determined the media campaign significantly increased the public's awareness of the ALS law's penalties and procedures. A time-series analysis of alcohol related crash data found no reduction in drunken driving at the effective date of the law, but a 12% reduction *after* the media campaign.¹²³ The research does not explain whether this reduction was traceable to the deterrent effect of the ALS law or the public's response to the general anti-DUI message of the media campaign. The study's ultimate findings were established on an analysis of only seven months of data acquired after the media campaign ended.¹²⁴ The study offers no indication of how long the decline in drunken driving continued.

Public awareness likewise impacted the Mann, *et al* (2000) study of Ontario, Canada's ALS law.¹²⁵ A telephone survey of Ontario residents found public awareness of the law was high at its commencement.¹²⁶ The researchers analyzed the trend of DUI fatalities nine years before and 13 months after Ontario's ALS law. This analysis found an immediate reduction of 17%,¹²⁷ predominately on light to moderate drinkers, with

¹²² *Id.* at 11-19.

¹²³ *Id.* at 36-46.

¹²⁴ *Id.* at 11. The 14-month media campaign began in April 1986 and continued through May 1987; *Id.* at 36-44. The researchers' findings were based on alcohol related traffic data reviewed through December 1987.

¹²⁵ R.E. Mann, R.G. Smart, G. Stoduto, E.M. Adlaf, E. Vingilis, D. Beirness & R. Lamble, *Changing Drinking- and-Driving Behavior: The Effects of Ontario's Administrative Driver's Licence Suspension Law*, 162(8) Canadian Medical Association Journal 1141-42 (2000).

¹²⁶ *Id.*

¹²⁷ R.E. Mann, R.G. Smart, G. Stoduto, D. Beirness, R. Lamble & E. Vingilis, *The Early Effects of Ontario's Administrative Driver's License Suspension Law on Driver Fatalities with a BAC > 80 mg%*, 93(3) Canadian Journal of Public Health 176-180 (2002).

implementation of the law.¹²⁸ The time period considered after the intervention of the ALS program was too short to firmly gauge the long term effect, but the data's trend indicates the decline was temporary.¹²⁹ Howard's (2005) study of Alberta, Canada's ALS law likewise found a significant reduction in drunken driving during the first year after the law became effective, which was attributed to public awareness.¹³⁰ Media coverage and public awareness of Alberta's law was high when it was implemented, but decreased overtime.¹³¹ The study determined "much of the reductions occurred in the first year ... [of the program]...and that rates returned to previous trends in the second and third years."¹³² All of these studies found an initial reduction in drunken driving likely generated by media efforts to inform the public, and typically, the trend erodes shortly after the media coverage slows and public awareness wanes.

Some research was confounded by contemporaneous legislative acts to combat drunken driving. Rogers (1995) used an intervention time series of data from 1985-1994, in concluding California's ALS law reduced drunken driving by 9% to 13%.¹³³ However,

¹²⁸ R.E. Mann, R.G. Smart, G. Stoduto, E.M. Adlaf, E. Vingilis, D. Beirness, R. Lamble & M. Asbridge, *The Effects of Drinking-Driving Laws: a Test of the Differential Deterrence Hypothesis*, 98(11) *Addiction* 1531-36 (2003).

¹²⁹ R.E. Mann, *et al.*, note 143 *supra*, at 178.

¹³⁰ Howard Research, *Evaluation of the Alberta Administrative Licence Suspension Program*, Alberta Ministry of Transportation, 1-114 (2005), Accessed July 9, 2013: <http://www.transportation.alberta.ca/Content/docType47/Production/aalsevaluationfinalreport.pdf>

¹³¹ *Id.* at 72-76.

¹³² *Id.* at 34.

¹³³ Patrice N. Rogers, *The General Deterrent Impact of California's 0.08% Blood Alcohol Concentration Limit and Administrative Per Se License Suspension Laws*, State of California, Department of Motor Vehicles, CAL-DMV-RSS-95-158, vol. 1 (1995), Accessed July 9, 2013: http://apps.dmv.ca.gov/about/profile/rd/r_d_report/Section_5/S5-158.pdf Data included police officers' notations that a driver "had been drinking," all nighttime accidents, single vehicle nighttime accidents with a male driver, and nighttime accidents occurring between 2 and 3 a.m. Data were acquired from the California Highway Patrol.

California's ALS law went into effect six months after California lowered its BAC limit from .10% to .08%. California was only the fourth state to adopt a .08% BAC limit and the amendment received considerable media coverage.¹³⁴ As the author noted, "the temporal proximity of the two laws (only six months apart) makes it very difficult to unravel the separate effects of each."¹³⁵ Additionally, a media campaign publicizing California's ALS law, unlike previous studies, had little to no impact on drunken driving. In fact, during the media campaign, DUIs increased in California's four largest counties.¹³⁶ At the same time, the 12-month moving average of the 10 years of data studied showed a consistent decline in drunken driving.¹³⁷ This finding indicates the decline was likely a continuation of the general downward trend in drunken driving in the 1980s correlated to the synergistic effects of all anti-DUI policies and shifts in the public's attitude towards drunken driving.

Roger's results are also contrary to McCarthy's (2003) study finding California's ALS law had no effect on reducing drunken driving.¹³⁸ McCarthy sought to compare the effectiveness of DUI and highway speed policies on older drivers as opposed to younger drivers. Various data were obtained and analyzed from California agencies including alcohol control measures, gas prices, alcohol prices, DUI arrest data, and socioeconomic

¹³⁴ *Id.* at 7.

¹³⁵ *Id.* at 77.

¹³⁶ *Id.* at 71-74.

¹³⁷ *Id.* at 25-72, figures 2.1 through 17.2.

¹³⁸ Patrick McCarthy, Research and Innovative Technology Administration, Bureau of Transportation Statistics, *Effects of Alcohol and Highway Speed Policies on Motor Vehicle Crashes Involving Older Drivers*, 6(23) *Journal of Transportation and Statistics* (2003), Accessed on July 11, 2013: <http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/journaloftransportationandstatistics/volume06number23/html/paper03/index.html>

data from 1981-1998.¹³⁹ The study found no influence of California's ALS law on either younger or older drivers in reducing drunken driving.¹⁴⁰

Research efforts are further complicated when legislatures implement contemporaneous anti-DUI policies with ALS laws. Beirness, *et al*, (1997) confronted this issue when considering Manitoba's 1989 ALS and vehicle seizure and impoundment law.¹⁴¹ Government data, i.e. injury and fatality crashes, single-vehicle nighttime crashes, criminal charges of impaired driving, and hit and run accidents, from five years prior and six years after implementation of the law were analyzed using an interrupted time series model. Saskatchewan, which did not have a similar program, was used for comparison.¹⁴² The authors found a reduction in drunken driving but were unable to separate the effect of the ALS law from that of the vehicle seizure law.¹⁴³ The study was further complicated by the fact that Saskatchewan inexplicably experienced a decline in drunken driving over the same period.¹⁴⁴ Voas, *et al* (2000) confronted this same issue when testing Ohio's ALS law to determine if it reduced DUI recidivism.¹⁴⁵ Ohio contemporaneously

¹³⁹ *Id.* at 2 and table 1.

¹⁴⁰ *Id.* at 6. The study identified a reduction in property damage only crashes among older drivers. Property damage only crashes are not a recognized proxy for drunken driving.

¹⁴¹ D.J. Bierness, H.M. Simpson & D.R. Mayhew, *Evaluation of Administrative Licence Suspension and Vehicle Impoundment Programs in Manitoba*, TIRF of Canada, Transport Canada No. TP-13096 E (1997). The ALS program authorized an automatic license suspension of 90 days for offenders with a BAC of .08 or who refuse a BAC test.

¹⁴² *Id.* at 23.

¹⁴³ *Id.* at 20.

¹⁴⁴ *Id.* at 32-35.

¹⁴⁵ R.B. Voas, A.S. Tippetts & E.Taylor, *Impact of Ohio Administrative License Suspension*, 42 Annual Proceeding of the Association for the Advancement of Automotive Medicine 401-415 (1998).

implemented a vehicle seizure and impoundment law targeting repeat offenders.¹⁴⁶ This study identified DUI or implied consent offenders from Ohio's driving records prior to the ALS law, then followed these drivers for 24 months after the ALS law's effective date. The authors found a significant reduction in post-ALS law convictions, but re-offenders also were subject to vehicle seizure, making it impossible to separate the effects of the two sanctions.¹⁴⁷

B. Multi-Jurisdictional Studies:

In an effort to strengthen the statistical analysis and control for specious variables, research efforts expanded to test data from multiple jurisdictions using cross-sectional data. Some studies found equivocal support that ALS laws reduced drunken driving. Zador, *et al*, (1989) measured the national effects of BAC *per se* laws, ALS laws, and first offense minimum incarceration laws.¹⁴⁸ This study analyzed traffic fatalities occurring from 1978 to 1985 in all 50 states and the District of Columbia using a multivariate regression model. Addressing a common flaw in previous research, the authors acknowledged and attempted to isolate the unrelated, existing downward trend in drunken driving during these years. After controlling for this decline, the authors determined the three laws *combined* only reduced drunken driving by .8 percent nationally.¹⁴⁹ The authors went on to warn that this small decline might be attributable to

¹⁴⁶ *Id.* Ohio's Vehicle Action (VA) law required temporary impoundment or immobilization in addition to license suspension for multiple offenders.

¹⁴⁷ *Id.*

¹⁴⁸ Paul, L. Zador, Adrian Lund, Michele Fields & Karen Weinberg, *Fatal Crash Involvement and Law Against Alcohol-Impaired Driving*, 10 *Journal of Public Health Policy* 467-85 (1989).

¹⁴⁹ *Id.* at 482-483.

the “effects of media and public interest generated by the laws ... as well as enthusiasm of local police and judicial officials.”¹⁵⁰

Stewart, *et al*, (1992) sought to determine if recidivism rates were lessened by implementation of the ALS laws in Louisiana, North Dakota, and Mississippi.¹⁵¹ The driving records of offenders arrested or convicted of DUI before the ALS law were identified and reviewed post-ALS law for recidivism. California’s DUI recidivism rates were used for comparison since it did not have an ALS law at the time. The study found no deterrent effect in Mississippi or Louisiana, but a significant effect in North Dakota.¹⁵² The authors cautioned that the North Dakota finding may be spurious and correlated to state-level factors such as police priorities and practices.¹⁵³

Chaloupka, *et al*, (1993) produced a multijurisdictional study seeking to test the effectiveness of all major DUI laws including ALS laws.¹⁵⁴ This work analyzed alcohol involved fatalities and nighttime fatalities from 1982-1988 for the 48 contiguous states. Data from the Fatal Accident Reporting System (FARS) database maintained by NHTSA were used including fatalities with known BAC levels. The FARS database did not start collecting BAC levels for fatalities until 1982, and this study claims to be the first to use this variable.¹⁵⁵ These data were paired with typical socio-economic variables i.e., age,

¹⁵⁰ *Id.* at 483.

¹⁵¹ Kathryn Stewart, Paul Gruenewald & Robert Nash Parker; *Assessing Legal Change: Recidivism and Administrative Per Se Laws*, 8(4) *Journal of Quantitative Criminology* 375-94 (1992).

¹⁵² *Id.* at 384-87.

¹⁵³ *Id.* at 391.

¹⁵⁴ Frank, J. Chaloupka, Henry Saffer & Michael Grossman, *Alcohol-Control Policies and Motor-Vehicle Fatalities*, 22(1) *The Journal of Legal Studies* 161-186 (1993).

¹⁵⁵ *Id.* at 165.

gender, income, employment, and also, state specific variables such as alcohol tax, seatbelt usages, and other DUI laws.¹⁵⁶ Simulations of the data indicated that ALS laws were ineffective if the suspension period was less than one year.¹⁵⁷ The study concluded “that existing laws with relatively weak penalties have no deterrent effect.”¹⁵⁸ This finding is consistent with the conclusion of Paulsrude and Klingberg (1975) that a direct threat of a 30-day license suspension did not deter chronic traffic offenders.¹⁵⁹ It is also in accord with Homel’s (1981) finding that suspension periods of less than 12 months are ineffective in altering driving behavior.¹⁶⁰

Some research finds unequivocal reductions in drunken driving attributable to ALS laws. Legge and Park (1994)¹⁶¹ noted the flaws in previous single jurisdiction studies that failed to control for extraneous factors such as economic conditions, alcohol consumption in general, average miles traveled, traffic congestion, mandatory seatbelt

¹⁵⁶ *Id.* at 173-174, tables 1 and 2.

¹⁵⁷ *Id.* at 184.

¹⁵⁸ *Id.* at 179.

¹⁵⁹ S. Paulsrude & C. Klingberg, *License Suspension: A Paper Tiger?*, Washington State, Department of Motor Vehicles, Research and Technology Division, (1975). Offenders were placed on probation by the DMV and subject to a discretionary 30-day license suspension for traffic infractions during the probationary period. Since the suspension was discretionary, DMV assigned offenders to one of three groups for study. Group 1 met with DMV personnel and was told any infraction during probation would result in a 30-day suspension. Group 2 also met with DMV personnel, but the 30-day suspension was not discussed and DMV would not impose the suspension on this group. Group 3 was not contacted by DMV and was unaware of the risk of suspension. The direct threat of a 30-day suspension had no effect on driving habits. The study excluded DUI offenders who are subject to a mandatory suspension.

¹⁶⁰ R. Homel, *Penalties and the Drink-Driver: A Study of One Thousand Offenders*, 14 *Australia and New Zealand Journal of Criminology* 225 (1981). Australia’s statute authorized discretionary license suspension of up to 12 months for first time offenders and up to three years for second or subsequent offenders. Homel monitored the driving records of 1,000 DUI offenders for 36 months after conviction and found 37.5% re-offended and of these 13% committed another DUI. Re-offenders were paired with the suspension period for the original conviction. The study found only suspension periods of more than 12 month but less than 18 months effective.

¹⁶¹ Jerome S. Legge & Joonghoon Park, *Policies to Reduce Alcohol-Impaired Driving: Evaluating Elements of Deterrence*, 75(3) *Social Science Quarterly* 594-606 (1994).

laws, and the increase in the minimum drinking age.¹⁶² This study analyzed single vehicle nighttime fatalities for all states for 1980, 1983, and 1987.¹⁶³ The study analyzed these pooled data using multivariate regression and controlling for many policy and environmental variables. The authors determined that states with ALS laws had reductions in drunken driving in comparison to states without ALS laws but no specific measure was provided.¹⁶⁴

Voas, *et al* (2000) also used a multivariate regression model to analyze crash data of all 50 states from 1982 to 1997.¹⁶⁵ In reviewing the effects of .10% BAC *per se* laws, .08% BAC *per se* laws, and ALS laws, the study found significant reductions in DUI fatalities attributable to each of these laws.¹⁶⁶ The authors caution the results may be unsound because variables addressing media coverage, public awareness of policies, and changes in public attitude towards drinking and driving were not included.¹⁶⁷

Villaveces, *et al* (2003) analyzed alcohol related crash fatalities from 1980 to 1997 for all 50 states and the District of Columbia.¹⁶⁸ The authors sought to isolate the effectiveness of major DUI sanctions including .08% *per se* laws, zero tolerance laws,

¹⁶² *Id.* at 597.

