AN ANALYSIS OF TIMBER TRESPASS AND THEFT ISSUES IN THE SOUTHERN APPALACHIAN REGION

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Abstract

Timber theft is a crime within the forest industry which has not received a large amount of attention within research literature. As a result, there are no recent estimates available of the extent of the problem. The southern Appalachian region has conditions which seem to be conducive to timber theft, but convictions for timber theft in the area are infrequent. In order to address these issues, a study was undertaken in a 20 county region of the southern Appalachians to interview law enforcement officers and prosecuting attorneys about their knowledge of timber theft and their current level of investigation and prosecution. To ascertain the extent of timber theft, interviews were also carried out with both industrial and non-industrial landowners.

The survey results indicate that both prosecuting attorneys and law enforcement officers are generally knowledgeable regarding timber theft and trespass. Results were similar between those individuals who had experience with the crime as well as those who did not. The overriding perception from both prosecuting attorneys and law enforcement officers was that timber theft should be handled as a civil violation. This perception was primarily a result of the frequent lack of properly located boundary lines to prove ownership of the property, and the difficulty of proving criminal intent. The study found 22 convictions for timber theft out of 36 criminal cases in the past three years.

Due to a low response rate (16%) from non-industrial private forest landowners, estimates of the extent of timber theft were determined from the industrial landowner data and

the law enforcement and attorney surveys. Based on these data, the impact of timber theft was conservatively estimated at 120 incidents per year, resulting in a loss of approximately $300,000 per year within the study area. An extrapolation of this to the entire southern Appalachian region would mean over $4 million per year.

The results of this research indicates that there are potential areas for improvement in the conviction of timber theft offenders as well as in reducing the total number of theft incidents. The current statutes used to deal with timber theft are generally inadequate to provide prosecutors with the potential to convict most timber thieves because of the unique evidentiary requirements of a timber theft. As a result, changes in the statute would likely provide the greatest remedy. Civil statutes are also inadequate in many states to provide landowners the opportunity to obtain a suitable civil judgment. Information needs to be disseminated to landowners, law enforcement officers, and prosecuting attorneys about the aspects of timber theft which are most pertinent to them, and how the problem should be dealt with both before and after the theft.

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1. Introduction

Timber theft is a topic which has received little discussion in research literature. As a result, there is almost no information available publicly about the extent of the problem. Very little information regarding any aspect of timber theft is widely available outside of extension publications detailing possible methods to prevent the problem (e.g. Baker and Mortimer 2002a). This is an interesting phenomenon as efforts are being taken to improve prevention of a problem that has not been thoroughly documented. Efforts need to be taken to bridge this gap in knowledge in order to provide landowners and legislators information regarding this problem.

A discussion of "timber theft" among forest industry professionals would likely result in a large number of interpretations of the term. There are numerous forms of timber theft, ranging from fraud perpetrated by the foresters entrusted to purchase timber for forest industries, to loggers harvesting timber for a private landowner under contract who sell occasional truckloads for their own profit, to individuals illegally entering onto someone else's land and stealing their timber. It is this last category of theft (also known as "timber trespass" when the act is deemed unintentional) which will be dealt with by this research. While the numerous other forms of timber theft may be equally, if not more, insidious and prevalent, the study of their effects is beyond the scope of this investigation.

1.1. Southern Appalachian Region

Forest industry professionals generally agree that all regions of the country have been subjected to timber theft of varying degrees. Cases from the Pacific Northwest in particular have received a great deal of media attention, in part because of the attention which logging of any

sort in that area has received (Solomon 2001). There is no evidence, however, that the problem is worse in the Northwest. A few extremely high-value cases have captured the media's attention, possibly because the majority of forestland in that region of the country is owned by the government (USDA Forest Service 2001). As a result, a large amount of federal money and manpower can be devoted to policing the woods and tracking down and prosecuting violators. In the Southern Appalachians, certain species of trees are also very valuable, and theft has reportedly been occurring at an alarming rate (Radspinner 2002). Here, however, forestland ownership is predominantly private and the legal framework surrounding timber theft from private land may be inadequate to effectively punish thieves in this area (Baker and Mortimer 2002b).

1.2. Potential for timber theft

Two criminological theories can be used to analyze the susceptibility of the Southern Appalachian region to timber thefts. The first of these theories is the Routine Activity Theory (RAT), sometimes referred to as the crime triangle, which consists of the three major components required for any crime to occur: opportunity, a motivated offender, and a suitable target (Cohen and Felson 1979). If all of these components are present, the potential for crime exists.

In addition to a forestland ownership pattern that is predominantly private, a number of other factors play into creating an environment extremely conducive to timber theft in the Southern Appalachians. The forestland ownerships in this area are highly fragmented with a well-developed public road system offering access to remote and sparsely populated areas.

These areas may be located out of sight of any neighboring landowners. This factor is key in creating ample opportunity for theft to occur unnoticed.

The socioeconomic status of the area is one of the lowest in the country. The percentage of the population living below the poverty line is greater than the national average almost uniformly across the region (Figure 1). This reduced socioeconomic status plays a key role in creating a motivated offender. A sociological study of timber theft occurrences in Washington State national forests found that timber thieves were not necessarily driven by a criminal temperament, but were often forced to steal out of economic desperation (Pendleton 1997).

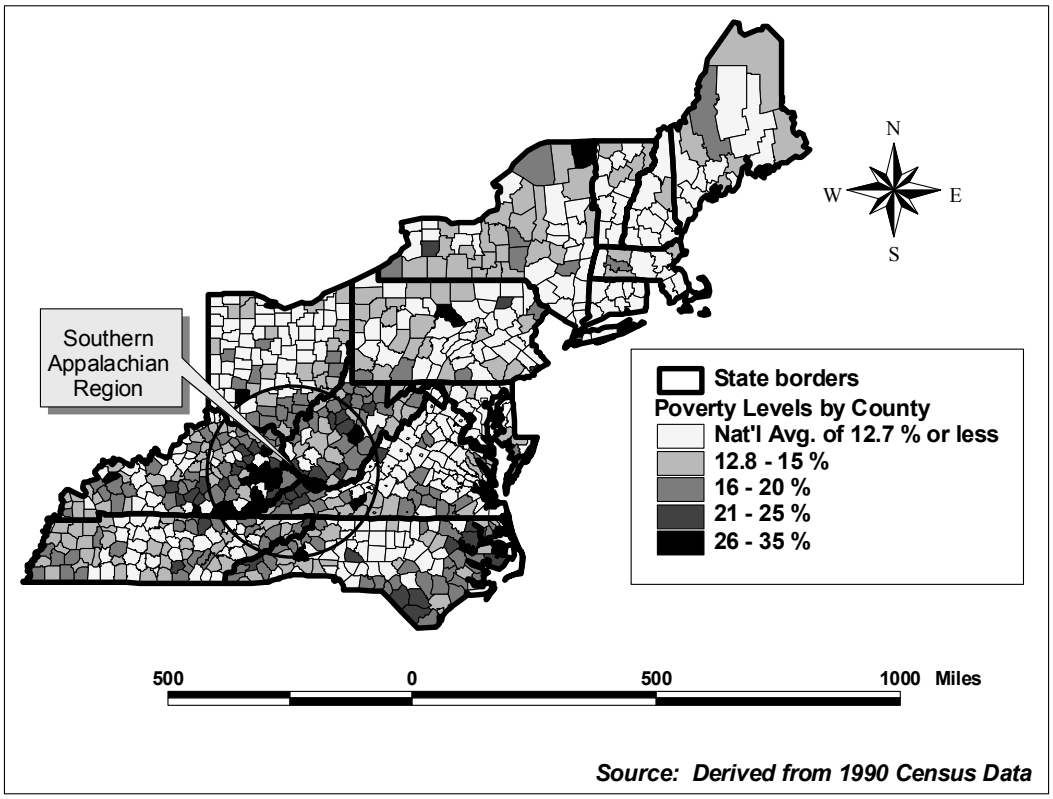

Figure 1: Percentages of population living below the poverty line by county

1.2.1. Timber as a suitable target in the Southern Appalachians

In addition to a motivated offender and opportunity, the third requirement for a crime to occur is a suitable target. In describing a suitable target, a second criminological theory is appropriate. The model "CRAVED" describes the suitability of a target of theft with respect to six characteristics: these properties are concealable, removable, available, valuable, enjoyable, and disposable (Clarke 1999). Using the model to analyze timber in the Southern Appalachians will explain this final component of the RAT. In this model, timber does not fit with the requirements of an enjoyable target, insofar as timber does not seem to be a commodity which a thief would utilize for their own enjoyment (with the exception of the money earned from selling it). Timber in the Southern Appalachians, however, fits well with the characteristics of the other model factors.

While the concealability of timber is not intuitive, in this context, the target of the theft does not have to be concealed from view. The Southern Appalachian region is home to a large number of forest products companies, including many sawmills. As a result, the appearance of vehicles transporting cut timber along the roadways is a common sight. Because of this, stolen timber can be "concealed" within the traffic of legitimately harvested timber.

Timber also does not seem to be an easily removed target. In comparison to the objects of other thefts, such as VCRs or jewelry, it is not. All that is required to remove one log is a chainsaw, a truck, and a means of loading the timber onto the truck. To steal one log in the Southern Appalachians requires very little skill. The overall smaller timber sizes are more conducive to untrained laymen stealing trees on the East Coast, as opposed to the West Coast. On the West Coast, the highest value timber is old growth, and is typically much larger than the

timber stolen on the East Coast. An untrained timber cutter can shatter trees of this size by using improper felling technique.

Timber in the Southern Appalachians is widely available and some species are extremely valuable. Black cherry (*Prunus sylvatica*), for example, can sell for over $1 per board foot for higher grades, and in some areas it can be worth a great deal more (*The Pennsylvania Woodlands* 2002). Figure 2 shows a graph of average black cherry stumpage prices in Pennsylvania over the past ten years. The upward trend is important to note, as some evidence suggests that there is a positive correlation between increases in timber prices and timber thefts within a region (Heimel 1993). Figure 3 depicts the volume per acre of black cherry in four states of the Southern Appalachian region. Clearly, there is an available supply in a number of counties across the region. In addition, red oak (*Quercus rubra*), white oak (*Quercus alba*), black walnut (*Juglans nigra*), and ash (*Fraxinus spp.*) are among the other valuable timber species in this region.

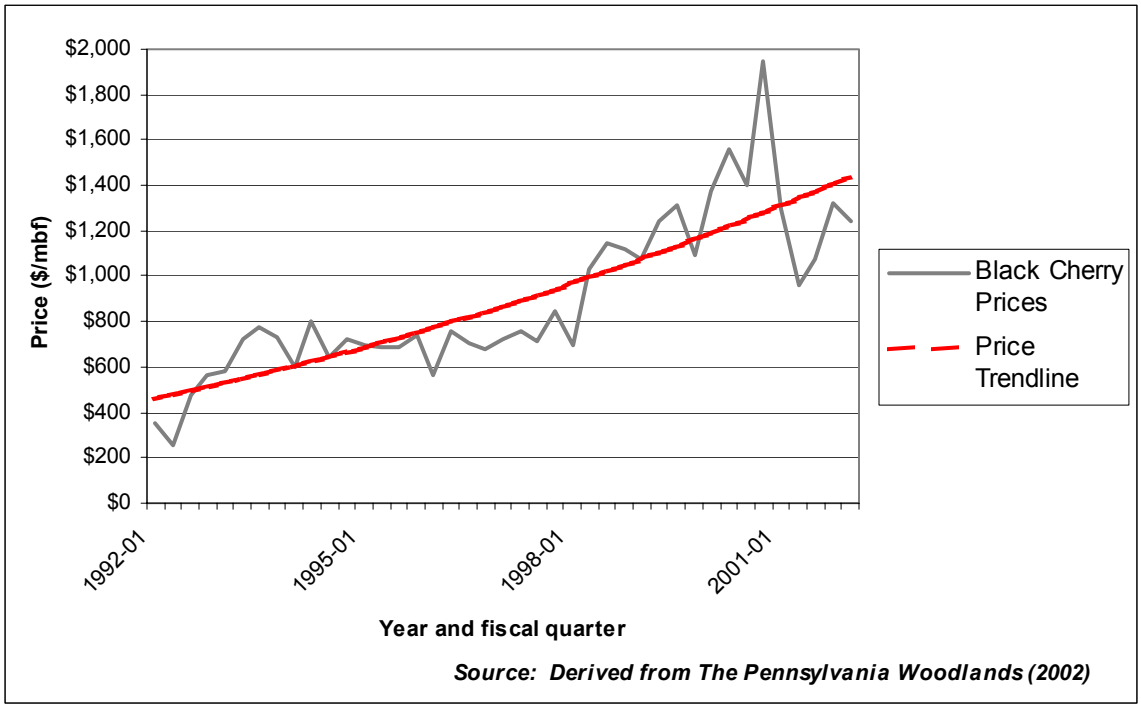

Figure 2: Black cherry price trends and trend line since 1992

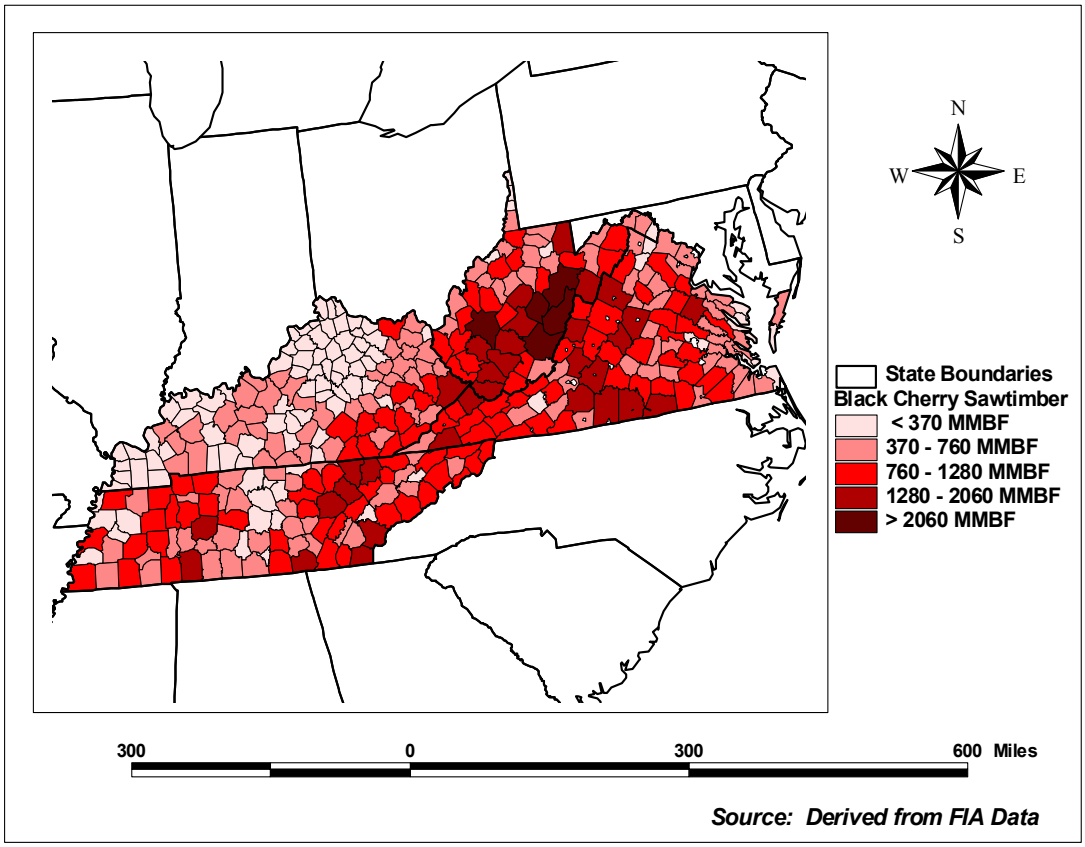

Figure 3: Black cherry sawtimber volumes across the Southern Appalachian region

Finally, the prevalence of the forest industry in the Southern Appalachians, particularly in the form of a large number of small sawmills, makes disposing of stolen timber relatively simple. Most states in the region do not have laws requiring some proof of ownership at the point of sale. While a purchaser may suspect the timber was stolen, they would be under no legal obligation to determine the true owner.

With the exception of "enjoyable" and to a lesser extent "removable," timber in the Southern Appalachians meets the criteria for a suitable target for theft defined by the model "CRAVED".

1.3. Justification

The completion of all three components of the RAT suggests that the Southern Appalachian region is an area that could conceivably be rife with timber theft. While major industrial landholders, such as real estate investment trusts and coal companies, have extensive property in this region, news of timber theft is infrequent and major cases often originate from U.S. Forest Service lands (e.g. Associated Press 2001). A search of recent news articles on timber theft shows there is little public news of timber theft occurring on private lands.

There could be numerous reasons why news reports of timber theft are so infrequent in the Southern Appalachian region. The major industrial landowners may shy away from any sort of legal battle, and therefore elect to settle cases out of court. Law enforcement officials or prosecuting attorneys could be turning a blind eye to an issue they feel is unimportant, or they may be ill-equipped to handle timber theft cases. State law in the area may restrict the ability of the police and prosecutors to follow through with all but the most blatant instances of timber theft. These could result in the lack of publicity surrounding the problem in the region, or timber theft may simply not be common in the area.

