

# Economic utility for the anthropogenic spread of wild hogs

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**Abstract:** Wild hogs (*Sus scrofa*) are an invasive, exotic species that has spread through much of the United States through anthropogenic means. Many states have laws and regulations with the intent of preventing the illegal importation, introduction, and establishment of wild swine populations. However, in many cases, these laws have been ineffectual at stopping the anthropogenic spread of wild swine. To assess the risk for moving wild hogs, we examined various wild hog-related laws throughout the United States and assessed the potential reward for their illegal movement of releasing hogs for hunting purposes. We found that fines ranged from \$0 to \$10,000, with the mean minimum fine of \$1,085 and a mean maximum fine of \$2,708. The mean cost of a single-day hunting trip was \$448; however, this varied widely among states. In many cases, potential rewards, as demonstrated by the economic utility, for releasing wild hogs far outweighed the monetary risk from getting caught. States with few or no wild hogs and weak laws and/or fines are at a substantial risk for the illegal importation of wild hogs. To reduce the potential for the spread of wild hogs, agencies should concentrate on increasing monetary fines or increasing the perceptions that this illegal activity will be successfully detected and prosecuted.

**Key words:** economic utility, feral swine, illegal introduction, *Sus scrofa*, wild hog

**INVASIVE, EXOTIC SPECIES** such as wild hogs (*Sus scrofa*) have spread across the United States through anthropogenic means (Mayer and Brisbin 2008). The initial release of hogs into the wild as free-ranging food items later became valuable big game species for hunting. Some populations were introduced into captivity for penned hunts, while others were released on the landscape for a more traditional hunting experience. The popularity of hunting hogs has resulted in translocated populations throughout the United States, especially in areas with low or no hog populations (Bevins et al. 2014). To address this, many state laws and regulations aim to reduce legal importation of wild swine. Federal regulations also prohibit the movement of undocumented swine (9 CFR Part 71.19). However, these laws have often been ineffectual to stop the anthropogenic spread of wild swine. A continual influx of illegally imported and released wild hogs will hamper current efforts at eradication.

Hunting hogs can be an enjoyable activity

that leads to an increased desire to hunt. This activity can become more expensive if hogs are not present where the hunter lives. Providing monetary incentives can be a powerful force that affects the decision-making process to complete a task (McNeely 1988), but many people will not complete tasks that are onerous, difficult, or time consuming. Instead, they will often seek loopholes or otherwise avoid the task while still qualifying for the incentive. This has often occurred when incentives have been offered to reduce populations of various nuisance wildlife populations, including wild hogs (Choquenot et al. 1996, Singleton et al. 2007, Bevins et al. 2014).

There are positive economic incentives for hunters to go to other states or other parts of their own state, obtain a small number of hogs, and release them on or near their property (Figure 1). Once a population is established, hunting the hogs can occur any time. As an incentive, hunters save money by not having to drive elsewhere to hunt hogs, especially if

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hunting on a frequent basis. Another incentive is that wild hogs can potentially be used to increase the value of a hunting lease or expand the lease from a single season, such as a deer season, to multiple seasons and multiple game animals. Local hunters may also use the opportunity to hunt hogs to establish a for-profit guide service (Bevins et al. 2014).

While most states have wild hogs (Bevins et al. 2014), many states do not have populations that are large enough to hunt on a regular basis, causing hunters to spend large amounts of time in pursuit of hogs with little return. In some states, such as Indiana, Ohio, and Illinois, hog populations are so fragmented that a hunter in the state may have to drive for hours to a general location where hogs have been reported. Hunters also must find a private landowner willing to allow them access to their property to hunt hogs; many are not willing to do so because of potential property damage from hog hunters. In states where hog populations are present, but at low levels, hog hunters may have to go to other states to hunt successfully. Some hunters and landowners may recognize the monetary benefits of illegally introducing hogs to their property for future hunting opportunities or future profits.

