

A Review of Exhaust System Noise

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OPPAGA

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A Review of Exhaust System Noise

EXECUTIVE SUMMARY

Noise is unwanted sound, and excessively loud vehicle exhaust systems may present noise that is a nuisance to individuals and communities. Further, literature finds certain adverse health and quality of life effects related to noise.

The Florida Motor Vehicle Noise Prevention and Control Act and the federal Noise Control Act were adopted in the 1970s and have created a complicated legal framework that includes several competing laws. At the state and local levels, some laws may be preempted.

At the state and local levels, OPPAGA's survey of law enforcement found that practices vary for the enforcement of exhaust noise related violations. Additionally, citations issued under state law for exhaust noise related offenses have increased over recent years. Over one-third of these citations were adjudicated guilty. While citations for exhaust noise related violations have increased, law enforcement reported several reasons why it is difficult to enforce state statutes for these offenses.

Florida currently has state statutes that address vehicle noise, including exhaust noise; however, there are options to further address exhaust noise being used in some other states and Florida municipalities. While Florida has state statutes that allow for enforcement of exhaust noise through violations for modified equipment or violations of maximum decibel limits, there are options to expand enforcement of existing statutes. Additionally, there are options for new approaches to enforce exhaust noise violations.

REPORT SCOPE

As directed by the Legislature, OPPAGA reviewed exhaust system noise regulation. This included a discussion of sound and sound measurement; a literature review of the effect of excessive noise on health and quality of life; an examination of federal, state, and local exhaust noise regulations, including citations issues under state law; and a presentation of potential options to further address exhaust system noise.

INTRODUCTION

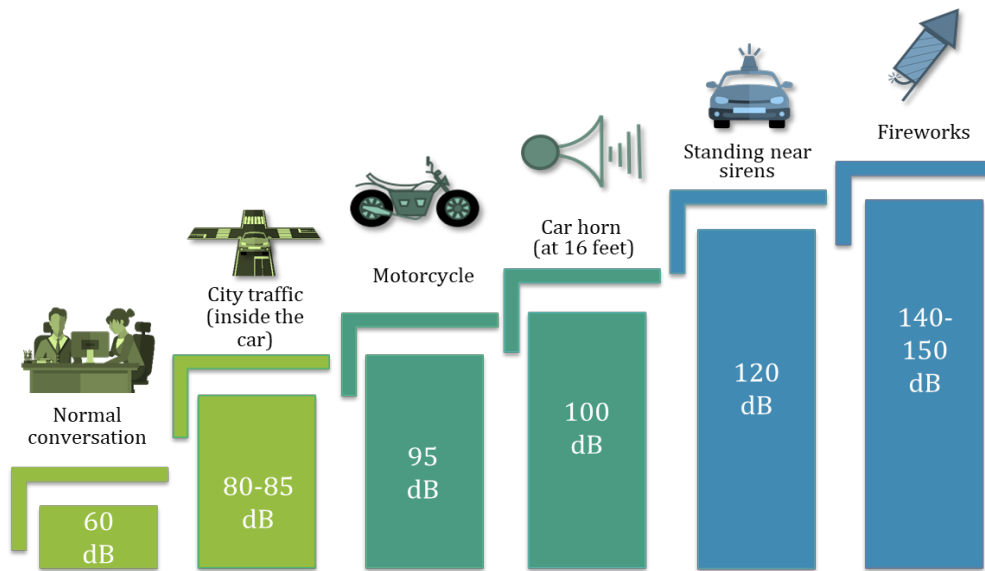
Unwanted noise, which can include noise from vehicle exhaust systems, can be a nuisance to individuals and communities. Exhaust noise is environmental noise, which includes all unwanted sounds in communities, except sounds that originate in the workplace. Sources include noise from road, rail, and air traffic. Because most vehicles create noise, road noise is one of the most prevalent sources of environmental noise in communities.

In Florida, citations for exhaust related noise increased from 857 in Fiscal Year 2017-18 to 3,018 in Fiscal Year 2021-22. Many law enforcement officers reported that the prevalence of vehicles or motorcycles with loud exhaust has increased over the past five years. Vehicle exhaust systems direct gasses away from the vehicle, creating a pressure wave that produces sound. Exhaust systems typically include a muffler, which reduces the sound produced by vehicle exhaust. Excessive vehicle exhaust noise may be caused by exhaust system defects, intentional modifications by vehicle owners or auto service businesses, or initial exhaust system design.¹ While certain modifications to increase the exhaust system sound may improve vehicle performance, some car enthusiasts may prefer the excessive noise from the exhaust system for its own sake. However, some people view loud exhaust systems as unpleasant or disruptive.

Noise is measured by sound-level meters, and there are different scales to measure noise. Noise is measured using a sound-level meter. Sound-level meters, commonly known as decibel meters, are handheld devices that use a microphone to capture sound measured in decibels. There are different scales of decibels to measure noise. Decibels (dB) are a unit of measurement for the intensity of a sound; the A-weighted decibel (dB A) scale is a unit of measurement for the intensity and frequency of sound. Decibels use a logarithmic scale as opposed to a linear scale because a logarithmic scale better matches how sound intensity feels to human ears. This means that if a sound is 80 dB, an increase in 10 dB results in a sound that is 10 times more intense and sounds twice as loud. Common noises have decibel levels that range from a normal conversation at 60 dB to fireworks up to 150 dB. (See Exhibit 1.)

¹ There are different methods to modify an exhaust system. Law enforcement and stakeholders are uncertain as to who is responsible for modifying exhaust systems. Some speculated that it is mostly individual vehicle owners who modify exhaust systems whereas others speculated that it could be both individuals and businesses. Law enforcement agencies interviewed or surveyed by OPPAGA reported enforcing s. [316.293\(5\)\(a\)](#), F.S., which prohibits the modification of exhaust equipment, against individuals but not against businesses. Law enforcement that reports that of this statute is difficult because it requires an officer to see the modification while it is occurring.

**Exhibit 1
Common Noises and Decibel Levels**



Source: OPPAGA analysis of information from the U.S. Centers for Disease Control and Prevention.

Vehicle noise has been regulated by the federal government and Florida and its political subdivisions since at least the 1970s; both federal and state laws preempt subordinate governments from adopting or enforcing certain noise emission regulations, resulting in a complicated framework for vehicle noise regulation. In 1972, Congress enacted the Noise Control Act (NCA) to require the U.S. Environmental Protection Agency (EPA) to regulate major sources of noise in commerce. Pursuant to this direction, the EPA adopted noise emission limits and other related standards for vehicles exceeding 10,000 pounds (large vehicles), motorcycles, and certain exhaust systems, which took effect between 1974 and 1980. The NCA specifies that states and state political subdivisions are preempted from adopting or enforcing laws or regulations that set standards for noise emissions that are not identical to EPA regulations.

In 1974, the Florida Legislature also enacted noise emission limits and other requirements in ss. 403.415 and 316.293, *Florida Statutes*, for a wide variety of motor vehicle and exhaust system types, including types addressed by the EPA's regulations. Some of the requirements that remain in these two sections of law are not identical to the EPA's regulations and, thus, appear to be preempted by the NCA. Like the NCA, state laws also preempt local governments from enacting ordinances addressing matters covered by Florida's noise emission statutes. Many local governments in Florida have adopted regulations to address vehicle noise emissions. These local ordinances use a variety of approaches for enforcement, some of which may be preempted under federal or state law, or both.

Appellate courts have not ruled on whether or to what extent Florida's vehicle noise emission statutes or ordinances may be preempted. Consequently, there are no definitive answers to this issue. OPPAGA analyzed ss. 403.415 and 316.293, *Florida Statutes*, to determine the extent to which these provisions might be preempted by federal law. (See Appendix A for more information on the federal preemption analysis.)

FINDINGS

Research Literature Finds Certain Adverse Health and Quality of Life Effects Related to Noise

OPPAGA reviewed numerous articles that assessed the adverse effects on health and quality of life due to environmental-related noise exposure in adults and children. (See Appendix B for additional information on these studies.) Many studies found adverse effects of environmental noise on adults' cardiovascular health, sleep, stress, and annoyance. While less research is available regarding children, there are some findings of adverse effects of environmental-related noise pertaining to children and pregnancy outcomes.

Multiple studies reported various adverse effects of excessive environmental noise on physical and emotional wellbeing. Excessive noise exposure can adversely affect certain health problems in adults. Multiple studies reported that chronic exposure to environmental noise affects the cardiovascular system and can contribute to related health problems, including pre-hypertension or hypertension and heart disease. For example, one study found that with every 5 dB A increase in noise exposure, the risk of hypertension increased by 3.4%.

The literature also points to a relationship between cardiovascular health and sleep. Although people become accustomed to noisy environments, a process called subjective habituation, the cardiovascular system does not adapt. Instead, in response to noise, the cardiovascular system experiences activations of the sympathetic nervous system, which alters stages of deep sleep to lighter stages of sleep. Sleep disturbance is considered the most severe non-auditory effect of noise exposure. Studies have shown an association between noise exposure and cardiovascular disease, hypertension, and habitual short sleep of less than six hours per night.² A strong association between night traffic noise annoyance and sleep disorder also exists. Sleep issues such as falling asleep, waking up, and sleep quality, become more common as noise levels increase.

Annoyance is another commonly found symptom of noise. Reported annoyance due to both traffic and aircraft noise is the most common effect discussed in the literature. Annoyance includes feelings of fear, anger, and belief that a person is avoidably harmed. Evidence supports that self-reported annoyance in men and women is statistically significant, as both reported high or extreme noise annoyance. In the literature, an association between traffic-related noise annoyance and the danger of hypertension was observed by researchers. Activities were also affected by high noise levels. Noise levels can disturb a person's ability to relax, listen to the TV or radio, or communicate with others, which can disrupt their quality of life. People with access to quiet places in their homes reported fewer issues with disturbances in their activities than those without access.

While less research is available regarding children, literature supports the negative associations between noise exposure and children and pregnancy outcomes. For children, environmental noise may affect behavior and academic performance. Various studies have found negative associations between environmental noise and lower reading comprehension, concentration deficits, and hyperactivity in children. Researchers have found a decline in reading comprehension in children exposed to high aircraft exposure levels, but the decrease was not considered statistically

² Habitual sleep is the amount of sleep usually obtained in a night or main sleep period.

significant. Behavioral problems such as conduct problems, hyperactivity, and peer-relationship problems were also observed in children exposed to road traffic noise.

Additionally, children were found to experience annoyance and some sleep problems. Exposure-response relationships were demonstrated between aircraft noise and extreme annoyance in children at school. This means the louder the noise, the more annoyed children become. For example, the percentage of children annoyed by environmental noise increased to 12.1% at 60 dB compared to 5.1% at 50 dB. Findings on noise-related sleep issues in children were mixed. A cross-sectional study of 12-year-old children observed poor sleep quality and tiredness; however, statistically significant findings for difficulty falling asleep were not made.

A few studies found an association between environmental noise and pregnancy outcomes. Results from the studies suggest a negative effect of road traffic noise in term birth weight, term low birth weight, and small size for gestational age. However, there were no effects of road traffic noise on premature birth. For combined exposures, such as road traffic noise and air pollution, strong associations for mild and early-onset pre-eclampsia were observed by researchers. Additionally, while it is unknown what sound levels are safe for pregnancy, the National Institute for Occupational Safety and Health recommends that pregnant women avoid sounds that are louder than 115 dB A.³

Florida Statutes and Administrative Code Establish Standards and Penalties for Vehicle Noise, Including Exhaust System Noise

Noise emissions by motor vehicles are addressed in the Florida Statutes and rules adopted in the Florida Administrative Code. Statutes address exhaust system noise by setting standards for the sale of new vehicles and also by setting standards for operating vehicles on roadways. Florida Administrative Code further defines some of these statutory standards. However, some statutory requirements are not currently implemented by DEP. Further, some requirements appear to be preempted by the federal Noise Control Act for certain vehicles. (See Appendix A for more information on the federal preemption analysis.)

Statutes Establish Noise Requirements for the Operation and Sale of Vehicles; However, Some Provisions Are Not Being Implemented

State law prohibits the operation of excessively loud vehicles through several statutes pertaining to noise. Exhaust noise related violations are non-moving traffic violations under Ch. 316, *Florida Statutes*, the Florida Uniform Traffic Control Law. Among other provisions, this chapter provides for enforcement of exhaust noise related violations using two general approaches. The first approach is enforcement of modified, removed, or defective noise preventing equipment. The second approach is enforcement of decibel levels. The allowable decibel level is based on 50 feet from the center lane of travel and sets a maximum noise limit based on the vehicle type, vehicle year, and speed

³ There is limited evidence on the effect of sound on pregnancy. The National Institute for Occupational Safety and Health states that high levels of noise can possibly affect pregnancy in two ways. First, high levels of noise can lead to stress, which could harm the baby. Second, very loud noises can travel through the woman's body and possibly damage the baby's hearing.

limit. Offenses are non-criminal traffic infractions, which are punishable by warnings, citations, and fines or fees. (See Exhibit 2.)

Exhibit 2

Law Enforcement Can Use Several Statutes Under Ch. 316, *Florida Statutes*, to Enforce Exhaust Noise Related Violations

Equipment Statutes

<p>Section 316.272, F.S. requires vehicles to be equipped with an exhaust system that prevents excessive noise and prohibits the use of muffler cutouts, bypasses, or similar devices on a vehicle on a highway.</p>	<p>Section 316.293(5), F.S. prohibits vehicle modifications that result in a louder vehicle noise than the noise made by the vehicle as originally manufactured and prohibits the operation of vehicles so modified.</p>	<p>Section 316.455(6), F.S. requires that motorcycles comply with s. 316.272, F.S. requirements for mufflers and prevention of noise.</p>
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Non-criminal traffic infraction punishable as a nonmoving violation as provided in Ch. 318, F.S.

Decibel Statute

Section 316.293(2), F.S. establishes decibel limits for categories of vehicles in different speed limit zones from 50 feet from the center of the lane of travel.

Vehicle Type	Date	35 mph or less	Over 35 mph
a. Motorcycles other than motor-driven cycles	Before January 1, 1979	82 dB A	86 dB A
	On or After January 1, 1979	78 dB A	82 dB A
b. For any motor vehicle with a Gross Vehicle Weight Rating or Gross Combination Weight Rating of 10,000 pounds or more (certain large vehicles such as a dump truck) ¹	On or After January 1, 1975	86 dB A	90 dB A
c. Motor-driven cycles and any other motor vehicle not included in paragraph (a) or paragraph (b)	Before January 1, 1979	76 dB A	82 dB A
	On or After January 1, 1979	72 dB A	79 dB A

Non-criminal traffic infraction punishable as a nonmoving violation as provided in Ch. 318, F.S.

¹ Gross combination weight rating means the value specified by the manufacturer as the loaded weight of a combination vehicle. Gross vehicle weight rating means the value specified by the manufacturer as the loaded weight of a single vehicle. Additionally, OPPAGA analysis is limited to equipment statutes that specifically mention noise. This excludes statutes, including ss. [316.2935](#) and [316.610](#), F.S., which could be used for exhaust equipment violations that may not increase noise levels.

Source: The *Florida Statutes*.

Some statutes specifically cover exhaust systems, while others generally cover vehicle noise. For example, ss. 316.272 and 316.455, *Florida Statutes*, apply specifically to noise from exhaust systems, while another section of statute could apply to other types of vehicle noise. Section 316.293(5), *Florida Statutes*, includes modifications to exhaust noise equipment, but also includes modifications to other noise-abatement equipment. Further, s. 316.293(2), *Florida Statutes*, provides decibel limits for operating noise levels in general. While these statutes include other noise from vehicles, law enforcement surveyed by OPPAGA reported using this statute to enforce exhaust noise related

violations.^{4,5} As a result, OPPAGA included these statutes in the analysis and refers to the statutes as “exhaust noise related” throughout the report.

State law also establishes vehicle noise requirements related to the sale of vehicles and equipment; however, some provisions are not currently implemented. Section 403.415, *Florida Statutes*, contains several provisions that regulate the sale of certain vehicles and equipment. It sets noise limits for motorcycles and large vehicles. Specifically, large vehicles manufactured on or after January 1, 1977, have a noise limit of 83 dB A.⁶ Additionally, motorcycles manufactured on or after January 1, 1975, have a noise limit of 83 dB A. The decibel limits for motorcycles differ by one dB between ss. 316.292 and 403.415, *Florida Statutes*, resulting in a situation where certain motorcycles could be legal to sell and illegal to operate because the operating noise limits are lower than the limit for new motorcycles (e.g. a motorcycle that is at the new vehicle limit of 83 dB A would be legal to sell but illegal to operate in Florida).

State law also requires DEP to assist with law enforcement training and to provide a sound-level meter loan program for law enforcement.⁷ DEP staff reported that only one law enforcement agency has requested training over the past 10 years. Upon request from law enforcement, DEP will provide training on topics including the procedure for setting up a sound-level meter and the type of evidence required for citations to withstand legal scrutiny. DEP staff also reported that the department has two sound-level meters available to lend to law enforcement. To date, no law enforcement agency has requested to borrow a sound-level meter.

There are other statutory requirements that DEP has not fully implemented.

- **Measurement procedures.** Statutes require DEP, in consultation with the Department of Highway Safety and Motor Vehicles (DHSMV), to establish measurement procedures for determining the compliance of operating vehicles with statutorily established decibel limits.⁸ To address these requirements, DEP promulgated two rules related to measuring sites, ambient sound, calibration techniques, and microphone orientation. These rules account for factors that affect sound-level measurements to ensure an accurate representation of the sound. (See Appendix C for more information on DEP rules).⁹

Statute also states that DEP may include adjustment factors for noise measurements other than 50 feet from the center lane of travel. This would allow law enforcement more flexibility in measuring vehicle noise because it would provide different decibel limits for different distances from the center lane of travel. However, the current DEP rule that specifies noise measurement procedures does not contain adjustment factors.¹⁰

⁴ OPPAGA surveyed 338 sheriff's offices and police departments and received responses from 135 organizations; however, not all respondents answered all questions. To address this, the report notes the number of respondents to each section of the survey. The majority of respondents were law enforcement command staff including sheriffs, police chiefs, deputies, lieutenants, captains, and sergeants. Other respondents included administrative personnel. Both large and small counties and city jurisdictions responded to the survey.

⁵ OPPAGA interviewed 14 law enforcement agencies including sheriff's offices, police departments, and the Florida Highway Patrol, and all reported that exhaust noise or music noise are the main sources of problematic vehicle noise. One reported that noise from engine backfiring is problematic and another reported that tire noise is problematic.