Without a thorough understanding of how significant a problem timber theft is to landowners in the Southern Appalachian region, a complete analysis of the issue is not warranted. In order to obtain some understanding of why more cases are not going to court, if in fact timber theft is deemed common in the area, information on the issue should be obtained from the law enforcement officials and prosecuting attorneys responsible for processing these cases. Based on information obtained from these two groups, some preliminary estimates of how significant a problem timber theft is, how significant it is perceived to be, and how readily it is being investigated and prosecuted can be developed.

1.4. Objectives

This study has four basic objectives:

1. Develop an estimate of the amount of timber theft that is occurring in the Southern Appalachian region.
2. Document the current level of prosecution and conviction of timber theft cases in the Southern Appalachian Region.
3. Ascertain the level of knowledge of prosecuting attorneys and law enforcement officials in the Southern Appalachian region regarding timber theft.
4. Develop recommendations that could ultimately help to reduce the occurrence of timber theft in the Southern Appalachian region.

2. Literature Review

The available published information regarding timber theft is scattered among numerous sources of information and research. Much of the available information rarely reaches the forestry journals. Some of the most interesting data is found in industry reports, government publications, or criminal justice journals.

2.1. Comprehensive timber theft research

Matthews (1970) described an unpublished survey of loggers and forest landowners conducted in Washington State. His response rate was only 17%; however, because 82% of respondents had reported loss, the author felt the results likely represented well more than 17% of the actual losses. Matthews estimated $1,000,000 loss in Washington during a one-year period, of which 47% was a result of theft, and 18% was a result of trespass. Though equipment

and machinery theft also contributed to the total dollar estimate Matthews did not specify what percentage represented only timber theft. The author also found that the majority of thefts were occurring on private land. He offered the fact that public land is frequently visited by employees driving "official" vehicles as a possible deterrent to theft from those properties. Additionally, the author found a reluctance to prosecute offenders due to fear of retribution, uncertainty about the legal system, and a general feeling that these crimes were "insignificant."

The lack of response in Matthews's research is not unique in timber trespass and theft investigations. A recent unpublished survey conducted in Virginia by the Virginia Forestry Association had only a 2% response regarding woodland security. The survey was aimed at representatives of all sectors of the forest industry, from landowners to consultants to loggers. The very poor response rate is not explained, and unlike in Matthews's survey, less than half of the respondents indicated any problems regarding woodland security (Virginia Forestry Association 2002).

A more comprehensive survey of timber theft issues was performed in New Brunswick, Canada. The provincial government, inspired by concerns over wood theft, created a working group to ascertain how significant a problem timber theft was in the area. The working group was a collaboration between a number of organizations. It attempted to determine what efforts had been made to reduce timber theft and to draw up recommendations of where improvements could be made to mitigate the impacts of timber theft in the province. Its methods involved using a survey of all branches of the Royal Canadian Mounted Police in the province to determine the number of cases about which they had been contacted, how many they had investigated, and how many had resulted in some sort of prosecution. An analysis of this information, as well as the laws surrounding wood theft, was performed to develop

recommendations about where improvements could be made (New Brunswick Wood Theft Working Group 2000).

The working group's findings showed that there had been an alarmingly rapid increase in timber thefts from government land over the past few years, and that while the number of thefts from private land were difficult to quantify, these too represented a significant loss. The working group listed the police perception that matters of this sort were civil in nature as one of the barriers to prosecution. This was due to the ability of the defendant to claim "color of right" to the wood, invalidating a criminal prosecution. Also, the lack of a legal deterrent to theft was listed among the critical factors. They listed recommendations for improvement in four categories: (1) enforcement, (2) legislation, (3) education and public awareness, and (4) prevention. This report is one of the most comprehensive of its sort that deals specifically with timber theft and trespass.

North America is certainly not alone in trying to grasp the extent of illegal timber operations. A number of countries with well-developed timber industries have attempted to estimate the amount of timber which is illegally harvested annually. Smith (2002) summarized a number of these estimates, emphasizing the extent of the worldwide problem with illegal timber operations. The majority of international illegal harvesting is partially the result of much weaker local government infrastructures, as a whole, than the United States and Canada. This likely accounts for estimates of up to 90% of the timber in some countries being harvested illegally.

The New York State Legislature attempted to analyze the impacts and potential cures for timber theft and trespass in that state. Here also, a government working group was created to study the problem of timber theft and trespass. The working group focused specifically on the legal ramifications of the problem and potential legislative changes that could be made to remedy

the issues surrounding timber theft in the state. A number of public hearings were organized to collect input regarding the needed changes, and why the current statutes were inadequate (NYS Legislative Commission on Rural Resources 2001). The ultimate result of these hearings was a strengthening of New York's timber theft laws.

Heimel (1993) described similar efforts in Pennsylvania, where forest industry representatives worked with prosecuting attorneys to improve the statutes surrounding timber trespass. The author described the perceived increase in timber trespass. This occurred particularly in the regions of the state where high-value timber grew in abundance. He also revealed a desire to increase the civil damages which were limited by the statutes. While the efforts were not initiated by the Pennsylvania state legislature, new legislation was ultimately adopted which increased penalties.

Swanson (1981) addressed the seeming lack of research on timber trespass and theft, under the general title of rural and agricultural crime. His research shows that there is a general lack of knowledge regarding the true extent of rural crimes in general. Offenses are not reported much of the time. Also, the FBI Uniform Crime Report does not breakdown the number of offenses that occur, but only the arrests. As a result, reported values for rural crime may be grossly under-representing the extent of the problem. As Swanson points out, one potentially severe result of this lack of information regarding rural crimes is a shift in the funding of criminal justice away from rural areas, and a shift in policy focus towards curbing crime primarily in urban areas.

2.2. Practical approaches to timber theft

The majority of public information available on timber trespass and theft focuses on assisting landowners in preventing the occurrence of trespass. A number of state extension agencies and forestry associations have published some sort of document that outlines actions which can be taken to reduce the occurrence of theft, and what can be done if a trespass should occur (Baker and Mortimer 2002a, Elmore 2002, Florida Forestry Association Woodlands Security Task Force, Mercker, Texas Forest Service 2002). These reports are recommend that landowners work with reputable foresters when harvesting timber, require a contract before starting any harvest, mark the boundaries of property, and inspect the property frequently to determine if theft has occurred.

The West Virginia Forestry Association has taken a slightly different approach. It published a fact sheet regarding timber trespass, but rather than detailing methods of preventing or reducing occurrences of theft, the publication details the various pertinent laws in West Virginia and the types of offenses these laws are meant to address (Gillespie). The purpose seems to be explaining the law and encouraging landowners to act against individuals who trespass on their timber.

In addition to information focusing on the prevention of theft, the Forest Resource Association also publishes "security alerts" aimed at notifying members of various methods which have been employed to steal from landowners or forest products firms. Among the trends these articles identify are the increased number of timber thefts to fund drug habits (Adams 2002), loggers harvesting unauthorized timber during salvage operations (Woodson 1998), and loggers harvesting unmarked trees during thinnings (Woodson 1995). One alert focused specifically on the increase in timber theft in the Appalachian Region (Radspinner 2002). It

detailed two separate cases of timber theft in the region and how these instances were handled. Recommendations were also provided which might help deter timber trespass.

Malm and McCollum (1983) described policies corporations could adopt to curb timber theft on an institution-wide basis. While the majority of concerns centered on internal fraud by both loggers and industry employees, some attention was given to restricting timber trespass and theft. McCollum (1987) reiterated many of these points, but also offered a number of more detailed practical efforts which could be taken. Included in the recommendations were frequent field inspections, surveillance, and in-woods cameras.

The federal government has also taken note of the importance of timber theft. The FBI Law Enforcement Bulletin has twice featured articles which focus on timber theft and proper investigative techniques. Windsor (1999) describes a case study of black walnut theft in Indiana which was solved by the state forestry agency two years after beginning the investigation. Examples of timber values lost to theft are given as well as investigative recommendations for law enforcement officers who might be responsible for timber theft investigations.

Turchie and Williams (1979) provide a thorough description of timber theft activity in the Pacific Northwest, and are able to provide some of the most detailed (though dated) numbers regarding the levels of National Forest theft at that time. In one six-month period, 55 reports of theft from one forest were recorded, with suspects identified in 35 of these cases. At one point in the spring of 1977, the Portland FBI office was investigating 110 timber theft incidents. The authors also detail examples of the various types of theft that might be encountered, the types of evidence that could be informative in a timber theft investigation, prices for some types of timber at that time, and investigative techniques useful to other law enforcement agencies.

Legal professionals also have had limited exposure to published information regarding timber trespass and theft. Wage and Becker (1999) is the only recent law review article to deal with the topic. The authors describe how the timber business is generally transacted and identify the greatest potentials for theft and fraud. Approximate timber values and methods to prevent trespass are also provided. They detail the types of information that should be gathered to formulate a strong timber trespass or theft case. This would include detailed notes of all parties involved, exactly what was taken, dates and times of the incident if known, and a detailed damage report prepared by a professional forester. A suitable damage report should contain, at a minimum, the involved parties, a detailed property description with maps, the method used in appraising the stolen timber, information on market prices, and a thorough breakdown of what was taken.

Finally, they describe problems which can exist in civil litigation and criminal prosecutions. These problems include the need to prove evidence of intent and timber ownership beyond a reasonable doubt in a criminal case, and the difficulty of collecting on judgments in civil cases. They also offer potential solutions for these problems. The solutions range from allowing natural resource professionals to investigate these cases, to altering the laws themselves to create different types of penalties which may be more influential in deterring criminals, or even allowing enforcement through existing legislation, such as state clean water acts, which could allow for penalties if thefts resulted in pollution.

2.3. Societal research on timber theft

A somewhat different research approach was utilized by Pendleton (1998). He performed an ethnographic study with a number of Forest Service law enforcement officers in

the Pacific Northwest. He attempted to ascertain the role of timber theft in the "social order of the forest community." His findings showed that there was a decided acceptance of timber theft within the forest community at large, and that the skills and techniques of theft were often handed down through the generations. He also grouped timber theft types into four categories: timber trespass, affiliated timber theft, unaffiliated timber theft, and timber poaching.

Timber trespass occurred when timber outside an existing timber contract was harvested on an actual job, such as cutting unmarked trees in a thinning or selection cut. Affiliated timber theft was defined as cutting outside the delineated timber harvest boundaries. Unaffiliated timber theft involved moving logging equipment onto a site specifically to steal timber. Timber poaching involved individuals cutting one or two trees in an area, possibly without the assistance of logging equipment. Pendleton found that there was a perceived scale of the social deviance involved with the various forms of theft. Trespass was perceived as the least deviant whereas poaching was perceived as the most deviant.

Pendleton's findings suggested that everyone, including enforcement officers, knew about theft and largely accepted it. The majority of the community surrounding the National Forest on which he did his research admitted that only unaffiliated timber theft was truly shunned by the community. Even then it was mostly due to the fact that this sort of action created an unfair advantage for the thieves because they were by-passing the normal logging protocols and linking "the 'honorable' profession with dishonesty." Even poaching was accepted; however, because it was typically performed by the lowest members of the community, timber poachers were labeled criminals by the community. In this way, it seems these individuals could still be labeled criminal, but they were allowed a place in the forest community (Pendleton 1998).

2.4. Legal Review

Any research focusing on timber theft should address the specific statutes, both criminal and civil, in the states of interest for the research. This type of investigation may illustrate potential legal shortcomings.

2.4.1. Civil Statutes

Civil statutes dealing with timber trespass can be split into three general categories based on the levels of damages the statute awards. In the majority of states, the law allows for either one, two, or three levels of damages depending on the facts of the case, with each level typically corresponding to some multiple of the stumpage value. An example of a statute which employs three levels of damages is employed in Tennessee. Here, timber unintentionally harvested with a "good faith" belief of ownership requires only stumpage value be paid; timber harvested negligently requires double stumpage; and unlawful timber harvested intentionally requires a triple stumpage payment to the landowner (Tennessee 2001). While this form is the most common, and triple stumpage is typically the amount paid for intentional trespass of timber, a wide range of potential damages exist. For example, in New Hampshire a negligent trespass can result in a damage award from 3 to 10 times the market value of the timber (New Hampshire 2001).

In the Southern Appalachians, there are states which employ each of the three major types of timber trespass statutes. In Virginia, as in Tennessee, civil violations can result in three levels of damages. The course of action undertaken by perpetrators in selecting their defense, however, has as much impact on the level of damages paid as does the intent of the trespasser. The highest level of penalty available is triple the stumpage value of the cut timber. The trespass

does not have to be willful or intentional to warrant a triple stumpage award, instead, the trespasser must deny a trespass occurred and be proven wrong by the landowner. If, however, the violator simply admits the trespass, they must pay double stumpage. An exception occurs if the trespasser can show a good faith claim to the trespassed timber. If the good faith defense is valid, the trespasser must pay only single stumpage (Virginia 2001).

The requirements of a good faith defense have not been clearly defined in case law, but it seems that if there is some justifiable reason for trespassers to believe the timber was their own, then they can be determined by a court to have acted in "good faith." While there has been little further interpretation of the Virginia statute in case law, the court has determined that a triple stumpage award, if determined feasible, is in the nature of a penalty to the trespasser, so further punitive damages cannot be sought (*Porter v. Wilson* 1992).

The statute in Kentucky involves two levels of damages, stumpage value and triple stumpage. The Kentucky law requires documentation that the landowner from whom the timber was cut was told of the harvest and gave his permission prior to the cutting (Kentucky 2001). This stricter requirement to avoid triple damages is compounded by a case history suggesting a propensity towards punitive damages in timber trespass cases (*Holliday v. Campbell* 1994).

The timber trespass statute in West Virginia has only one level of damages, triple stumpage, which is available if the landowner can simply show that a trespass occurred (West Virginia 2001). The intent of the law is to fairly compensate landowners for their loss (*Bullman v. D&R Lumber Co.* 1995). Presumably, a landowner may have refrained from cutting mature timber because stumpage prices were lower than they were willing to accept. By providing triple stumpage even if a trespass is casual and involuntary, the court has attempted to alleviate this

situation. Additionally, the law does not preclude the potential for punitive damages in excess of the triple stumpage (*Bullman v. D&R Lumber Co.* 1995).

While timber trespass statutes can generally be categorized based on the structure of their damage awards, other factors within the wording of the statutes are also critical to their utility in civil litigation. The treatment of "trespasser intent" is one of these issues. In those states which have multiple levels of damages, such as Tennessee and Virginia, the intent of the trespasser can play a key role in determining which level the court awards. The wording of the timber trespass statute in Virginia seems to place the burden on the trespasser to show that they did not intend to commit the trespass. In other words, there is a presumption of intent (Virginia 2001). Tennessee, however, seems to have no such presumption. In the absence of evidence as to intent, the court will not presume its existence (*Mix v. Miller* 1999).

As mentioned previously, the good faith defense is the method by which trespassers can seek to reduce the damage award for which they will be liable. The relative ease or difficulty in successfully employing this defense, therefore, is also a key issue to consider in timber trespass cases. In some cases, a good faith defense has succeeded where evidence has been given to the court verifying that the offending party had some reason to believe that they maintained ownership of the land. For example, in *Porter v. Wilson* (1992) the defendant cut timber on a portion of a tract for which he had a deed; however, unbeknownst to him, half of that tract had been granted to another party years before the defendant had purchased the entire tract. As a result, the defendant believed his title to the entire tract was valid because he had no knowledge of the previous conveyance. In this situation, the court decided the defendant was trespassing under a good faith belief in ownership of the land.

Another consideration regarding civil timber trespass is the futility of trying to collect damage awards from "judgment-proof" defendants, or those who have little or no assets. When the court awards plaintiffs a civil judgment, they are required to collect that judgment without the assistance or authority of any law enforcement agency. Also, if defendants do not have sufficient assets to meet the claims of all their creditors, they can file for bankruptcy and the plaintiff's claim will be invalidated.

2.4.2. Criminal Statutes

In addition to timber trespass, the civil violation involving the unauthorized removal of timber, timber theft is also an important legal remedy available to landowners. Theft represents a criminal violation which can result in prison, fines, and restitution depending upon the discretion of the court. Often, it may be desirable for a landowner to pursue civil remedies for a timber theft. This might be the case because the goal of most civil remedies for timber trespass is to financially compensate the landowner for their loss. However, as mentioned above, responsibility for collection of any judgment awarded falls entirely on the shoulders of the litigant. If the trespasser is judgment-proof, a successful civil litigation is fruitless. When this is the case, a criminal prosecution, if possible, could provide jail time in addition to financial punishment.

In most states, a timber theft falls under a blanket theft or larceny law which covers thefts of most types of property (West Virginia is an exception, as it has a separate timber theft law). Here, the legal requirements require showing that the alleged thief intended to deprive the landowner of the timber, and was acting willfully and maliciously. The key distinguishing characteristic between a timber theft and a timber trespass is that the burden of proof shifts to

"beyond a reasonable doubt," whereas it is merely a "preponderance of the evidence" in a civil litigation. This makes winning a timber theft case even more difficult, as it requires proving that thieves recognized the property boundary in the woods and intentionally crossed it to harvest timber which they knew was not their own. This burden of proof becomes even more problematic when the issue of reconstructing a possibly harvested boundary line is raised.