To prevent undesirable behavior from hunters and landowners, lawmakers often use

negative incentives to guide behavior (Piliavin et al. 1986). In many cases, states and federal agencies have laws and regulations that, at least at first glance, provide a disincentive to illegally importing feral hogs. But for laws and regulations to be an effective deterrent, fines or other punishment must be high enough to offset the potential gain from the illegal activity or to cause substantial financial harm to the perpetrator (Ehrlich 1972, Rechtschaffen 1998, Garoupa 2001). There also has to be a high perceived risk of getting caught and the potential for being successfully prosecuted (Garoupa 2001). Unfortunately, the effect of laws on the potential to reduce the introduction of wild hogs has not been examined or summarized. Therefore, we conducted a utility analysis for importing and releasing wild hogs, where utility is defined as the ability of an object to satisfy a need or want (Piliavin et al. 1986). When utility is a positive value, it is perceived by a rational actor (i.e., the person committing the activity) to be useful. When a utility is negative, a rational actor would perceive the object to be useless. The greater the positive value, the greater the usefulness. To calculate the utility of illegally importing and releasing wild hogs, we reviewed and summarized fines and penalties from various states regarding the illegal importation and release of wild hogs and



**Figure 1.** Wild hogs are often introduced into areas for hunting, but can quickly spread to neighboring lands, such as this farmer's corn field in Lawrence County, Indiana. (Photo courtesy of USDA)

examined the positive incentives for moving wild hogs, such as the cost savings from required travel to another state to legally hunt hogs. To demonstrate the application of using functions for estimating the likelihood of illegal behavior, we modeled the utility of an actor in Indiana, a state with small, widely dispersed wild hog populations and a law targeted to stopping illegal introductions of wild hogs.

## Methods

To determine the potential negative incentives that currently exist to deter someone from moving wild hogs to new locations, we examined the laws and policies of state agencies responsible for managing wild hogs using Internet resources provided by state agencies from October 5, 2013 to March 15, 2014. Specifically, we searched for laws, policies, and fines that referenced the legality of possessing, hunting, trapping, transporting, or other activities regarding wild or feral swine and wild or feral hogs. In instances where information could not be obtained on the Internet, we called wildlife agencies in each state to determine the information. We recorded the maximum and minimum fines and jail terms when available. If minimum fines or jail terms were not listed, no data were recorded. When no information on fines or jail terms could be located, these states were excluded. Because of the multitude of common names for wild hogs, we also documented the use of common names used for free-ranging *Sus scrofa*.

To determine the value of the positive incentives for translocating wild hogs, we recorded the cost of a single-day hog hunt. We examined Internet websites using a Google search for businesses offering to guide or provide hog hunting services for a single-day hunt, exclusive of lodging, hunting permit fees, or other expenses to obtain a range of values to use in the model. We based our sample selection on the order of information presented in the search results, terminating the search once >75% of a page resulted in non-relevant or repeated results. We excluded results listed as paid advertisements. Within a given state, all businesses were included that met this criteria. When lodging, meals, or other expenses were included, we subtracted the costs of lodging listed on the site, or subtracted the costs for

non-hunting observers. If a single-day hunt exclusive of other expenses could not be determined, that site was excluded. All prices were based on current (2015 U.S.\$) price lists. We did not differentiate between captive and free-ranging wild hogs or between different prices based on quality of the hog.

To calculate utility of translocating wild hogs, we used the following Expected Utility formula from Piliavin et al. (1986):