¹⁶³ *Id.* at 600, table 1. These years were selected because 1980 represented the beginning of the national effort to combat DUI, 1984 represented a time when many anti-DUI laws were effective, and 1987 was the year by which many states had imposed mandatory seatbelt usage. *Id.* at 597.

¹⁶⁴ *Id.* at 602.

¹⁶⁵ Robert B. Voas, A. Scott Tippetts & James Fell, *The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes*, 32 *Accident Analysis and Prevention* 483-492 (2000).

¹⁶⁶ *Id.* at 489.

¹⁶⁷ *Id.* at 491.

¹⁶⁸ Andres Villaveces, Peter Cummings, Thomas Koepsell, Frederick P. Rivara, Thomas Lumley & John Moffat, *Association of Alcohol-Related Laws with Death Due to Motor Vehicle and Motorcycle Crashes in the United States, 1980-1997*, 157(2) *American Journal of Epidemiology* 131-140 (2003). Study included all 50 states and the District of Columbia.

ALS laws, mandatory incarceration for first offenders, sobriety checkpoint laws, and mandatory seatbelt and motorcycle helmet laws. This study controlled for the general declining “trend in traffic mortality rates,”¹⁶⁹ but did not control for other factors such as alcohol control policies, price variations among states, economic conditions, or changes in public attitude. The study notes that it did not include a measurement for police efforts in enforcing the laws. The study concluded that ALS laws were associated with a 5% decline in “overall mortality and alcohol-related mortality.”¹⁷⁰

Similar studies find ALS laws have no impact on drunken driving. Young and Likens (2000) considered alcohol involved fatalities from the FARS database for the 48 contiguous states from 1982 to 1990 to test the effectiveness of various DUI sanctions including ALS laws.¹⁷¹ The authors included a large number of socioeconomic, state specific DUI policies, and alcohol control variables in the analysis.¹⁷² This study concluded that ALS laws had no effect in reducing drunken driving and no deterrent effect.¹⁷³

Eisenberg (2003) sought to test the effectiveness of several major DUI sanctions including ALS laws using alcohol related FARS data for all 50 states and the District of Columbia from 1982 to 2000.¹⁷⁴ The study employed the same socioeconomic, traffic,

¹⁶⁹ *Id.* at 132.

¹⁷⁰ *Id.* at 136.

¹⁷¹ Douglas J. Young & Thomas W. Likens, *Alcohol Regulation and Auto Fatalities*, 20 *International Review of Law and Economics* 107-126. (2000).

¹⁷² *Id.* at 113.

¹⁷³ *Id.* at 122.

¹⁷⁴ Daniel Eisenberg, *Evaluating the Effectiveness of Policies Related to Drunk Driving*, 22(2) *Journal of Policy Analysis and Management* 249-274 (2003).

alcohol control, and DUI sanction variables as prior works but also included new variables to control for the effect of MADD on enforcement and graduated driver's licenses for minors.¹⁷⁵ This study also included fixed effects to control for states with constant atypical data.¹⁷⁶ Eisenberg found “no clear pattern” that ALS laws are effective in reducing drunken driving.¹⁷⁷

Studies using self-reported data have consistently found ALS laws ineffective in reducing drunken driving. Kenkel (1993) considered the relationship between DUI sanctions, including ALS laws and alcohol control policies, on deterring heavy alcohol usage and drunken driving.¹⁷⁸ Kenkel used self-reported drinking and driving data from the 1985 National Health Interview Survey. Kenkel controlled for alcohol access variables, i.e., alcohol cost, government control of alcohol sales, and legal drinking age, and also typical socio-economic variables, i.e., age, marital status, employment, and race.¹⁷⁹ Kenkel found that ALS laws in combination with alcohol control measures reduced *heavy drinking*,¹⁸⁰ but “holding the laws effect on heavy drinking constant,

¹⁷⁵ *Id.* at 251.

¹⁷⁶ *Id.* at 254. Utah consistently has lower fatality rates. This is likely due to state policies and public attitudes towards drinking and driving. The statistical model accepts this as a fixed effect of the state and controls for it regardless of its origin.

¹⁷⁷ *Id.* at 270.

¹⁷⁸ Donald S. Kenkel, *Drinking, Driving, and Deterrence: The Effectiveness and Social Cost of Alternative Policies*, 36(2) *Journal of Law and Economics* 877-913 (1993).

¹⁷⁹ *Id.* at 886-889. Self-reported data were from the 1985 Health Interview Survey. Full list of other variables at table A, page 905.

¹⁸⁰ *Id.* at 885, table 1, Kenkel defines heavy drinkers as males who report consuming 5 or more alcoholic drinks an average of 17 days per year, and females who consume 5 or more alcoholic drinks an average of 2.6 days per year.

however, no independent effect on drunk driving [was] observed.”¹⁸¹ This finding points to a synergistic effect of all anti-DUI policies as well as alcohol control policies in reducing drunken driving.

Sloan *et al* (1995) also used self-reported data from the Behavioral Risk Factor Surveillance Survey (BRFSS) from 1989-1990 to study the effects of state-level deterrents on drunken driving.¹⁸² Alcohol usage data from the BRFSS are consistent with other national surveys and considered reasonably valid.¹⁸³ This study included typical socio-economic variables, i.e. age, income, employment, and also state specific variables, such as alcohol prices, the state’s tort liability system, compulsory liability insurance, and dramshop legislation, in its analysis.¹⁸⁴ The authors concluded that alcohol control policies are effective in reducing drunken driving by limiting access to alcohol, but many DUI sanctions including ALS laws have no deterrent effect on drunken driving.¹⁸⁵

Stout, *et al* (1999) also used self-reported data from the 1984–1995 BRFSS to examine various alcohol related behaviors.¹⁸⁶ The authors controlled for a set of typical socio-economic variables and also state specific variables such as driving habits, alcohol price, and state laws. This study also included state variables for religiosity and whether

¹⁸¹ *Id.* at 892. Quote from Frank J. Chaloupka, Henry Saffer & Michael Grossman, *Alcohol-Control Policies and Motor-Vehicle Fatalities*, 22(1) *The Journal of Legal Studies* 161-186, at 163 (1993).

¹⁸² Frank A. Sloan, Bridget A. Reilly & Christoph Schenzler, *Effects of Tort Liability and Insurance on Heavy Drinking and Driving and Driving*, 38(1) *Journal of Law and Economics* 49-77 (1995).

¹⁸³ M. Kirsten Bradstock, *et al.*, *Drinking-Driving and Health Lifestyle in the United States: Behavioral Risk Factors Surveys*, 48(2) *Journal of Studies on Alcohol* 147-152 (1987).

¹⁸⁴ Sloan, *et al.*, note 198 *supra*, at 57-63.

¹⁸⁵ *Id.* at 70.

¹⁸⁶ Emily M. Stout, Frank Sloan, A. Liang Lan & Hester H. Davies, *Reducing Harmful Alcohol-related Behaviors: Effective Regulatory Methods*, 61 *Journal of Studies on Alcohol* 402-12. (2000).

states adopted prohibition before 1920 when national prohibition took effect under the 18th Amendment.¹⁸⁷ This study identified effective DUI sanctions, i.e., mandatory jail sentences, increased fines, and open container laws, but found most criminal sanctions including ALS laws did not deter drunken driving.¹⁸⁸

The clear defect in all these multivariate, cross-sectional studies is omitted variable bias. Ruhm (1996) demonstrated how most of these studies overstate DUI deterrent effects due to omitted variable bias.¹⁸⁹ Previous research ignored anti-drunken driving variables such as grassroots activities and the public's changing attitude toward drunken driving. Additionally, this research disregarded the general decline in all highway fatalities attributable to modern vehicle safety features such as airbags and anti-lock brakes.¹⁹⁰ Even when a large set of variables are included, it is not possible to hold these variables constant and isolate the effect of a specific policy.¹⁹¹ By including additional variables, Ruhm demonstrates that drunken driving reductions typically credited to ALS laws are really a meager .01%. He elaborates that even this paltry decline is likely explained by variables he has omitted such as community based efforts to combat drunken driving.¹⁹² Ultimately, Ruhm concluded that all multivariate, cross-sectional studies on DUI sanctions are terminally flawed.¹⁹³

¹⁸⁷ *Id.* at 407, table 3.

¹⁸⁸ *Id.* at 410.

¹⁸⁹ Christopher J. Ruhm, *Alcohol Policies and Highway Vehicle Fatalities*, 15 *Journal of Health Economics* 435-54, at 446 (1996).

¹⁹⁰ *Id.* at 436.

¹⁹¹ *Id.* at 438-439.

¹⁹² *Id.* at 451.

¹⁹³ *Id.* at 450-452.

Whetten-Goldstein *et al.*, (2000) followed up on Ruhm's effort by examining alcohol related data from the FARS database from 1984 to 1995.¹⁹⁴ The authors acknowledged that past studies were flawed due to omitted variable bias.¹⁹⁵ This study likewise included fixed effects for constant atypical data. The analysis controlled for a large number of variables, i.e., socioeconomic factors, major DUI sanctions, alcohol control policies, and tort liability variables.¹⁹⁶ These authors determined that ALS laws had some effect in reducing drunken driving, but this finding was not otherwise quantified.¹⁹⁷

Noland and Karlaftis (2005)¹⁹⁸ likewise acknowledged flaws in the analyses of alcohol related crash data including inconsistencies in the data sets used, differences in the variables used in the model specifications (omitted variable bias), and differences in the methodology used.¹⁹⁹ Their study considered alcohol related fatalities from the FARS database from 1990 to 1997 to determine the effects of safety-belt laws and ALS laws in reducing driver fatalities. This study utilized advanced statistical methods designed to eliminate much of these inconsistencies.²⁰⁰ The study concluded that ALS laws had no statistically significant effect on reducing drunken driving.²⁰¹

¹⁹⁴ Kathryn Whetten-Goldstein, Frank A. Sloan, Emily Stout & Lan Liang, *Civil Liability, Criminal Law, and Other Policies and Alcohols-Related Motor Vehicle Fatalities in the United State: 1984-1995*, 32 *Accident Analysis and Prevention* 723-33 (2000).

¹⁹⁵ *Id.* at 732. The authors referred to this phenomenon as "equation specification."

¹⁹⁶ *Id.* at 730-731, tables 4 and 5.

¹⁹⁷ *Id.* at 729.

¹⁹⁸ Robert B. Noland & Matthew G. Karlaftis, *Sensitivity of Crash Models to Alternative Specifications*, Part E 41 *Transportation Research*, 439-58, (2005).

¹⁹⁹ *Id.* at 440.

²⁰⁰ *Id.* at 444-45. The authors contrasted ordinary least square (OLS) fixed-effect models with negative

Wagenaar and Maldonado-Molina (2007) made novel use of auto regression with an integrated moving average (ARIMA) time series intervention modeling to test the effectiveness of ALS laws.²⁰² The authors sought to improve on the limitations of single jurisdictional studies, and also, on multijurisdictional studies using multivariate models that included a “selection of an idiosyncratic limited set of covariates.”²⁰³ The study considered single vehicle nighttime crashes and driver fatalities with a BAC finding from the FARS database from 1976 to 2002 for 46 states. Multi-vehicle daytime crashes and driver fatalities with .00 BAC were included as covariates to control for traffic related variables affecting the data sets. ARIMA estimates for each state were pooled to increase the validity of the findings. The pooled findings led the researchers to conclude that ALS laws resulted in a reduction of 5.2% in all alcohol related fatalities.²⁰⁴ The study notes that it failed to account for all factors such as alcohol excise tax and mandatory seatbelt laws that might confound the results.²⁰⁵ Additionally, NHTSA did not require states to provide driver fatalities BAC information to FARS database until 1982 which required the researchers to estimate the missing pre-1982 data.²⁰⁶

binominal fixed effect models. Binominal fixed effect models were used because they displayed less variation in results than linear regression models that account for serial correlation.

²⁰¹ *Id.* at 454.

²⁰² Alexander C. Wagenaar & Mildred M. Maldonado-Molina, *Effects of Drivers' License Suspension Policies on Alcohol-Related Crash Involvement: Long-Term Follow-Up in Forty-Six States*, 31(8) *Alcoholism: Clinical and Experimental Research* 1399-1406 (2007).

²⁰³ *Id.* at 1400.

²⁰⁴ *Id.* at 1404.

²⁰⁵ *Id.* at 1403.

²⁰⁶ *Id.* at 1401.

IV. STUDY OVERVIEW

This study posits that ALS laws are ineffective in deterring drunken driving which is evident from their failure to reduce drunken driving after their effective date. If prior studies finding ALS laws to deter drunken driving are valid, then there should be a statistically significant reduction in drunken driving in these states tested after the effective dates of the ALS law. Additionally, if these studies are valid, the reduction in drunken driving should be at a minimum about 5% and possibly as high as 17%. If declines in drunken driving this large are present it should be readily apparent in the data.

This study analyzed accepted proxies for drunken driving from eight states having ALS laws to determine if a decline existed. States were selected for analysis based on their demographic, geographic, and chronological diversity. Two diverse data sets, i.e. single vehicle nighttime (SVN) fatalities and driver fatalities with .01 or greater BAC, were secured for analysis from the FARS database maintained by the NHTSA. Appropriate steps were taken to ensure that potentially confounding factors were eliminated from the statistical analysis. The statistical computations were performed using IBM SPSS Statistics. ARIMA modeling was employed to accommodate for the seasonal nature of traffic data.

This research adds to the literature on the effectiveness of ALS laws by: 1) analyzing the impact of ALS laws in multiple states that adopted ALS law between 1985 and 1998; 2) using two diverse proxies for drunken driving; 3) using the best data available obtained from the FARS database; 4) employing statistical methods that reflect the seasonality of traffic data; 5) and by eliminating potentially confounding variables. Additionally, this research appears to be the first to introduce the length of the suspension

period by selecting states that administratively suspend an offender's license for as few as seven days to as long as one year.

V. METHODS

A. State Selection:

States were chosen based on geographical and demographical diversity. States that were identified as having potential issues which would confound the results were eliminated from consideration. According to Wagenaar and Maldonado-Molina (2007), Arkansas, Colorado, Mississippi, North Carolina, North Dakota, Nevada, Utah, and Washington passed other major anti-DUI policies contemporaneously with their ALS laws.²⁰⁷ Therefore, these states were eliminated from consideration.

To avoid the existing downward trend in drunken driving that began in the early 1980s, states implementing ALS laws before 1985 were likewise rejected.²⁰⁸ Drunken driving is also affected by population density. Research confirms that drunken driving is more prevalent in rural areas than in urban areas,²⁰⁹ due to higher speeds, two-lane roads, and a lack of public transportation.²¹⁰ Jurisdictions with highly urban or highly rural populations were not considered for this study.²¹¹ Each state's per capita alcohol

²⁰⁷ *Id.* at 1403, table 2. These states include Arkansas, Colorado, Mississippi, North Carolina, North Dakota, Nevada, Utah, and Washington.