If no clear boundaries can be shown, ownership of the timber is brought into question. If the ownership cannot be clearly established, then it cannot be clearly established that the timber was stolen. The burden rests entirely upon the state to prove where the boundary line lies in order to establish ownership (*State v. Williams* 2000). This could represent a major hurdle to prosecution in instances where a survey has not been previously performed, as the financial responsibility for obtaining the survey would then fall to the state. Even if the boundary isn't required to show ownership of the timber, it will likely be a key factor in proving the malicious intent of the trespasser (*State v. Williams* 2000).

While these issues make successful timber theft prosecutions rare, they do occur (*State v. Petrice* 1990). Successful prosecutions are a critical factor, not only for the purposes of helping serve as a deterrent to other potential thieves, but also to create a permanent record of timber theft on the part of the thief. A critical aspect of sentencing in a criminal conviction is the question of previous convictions. An individual without any previous criminal convictions will receive a much lighter sentence than a career criminal (Tennessee 2001). As a number of other researchers have pointed out, the prevalence of repeat offenders can be quite high in timber trespass and theft, as a result, it is important that offenders are prosecuted and the penalties are appropriate when caught (Pendleton 1998, Wage and Becker 1999, Windsor 1999).

West Virginia, as was mentioned previously, has adopted a separate criminal statute to deal specifically with timber theft cases. The legal requirements of the law are identical to general larceny; however, the state has elected to increase the financial penalty handed down to convicted offenders. Whereas in most states a thief may be required to pay restitution to the landowner for the timber stolen at the discretion of the court, in West Virginia, the violator is required to pay triple stumpage value if convicted. This is a critical inclusion in a timber theft statute. There is now no financial incentive to pursue civil remedies in West Virginia in lieu of criminal remedies, as the court will require the same damage award. Thus, if the facts of the case are strong enough to overcome the criminal burden of proof, landowners have incentive to pursue criminal remedies.

3. Methodology

The methods employed to complete this research project involved input from members of the graduate committee, as well as an industry steering committee composed of represenatives from Georgia Pacific, MeadWestvaco, Plum Creek, Mountain Forest Products, The Forestland Group, and Wagner Forest Management.

3.1. Preliminary project definition

The initial step in determining the utility of this project was discussions with local landowners to determine what problems were being encountered regarding timber trespass and theft. After an initial meeting with employees of Mountain Forest Products to ascertain what areas might need further research, an initial research prospectus was developed to solicit further interest and support in the project.

When the above-mentioned participators agreed to fund the project, a preliminary research plan was developed detailing the general objectives of the project, the proposed research area, and methods which might be employed to fulfill the objectives.

3.2. Finalization of project plan

The industry steering committee was convened to discuss the preliminary research plan. Based upon input from this group, as well as the graduate committee, further synthesis of the objectives was performed. Also, redefinition of the research area was performed such that all research counties represented both the landholdings of the project participators and a relatively uniform amount of timber industry activity (Figure 4). The research area included twenty counties based on the budgetary limitations of the project. A random selection of between 30 and 35 counties could provide a stronger statistical analysis. As a result, this project should be considered a pilot project designed to meet the objectives set out in section 1.4.

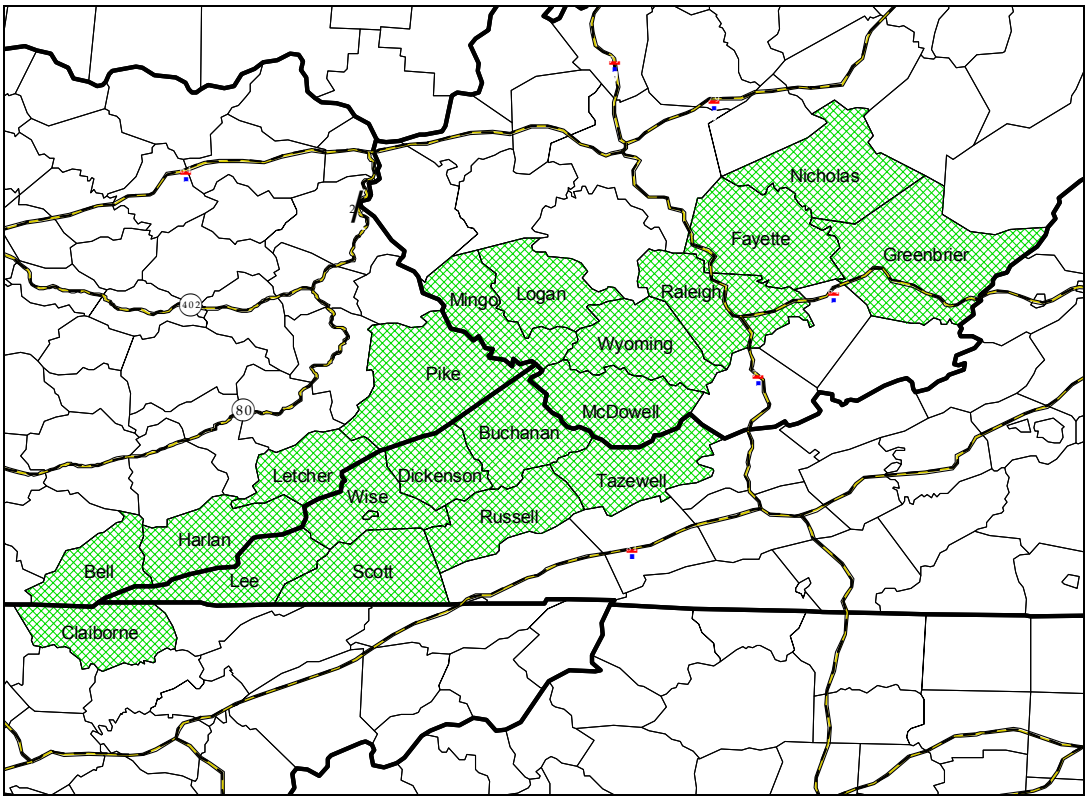

Figure 4: Project research area

3.3. Legal research

During the spring semester of 2002, a comprehensive legal research of pertinent criminal and civil statutes was undertaken. The purpose of this review was twofold. First, the researcher needed to become familiar with the terminology and intricacies of the legal profession to prepare him for composing appropriate interview instruments and for conducting the interviews. Secondly, a thorough review was required for the purpose of familiarizing the researcher with how cases of this sort had previously been conducted in the courts. This would allow appropriate recommendations to be made regarding potential changes to legislation.

3.4. Sample selection

The sampling population was selected based on input from the industry committee as to which counties would provide the most uniform depiction of timber activity in the Southern Appalachians. A face-to-face interview would be conducted with a county prosecuting attorney and a local law enforcement official in each of the research counties. This format would allow for the direction of interviews by the researcher and for interpretation of questions to ensure the highest quality of responses possible. Phone interviews would be conducted with a subset of the landowners in this region as well, in order to develop an estimate of the extent of timber trespass and theft occurrences in the region.

Selection of landowners could not feasibly be conducted through a random sampling scheme because an unbiased population of forest landowners in the desired region could not be obtained within the budget and time constraints of the project. Based on previous survey research, a judgment sampling scheme was selected as the most appropriate method to obtain a somewhat representative sample of forest landowners (Schutt 2001). In the judgment sampling scheme, knowledgeable industry individuals were asked to provide what, in their opinions, was a representative cross-section of landowners in their respective area. From these lists, a sample of five non-industrial landowners per county was selected.

The researchers hypothesized that timber theft would affect industrial and non-industrial landowners differently. Industrial landowners were believed to be less likely to pursue civil judgments against individuals to protect their corporate image. Also the scale of theft was expected to differ somewhat. Many industrial landowners have expansive non-contiguous landholdings, so numerous thefts could be occurring on various portions of their properties. Finally, a theft of the same absolute value was expected to have a much greater impact on a non-

industrial landowner because it would represent a larger percentage of their total landholdings. As a result, a separate sample of industrial landowners was also collected. This sample was collected using a snowball sampling scheme (Schutt 2001). Essentially, any major industrial landowner the researcher discovered in the area was contacted and requested to participate in the phone survey.

3.5. Survey construction

Three surveys were constructed to gather the information deemed necessary for the research (Appendices A, B, C). The format and content were selected to facilitate the subsequent analysis, with minimal open-ended questions. In this way, the majority of the questions could be easily classified and entered into a statistical analysis program. The scope of the surveys was minimized for both the attorneys and law enforcement officials in order to emphasize the focus of the research entirely towards timber theft. The landowner survey included more general information in an attempt to ascertain contributing factors that might serve as future predictors of timber theft vulnerability.

Once the surveys had been completed, they were submitted to the graduate committee for review and revision. Following this round of revision, they were also sent to the industry steering committee for further review. The input of all individuals was incorporated into the final survey instruments.

3.5.1. Validation

Prior to interviewing subjects, the surveys were used on a test county adjacent to the research area. Minor revisions followed this validation survey. The surveys attached in Appendix A are those which were used in the actual interview process.

3.6. Interview Collection

During the late summer, fall and winter of 2002 surveys were conducted with prosecuting attorneys, law enforcement officials, and landowners. All surveys were conducted by the researcher to minimize variation between individual surveys and to ensure uniform interpretation of questions across subjects. In scheduling interviews in each of the research counties, the prosecuting attorney's office was contacted, and an interview date arranged. Following the interview, the interviewer went to the sheriff's office of the same county and asked to be put in contact with someone who would be knowledgeable about timber thefts in the county over the past five years.

3.7. Statistical Analysis

Following the collection of all interview data, a statistical analysis was carried out to look for trends in the data. Due to the small sample size, analysis of attorney and law enforcement responses was performed using nonparametric statistics. Hodges-Lehman estimates of median values were calculated as estimates of average response to each question (Hollander and Wolfe 1999). The data was broken down to the state level to examine differences, if any between the states. Kruskal-Wallis tests for location were used to test for any significant differences at the $\alpha = 0.05$ level (Hollander and Wolfe 1999).

A factor analysis was performed on the surveys to determine if there were underlying factors which seemed to drive responses. The number of factors was determined using an eigenvalue cutoff of 1.0. Using the resulting factor scores, a cluster analysis was performed. The clustering algorithms utilized a dissimilarity matrix computed from the factor scores and variables as an input into the analysis. This matrix was computed via the "daisy" function in R (Kaufman and Rousseeuw 1990). Two clustering algorithms were compared to determine which presented the best division of attorneys. The methods utilized were a fuzzy cluster analysis and partitioning around medoids. The two methods were compared to determine if a hard clustering procedure, partitioning around medoids, was more suited to the data than a fuzzy clustering procedure.

Additionally, comparisons were made between the responses of attorneys and law enforcement officials to the same questions to determine if there is a difference in perceptions of timber theft between the two. This analysis was done using Fisher's exact test at the $\alpha = 0.05$ level (Hollander and Wolfe 1999).

Analysis of landowner data was subject to the limitations of the sampling scheme employed to gather the data. Because a non-probability method was employed, analysis was limited to empirical rather than statistical methods. Summaries of findings were generated, with general trends in the data highlighted. Where pertinent, comparisons were made between landowner data and the law enforcement and attorney data.

4. Results

4.1. Prosecuting Attorney Responses

Attorney responses are summarized by question in Table 1. Those questions not included in the table were open-ended questions which are summarized in Appendix B. They were not categorized for purposes of assessing average response. The average responses for questions 1, 2, 4, 11, 12, 17, 18, 19, and 20 represent a response category which has been given a numeric code. Table 2 shows the categories and codes for each of these questions. Responses to questions 1, 4, 11, 12, and 20 are on a nominal scale, so average responses refer to modes, not median estimates. The average response for questions 15 and 16 represent average rankings with a possible high value of seven. Question 15c, for example, has an average response of 5.5, which means that attorneys ranked timber theft between the fifth and sixth least severe crime of the seven listed. Further detail of specific attorney responses, including open-ended responses, is given in Appendix B.

Table 1: Average response by question and significant differences between states for prosecuting attorney responses

Question	State Responses			Avg. Response	Sig. Difference	P-value
	VA (n=6)	WV (n=8)	KY (n=4)			
Q1	0.5	0	0	0	no	
Q2	2	0.75	0.5	1	no	
Q3	4.5	0.75	0	1	yes	0.049
Q4	1.75	5	1	3	no	
Q5	4	1.75	0	2.5	no	
Q7	3	1	0	1.5	no	
Q8	0	0	0	0	no	
Q9	100	0	0	50	no	
Q10	100	100	100	100	no	
Q11	0	1	0	0.5	no	
Q12	1	1	na	1	no	
Q15a	4	4	5	4	no	
Q15b	2	2	3.5	2	no	
Q15c	6	5.5	5.5	5.5	no	
Q15d	6.5	7	7	7	no	
Q15e	4	3.5	3.5	3.5	no	
Q15f	2.5	1	2.25	2	no	
Q15g	2.5	5	1	3.5	yes	0.004
Q16a	3.5	3.5	4.75	4	no	
Q16b	5.5	3.25	4.5	4	no	
Q16c	6	6	6	6	no	
Q16d	5	6.25	5.5	6	no	
Q16e	2.5	2.75	2.5	2.5	no	
Q16f	2	1.5	3	2	no	
Q16g	3	4.75	1.5	3.5	yes	0.017
Q17a	3	4	4	4	no	
Q17b	3	2	2.5	2.5	no	
Q17c	2.5	2.75	3.5	3	no	
Q17d	3	2.75	2.75	3	no	
Q17e	2	3	2.25	2.5	no	
Q17f	3	2.75	3	3	no	
Q17g	3	3.5	4	3.5	no	
Q17h	3	3	3.25	3	no	
Q17i	3.5	4	4	4	no	
Q17j	3	3.5	1.75	3	no	
Q17k	2.5	3	2.5	3	no	
Q17l	3.5	4	3	3.5	no	
Q18	2.5	3	3	3	no	
Q19	2	2.5	2	2.5	no	
Q20	0	0.5	0.5	0.5	no	

Table 2: Codes and response categories for statistical analysis on attorney responses

Question	Numerical Code	Response Category
1	0	insignificant
1	1	significant
2	0	0
2	1	1-2
2	2	3-5
2	3	6-10
2	4	11-15
2	5	> 15
4	1	larceny
4	2	destruction of trees
4	3	conversion
4	4	destruction of property
4	5	timber theft
11	0	difficult
11	1	easy
12	0	unsupportive
12	1	supportive
17	1	strongly agree
17	2	agree
17	3	neither agree nor disagree
17	4	disagree
17	5	strongly disagree
18	0	< $100
18	1	$100-500
18	2	$500-1000
18	3	> $1000
19	0	< $50
19	1	$50 - 200
19	2	$200 - 500
19	3	> $500
20	0	misdemeanor trespassing
20	1	felony armed robbery

Each question which has a quantitative response was tested to determine if there was a significant difference between the responses in each state . The only questions which exhibit this difference at the $\alpha = 0.05$ level are question three, 15g, and 16g. Question three deals with the number of cases tried by attorneys in the past three years. Questions 15g and 16g both deal with the ranking of assault within the list of seven crimes. The selection of the term assault (which

means the imminent threat of harm, as opposed to the actual harm itself) and its interpretation within each state may be one source of the significant difference between the states.

The analysis of response with respect to experience dealing with timber theft also resulted in few significant differences at the $\alpha = 0.05$ level. An analysis comparing attorneys who had handled at least one case to those who had not prosecuted any cases found a significant difference only on question 17g, which deals with the effects of timber theft on industrial landowners. Attorneys with no experience rated the impact of timber theft on industrial landowners lower than attorneys who had experience with timber theft ($P = 0.049$). A second analysis looking at experience in terms of response to question two (the number of instances regarding which attorneys were contacted annually) resulted in one significant difference as well. This, however, was question 16c which is the rating of likelihood of prosecuting timber theft. The results merely point out the obvious, that individuals who have dealt with more timber theft cases are more likely to prosecute those cases.

A test was performed between question 15c and question 16c to determine if there was a significant difference between the relative severity of timber theft and the likelihood of prosecuting timber theft. There was no significant difference with respect to the average rank ($P = 0.228$) or the dispersion in the data ($P = 0.252$).

4.1.1. Factor analysis

In addition to calculating average responses, a factor analysis was performed on the data to ascertain if there were underlying factors within the surveys which seemed to group attorneys in their response patterns. Five factors had eigenvalues greater than one. These five factors explained 82% of the variation in the input variables. In order to facilitate analysis of the factors,

the results were entered into a clustering program which formed discrete clusters out of the variables analyzed. This forced each variable to be a member of only one factor, based upon the factor loadings, or the correlation of each variable with each factor. The factor for which each variable has the highest loading will represent its membership in that factor. Table 3 shows the results of this analysis with the variables contained within each factor, their r^2 within that factor, their r^2 with the next closest factor, and the ratio of these values. Because of the small sample sizes, the factor analysis is not statistically sound. Kaiser's measure of sampling adequacy is only 0.28.