$$E(U) = (1 - p) U(y) + p U(y - F)$$

$E(U)$  = the actor's expected utility from a contemplated activity

$p$  = likelihood of being punished in the activity

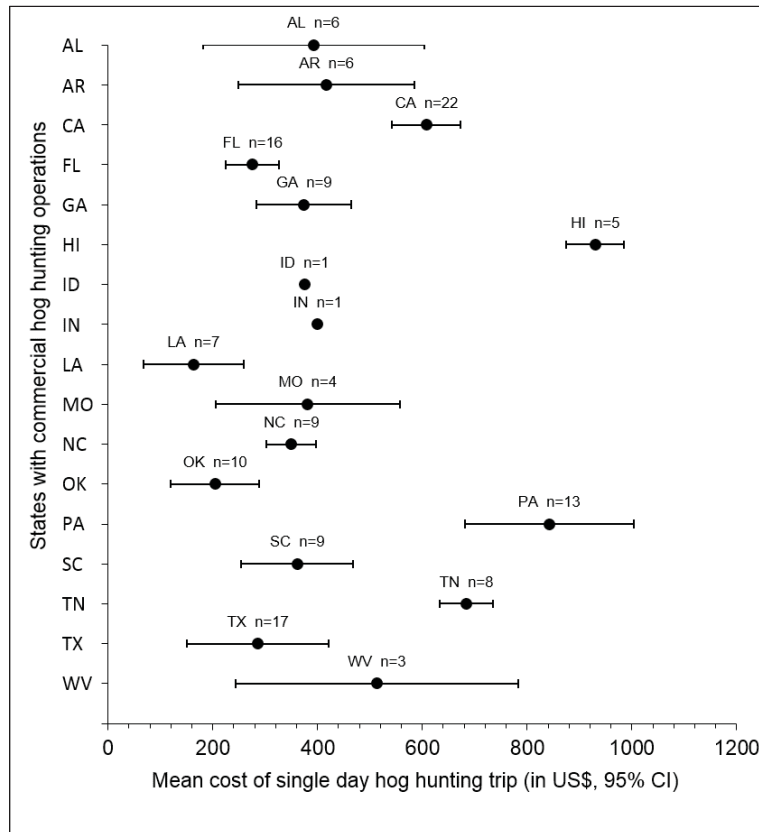
$y$  = the anticipated returns (material or psychological) from the activity

$F$  = the anticipated penalty resulting if the actor is punished for the activity

For the minimum value of translocating hogs to a location near the actor's location, anticipated returns ( $y$ ) are a function of the personal cost savings for having wild hog hunting near the actor's home, as opposed to driving a considerable distance to hunt. Factors used to calculate the cost savings include the cost of the hunt (estimated above), cost of an out-of-state license, cost of getting to the location, and costs of lodging. We excluded other costs that would be incurred regardless of the location of the hunt, such as meals, guns, and ammunition.

Anticipated penalties ( $p$ ) are the fines, potential imprisonment, and the resulting loss of revenue for time imprisoned estimated from the data collected above. We determined the likelihood of being punished ( $p$ ) as a range of probabilities because we located no estimates of the likelihood of being caught and successfully prosecuted, although the likelihood of getting caught in a wildlife-related crime has been described as "slight" compared with other crimes (Nurse 2013). Eliason (2003) reported on several studies where deer poaching detection rates in 3 states were estimated to range from 1.1% to 2.2%. We found no data on the likelihood of being caught and punished in Indiana for the importation and release of wild hogs; therefore, we calculated a range of values from 0.001 to





**Figure 2.** Mean cost of single-day hog hunts in 2015 in 15 states as determined by a search of posted costs on the Internet by companies and individuals offering wild hog hunts. Cost estimates are for a single-day, single-hog hunt.

states did not explicitly state the level of the fine but assess them through the current criminal code or the judge or justice of the peace presiding over the case. Among states, the definition of a feral or wild hog can vary. We found that 48% of states based their definition of a feral or wild hog on the amount of time the animal has spent outside of captivity, while 30% of states had no specific definition. We found no information regarding a definition of wild hogs from 22% of states. Minimum fines per hog ranged from \$0 to \$10,000 with a median fine of \$500 ( $\bar{x} = \$1,085$ ,  $SE = \$571$ ,  $n = 17$ ) and a mode of \$1,000. Maximum fines per hog ranged from \$50 to \$10,000 with a median fine of \$1,500 ( $\bar{x} = \$2,708$ ,  $SE = \$576$ ,  $n = 20$ ) and a mode of \$5,000. Years in jail per hog ranged from 0 years to 2 years with a median of 1 year ( $\bar{x} = 0.7$  years,  $SE = 0.2$  years,  $n = 11$ ; Table 1).

0.25 as an estimate for p.

We used the national average values for a single-day hunt and an estimate of other costs for overnight travel as cost savings for y, and the potential penalties as being the average fines for translocating wild hogs. However, because utility is site specific (i.e., needs to include estimates of distance traveled for additional cost savings, and potential loss of income for time spent in jail), we also provide an example of a utility calculation as case study for Indiana.