²⁰⁸ *Id.* at 1402, table 1. These states include Alabama (1983), Delaware (1982), Iowa (1982), Kansas (1982), Louisiana (1984), Maine (1984), Minnesota (1978), Missouri (1983), New Mexico (1984), Oklahoma (1983), and West Virginia (1981).

²⁰⁹ J. Blatt & S. Furman, *Residence Location of Drivers Involved in Fatal Crashes*, 6 *Accident Analysis and Prevention* 705-11 (1998).

²¹⁰ *Id.*

²¹¹ U.S. Census Bureau: 2010 Census, *List of Population, Land Area, and Percent Urban and Rural in 2010 and Changes from 2000 to 2010*, Accessed March 27, 2013: <http://www.census.gov/geo/reference/ua/urban-rural-2010.html> Highly urban population: Arizona (89.8%), California (94.9%), Connecticut (88%), District of Columbia (100%), Florida (91.2%), Hawaii (92), Illinois (88.5%), Maryland (87.2%), Massachusetts

consumption was also considered. In general, states with low levels of per capita alcohol consumption have restrictive alcohol access policies such as high taxes on alcohol, limitations on who may retail alcohol, and limitations on hours of sale, which decrease drunken driving.²¹²

Based on these forgoing criteria, the states identified in table 1 below are demographically, geographically, and chronologically diverse, and eliminate potentially confounding factors such as population density and alcohol consumption.

TABLE 1.

State	ALS Date	Alcohol Fatalities 1998	Alcohol Fatalities 2004	Per Capita Consumption Alcohol Gal.	Urban Population ²¹³	Rural Population ²¹⁴
Virginia	1995	38.4%	39.4%	2.11	75.5%	24.5%
South Carolina	1998	37.2%	44.3%	2.31	66.3%	33.7%
Idaho	1994	37.7%	35.6%	2.67	70.6%	29.4%
Nebraska	1993	38.2%	36.3%	2.31	73.1%	26.9%
Wyoming	1985	46.1%	36.2%	2.61	64.8%	35.2%
New Hampshire	1993	48.9%	34.5%	4.44	60.3%	39.7%
Wisconsin	1988	42.5%	45.2%	2.76	70.2%	29.8%
Georgia	1995	33.7%	32.8%	1.97	75.1%	24.9%

(92%), New York (88%), Ohio (78%), Oregon (81%), and Texas (85%). Highly rural population: Vermont (60%) was excluded because of its high rural population and this factor's influence on DUI rates. All figures are rounded.

²¹² Andreas Muller, *Business Recession, Alcohol Consumption, Drinking and Driving Laws: Impact on Oklahoma Motor Vehicle Fatalities and Fatal Crashes*, 79(10) American Journal of Public Health 1366-1370 (1989).

²¹³ U.S. Census Bureau, *2010 Census, List of Population, Land Area, and Percent Urban and Rural in 2010 and Changes from 2000 to 2010*, Accessed March 27, 2013: <http://www.census.gov/geo/reference/ua/urban-rural-2010.html>

²¹⁴ *Id.*

This assortment of states also provides ALS law data that suspend an offender's license for periods ranging from as few as seven days to as long as one year. There is some indication in the literature that short license suspension periods have no deterrence effect on drunken driving.²¹⁵ It is plausible that very short suspension periods such as Virginia's seven-day suspension offers little incentive for potential offenders not to offend while states with long suspension periods such as Georgia's one-year suspension period provides great incentive. No prior research is found considering the impact of the suspension period on the effectiveness of ALS laws.

Since the effective date of the ALS law is crucial to securing the appropriate data sets, independent legal research was undertaken to confirm the exact date each state's ALS law became effective. The effective date for each state's ALS law, each state's primary statute codifying the law, and the range of penalties is listed in table 2 below.

TABLE 2.

STATE	Code Section	Effective Date	Failure 1 st Offense	Failure 2 nd Offense	Refusal 1 st Offense	Refusal 2 nd Offense
Virginia	46.2-391.2	1/1/1995	7 days	60 days	1 year	1 year
South Carolina	56-5-2950 56-5-2951	6/29/1998	30 days	60 days	6 mon.	9 mon.
Idaho	18-8002 18-8002A	7/1/1994	90 days	1 year	Jud. sus. 1 year	Jud. sus. 2 year
Nebraska	60-498.01 60-498.02	1/1/1993	90 days	1 year	1 year	1 year
Wyoming	31-6-102 31-6-103	7/1/1985	90 days	90 days	6 mon.	18 mon.
New Hampshire	265-A:30 265-A:4 264-A:14	1/1/1993	6 mon.	2 years	180 days	2 years
Wisconsin	343.305	1/1/1988	6 mon.	6 mon.	1 year	2-3 years
Georgia	40-5-67.1 40-5-67.2	1/1/1995	1 year	3 years	1 year	1 year

²¹⁵ Paulsrude & Klingberg, note 175 *supra*.

B. Data:

NHTSA's FARS database became operational in 1975 and includes motor vehicle fatalities from all 50 states, the District of Columbia, and Puerto Rico. NHTSA, through the National Center for Statistics and Analysis (NCSA), has a cooperative agreement with an agency in each jurisdiction designated to provide crash fatality information. Each jurisdiction designates a FARS Analyst to gather, translate, and transmit data to NCSA in a standardized format. Data are acquired from multiple sources including accident reports, death certificates, vehicle registrations, coroner reports, and medical records.²¹⁶ All FARS Analysts attend formal training and received on-the-job training from other FARS Analysts.²¹⁷ Continuing training is provided to ensure all FARS data are properly coded. Additionally, the FARS computerized recording system has built-in processes to ensure consistency, and the data entered by FARS Analysts are reviewed for quality by NHTSA employees.²¹⁸ State-level data are unreliable due to reporting disparities and standards that vary from state to state.²¹⁹ This research uses standardized data acquired from the FARS database which are far superior to any other traffic data source.

The best available empirical measures of drunken driving are vehicle fatality rates.²²⁰ Fatally injured drivers are twice as likely to have consumed alcohol as drivers

²¹⁶ NHTSA, *Fatality Analysis Reporting System (FARS): Analytical Users Manual, 1975-2011*, DOT HS 811 693 (2012).

²¹⁷ NHTSA, *Fatality Analysis Reporting System, Fatal Crash Data Overview*, DOT HS 809 726 (2005).

²¹⁸ NHTSA, *Fatality Analysis Reporting System (FARS), Analytical User's Manual 1975-2011*, DOT HS 811 693 (2012).

²¹⁹ Phillip Cook & George Tauchen, *The Effect of Minimum Drinking Age Legislation on Youthful Auto Fatalities, 1970-1977*, 13 *Journal of Legal Studies* 169 (1984).

²²⁰ Frank J. Chaloupka, Henry Saffer & Michael Grossman, *Alcohol-Control Policies and Motor-Vehicle Fatalities*, 22(1) *The Journal of Legal Studies* 161-86, at 165 (1993).

who survive a crash.²²¹ Since 1982, NHTSA has required each state to test the BAC of all traffic fatalities occurring within 30 days of the incident and input this information into FARS.²²² This means that even trace amounts of alcohol are detected and reported to FARS. Research finds that even at the lowest BAC levels, the brain's ability to process information is slowed, visual perception is degraded, and the ability to allocate one's attention to multiple tasks is limited.²²³ Necessary driving skills are "impaired at .01 to .02 percent BAC or, in other words, at the lowest levels that can be measured reliably."²²⁴ For a portion of this research a "drunken driver" is operationalized as a driver killed while having a BAC of .01 or greater. For each of the eight states identified driver fatalities with BAC of .01 or higher will be analyzed for declines after the effective date of each states ALS law. Additionally, three subsets of these data are analyzed for declines in drivers killed with BAC levels of .01-.07, .08-.14, and .15+. Research shows that DUI deterrent policies are most effective with moderate social drinkers and tend to be ineffective with hardcore problem drinkers.²²⁵

This study will also examine a second recognized proxy for drunken driving. For this portion of the research a "drunken driver" is operationalized as a single vehicle nighttime (SVN) driver fatality. SVN fatalities occur between the hours of 9 p.m. and

²²¹ Rajesh Subramanian, *Alcohol Involvement in Fatal Crashes*, NHTSA, DOT HS 809 579, at 6 (2003).

²²² Wagenaar & Maldonado-Molina, note 218 *supra*, at 1401 (2007).

²²³ Marcelline Burns & Herbert Moskowitz, *Effects of Alcohol on Driving Performance*, 14 *Alcohol Health and Research World* 12-14 (1990).

²²⁴ *Id.* at 14.

²²⁵ Houston & Lilliard, note 103 *supra*; *See also*, James Nichols; H. Laurence Ross, *The Effectiveness of Legal Sanctions in Dealing with Drinking Drivers*, Surgeon General's Workshop on Drunk Driving: Background Papers, U.S. Department of Health and Human Services, at 93 (1989).

5:59 a.m. and only involved the driver's vehicle and no other vehicle, bicycle, or pedestrian. Drivers killed in nighttime crashes are four times more likely to have consumed alcohol compared to drivers killed in daytime crashes.²²⁶ Drivers killed in single vehicle crashes are three times more likely to have consumed alcohol than drivers killed in multiple vehicle crashes.²²⁷ Research finds that 58% of single vehicle fatalities were intoxicated at the time of the crash, compared with only 10% of fatalities in multivehicle accidents. Additionally, 52% of SVN fatalities occur between the hours of 9 p.m. and 6 a.m.²²⁸ SVN fatalities are accepted as a valid proxy for drunken driving.²²⁹

Numerous factors other than alcohol contribute to driver fatalities including weather, driving volume, enforcement efforts, the economy, vehicle quality, vehicle safety, and roadways.²³⁰ Two proxies for non-alcohol related fatalities were also secured from the FARS database for the relevant time frame. These were driver fatalities with .00 BAC and multivehicle daytime (MVD) fatalities. Driver fatalities with .00 are drivers who were killed in traffic crashes whose postmortem blood test revealed no measurable amount of alcohol.²³¹ MVD fatalities are driver's killed between the hours of 6 a.m. and

²²⁶ Subramanian, note 237 *supra*, at 11.

²²⁷ *Id.* at 13.

²²⁸ M. Ostrom & A. Ericksson, *Single-Vehicle Crashes and Alcohol: A Retrospective Study of Passenger Car Fatalities in Northern Sweden*, 25 *Accident Analysis & Prevention* 171-176 (1993).

²²⁹ J.C. Fell & C.E. Nash, *The Nature of the Alcohol Problem in U.S. Fatal Crashes*, 16(3) *Health Education & Behavior* 336-343 (1989).

²³⁰ Robert B. Voas, A. Scott Tippetts & James Fell, *The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes*, 32 *Accident Analysis and Prevention* 483-492 (2000).

²³¹ A BAC of .00 does not eliminate the possibility that the fatally injured driver was impaired by another drug. Alcohol is the most common drug associated with driver fatalities followed by marijuana, benzodiazepines, and stimulants. *See*, Marie C. Long, *et al.*, *The Prevalence of Alcohol, Cannabinoids, Benzodiazepines and Stimulants Amongst Injured Drivers and their Role in Driver Culpability*, 32 *Accident Analysis & Prevention* 613-622 (2000). However, the majority of driver fatalities impaired by marijuana also test positive for alcohol. *See*, A. S. Christophersen, *et al.*, *Prevalence of Alcohol and Drugs in Blood*

8:59 p.m. in crashes involving two or more vehicles. MVD fatalities represent the lowest indication of alcohol involvement.²³² Specious factors that may confound the results of the statistical analyses are present in both alcohol related fatalities data sets, i.e. SVN and .01↑BAC driver fatalities, and also the non-alcohol related fatalities data sets. These specious factors are controlled for by using a ratio of alcohol related fatalities to non-alcohol related fatalities. “This approach - analyzing a ratio series of the intervention series to a baseline/control series (or as a proportion of the total of the two) - tends to create more stable series, providing greater statistical power to detect real changes if they are present.”²³³ The five ratios of these data are expressed as SVN/MVD, .01↑/.00BAC, .01-.07/.00BAC, .08-.14/.00BAC, and .15↑/.00BAC.

C. Statistical Analysis:

Traffic data are influenced by such factors as the season, holidays, weather, and the economy. Box and Jenkins developed a time series model designed for evaluating seasonal data such as traffic data known generally as ARIMA modeling.²³⁴ Research confirms that ARIMA models are best suited for analyzing and forecasting traffic data.²³⁵

Samples from Norwegian Drivers Involved in Road Traffic Accidents, 2 NHMRC Road Accident Research Unit 768-772 (1995). The number of drivers fatally injured while impaired by benzodiazepines and stimulants are very low compared to those killed while impaired by marijuana and alcohol. *See*, W. K. Jeffrey, *et al.*, *Drug and Alcohol Concentrations of Drivers Involved in Fatal Motor Vehicle Accidents in British Columbia, Canada: A 1-Year Study*, 2 MHMRC Road Accident Research Unit 746-751 (1995).

²³² R.L. Douglass & L.D. Filkins, *Empirical Development of a Surrogate Measure of Alcohol Involvement in Official Accident Data*, 4(9) HIT Lab Reports 7-11 (1974); D. Maxwell, *Classification and Estimation of Alcohol-Involvement in Fatalists*, NHTSA, DOT HS 806 372 (1983).

²³³ Lacey, note 30 *supra*, at 21.

²³⁴ G.E.P. Box & G.M. Jenkins, *Time Series Analysis: Forecasting and Control*, Wiley, 4th ed. (2008).

²³⁵ Billy M. Williams & Lester A. Hoel, *Modeling and Forecasting Vehicular Traffic Flow as a Seasonal ARIMA Process: Theoretical Basis and Empirical Results*, 129 *Journal of Transportation Engineering* 664-672 (2003).

ARIMA modeling was employed in this study. ARIMA models uniquely account for the time-related dynamics (trends, drift, and other auto-correlated processes) as well as cyclical /seasonal patterns using autoregressive (AR), integrative (I), and moving average (MA) components.²³⁶

For each of the eight states, 36 months of pre-ALS law data and 36 months of post-ALS law data for both drunken driving proxies, i.e. SVN and .01↑BAC fatalities, and both non-alcohol related fatalities, i.e. MVD and .00 BAC fatalities, were acquired from the FARS database. The intervention date for each state was the effective date of the state's ALS law. These data were used to create five ratios of alcohol related fatalities to non-alcohol related fatalities, i.e., SVN/MVD, .01↑/.00BAC, .01-.07/.00BAC, .08-.14/.00BAC, and .15↑/.00BAC.

For each state and each data set, the 72 months of actual data ratios were used to create an ARIMA model or the "actual model."²³⁷ The 36 months of pre-ALS law actual data were used to predict a successive 36 months post-ALS law ARIMA model without considering the law's intervention or the "predicted model." This predicted model was then compared to the actual model using a paired-samples t-test. If the ALS laws reduced either of the drunken driving proxies, there should be a statistically significant difference between the predicted model and actual model.