Table 3: Discrete factors computed from attorney responses

Factor	Variable	R-squared with		1-R**2 Ratio
		Own Factor	Next Closest	
Factor 1	**q17e**	0.76	0.08	0.26
	q17f	0.77	0.06	0.25
	q17j	0.76	0.05	0.25
	q17k	0.56	0.15	0.52
Factor 2	**q17a**	0.69	0.06	0.33
	q17g	0.72	0.03	0.29
	q17h	0.52	0.08	0.53
	q17l	0.47	0.28	0.74
Factor 3	**q17b**	0.67	0.08	0.36
	q17d	0.43	0.15	0.67
	q20	0.47	0.13	0.60
Factor 4	**q1**	0.63	0.05	0.39
	q2	0.73	0.08	0.29
	q17c	0.65	0.40	0.59
Factor 5	**q18**	0.68	0.10	0.35
	q19	0.68	0.03	0.33

All attorneys must have responded to a particular question for it to be included in the factor analysis. Also, the questions requiring attorneys to rank crimes (questions 15 and 16)

were not included in this phase of the analysis because their interpretation was not intuitive when separated from the other ranked crimes in the question. Three variables, question 3, question 17i, and state from which the attorney originated, were removed from the analysis because their placement did not fit with any of the factors. Kaiser's measure of sampling adequacy prior to the removal of these variables was 0.155.

Factor scores were calculated for each variable, which serves as a rescaling of the responses to the questions represented in that factor. This condensed scale serves as a tool to assess where attorneys differed in the underlying factors illuminated by the factor analysis. The researcher's interpretation of what underlying issue each factor is related to, and the explanation of the rescaled values is given in Figure 5. In factor 1 for example, a score of –2 would suggest that the individual felt that timber theft was simple to prosecute, and his responses would likely be high (meaning disagreement) for questions 17e, f, and k, but low (meaning agreement) for question 17j. Very few scores were outside the range of –2 to +2.

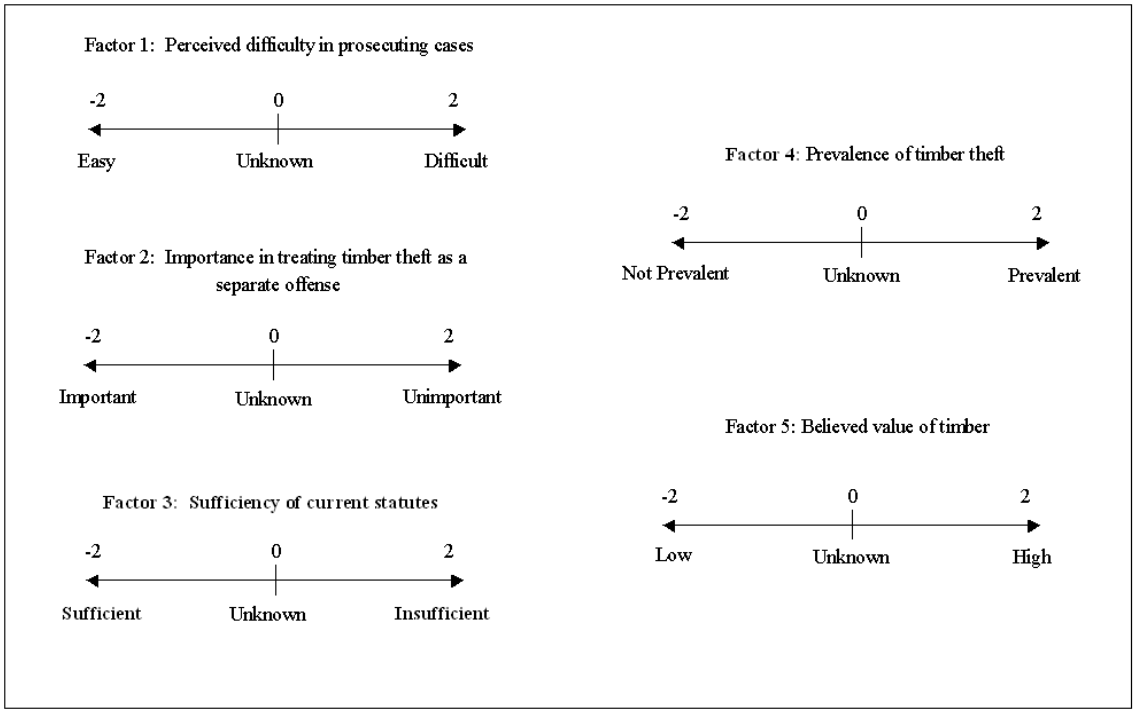

Figure 5: Factor interpretations and factor score scales

4.1.2. Cluster analysis

Using the calculated factor scores for each of the attorneys along with all other variables not included in the factor analysis, a cluster analysis was performed on the attorney responses. Two methods of clustering were utilized, both using an optimization approach, and the results were very similar, differing only in the selection of five attorneys (Figure 5). Neither procedure split attorneys along state lines (Table 3). The grouping developed using the partitioning around medoids algorithm produced slightly better results with an average similarity of 0.14 for two clusters, compared to a similarity of 0.13 using the fuzzy algorithm.

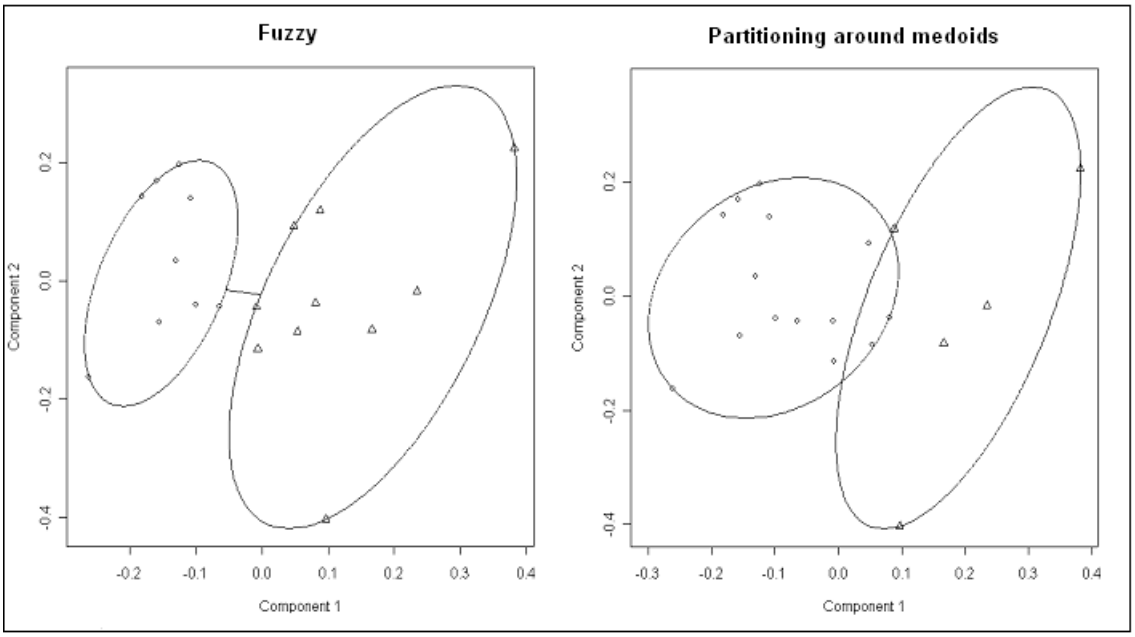

Figure 6: Results of clustering analysis using a fuzzy clustering algorithm and a partitioning around medoids algorithm

Table 4: Attorney cluster memberships

Fuzzy cluster 1	PAM cluster 1	Fuzzy cluster 2	PAM cluster 2
VA-1	VA-1	VA-2	VA-2
VA-3	VA-3	VA-4	VA-6
VA-5	VA-4	VA-6	KY-1
WV-1	VA-5	WV-2	KY-2
WV-3	WV-1	WV-6	KY-4
WV-4	WV-2	KY-1	
WV-5	WV-3	KY-2	
WV-7	WV-4	KY-3	
WV-8	WV-5	KY-4	
	WV-6	TN-1	
	WV-7		
	WV-8		
	KY-3		
	TN-1		

The factor scores of each cluster member in the fuzzy clustering are given in Table 5. Also shown are the average scores of all objects in the clusters. While none of the average

scores is extremely high, it can be clearly seen that the clusters differ in the sign of the average factor scores. Because factor scores are analogous to a rescaling of the variables included in the factors, this is an anticipated result. For individual objects, however, there is not a distinct pattern of score differences between the clusters. For example, the score for WV-3 in factor 1 is 1.7, which is logical because the average factor score is positive for cluster 1; however, VA-2 has a factor 1 score of about 1.8 even though it is a member of cluster 2.

Table 5: Factor scores and average factor scores for attorney clusters

	Cluster Members	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Cluster 1	VA-1	-0.62	0.71	-1.16	2.44	-0.07
	VA-3	-0.14	0.53	-0.20	-0.44	-0.61
	VA-4	-0.40	0.53	0.12	-0.28	-1.71
	VA-5	0.08	1.01	0.60	1.08	0.17
	WV-1	0.54	0.21	1.85	-0.73	0.21
	WV-2	0.38	-0.62	-1.45	-0.02	0.83
	WV-3	1.73	1.39	-0.64	0.32	0.49
	WV-4	-0.83	0.56	0.37	-0.12	0.36
	WV-5	-0.21	0.20	-0.24	0.32	1.03
	WV-6	0.33	-1.73	-1.03	-1.17	0.84
	WV-7	1.54	-0.11	0.48	1.34	0.42
	WV-8	-1.01	0.16	-1.38	-1.20	1.44
	KY-3	0.52	0.16	0.92	-0.91	0.11
	TN-1	0.28	0.80	0.63	-0.97	0.29
	Cluster Average	**0.16**	**0.27**	**-0.08**	**-0.02**	**0.27**
Cluster 2	VA-2	1.81	-1.64	-0.52	0.18	-2.04
	VA-6	-1.58	-1.97	1.72	1.45	0.46
	KY-1	-1.61	0.99	-0.59	-0.39	-2.06
	KY-2	-0.11	0.12	1.02	-0.69	0.30
	KY-4	-0.70	-1.31	-0.51	-0.22	-0.45
	Cluster Average	**-0.44**	**-0.76**	**0.22**	**0.07**	**-0.76**
	Absolute Difference	***0.59***	***1.04***	***0.30***	***0.09***	***1.03***

The differences in the absolute values of the average factor scores are extremely small. As a result of the small absolute differences, none of the factor scores is significantly different between the two clusters. The other variables included in the cluster analysis had equal

weighting in determining similarities within clusters, so the factors, which represent 16 variables between them, are likely not having enough influence in the clustering procedure. Despite the absence of significant differences between the clusters, factor 2 and factor 5 clearly have the largest absolute difference in average score. This suggests that cluster members are most divergent in their opinions regarding the importance of treating timber theft as a separate crime and their knowledge of the value represented by timber in the region (see Figure 5).

Looking at specific questions within the clusters, there are significant differences in a number of these. Questions 15b, 15g, 16f and 16g all deal with crimes ranked by attorneys and all have significantly different responses between the clusters. Questions 17a and 17l also had significant differences. Both of these questions were major influences in factor scores for factor 2.

4.2. Law Enforcement Officer Responses

Table 6 shows average responses to the law enforcement survey. Questions 1, 2, 8, 11, 12, and 13 all represent categorical questions which have been given numerical codes. Table 7 summarizes the codes for these questions. Responses to questions 1 and 8 are on a nominal scale, so their average response represents a mode, not a median estimate. Question 10 responses represent relative rankings of the severity of seven crimes. All questions were tested to determine if a significant difference existed in officer response between the states (Table 6). Only question 11c showed a statistically significant difference ($P = 0.042$). This question deals with the necessity of altering the laws dealing with timber theft based on the number of theft occurrences. Graphical breakdowns of law enforcement responses are given in Appendix C.

Table 6: Average response by question and significant differences between states for law enforcement officer responses

Question	State Responses VA (n=5)	WV (n=4)	KY (n=3)	Avg. Response	Sig. Difference	P-value
Q1	0	0	0.5	0	no	
Q2	1	1	1.5	1	no	
Q3	100	100	50	100	no	
Q4	40	19.25	25	25	no	
Q5	95	95	100	100	no	
Q6	10	9.5	75	20	no	
Q8	1	1	0	0.5	no	
Q10a	4.5	3.75	5	4.5	no	
Q10b	4	2.5	3.5	3.5	no	
Q10c	6	5	6	6	no	
Q10d	5.5	7	6.5	6.5	no	
Q10e	3.5	3.25	4	3	no	
Q10f	1.5	2.75	2	2	no	
Q10g	3	4	1	2.5	no	
Q11a	3.5	4	2	3.25	no	
Q11b	3	3	4.5	3	no	
Q11c	2	2.75	1.5	2	yes	0.042
Q11d	3	2.75	1.5	2.5	no	
Q11e	4	4	4.5	4	no	
Q11f	2.5	2	3	2	no	
Q11g	3	3.25	1.5	3	no	
Q11h	3.5	3.5	3	3.5	no	
Q11i	1.5	2	1.5	2	no	
Q11j	3	3	3	3	no	
Q11k	2.5	2	2	2	no	
Q11l	3	2	2	2.5	no	
Q12	2.5	2.25	2	2.5	no	
Q13	2.5	2.25	3	2.5	no	

These data were also analyzed to determine if there were significant differences based upon experience level. Question 2 was used as the classification variable to determine if there was a pattern as the number of cases handled increased. Significant differences arose in two questions, 11b ($P = 0.044$) and 11h ($P = 0.028$). Question 11b addresses the sufficiency of current laws to deter thieves, and question 11h deals with the propriety of victims negotiating for restitution in order to avoid the uncertainty of a trial.

Table 7: Codes and response categories for statistical analysis on law enforcement responses

Question	Numerical Code	Response Category
1	0	insignificant
1	1	significant
2	0	0
2	1	1-2
2	2	3-5
2	3	6-10
2	4	11-15
2	5	> 15
8	0	difficult
8	1	easy
11	1	strongly agree
11	2	agree
11	3	neither agree nor disagree
11	4	disagree
11	5	strongly disagree
12	0	< $100
12	1	$100-500
12	2	$500-1000
12	3	> $1000
13	0	< $50
13	1	$50 - 200
13	2	$200 - 500
13	3	> $500

4.2.1. Factor analysis

A set of the variables was entered into factor analysis to determine if there were underlying issues which seemed to drive law enforcement officer responses. Five factors had an eigenvalue greater than one. These factors combined accounted for 84% of the variability in the input variables. Variables left out of the initial analysis were those questions which not all attorneys answered, and all portions of question 10 which required a ranking of seven crimes in terms of severity. After an initial investigation, state of employment and questions 11d and 11g

were also excluded due to a poor fit of the model. Kaiser's measure of sampling adequacy could not be calculated because the number of variables exceeded the number of officers interviewed.

The final factor pattern was input into a clustering algorithm for generation of a table of variables which were primarily associated with each factor (Table 8). Factor scores were calculated during the analysis as well. The interpretation of these factors and the output factor scores are summarized in Figure 6. Many of the factors are similar to those observed from attorney responses. For example, both the sufficiency of current statutes and the difficulty in winning cases were factors derived from each survey.