### Results

We found information for penalties related to the importation and/or release of wild hogs on the Internet for 5 states and collected additional information from 21 states by contacting the appropriate biologist or through returned phone calls, including from 2 states with information located on the Internet. We found legislation from 24 states that limit the release of hogs. Of those 24 states, each has the potential to assess fines as a penalty for the illegal release of hogs (Table 1). Several

We found data from 146 different companies or individuals from 17 states offering single-day hogs hunts (Figure 2). Prices of hunts varied greatly among states but appeared to be highest (1) where hogs are uncommon; (2) among states popular as a tourist destination, such as Hawaii; or (3) in states such as Tennessee, where hog hunting has been severely restricted by state law. Hunt prices ranged from \$150 to \$1,500 ( $\bar{x} = \$448$ ,  $SE = 263$ ,  $n = 146$ ) with a mode of \$500. There was considerable variation among states, but low variability within states (Figure 2).

Based on the mean values for the minimum and maximum fines of \$500 and \$1,000, respectively, and an average cost of a wild hog hunt of \$500, the likelihood of being punished would have to be 100% for the minimum fine to serve as a deterrent. For the average maximum fine of \$1,000 to serve as a deterrent, the likelihood of being punished would have to be 50%. The highest fine reported was \$10,000. For this fine to serve as a deterrent, the likelihood of being punished would have to be 5%. Because the expected detection rate is low (likely <1%),

**Table 1.** Fines and jail time reported by states or located on the Internet regarding the illegal importation and/or release of wild hogs into the environment collected from October 5, 2013 through March 15, 2014. In some cases, a minimum fine was not explicitly reported and was not assumed to be \$0, but rather left blank.

State	Minimum fine (US\$)	Maximum fine (US\$)	Jail sentence (years)	Other measures
Arkansas	1,000	5,000	2	Penalties are per hog (jail term less on private land)
Colorado	250	1,000		Penalties are per hog
Florida				Judge sets all fines; no listed minimum or maximum
Georgia	1	1,000		Typically includes a 3-year loss of hunting privileges
Hawaii		1,000	1	Penalties are per hog
Idaho	200	5,000	1	
Illinois				Class A misdemeanor
Indiana				Class D felony
Kentucky	500		1	Potential loss of hunting privileges
Maryland	0			All hogs are considered livestock
Massachusetts		50		Non-criminal citation of \$50
Mississippi	2,000	5,000	0.013	Loss of hunting and fishing privileges for 1 year
Missouri	1	5,000	1	Some have been sentenced for up to 4 years in jail
Montana		1,000		Loss of hunting and fishing privileges
Nebraska		100		Loss of hunting and fishing privileges
New Hampshire				Misdemeanor
New Jersey		1,000		For release of domestic hog
	500	2,500		For release of Eurasian hog unknowing: 4th degree criminal offense
	1,000	5,000		For release of Eurasian hog knowing: 3rd degree criminal offense
New York	500	1,000		Penalties are per hog; also loss of hunting privileges for a specified term
North Dakota		5,000		
Oklahoma	250	2,000	0.026	
Oregon	250			For a misdemeanor charge
	1,000			For a felony charge if tied with a violation of Lacey Act
South Carolina		500	0.12	Penalties are per hog
Texas	1	500		Fines set by Justice of the Peace
Wyoming	10,000	10,000		Penalties are per hog

the fines would have to be  $> \$50,000$  to serve as an economic deterrent, assuming the total value for importing and releasing a wild hog is \$500, or the average value of a hunt.

To illustrate the usefulness of a utility model, it has to be applied in context, and the total benefits and costs determined. The total costs associated with a hunt are specific to each location (i.e., a person in northern Indiana may have to drive further for a legal hunt than a person in southern Indiana). The average income will also vary with location, which can influence the deterrent effect of incarceration. To illustrate this, we applied the formula to estimate the utility of translocating wild hogs to Indiana, a state with relatively few hogs, widely dispersed populations across the state, and a history of illegal introductions. Because costs vary depending on the home location of the actor, we estimated the total cost of a single-day hunting trip from Indiana to central Florida, one of the closest states with large populations of hogs to hunt, easily located guide services, and low prices. For our Indiana actor, the total cost for the hunting trip, including 2 nights in a moderately priced hotel (\$75 per night), 1,800 miles round trip from Lawrence County, Indiana to central Florida in an average vehicle (\$180; 25 miles per gallon at \$2.50 per gallon), and paying for a guide service (\$276; Table 1), would be \$531.