VI. RESULTS

For each state, the SVN/MVD ratios are considered first. In the graphs following these analyses, the "actual" lines are ARIMA models of the actual SVN/MVD fatalities

²³⁶ Lacey, note 30 *supra*, at 21.

²³⁷ IBM's SPSS program was used. The model of best fit was selected using IBM SPSS's expert modeler function.

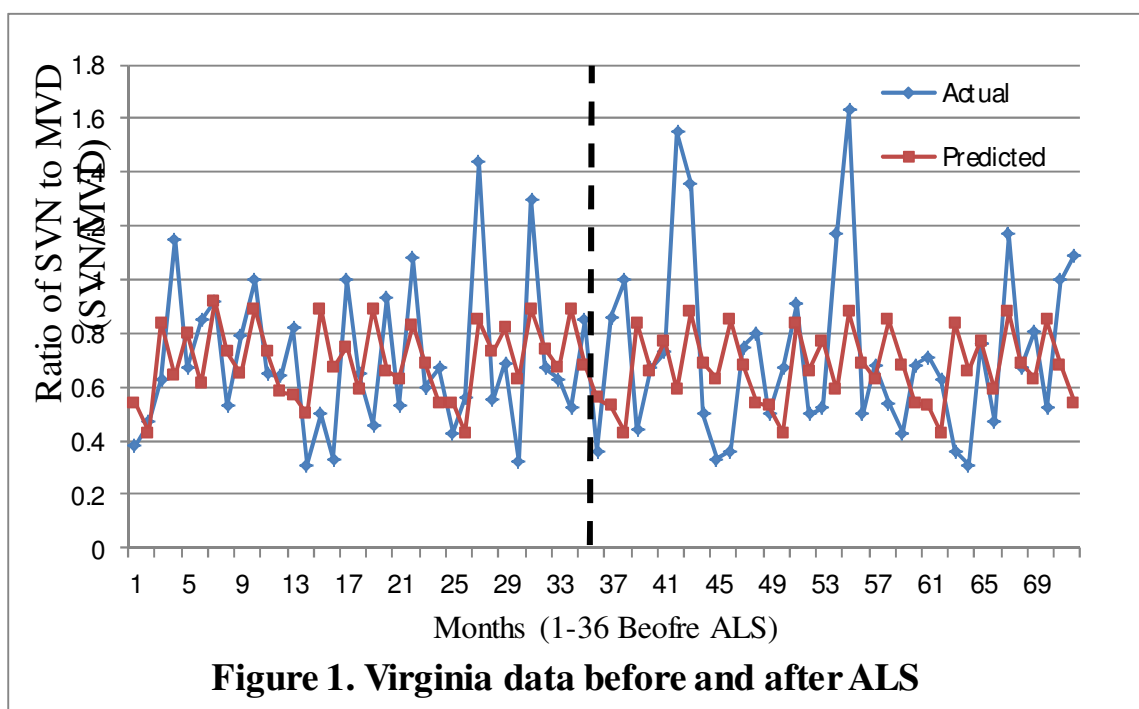
for the relevant 72 month period. The intervention dates are the effective dates of the ALS laws and are represented by the horizontal lines. The “predicted” lines in these graphs are ARIMA model predictions of SVN/MVD fatalities for the 36 months post-ALS law data using the previous 36 months of actual data. These predictions are made without considering the ALS laws’ intervention effect.

For each state, the .01↑/.00BAC ratios are considered next. In the graphs following these analyses, the “actual” lines are ARIMA models of the actual ratios of .01↑/.00BAC driver fatalities for the relevant 72 month periods. The intervention dates are the effective dates of the ALS law in each state and are represented by the horizontal lines. The “predicted” lines in these graphs are ARIMA model predictions of .01↑/.00BAC driver fatalities for the 36 months post-ALS law data using the previous 36 months of actual data. These predictions are made without considering the ALS laws’ intervention effect.

Lastly, for each state, three subsets of BAC data were analyzed to determine if the ALS laws produced declines in driver fatalities in the BAC ranges of .01-.07, .08-.14, or .15↑. As in the previous analyses, ratios of driver fatalities with alcohol involvement to driver fatalities without alcohol involvement were used to control for spurious factors. These three ratios are expressed as .01-.07/.00BAC, .08-.14/.00BAC, and .15↑/.00BAC. Again, ARIMA models of actual post-ALS law data were compared to ARIMA models of predicted post-ALS law data using a paired-sample t-test. These results are reported in the table following these analyses.

A. Virginia:

Virginia's SVN/MVD predicted and actual lines are virtually the same indicating the ALS law had no effect in reducing drunken driving. The statistics support this interpretation as well.²³⁸ A paired-sample t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36 pairs) showed no statistically significant difference, $t(35) = 1.114$, $p = .273$



Virginia's .01 \uparrow /.00 BAC predicted line is a good fit to the pre-ALS law actual data but a poor fit for the post-ALS law actual data. A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed a statistically significant difference between the two ratios, $t(35) = 4.476$ and $p = 0.000$, at the 95%

²³⁸ The model of best fit is a simple seasonal model, with a stationary R-squared of 0.834. Mean absolute percentage error (MAPE) is 33.43, and the mean actual error (MAE) is 0.204. The mean ratio of the actual post ALS data was 0.74, with a standard deviation of 0.33. The mean ratio for the predicted post-ALS data was 0.67, with a standard deviation of 0.14.

alpha level.²³⁹ However, the ARIMA model predicts a continuous decline in driver fatalities while the actual data show an *increase* in driver fatalities after the initial decline. If this finding is accepted as valid it would indicate the ALS law caused an *increase* in drunken driving of approximately 20%.²⁴⁰ As discussed, the premise of deterrence theory is that crime can be reduced by increasing the severity, certainty, and swiftness of punishment. ALS laws increase the swiftness and certainty of punishment for drunken drivers. Logically, this should lead to a decrease in drunken driving after implementation of an ALS law. Virginia's data indicate that drunken driving *increased* by 20% after implementation of its ALS law. This is an anomalous finding and if accepted as correct it would indicate the ALS law was counterproductive.

²³⁹ The model of best fit is the Winters' Additive model, with a stationary R-squared of 0.902. Mean absolute percentage error (MAPE) is 20.421, and the mean actual error (MAE) was 0.125. The mean ratio for the actual post-ALS data is 0.673, with a standard deviation of 0.239. The mean ratio for the predicted post-ALS data is 0.472, with a standard deviation of 0.124.

²⁴⁰ The percentage change is calculated by subtracting the mean ratio for the predicted post-ALS data (0.472) from the mean ratio for the actual post-ALS data (0.673) or $0.673 - 0.472 = .201$ or 20.1%. A positive difference indicates the ALS law increased drunken driving. A negative difference indicates the ALS law decreased drunken driving.

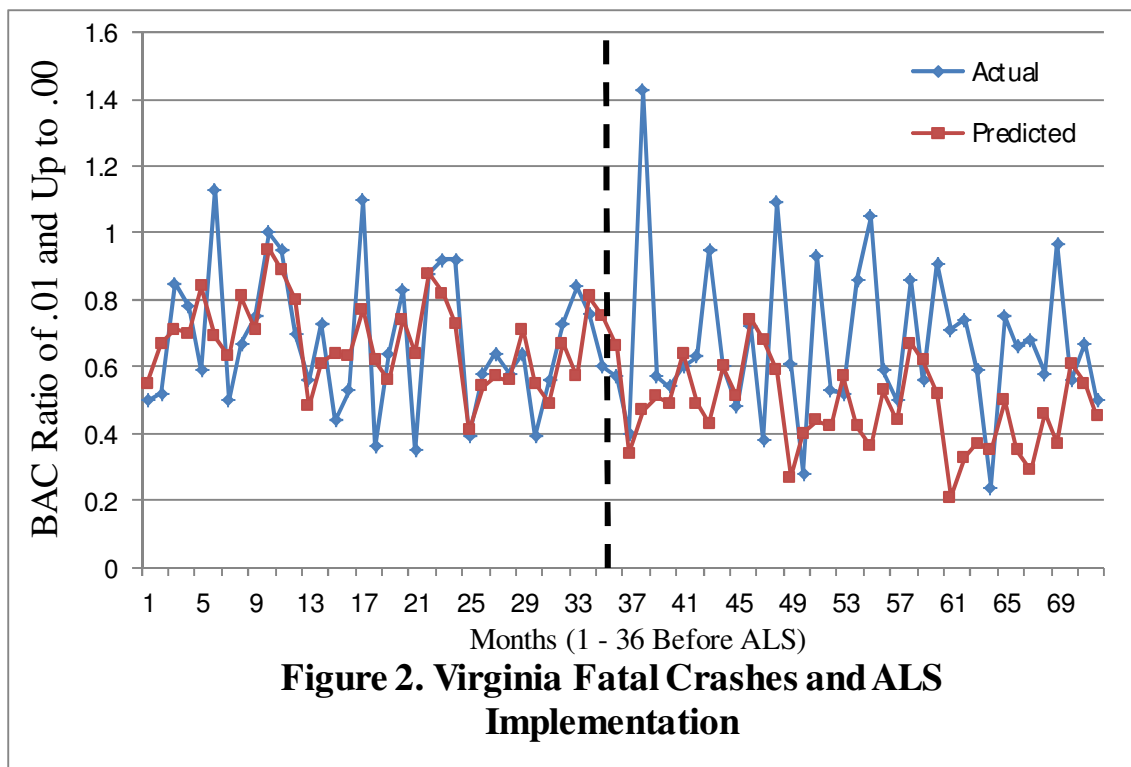


Figure 2. Virginia Fatal Crashes and ALS Implementation

Virginia's three subsets of BAC data indicated no statistically significant differences in the .08-.14/.00BAC and .15↑/.00BAC ranges. The .01-.07/.00BAC category did have a significant finding, $p = .011$. If this finding is valid it indicates the ALS law produced an *increase* in drunken driving of 3.41% in this category.²⁴¹ Again, if this finding is valid it would indicate the ALS law was counterproductive in reducing drunken driving.

²⁴¹ Refer to note 256 for mathematical formula. $0.0903 - 0.0562 = .0341$ or 3.41% increase.

TABLE 3.

Virginia	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.796	.800	.888
MAPE ²⁴²	54.681	29.881	29.562
MAE ²⁴³	.029	.033	.112
Mean ratio of actual post-ALS data	.0903 (s.d. = .06135)	.1530 (s.d. = .07855)	.4103 (s.d. = .16145)
Mean ratio of predicted post ALS data	.0562 (s.d. = .03491)	.1260 (s.d. = .02868)	.4527 (s.d. = .08024)
t (35)	2.679	1.874	-1.420
p value	.011*	.069	.165

* Statistically significant at 95% alpha level.

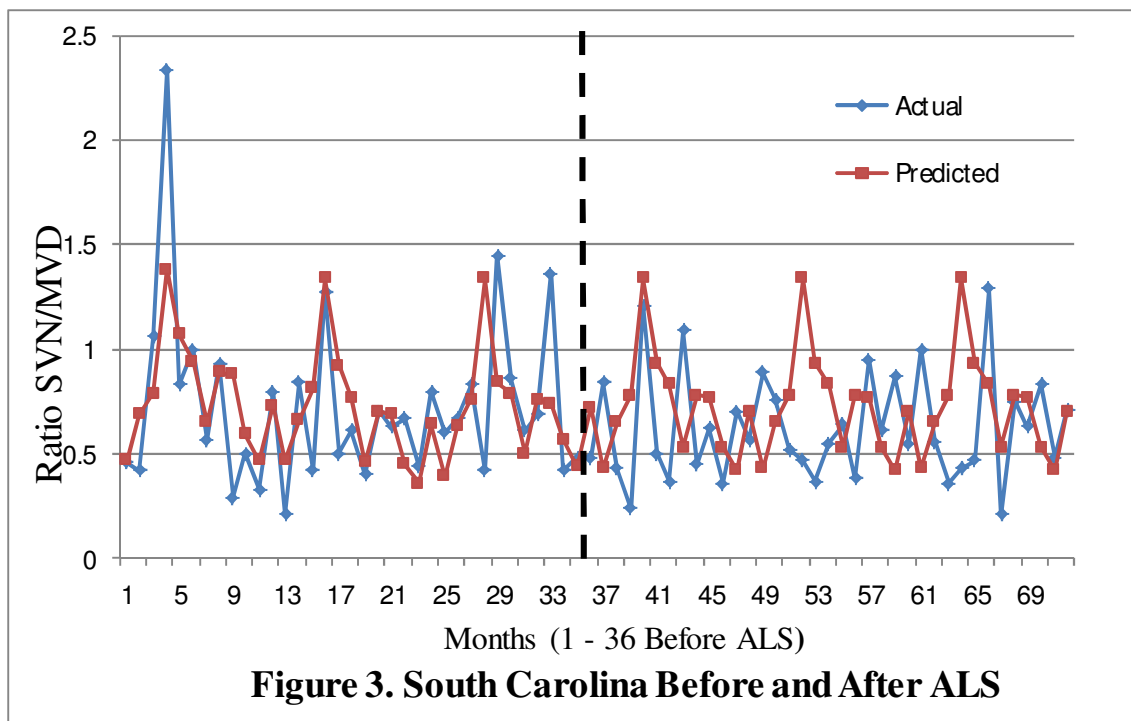
B. South Carolina:

South Carolina's SVN/MVD predicted line and the actual line, with rather dramatic outliers in the actual data, suggest the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.²⁴⁴ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -1.503$ and $p = 0.142$.

²⁴² Mean absolute percentage error (MAPE).

²⁴³ Mean absolute error (MAE).