⁶ Large vehicles are defined as vehicles with a gross vehicle weight rating of 10,000 pounds or more, a school bus, or any multipurpose passenger vehicle under s. [403.415, F.S.](#)

⁷ Section [403.415\(9\), F.S.](#)

⁸ Sections [316.293\(3\)](#) and [403.415\(9\), F.S.](#)

⁹ Rules [62-18.060](#) and [62-18.070, F.A.C.](#)

¹⁰ DEP previously had a rule with adjustment factors, but repealed the related adjustment factors table in the rule in 2012. However, DEP staff reported that the department has provided recommended adjustment factors directly to law enforcement.

- **New vehicle test procedures.** Statute requires DEP to establish test procedures for determining compliance for new vehicle noise limits.¹¹ These procedures would specify measurement conditions and procedures for noise testing, such as testing sites and decibel meter requirements. DEP staff reported that the department had rules for this requirement, but the rules were repealed in 2012 because DEP determined that new vehicle noise limits are preempted by federal noise regulations. While the federal government does have regulations for new vehicle noise limits for certain large vehicles and motorcycles, state requirements for new vehicle noise limits and certifications may still apply to other types of vehicles (e.g. school buses and multipurpose passenger vehicles).
- **Vehicle certifications.** Statutes require DEP to receive noise compliance certification from vehicle and noise abatement device manufacturers, distributors, importers, or designated agents.¹² DEP staff reported that the department does not receive these certifications because the federal government preempts the statutes requiring the certifications. While the federal government does have regulations for new vehicle noise limits for certain large vehicles and motorcycles, state requirements for new vehicle noise limits and certifications may still apply to other types of vehicles (e.g., school buses and multipurpose passenger vehicles).
- **Decibel levels.** Statutes direct DEP, in consultation, with DHSMV, to adopt a regulation establishing maximum decibel levels for motor vehicle exhaust systems.¹³ DEP staff reported that this requirement was superseded by the decibel limits established in ss. 316.293 and 403.415, *Florida Statutes*. These statutes provide decibel limits for general vehicle noise as opposed to decibel limits for exhaust systems.

Local Ordinances Take Diverse Approaches to Regulating Vehicle Noise

Many Local Governments Address Vehicle Noise Through Local Ordinances

Many local governments have ordinances that prohibit excessive noise. These ordinances sometimes include a section stating that excessive noise harms public health, safety, and quality of life. Some local ordinances specify certain causes of excessive noise that are covered under the ordinance, and many local ordinances include a prohibition on excessive noise from motor vehicles. These ordinances range from excluding vehicle noise to explicitly prohibiting excessive noise from motor vehicles. The associated standards and penalties widely vary among counties and cities that explicitly regulate vehicle noise or with noise ordinances that do not exempt vehicle noise.

Florida counties regulate vehicle noise in a variety of ways. OPPAGA reviewed the ordinances of all 67 Florida counties. Nineteen counties did not have any noise ordinances. Of the 48 counties with a noise ordinance, 18 explicitly excluded exhaust noise from the noise ordinance, 7 did not mention vehicle noise that does or could include exhaust noise, and 6 had contradictory ordinances that

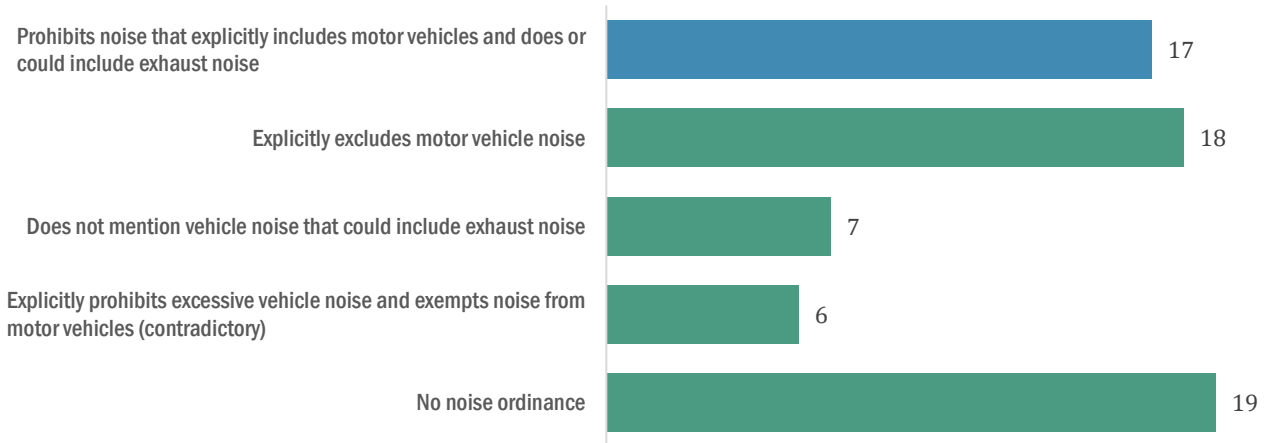
¹¹ Section [403.415\(5\)](#), *F.S.*, requires DEP, in consultation with DHSMV, to establish test procedures for determining compliance with s. [403.415](#), *F.S.* The procedures must substantially conform with applicable standards and recommended practices established by the Society of Automotive Engineers, Inc., or its successor bodies, and the American National Standards Institute, Inc., or its successor bodies, for the measurement of motor vehicle sound levels.

¹² Sections [403.415\(6\)](#), [\(7\)](#), and [\(8\)](#), *F.S.*

¹³ Sections [316.272\(1\)](#) and [403.061\(11\)](#), *F.S.*, direct DEP, in consultation with DHSMV, to adopt a regulation establishing a maximum decibel level for exhaust systems for motor vehicles.

specifically prohibited excessive vehicle noise and also exempted noise from motor vehicles. The remaining 17 counties had prohibitions on vehicle noise that include exhaust noise. (See Exhibit 3.)

Exhibit 3 Noise Ordinances in Counties Vary



Source: OPPAGA analysis of Florida county ordinances.

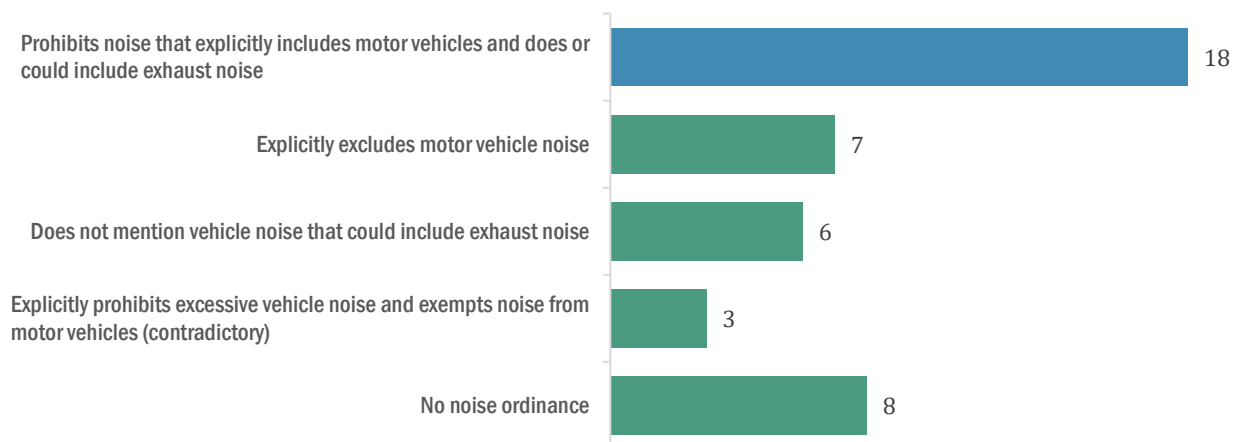
The 17 counties with ordinances that regulate vehicle noise that include exhaust noise used a variety of standards. Additionally, 12 of these counties used more than one standard to regulate vehicle noise. These standards included the following.

- Nuisance standard, such as prohibiting disruptive or unreasonably loud noise (12 counties)
- Equipment standard, such as requiring that a vehicle be equipped with a working muffler (9 counties)
- Decibel standard, such as prohibiting vehicle noise louder than a specified decibel level (9 counties)
- Plainly audible standard, such as prohibiting sound from any vehicle which is plainly audible at a certain distance (5 counties)

Florida municipalities also have a wide a range of ordinances related to vehicle noise. OPPAGA reviewed the ordinances of 42 Florida cities.¹⁴ Of these cities, eight did not have an ordinance related to noise. Of the 34 cities with a noise ordinance, 18 had regulations about vehicle noise that include exhaust noise. Seven cities explicitly excluded exhaust noise from the noise ordinance, and 6 did not mention of vehicle noise that includes exhaust noise. Three cities had contradictory ordinances that specifically prohibited excessive vehicle noise and also exempted noise from motor vehicles from the noise ordinance. (See Exhibit 4.)

¹⁴ OPPAGA selected a sample of 10% (42) of Florida cities and found relevant ordinances for 36. These cities were in 26 counties throughout the state and represented a range of small and large cities.

Exhibit 4 Noise Ordinances in Municipalities Vary



Source: OPPAGA analysis of a sample of 10% (42) of Florida cities.

Cities that prohibited excessive vehicle noise that includes exhaust noise did so using a variety of standards and some used multiple standards. Five cities used more than one type of standard. For example, two cities had ordinances that established both a nuisance standard and an equipment standard. These standards included the following.

- Equipment standard, such as requiring that a vehicle be equipped with a working muffler (13 cities)
- Nuisance standard, such as prohibiting disruptive or unreasonably loud noise (4 cities)
- Decibel standard, such as prohibiting vehicle noise louder than a specified decibel level (4 cities)
- Plainly audible standard, prohibiting sound from any vehicle which is plainly audible at a distance of 50 feet or more (1 city)
- Per se standard, classifying the use of motorcycles after 9:00 p.m. as a violation of the city's noise ordinance (1 city)

Counties and cities have penalties for violating vehicle noise ordinances. Some ordinances provide that violations related to excessive vehicle noise may be punished by a fine. For example, law enforcement officers surveyed reported fine amounts from \$50 for a first offense to \$500 for a second or subsequent offense. Some local governments also include imprisonment or vehicle impoundment as potential penalties for excessive vehicle noise. Local governments sometimes reserve more severe penalties for repeated violations.

However, statutes may preempt local ordinances related to vehicle operating noise and new vehicle noise limits. Ch. 316, *Florida Statutes*, includes two general preemptions on local ordinances.

- Section 316.002, *Florida Statutes*, provides that “[i]t is unlawful for any local authority to pass or to attempt to enforce any ordinance in conflict with the provisions of this chapter.”
- Section 316.007, *Florida Statutes*, provides that “[t]he provisions of this chapter shall be applicable and uniform throughout this state and in all political subdivisions and municipalities therein, and no local authority shall enact or enforce any ordinance on a matter covered by this chapter unless expressly authorized.”

Thus, excessive motor vehicle noise appears to be a matter preempted to the state. The general preemptions in Ch. 316, *Florida Statutes*, cover sections that address noise from the operation of motor vehicles, such as ss. 316.272, 316.293, and 316.455, *Florida Statutes*. More specifically, s. 316.0076, *Florida Statutes*, provides that the “[r]egulation of the use of cameras for enforcing the provisions of this chapter is expressly preempted to the state.” Section 316.008, *Florida Statutes*, does recognize broad powers of local authorities to regulate traffic. However, the Supreme Court of Florida has held that, other than where explicitly noted, these powers do not encompass imposing punishment outside the framework of Chs. 316 and 318, *Florida Statutes*, for conduct prohibited by Ch. 316, *Florida Statutes*, and subject to punishment under Ch. 318, *Florida Statutes*.¹⁵

Further, s. 403.415, *Florida Statutes*, may preempt local ordinances related to new vehicle noise limits. Section 403.415(10), *Florida Statutes*, provides that “no local authority shall enact or enforce any ordinance on a matter covered by this section unless expressly authorized.”¹⁶

Law Enforcement Practices Vary for Enforcing Exhaust Noise Related Violations; Citations Have Increased and Over One-Third Adjudicated Guilty

Local ordinances for exhaust noise related violations are rarely enforced; however, enforcement of state statutes for exhaust noise related violations have increased in recent years. The enforcement practices for state statutes vary among entities. The most common disposition for these offenses is an adjudication of guilt; the median citation amount is \$116. While enforcement has increased in recent years, there are several enforcement challenges.

Law Enforcement Rarely Enforces Local Ordinances for Exhaust Noise Related Violations

OPPAGA’s survey of local law enforcement found that very few respondents (2 offices) reported that they had enforced local ordinances regulating excessive exhaust noise. For a first offense, respondents would issue a verbal warning, written warning, or citations. For a second or subsequent offense, respondents would issue a written warning or citation. One respondent reported issuing fewer than 20 citations in the past year and one reported issuing only one citation in the past year.

Survey respondents reported a variety of reasons for not enforcing local vehicle noise ordinances. Some pointed to the lack of significant penalties for violating the ordinance. Several respondents reported preferring to use state statute rather than local ordinance to address excessive noise from vehicles. Some identified practical barriers, such as requiring decibel meters or difficulty inspecting modified exhaust equipment in the field.

¹⁵ *Masone v. City of Aventura*, 147 So. 3d 492, 497 (Fla. 2014).

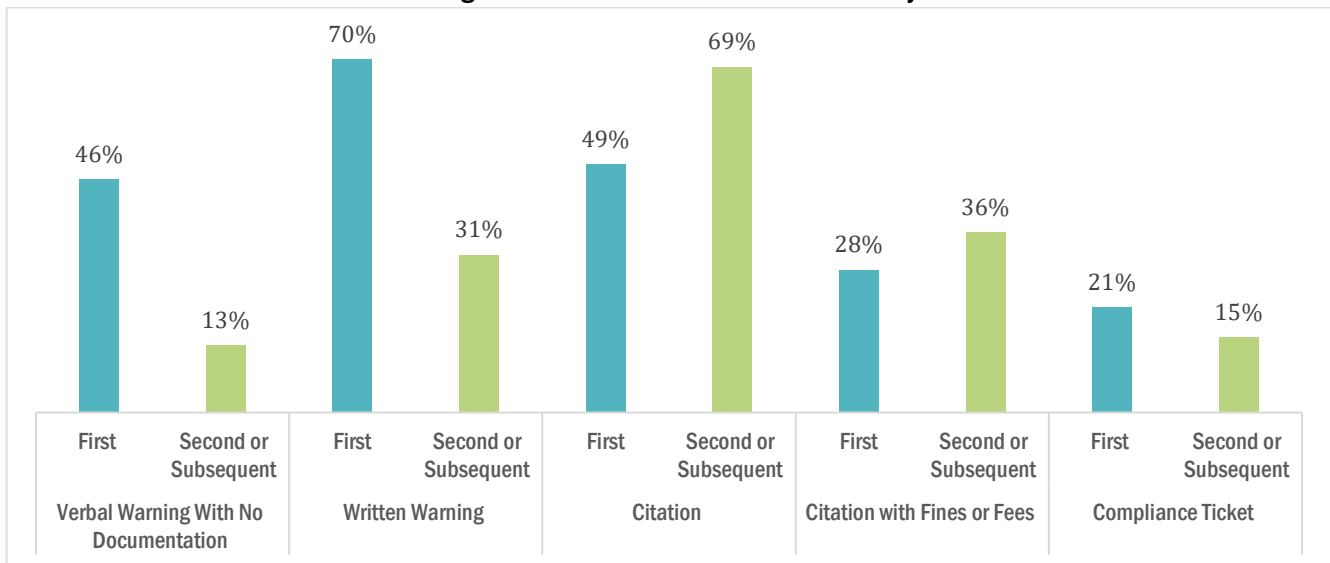
¹⁶ “(10) ENACTMENT OF LOCAL ORDINANCES LIMITED.—The provisions of this section shall be applicable and uniform throughout this state and in all political subdivisions and municipalities therein, and no local authority shall enact or enforce any ordinance on a matter covered by this section unless expressly authorized. However, this subsection shall not prevent any local authority from enacting an ordinance when such enactment is necessary to vest jurisdiction of violation of this section in the local court.”

There Are Different Enforcement Approaches Used for Exhaust Noise Related Violations Under State Statutes

Law enforcement practices for enforcing exhaust noise related statutes vary. OPPAGA’s survey of sheriff’s offices and police departments found that law enforcement are most commonly made aware of violations by hearing loud exhaust while on patrol (92%), followed by citizen complaints (72%), and other (4%), which can include targeted enforcement operations.^{17,18} After identifying a vehicle with loud exhaust, law enforcement has discretion on how to handle the offense. OPPAGA’s survey found that most respondents reported providing a written warning for an exhaust noise related violation; for second or subsequent offenses, most write a citation. Some respondents also issue a compliance ticket, which is also known as a fix-it ticket citation and allows the driver to fix the exhaust equipment and have the citation dismissed. (See Exhibit 5.)

Exhibit 5

Law Enforcement Practices for Enforcing Exhaust Noise Related Violations Vary¹



¹ A total of 67 respondents answered the survey questions on enforcement approaches.

Source: OPPAGA analysis of law enforcement responses to exhaust noise survey.

Citations Under State Statutes for Exhaust Noise Related Violations Have Increased

While law enforcement uses a variety of enforcement approaches, including verbal and written warnings, available statewide traffic data is limited to citations.¹⁹ Overall, non-moving traffic violation citations have declined, with the total number of citations decreasing from 730,323 citations in 2017 to 562,789 citations in 2021.²⁰ However, over a similar period, exhaust noise related citations increased from 857 in Fiscal Year 2017-18 to 3,018 in Fiscal Year 2021-22. (See Exhibit 6.) This

¹⁷ OPPAGA surveyed 338 sheriff’s offices and police departments and received responses from 135 organizations; however, not all respondents answered all questions. To address this, the report notes the number of respondents to each section of the survey. The majority of respondents were law enforcement command staff including sheriffs, police chiefs, lieutenants, captains and sergeants; other respondents included administrative personnel. Both large and small counties and city jurisdictions are represented in the survey.

¹⁸ The survey question on methods of finding out about loud exhaust is limited to respondents who enforce exhaust noise related violations. This question had a total of 76 respondents.