Table 8: Factors computed from law enforcement responses

Cluster	Variable	R-squared with		1-R**2 Ratio
		Own Cluster	Next Closest	
Cluster 1	**q11e**	0.63	0.20	0.46
	q11j	0.63	0.10	0.41
	q12	0.64	0.03	0.37
Cluster 2	**q11a**	0.84	0.09	0.17
	q11b	0.84	0.26	0.21
Cluster 3	**q11i**	0.67	0.11	0.37
	q11l	0.49	0.15	0.60
	q13	0.32	0.17	0.83
Cluster 4	**q11c**	0.75	0.28	0.35
	q11f	0.75	0.24	0.33
Cluster 5	**q1**	0.77	0.08	0.25
	q2	0.78	0.07	0.24
	q11h	0.82	0.04	0.19

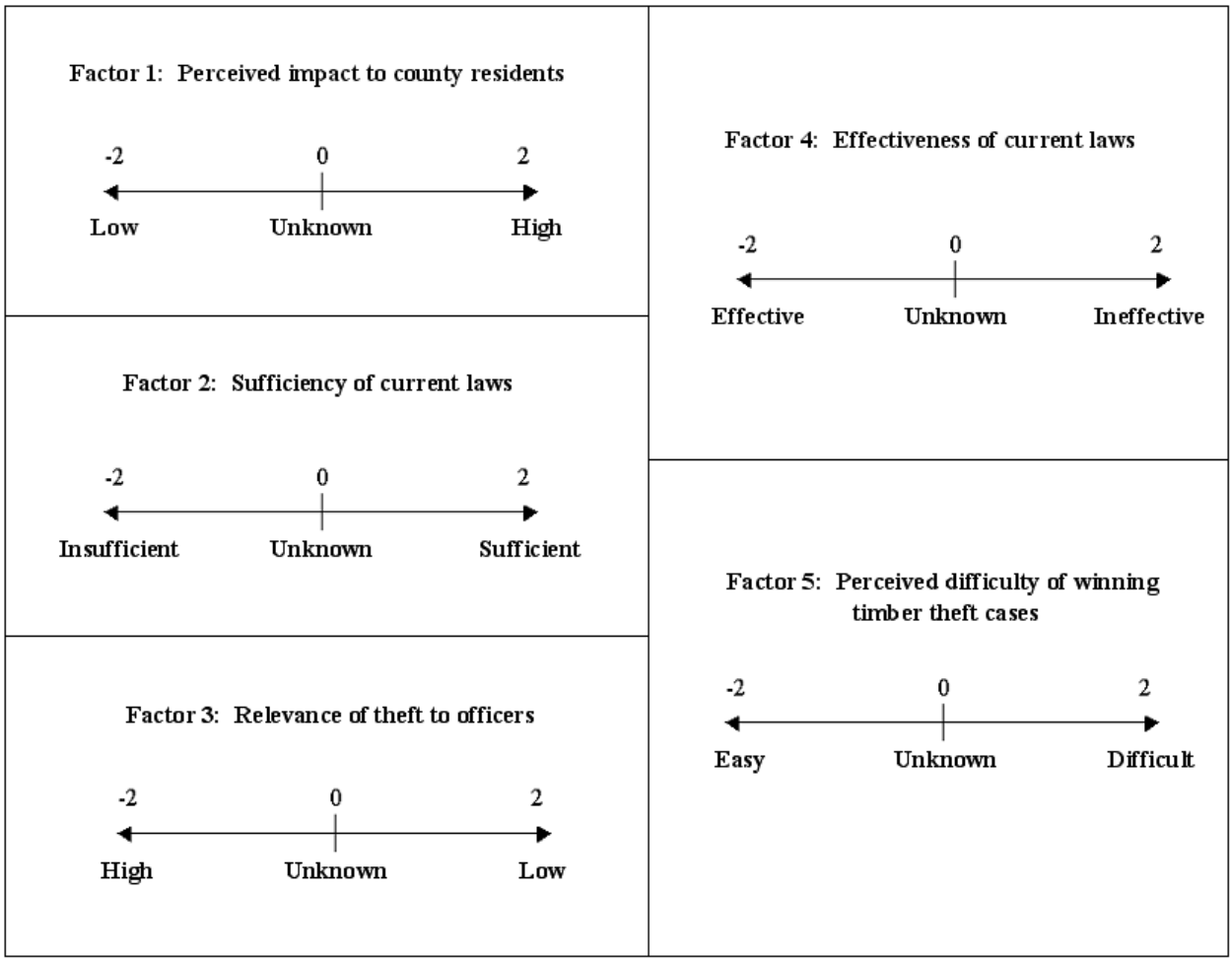

Figure 7: Calculated factors and factor score interpretations

4.2.2. Cluster analysis

A cluster analysis was performed on the data using the factor scores in addition to the variables not input into the factor analysis. The goal was to determine if groups of law enforcement officers were similar in their responses to the surveys, and if so, which characteristics seemed to be the defining variables in the cluster separation. As with the attorney responses, a hard and a fuzzy clustering algorithm were used to determine which created the

optimal clusters (Figure 6). The fuzzy algorithm yielded better results with an average similarity of 0.12 compared to 0.08 using the partitioning around medoids (PAM) algorithm.

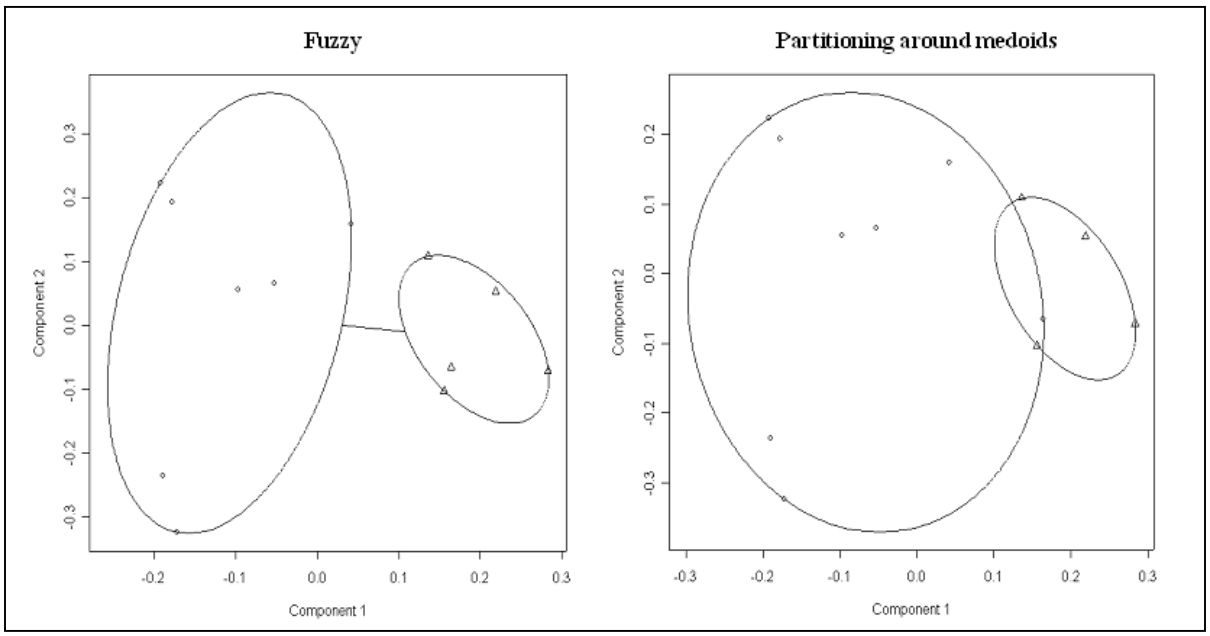

Figure 8: Clusters of law enforcement responses

The clusters produced are identical with the exception of one observation; officer VA-5 was included in the larger cluster with the PAM algorithm. Comparisons of the factor scores between the cluster members do not reveal any overriding patterns (Table 9). The pattern between average values is very similar to those produced from the attorney responses. There is a difference in the sign of the average value signifying the cluster members were on opposing sides of the issue on average, but the scale of the difference is so small that there is not a significant difference between the clusters with respect to the factor scores.

A comparison of all variables with respect to the clusters produced shows that question 10c and 11c were significantly different between the two clusters. Question 10c is the severity of timber theft compared to the other crimes. Cluster two ranked timber theft as less severe on

average than did the members of cluster one. Question 11c deals with the number of timber theft instances and the justification in re-examining the laws because of these instances. Cluster two members disagreed that there were sufficient instances to re-examine the laws more than did cluster one members on average.

Table 9: Law enforcement clusters and factor scores

	Cluster members	Factor1	Factor2	Factor3	Factor4	Factor5
Cluster 1	VA-1	-0.23	0.12	-1.63	-0.03	-0.46
	VA-2	0.09	-0.19	-1.39	0.51	-0.48
	VA-4	0.40	1.23	0.38	1.43	1.42
	WV-2	-2.22	0.70	-0.79	-0.53	-1.16
	WV-3	0.21	-1.31	1.67	-0.79	-0.49
	WV-5	1.17	1.27	-0.55	-1.32	1.19
	KY-3	-1.35	-1.17	0.96	0.18	1.94
	KY-4	1.53	-1.13	0.32	2.25	-0.29
	Average	**-0.05**	**-0.06**	**-0.13**	**0.21**	**0.21**
Cluster 2						
	VA-3	-0.22	0.17	0.72	-0.02	-0.50
	VA-5	0.00	-1.29	-0.62	-0.51	-0.12
	WV-4	0.18	0.65	0.78	-0.53	0.14
	TN-1	0.43	0.94	0.14	-0.63	-1.19
	Average	**0.10**	**0.12**	**0.26**	**-0.42**	**-0.42**
	Absolute difference	***0.15***	***0.18***	***0.38***	***0.63***	***0.63***

4.3. Attorney – Law Enforcement Comparison

In addition to analyzing the attorney and law enforcement surveys individually, comparisons were made between the two groups based on certain questions which were identical in each survey. Question 10 on the law enforcement survey was compared to responses to question 15 on the attorney survey. There was no significant difference found between the two surveys with respect to the severity of timber theft ($P = 0.16$). In addition, eight sections of question 11 on the law enforcement survey coincided with eight sections of question 17 on the

attorney survey. These also were compared for differences in response. Two noteworthy differences were found. These were questions 17b and 17c on the attorney survey and questions 11b and 11c on the law enforcement survey. Section c was a significant difference (P = 0.043) and section b was noteworthy, though not significant (P = 0.069). Both of these questions deal with the sufficiency of current laws to deal with timber theft.

Three other questions were identical for the two surveys. The first question asked about the significance of timber theft in the jurisdictions of the respondents. There was no difference in response, as both groups predominantly responded that timber theft was not a significant issue (P = 1.0). Question 18 and 19 of the attorney survey and question 12 and 13 of the law enforcement survey dealt with the value of timber resources in the area. No differences existed in these responses (P = 0.112 and 0.487 respectively).

4.4. Landowner Responses

Two types of landowners were contacted in an attempt to establish an estimate of timber theft in the region. Out of 63 non-industrial private landowners contacted, only 10 (16%) provided any information regarding timber theft on their property. Of these, many were unwilling to participate in the entire survey due to the private nature of many of the questions. None of those contacted reported having discovered timber trespass or theft on their property. There were two major causes of non-response. One was an inability to contact the landowners to administer the survey. When landowners were contacted, though, they were often unwilling to provide the requested information to the researcher. A possible cause of this is the absence of any means for landowners to verify that the survey was part of a valid research project. A letter

notifying landowners of the project prior to calling them may have improved participation. This could have reduceded the perception that the survey was some form of telemarketing.

4.4.1. Industrial landowner responses

Summarized responses of industrial landowners to the surveys are shown in Table 10. The confidence intervals shown represent as close to 95% as the exact distribution would allow. Depending on the sample size, the actual confidence level ranges from 93.8% to 95.4%. Confidence limits are only given for continuous variables. Further breakdowns of all questions are given in Appendix D.

Table 10: Average responses and confidence limits for industrial landowner responses

Question	Lower Limit (2.5%)	Average Response	Upper Limit (97.5%)
Q1		1	
Q2		1	
Q2b	4	9	44.5
Q3a	10%	37.50%	70%
Q3b	30%	62.50%	90%
Q4	15	72.25	150
Q5	14,000	20,000	70,000
Q5b	1%	7.75%	25.50%
Q6		0.5	
Q7	0.5	2	43.5
Q7a		1.5	
Q7c		1	
Q7d		0	
Q7e		1.5	
Q7f		1.5	
Q7g		2	
Q8		1	
Q8a		1	
Q9		1	
Q11		0	
Q11b	96,300	171,000	371,500
Q11c	1	1.75	3
Q11d		1	
Q11e		1	
Q12		1	
Q12a	5	3	15

All nine industrial landowners reported theft incidents in the past three years. The combined acreage represented by landowners contacted in the region represented 1.85 million acres of forestland (including 600,000 acres of national forest). While all industrial landowners contacted were in offices within the research area, often the landholdings represented extended into counties outside of this area. Therefore, the area represented by the landowner data is greater than the area of those landholdings contained only within the bounds of the research area. A total of 147 incidents had been reported on this land base (86 originating on the national forest). These thefts resulted in a loss of $323,000 ($19,000 from national forest) as estimated by the landowners surveyed. Of these, landowners contacted law enforcement to initiate the criminal investigation process in 99 of these instances. Four of these cases resulted in criminal convictions (Figure 9). All of these convictions arose from Forest Service cases.

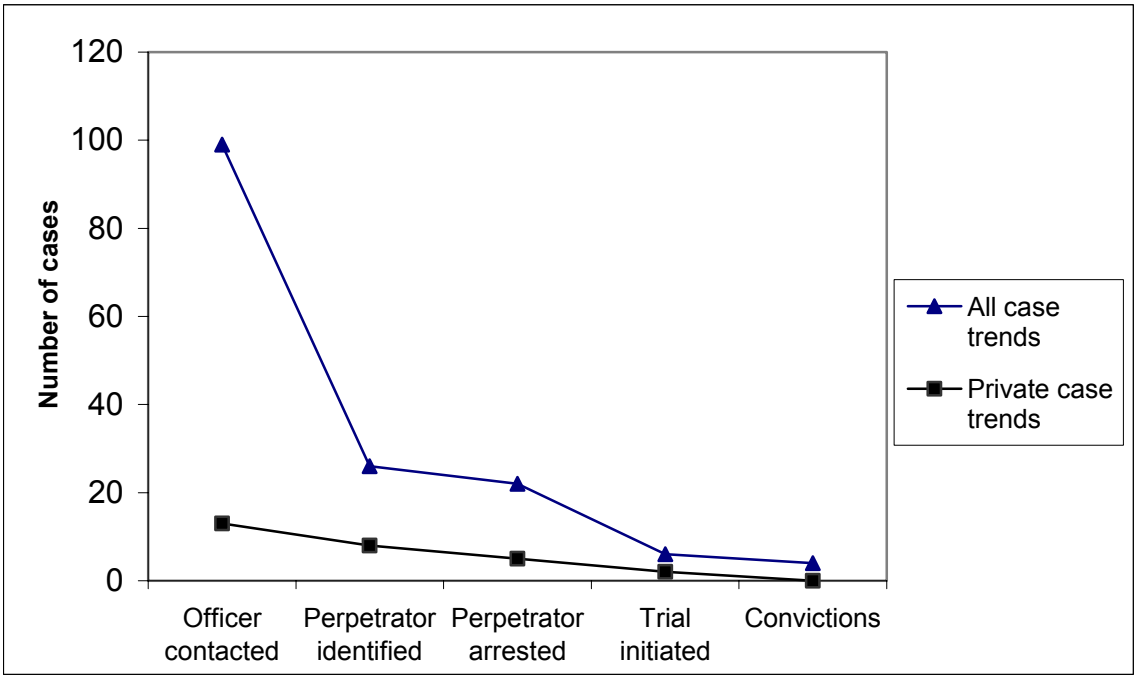

Figure 9: Progression of cases from initiating contact with law enforcement through criminal conviction

5. Discussion

The sampling scheme employed in collecting the data is an important limitation in the discussion of the data results. For law enforcement and attorney samples, the area in which the study was conducted was selected with the intent of expressing the interests of the contributing companies. As such, the sample is intentionally biased, and any inference outside of the 20 county region is suspect. For the industrial landowner data, a snowball sample was collected, which has no validity in terms of statistical representation. Again, beyond the level of descriptive statistics little information can be gathered from the sample.

5.1. Level of knowledge

One measure of the current level of knowledge of attorneys in the area is to consider the average responses to questions in the survey. On average, attorneys have handled one case per year and do not perceive that timber theft is a significant problem. They feel that the current laws are a sufficient deterrent to theft, cases are relatively difficult to prosecute, and they are content with treating it as a larceny. Timber theft is perceived as more severe than shoplifting and less severe than auto theft, but attorneys are equally likely to prosecute a shoplifting and a timber theft if forced to choose between the two. They rate timber theft as closer to a misdemeanor trespassing than felony armed robbery, and do not attribute the primary impact of timber theft to any particular class of landowners. With most other aspects of the crime, (suitability of civil penalties, rationale of trying to negotiate for a settlement, etc.) there are no defined opinions, except that they do not agree with prosecuting crimes for which convictions

are easier to obtain in favor of timber theft. Finally, they estimate the value of an acre of Appalachian mixed hardwood timber at greater than $1000 per acre and the value of one high quality black cherry log at greater than $200. These values are reasonable for the area.

The data for attorney response, analyzed in terms of both experience and state of employment, yielded few significant trends. The number of cases was the only issue pertaining to timber theft which was significantly different between the states. The difference was substantial, however, as Virginia attorneys accounted for 75% of all timber theft cases discovered. Evidence from these surveys is not adequate to explain why this disparity exists.

The differences in terms of experience were also minimal. In comparing the samples based purely on whether or not attorneys had tried one case in the past three years, the only significant difference was in terms of the perceived impact of timber theft on large corporations. The pattern here indicated that the more experience attorneys had, the more likely they were to agree with the statement that theft primarily impacted large corporations. This indicates a pattern of recognition regarding the property on which cases are occurring. While attorneys with experience were more likely to agree, even in this group only 45% did so. Thus, even within the experienced attorneys, the overriding opinion is not that all cases are occurring on industrial land, merely an increase in the recognition that some cases are affecting these landowners.

In looking at experience on an ordinal scale, the only difference found related to the likelihood of prosecuting crimes. Here though, the pattern of response is not intuitive. All attorneys in the highest category of experience rated timber theft the least likely crime to prosecute. This suggests that as attorneys get more exposure to the crime, they become less likely to prosecute the crime. Beyond this group of highest experience, though, the pattern becomes much less distinct, and rankings are mixed across all remaining levels of experience.

Here again, there is not ample further evidence to suggest why this pattern is occurring, or if there is actually a causative effect between experience and this result.