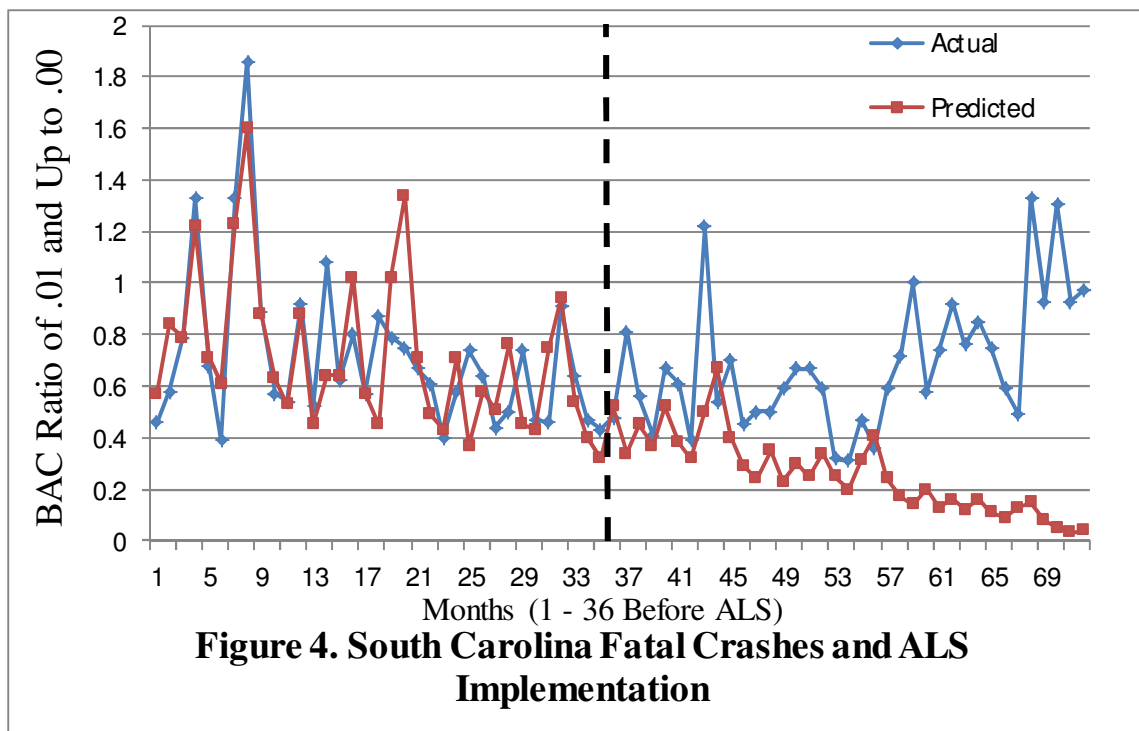
²⁴⁴ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.789. Mean absolute percentage error is 38.509, and the mean actual error was 0.222. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.629 with a standard deviation of 0.261. The mean ratio for the predicted post-ALS data is 0.724, with a standard deviation of 0.245.



South Carolina's predicted line is a good fit for the actual data pre-ALS law, but a poor fit for the post-ALS law data. This indicates the predicted driver fatalities based on pre-ALS data are not a good fit for the post-ALS data. As can be seen, the model predicts a continuous decline in driver fatalities while the actual data show an increase in driver fatalities after the initial decline. The statistics support this interpretation as well.²⁴⁵ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed a statistically significant difference between the two ratios, $t(35) = 7.614$ and $p = 0.000$. If this finding is accurate it shows the ALS law caused an *increase* in drunken driving of 43.4%.²⁴⁶

²⁴⁵ The model of best fit is the Winter's Multiplicative model, with a stationary R-squared of 0.763. Mean absolute percentage error (MAPE) is 21.496, and the mean actual error (MAE) was 0.145. The mean ratio for the actual post-ALS data is 0.688, with a standard deviation of 0.259. The mean ratio for the predicted post-ALS data is 0.254, with a standard deviation of 0.149.

²⁴⁶ Refer to note 256 for mathematical formula. $0.254 - 0.688 = .434$ or 43.4% increase.



Each of South Carolina's subsets of BAC data indicate a statistically significant difference, $p = .000$. In the .01-.07/.00BAC category, $p = .000$, the finding shows the ALS law produced a 5.39% increase in driver fatalities with BAC's in this range.²⁴⁷ In the .08-.14/.00 BAC category, $p = .000$, the finding indicates the ALS law caused a 13.62% increase in driver fatalities in this range.²⁴⁸ In the .15↑/.00BAC category, $p = .000$, the finding shows the ALS law produced an increase of 27.54% in driver fatalities with a BAC in this range.²⁴⁹

²⁴⁷ Refer to note 256 for mathematical formula. $0.0539 - 0.0000 = .0539$ or a 5.39% increase.

²⁴⁸ Refer to note 256 for mathematical formula. $0.1645 - 0.0283 = .1362$ or a 13.62% increase.

²⁴⁹ Refer to note 256 for mathematical formula. $0.4462 - 0.1708 = .2754$ or a 27.54% increase.

TABLE 4.

South Carolina	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Winters' Additive	Winters' Additive	Winters' Multiplicative
Stationary R-squared	.835	.865	.709
MAPE	46.077	33.059	31.469
MAE	.026	.062	.118
Mean ratio of actual post-ALS data	.0539 (s.d. = .03848)	.1645 (s.d. = .06817)	.4462 (s.d. = .18272)
Mean ratio of predicted post-ALS data	.0000 (s.d. = .03720)	.0283 (s.d. = .07533)	.1708 (s.d. = .08867)
t(35)	5.508	7.401	7.225
p value	.000*	.000*	.000*

* Statistically significant at the 95% alpha level.

C. Idaho:

Idaho's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting that implementation of the ALS law had no effect reducing the number of SVN fatalities. The statistics support this interpretation as well.²⁵⁰ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -.783$ and $p = 0.439$.

²⁵⁰ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.664. Mean absolute percentage error is 79.327, and the mean actual error was 0.337. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.654, with a standard deviation of 0.499. The mean ratio for the predicted post-ALS data is 0.652, with a standard deviation of 0.763.

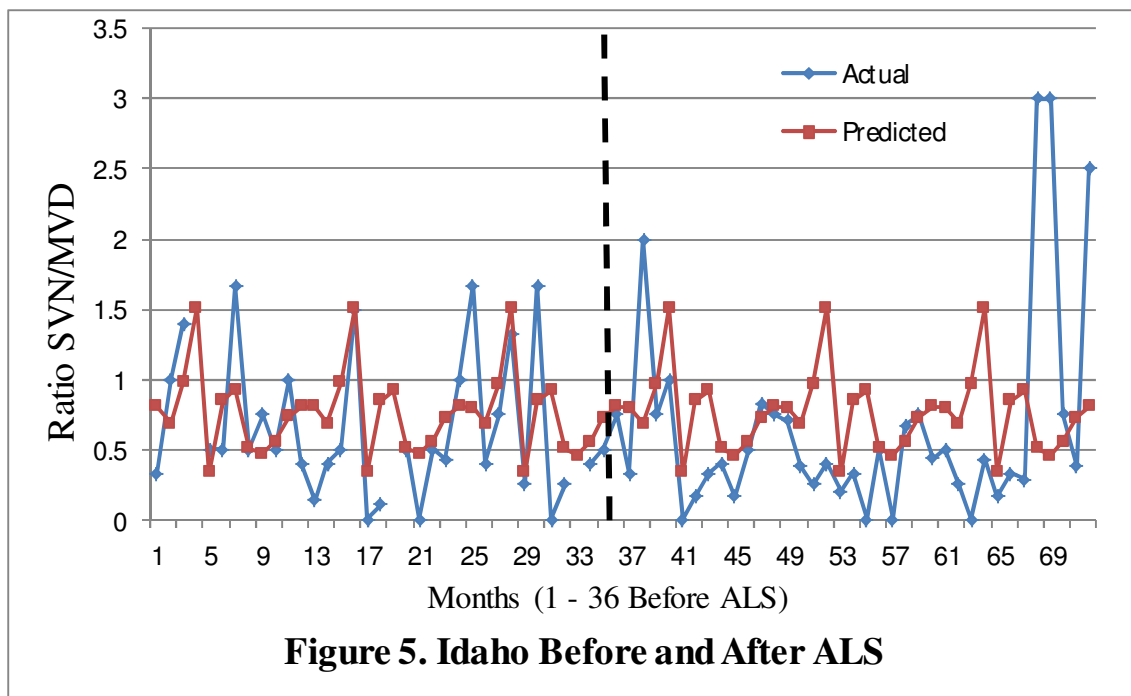
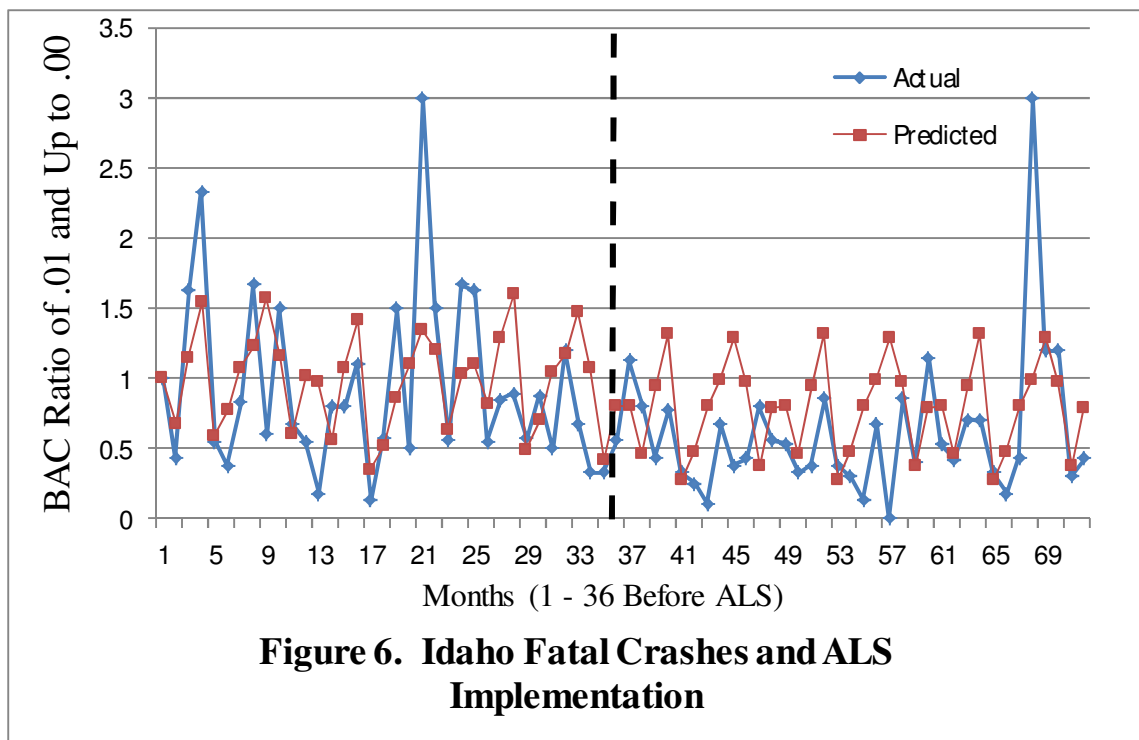


Figure 5. Idaho Before and After ALS

Idaho's .01 \uparrow /.00BAC predicted line is a good fit for the actual data. The post-ALS predicted data are slightly higher than the actual data, suggesting the ALS law may have reduced the number of alcohol involved fatalities. The statistics support this interpretation as well.²⁵¹ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed a statistically significant difference between the two ratios, $t(35) = -2.027$ and $p = 0.05$. This indicates that the number of alcohol related driver fatalities declined post-ALS, which suggests that the ALS law reduced drunken driving by 17.7%.²⁵²

²⁵¹ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.855. Mean absolute percentage error is 65.30, and the mean actual error was 0.415. The mean ratio for the actual post-ALS data is 0.615, with a standard deviation of 0.511. The mean ratio for the predicted post-ALS data is 0.792, with a standard deviation of 0.328.

²⁵² Refer to note 256 for mathematical formula. $0.615 - 0.792 = -.177$ or a 17.7% decrease.



Idaho's three subsets of BAC data showed no statistically significant differences in the .01-.07/.00BAC and .15↑/.00BAC ranges. The finding in the category of .07-.14BAC approaches statistical significance at the 95% alpha level, $p = .051$. If this finding is valid, it would indicate a reduction in drunken driving in this subcategory of 5.36%.²⁵³ This is consistent with the finding in figure 6 above, and may represent a valid finding that Idaho's ALS law reduced drunken driving. If this is the case, the result is likely traceable to media and law enforcement efforts to apprise the public of the law. This finding may also be a false positive or type I error. A decline in drunken driving was only identified in two of the five datasets, and these results are inconsistent with the findings in figure 5 above which found Idaho's ALS law had no effect in reducing SVN fatalities. A summary of these results is found in table 5 below.

²⁵³ Refer to note 256 for mathematical formula. $0.1219 - 0.1755 = -.536$ or 5.36%.

TABLE 5.

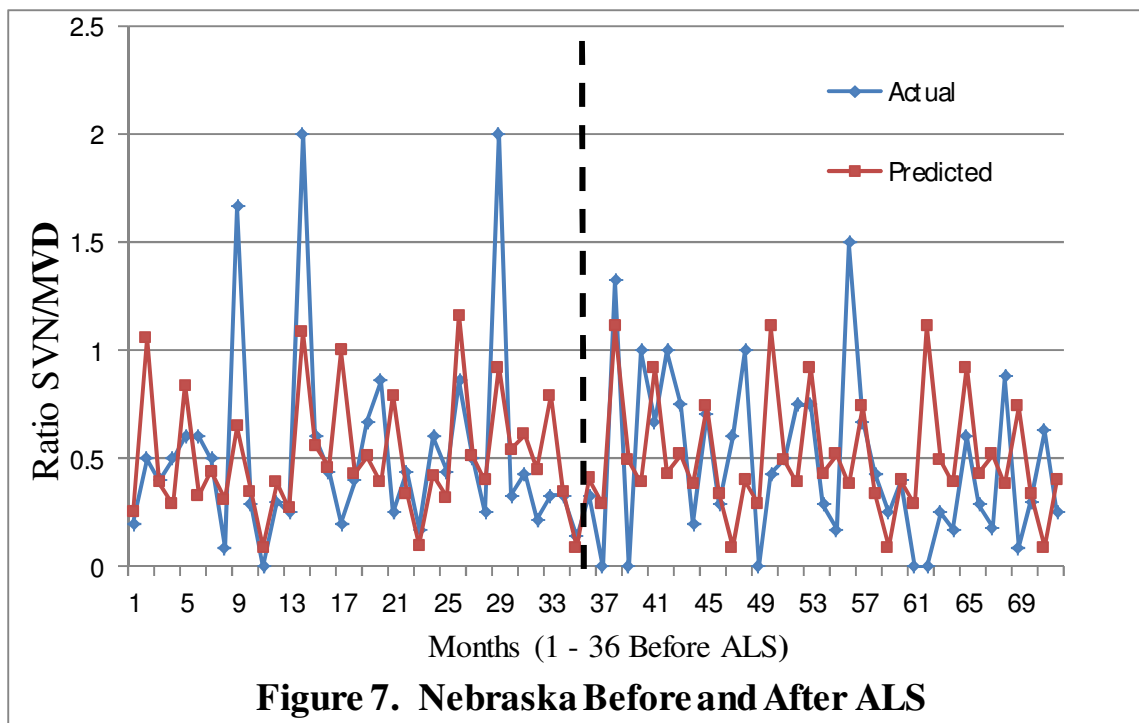
Idaho	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.693	.865	.845
MAPE	141.492	136.350	63.723
MAE	.064	.108	.269
Mean ratio of actual post-ALS data	.0608 (s.d. = .10449)	.1219 (s.d. = .12354)	.4340 (s.d. = .44894)
Mean ratio of predicted post-ALS data	.0665 (s.d. = .05527)	.1755 (s.d. = .09757)	.5173 (s.d. = .26043)
t(35)	-.276	-2.018	-1.149
p value	.784	.051*	.258

* Approaches statistical significance at the 95% alpha level.