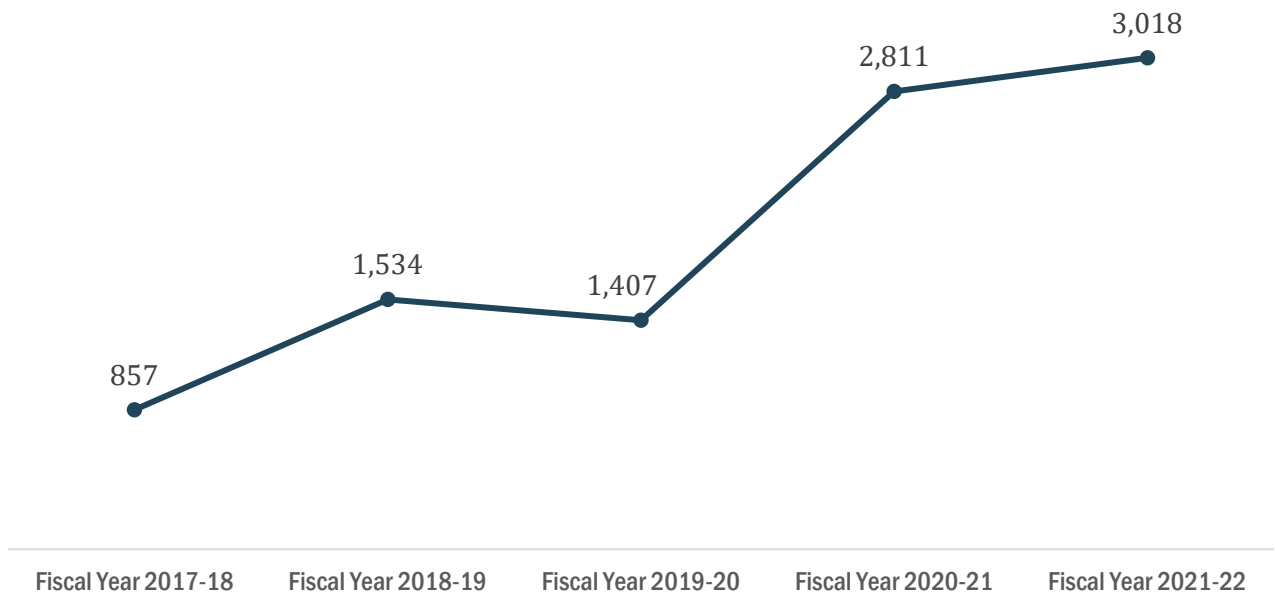
¹⁹ Statewide traffic data is the Uniform Traffic Citation database housed in DHSMV.

²⁰ Other types of non-moving traffic citations include violations such as failure to display tag or driver license, no proof of insurance, seat belt violations, and texting and driving.

increase may be due to a rise in citizen complaints regarding loud exhaust noise. Most (67%) survey respondents also reported that the prevalence of vehicles or motorcycles with loud exhaust has increased over the past five years, and 22% reported that it stayed about the same.²¹ (See Appendix D for a list of citations by county.)

Exhibit 6

Exhaust Noise Related Traffic Citations Under State Statutes Increased From Fiscal Year 2017-18 Through Fiscal Year 2021-22¹



¹ Citation data does not capture verbal or written warnings and are most likely an undercount of the full scope of enforcement activity for exhaust noise related offenses.

Source: OPPAGA analysis of DHSMV Uniform Traffic Citation data.

Most Exhaust Noise Related Citations Under State Statutes Are Equipment Related Instead of Decibel Related

From Fiscal Year 2017-18 through Fiscal Year 2021-22, 89% of exhaust noise related offenses were associated with improper or modified equipment. Over the same period, only 105 offenses (1%) were recorded under the decibel statute.²² While the overall number of citations issued for decibel statute violations is low, enforcement increased from 7 citations in Fiscal Year 2017-18 to 36 citations in Fiscal Year 2021-22. Citations do not account for warnings from law enforcement to drivers or citations written under local ordinances. (See Exhibit 7.)

²¹ The survey question on prevalence of exhaust noise over the past five years is limited to respondents who enforce exhaust noise related violations. This question had a total of 75 respondents. Only one respondents reported that the prevalence of exhaust noise decreased and 7 (9%) were unsure if the prevalence of exhaust noise has changed over the past five years.

²² Additionally, 10% of offenses could relate to exhaust systems, but it is not possible to determine if these offenses are under equipment or decibel statutes due to missing statutory citations in the data.

Exhibit 7

The Majority of Exhaust Noise Related Citations Were Equipment Related from Fiscal Year 2017-18 Through Fiscal Year 2021-22¹

Offense Type	Offense Statute and Description	Offenses by Fiscal Year					Total
		2017-18	2018-19	2019-20	2020-21	2021-22	
Equipment	Section 316.455(6), F.S. requires that motorcycles comply with Section 316.272 F.S. requirements for mufflers and prevention of noise.	8	24	16	13	6	67
Equipment	Section 316.272, F.S. requires vehicles to be equipped with an exhaust system that prevents excessive noise and prohibits the use of muffler cutouts, bypasses, or similar devices on a vehicle on a highway.	147	500	470	890	874	2,881
Equipment	Section 316.293(5), F.S. prohibits vehicle modifications that result in a louder vehicle noise than the noise made by the vehicle as originally manufactured and prohibits the operation of vehicles so modified. Vehicle modifications include exhaust systems and other noise-abatement devices.	368	899	762	1,677	1,886	5,592
Decibel	Section 316.293(2), F.S. establishes decibel limits for operating vehicle noise for different categories of vehicles in different speed limit zones.	7	16	16	30	36	105
N/A	Could Relate to Exhaust Systems, Undetermined	327	95	143	201	216	982
Total Per Calendar Year		857	1,534	1,407	2,811	3,018	9,627

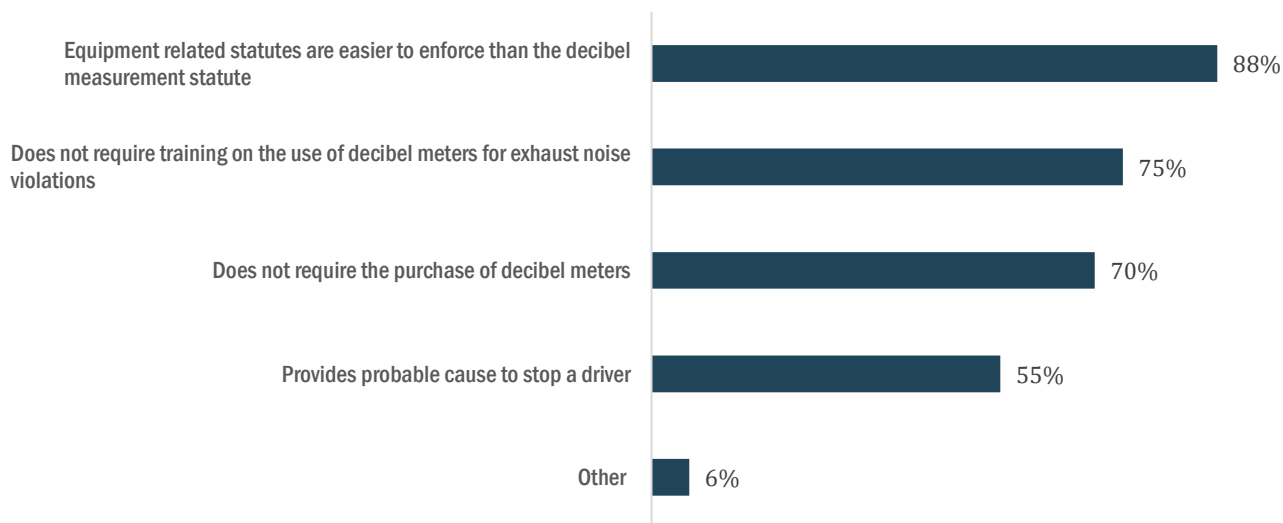
¹ Citations do not account for warnings from law enforcement to drivers or for citations written under local ordinances. Additionally, 982 citations may relate to exhaust noise related citations, but it is undetermined. Of these, 582 citations are missing a subsection for s. [316.293, F.S.](#), and 400 citations are missing a statutory citation. Additionally, OPPAGA analysis is limited to equipment statutes that specifically mention noise. This excludes statutes, including ss. [316.2935](#) and [316.610, F.S.](#), which could be used for exhaust equipment violations which may not increase noise levels.

Source: OPPAGA analysis of DHSMV Uniform Traffic Citation data.

In OPPAGA’s survey, 60% (78 of 130) of law enforcement respondents reported enforcing exhaust noise related violations. Of those enforcing such violations, 96% used one of the equipment statutes. Law enforcement reported using the equipment statutes for several reasons. Eighty-eight percent of respondents reported that equipment-related statutes are easier to enforce than the decibel statute. Other reasons include that it is obvious to see modifications so enforcement can happen without having an officer staged on a sidewalk with a decibel meter. (See Exhibit 8.)

Exhibit 8

The Majority of Law Enforcement Reported That Equipment Statutes Are Easier to Enforce Than the Decibel Statute¹



¹ Responses were limited to law enforcement agencies that reported enforcing exhaust noise related equipment statutes and a total of 67 respondents answered the survey question on benefits of the equipment statutes. Responses in the Other category included that the equipment standard is easier to articulate, does not require having an officer staged on a sidewalk with a decibel meter.

Source: OPPAGA analysis of a survey on exhaust noise.

In OPPAGA's survey, only two law enforcement respondents reported enforcing the decibel statute for exhaust noise related violations. These respondents reported that the benefits of using the decibel statute are that a decibel meter is easy to use and provides an objective measurement of noise, which is clear evidence to use in court. Additionally, one respondent stated decibel readings do not require an officer to examine the vehicle for modified exhaust equipment. These offices reported enforcing the decibel statute at special events or specific problematic locations. For example, using one approach, the traffic unit sets up a tripod with a decibel meter at the problematic location, then the officer controlling the decibel meter communicates with another officer who pulls the vehicle over when a violator drives past the location.

Over One-Third of Citations Under State Statutes Result in a Guilty Adjudication; Citations Have a Median Cost of \$116

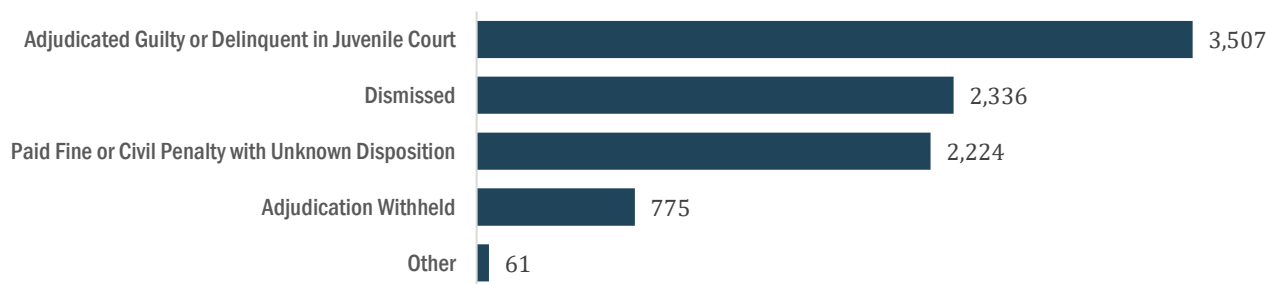
For offenses committed in Fiscal Year 2017-18 through Fiscal Year 2021-22, 39% (3,507) of citations were adjudicated guilty. (See Exhibit 9.) Over the same period, 26% (2,336) of citations were dismissed. Additionally, 25% (2,224) of citations are documented as a paid fine or civil penalty but do not have additional disposition information in the traffic or clerk data.²³ About 9% (775) of cases resulted in adjudication withheld.²⁴

²³ OPPAGA analyzed a dataset of combined data from DHSMV Uniform Traffic Citation data and Clerk and Comptroller Comprehensive Case Information System data.

²⁴ When adjudication is withheld in nonmoving traffic cases, the driver does not receive a conviction for the traffic offense and may be required to pay costs.

Exhibit 9

Most Citations are Adjudicated Guilty or Dismissed¹



¹ Dispositions exclude 724 pending dispositions. Additionally, Paid Fine or Civil Penalty with Unknown Disposition is defined as a case that is documented as a paid fine or civil penalty, but does not have additional disposition information in the data. The other category includes 31 acquitted citations, 14 nolle prossed cases, and 16 others were transferred, dropped, or had no action.

Source: OPPAGA analysis of DHSMV Uniform Traffic Citation data and Clerk and Comptroller Comprehensive Case Information System Fiscal Year 2017-18 through Fiscal Year 2021-22 data.

Violators paid a median citation cost of \$116. As part of nonmoving traffic citations, drivers may be required to pay fines and fees. Florida statutes establish a base cost of \$108 in fines and fees for nonmoving traffic violations.²⁵ While fine and fee amounts vary by county and municipality, the median cost for exhaust noise related citations was \$116.²⁶

Section 318.18(23), *Florida Statutes*, establishes an additional fine specifically for modified exhaust systems or other noise abatement equipment.²⁷ This additional fine does not apply to the other exhaust noise statutes. In addition to other penalties imposed, law enforcement may impose a fine of \$200 for a first offense and a fine of \$500 for a second or subsequent offense. There is some evidence in the data of this additional fine being used. OPPAGA identified approximately 159 citations with the \$200 additional fine and approximately 13 citations with the \$500 additional fine.²⁸ In OPPAGA's survey, 50% of respondents reported that their organization is aware of the increased fine yet the organization has not imposed the increased fine amount, 5% reported awareness of the fine increase and have imposed it, and 46% reported not being aware of the increased fine amount.²⁹

Some Law Enforcement Offices Do Not Enforce Exhaust Noise Related Statutes for a Multitude of Reasons and Most Have Not Received Relevant Training

Forty percent (52 of 130) of respondents reported that their organization does not enforce decibel or equipment state statutes for exhaust noise related violations. Respondents provided several reasons why the decibel statute is not easily enforceable. For instance, 56% reported that it is impractical to prepare a decibel meter to target a moving vehicle to measure noise levels. Sixteen respondents

²⁵ Section [318.18](#), *F.S.*

²⁶ Cost data can include an aggregated cost for multiple different offenses within one citation. Thus, OPPAGA excluded some cost information that was outside the possible parameters for fines or fees for exhaust noise offenses. OPPAGA limited the cost analysis to costs within the range of \$108 to \$200 for citations that were adjudicated guilty (or adjudicated delinquent in a juvenile court), nolle prosequi, or are listed as paid a fine or civil penalty with an unclear adjudication decisions. Broward and Calhoun counties are also excluded due to no reported fine data to the Florida Clerks of Court Comprehensive Case Information System. Using this approach, OPPAGA identified 3,573 citations with a total cost between \$108 and \$200.

²⁷ Section [316.293\(5\)](#), *F.S.*, prohibits vehicle modifications that result in a louder vehicle noise than the noise made by the vehicle as originally manufactured and prohibits the operation of vehicles so modified.

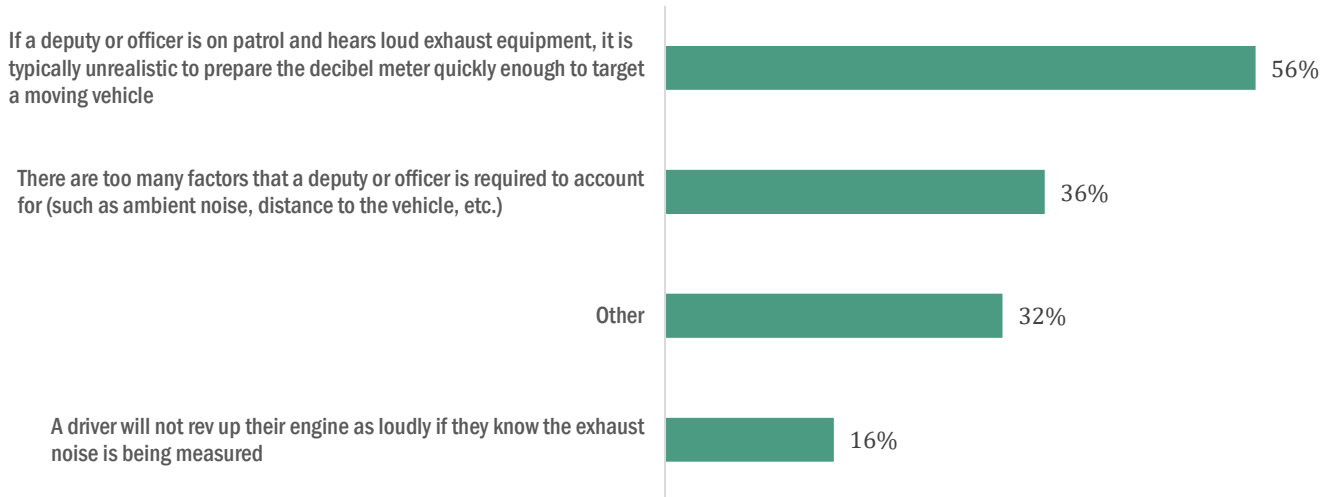
²⁸ Section [316.293\(5\)\(a\)](#), *F.S.*, includes a fine enhancement of \$200 for a first offense and \$500 for a second offense. OPPAGA identified 159 citations for s. 316.293(5), *F.S.* with a total cost in the \$300 to \$400 range and the median is \$314. Additionally, OPPAGA identified 13 citations for s. [316.293\(5\)](#), *F.S.*, with a total cost in the \$600 to \$700 range and the median is \$616.

²⁹ Survey questions on fines and fees were limited to respondents who enforce exhaust noise related violations. These questions had 65 respondents.

reported other factors that contribute to the inability to enforce the statute, including 8 respondents who said their agency does not have sufficient decibel meters. Further, 36% indicated that ambient noise and distance from a vehicle are some of the many factors that officers must account for when enforcing the decibel statute. (See Exhibit 10).