The cluster analysis results were not significant in their ability to show any structure in the data. Similarity values in the range of 0.1 are indicative of a lack of structure. This is reiterated by the pattern of factor scores seen in the cluster analysis results. The cluster analysis on both the attorney and law enforcement responses therefore indicate a lack of any structure. This does not necessarily mean that there is not structure in the data, but may be a result of the extremely small sample sizes input into the analysis and a resulting lack of power.

A summary of average law enforcement responses can also be used as a general estimate of the level of knowledge. On average, officers were contacted regarding between one and five incidents per year, and did not perceive timber theft as a significant problem. Timber theft was perceived as slightly more severe than shoplifting, and less severe than auto theft. Officers were of the opinion that it primarily affected small non-industrial landowners, and that there were enough instances to justify re-examining the laws. While convictions were deemed difficult to obtain and more information about the timber business would aid in theft investigations, officers claimed investigations were relatively easy to conduct. One explanation of this is that officers were typically trying to discover if a case was actually civil in nature (boundary disputes, existing contract, etc), and if these facts were found, the criminal investigation was complete. Also, there was a moderate opinion that landowners should not negotiate for a settlement if a criminal theft is discovered on their property. Value estimates of timber were between the "$500-1000" category and the "greater than $1000" category for one acre of mixed hardwood timber and between the "$200-500" and "greater than $500" category for one high-quality black cherry log.

One question which is of particular importance to determining the current level of knowledge of law enforcement officers with regards to timber theft is why more cases were not sent to prosecuting attorneys. Over 50% of the responding officers said that the acts were civil in nature. This indicates that a number of officers are aware of the requirements of a criminal case and feel that many of the instances to which they are replying do not fill these requirements. This is where the weakness in current statutes is most obvious. Because any dispute over the ownership of timber will invalidate a criminal investigation, officers are not sending cases involving such a dispute on to the prosecuting attorneys. Additionally, over 50% stated surveys or boundary markers were critical to successful criminal investigations. Officers perceive the absence of these as the makings of a civil case.

Significant differences in law enforcement responses were not common based on experience or state variations. The only difference between the states dealt with the question of whether or not sufficient instances of timber theft were present to justify re-examining the laws surrounding it. This is an interesting result because the state which was significantly different from the others was Virginia. Just as the attorney responses indicated Virginia had more cases than any other state, the law enforcement officers from Virginia all agreed that there were sufficient instances present to re-examine the law. It appears that law enforcement officers in Virginia have noticed a large number of cases being passed to county prosecutors, and may be attributing this trend to the need for improved laws.

When looking at law enforcement officer experience, two variables exhibited differences between experience levels. The first dealt with the sufficiency of current laws to deter timber theft. Only officers with no experience claimed the current statutes were an adequate deterrent. There was not a pattern to link this question to the issue of re-examining the laws. In other

words, officers from Virginia did not have a response pattern which might indicate that the need to re-examine laws was because of their lack of deterrence. The only state police officer who participated in the survey represented the lone strong disagreement with the sufficiency of the deterrent effect of current statutes.

The second significant variable with respect to officer experience was the need to negotiate for a settlement, even if a criminal act occurs. The response pattern shows an increase in agreement as experience increased. Inexperienced officers all disagreed that landowners should try to negotiate. The majority of experienced officers responded neutrally (none disagreed) and the only officer who agreed was in the highest experience category. This pattern does not imply that landowners should begin a negotiation agreement when thefts occur on their property, but there is a pattern of an increase in the perceived rationale of this approach as officers have obtained more experience with cases. This could be an indication of increased realization of the difficulty of successfully prosecuting criminal timber thefts. As officers gain more experience with cases, they may realize that it can be difficult to successfully prosecute, and pursuing a settlement may begin to seem more rational.

In both attorney and law enforcement responses, there are a number of variables which have a bimodal distribution of responses. This may be misrepresenting the average responses on a number of questions. For example, the response patterns in Appendix B show that some of the statements in question 17 of the attorney survey have a distinct split between agreement categories and disagreement categories. This pattern is one explanation of why average responses to many of the sections on question 17 is in the no opinion category, as it is between the agreement and disagreement categories. Question 17c, for example, has 37% agreement and 37% disagreement, and question 17j has 42% agreement and 42% disagreement. This split in

responses is not along state or experience lines, and is somewhat more complex. The variables which best serve to explain this division in responses is made apparent by examining the factor analysis. The basis of factor analysis is to group variables which have similar response patterns across subjects. Thus, the variables which comprise the remainder of the factors should be the best indicators of what issues may be causing the bimodality.

While question 17c does not fit extremely well into just one factor (Table 3), the pattern can be seen here. The perceived significance of timber theft (question 1) and the number of cases about which attorneys have been contacted (question 2) are the variables which most closely mirror changes in opinions regarding the re-examination of timber theft laws based on the number of incidents (Spearman's r = -0.458 and -0.416 respectively). Thus to offer a general explanation of the response pattern for whether or not there are sufficient instances to justify re-examining the laws, the reason can be equated to the underlying factor of the prevalence of timber theft in the region. Attorneys who have dealt with a number of cases and who perceive this number of cases as a significant impact are more likely to believe the laws should be re-examined based on the number of incidents occurring.

Similarly, with the opinions regarding whether landowners should negotiate even if the incident is criminal, the perception of the difficulty in convicting for timber theft explains the majority of the variation (r = 0.656). This positive correlation shows that as attorneys have had increased difficulty in obtaining convictions for timber theft, they increasingly suggest that landowners seek a settlement from the offending party. This is an intuitive trend, as it would be natural to recommend seeking an easy settlement if criminal convictions are likely to be unsuccessful.

Using the factor analysis to evaluate the information contained in both attorney and law enforcement responses allows for the explanation of many of the questions from the surveys to be grouped into five underlying factors. Those questions with the highest ($1-r^2$) ratio are the most difficult to explain in terms of only the underlying factor, and would benefit from information obtained from other factors as well. Question 17d from the attorney survey, for example, deals with whether or not civil remedies provide suitable compensation. The best predictor of response, however, is actually question 17c which is not one of the variables in factor 3.

One of the most interesting trends in the data is provided by questions 15 and 16 of the attorney survey. These questions provide insight into the opinions of timber theft in relation to other crimes. Both "shoplifting" and "auto theft" represent a larceny, which is the same crime as timber theft in all states except West Virginia. They merely suggest a different value and were meant to evoke a different impression in the opinions of respondents. Yet, only one respondent commented on this similarity. With no information regarding the dollar values involved in the thefts requested or provided up front, 16% of respondents ranked timber theft as more severe than auto theft, and 68% ranked it within one level of severity, either higher or lower, than auto theft. This is an encouraging result as it indicates that there is some recognition that timber theft can represent significant dollar losses. The responses from industrial landowners show single theft incidents valued at $15,000 and $20,000, which suggests that the potential value involved in one incident can certainly surpass that of an auto theft. Still, 21% of attorneys ranked timber theft as less severe than shoplifting, which shows there is a gap in the awareness of the values associated with timber theft.

Considering these results, the shift in terms of the likelihood of prosecuting timber theft suggests how difficult timber theft may be to prosecute. It certainly shows that prosecutors are reluctant to try a larceny with timber as the subject compared to the other subjects presented. Only 26% would prosecute a timber theft before a shoplifting, and only one attorney listed himself or herself as more likely to prosecute a timber theft than an auto theft (this respondent had not previously prosecuted a timber theft case). This response does not seem to be related to knowledge of the value of timber, as both respondents who were more likely to prosecute timber theft and those who were not had responses to the value of one black cherry log dispersed across the response categories. Therefore, the evidence suggests that it may be the difficulty of proving the case, and not a general lack of knowledge regarding the timber itself, which is driving this pattern.

Law enforcement officers responded to the same question as attorneys regarding the ranking of severity of crimes. Again, there was no value information provided, yet 17% still ranked auto theft as less severe than timber theft, and 42% ranked timber theft within one level of severity of auto theft. This suggests that there is a level of awareness about the potential impact of timber theft within law enforcement as well, but 42% also ranked shoplifting as more severe than timber theft. This is discouraging, because law enforcement officers can essentially be a filter of which cases reach prosecuting attorneys, and the decision of which cases are passed on and which are not is made at their discretion. Therefore, the perceived severity would ideally be as high, if not higher, than for attorneys, so that the decision to discard cases could be made either at the discretion of prosecutors, or at least based on more collaboration with prosecutors.

The breadth of knowledge discerned by this research within the legal system of the Southern Appalachian region is variable. There is evidence that some of the participants have a

level of knowledge which supports the need to actively investigate and prosecute timber thefts, yet there is little evidence that this knowledge comes from experience with timber theft. There is still a perception, however, that timber theft is primarily a civil violation.

The blame for this perception does not fall entirely on the shoulders of the participants in the legal system. While much of the knowledge which might be expected to be present as a result of having experience with cases is not, this may be a result of issues not addressed in the surveys. Also, as has been pointed out previously, published literature which deals with timber theft in detail is evident in only one law review, and this was a regional law review in Pennsylvania. Law enforcement would have little opportunity to be exposed to information regarding the crime outside of newspaper reports of cases. While there are some attorneys who have had extensive experience with timber theft (one attorney reported trying ten cases in the past three years), there either is not a mechanism to share information regarding what approaches are effective and what aren't, or it is not utilized. Perhaps landowners are the ideal vehicle to initiate this sharing of information.

5.2. Level of prosecution

The current levels of prosecution and conviction for timber theft in the Southern Appalachian region are contained in the information gathered from attorneys and landowners. A total of 36 criminal cases were initiated over the past three years. The results of these cases were varied. Restitution in some form was paid to the offended party in 29 of these cases, but there were only 22 convictions, indicating that in some instances landowners were content with receiving a monetary settlement. The 61% conviction rate on trials initiated indicates that attorneys are utilizing their discretion in selecting which cases they prosecute. Regrettably, data

regarding a comparable conviction rate for all types of larcenies is not available within the state court system. Information from federal government land indicates that all incidents which have been prosecuted have resulted in a conviction; however, only 24% of the incidents resulting in arrests have been prosecuted, and only 20% of the incidents discovered on their property result in an arrest.

The surveys did not produce results which provide an idea of the extent of civil litigation. Industrial landowner data is not a suitable guide for estimating civil litigation because there is a reluctance on the part of many large organizations to sue individuals or small local companies. The "bad press" associated with these losses outweighs the pecuniary award received in a successful conviction. This can be seen in the survey results. Private industrial landowners initiated only seven civil litigations, yet they contacted law enforcement in thirteen instances. This disparity indicates the reluctance to initiate civil instances.

5.3. Extent of trespass and theft

The sample of non-industrial private landowners (NIPL) did not yield any information which could be used in developing an estimate of the timber theft occurring in the region. Two key factors affected the use of this information. First, the sampling scheme developed to select landowners for the survey was highly biased, in that local state forestry agency employees were requested to provide a list of names and contact information. Thus, only landowners who were known to these foresters would have a possibility of selection. The process was also subject to the bias of the state foresters themselves. Secondly, the response rate was too low to be considered a valid representation of the population. Also, unlike with Matthews (1979), the

respondents were not participating because of vested interest in the topic. None of the landowners reported having experienced timber theft.

Despite the lack of evidence from the NIPLs, information from the other portions of the research project allow for a rough estimate of the amount of theft that could be occurring in the region. Perhaps most important among this information is evidence which shows that theft is occurring from NIPLs. Results from the attorney surveys reveal 36 criminal cases have been tried in the region over the past three years, and 44% of attorneys who had tried at least one of these cases agreed that timber theft primarily affects small private landowners. Additionally, in discussing these cases with attorneys, the researcher learned that many of the cases were involved with NIPLs. As a result, it can safely be stated that not all cases occur on industrial land.

Law enforcement responses can be used to determine further clarification of the extent of theft in the region. Using the average value for the number of theft investigations sent to the prosecuting attorney (20%) in conjunction with the average number of cases tried by prosecuting attorneys per year (12), the expected number of theft investigations could be estimated at 60. This is also in line with the estimate of between one and five calls regarding theft and trespass to law enforcement officers per year. The average officer investigated 100% of cases about which they were contacted. Utilizing this information in conjunction with industrial landowner data offers the potential to generate an estimate of the number of theft and trespass incidents in the region. Industrial landowners (excluding the Forest Service) contacted law enforcement regarding 22.5% of the timber trespass or theft instances on their property. This suggests that an average of 267 incidents are occurring per year.

This estimate must be considered within the framework of the data from which it is calculated. An approximate 95% confidence interval can be generated around this average by using the standard errors of the means used to calculate the estimate. The interval based on this data is between 131 and 1527 incidents per year. This is an alarming range in terms of both its width and potential extent. It represents the difficulty in generating an estimate based on a small number of individuals and from secondary sources of data.

Possibly the greatest source of error in the calculations is the use of percentage of instances reported to law enforcement by industrial landowners. A number of likely fallacious assumptions must be made to utilize this number. First, an assumption must be made that NIPLs would be equally as willing to not report instances of missing timber as are industrial landowners. This is unlikely, particularly in the case of smaller landowners, as even a few trees missing could represent a substantial percentage of the total value of their timber investment. Industrial landowners on multiple occasions during the interview process commented that in addition to the instances reported in the interviews there were a number of "minor" incidents representing a small number of trees missing which were deemed insubstantial. Secondly, the instances which are being considered include trespass issues. An industrial landowner may be better educated about dealing with a civil situation without needing to contact law enforcement. They may also be more reluctant to have their company affiliated with a criminal investigation unless absolutely necessary, whereas a NIPL could be more reliant on the expertise and knowledge of a law enforcement officer to differentiate between civil and criminal violations. Both of these assumptions would increase the expected percentage reported for NIPLs. Therefore, raising the percent reporting to 50%, or possibly higher, may be reasonable.

In addition, generating a 90% confidence interval from the law enforcement survey data can also help reduce the range. This may be a more reasonable confidence level for dealing with data from a small pilot study. This change in addition to increasing the percent reporting to 50% alters the average number of incidents on private land to 120 and the range of average incidents shrinks considerably to [85, 206]. This range is much more reasonable for a 20 county region. With an average of 12 criminal cases recorded per year, this represents approximately 10% of the incidents going to trial, compared to the recorded rate of slightly over 3% from industrial landowners. This provides some admittedly tenuous evidence that the estimate is not unreasonable.

The problem of assigning a dollar value to this level of theft adds another level of complexity. There is no data available to estimate the average dollar value taken during one incident from NIPL lands. Using estimates from industrial landowners in this estimate is even more problematic than in estimating the number of instances. The value from the Forest Service involves all incidents, from a single tree to much larger areas; however, the value is based on the cost of a firewood permit in incidents where individuals were found harvesting smaller timber. This approach does not attempt to put value on the timber itself, it merely treats these harvests as unauthorized firewood cuts. A private landowner in these instances would need to obtain a value estimate of the timber itself for purposes of any court-ordered restitution. The other thefts reported, as previously mentioned, do not always account for smaller incidents. Therefore, an estimate generated from this data would overestimate the value.

To obtain a range of the possible value involved, the possible range of theft incidents can be multiplied by the various average cost figures. The lowest estimate (using average costs just from the Forest Service of $220) is $10,300 and the highest (using the combined Forest Service

and industrial landowner average of $2,200) is slightly over $1.06 million. The best estimate of an average cost to NIPLs is around $120,000, placing an average value of trespasses and thefts at $1,000. This is a somewhat arbitrary value selected based on the expectation that average costs per incident may be much lower than average cost per incident for industrial landowners ($6,200). This total cost estimate utilizes the conservative estimate of extent. If the wider range were used, the upper limit value would be extremely unrealistic.

The estimates for industrial landowners only represent those landowners who were contacted and participated. The actual amount of industrial land in the 20 county study area is over two times that recorded in the surveys, based on FIA estimates in the region. As a result, the annual loss to industrial landowners can be estimated at over $200,000 per year. This figure in combination with the estimate of theft from NIPLs, places the estimate of the extent of theft in the study area at over $300,000 per year. This equates to over $15,000 per county per year. The value of timber lost to timber theft in the entire Southern Appalachian region could exceed $4 million per year based on this estimate. It is important to reiterate the extreme uncertainty in this estimate. The nature of this crime is that it is difficult to discover because it can be perpetrated in remote areas where discovery may never occur. Also, all dollar estimates have been made based on circumstantial evidence not directly relating to NIPLs. The actual values could be much more or less extreme than those presented. No baseline data of any sort exists on which to base these approximations.

5.4. Legal implications

The weaknesses previously discussed regarding timber theft laws are reiterated by the survey responses. The low percentage of incidents carried through to criminal cases is at least

partially a result of the statutory roadblocks to criminal prosecutions of timber theft. Overwhelmingly, the question of proving intent in these cases is listed as the most difficult aspect. Those attorneys who addressed it specifically as a good faith defense were suggesting that offenders were contending the criminal cases were in fact civil in nature. Only two attorneys mentioned the issue of requiring a deed or survey to prove ownership. One of these individuals discussed having two separate cases thrown out of court, and refusing to try other cases, because of the lack of suitable boundary information. Unlike in many other larceny cases, timber theft prosecutors are at a disadvantage in proving intent. In a larceny, the issue of intent may need to be proven through the actions and circumstances surrounding the theft itself (*Tarpley v. Com*). With a timber theft, there will rarely be any evidence to the actions of the offenders unless one of those present is willing to testify against the others. In timber theft (with the exception of timber poaching), identifying the offender may be easier than proving ownership of the timber and the intent of the crime.