In Indiana, a law that could be used to prosecute individuals who release wild hogs is the Animals Running At Large (Indiana Code [IC] 15-17-18-8). Under this law, illegally releasing hogs would be a class B misdemeanor. In Indiana, a class B misdemeanor could result in a fixed term of imprisonment for  $\leq 180$  days and a fine of  $\leq \$1,000$  (IC 35-50-3-3). According to City-Data.com (<http://www.city-data.com/city/Bedford-Indiana.htm>), the median household income in Indiana during 2012 was \$33,039. Adjusting based on 2.8% inflation, the 2015 median household income would be \$33,978. Assuming a 2-income household, an individual of that household would have a gross income of \$326.71 per week. Assuming that the judge imposes the maximum fine of \$1,000 and the maximum imprisonment penalty of 180 days, or 25 weeks of full-time employment, the total potential penalty would be approximately \$9,167. However, based on past fines imposed

for wildlife-related crimes, the likelihood of the maximum fine is low, with the likelihood of the maximum imprisonment term even lower.

Lawrence County, Indiana has a long history of wild hog releases (Caudell et al. 2013). Lawrence County is 1,171 km<sup>2</sup>. With only 2 game wardens working in the county at any given time, the likelihood of being caught in the act of releasing wild hogs is relatively low and likely near 1%, similar to those for poaching of white-tailed deer (*Odocoileus virginianus*) discussed by Eliason et al. (2003).

Using the Expected Utility formula (Piliavin et al. 1986) and a 1% chance of detection, the maximum fine and maximum time in jail would result in an expected utility from the illegal importation of wild hogs as \$441. If expected utility is  $> \$0$ , then there is a positive incentive for the illegal action. At a 1% detection rate, it would require a total fine of \$53,100 to result in an economic deterrent. If the detection rate could be increased to 10%, then a total fine of \$5,310 would result in an expected utility of \$0; therefore, any increase in fines beyond this amount should result in a deterrent for the rational economic actor.

## Discussion

We found that most states have a variety of measures in place to reduce the likelihood of the spread or introduction of wild hogs. Even states currently without hogs have recognized that wild hogs are a potential threat and have laws in place to reduce the likelihood of introduction. However, in many cases, there are factors such as rates of detection that are likely to negate the effects of fines and penalties.

The threat of jail, fines, and loss of hunting privileges represent negative economic incentives for moving wild hogs to locations where there are no wild hogs or where there are limited populations. However, for the rational economic actor, the negative incentives have to be weighed against the potential gain from importing wild hogs. For the casual, ethical hunter who is likely a law-abiding citizen, the threat of legal action may be enough to keep them within the bounds of most game laws. But someone who regularly engages in risky or illegal behavior either (1) weighs the cost of being caught against the likelihood of being caught and rationalizes that the potential gains

outweigh the benefits; (2) incorrectly assesses the actual risk of getting caught and, therefore, misinterprets the data; or (3) just does not care if they get caught or not (Cooter and Ulen 2011).

We also saw a large diversity of fines associated with the laws regarding wild hogs. High fines can be an important part of a deterrent system for preventing illegal activity. However, fines have to be high enough to serve as an effective deterrent. Polinsky and Shavell (1991) discussed that for fines to be an effective deterrent, they have to be appropriate to the wealth of the individual committing the crime. Essentially, Polinsky and Shavell (1991) found that the greater the income of the individual, the greater the fine needs to be to serve as a deterrent. Most current fines will not serve as a deterrent in many cases when the factors of the Piliavin et al. (1986) utility function are considered. For fines to be more effective, fines or detection rates would need to increase. Increasing detection rates may mean that states use task forces or additional personnel in sting operations; however, this may be cost prohibitive for many states. Increasing fines or related penalties, if high enough, may achieve the same goal while maintaining costs at the current level.