Exhibit 10

There Are Several Reasons Why the Decibel Statute Is Difficult to Enforce¹



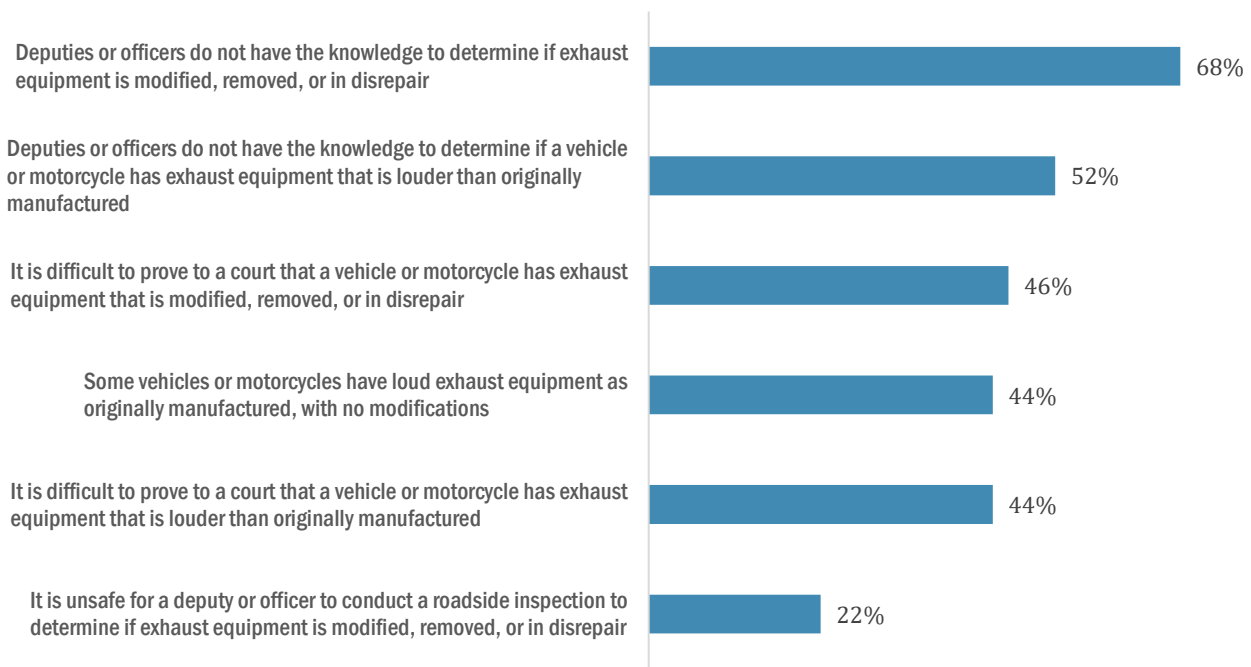
¹ Out of 52 organizations that do not enforce exhaust noise related violations, 50 respondents answered the survey question on why they do not enforce the decibel statute. Additionally, the other category includes that the organization does not have decibel meters, does not have training, or has limited time for traffic enforcement due to other types of crimes.

Source: OPPAGA analysis of a survey on exhaust noise.

Most agencies attribute law enforcement officers' inability to enforce equipment-related statutes to a lack of specialized knowledge regarding exhaust modifications. For instance, 52% of respondents reported that law enforcement officers did not have the knowledge to determine if a motor vehicle or motorcycle had exhaust equipment that was louder than originally manufactured. OPPAGA also found that law enforcement officers experienced difficulty providing evidence of violations in court. For example, 46% of respondents indicated that it is difficult to prove to the court that a motor vehicle or motorcycle has exhaust equipment that is modified, removed, or in disrepair. (See Exhibit 11.)

Exhibit 11

Equipment Statutes Also Pose Challenges for Enforcing Exhaust Noise Related Violations¹



¹ Out of 52 organizations that do not enforce exhaust noise related violations, 50 respondents answered the survey question on why they do not enforce equipment statutes.

Source: OPPAGA analysis of a survey on exhaust noise.

Most law enforcement organizations have not received relevant training to enforce exhaust noise related violations. Law enforcement officers receive training on general traffic enforcement at the law enforcement academy and through field officer training in their employing organization. However, of the 116 survey respondents who answered training related questions, 79% (92) reported that deputies or officers have not received any training for exhaust noise related violations. Sixteen percent (19) reported that a deputy or officer has received training on how to use decibel meters to measure noise from vehicles or motorcycles. Examples of training included that the topic is covered in the employing local law enforcement organization's Sound Meter Training Class, using lasers to measure distance required in the decibel statute, and vendor specific training materials. Only 5% (six) reported that a deputy or officer has received training on how to identify modified, removed, or defective exhaust equipment. Examples included in-house training from senior traffic unit deputies or officers and how to recognize aftermarket parts versus stock parts.

OPTIONS

Florida currently has state statutes that address vehicle noise, including exhaust noise.³⁰ While many other states have similar laws to Florida, there are options to further address exhaust noise being used in some other states and Florida municipalities; this includes expanding enforcement of existing statutes and clarifying existing statutes. In addition, there are options for new approaches to enforce exhaust noise related violations on roadways that could be used for any motor vehicle or motorcycle except for certain large vehicles engaged in interstate commerce.

Several Options Could Expand Enforcement of Existing Statutes

The Department of Highway Safety and Motor Vehicles or Local Law Enforcement Could Conduct an Educational or Enforcement Campaign on Exhaust Noise

Educational or enforcement campaigns are typically implemented by a state or local entity and used to educate the public on a specific issue. The Florida Department of Highway Safety and Motor Vehicles has completed many educational and enforcement campaigns to educate motorists about various driving laws and safety aspects. For example, DHSMV completed a two-month educational Safe Holiday Travel Campaign in 2021 that reminds drivers to exercise extra caution while driving during the holiday season. The Safe Holiday Travel Campaign received 1.3 million impressions.³¹ The DHSMV also completed a Move Over campaign in January 2022 to notify drivers that Florida law requires them to move over for stopped law enforcement, construction vehicles, and other entities. This campaign received 1.2 million impressions. These campaigns can be funded through both state and federal dollars.

Local law enforcement also conducts various campaigns to focus on specific enforcement areas. For example, the Florida Sheriffs Association conducted Operation Loose Wire in 2021, which focused on decreasing cases of loose or neglected livestock. Seventeen counties participated and focused on both education and enforcement. For education, the task force distributed 225 messages to citizens and hosted 88 citizen events on the topic. The enforcement aspect resulted in 1,142 complaints received, 415 loose animals located, 180 arrests, and 48 cases referred to the state attorney.

DHSMV or local law enforcement could conduct similar campaigns to focus on education and enforcement of exhaust system noise violations. This approach could include the dissemination of information on the consequences of exhaust system noise violations, such as the increased fine under section s. 318.18(23), *Florida Statutes*.³² A campaign could also focus enforcement on areas of the state that have a high number of citizen complaints or violations related to exhaust system noise. According to law enforcement survey respondents, advantages of the task force approach include that it combines resources to address a specific problem, allows for focus on areas where loud exhaust is a

³⁰ The Florida Department of Transportation (FDOT) is responsible for addressing traffic noise on state roads, which includes noise abatement activities. Noise abatement activities include a variety of roadway modifications that could affect exhaust noise, ranging from design modifications for traffic calming to larger construction projects involving noise barriers.

³¹ An impression is a count of how many times a campaign is shown.

³² In addition to other penalties imposed, s. 318.18(23), *F.S.*, includes a fine of \$200 for a first offense and \$500 for a second or subsequent offense of s. 316.293(5), *F.S.*, which prohibits modifications that would make a vehicle louder than originally manufactured.

problem, allows for specific training on loud exhaust for law enforcement, and increases public education and awareness. Disadvantages include the amount of staff required to conduct a task force, especially for smaller agencies or agencies that struggle with staffing levels; it is not a priority or takes time and resources away from more serious offenses; and concern about public perception from citizens who would rather see a task force dedicated to more serious offenses.

The Legislature Could Direct Entities to Provide Additional Training for Law Enforcement Officers

According to OPPAGA's survey, most responding law enforcement offices have not received relevant training to enforce exhaust noise related violations. Out of the 116 survey respondents who answered the training related questions, 79% (92) reported that deputies or officers have not received any training for exhaust noise related violations. Those who did receive training typically received it from their individual law enforcement organization; examples included a sound meter training class and training provided by senior traffic unit deputies or officers on how to recognize aftermarket parts versus stock parts. The Florida Department of Law Enforcement's Criminal Justice Standards and Training Commission is responsible for creating entry-level training for Florida criminal justice officers. The commission provides training related to general noise complaints and calls but does not cover specific types of noise complaints. The commission provides training based on a statewide analysis of need, and any training provided has to be relevant to the entire state. Also, DEP is statutorily required in s. 403.415(9), *Florida Statutes*, to assist in the training of law enforcement officers regarding operating vehicle noise measurements. However, this is limited to the decibel statute. To date, only one law enforcement office has requested training from DEP under this statute.

The Legislature could direct local law enforcement entities, the Criminal Justice Standards and Training Commission, and DEP, to develop a training program or materials on enforcing exhaust noise statutes. Suggested training topics from OPPAGA's survey and interviews included how to use a decibel meter, how to determine if exhaust equipment has been modified or is an aftermarket part, information on factory specifications of exhaust equipment, and how to provide related testimony in court. The advantage of this approach is that it could increase enforcement of current statutes for exhaust noise. However, the disadvantages include the cost of developing training. Additionally, law enforcement reports that the current statutes are difficult to enforce; thus, training may have a limited effect.

The Legislature Could Expand the Use of Traffic Cameras to Include Noise Cameras

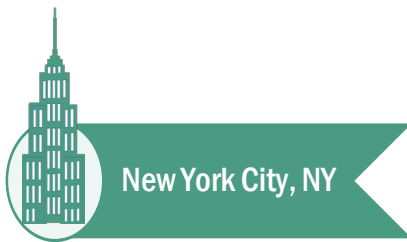
Automated noise cameras are currently being used in some locations across the country. A camera is installed near a roadway and programmed to a certain noise level to trigger an activation, then the cameras take a short video to capture the vehicle, license plate number, and decibel levels. Some localities in other states, including New York City and Knoxville, Tennessee, started automated noise activated camera pilot programs in response to a high number of citizen complaints about exhaust noise. However, the cities use the cameras in different ways. For example, the New York City Department of Environmental Protection uses noise cameras to issue fines through the Environmental Control Board as opposed to a court.³³ Knoxville's Policy Department only uses noise cameras to collect

³³ The Environmental Control Board is within the New York City Office of Administrative Trials and Hearings and holds hearings on cases that involve summonses from 13 different city enforcement agencies, including the Department of Environmental Protection.

data because the city lacks the statutory authority to issue citations from noise cameras. (See Exhibit 12.)

One Florida locality, the City of Miami Beach, passed a resolution in July 2022 to establish a noise camera pilot program.³⁴ The pilot program ran from December 2022 through April 2023. The city installed three noise cameras in different locations to test how the cameras work under different scenarios. During the pilot, there were 2,688 total activations and 197 activations over 100 dB.³⁵ The city plans to begin a second pilot program with three new cameras. The new cameras have additional features, including an array of microphones that triangulate sound and can mark the vehicle that is the source. The city is using these pilot programs to test how the cameras work and to gather information about where and when noise events occur.³⁶

Exhibit 12 Examples of the Use of Automated Noise Cameras

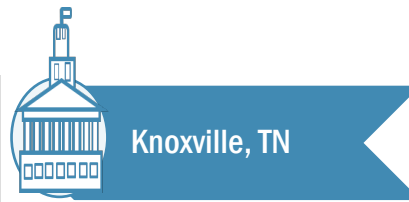


Installation Date: July 2021

Use: Issuing Fines

The city's Department of Environmental Protection completed a three-month pilot program to test the cameras. During the pilot, the city issued a notice to appear as opposed to issuing fines. As of February 2023, the city had one camera that is moved around to different locations to issue fines after a staff person reviews the video and data. The department issues fines through the Environmental Control Board as opposed to a court. The city is in the process of purchasing more noise cameras.

Findings: A noise event is triggered at 86 decibels and the camera captures about 250 to 300 noise events per month.



Installation Date: February 2022

Use: Data Collection

The city's Policy Department has one camera that is moved around to different locations to gather data on noise for law enforcement. The goal is to gather information about where and when noise events occur to better target noise enforcement activities.

Findings: A noise event is triggered at 86 decibels and over an approximately two month period from February to April 2022, the noise camera captured 486 excessive noise events. Most of the noise events occurred between 7 p.m. and 3 a.m. As of July 2022, there were a total of 1,300 noise events recorded and the average noise event is approximately 90 dB A.



Installation Date: December 2022

Use: Data Collection

The city commission and Miami Beach Police Department have three cameras being used in a temporary pilot program. The pilot program is being used to test how the cameras work and to gather information about where and when noise events occur to respond to a high volume of citizen complaints.

Findings: From December 2022 through April 2023, the three cameras had 2,688 total activations and 197 activations that were over 100 dB. For purposes of the pilot program, the minimum decibel level for an activation was set to 64 dB.

Source: OPPAGA interviews.

Florida law expressly preempts the use of cameras for enforcing violations of the Florida Uniform Traffic Control Law.³⁷ However, the Legislature can create an exception, and statutes currently allow local governments the option of using red light cameras, which some jurisdictions use to issue notices

³⁴ Resolution Number 2022-32208.

³⁵ For purposes of the pilot program, the minimum decibel level for an activation was set to 64 dB.

³⁶ In December 2022, the City of Miami Beach passed a second resolution (Resolution Number 2022-32441) that urged the Legislature to amend state statutes to allow municipalities to issue traffic citations from noise cameras.

³⁷ Section [316.0076](#), F.S.

of violation to drivers for failing to stop at red lights.^{38,39} Red light cameras use sensors installed to work in conjunction with a camera to automatically record photos or videos when a vehicle fails to stop at a red light. Local jurisdictions review these red light camera images and issue notices of violations.⁴⁰ If a driver does not pay the \$158 violation fine within 60 days, the local jurisdiction will issue a uniform traffic citation.⁴¹ Section 316.0083, *Florida Statutes*, provides parameters for processes regarding required notifications, issuance of citations to registered owners of motor vehicles, and review of evidence by the vehicle owner. Statute also requires local governments to implement a public awareness campaign prior to using red light cameras. In addition, the law requires each governmental entity that utilizes a red light camera to submit an annual report to the DHSMV detailing the detectors' results and enforcement procedures. During Fiscal Year 2021-22, 42 local jurisdictions in Florida had a red light camera program. As of June 30, 2022, the state had 487 red light cameras.

Similar to red light cameras, the Legislature could establish regulations to allow local governments the option to use noise cameras. According to law enforcement survey respondents, advantages of noise cameras include that they are automated and are a tool to assist officers with increased enforcement, the information and video from the camera provide evidence for use in court, and measurement from a camera using a decibel standard provides an impartial and equitable measurement standard. Disadvantages include the cost to purchase and maintain the camera; potential concerns about calibration and certification, both in operation and in court; concerns about identifying the driver versus the vehicle owner, both in operation and in court; the amount of personnel time to review videos; and concerns about public perception regarding government infringement and privacy and dislike of red light cameras in some jurisdictions.

The Legislature Could Apply Increased Fines in s. 318.18(23), *Florida Statutes*, to Other Statutes for Exhaust Noise Violations

Some states, including New York and Florida, recently increased penalties for some types of exhaust system modifications. New York requires that motor vehicles operating on highways, including motorcycles, to be equipped with an adequate muffler or exhaust system at all times.^{42,43} New York also prohibits any persons from selling, offering for sale, or installing equipment that amplifies or increases the noise emitted by the exhaust system. Similarly, no person shall sell, offer for sale, or install straight pipes on a motorcycle. In 2021, New York passed legislation that discourages drivers from installing illegal vehicle equipment by allowing law enforcement officers to issue violators up to \$1,000 in fines.⁴⁴

Similarly, the 2021 Florida Legislature increased penalties for some exhaust noise violations. Chapter 2021-188, *Laws of Florida*, amended statute to create an additional fine for modifying the exhaust

³⁸ The Mark Wandall Traffic Safety Program is under section s. [316.0083](#), *F.S.*

³⁹ Section [316.0776](#), *F.S.*, allows for the use of red light cameras on state roads when permitted by FDOT and under placement and installation specifications developed by the FDOT. Traffic infraction detectors are allowed on streets and highways under the jurisdiction of counties or municipalities in accordance with placement and installation specifications developed by FDOT. The statute further requires that the DHSMV, county, or municipality notify the public that a red light camera may be in use at that intersection.

⁴⁰ A violator may either pay the notice or contest a notice. Contested notices are reviewed by law enforcement and are either upheld or dismissed.

⁴¹ Additional charges, up to \$500, may be applied to the \$158 notice of violation fine.

⁴² Vehicles and Traffic, Title 3, Article 9, [Section 375](#), *Laws of New York*

⁴³ The exhaust system requirements in New York are similar to Florida's s. [316.272](#), *F.S.*, which establishes requirements for vehicles exhaust systems and requires that vehicles be equipped with an exhaust system that prevents excessive noise. The law also prohibits the use of muffler cutouts, bypasses, or similar devices on highways.

⁴⁴ The installation prohibition in New York is similar to Florida's s. [316.293\(5\)\(a\)](#), *F.S.*, which does not allow any person to modify an exhaust system in a manner that makes it louder than originally manufactured.

system of a motor vehicle so that the noise emitted is above that of the vehicle as originally manufactured; the fine is up to \$200 for a first offense and \$500 for a second or subsequent offense.^{45,46} This increased fine is in addition to the base combined fines and fees of \$108, which could result in a total cost of at least \$308 for a first offense and at least \$608 for a second offense. Prior to the recent legislation, violation of the law resulted in a non-criminal traffic infraction, which had a total cost of at least \$108.

There is evidence of law enforcement using the increased fine. OPPAGA's survey found that 5% of organizations reported issuing citations with the increased fine amount.⁴⁷ Additionally, OPPAGA's analysis of fines found several instances of amounts around \$308 and \$608 for violations of s. 316.293(5), *Florida Statutes*. However, other law enforcement organizations reported not issuing citations for the increased fine amount or being unaware of the increased fine.

The Legislature could consider applying the increased fine to additional exhaust noise related statutes including violations of the decibel statute or for other equipment statutes for vehicles that are not equipped with an exhaust system that prevents excessive noise or do not have required equipment.⁴⁸ Information on the increased fine could also be included as a topic in an educational campaign to inform all law enforcement and the public of the increased fine. In general, the advantages to increasing penalties for violations is that it could deter vehicle owners from illegally modifying their muffler or exhaust system or encourage owners to fix their vehicle to ensure the muffler and exhaust system is in good and proper working order. A potential disadvantage is that law enforcement officers may not enforce the increased fine due to not wanting to financially burden the vehicle owner.

The Legislature Could Direct DEP to Review Federal Preemption and Recommend Updates to Florida Law to Clarify Exhaust Noise Provisions and Improve Enforcement of Exhaust Noise Violations

Some of the various provisions in Chs. 316 and 403, *Florida Statutes*, for vehicle noise are being implemented and some are not implemented. Of the provisions that are not implemented, some of the requirements for certain large vehicles and motorcycles appear to be preempted by the federal government; however, the requirements for other types of vehicles do not appear to be preempted. To address this issue, the Legislature could direct the Department of Environmental Protection to review federal laws and regulations and recommend statutory revisions to Florida's noise emission provisions, including changes to rule-making authority, to regulate these vehicles.

- If the Legislature wishes to retain authority over the noise emissions of newly manufactured vehicle and equipment types that do not appear to be preempted by the federal government, the Legislature could direct DEP to review federal laws and regulations and recommend statutory revisions to Ch. 403, *Florida Statutes*.
- If the Legislature wishes to improve the enforcement of noise emission regulations for vehicles currently operating on roadways under Ch. 316, *Florida Statutes*, the Legislature could require DEP to reestablish a rule for distance adjustment factors when measuring decibels levels of

⁴⁵ Section [316.293\(5\)](#), *F.S.*

⁴⁶ Chapter [2021-188](#), *Laws of Florida*.