The specific form of the theft is a critical aspect to consider in this discussion. A poaching would be more similar to a typical larceny than either affiliated or unaffiliated timber theft. In poaching, the critical issue would be identifying the offender, because the crime itself would not be associated with a timber harvest, so claiming that the theft was accidental would be more difficult. In the other two forms of timber theft, though, the issue of intent and ownership play a larger role. Unlike entering another's property to steal tools from their yard or shoplifting an item in a hardware store, timber is a target which may be growing in homogenous tracts with human-defined boundaries placed throughout. With other types of theft, if the offender is caught and the item is identifiable as belonging to the victim, the fact of the theft itself may be evidence of intent. The trespasser must essentially prove that they had an intention other than the

permanent deprival of the owner whether they were intending to return the item, or they "forgot" about the stolen items upon leaving the store. However, the ability to claim that a single tree or group of trees was intentionally removed when those trees were identical to the surrounding trees, requires the presence of some delineation of the property boundary. When proof of this delineation is not available in the form of an existing boundary, the question of intent becomes very clouded. A claim of ignorance in this instance might seem feasible.

5.4.1. Statutory remedies

Altering the wording of the pertinent statutes may assist in reducing these legal problems. One approach which could alleviate some of the difficulty in prosecuting crimes of this sort would be associating a presumption of either intent or ownership to timber thefts. Essentially, the onus would be put on the defendant to show that they did not intend to steal the timber, or that the timber did not belong to the victim. This, however, is a radical approach which would likely be difficult to adopt. Because all accused individuals are innocent in the eyes of the law until proven guilty, placing a presumption of guilt in one element of the crime if the other aspects can be proven would likely be unconstitutional.

An alternative, though related, approach would be to add a requirement of some sort, the violation of which would serve as prima facie evidence of intent. In shoplifting, the concealment of goods within a store is prima facie evidence of intent to steal (Virginia 2001b). A similar presumption could be created by failure to notify a landowner whose property adjoins that on which a cutting is occurring. A search of adjoining landowners at the county tax office should provide contact information, and if no information is available, a photocopy of the page showing the lack of information should be suitable evidence of due diligence in attempting to notify.

While this would create a wealth of new responsibility on the part of harvesting companies, it would provide a mechanism to differentiate truly unintentional trespasses (where a harvester notified regarding the harvest) from felonious operations.

Restitution is also an issue which needs to be addressed. Incorporating a mandatory restitution clause in the statute is critical to increasing the probability of initiating a criminal trial when the act is intentional. As has been shown, many landowners are willing to drop criminal cases if they are paid restitution. While this is an ideal situation for them, they are not helping to reduce the problem in the area. Criminal convictions are critical to sufficiently penalize repeat offenders.

While none of the results directly deal with the sufficiency, or lack thereof, of civil statutes, a slight majority of the attorneys (58%) stated they thought civil remedies provided suitable compensation. Nothing, however, provides evidence to the actual civil process. As was stated in the legal review, the variability in the construction of civil statutes creates a different situation in each state, but there are benefits and drawbacks which can be taken from each. The strict liability approach of West Virginia, for example, provides the most beneficial approach for offended landowners. In this situation, the facts which must be proven to win a case are that trees were removed from the landowner's property without their permission, and that the defendant was the individual who removed them. This situation, however, can be a detriment to the logging companies who may honestly mistake timber as that intended for harvest. Particularly with the infrequent delineation of property in the southern Appalachian region, the possibility of accidental trespass is present. In West Virginia, they are forced to pay three times the stumpage value of this timber in the instance of these accidents.

The statutes in Virginia seem to have attempted to remedy this situation, but succeeded only in confusing the issue more. By offering the offending party a chance to pay a lower penalty by admitting the trespass, the punishment for accidental trespass is reduced. The downside is that there are three levels of penalties which are not reliant on the facts of the case, but are dependent on the desire of the offending party to defend their actions or not.

The structure of statutes in Kentucky may be the best approach, utilizing two levels of damages. Triple stumpage is required for any trespass unless the defendant can show they had prior permission to harvest the timber, or they are able to demonstrate a good-faith belief in ownership of the timber. This reduces the inflated penalty for "honest" mistakes, and leaves the door open for a higher penalty if the plaintiff wishes to pursue punitive damages by proving intentional trespass. Essentially, it utilizes a strict liability approach with regards to the trespass, and allows the defendant to defend for purposes of reducing the penalty.

One of the largest roadblocks to landowners pursuing timber trespass cases is the futility of trying to collect civil judgments from offending parties. A logging company may have little equity on which to attach a lien, and could merely claim bankruptcy with secured debtors having primary interest in what equity might exist. An available approach to sidestep this issue is to sue the purchaser of the timber. With this method, the same laws may apply, and the offended party does not need to worry about a judgment against the logger (52 American Jurisprudence 2d). In this sense, the landowner is able to recover the value from a manufacturing firm with more equity, and the responsibility of collecting from the harvester falls to them. Regrettably, most states do not have statutes currently in place to provide this remedy to landowners. A statute, similar to Tennessee's timber purchaser law, requiring the purchaser to obtain some proof of ownership from the seller would create the opportunity for this type of remedy.

5.4.2. Operational remedies

Changes to existing statutes are not the only option available to help alleviate the problems associated with timber trespass and theft. A dissemination of information regarding the principal issues involved in timber theft, from the values associated with timber to the potential obstacles in investigating and prosecuting cases of this sort, could greatly increase the awareness and familiarity of both law enforcement and prosecuting attorneys. Also, information should be provided to landowners to increase their awareness of the risks involved with not having a valid survey of their property, and allowing their land to go unwatched for extended periods of time. The statute of limitations in timber trespass can be as short as two years, and if no attempt was made to conceal the harvest, the time begins to count off at the time the last tree was harvested. Therefore, if landowners do not have their property inspected at least every two years, they run the risk of not being able to bring a civil action.

The industrial landowner responses indicates that the boundary lines of many of the ownerships are not delineated or are only infrequently marked with paint or signs. This is a trend which must be altered to offer the best potential for reducing accidental trespass, and as has been mentioned, it is one of the most critical issues in terms of a criminal trial. There are few methods available to landowners which can reduce the opportunity for theft, and overlooking those methods invites theft to occur undeterred.

While preventative efforts are certainly an important aspect of trying to reduce incidents in the region, increasing the potential for landowners to take cases to court and obtain convictions when incidents do occur is an area which must receive attention as well. One potential improvement in this area would be to provide investigatory assistance in timber theft instances through the state forestry agencies. South Carolina has a dedicated set of employees

within their state forestry agency who have primary responsibility for investigating any crimes affecting the forest, primarily arson and timber theft. They reported returning over $2.5 million to landowners through theft investigations in 2000 (Heath 2001). This figure involves timber thefts other than just theft of standing timber. It also includes crimes which are more closely associated with the forest business, such as load diversion and theft through merchandising. These more involved crimes require a basic knowledge of how forest harvesting is conducted to facilitate their proper investigation. Similarly, understanding harvesting can be beneficial in investigating timber theft, and having an investigative body with this knowledge and training would certainly provide assistance in generating stronger criminal cases. In fact, 92% of law enforcement officers agreed that a more thorough understanding of the timber business would help in timber theft investigations.

The onus is on the forest industry and landowners to increase awareness about this issue. As with shoplifting, proactive efforts must be made to show the legal system participants that thefts will not be tolerated and will be prosecuted. Successful convictions need to be publicized to alert surrounding counties that a problem does exist. Also, criminal incidents being dropped because restitution is paid before trial proceeds indicate that landowners are not as interested in punishing thieves and stopping the problem in the region, as they are in remedying their immediate financial burden.

6. Conclusion

The issue of timber theft and trespass has not been researched comprehensively in the United States. This study has attempted to increase the level of knowledge regarding the crime only within a small area of the Southern Appalachians. The nature of this crime changes within

a very short distance from the research area because the timber types and nature of the forest business change as well. The information provided here is a detailed case study of those counties included, and is not meant to be applied to all areas of the country.

There is body of knowledge within the legal system regarding the crime of timber theft, but the knowledge is not as widespread, or as developed as it should be for timber theft to be treated on equal footing with similar crimes. Many of the gaps in prosecution, and certainly in conviction, are a result of the difficult legal issues which surround the crime of timber theft. There are not sufficient statutory provisions within larceny laws to deal with the unique nature of timber as a subject of theft. Changes need to be made to facilitate the prosecution of this crime.

The extent of timber theft within the study area could not be estimated accurately within the study area due to the insufficiency of the landowner surveys. The estimates provided were based on widely variant responses and estimations based only on professional judgment of likely patterns. Particularly with respect to value estimates, further research is needed to calculate the economic impact of the crime both to landowners, and to the forest industry.

7. Areas of future research

The research on timber theft has been minimal and locally oriented. As such, the possible areas for expansion of research on this topic are numerous.

- The principal issue which needs to be addressed is to determine the extent of timber theft on the national level. Potential avenues for this are already in existence, and merely require a driving force to direct the research. By adding questions to the *National Woodland Owner Survey*, for example, estimates could be generated of those incidents which have been discovered.

- One of the most difficult aspects of researching timber theft is that it can be a hidden crime which could impact absentee landowners years before they notice, and if the thefts are of extremely small numbers of trees and adequately dispersed, they may never be discovered. Estimates of the number of instances which are not discovered and not reported should be developed.
- A study which can be generalized outside of one particular region should be conducted to determine if legal roadblocks are affecting prosecutions of timber thefts elsewhere, or if attorneys and law enforcement in other regions of the country have determined a better way to deal with timber theft.
- This project did not thoroughly address the issue of timber trespass litigation, beyond mentioning that investigation of the current statutes and court records indicates that they can be highly confusing. Research should be conducted detailing if, in fact, there is a difficulty in civil litigation because of the statutes, and if certain statutory structures seem to be better suited to successful litigation.
- There are numerous other types of timber theft, other than the theft of standing timber, which have the possibility to represent a greater financial impact to major forestry corporations. The literature on these crimes is equally as scattered as theft "off the stump," and information dealing with extent and prevention of these crimes is a need which should be filled.

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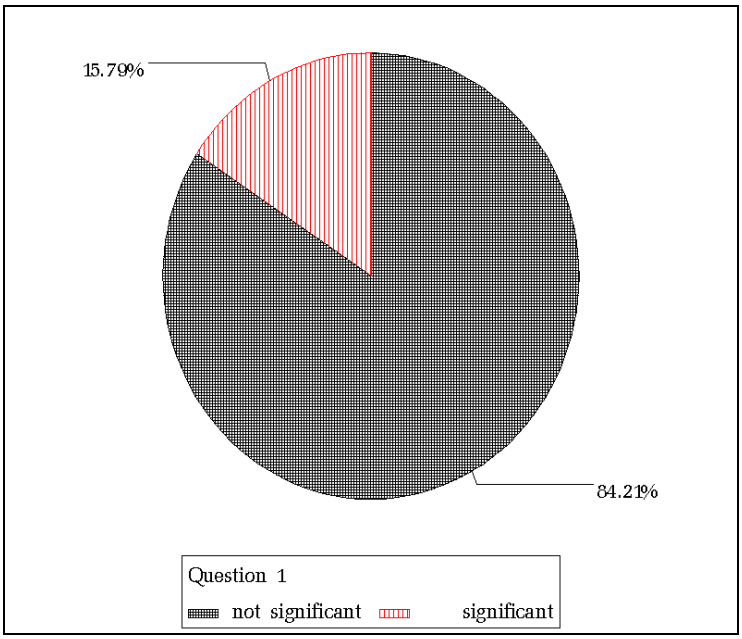
Appendix A: Attorney Survey and Responses

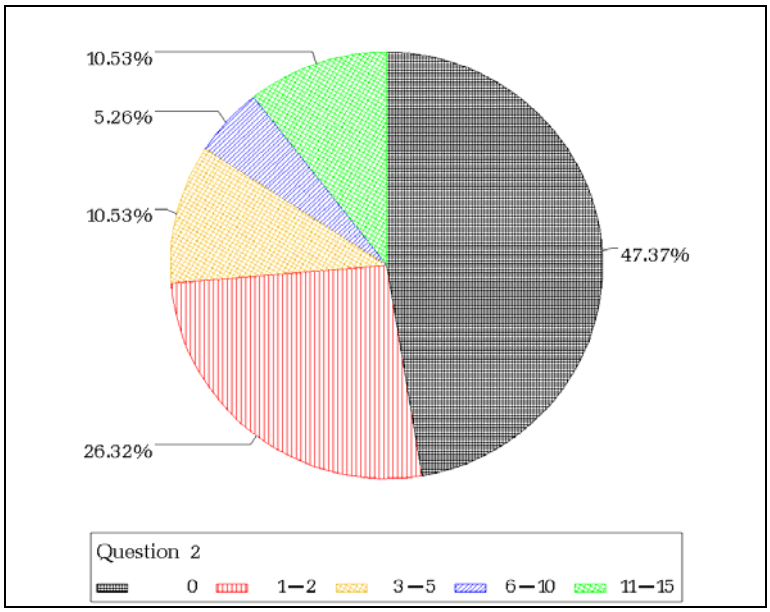
Timber Theft Attorney Survey

1) Timber theft is a crime which has received essentially no previous research. As a result, very little information is available about both the crime and its extent. In your opinion, is timber theft a significant or relatively insignificant problem in your jurisdiction?

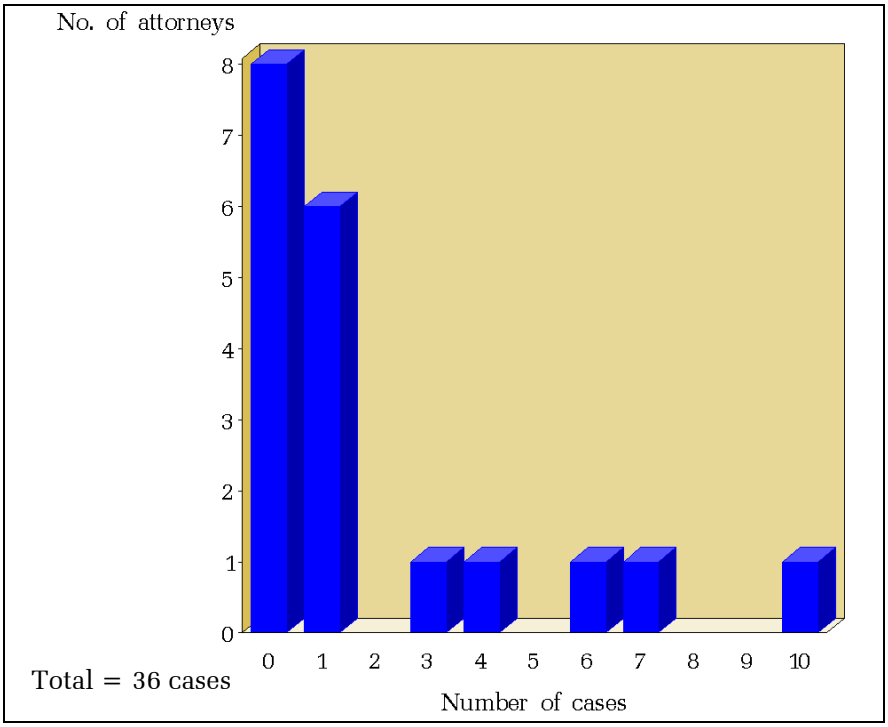


2) We are interested in determining how much timber theft is actually discovered and prosecuted in this area. On average, approximately how many cases of timber trespass or theft is your office presented with each year? (If no cases reported, skip to question 15)

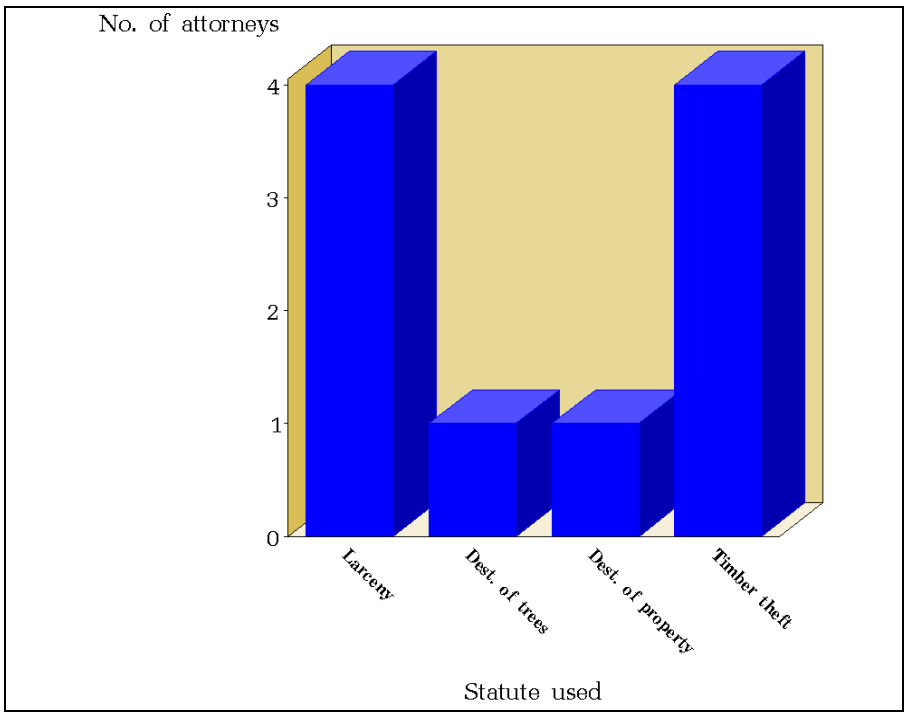
___ 0 ___ 1-2 ___ 3-5 ___ 6-10 ___ 11-15 ___ more than 15



3) How many cases of timber theft have you prosecuted in the past three years?