D. Nebraska:

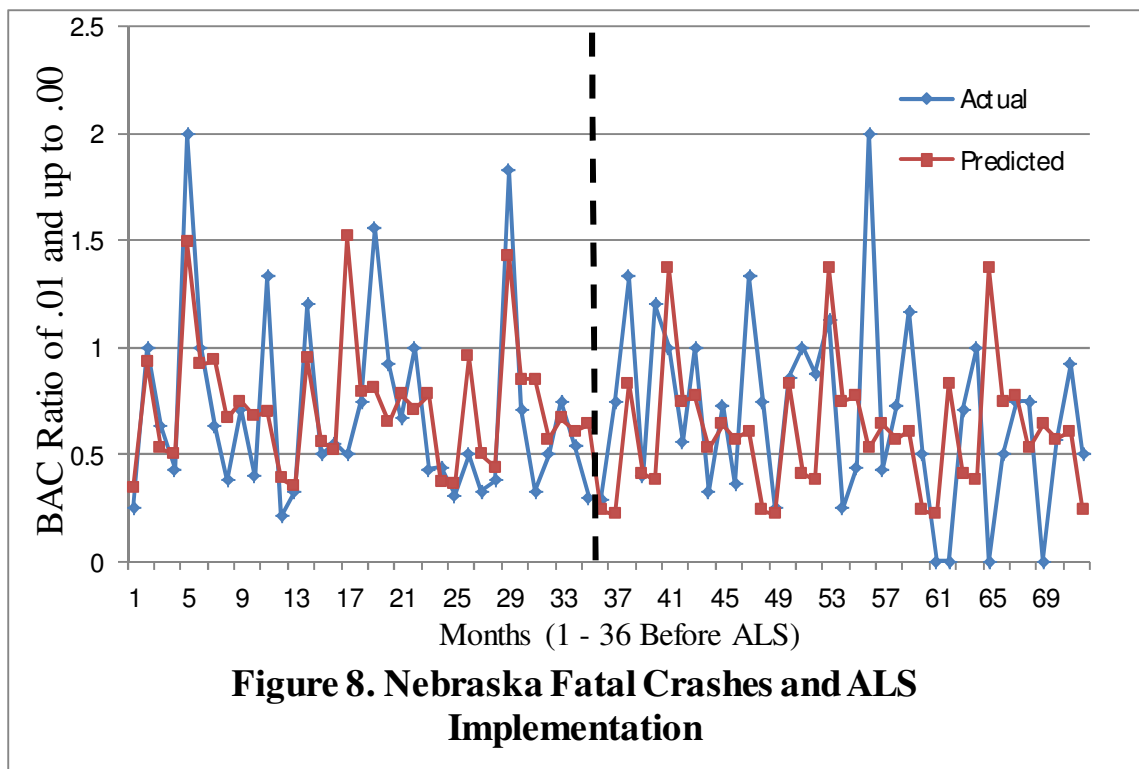
Nebraska's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting that implementation of ALS had no effect on the number of SVN fatalities. The statistics support this interpretation as well.²⁵⁴ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -0.366$ and $p = 0.716$.

²⁵⁴ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.839. Mean absolute percentage error is 59.168, and the mean actual error was 0.252. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.481, with a standard deviation of 0.382. The mean ratio for the predicted post-ALS data is 0.507, with a standard deviation of 0.275.



Nebraska's .01 \uparrow /.00BAC predicted line is a good fit for the actual data indicating the ALS law had no effect in reducing drunken driving. The statistics support this interpretation as well.²⁵⁵ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = 0.992$ and $p = 0.328$.

²⁵⁵ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.843. Mean absolute percentage error is 40.498, and the mean actual error was 0.232. The mean ratio for the actual post-ALS data is 0.697, with a standard deviation of 0.435. The mean ratio for the predicted post-ALS data is 0.611, with a standard deviation of 0.301.



Nebraska's three subsets of BAC data showed no statistically significant differences were observed in the .08-.14 or .15↑ ranges. There is a statistically significant finding in the .01-.07 category, $p = .003$. A summary of these findings is found in table 6 below. If this finding is valid, it would indicate a reduction in drunken driving in this category of 9.31%.²⁵⁶

²⁵⁶ Refer to note 256 for mathematical formula. $0.0875 - 0.1806 = -0.0931$ or a 9.31% decrease.

TABLE 6.

Nebraska	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.834	.824	.845
MAPE	67.680	54.728	49.374
MAE	.097	.078	.140
Mean ratio of actual post-ALS data	.1806 (s.d. = .15586)	.1594 (s.d. = .18530)	.3676 (s.d. = .26171)
Mean ratio of predicted post-ALS data	.0875 (s.d. = .10208)	.1360 (s.d. = .11533)	.3797 (s.d. = .12718)
t(35)	3.210	.650	-.259
p value	.003*	.521	.797

* Statistically significant at 95% alpha level.

E. Wyoming:

Wyoming's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting that implementation of ALS had no effect on the number of SVN fatalities. The statistics support this interpretation as well.²⁵⁷ A paired samples t-test comparing the post-ALS actual data to the post predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(30) = 0.405$ and $p = 0.689$.

²⁵⁷ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.872. Mean absolute percentage error is 87.65, and the mean actual error was 0.588. The mean ratio (SVN/MVD) for the actual post-ALS data is 1.02, with a standard deviation of 1.25. The mean ratio for the predicted post-ALS data is 0.927, with a standard deviation of 0.413.

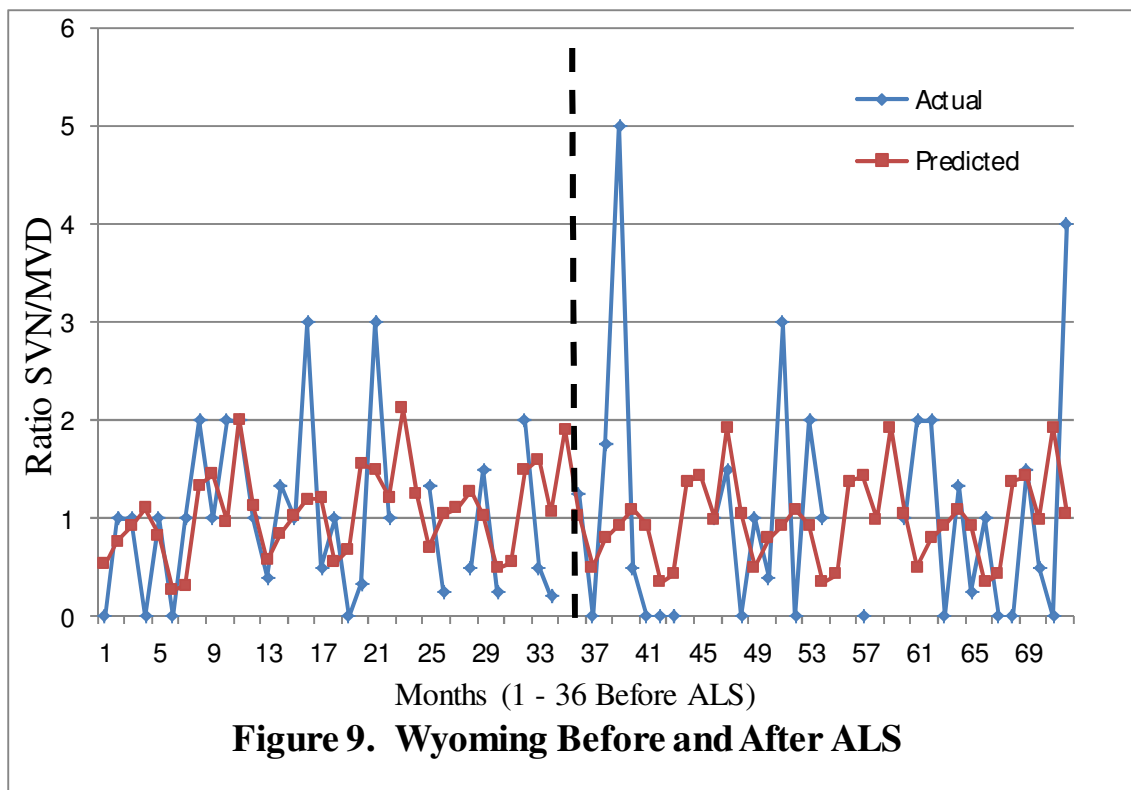
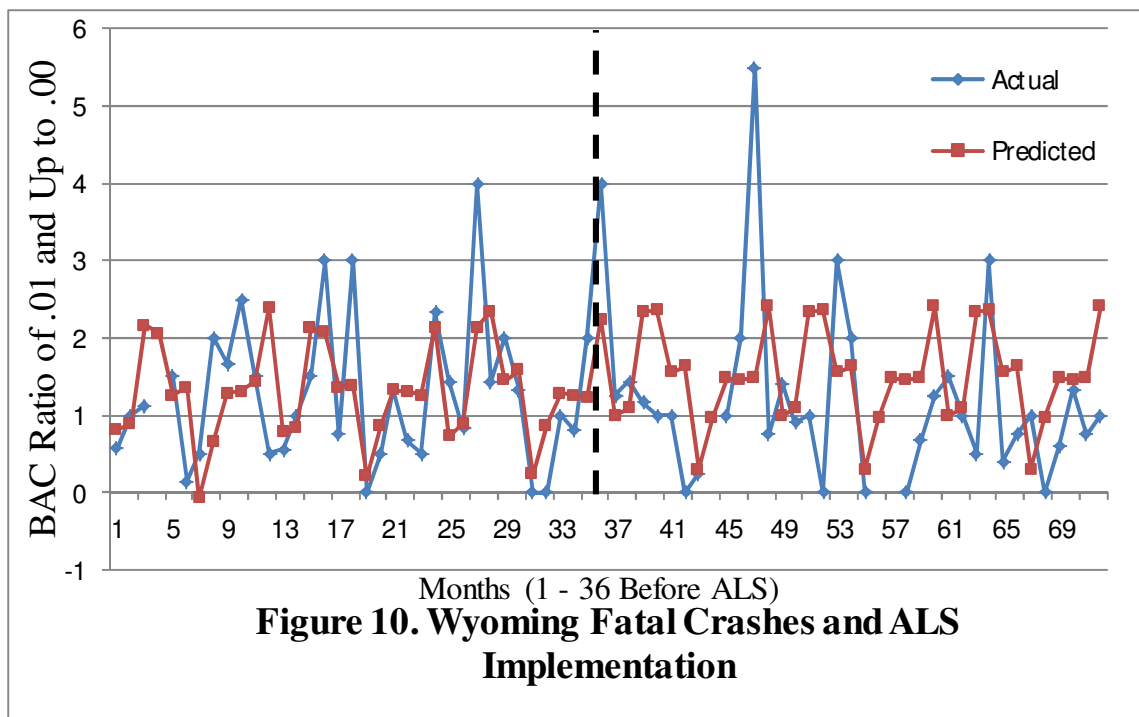


Figure 9. Wyoming Before and After ALS

Wyoming's .01 \uparrow /.00BAC predicted line is fairly good fit for the actual data indicating the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.²⁵⁸ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -1.93$ and $p = 0.63$.

²⁵⁸ The model of best fit is the simple seasonal model, with a stationary R-squared of 0.832. Mean absolute percentage error is 82.049, and the mean actual error was 0.668. The mean ratio for the actual post-ALS data is 1.133, with a standard deviation of 1.08. The mean ratio for the predicted post-ALS data is 1.533, with a standard deviation of 0.631.



Wyoming's three subsets of BAC data showed no statistically significant differences in the .08-.14/.00BAC or .15↑/.00BAC ranges. There was a statistically significant finding in the .01-.07/.00BAC category, $p = .000$. If this finding is valid, it would indicate the ALS law produced a 46.92% increase in drunken driving in this category.²⁵⁹ A summary of these findings is found in table 7 below.

²⁵⁹ Refer to note 256 for mathematical formula. $0.1394 - 0.6086 = .4692$ or 46.92%.

TABLE 7.

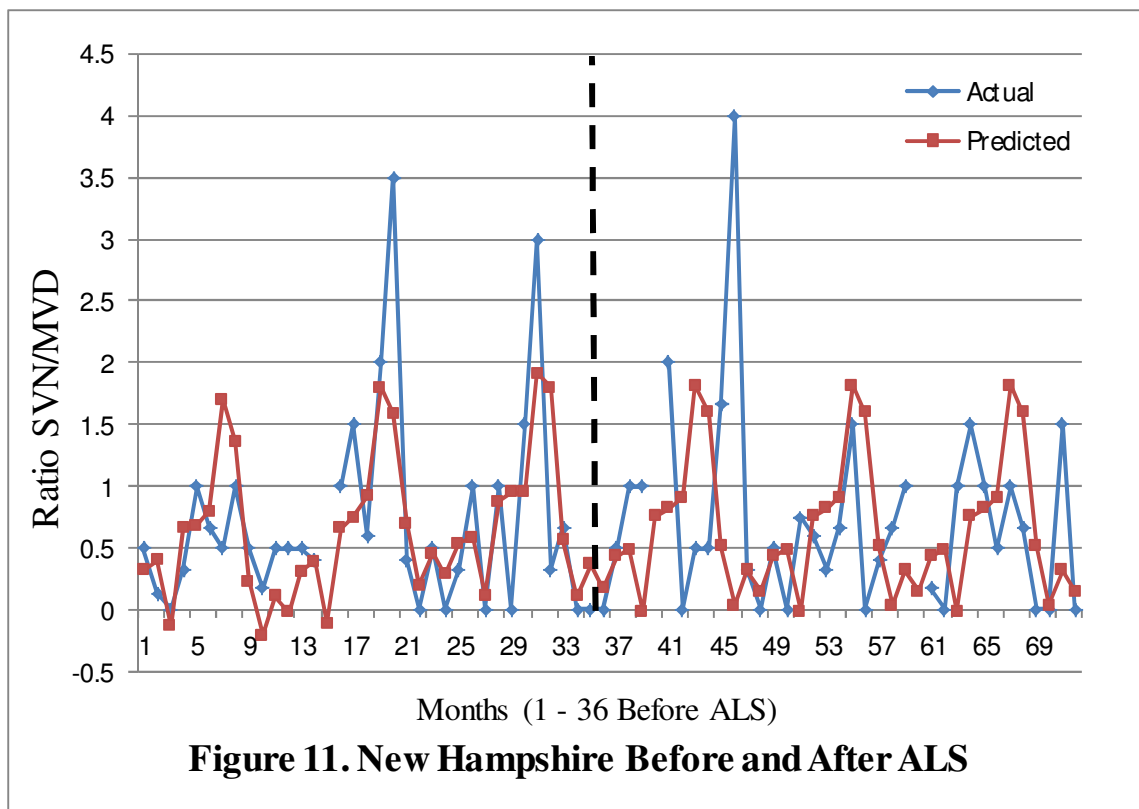
Wyoming	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Winters' Additive	Simple Seasonal	Simple Seasonal
Stationary R-squared	.772	.870	.811
MAPE	110.370	116.837	115.165
MAE	.162	.250	.533
Mean ratio of actual post-ALS data	.1394 (s.d. = .32243)	.2521 (s.d. = .30941)	.8068 (s.d. = .69249)
Mean ratio of predicted post-ALS data	.6086 (s.d. = .20529)	.3222 (s.d. = .15964)	1.0200 (s.d. = .48661)
t(32)	-6.991	-1.167	-1.379
p value	.000*	.252	.177

*Statistically significant at 95% alpha level.