⁴⁷ The survey question on fines and fees were limited to respondents who enforce exhaust noise related violations. These questions had 65 respondents.

⁴⁸ The increased fine could be applied to ss. [316.293\(2\)](#), [316.272](#), and [316.455](#), *F.S.*

vehicle noise.⁴⁹ The Legislature could also direct DEP to review the state statutes and the relevant federal laws and regulations, recommend any changes to state statute and DEP’s rule-making authority, and initiate rulemaking to address rule requirements in state statute that are not promulgated.⁵⁰

There Are Additional Options to Create New Mechanisms for Enforcing Exhaust Noise Violations

The Legislature could also consider creating new approaches to enforce exhaust noise related violations which could be used for any motor vehicle or motorcycle except for certain large vehicles engaged in interstate commerce. (See Exhibit 13.)

Exhibit 13

The Legislature Could Implement New Approaches to Enforce Exhaust Noise Related Violations

Option	Description	Policy Considerations
Create a Plainly Audible Standard for Exhaust Noise in Statute	<p>The Legislature could consider creating statutory language that allows law enforcement to enforce loud exhaust using the plainly audible standard. This could include a new provision under Ch. 316, <i>F.S.</i>, that specifies the distance, definitions, and enforcement guidelines similar to the plainly audible standard for music and other noise under s. 316.3045, <i>F.S.</i></p> <p>The plainly audible standard has been used for vehicle noise by local governments in many places, including Florida.¹ At the local level, some Florida cities and counties use the plainly audible standard for exhaust noise violations. Generally, these local ordinances allow for a violation if exhaust noise is plainly audible from a certain distance, such as 50 to 100 feet.</p> <p>At the state level, Florida uses a plainly audible standard under s. 316.3045, <i>F.S.</i>, for music and other noises, such as from a video player or electronic sound making device, from vehicles.^{2,3} This allows for a non-moving and non-criminal traffic violation if music or other noise is plainly audible at a distance of 25 feet or more from the motor vehicle or louder than necessary for the convenient hearing by persons inside the vehicle in areas adjoining private residences, churches, schools, or hospitals. DHSMV adopted rules to define plainly audible and establish that the primary means of detection of excessive noise is based on the officer’s ordinary auditory senses.⁴ Further, the officer must have direct line of sight and hearing to the vehicle producing the sound to justifiably identify the offending vehicle and the distance involved.</p>	<p>Advantages: Easy to enforce by providing a set distance for law enforcement to use, provides probable cause to stop a vehicle, and does not require equipment, although body cameras or vehicle cameras can assist with footage and evidence.</p> <p>Disadvantages: Subjective measure that is based on determination of a law enforcement officer. In addition, some vehicles have a loud factory exhaust that can be heard from many feet away without any modifications, which is a problem because the driver did not modify the vehicle to make the exhaust louder.</p>
Create a Nuisance Standard for Exhaust Noise in Statute	<p>The Legislature could consider creating statutory language that allows law enforcement to enforce loud exhaust violations using the nuisance standard. This could include a new provision under Ch. 316, <i>F.S.</i>, that would specify definitions of a nuisance noise and guidelines for enforcement.</p>	<p>Advantages: Easy to enforce as it does not require special equipment. It also allows an officer to use the perception of a citizen, as opposed to the officer’s opinion, to determine if a noise is unreasonably loud.</p>

⁴⁹ While Florida statutes establish vehicle noise standards at a distance of 50 feet from the center of the lane of travel, s. 316.293(2), *F.S.*, also allows DEP to establish measurement procedures that include adjustment factors to be applied to the noise limit for measurement distances of other than 50 feet from the center of the lane of travel. DEP currently does not have rule establishing these adjustment factors, therefore the decibel measurements may be required to be taken from 50 feet from the center lane of travel as described in statute. DEP previously had a rule that allowed for a decibel adjustment factor from 26 feet to 118 feet from the center lane of travel, but this rule was repealed in 2012.

⁵⁰ Sections 316.272(1) and 403.061(11), *F.S.*, direct DEP, in consultation with DHSMV, to adopt a regulation establishing a maximum decibel level for exhaust systems for motor vehicles. DEP staff reported that these general requirements to establish maximum decibel limits were superseded by the decibel limits in state statute.

Some localities in Florida use a nuisance standard to address noise violations.⁵ OPPAGA identified 12 of 67 counties and 4 of 42 cities reviewed as having a nuisance standard that could be applied to exhaust noise. A nuisance standard allows for a violation if there is a noise disruptive or unreasonably loud. For example, one ordinance describes the nuisance standard as, it shall be unlawful for any person to willfully make any loud and raucous noise, which is defined as any sound which, because of its volume level, duration, and character, annoys, disturbs, injures, or endangers the comfort, health, peace or safety of reasonable persons of ordinary sensibilities.

Disadvantages: Can be ambiguous and subjective, with a concern about difficulty proving in court because the perception of unreasonably loud is different between different people. Lastly, it may require a complainant and statements from the complainant because citizens are the entity that is disturbed by the noise, as opposed to the law enforcement officer.

The Legislature could consider implementing a probable cause based decibel testing pilot program, which would require drivers to pay to have their exhaust system noise tested if law enforcement suspects it exceeds decibel limits. For example, the Legislature could require DHSMV to implement a pilot program with private sector inspection facilities in select localities.⁶ The Legislature could define the inspection services to be offered by the private sector, require DHSMV to establish certification and training requirements and an application process for participants, and direct the department to evaluate effectiveness of the program. This option would also require the Legislature to direct DEP to adopt rules for stationary measurement of exhaust noise, as the current statute and rule is for roadside measurement of moving vehicles.

Advantages: Allows exhaust system noise to be measured in an objective setting where it is easier to account for factors that affect noise measurements, such as ambient noise, as opposed to roadside decibel measurements. It also does not require law enforcement to conduct the noise measurement. It would also only apply to those who have been stopped by law enforcement for suspected modification of their vehicle's exhaust systems. The Specialty Equipment Market Association Action Network, which is a nationwide partnership organization made up of vehicle clubs, enthusiasts, and members of the specialty auto industry, supports a similar program in model legislation.

Establish a
Probable
Cause Based
Decibel Testing
Program

California has a probable cause based decibel testing program.⁷ Under this system, a law enforcement officer would pull over a driver based on probable cause that the vehicle is louder than the decibel limit based on hearing the noise. Then the law enforcement officer writes a ticket, and provides the driver with a notice to visit the decibel testing site where the vehicle noise is measured and the vehicle either passes or fails the noise test. Individuals are charged \$108 for an inspection.

Disadvantages: Inspections may be a cost burden to vehicle owners. Further, drivers could possibly remove the louder exhaust system and reinstall a legal exhaust for the test, then reinstall the modified exhaust system after the test. Moreover, some vehicles have a button that automatically changes the exhaust system settings to close the valve that allows exhaust to escape through the muffler to decrease noise levels for the test and then open the valve after the inspection. In addition, Florida does not have an existing testing network or infrastructure available for this type of approach and it would be a resource burden on the state to implement and maintain. However, in OPPAGA's interview with the California Bureau of Automotive Repair, bureau officials reported that the equipment requirement is not extensive, as it mostly requires decibel meters and space for the testing.

The California Bureau of Automotive Repair uses a noise testing site network called the Foundation for California Community Colleges, which has about 40 locations around the state. Most of the testing sites are at community colleges; however, some are at private facilities, but no auto shops are in the network. During testing, a tester, called a referee, uses a decibel meter to measure sound in a controlled environment using Society of Automotive Engineers standards.

¹ A review by the Noise Pollution Clearinghouse of the 491 largest communities in the United States found that 61% of municipalities have a plainly audible standard.

² A person operating or occupying a motor vehicle on a street or highway may not operate or amplify the sound produced by a radio, tape player, compact disc player, portable music or video player, cellular telephone, tablet computer, laptop computer, stereo, television, musical instrument, or other mechanical or electronic soundmaking device or instrument, which sound emanates from the motor vehicle, so that the sound is plainly audible at a distance of 25 feet or more; or louder than necessary for the convenient hearing by persons inside the vehicle in specified areas.

³ In 2022, the Legislature amended the existing vehicle music statute, which the Florida Supreme Court invalidated in 2012. The Legislature amended statute to make excessive noise statute constitutional and update the language to improve enforcement. Specifically, the bill removed the noise exemption for vehicles used for business or political purposes, which addressed the court's constitutional issue. Further, the bill allowed local authorities to impose more stringent regulations on sound produced by a radio or other mechanical or electronic soundmaking device that emanates from a motor vehicle.

⁴ Rule [15B-13.002, F.A.C.](#), defines plainly audible as any sound produced by a radio, tape player, compact disc player, portable music or video player, cellular telephone, tablet computer, laptop computer, stereo, television, musical instrument, or other mechanical or electronic soundmaking device or instrument, which sound emanates from a motor vehicle, including sound produced by a portable soundmaking device, that can be heard outside the vehicle by a person using his or her normal hearing faculties.

⁵ Communities in other states also use the nuisance standard. A review by the Noise Pollution Clearinghouse of the 491 largest communities in the United States found that 85% of municipalities have a nuisance standard.

⁶ Section [319.141, F.S.](#), directs DHSMV's operation of the Private Rebuilt Vehicle Inspection Program. DHSMV has memorandums of understanding with private sector participants to conduct inspection services for rebuilt vehicles. This includes an examination of the rebuilt vehicle including a determination if airbags were deployed and replaced, receipts for all major vehicle parts, and review of vehicle titles. The statute requires this program to operate in Bay, Broward, Duval, Escambia, Hillsborough, Leon, Manatee, Marion, Miami-Dade, Orange, Palm Beach, and Volusia counties.

⁷ Florida used to require vehicle inspections, but the Legislature eliminated funding for the program in 1981. In 1988, the Legislature created a motor vehicle emissions inspection program focused on six urban counties (Broward, Duval, Hillsborough, Miami-Dade, Palm Beach, and Pinellas); however Florida terminated the program in 2000.

Source: OPPAGA analysis.

AGENCY RESPONSE

In accordance with the provisions of s. 11.51(2), *Florida Statutes*, OPPAGA submitted a draft of this report to the Florida Department of Highway Safety and Motor Vehicles and Department of Environmental Protection for review and response. The Department of Highway Safety and Motor Vehicles' written response is reproduced in Appendix E.

APPENDIX A

Federal Preemption Analysis for Florida’s Statutes Addressing Noise Emissions by Motor Vehicles

Background

Federal Noise Control Act

In 1972, Congress enacted the Noise Control Act (NCA) to protect communities from noise that is harmful to the nation’s health and welfare.⁵¹ While recognizing that the primary responsibility for noise control rests with state and local governments, Congress found that federal action is essential to uniformly address major noise sources in commerce (e.g., transportation vehicles, equipment, and machinery) on a national basis.⁵² To this end, the NCA preempts states and state political subdivisions from adopting or enforcing laws or regulations that set a limit on or a standard for noise emissions that is not identical to the EPA’s noise emission regulations under the act.⁵³

The NCA requires the U.S. Environmental Protection Agency (EPA) to implement the act. The EPA’s responsibilities include identifying major sources of noise, adopting noise emission regulations, and enforcing the act, violations of which are subject to fines and criminal penalties.^{54,55,56} As directed by the act, the EPA adopted regulations between 1974 and 1980 to establish noise emission limits and other standards in the following two categories relevant to this report:

- *New Vehicular Products:* The regulations in 40 C.F.R. part 205 set limits for the noise emissions of the following “new products”: medium and heavy trucks with a gross vehicle weight rating (GVWR) in excess of 10,000 pounds; motorcycles; and motorcycle exhaust systems.^{57,58} To enforce the limits, the regulations require manufacturers, among other things, to design, build, and equip those new products in a manner that will not exceed those limits and to provide certain warranties that the product complies with the new

⁵¹ 42 U.S.C. §§ [4901-4918](#).

⁵² 42 U.S.C. § [4901\(a\)](#).

⁵³ 42 U.S.C. §§ [4905\(e\)](#) and [4917\(c\)](#).

⁵⁴ 42 U.S.C. § [4904\(b\)](#).

⁵⁵ 42 U.S.C. §§ [4905\(a\)\(1\)](#) and [4917\(a\)\(1\)](#) (respectively requiring the EPA to adopt noise emission regulations for certain types of products identified as a major source of noise in categories such as transportation equipment and motors and engines, and for motor carriers engaged in interstate commerce).

⁵⁶ 42 U.S.C. §§ [4909](#) and [4910](#). The NCA also authorizes any person to commence a civil action against a person for a violation of the act and against the EPA for failing to perform any required act or duty under the act. 42 U.S.C. § [4911\(a\)](#).

⁵⁷ “[N]ew product’ means (A) a product the equitable or legal title of which has never been transferred to an ultimate purchaser, or (B) a product which is imported or offered for importation into the United States and which is manufactured after the effective date of a regulation under section 4905 or 4907 of this title which would have been applicable to such product had it been manufactured in the United States.” 42 U.S.C. § [4902\(5\)](#).

⁵⁸ 40 C.F.R. §§ [202.11](#), [205.50\(a\)](#), [205.52\(a\)](#), [205.150\(a\)](#), [205.152\(a\)](#), [205.164\(a\)](#), and [205.166\(a\)](#).

standards.⁵⁹ A manufacturer is prohibited from distributing in commerce any new product that is not in conformity with an applicable EPA regulation.^{60,61}

- *Operating Motor Vehicles:* The regulations in 40 C.F.R. part 202 set limits for the total operating sound produced by the motor vehicles of motor carriers engaged in interstate commerce with a GVWR or gross combination weight rating (GCWR) in excess of 10,000 pounds.⁶² The regulations also specify exhaust system and tire requirements.⁶³

In 1982, the EPA stopped funding for the office that implemented the NCA “as part of a shift in federal noise control policy to transfer the primary responsibility of regulating noise to state and local governments.”⁶⁴ Despite federal funding no longer being available to enforce the NCA, Congress has not repealed the act, so the EPA’s regulations under the NCA remain in effect today as do the act’s preemption provisions.⁶⁵

Florida Motor Vehicle Noise Prevention and Control Act of 1974

Two years after the NCA, the Florida Legislature enacted the “Florida Motor Vehicle Noise Prevention and Control Act of 1974.”⁶⁶ The sections of law created by the act address the same two categories addressed by the EPA’s regulations under the NCA.

- *New Vehicular Products:* Section 403.415(4), *Florida Statutes*, establishes sound level limits for new motor vehicles with a GVWR over 10,000 pounds, school buses, multipurpose passenger vehicles (e.g., sport utility vehicles), and motorcycles. To enforce these limits, the law
 - requires manufacturers of such motor vehicles and others to file a written certificate with the Department of Environmental Protection (DEP) stating that the makes and models of the vehicles listed therein comply with the limits as tested pursuant to procedures adopted by DEP in consultation with the Department of Highway Safety and Motor Vehicles (DHSMV);⁶⁷
 - requires DEP to notify the DHSMV of all makes and models of motor vehicles for which valid certificates have been filed;⁶⁸
 - prohibits persons from selling, offering for sale, or leasing a new motor vehicle that produces a maximum sound level exceeding the limits;⁶⁹

⁵⁹ 42 U.S.C. § 4905(d)(1).

⁶⁰ “[D]istribute in commerce’ means sell in, offer for sale in, or introduce or deliver for introduction into, commerce.” 42 U.S.C. § 4902(8). “The term ‘commerce’ means trade, traffic, commerce, or transportation -- (A) between a place in a State and any place outside thereof, or (B) which affects trade, traffic, commerce, or transportation described in subparagraph (A).” 42 U.S.C. § 4902(7).

⁶¹ 42 U.S.C. § 4909(a)(1).

⁶² 42 U.S.C. § 4917 and 40 C.F.R. §§ 202.12, 202.20, and 202.21.

⁶³ 40 C.F.R. § 202.22 and 202.23.

⁶⁴ *EPA History: Noise and the Noise Control Act*, Environmental Protection Agency (last visited April 30, 2023), <https://www.epa.gov/history/epa-history-noise-and-noise-control-act>.

⁶⁵ *Nottke v. Norfolk S. Ry. Co.*, 486 F. Supp. 3d 1146, 1148 (N.D. Ohio 2020) (stating “Incongruously, the EPA regulations implementing the NCA continue to have an ongoing preemptive effect that prevents state and local governments from adopting adequate noise emission standards. Moreover, without funding, the EPA can neither effectively enforce the current regulations, nor amend or rescind them.”).

⁶⁶ Chapter 74-110, *Laws of Florida*.

⁶⁷ Section 403.415(5) and (6), *F.S.*

⁶⁸ Section 403.415(7), *F.S.*

⁶⁹ Section 403.415(4), *F.S.*

- prohibits the sale or offer for sale of replacement exhaust mufflers, intake mufflers, or other noise abatement devices that, when installed, will cause a motor vehicle to exceed the sound level as originally manufactured and determined by the test procedures for sound level limits;⁷⁰
- requires manufacturers and others to file a written certificate with DEP stating that the noise abatement devices comply with the section for the devices' intended application;⁷¹ and
- requires DEP to advise the DHSMV on the technical aspects of motor vehicle noise enforcement regulations, assist in the training of enforcement officers, and administer a sound-level meter loan program for local enforcement agencies.⁷²

To ensure the law applies uniformly throughout the state, subsection (10) preempts local authorities from enacting or enforcing any ordinance on a matter covered by the section unless expressly authorized.