Garoupa (2001) argued that, ideally, the optimal fine for a deterrent encompasses the entire wealth of the individual. But because the size of fines will be ultimately limited by law, such as maximum fine sizes for a particular type of violation, more creative penalties may be needed. For an individual with little wealth, the real value they place on an item or a privilege, such as the privilege to hunt, could be used to serve as a deterrent when wildlife laws are broken. Recently, Kentucky revised its laws regarding the possession and release of wild hogs (Kentucky Revised Statutes [KRS] 150.186bbb) so that the fines can include the forfeiture “of his or her right to hunt, fish, trap, or be licensed as a commercial guide for a period of 10 years” (KRS 150.990 Penalties). The loss of hunting privileges has the potential to serve as a significant deterrent for the importation of wild hogs because of the value that people place on hunting. The value of hunting for a particular individual is unknown but has been estimated by examining the maximum collectable revenue and the total benefit value (Martin and

Gum 1978). However, it is likely that the value of hunting exceeds the cost of a hunting license for many people. For some people, hunting may represent their most valued recreational activity, and the loss of hunting privileges can represent an impact to an entire lifestyle.

Based on the Piliavin et al. (1986) utility function, the likelihood of being punished can decrease the size of the fine needed to serve as an effective deterrent. This likelihood is a combination of the detection rate for the crime and the likelihood of prosecution. Moreover, the actor’s perception of being detected can increase the perception of being detected for the model. If an actor believes he may be detected more often than the actual likelihood of detection based on the number of law enforcement personnel, it should decrease his utility (Piliavin et al. 1986, Ehrlich 1972). Therefore, the use of tip lines and economic incentives, such as rewards, for reporting people who transport and release hogs, similar to the program implemented by the Tennessee Department of Natural Resources (Coil 2014), may decrease utility. Effective tip lines combined with rewards increase both the actual and perceived chance of being caught releasing wild hogs. Just as fines have to be high enough to discourage people from breaking the law, rewards have to be high enough to encourage people to report neighbors, acquaintances, and others who break the law. While states may not have enough funds to provide large rewards, providing other incentives, such as lifetime hunting licenses or special hunting opportunities may be substantial enough to cost a state little in terms of funds or lost revenue.

Having state biologists, agriculture agents, and other employees demonstrate vigilance about the transportation, possession, and release of wild hogs can also increase both the perceived and actual chance of detecting someone engaged in illegal hunting activities. Increasing the perception of being caught can magnify the size of the fine. For example, if a fine is \$500, a person has to weigh the effect of that fine on their personal situation with the likelihood of getting caught. If \$500 is a significant amount, but if there is little chance of being seen by a relatively small number of law enforcement personnel, the person may decide the risk of getting caught is low and that



the rewards are large enough to outweigh those risks. However, if they believe their neighbors, the person at the gas station, or any passing state employee would report them, that can increase their perceived risk of detection and make them believe it is more likely that they will lose \$500, making them less likely to take the chance of engaging in the illegal activity (Cooter and Ulen 2011).

For laws to be successful deterrents, there must be a high likelihood that they can be successfully enforced; however, if laws are ambiguous, enforcing them becomes difficult. Currently, there is no single, widely accepted common name for a free-ranging undomesticated *Sus scrofa* that populates the United States. The wild progenitor of some of the common domestic species is the wild boar of Europe, Asia, and North Africa (*Sus scrofa*), but a variety of common names are used for the North American free-living species of hog including feral swine, hog, and pig; wild swine, hog, and pig; razorback; Eurasian wild boar; and a myriad of other names. This can lead to confusion on the part of the general public, lawmakers, and those attempting to enforce laws (Gentry et al. 2004). Those who draft laws and regulations have to be conscious of the definition of terms used. For instance, several states have regulations that prohibit the transportation or capture of feral swine. Merriam-Webster's online dictionary (<<http://www.merriam-webster.com/dictionary/feral>>) defines the word feral as relating to or suggestive of a wild beast or not domesticated or cultivated; however, it also defines feral as an animal having escaped from domestication and becomes wild, which is often the definition that wildlife biologists will use to distinguish between native wild animals and those populations that are now wild but originated in captivity. Therefore, it could be argued that once a feral animal is in captivity, it is no longer feral and is a domestic hog rather than a feral hog. Even if the word feral is specifically defined in the law, a lawyer may be able to make a compelling argument. Free-ranging or wild might be more accurate terms for the common name because of specific definitions of wildlife under the law; even if wildlife is in captivity, it is still wildlife and not domesticated. Therefore, the name wild American hog might