F. New Hampshire:

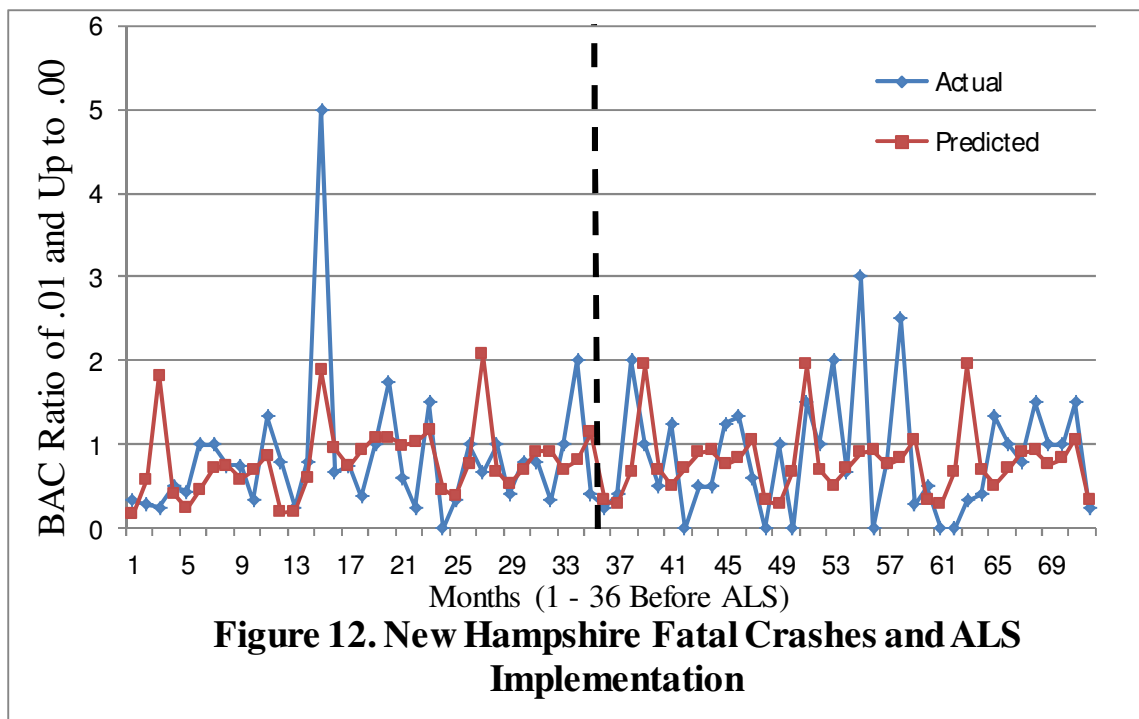
New Hampshire's SVN/MVD predicted line is a good fit for the actual data, except for those dramatic outliers at the end, suggesting the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.²⁶⁰ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(33) = 0.449$ and $p = 0.656$.

²⁶⁰ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.808. Mean absolute percentage error is 0.420, and the mean actual error was 0.420. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.743, with a standard deviation of 0.792. The mean ratio for the predicted post-ALS data is 0.665, with a standard deviation of 0.567.



New Hampshire's .01 \uparrow /.00BAC predicted line is a good fit to the actual data, suggesting the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.²⁶¹ A paired samples t-test comparing the post actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = 0.569$ and $p = 0.573$.

²⁶¹ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.846. Mean absolute percentage error is 78.176, and the mean actual error was 0.47. The mean ratio for the actual post-ALS data is 0.881, with a standard deviation of 0.726. The mean ratio for the predicted post-ALS data is 0.807, with a standard deviation of 0.417.



New Hampshire's three subsets of BAC data revealed no statistically significant difference in the .15↑/.00 BAC range. Statistically significant changes were found in the .01-.07/.00BAC and .08-.14/.00BAC categories. If valid, the finding in the .01-.07/.00 BAC category, $p = .041$, would indicate that drunken driving *increased* by 12.48 % as a result of the ALS law.²⁶² A statistically significant change was also detected in the .08-.14/.00BAC category, $p = .034$. If this finding is valid, it would indicate a decrease in drunken driving of 7.81% due to the ALS law.²⁶³ A summary of these findings is found in table 8 below.

²⁶² Refer to note 256 for mathematical formula. $0.1477 - 0.0229 = .1248$ or a 12.48% increase.

²⁶³ Refer to note 256 for mathematical formula. $0.1486 - 0.2267 = -.0781$ or 7.81% decrease.

TABLE 8.

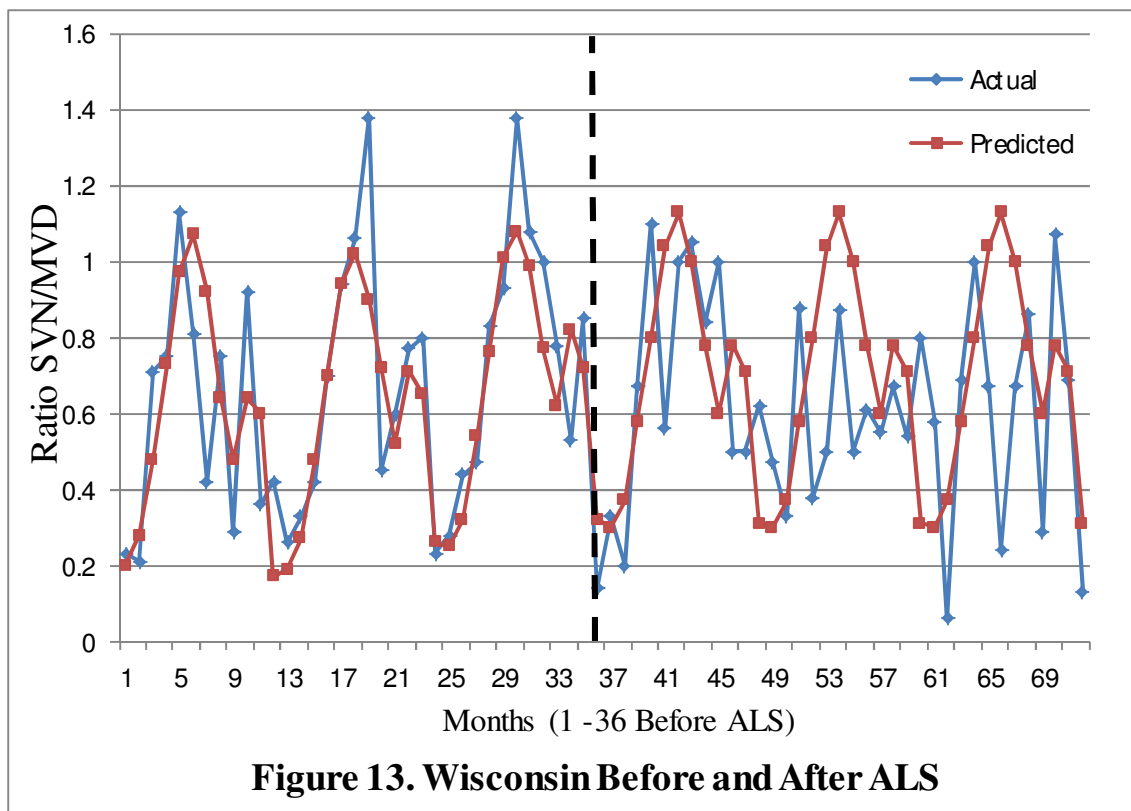
New Hampshire	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.898	.745	.852
MAPE	130.713	230.854	96.541
MAE	.046	.142	.419
Mean ratio of actual post-ALS data	.1477 (s.d. = .35859)	.1486 (s.d. = .18700)	.5824 (s.d. = .44669)
Mean ratio of predicted post-ALS data	.0229 (s.d. = .05738)	.2267 (s.d. = .11286)	.5852 (s.d. = .47834)
t(35)	2.125	-2.210	-.025
p value	.041*	.034*	.980

*Statistically significant at 95% alpha level.

G. Wisconsin:

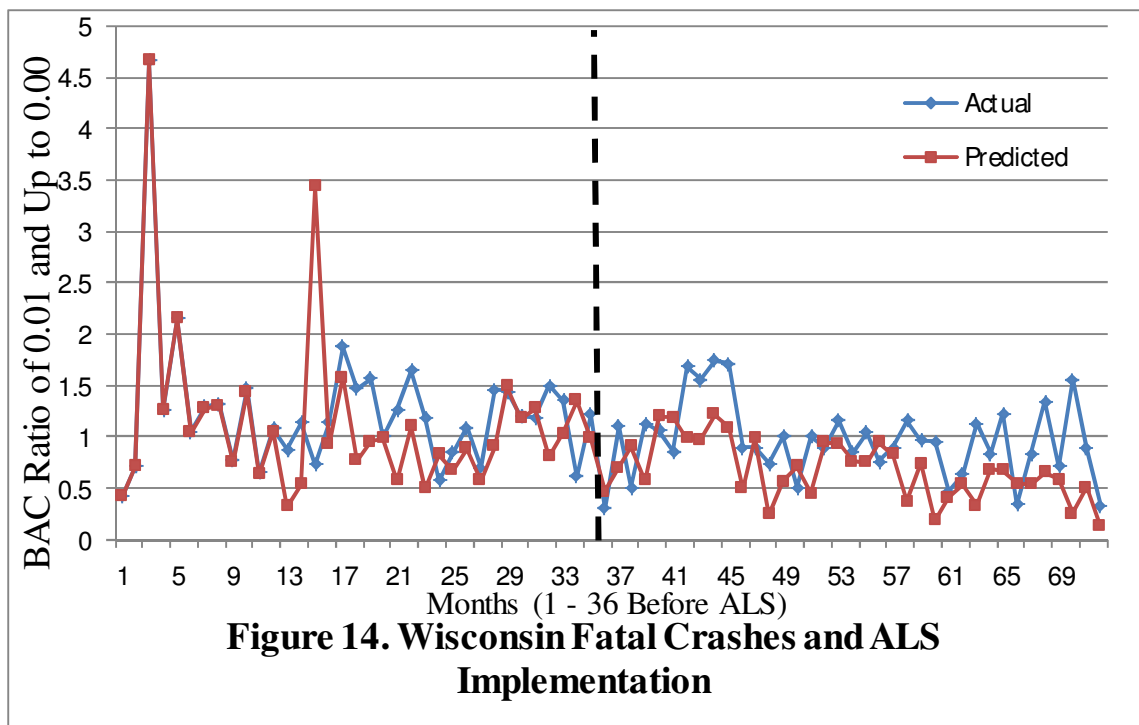
Wisconsin's SVN/MVD predicted line and the actual line, with the exception of the rather dramatic outliers, are a good fit indicating the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.²⁶⁴ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -1.509$, $p = 0.140$.

²⁶⁴ The model of best fit is an ARIMA simple seasonal, with a stationary R-squared of 0.877. The mean absolute percentage error is 28.74, and the mean actual error is 0.15. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.623, with a standard deviation of 0.274. The mean ratio for the predicted post-ALS data is 0.699, with a standard deviation of 0.272.



Wisconsin's $.01 \uparrow / .00 \text{BAC}$ predicted line is a fairly good fit to the actual data, indicating the ALS law had no effect in reducing drunken driving. The statistics support this interpretation as well.²⁶⁵ A paired samples t-test comparing the post-ALS actual data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -1.93$ and $p = 0.63$.

²⁶⁵ The model of best fit is the simple seasonal model, with a stationary R-squared of 0.832. Mean absolute percentage error is 82.049, and the mean actual error was 0.668. The mean ratio for the actual post-ALS data is 1.133, with a standard deviation of 1.08. The mean ratio for the predicted post-ALS data is 1.533, with a standard deviation of 0.631.



Wisconsin's three subsets of BAC data indicated no statistically significant difference in the .01-.07/.00BAC range. Statistically significant differences were detected in the .08-.14/.00BAC, $p = .017$, and .15 \uparrow /.00BAC, $p = .000$, categories. If the finding in the .08-.14/.00BAC category is valid, it would indicate the ALS law caused a 5.27% reduction in driver fatalities within this BAC range.²⁶⁶ If the finding in the .15 \uparrow /.00 BAC category is valid it would indicate the ALS law caused a 60.44% increase in drunken driving.²⁶⁷ A summary of these findings is found in table 9 below.

²⁶⁶ Refer to note 256 for mathematical formula. $0.1765 - 0.2292 = -0.0527$ or 5.27% decrease.

²⁶⁷ Refer to note 256 for mathematical formula. $0.6691 - 0.0647 = .6044$ or 60.44% increase.

TABLE 9.

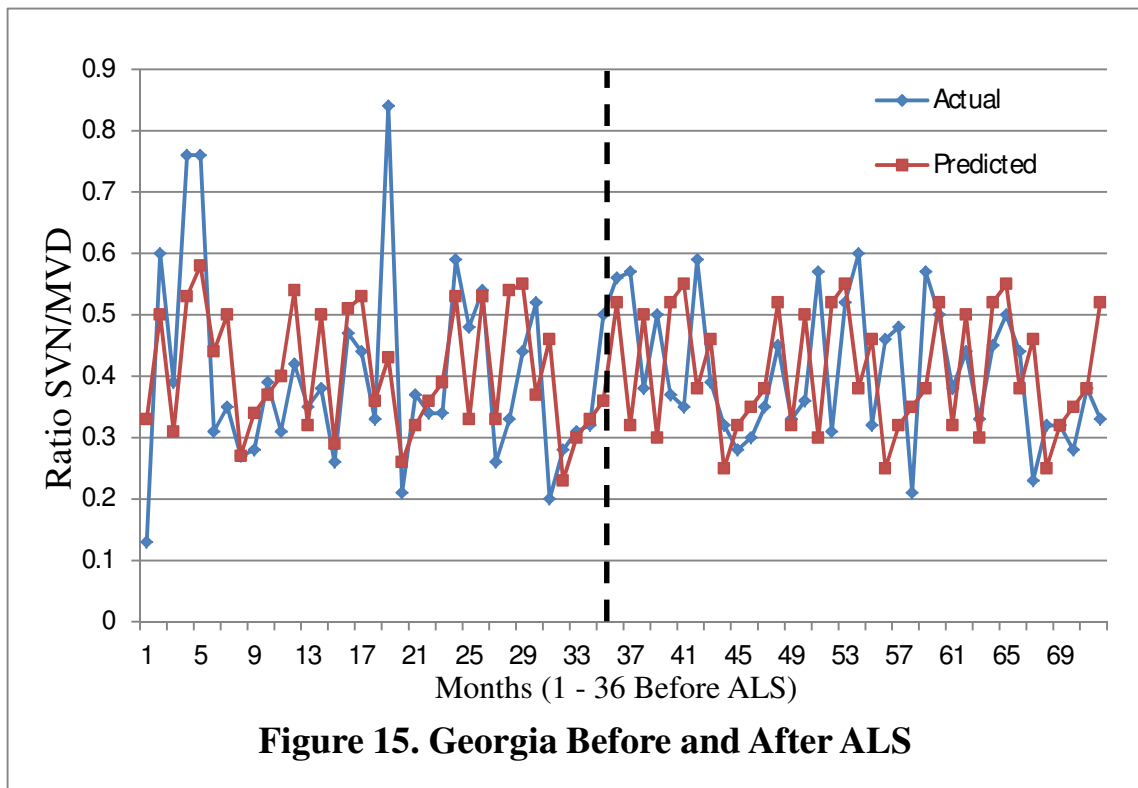
Wisconsin	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Winters' Multiplicative
Stationary R-squared	.801	.893	.800
MAPE	83.030	60.828	44.026
MAE	.068	.087	.311
Mean ratio of actual post-ALS data	.1228 (s.d. = .09390)	.1765 (s.d. = .10464)	.6691 (s.d. = .27974)
Mean ratio of predicted post-ALS data	.1197 (s.d. = .06865)	.2292 (s.d. = .06397)	.0647 (s.d. = .23618)
t(35)	.171	-2.509	11.797
p value	.865	.017*	.000*

* Statistically significant at the 95% alpha level.