- *Operating Motor Vehicles:* Section 316.293, *Florida Statutes*, establishes sound level limits for the total noise of vehicles in the following categories: motorcycles, other than motor-driven cycles; motor vehicles with a GVWR or GCWR of 10,000 pounds or more; and motor-driven cycles and any other motor vehicle not included in the two previous categories.^{73,74} To enforce these limits, the law
 - prohibits the operation of motor vehicles in a manner that generates sound levels in excess of the sound limits;⁷⁵
 - requires DEP, in consultation with the DHSMV, to adopt measurement procedures to determine compliance with the sound level limits;⁷⁶
 - prohibits the modification of an exhaust system or other noise abatement device of a motor vehicle operated on the highways of this state in such a manner that the noise emitted by the motor vehicle is above that emitted by the vehicle as originally manufactured;⁷⁷
 - prohibits operating a motor vehicle upon the highways of the state with an exhaust system or noise-abatement device unlawfully modified;⁷⁸ and
 - provides that a violation of the section is a noncriminal traffic infraction, punishable as a nonmoving violation under Ch. 318, *Florida Statutes*.⁷⁹ Preemption Analysis for ss. 403.415 and 316.293, *Florida Statutes*

⁷⁰ Section [403.415\(8\)](#), *F.S.*

⁷¹ *Id.*

⁷² Section [403.415\(9\)](#), *F.S.*

⁷³ Section [316.293\(2\)](#), *F.S.*

⁷⁴ Certain emergency vehicles, motor vehicles engaged in certain competitive sport events or in a manufacturer's engineering, design, or equipment test, and construction or agricultural equipment are exempted from the section of law. Section [316.293\(6\)](#), *F.S.*

⁷⁵ Section [316.293\(2\)](#), *F.S.*

⁷⁶ Section [316.293\(3\)](#), *F.S.*

⁷⁷ Section [316.293\(5\)\(a\)](#), *F.S.*

⁷⁸ Section [316.293\(5\)\(b\)](#), *F.S.*

⁷⁹ Section [316.293\(7\)](#), *F.S.* The penalty for a nonmoving violation is \$30. Section [318.18\(2\)](#), *F.S.* Additionally, a violation of the noise abatement device prohibitions in s. [316.293\(5\)](#), *F.S.*, is subject to an additional fine of \$200 for a first offense and \$500 for a second or subsequent offense. Section [318.18\(23\)](#), *F.S.*

Florida's laws regulating motor vehicle noise emissions apply to a wide variety of motor vehicle and exhaust system types, which by definition include motor vehicle and exhaust system types that are subject to the EPA's noise emission regulations. The Florida limits for motor vehicle noise emissions are not identical to the EPA's regulations; thus, it is necessary to determine the extent to which the provisions may be preempted by the NCA.

The following discussion provides an overview of the NCA's preemption provisions and sets forth a preemption analysis for ss. 403.415 and 316.293, *Florida Statutes*. Appellate courts have not considered whether or to what extent Florida's motor vehicle noise emission laws are preempted by the NCA; thus, this issue is a question of law that is undecided by the courts and this analysis is strictly theoretical.⁸⁰

Preemption Analysis

Section 403.415, Florida Statutes – New Vehicular Products

For new vehicular products subject to the EPA's noise emission regulations, the NCA prohibits states and state political subdivisions from adopting or enforcing any law or regulation setting a limit on noise emissions from such product, or component thereof, which is not identical to the EPA's regulation. The act also recognizes that the state and state political subdivisions may "establish and enforce controls on environmental noise (or one or more sources thereof) through the licensing, regulation, or restriction of the use, operation, or movement of any product or combination of products."⁸¹

Also relevant to the federal preemption provisions is language in the Florida Statutes. When this language was first enacted in 1975 and 1976, the EPA was in the process of adopting regulations for the noise emissions of new vehicular products. Recognizing the EPA's actions, the Legislature provided in

- s. 403.415(2)(b), *Florida Statutes*, that "It is also the intent of the Legislature to recognize the proposed United States Environmental Protection Act Noise Commission Standards Regulations for medium and heavy-duty trucks as being the most comprehensive available and in the best interest of Florida's citizenry and, further, that such regulation shall preempt all state standards not identical to such regulation."⁸²
- s. 403.4153, *Florida Statutes*, that "On and after the date of promulgation of noise emission standards by the administrator of the United States Environmental Protection Agency for a class of new motor vehicles as described in s. 403.415(4)(a) or (b), the state sound level limits in effect at that time for that class of vehicles shall be maintained until the federal standards become effective."⁸³

To analyze the provisions of s. 403.415, *Florida Statutes*, as to federal preemption, Exhibit A-1 lists the maximum sound levels that may be generated by new vehicular products under the

⁸⁰ Likely due to the defunding of the EPA office that implemented the NCA in 1982, very few appellate cases exist in other jurisdictions that address federal preemption by the NCA as it relates to new vehicular products and operating motor vehicles. The few cases located during OPPAGA's review were not relevant to the preemption analysis in this appendix.

⁸¹ 42 U.S.C. § 4905(e).

⁸² Chapter 75-59, s. 1, *Laws of Florida*.

⁸³ Chapter 76-289, s. 2, *Laws of Florida*.

EPA's regulations and the maximum sound levels for the corresponding new vehicular products under s. 403.415(a) and (b), *Florida Statutes*. The exhibit also states whether enforcement of the state law as to certain types of motor vehicles appears to be preempted by the NCA.

During its review, OPPAGA asked DEP officials to identify whether any of the provisions of s. 403.415, *Florida Statutes*, are subject to federal preemption. The officials responded that the entire section of law is preempted; however, under OPPAGA's analysis, the section appears to remain in force for certain types of new vehicular products.

In sum, Exhibit A-1 shows that the provisions of s. 403.415, *Florida Statutes*,

- appear to be preempted as to motor vehicles with a GVWR over 10,000 pounds and appear at least partially preempted as to motorcycles; and
- appear to not be preempted as to school buses and multipurpose passenger vehicles.

Exhibit A-1

Enforcement of s. 403.415, *Florida Statutes*, as to Certain Types of Motor Vehicles Appears to be Preempted by the Federal Noise Control Act

Federal New Vehicular Products Distributed in Commerce	Federal Maximum Sound Level That May Be Generated by the Product	State New Vehicular Products	State Maximum Sound Level That May Be Generated by the Product Under s. 403.415(a) and (b), <i>F.S.</i>	Is the Enforcement of State Law Preempted by the NCA?
Medium and heavy trucks having a gross vehicle weight rating in excess of 10,000 pounds (excludes buses and certain special purpose equipment) ^{1,2,3}	Manufactured after <ul style="list-style-type: none"> ▪ January 1, 1979 – 83 dB A; or ▪ January 1, 1988 – 80 dB A⁴ 	Motor vehicles with a GVWR over 10,000 pounds ^{5,6}	Manufactured <ul style="list-style-type: none"> ▪ from January 1, 1973, to December 31, 1976 – 86 dB A; or ▪ thereafter – 83 dB A⁷ 	Appears to be preempted because the state law sets limits that are not identical to the federal regulations and due to the text of ss. 403.415(2)(b) and 403.4153, <i>F.S.</i>
School buses exempted; multipurpose passenger vehicles not addressed	Not addressed	School buses and multipurpose passenger vehicles (e.g., sport utility vehicles) ⁸	Same as above ⁹	Does not appear to be preempted because school buses are exempted and multipurpose passenger vehicles are not addressed by the federal regulations.
Street Motorcycles and Off-Road Motorcycles With Engine Displacements of 170 cc or Lower ^{10,11}	Manufactured during or after the <ul style="list-style-type: none"> ▪ 1983 model year – 83 dB A; or ▪ 1986 model year – 80 dB A¹² 	Motorcycles (excludes mopeds) ¹³	Manufactured <ul style="list-style-type: none"> ▪ from January 1, 1973, to December 31, 1974 – 86 dB A; or ▪ thereafter – 83 dB A¹⁴ 	Appears to be at least partially preempted because the state law sets limits for motorcycles that are not identical to the federal regulations and due to the text of s. 403.4153, <i>F.S.</i> If types of motorcycles exist that would be subject to the state law, but not to the federal regulations, the state law would not be preempted as to those types of motorcycles.
Off-Road Motorcycles With Engine Displacements Greater Than 170 cc	Manufactured during or after the <ul style="list-style-type: none"> ▪ 1983 model year – 86 dB A; or ▪ 1986 model year – 82 dB A¹⁵ 			
Moped-Type Street Motorcycles ¹⁶	Manufactured during or after the 1983 model year – 70 dB A ¹⁷	Not addressed	Not addressed	Not applicable
Street, Off-Road Motorcycles, and Moped-Type Motorcycle Replacement Exhaust Systems or Components Thereof ¹⁸	When installed, must not cause the motorcycle to exceed the maximum sound levels applicable to the motorcycle when new. ¹⁹	Replacement exhaust mufflers, intake mufflers, or other noise abatement devices for motorcycles subject to the section's sound level limits. ²⁰	When installed, the product must not cause a motor vehicle to exceed the sound level as originally manufactured and determined by the test	Appears to be at least partially preempted because the state law sets limits for motorcycles that are not identical to the federal regulations and due to

Federal New Vehicular Products Distributed in Commerce	Federal Maximum Sound Level That May Be Generated by the Product	State New Vehicular Products	State Maximum Sound Level That May Be Generated by the Product Under s. 403.415(a) and (b), <i>F.S.</i>	Is the Enforcement of State Law Preempted by the NCA?
			procedures for the sound level limits established under the section. ²¹	the text of s. 403.4153, <i>F.S.</i> If types of motorcycles exist that would be subject to the state law, but not to the federal regulations, the state law would not be preempted as to those types of motorcycles.
Not addressed	Not addressed	Replacement exhaust mufflers, intake mufflers, or other noise abatement devices for motor vehicles with a GVWR over 10,000 pounds, school buses, and multipurpose passenger vehicles, which are subject to the section's sound level limits. ²²	When installed, the product must not cause a motor vehicle to exceed the sound level as originally manufactured and determined by the test procedures for the sound level limits established under the section. ²³	Appears to be preempted as vehicles with a GVWR over 10,000 pounds because the state law sets sound level limits that are not identical to the federal regulations and due to the text of ss. 403.415(2)(b) and 403.4153, <i>F.S.</i> Does not appear to be preempted as to school buses and multipurpose passenger vehicles because these vehicle types are not addressed by the federal regulations.

¹ "Gross Vehicle Weight Rating (GVWR) means the value specified by the manufacturer as the loaded weight of a single vehicle." 40 C.F.R. § 205.51(a)(15).

² A new medium or heavy truck refers to a "vehicle" defined as "any motor vehicle, machine or tractor, which is propelled by mechanical power and capable of transportation of property on a street or highway and which has a GVWR in excess of 10,000 pounds and a partially or fully enclosed operator's compartment." 40 C.F.R. § 205.51(29).

³ 40 C.F.R. § 205.50.

⁴ 40 C.F.R. § 202.52(a).

⁵ "Motor vehicle" means any vehicle which is self-propelled and any vehicle which is propelled by electric power obtained from overhead trolley wires, but not operated upon rails." Section 403.415(3)(d), *F.S.*

⁶ The definition in the state statute for "GVWR" is identical to the federal definition in for that term in 40 C.F.R. § 205.51(a)(15). Section 403.415(3)(c), *F.S.*

⁷ Section 403.415(4)(b), *F.S.*

⁸ "Multipurpose passenger vehicle" means "a motor vehicle with motive power designed to carry 10 persons or less and constructed either on a truck chassis or with special features for occasional off-road operation." Section 403.415(4)(b), *F.S.*

⁹ *Id.*

¹⁰ In relevant part, a “[s]treet motorcycle means: (i) Any motorcycle that: (A) With an 80 kg (176 lb) driver, is capable of achieving a maximum speed of at least 40 km/h (25 mph) over a level paved surface; and (B) Is equipped with features customarily associated with practical street or highway use, such features including but not limited to any of the following: stoplight, horn, rear view mirror, turn signals: . . .” 40 C.F.R. § [205.151\(a\)\(2\)\(i\)](#).

¹¹ “Off-road motorcycle means any motorcycle that is not a street motorcycle or competition motorcycle.” 40 C.F.R. § [205.151\(a\)\(4\)](#).

¹² 40 C.F.R. § [205.152\(a\)\(1\)\(i\) and \(2\)\(i\)](#).

¹³ “‘Motorcycle’ means any motor vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground, including an autocytle, as defined in s. 316.003, and excluding a vehicle in which the operator is enclosed by a cabin unless it meets the requirements set forth by the National Highway Traffic Safety Administration for a motorcycle. The term ‘motorcycle’ does not include a tractor or a moped.” Section [403.415\(3\)\(e\)](#), F.S.

¹⁴ Section [403.415\(4\)\(a\)](#), F.S.

¹⁵ 40 C.F.R. § [205.152\(a\)\(2\)\(ii\)](#).

¹⁶ In relevant part, a “moped-type street motorcycle” means: “. . . (ii) Any motorcycle that: (A) Has an engine displacement less than 50 cubic centimeters; (B) Produces no more than two brake horse power; (C) With a 80 kg (176 lb) driver, cannot exceed 48 km/h (30 mph) over a level paved surface.” 40 C.F.R. §§ [205.151\(a\)\(2\)\(ii\)](#) and [205.152\(a\)\(1\)\(ii\)](#).

¹⁷ 40 C.F.R. § [205.152\(a\)\(1\)\(ii\)](#).

¹⁸ 40 C.F.R. § [205.164\(a\)](#).

¹⁹ 40 C.F.R. § [205.166\(a\)](#).

²⁰ Section [403.415\(8\)\(a\)](#), F.S.

²¹ *Id.*

²² *Id.*

²³ *Id.*

Source: OPPAGA analysis of federal laws and regulations and Florida laws and rules relating to motor vehicle noise emissions.

Section 316.293, Florida Statutes – Operating Motor Vehicles

For the operating motor vehicles of interstate motor carriers subject to the EPA’s noise emission regulations, the NCA prohibits states and state political subdivisions from adopting or enforcing any noise emission standard for the operation of such vehicles that is not identical to the relevant EPA standards. The act also recognizes that the state and state political subdivisions may “establish and enforce standards or controls on levels of environmental noise, or to control, license, regulate, or restrict the use, operation, or movement of any product if the Administrator [of the EPA] . . . determines that such standard, control, license, regulation, or restriction is necessitated by special local conditions and is not in conflict with regulations promulgated under this section.”⁸⁴

To analyze the provisions of s. 316.293, *Florida Statutes*, as to federal preemption, Exhibit A-2 lists the federal noise emission standards for the operating motor vehicles of interstate motor carriers and the corresponding standards set forth for operating motor vehicles in state law. The exhibit also states whether enforcement of the state law as to certain types of motor vehicles appears to be preempted by the NCA.

In sum, the exhibit shows that the provisions of s. 316.293, *Florida Statutes*,

- appear to be at least partially preempted as to motor vehicles with a GVWR or GCWR of 10,000 pounds or more and as to the exhaust systems of such motor vehicles; and
- appear not to be preempted as to all vehicle types other than motor vehicles with a GVWR or GCWR of 10,000 pounds or more.

⁸⁴ 42 U.S.C. § [4917\(c\)](#).

Exhibit A-2

Enforcement of s. 316.293, *Florida Statutes*, as to Certain Types of Motor Vehicles Appears to be Preempted by the Federal Noise Control Act

Federal Operating Motor Vehicles	Federal Noise Emission Standards	State Operating Motor Vehicles	State Noise Emission Standards	Is the Enforcement of State Law Preempted by the NCA?
<p>Motor vehicles of motor carriers engaged in interstate commerce with a gross vehicle weight rating or gross combination weight rating in excess of 10,000 pounds^{1,2, 3, 4, 5}</p>	<p>For highway operation, may not generate a total sound level more than the following:</p> <ul style="list-style-type: none"> ▪ Speed limit ≤ 35 mph: 86 dB A if manufactured before the 1986 model year or 83 dB A if manufactured thereafter; and ▪ Speed limit > 35 mph: 90 dB A if manufactured before the 1986 model year or 87 dB A if manufactured thereafter.⁶ <p>For stationary operation, may not generate a total sound level more than the following:</p> <ul style="list-style-type: none"> ▪ Speed limit ≤ 35 mph: 86 dB A if manufactured before the 1986 model year or 83 dB A if manufactured thereafter. ▪ Speed limit > 35 mph: 90 dB A if manufactured before the 1986 model year or 87 dB A if manufactured thereafter.⁷ 	<p>Motor vehicles with a GVWR or GCWR of 10,000 pounds or more.^{8,9}</p>	<p>On or after January 1, 1975, may not generate a sound level in excess of the following:</p> <ul style="list-style-type: none"> ▪ Speed limit ≤ 35 mph: 86 dB A; and ▪ Speed limit > 35 mph: 90 dB A.¹⁰ 	<p>Appears to be at least partially preempted because the state standards are not identical to the federal regulations. If motor vehicles in this category exist that would be subject to the state law, but not to the federal regulations, the state law would not be preempted as to those vehicles.</p>
<p>Not addressed</p>	<p>Not addressed</p>	<p>Motorcycles, other than motor-driven cycles^{11,12}</p>	<p>Before January 1, 1979, may not generate a sound level in excess of the following:</p> <ul style="list-style-type: none"> ▪ Speed limit ≤ 35 mph: 82 dB A; and ▪ Speed limit > 35 mph: 86 dB A. 	<p>Does not appear to be preempted because motorcycles are not addressed by the federal regulations.</p>

Federal Operating Motor Vehicles	Federal Noise Emission Standards	State Operating Motor Vehicles	State Noise Emission Standards	Is the Enforcement of State Law Preempted by the NCA?
			<p>On or after January 1, 1979, may not generate a sound level in excess of the following:</p> <ul style="list-style-type: none"> ▪ Speed limit ≤ 35 mph: 78 dB A; and ▪ Speed limit > 35 mph: 82 dB A.¹³ 	
Not addressed	Not addressed	Motor-driven cycles and any other motor vehicle not included in s. 316.193(2)(a) or (b), <i>F.S.</i>	<p>Before January 1, 1979, may not generate a sound level in excess of the following:</p> <ul style="list-style-type: none"> ▪ Speed limit ≤ 35 mph: 76 dB A; and ▪ Speed limit > 35 mph: 82 dB A. <p>On or after January 1, 1979, may not generate a sound level in excess of the following:</p> <ul style="list-style-type: none"> ▪ Speed limit ≤ 35 mph: 72 dB A; and ▪ Speed limit > 35 mph: 79 dB A.¹⁴ 	Does not appear to be preempted because these vehicle types are not addressed by the federal regulations.
Exhaust systems of motor vehicles of motor carriers engaged in interstate commerce with a GVWR or GCWR in excess of 10,000 pounds ¹⁵	The exhaust system must be (a) free from defects which affect sound reduction; (b) equipped with a muffler or other noise dissipative device; and (c) not equipped with any cut-out, bypass, or similar device. ¹⁶	Exhaust systems or other noise abatement devices of Motor vehicles with a GVWR or GCWR of 10,000 pounds or more.	<p>Prohibits modifying an exhaust system or other noise-abatement devices for a motor vehicle operated on this state's highways such that the noise emitted by the motor vehicle exceeds the noise emitted by the vehicle as originally manufactured.</p> <p>Prohibits operating a motor vehicle on this state's highways with an unlawfully modified</p>	Appears to be at least partially preempted because the state standards are not identical to the federal regulations. If motor vehicles in this category exist that would be subject to the state law, but not to the federal regulations, the state law would not be preempted as to those vehicles.