be more appropriate. An even clearer definition would be to use the scientific name for wild and domestic swine in laws regarding the management of wild hogs. Gentry et al. (2004) reported on a recent ruling of the International Commission on Zoological Nomenclature that specific epithet of domestic swine should be *Sus domesticus* because of the long history of the use of this name for the domesticated version of the wild hog species. While this does not assist with the identification of species, it does make it easier for lawmakers to draft legislation. The use of *Sus scrofa* and *Sus domesticus* for wild and domestic swine, respectively, would provide a more accurate definition to keep the legal definitions distinct.

During our research, we found that states have a wide range of laws and policies regarding the management of wild hogs, and laws that prohibit hog hunting are probably one of the most cost-effective disincentives to the illegal importation of wild hogs. Attempts at legalized hunting have resulted in the significant expansion of populations in both Tennessee and California because this provides unintended incentives to spread wild hogs to other parts of a state (Zivin et al. 2000, Bevins et al. 2014). We hypothesize that the reverse may true be if all hunting of wild hogs is outlawed because this type of law accomplishes several goals. Making it illegal to hunt hogs removes the incentive for hunters to move hogs to new areas. It also means that there is no chance that a hunting industry, such as guide services, could be established around hog hunting. If the law goes further to state that it is illegal to hunt any wild hog or any feral domestic swine, this can improve the chances for prosecution; the prosecuting lawyer does not have to prove that the hog is a particular species or breed because any hog that is taken during hunting would be illegal. Anyone caught in possession of a hog that appears to have been shot during the course of hunting could be fined. Unfortunately, there are also incentives other than economics resulting from the illegal importation of wild hogs, such as the enjoyment of a new animal to hunt outside of other hunting seasons or supplementing existing populations with new genetics in an effort to improve the population (Bevins et al. 2014). In addition to the incentives that hunters obtain from introducing hogs, there



are psychological incentives associated with criminal behavior, such as thrill seeking (Nurse 2013), or ignoring a law that the perpetrator believes is unjust (Cooter and Ulen 2011). These other incentives may need to be researched and addressed through other means.

### Management implications

The relatively simple model we presented is intended to give state agencies a starting point to evaluate the effectiveness of their own fine and punishment system for importing wild hogs. Other factors may need to be included based on the current laws and policies of any particular state. For instance, if it is legal to establish a guide service within a state for hunting wild hogs, that would add to the economic incentive for importing and releasing wild hogs.

Perception of being caught and punished can be just as important of a deterrent effect as the actual penalties assessed for criminal behavior (Ehrlich 1972). For laws and their resulting penalties to serve as an effective deterrent for the translocation of wild hogs, they should be widely advertised. In most cases, we had to call the state agency to determine the illegality of transporting and releasing wild hogs and to determine potential fines. In these states, the actor may not be aware that the action is illegal, which does not serve as a deterrent. Using tip lines and rewards also have the potential to increase the perceived likelihood of being caught, assuming that the rewards for reporting illegal activity are high enough to serve as a deterrent. In addition, successful court cases resulting in high fines or jail terms should be widely publicized to enhance their deterrent effect.

Recreational hunting is often touted by hunters as being important in controlling the population. In populations where no active control or substantial control is being conducted, or where populations are already large, this may be the case. Timmons et al. (2012) estimated that if hunting were eliminated in Texas, feral hog populations would triple in 5 years, which would, at first glance, appear that hunting is an important part of the overall solution of managing wild hogs. While this may be true in large populations or where the landscape is saturated with wild hogs, in states where hogs are found in small numbers,

encouraging or allowing recreational hunting by non-landowners can contribute to the anthropogenic spread of wild hogs.

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