H. Georgia:

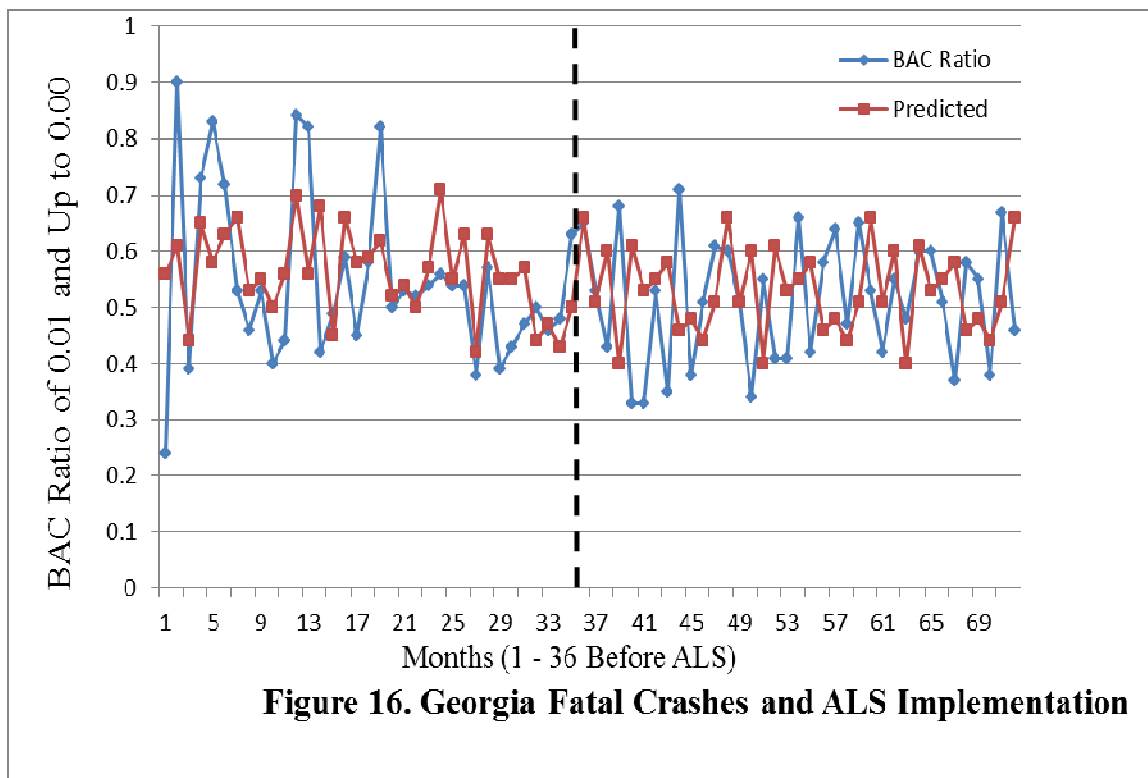
Georgia's SVN/MVD predicted line is a good fit to the actual data, suggesting the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.²⁶⁸ A paired samples t-test comparing the post-ALS known data to the post-ALS predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -0.76$ and $p = 0.940$.

²⁶⁸ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.826. Mean absolute percentage error is 27.798, and the mean actual error was 0.099. The mean ratio (SVN/MVD) for the actual post-ALS data is 0.402, with a standard deviation of 0.017. The mean ratio for the predicted post-ALS data is 0.404, with a standard deviation of 0.099.



Georgia's .01 \uparrow /.00BAC predicted line is a good fit to the actual data, suggesting the ALS law had no effect on reducing drunken driving. The statistics support this interpretation as well.²⁶⁹ A paired samples t-test comparing the post-ALS law known data to the post-ALS law predicted data (N = 36) showed no statistically significant difference between the two ratios, $t(35) = -0.815$ and $p = 0.421$.

²⁶⁹ The model of best fit is an ARIMA simple seasonal model, with a stationary R-squared of 0.901. Mean absolute percentage error is 20.59, and the mean actual error was 0.104. The mean ratio for the actual post-ALS data is 0.509, with a standard deviation of 0.11. The mean ratio for the predicted post-ALS data is 0.529, with a standard deviation of 0.074.



Georgia's three subsets of BAC data showed no statistically significant differences in the .08-.14/.00 BAC or the .15↑/.00BAC categories ranges. A statistically significant difference was detected in the .01-.07/.00 BAC category, $p = .011$. If this finding is accepted as valid, it would indicate the ALS law produced a 3.41% *increase* in driver fatalities with a BAC in this range.²⁷⁰

²⁷⁰ Refer to note 256 for mathematical formula. $0.0903 - 0.0562 = .0341$ or a 3.41% increase.

TABLE 10.

Georgia	.01-.07/.00 BAC	.08-.14/.00 BAC	.15↑/.00 BAC
Model Used	Simple Seasonal	Simple Seasonal	Simple Seasonal
Stationary R-squared	.796	.800	.888
MAPE	54.681	29.881	29.562
MAE	.029	.033	.112
Mean ratio of actual post-ALS data	.0903 (s.d. = .06135)	.1530 (s.d. = .07855)	.4103 (s.d. = .16145)
Mean ratio of predicted post-ALS data	.0562 (s.d. = .03491)	.1260 (s.d. = .02868)	.4527 (s.d. = .08024)
t(35)	2.679	1.874	-1.420
p value	.011*	.069	.165

* Statistically significant at 95% alpha level.

VI. DISCUSSION

This research considered a diverse selection of states, the best data available, and utilized sophisticated statistical analyses to gauge the effectiveness of ALS laws. If prior research is valid and ALS laws are responsible for an approximate 5% reduction in drunken driving, then this should be readily apparent in the data. However, this study found little or no support that ALS laws are effective in reducing drunken driving. This leads to the conclusion that there is no empirical evidence that ALS laws deter drunken driving. These results are consistent with the large, but often ignored, body of literature reaching the same conclusion.

For the eight states considered, two major categories of drunken driving data were considered, i.e. SVN/MVD and .01↑/.00BAC, along with three subcategories of drunken driving data, i.e., .01-.07/.00 BAC, .08-.14/.00 BAC, and .15↑/.00 BAC. Only Idaho revealed a statistically significant, $p = .05$, reduction in a major category of data. Idaho's

data in the .01↑/.00 BAC category, $p = .05$, indicates the ALS statute reduced drunken driving by 17.7%. This positive finding in one of Idaho's major categories was supported by a marginally positive finding the minor subcategory of .08-.14/.00BAC, $p = .051$. Of all the states, Idaho presents the best statistical proof that its ALS law reduced drunken driving. However, these two findings are negated by the lack of similar findings in Idaho's other major category, SVN/MVD, or in either of its .01-.07/.00BAC and .15↑/.00BAC subcategories. If Idaho's data were pooled these marginally positive findings would evaporate leading to the conclusion that these positive finding are likely false positive or type I errors.

Nebraska, New Hampshire, and Wisconsin all had positive finding in at least one subcategory of data, but these positive findings did not present in any of their major categories of data. Nebraska's subcategory, .01-.07/.00BAC, $p = .003$, indicated a reduction in drunken driving in this range of 9.31%, but in no other category or subcategory. New Hampshire also had a positive finding in the .08-.14/.00BAC subcategory, $p = .034$, indicating a reduction in drunken driving of 7.81% in this range. No reduction in drunken driving was identified in any other major category or subcategory for New Hampshire. New Hampshire's positive finding is negated by the positive finding in its .01-.07/.00BAC subcategory, $p = .041$, indicating an *increase* in drunken driving of 12.48% traceable to the ALS statute. Wisconsin produced similar results with a positive finding in the .08-.14/.00BAC, $p = .017$, or a decrease in drunken driving of 5.27%, but also exposed a positive finding in the .15↑/.00BAC category, $p = .000$, translating to an *increase* in drunken driving of 60.44% in this range. These inconsistent findings in the subcategories of the data lead to the conclusion that these

results are likely false positives or type I errors. This interpretation is also supported by the findings in several of the states of an *increase* in drunken driving after implementation of the ALS law.

More importantly when the findings are considered *in toto* there is absolutely no evidence that ALS laws reduced drunken driving in these states. If these data were pooled across states and variables the marginally positive findings would be erased. This result is significant since the eight states tested represent approximately 20% of the 42 states with ALS laws. This is wholly inconsistent with the literature urged by special interest groups such as MADD, IIHS, NTSB, and NHTSA indicating ALS laws reduce drunken driving by 5% to 12%. This study confirms that the single-jurisdictional studies relied upon by these groups demonstrate short-lived results spurred on by factor other than the ALS laws such as media attention and increased police enforcement. These findings are also consistent with findings by Ruhm's,²⁷¹ Whetten-Goldstein, *et al.*,²⁷² and Noland and Karlaftis²⁷³ that all multi-jurisdictional, cross-sectional data studies are flawed due to omitted variable bias.

VII. CONCLUSION

This research shows that ALS laws are not effective in reducing drunken driving. While ALS laws may not directly reduce drunken driving, that is not to say these laws lack benefit. ALS laws are more certain to suspend an offender's license than a judicial post-conviction process.²⁷⁴ By suspending the offender's license quickly, the offender is

²⁷¹ Ruhm, note 205 *supra*.

²⁷² Whetten-Goldstein, *et al.*, note 210 *supra*.

²⁷³ Noland & Karlaftis, note 214 *supra*.

²⁷⁴ R.B. Voas, A.S. Tippetts & E. Taylor, *Effectiveness of the Ohio Vehicle Action and Administrative License Suspension Laws*, Public Services Research Institute; National Highway Traffic Administration (2000).

incapacitated quicker and removed from the roadways sooner.²⁷⁵ Additionally, suspending the offender's license administratively appears to remove the offender's need to delay the companion criminal case and may increase the number of DUI guilty pleas.²⁷⁶ The added costs of ALS law are typically self-supported by offenders' reinstatement fees.²⁷⁷ Additionally, there are federal monies available to the states to offset the costs of initial implementation.²⁷⁸

All of these indirect benefits of ALS laws improve the legal system and may aid in reducing drunken driving. Further research is possible to: 1) gauge the influence of ALS laws on the disposition of the underlying criminal case; 2) determine whether long administrative license suspension periods, *e.g.* one year, produce better results, and finally, 3) whether the expense of publicizing ALS laws is a cost effective means of reducing drunken driving.

Additionally, these remaining eight states cannot ignore the federal government's pressure on the states to adopt ALS laws. In addition to the DDPA grant funding discussed earlier, the federal government has implemented Federal Motor Carrier Safety Administration (FMCSA) regulations that as a practical matter may require states to pass ALS laws at least for commercial driver's licenses (CDL). In order to establish a national database of CDL suspensions for DUI convictions and implied consent violations while

Accessed September 7, 2013: <http://www.nhtsa.gov/people/injury/research/ohio/toc.html>

²⁷⁵ Ross, note 136 *supra*, at 65-67.

²⁷⁶ Howard Research, note 146 *supra*.

²⁷⁷ Lacey, note 30 *supra*.

²⁷⁸ J.H. Lacey, R.K. Jones & J.R. Stewart, *Effectiveness of the Ohio Vehicle Action and Administrative License Suspension Laws, Cost-Benefit Analysis of Administrative License Suspension*, NHTSA, DOT HS 807 689 (1991).

operating a commercial vehicle the FMCSA established standards that every state must adopt.²⁷⁹ These FMCSA regulations impose on all states an extremely broad definition of “conviction” for these offenses which is inconsistent with traditional criminal law.²⁸⁰ This creates a potential issue when an offender’s case is adjudicated in criminal court, but that adjudication is not a conviction under state criminal law. This would include diversion programs, probation, or dismissal upon payment of cost. However, this adjudication may be a conviction under FMCSA regulations which would require the state to report it as such and suspend the offender’s license. States must establish a system to identify and report convictions under FMCSA’s regulations that may not be convictions under state law. Additionally, the state must establish an administrative process to suspend the CDL offender as required by FMCSA. A state that fails to establish such a process may be guilty of “masking” and subjected to a loss of federal funds.²⁸¹ Given the complexities this process creates, states may be best served by adopting ALS laws at least for CDL offenders.

Finally, post-conviction implied consent laws are considered ineffective because they lack uniformity with other states’ laws in application, enforcement, and procedure.²⁸² If ALS laws are in place nationwide, it should produce results similar to

²⁷⁹ FMCSA Regulations, 49 C.F.R. §383.51(b), table 1.

²⁸⁰ FMCSA Regulations, 49 C.F.R. §383.5, a conviction is defined as:

Conviction means an unvacated adjudication of guilt, or a determination that a person has violated or failed to comply with the law in a court of original jurisdiction or by an authorized administrative tribunal, an unvacated forfeiture of bail or collateral deposited to secure the person's appearance in court, a plea of guilty or nolo contendere accepted by the court, the payment of a fine or court cost, or violation of a condition of release without bail, regardless of whether or not the penalty is rebated, suspended, or probated.

²⁸¹ FMCSA Regulations, 49 C.F.R. §384.226

²⁸² *See Generally*, Cafaro, note 70 *supra*.

mandatory jail time for first time DUI offenders also encouraged by the federal government. While the minimum jail sentence varies from state to state, drivers are still generally aware that drunken driving will lead to incarceration regardless of which state they are arrested in. ALS laws in compliance with the DDPA will create a national system of immediate license suspension that will continue for at least 90 days.

Ultimately, immediate administrative license suspension will be as familiar to drivers as minimum jail sentences are now. Since 42 states and the District of Columbia have implemented ALS laws it is likely just a matter of time before the remaining states are compelled to do the same.

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