Federal Operating Motor Vehicles	Federal Noise Emission Standards	State Operating Motor Vehicles	State Noise Emission Standards	Is the Enforcement of State Law Preempted by the NCA?
			exhaust system or noise-abatement device. ¹⁷	
Not addressed	Not addressed	Exhaust systems or other noise abatement devices of all other motor vehicles.	Same as above	Does not appear to be preempted because the devices for all other vehicle types are not addressed by the federal regulations.

¹ “Motor vehicle means any vehicle, machine, tractor, trailer, or semitrailer propelled or drawn by mechanical power and used upon the highways in the transportation of passengers or property, or any combination thereof, but does not include any vehicle, locomotive, or car operated exclusively on a rail or rails.” 40 C.F.R. § [202.10\(m\)](#).

² “Motor carrier means a common carrier by motor vehicle, a contract carrier by motor vehicle, or a private carrier of property by motor vehicle as those terms are defined by paragraphs (14), (15), and (17) of section 203(a) of the Interstate Commerce Act [49 U.S.C. 303(a)].” 40 C.F.R. § [202.10\(f\)](#).

³ “Interstate commerce means the commerce between any place in a State and any place in another State or between places in the same State through another State, whether such commerce moves wholly by motor vehicle or partly by motor vehicle and partly by rail, express, water or air. This definition of ‘interstate commerce’ for purposes of these regulations is the same as the definition of ‘interstate commerce’ in section 203(a) of the Interstate Commerce Act. [49 U.S.C. 303(a)]” 40 C.F.R. § [202.10\(k\)](#).

⁴ “Gross Vehicle Weight Rating (GVWR) means the value specified by the manufacturer as the loaded weight of a single vehicle.” 40 C.F.R. § [202.10\(h\)](#). “Gross Combination Weight Rating (GCWR) means the value specified by the manufacturer as the loaded weight of a combination vehicle.” 40 C.F.R. § [202.10\(i\)](#).

⁵ 40 C.F.R. §§ [202.11](#) and [202.12\(a\) and \(b\)](#).

⁶ 40 C.F.R. §§ [202.12\(a\)-\(c\), \(f\), and \(g\)](#) and [202.20](#).

⁷ 40 C.F.R. §§ [202.12\(a\)-\(c\), \(f\), and \(g\)](#) and [202.21](#).

⁸ “Motor vehicle” means “Except when used in s. 316.1001, a self-propelled vehicle not operated upon rails or guideway, but not including any bicycle, electric bicycle, motorized scooter, electric personal assistive mobility device, mobile carrier, personal delivery device, swamp buggy, or moped. For purposes of s. 316.1001, ‘motor vehicle’ has the same meaning as provided in s. 320.01(1)(a).” Section [316.003\(46\)](#), *F.S.*

⁹ The definitions under state law for GVWR and GCWR are identical to the federal definitions for those terms. Section [316.293\(1\)\(c\) and \(b\)](#), *F.S.* and 40 C.F.R. § [202.10\(h\) and \(i\)](#).

¹⁰ Section [316.293\(2\)\(b\)](#), *F.S.*

¹¹ “Motorcycle” means “[a]ny motor vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground. The term includes an auticycle, but does not include a tractor, a moped, an electric bicycle, or any vehicle in which the operator is enclosed by a cabin unless it meets the requirements set forth by the National Highway Traffic Safety Administration for a motorcycle.” s. [316.003\(47\)](#), *F.S.*

¹² A definition for “motor-driven cycle” does not appear in the Florida Statutes.

¹³ Section [316.293\(2\)\(a\)](#), *F.S.*

¹⁴ Section [316.293\(2\)\(c\)](#), *F.S.*

¹⁵ “Exhaust system means the system comprised of a combination of components which provides for enclosed flow of exhaust gas from engine parts to the atmosphere.” 40 C.F.R. § [202.10\(f\)](#).

¹⁶ 40 C.F.R. § [202.22](#).

¹⁷ Section [316.293\(5\)](#), *F.S.*

Source: OPPAGA analysis of federal laws and regulations and Florida laws and rules relating to motor vehicle noise emissions.

APPENDIX B

Literature Review Summaries

Literature supports adverse effects of excessive noise exposure on health and quality of life. Academic studies reported associations between excessive noise exposure and cardiovascular disease and annoyance among adults. For example, chronic exposure to environmental noise can cause health problems such as hypertension and heart disease in adults. In addition, both men and women self-reported high or extreme annoyance due to environmental noise. Less research is available regarding the effects of noise exposure on health and quality of life in children and on pregnancy outcomes; therefore, further research is needed in these areas.

Some researchers recommend maximum noise levels to avoid health and quality of life issues. To avoid adverse health effects and promote well-being, researchers recommend certain sound levels from road traffic noise in residential areas. For example, one 2006 paper concluded that residential environmental noise should not exceed 45 dB to obtain an extremely healthy environment for residents. According to researchers, when there is a quieter side of the house, the loud side of the house should not exceed 60 decibels for most people. In 1974, the U.S. Environmental Protection Agency (EPA) recommended that an average 24-hour exposure limit of 55 dB in outdoor areas should be followed. Furthermore, to prevent long-term noise induced hearing loss, the EPA recommends a second exposure limit of 70 dB over 24 hours.

There are research gaps and limitations in research on the effect of noise on health and quality of life. There is limited research, especially pertaining to children and pregnancy outcomes. Specifically, existing literature lacks substantive research and longitudinal data on adverse health effects in children and pregnancy outcomes due to environmental noise exposure and air pollution.

Exhibit B-1 presents an overview of literature reviews examining the effects of noise on health or quality of life. Studies are presented in chronological order.

Exhibit B-1

Literature Review on the Effect of Noise on Health or Quality of Life

Study	Measured Outcome	Sample Size or Number of Studies	Methods	Findings
Stansfeld, Stephan and Mark Matheson. "Noise Pollution: Non-auditory effects on health." <i>British Medical Bulletin</i> . Vol. 68: 243–257, 2003	The effects of noise, defined as unwanted sound, on health and quality of life	Review of 86 articles published in 2003 or earlier	Literature review	<p>This study reviewed the effect of noise on several health and quality of life indicators.</p> <ul style="list-style-type: none"> • Annoyance has the most evidence and is the most common result of both traffic and aircraft noise in both adults and children. This includes feelings of fear, anger, and belief that a person is avoidably harmed. • In occupational settings, there is evidence that noise adversely affects blood pressure. Multiple studies report that continuous exposure to noise at 85 dB A or higher have higher blood pressure than others not exposed to noise. In 2003, there was some evidence that noise exposure in the community (e.g., from an airport) relates to hypertension and coronary heart disease. • There were inconsistent results from studies on the effect of noise on endocrine response, such as increased levels of adrenaline, noradrenaline, and cortisol. In children, there was evidence of noise causing increased adrenaline and noradrenaline, but not cortisol. • There was not a relationship found between noise and psychiatric disorders, even though it was believed that noise could lead to annoyance and more serious mental health effects. Instead, authors state that noise increased annoyance and a psychiatric disorder could also increase annoyance, independently of noise. • For primary school aged children, noise has a negative effect on sustained attention, visual attention, concentration, speech perception, memory processing, reading ability, and standardized test scores.
Ohrstrom, E., A. Skanberg, H. Svensson, and A. Gidlof-Gunnarsson. "Effects of road traffic noise and the benefit of access to quietness." <i>Journal of Sound and Vibration</i> . Vol 295: 40–59, 2006	Perceived adverse health effects of noise on annoyance, sleep, well-being, and relaxation	956 people	Cross-sectional field study from 2000 to 2002 in Sweden; researchers used a questionnaire to assess health and well-being effects and collected sound levels from road traffic	<p>Researchers found quality of life improvements when people have access to a quieter and noise-shielded indoor and outdoor side of their home. When measuring annoyance, more respondents reported feeling annoyed at higher levels of noise. Annoyance varied between those with a quiet side of the home compared to those without a quiet side. Specifically, at a sound level of 53–57 dB, 11% of respondents reported annoyance when having access to a quieter side and 22% reported annoyance with no access. At 63–68 dB, this changes to 38% and 57% respectively. Additionally, researchers found statistically significant increases in symptoms of tiredness, stress, irritation, anger, and preferring to be alone in the noisiest homes compared to the least noisy homes.</p> <p>Activities and sleep were also affected by noise levels. Activities including not being able to keep the windows open, relaxation, listening to the television or radio, and communication all became worse as the noise levels increased. Respondents with access to a quieter side of their home reported fewer issues with these four activities. Issues with sleeping measures, including falling asleep, waking up, and sleep quality, became more common with higher noise levels.</p> <p>Researchers conclude that a healthy residential environment has noise levels are below 45 dB. Additionally, access to a quieter side of a home improves perceived health effects. For most people, the loud side of the home should not have a noise level greater than 60 dB when there is a quieter side available. For homes in loud areas, shielding (constructing non-residential buildings) and sound barriers can be used to create a better noise environment.</p>
Goines, Lisa and Louis Hagler. "Noise Pollution: A Modern	N/A	N/A	Qualitative review article	<p>This article contains findings on several different topics. First, it defines noise as unwanted sound. With environmental noise defined as all the unwanted sounds in our communities except those that originate in the workplace. Second, it includes a brief history of approaches to noise in the United States. It begins with the</p>

Study	Measured Outcome	Sample Size or Number of Studies	Methods	Findings
Plague.” <i>Southern Medical Journal</i> . Vol. 100, No. 3, 2007				<p>premise that domestic tranquility if one of the guarantees of the United States Constitution and included in many state constitutions.</p> <p>The article also contains summaries of health and quality of life effects that are similar to other articles in this review, including hearing impairment, interference with spoken communication, sleep disturbances, cardiovascular issues, impaired task performance, and negative social behavior and annoyance. Steps to improve noise could include improved methods of local control including public education, legislation, and active enforcement of noise ordinances by law enforcement.</p>
Van Kempen, Elise and Wolfgang Babisch. “The Quantitative Relationship Between Road Traffic Noise and Hypertension: A Meta-analysis.” <i>Journal of Hypertension</i> . Vol. 30: 1075–1086, 2012	The effect of exposure to road noise on hypertension	27 observational studies published between 1970 and 2010 in English, Dutch, or German. Data from 24 of the studies was aggregated	Meta-analysis (statistical analysis combining data from several studies)	<p>This review analyzed the effect of road noise on hypertension. Due to the fact that most vehicles create noise, road noise is one of the most important sources of noise in the community. Results show a statistically significant relationship between road noise exposure and hypertension. Furthermore, when reviewing results between 45–75 dB, results show that risk of hypertension increases 3.4% with every increase of 5 dB. Additionally, the meta-analysis found that men may have greater risk of hypertension.</p> <p>To put road traffic noise in context, the relationship between road noise and hypertension is weaker than the relationship between aircraft noise and hypertension, which was found to have a 6% increase in risk for every 5 dB. Researchers state that aircraft noise has a stronger relationship with hypertension due to its intensity, location of the source, and the variability and unpredictability of the noise. Researchers also point out that this is consistent with another study that found people reported aircraft noise is more annoying than road noise.</p> <p>Researchers also discuss the biological mechanisms for the effect of road noise on hypertension. Many studies conclude that noise is a physiological stressor, which leads to responses such as increased blood pressure and hypertension. Another possible mechanism is that noise is a psychological stressor, leading to annoyance, which could lead to disease; however, a small number of studies have examined the effect of annoyance from noise and disease prevalence.</p>
Clark, Charlotte, Rosanna Crombie, Jenny Head, Irene van Kamp, Elise van Kempen, and Stephen A. Stansfeld. “Does Traffic-related Air Pollution Explain Associations of Aircraft and Road Traffic Noise Exposure on Children’s Health and	Relationship between aircraft noise and air pollution and traffic noise and air pollution on children’s health and cognition	719 children ages 9 to 10 years across 22 schools near London’s Heathrow airport in the United Kingdom	Secondary analysis, including descriptive statistics and regression modeling, of the Road Traffic and Aircraft Noise Exposure and Children’s Cognition and Health (RANCH) project	<p>At the time of this 2012 article, over 20 studies found a negative relationship between environmental noise, including air and road noise, on reading abilities and memories of children; however, few studies examined how air pollution affected this relationship. This study used data and results from a prior study on aircraft and road noise to determine if air pollution has an effect on children’s health and cognition.</p> <p>The 2005 RANCH study found that aircraft noise at school affected reading comprehension and recognition memory. Exposure to road noise did not have a negative effect on health or cognition. Neither aircraft nor road noise had negative outcomes related to working memory, psychological distress, or self-reported health.</p> <p>This study examined the relationship between aircraft noise, road noise, and air pollution, while accounting for other factors that could affect the outcomes, including age, gender, parental employment status, and support for schoolwork, classroom window glazing, and other factors. After accounting for these factors and air pollution, researchers still found that aircraft noise has a statistically significant negative association on reading comprehension, recognition memory, information recall, and conceptual recall. Like in the prior study, there were no significant effects of road noise on health or cognition.</p>

Study	Measured Outcome	Sample Size or Number of Studies	Methods	Findings
Cognition? A Secondary Analysis of the United Kingdom Sample From the RANCH Project." <i>American Journal of Epidemiology</i> . Vol. 176, No. 4, 2012				Researchers bring up several discussion points on the findings. Due to the fact that air pollution is not contributing towards the poor cognition outcomes of children exposed to aircraft noise, it raises concerns on the influence of this type of noise for children. Other studies have found some associations between air pollution and cognition, including on vocabulary, attention, and memory after accounting for socioeconomic factors; however, the difference could be due to different levels of air pollution or the home environment.
Gehring, Ulrike, Lillian Tamburic, Hind Sbihi, Hugh W. Davies, and Michael Brauer. "Impact of Noise and Air Pollution on Pregnancy Outcomes." <i>Epidemiology</i> . Vol. 25, No. 3: 351-358, 2014	Environmental noise on small size for gestational age, preterm birth, term birth weight, and low birth weight at term	68,238 births in Vancouver, British Columbia, Canada between 1999 and 2002	Statistical analysis including a deterministic modeling software to estimate environmental noise at each subject's home and regression models to determine pregnancy effects	There are few studies on the association between environmental noise and pregnancy outcomes. This study examined a large sample to determine the effect on environmental noise on pregnancy outcomes. Researchers accounted for other factors using available data that could affect pregnancy outcomes, including sex, parity, and the month/year of birth, maternal age at delivery, maternal smoking, neighborhood-level income quintiles, and maternal education quartiles. The results show a negative effect of road noise on small size for gestational age, term birth weight, and term low birth weight. There were no effects of road noise on preterm birth. While there is an effect of road noise on pregnancy outcomes, the biological mechanisms for why this occurs are undetermined. Possible mechanisms include stress, sleep disturbance, and increased blood pressure.
Hammer, Monica S., Tracy K. Swinburn, and Richard L. Neitzel. "Environmental Noise Pollution in the United States: Developing an Effective Public Health Response." <i>Environmental Health Perspectives</i> . Vol. 122, No. 2, 2014	The health effects associated with noise, or unwanted sound	Review of 64 articles	Commentary	<p>This study aimed to describe the most serious health effects associated with noise. In the United States, the primary sources of environmental noise include road and rail traffic, air transportation, and occupational and industrial activities. Various studies have found that chronic environmental noise causes a wide variety of adverse health effects such as, sleep disturbance, annoyance, noise-induced hearing loss, cardiovascular disease, endocrine effects, and increased incidence of diabetes. Specifically, this study found the following adverse health effects.</p> <ul style="list-style-type: none"> • Although people in noisy environments experience a subjective habituation to noise, their cardiovascular system does not habituate. Instead, the cardiovascular system experiences activations of the sympathetic nervous system, which changes from deep sleep to lighter stage of sleep in response to noise. Increase in blood pressure and disruptions in cardiovascular circadian rhythms is caused by decrease in quality and quantity of sleep. • Heart disease is casually related to atherosclerosis, which is caused by increased heart rate, blood pressure, and stress levels from excessive noise.¹ • Long-term exposures to noise may cause an increased inability to perceive sound and can cause metabolic changes in sensory hair cells, which are crucial for hearing, leading to their demise. • Behavioral problems and stress in children due to noisy environments result in poor school performance, decreased learning, lower reading comprehension, and concentration deficits. Children

Study	Measured Outcome	Sample Size or Number of Studies	Methods	Findings
				with noise-induced hearing loss experience lower self-esteem, score significantly lower on basic skills, and exhibit impaired social-emotional development.
Munzel, Thomas, Tommaso Gori, Wolfgang Babisch, and Mathias Basner. "Cardiovascular Effects of Environmental Noise Exposure." <i>European Heart Journal</i> . Vol. 35: 829–836, 2014	The relationship between environmental noise exposure and cardiovascular health effects	Review of 95 articles	Literature review	<p>This review focused on the cardiovascular consequences of environmental noise exposure across 90 studies and has several findings detailed below.</p> <p>In both laboratory settings where traffic noise was simulated and in real-life environments, acute noise exposure can cause increases in blood pressure, heart rate, and cardiac output, likely mediated by the release of stress hormones.</p> <ul style="list-style-type: none"> • Sleep disturbance is considered the most severe non-auditory effect of environmental noise exposure because epidemiologic studies have shown that habitual short sleep less than six hours per night is associated with cardiovascular disease, hypertension, diabetes, and obesity.² • Several studies on chronic exposure to environmental noise found a relationship with elevated blood pressure, hypertension, ischaemic heart disease, and other health effects. • Further several studies found effects related to hypertension. <ul style="list-style-type: none"> ○ A study reported a statistically significant relationship between road traffic noise and the incidence of hypertension with noise exposure per 10 dB increase. However, an updated meta-analysis of 12 studies reported an increase in hypertension risk per 10 dB increase of environmental noise, but the results were not statistically significant. ○ Two studies found statistically significant associations between road traffic noise and hypertension in people ages 45–55. ○ In a Danish cohort study, results indicated a statistically significant higher systolic blood pressure per 10 dB increase of the road traffic noise level in middle-aged subjects, and stronger associations in men and older subjects. ○ The Hypertension and Exposure to Noise near Airports study found that road traffic noise was linked to hypertension in men but not in women. <p>Researchers conclude that a number of factors modify the impact of noise on health. Exposure-modifying factors include location of rooms, the quality of sound insulation, and other behavioral risk factors.</p>
Aluko, Esther O. and Victor U. Nna. "Impact of Noise Pollution on Human Cardiovascular System." <i>International Journal of Tropical Disease & Health</i> . Vol. 6(2): 35–43, 2015	The impact of noise on the cardiovascular system	Review of 43 articles	Literature Review	<p>This review focused on the impact of noise pollution on the cardiovascular system across 43 studies and has several findings detailed below.</p> <p>Researchers found statistically significant exposure-response relationships between night-time aircraft noise and day-time road traffic noise exposure and risk of hypertension. Researchers measured the effect of aircraft noise and road traffic noise on hypertension by utilizing a questionnaire to collect data. Additionally, researchers in the study measured blood pressures of persons who lived at least five years near any of the six major European airports.</p> <p>Noise exposure was assessed using detailed models to measure aircraft and road traffic noise levels. Results show a greater odds of hypertension with every 10 dB increase of night-time aircraft noise. There was a stronger association between noise and hypertension for men, however this was not statistically significant. Researchers conclude that for night-time aircraft noise and daily average road traffic noise, results indicated long-term exposure to noise increased the risk of hypertension.</p>
Stansfeld, Stephen and Charlotte Clark.	The exposure-effect relationship	Review of 51 articles	Literature Review	<p>This paper examined the impact of different health outcomes on children caused by environment noise and has several findings detailed below. Overall, the review found sufficient evidence to support the effects of</p>

Study	Measured Outcome	Sample Size or Number of Studies	Methods	Findings
<p>"Health Effects of Noise Exposure in Children." <i>Early Life Environmental Health.</i> Vol. 2: 171–178, 2015</p>	<p>between environment noise and children's health</p>			<p>environmental noise on children's well-being and cognitive effects, such as reading comprehension and long-term memory and annoyance.</p> <ul style="list-style-type: none"> • In the first RANCH study, researchers observed a relationship between aircraft noise and severe annoyance in children at school. The percentage of children severely annoyed increased 12.1% at 60 dB from 5.1% at 50 dB. Researchers sampled 2,844, 9- to 10-year old children living around airports in the Netherlands, Spain, and the United Kingdom and found no overall effects of aircraft and road traffic noise on children's mental health, but found a small association of increased hyperactivity scores. Researchers also found a relationship between chronic aircraft noise exposure and impaired reading comprehension and recognition memory. Researchers suggests that aircraft noise exposure greater than 55 dB result in reading comprehension in children falling below average. However, researchers have found the decrease to be non-significant in a follow-up study. • In a South African study, increased levels of annoyance in children over time was related to aircraft noise exposure. • In a German study, researchers found a higher percentage of older children are annoyed by road noise when compared to younger children. Specifically, 7.3% of 8- to 10-year olds were annoyed by road noise during the daytime compared to 16.4% of 11- to 14-year olds. • While there was no significant association with difficulties falling asleep, a moderate exposure relationship between road traffic exposure at night and sleep quality and problems with sleepiness during the day was found in a cross-sectional study of 12-year olds in Sweden. • Two studies (the West London Schools Study and the Schools Health & Environment Study) found an association between aircraft noise exposure and increased hyperactivity scores. • A Munich, Germany cross-sectional study found that children living in quieter environments had higher levels of psychological well-being than children living in areas exposed to high aircraft noise; the longitudinal data showed a significant decline in self-reported quality of life after the inauguration of a new airport. In the study, researchers found that high noise exposure was associated with deficits in long-term memory and reading comprehension in 10-year olds prior to the relocation of the Munich airport. Two years after the removal of the airport, these cognitive impairments were not present. Over 20 studies found detrimental effects of noise on children's memory and reading outcomes, showing stronger evidence of the effects of noise on children's cognition. A study of 9- to 10-year old children in rural Austria found an association between environmental noise greater than 60 dB A, and poorer memory performance. The study did not find an association between community noise exposure and children's attention span.
<p>Hjortebjerg, Dorrit, Anne Marie Nybo Andersen, Jeppe Schultz Christensen, Matthias Ketzel, Ole Raaschou-Nielsen, Jordi Sunyer,</p>	<p>Effect of road noise on behavioral problems in 7-year-old children</p>	<p>46,940 seven-year-old children in the Danish National Birth Cohort from 1996 to 2002</p>	<p>Estimated road noise by using addresses and factors including yearly average daily traffic, traffic speed, and road type.</p>	<p>Results show that exposure to road noise is associated with increased behavioral problems for seven-year-old children. The study uses the Danish Strengths and Difficulties Questionnaire, a validated questionnaire for parents, to categorize behavioral problems into three groups-- normal, borderline, and abnormal. Behavioral problems included emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and a total difficulties score, which summed together the previously listed items. The study also controls for other factors that could affect behavioral problems.</p> <p>Results show a variety of associations between road noise and behavioral problems. Researchers found a 7% increase in abnormal total difficulties scores for every 10 dB increase. Additionally, for the same increase in 10 dB, borderline hyperactivity/inattention scores increased by 5% and abnormal scores increased by 10%.</p>

Study	Measured Outcome	Sample Size or Number of Studies	Methods	Findings
Jordi Julvez, Joan Forns, and Mette Sørensen. "Exposure to Road Traffic Noise and Behavioral Problems in 7-Year-Old Children: A Cohort Study." <i>Environmental Health Perspectives</i> . Vol. 124, No. 2, 2016			Airport noise was captured using noise zones from local authorities. Multinomial logistic regression analysis was used to determine relationship between road noise and behavioral problems.	<p>Researchers discuss that the effect of road noise at home on children is particularly relevant for the hyperactivity/inattention scores in this study. They cite a previous study which found that hyperactive children are easily distracted by background noise and hypothesize that road noise could worsen the distraction and difficulties.</p> <p>Researchers did not find a significant relationship between road noise and emotional problems and the relationships between road noise, peer relationships, and abnormal conduct scores are small and insignificant.</p>
Weyde, Kjell Vegard, Norun Hjertager Krog, Bente Oftedal, Per Magnus, Simon Øverland, Stephen Stansfeld, Mark J. Nieuwenhuijsen, Martine Vrijheid, Montserrat de Castro Pascual, and Gunn Marit Aasvang. "Road Traffic Noise and Children's Inattention." <i>Environmental Health</i> . Vol. 16: 127, 2017	Adverse effects of children's inattention symptoms due to road traffic noise exposure.	3,396 children with residential address in b Oslo, Norway between 2004–2007	Nordic Prediction Method and software program CadnaA verison 4.3 were used to model noise exposure. Utilized residential address to estimate road traffic noise. Two samples were used to examine noise exposure during pregnancy and noise exposure at five-years old and at age 8. The study was based on	<p>This study examined the association between road traffic noise and inattention symptoms in children, and whether the association affected by sleep duration.</p> <p>Researchers found a statistically significant effect modification by income. Results show a positive tendency between noise and inattention for all levels of income, with the highest noise level showing the strongest tendency. Researchers also found an effect modification by education with noise for 5- and 8-year old children, with a positive effect for children of highly educated mothers, and a negative effect for children with less educated mothers. Researchers found a statistically significant effect by gender. Specifically, there was an association between inattention symptoms for boys and road traffic noise, but not in girls. Lastly, the study found that inattention in 8-year olds was associated with both noise exposure at 8 years old and over a five-year period (3 years to 8 years).</p>

Study	Measured Outcome	Sample Size or Number of Studies	Methods	Findings
			Norwegian Mother and Child Cohort Study.	
Singh, Devi, Neeraj Kumari, and Pooja Sharma. "A Review of Adverse Effects of Road Traffic Noise on Human Health." <i>Fluctuation and Noise Letters</i> . Vol. 17, No. 1, 2018	Adverse effects of road traffic noise on human health	Review of 32 relevant articles and studies	Literature Review	<p>This review examines the health hazards of road traffic noise. The review defines noise as any unpleasant and unwanted sound. Noise pollution is defined as an environmental pollutant with noise beyond the permissible limits that cannot be seen or smelt. The paper has several findings detailed below.</p> <ul style="list-style-type: none"> • Studies support that long-term exposure to urban noise result in cardiovascular, respiratory and metabolic diseases. Traffic noise exposure has been associated with more adverse effects such as, hypertension and myocardial infarction (MI).³ • Questionnaire survey results from 1,112 randomly selected adults found that 17% of respondents reported high or extreme noise annoyance. Another study found that self-reported annoyance was analyzed at 65–70 dB(A). Self-reported annoyance for female subjects was statistically significant. However, it was more prevalent in male subjects. An association between traffic-related noise annoyance and danger of blood vessel hypertension was observed. In addition, a positive yet unimportant relationship between noise disturbance and the danger of ischemic coronary illness was also observed.⁴ Researchers also observed a strong association between sleep disorder and night traffic noise annoyance. • Another study discovered an association of traffic noise with Type II diabetes mellitus in men and mortality due to hypertension in women. • A study conducted on 909 adults between 18–80 years old in India found an association between the prevalence of hypertension and road traffic noise. The study suggests a threshold exposure for occurrence of hypertension due to road traffic noise at greater than 65 dB for men and greater than 60 dB for women. • Results from a study indicates public transport used by school children has an effect on their systolic blood pressure, or the maximum pressure when the heart is ejecting blood into the arteries. The study observed a 1.3 mmHg higher systolic pressure for children using public transportation compared to children who were not. • It has been observed that during first trimester of pregnancy there is a higher risk of pre-eclampsia and pregnancy induced hypertensive disorders with increased air pollution. Same effects were observed when road traffic noise was increased by 10 dB. While there was no evidence for major risk for severe pre-eclampsia, there are strong associations for mild and early-onset pre-eclampsia for combined exposures of air pollution and road traffic noise.

¹ Atherosclerosis is a cause of coronary heart disease, which occurs when plaque buildup inside the arteries resulting in a heart attack, stroke or death.

² Habitual sleep is the amount of sleep usually obtained in a night or main sleep period.

³ Hypertension is a medical condition when the pressure of blood being pumped through the arteries is higher than it should be. Myocardial infarction (MI) occurs when blood flow decreases or stops at a part of the heart, causing damage to the heart muscle which results in a heart attack.

⁴ Ischemic heart disease is a heart condition that occurs when oxygen supply to the myocardium muscle of the heart decreases.

Source: OPPAGA review of literature pertaining to the effect of noise on health or quality of life.

APPENDIX C

Acceptable Measurement Sites and Procedures to Ensure Accurate Decibel Measurement of Vehicle Noise

Florida statute and rules include requirements for using a decibel meter to measure vehicle noise, including for exhaust noise related offenses. (See Exhibit C-1.)

Exhibit C-1

There are Several Factors for Law Enforcement to Account for When Measuring Vehicle Noise

<p>Distance</p>	<p>Sound levels decrease as distance from the source of sound increases. Therefore, sound level measurement procedures include distance requirements to ensure the consistency of standards and measurements. While state law establishes vehicle noise standards at a distance of 50 feet from the center of the lane of travel, statute also allows the Department of Environmental Protection (DEP) to establish measurement procedures that include adjustment factors to be applied to the noise limit for measurement distances of other than 50 feet from the center of the lane of travel.</p> <p>DEP currently does not have a rule establishing these adjustment factors, therefore the decibel measurements may be required to be taken from 50 feet from the center lane of travel as described in statute. DEP previously had a rule that allowed for a decibel adjustment factor from 26 feet to 118 feet from the center lane of travel, but this rule was repealed in 2012.</p> <p>Source of requirement: Sections 316.293(2) and (3), <i>Florida Statutes</i>. Previous rule: Rule 62-18.050, <i>Florida Administrative Code</i>.</p>
<p>Measuring Sites</p>	<p>State regulations specify acceptable highway measuring sites for vehicle sound measurement. Vehicle sound measurements may be taken from standard sites or from restricted sites. Standard measuring sites must be open and free of sound-reflecting surfaces within a 100-foot radius of the microphone and a 100-foot radius of the microphone point. Restricted measuring sites are sites that do not meet standard site requirements because of large sound-reflecting surfaces within the clear area. Restricted measuring sites may be used by applying correction factors as specified in state regulations.</p> <p>Source of requirement: Rule 62-18.070(1) and (2), <i>Florida Administrative Code</i>.</p>
<p>Ambient Sound</p>	<p>State regulations also specify measurement procedures to ensure that ambient sound does not interfere with vehicle sound level measurement. Sound levels are cumulative, and vehicle sound level measurements may be affected by other sources of sound in the measurement area. However, if the loudest source of sound is 10 dB greater than ambient sound in the measurement area, the difference between the sound level of the loudest source of sound and the total sound level is negligible. State regulations require that vehicle sound level measurements be made only when the A-weighted ambient sound level, including wind effects and all sources other than the vehicle being measured, is at least 10 dB lower than the sound level of the vehicle.</p> <p>Source of requirement: Rule 62-18.060(5), <i>Florida Administrative Code</i>.</p>
<p>Calibration</p>	<p>Sound level meters are calibrated using calibration devices, which produce a specified sound pressure level. State regulations require a calibration check before and after each period of use and at intervals not exceeding two hours when a sound level meter is used for longer than two hours.</p> <p>Source of requirement: Rule 62-18.060(3), <i>Florida Administrative Code</i>.</p>
<p>Microphone</p>	<p>Certain sound level meters may be better suited to vehicle sound measurement depending on the type of microphone used in the sound level meter. Condenser microphones are more sensitive to sound at lower frequencies than electro-dynamic microphones, and therefore condenser microphones may be better suited to measuring vehicle sound. Smaller precision condenser microphones are also sensitive to frequencies arriving from any direction. State regulations require that the microphone be oriented in relation to the source of the sound in accordance with the instrument manufacturer’s instructions.</p> <p>Source of requirement: Rule 62-18.060(1), <i>Florida Administrative Code</i>.</p>

Source: OPPAGA analysis of the *Florida Statutes* and the *Florida Administrative Code*.

APPENDIX D

Citations by County

Exhaust related citations varied by county from Fiscal Year 2017-18 through Fiscal Year 2021-22. Some counties had no exhaust related citations over the timeframe, although citations do not account for warnings from law enforcement to drivers or for any citations written under local ordinances. Exhibit D-1 provides exhaust related citations by county. The citations include any written under ss. 316.272, 316.455(6), or 316.293, *Florida Statutes*, by any law enforcement agency within the county or by the Florida Highway Patrol.

Exhibit D-1

Exhaust Noise Citations by County From Fiscal Year 2017-18 Through Fiscal Year 2021-22

County	Exhaust Noise Related Offenses	% of Total Offenses	County Population Estimates, April 1, 2021
Alachua	8	0.1%	284,607
Baker	18	0.2%	28,692
Bay	68	0.7%	178,282
Brevard	22	0.2%	616,742
Broward	372	3.9%	1,955,375
Calhoun	1	0.0%	13,683
Charlotte	24	0.2%	190,570
Citrus	18	0.2%	155,615
Clay	56	0.6%	221,440
Collier	428	4.4%	382,680
Columbia	46	0.5%	69,809
DeSoto	7	0.1%	34,031
Dixie	1	0.0%	16,804
Duval	238	2.5%	1,016,809
Escambia	26	0.3%	324,458
Flagler	38	0.4%	119,662
Gadsden	1	0.0%	43,813
Gilchrist	2	0.0%	18,126
Glades	2	0.0%	12,130
Gulf	4	0.0%	14,824
Hamilton	1	0.0%	13,226
Hardee	15	0.2%	25,269
Hendry	10	0.1%	40,540
Hernando	46	0.5%	196,540
Highlands	3	0.0%	102,065
Hillsborough	639	6.6%	1,490,374
Holmes	6	0.1%	19,665
Indian River	9	0.1%	161,702
Jackson	23	0.2%	47,198
Jefferson	2	0.0%	14,590
Lafayette	4	0.0%	7,937
Lake	76	0.8%	400,142
Lee	137	1.4%	782,579
Leon	10	0.1%	295,921
Levy	43	0.4%	43,577
Liberty	2	0.0%	7,464
Madison	1	0.0%	18,122
Manatee	23	0.2%	411,209
Marion	100	1.0%	381,176
Martin	12	0.1%	159,053
Miami-Dade	2,054	21.3%	2,731,939
Monroe	19	0.2%	83,411
Nassau	40	0.4%	93,012

County	Exhaust Noise Related Offenses	% of Total Offenses	County Population Estimates, April 1, 2021
Okaloosa	36	0.4%	213,204
Okeechobee	14	0.1%	39,148
Orange	2,201	22.9%	1,457,940
Osceola	268	2.8%	406,460
Palm Beach	587	6.1%	1,502,495
Pasco	64	0.7%	575,891
Pinellas	266	2.8%	964,490
Polk	323	3.4%	748,365
Putnam	33	0.3%	73,673
Santa Rosa	21	0.2%	191,911
Sarasota	124	1.3%	441,508
Seminole	152	1.6%	477,455
St. Johns	150	1.6%	285,533
St. Lucie	169	1.8%	340,060
Sumter	12	0.1%	134,593
Suwannee	41	0.4%	43,676
Taylor	40	0.4%	20,957
Union	4	0.0%	15,799
Volusia	438	4.5%	563,358
Wakulla	12	0.1%	34,311
Walton	8	0.1%	77,941
Washington	9	0.1%	24,995
Florida	9,627	100.0%	21,898,945

Source: OPPAGA analysis of Florida Department of Highway Safety and Motor Vehicles Uniform Traffic Citation data and population estimates for reference from the University of Florida Bureau of Economic and Business Research.

APPENDIX E

Agency Response



Dave Kerner
Executive Director

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June 21, 2023

Claire K. Mazur
Staff Director, Criminal and Civil Justice
Office of Program Policy Analysis & Government Accountability

Dear Ms. Mazur,

This response is in accordance with s. 11.51 (2), Florida Statutes.

The department of Highway Safety and Motor Vehicles (department) appreciates the opportunity to review the Office of Program Policy Analysis and Government Accountability (OPPAGA) DRAFT report, A Review of Exhaust System Noise, and has the following response:

Overall, the department has no concerns with the findings presented in the report.

The department believes exhaust noise violations are best addressed at the local level through a city or county ordinance with state legislation removing the barriers to enforcement or application of the law.

The department believes the process of issuing a noise violation should be based on an officer's subjective evaluation of the vehicle noise, requiring the vehicle owner to take the vehicle to an independent inspection facility for exhaust noise testing. In the department's opinion, this represents the best process for law enforcement officers by removing the technical barriers to application of the law such as maintaining and certifying decibel meters. This will also free up valuable officer time to enforce public safety issues.

The department agrees that exhaust noise, as stated in the report, is more of a nuisance than a traffic safety issue. The department believes more emphasis and resources should be placed on studying and understanding the greater threats to traffic safety such as:

1. Speeding and aggressive driving: From 2018 – 2022, crashes involving speeding and aggressive driving resulted in 1,985 fatal crashes that claimed 2,268 lives.
2. Impaired driving: From 2018 – 2022, crashes involving a driver impaired by drugs and/or alcohol resulted in 4,700 fatal crashes that claimed 5,258 lives.

The department appreciates OPPAGA's efforts and looks forward to collaborating on continued study and evaluation of important issues facing the state of Florida. Please let us know if we can be of assistance in future efforts.

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OPPAGA

Office of Program Policy Analysis and Government Accountability

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