4) Under which criminal statutes (for example larceny, destruction of trees, etc.) did you prosecute those cases?



5) In how many of those cases was a plea bargain sought? (If 0, skip to question 7)

N = 27 cases

6) What charges were brought through the plea bargains?

Misdemeanor charges: N = 8 cases

Felony charges: N = 1 case

Restitution paid, case dropped: N = 1 case

7) How many of those cases resulted in a conviction?

N = 22 cases

8) We are interested in assessing what types of penalties are frequently decreed by the court in these cases. In the successful convictions, how often was prison or jail time adjudged by the court?

N = 1 case

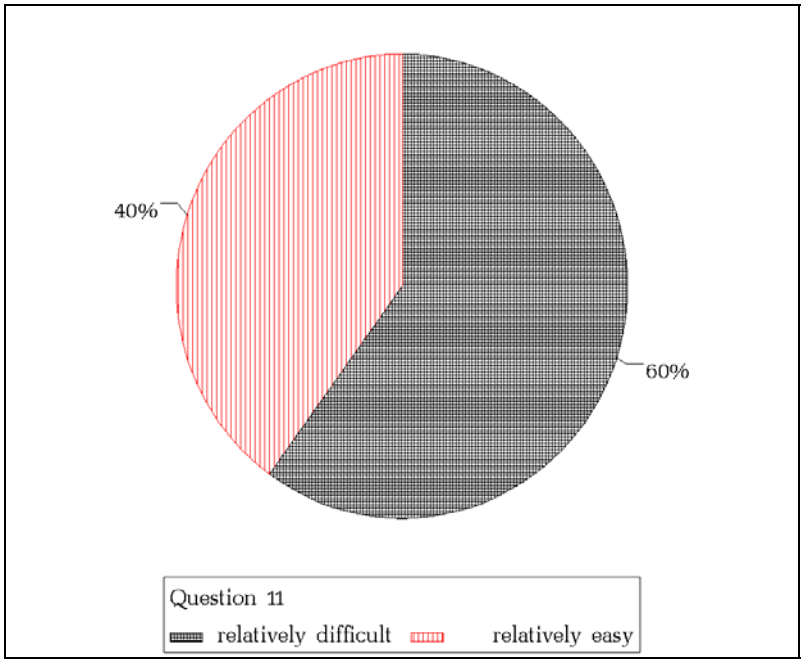
9) How often did the court adjudge fines?

N = 17 cases

10) How often did the court adjudge restitution?

N = 29 cases

11) Are most timber theft cases relatively easy or relatively difficult to successfully prosecute?

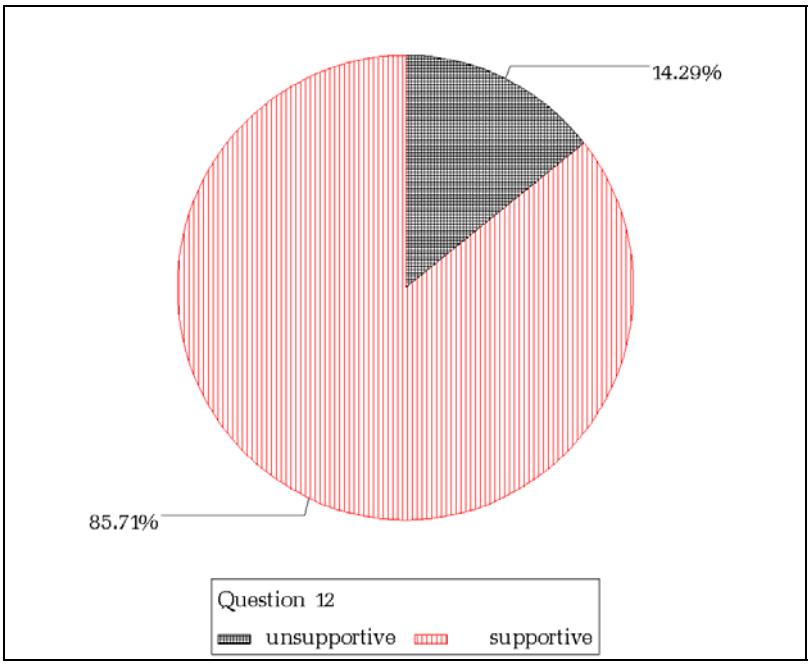


Why?

Relatively Easy: 75% were given good cases, 25% caught perpetrator in act

Relatively Difficult: 83% requirements for a criminal case not present

12) Are judges in your jurisdiction generally <u>supportive</u> or <u>unsupportive</u> of vigorous prosecution of persons arrested for timber theft?



13) What resources are critical to successful prosecution of timber theft cases in your jurisdiction?

60% Sheriff's office
50% State forestry agency
30% State police

14) We realize that county prosecutors have a large responsibility and a heavy caseload. As a result you are often forced to exercise prosecutorial discretion and elect not to try some cases. In the timber theft cases you chose not to prosecute, what were the major factors influencing that decision?

63% Cases were civil in nature
25% Landowners only wanted restitution

15) We are interested in determining how severe a crime timber theft is viewed to be. Please rank the following crimes in order of severity, numbering from 1 to 7 with 1 being the most severe.

_____ Grand theft auto

_____ Arson

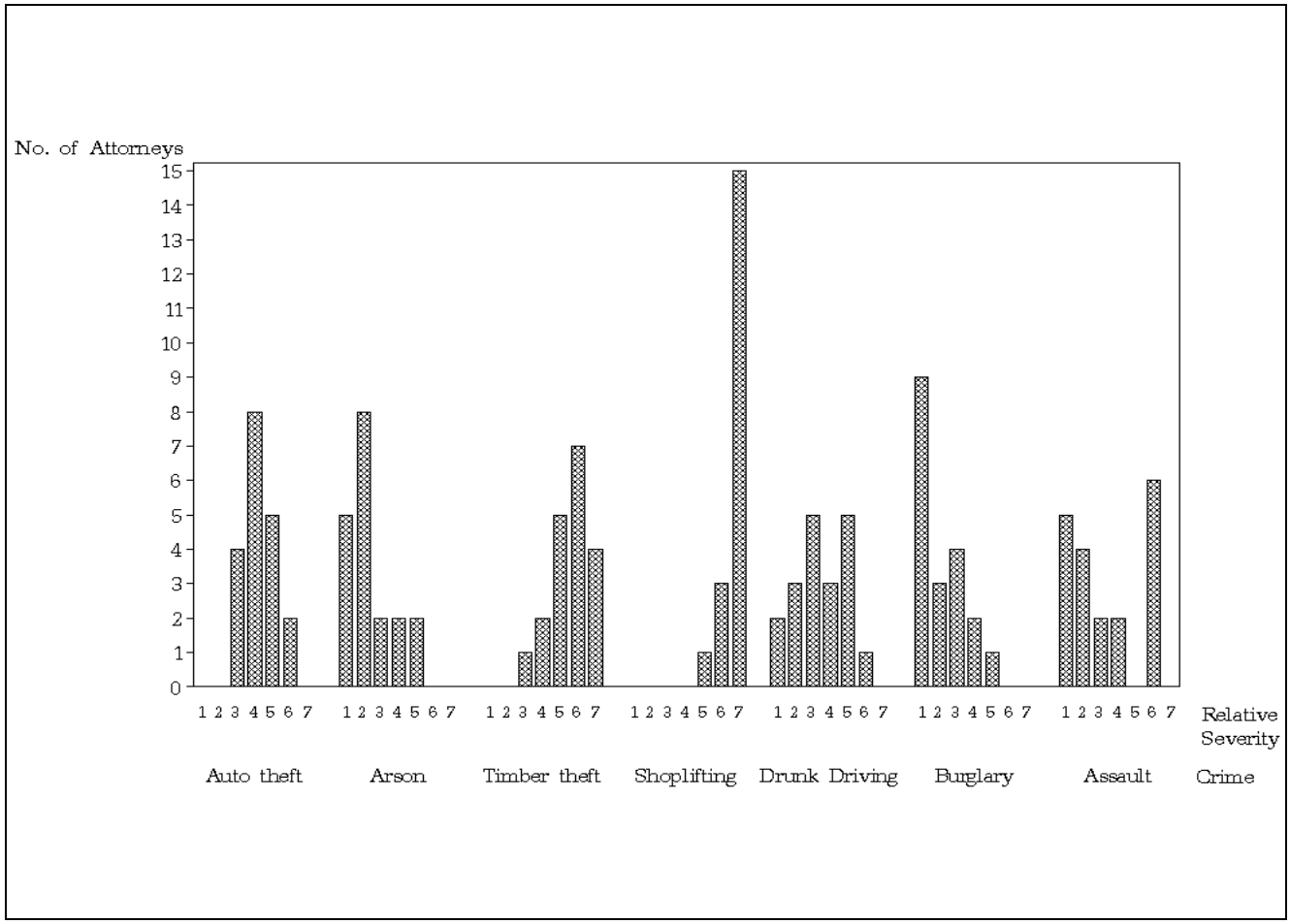
_____ Timber theft

_____ Shoplifting

_____ Driving while intoxicated

_____ Burglary

_____ Assault



16) There are a number of factors which must play a role in determining whether or not to prosecute a case, such as the frequency of similar offenses in the area, the probability of attaining a conviction, etc. Please rank the following crimes in order of the likelihood of being prosecuted, numbering from 1 to 7, with 1 being most likely to be prosecuted.

_____ Grand theft auto

_____ Arson

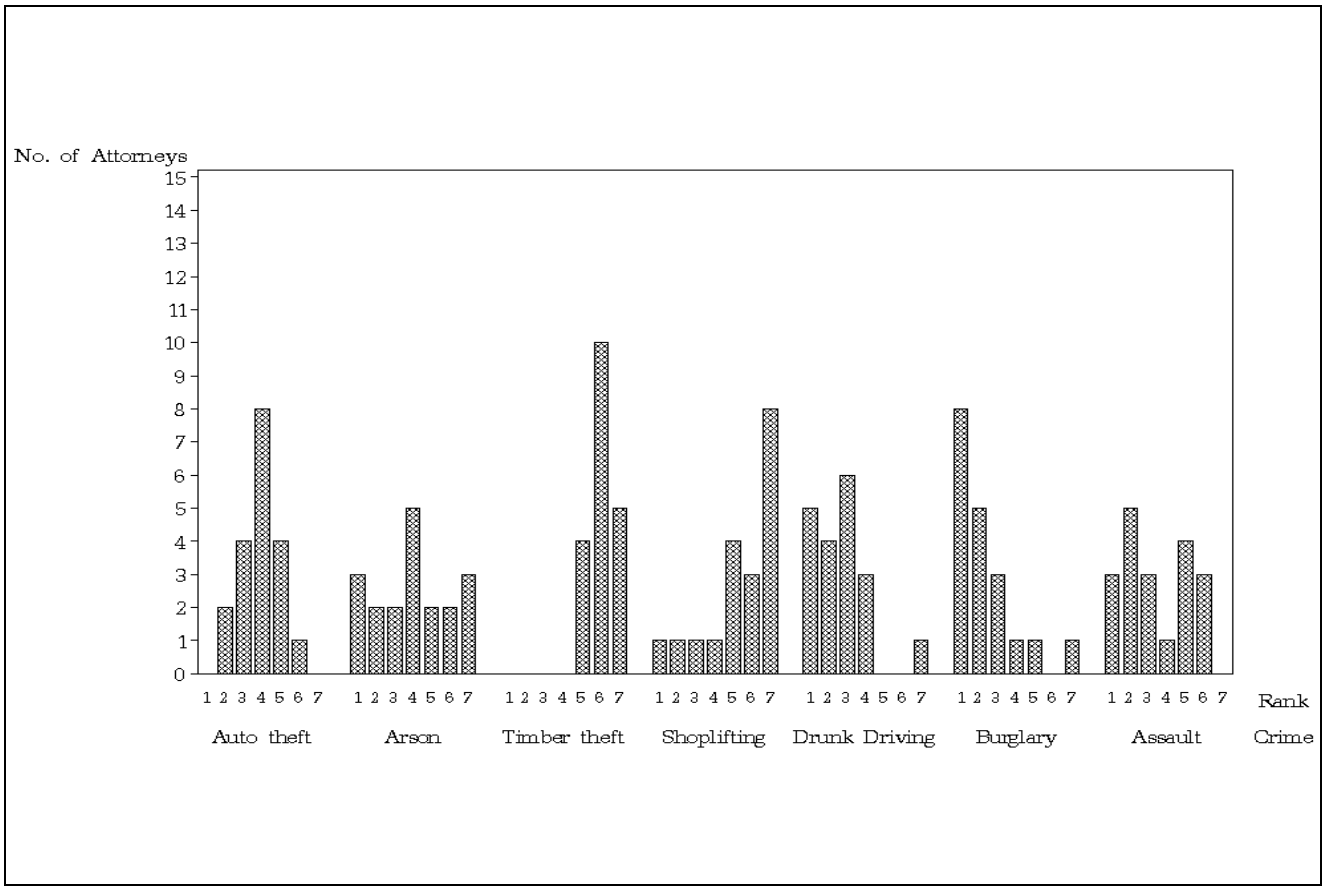
_____ Timber theft

_____ Shoplifting

_____ Driving while intoxicated

_____ Burglary

_____ Assault



17) Based on the answer card provided please state the extent to which you agree or disagree with each of the following statements (***Graphical results follow question***).

a. Timber theft should be handled differently from other larceny cases.

b. Timber theft laws, as currently written, are sufficient to deter would-be timber thieves.

c. There are sufficient instances of timber theft to justify re-examining the laws surrounding it.

d. Civil remedies provide suitable compensation for victims of timber theft, should criminal proceedings fail.

e. Convictions for timber theft are difficult to obtain.

f. Timber theft cases frequently have sufficient evidence to carry the burden of proof.

g. Timber theft is a crime that primarily affects large corporations.

h. Timber theft is a crime that primarily affects small landowners.

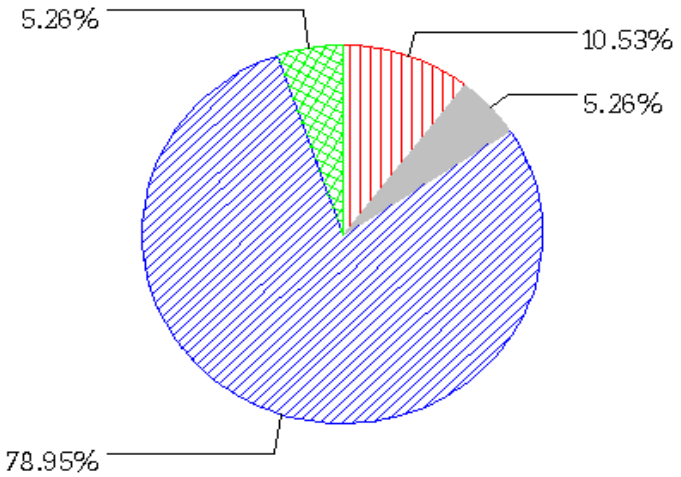
i. Timber theft is a crime that primarily affects public land.

j. In the event of timber trespass, landowners should try and negotiate with culprits for some amount, even if the act is criminal, in order to avoid the uncertainty of a trial.

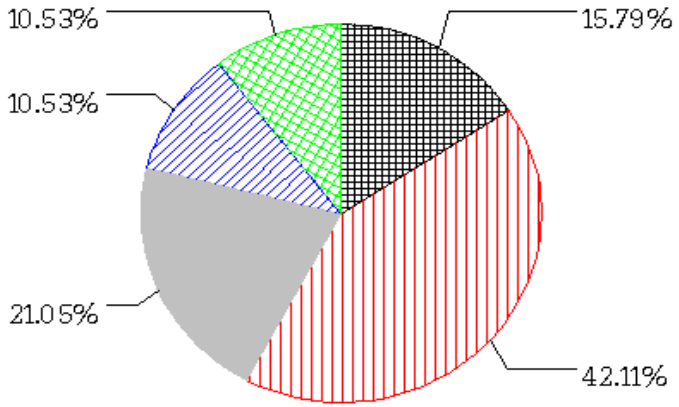
k. Prosecuting crimes that are considered less severe than timber theft, but which are more prevalent in the county, is a better use of this office's resources.

l. Prosecuting crimes that are less severe than timber theft, but easier for which to obtain convictions, is a better use of this office's resources.

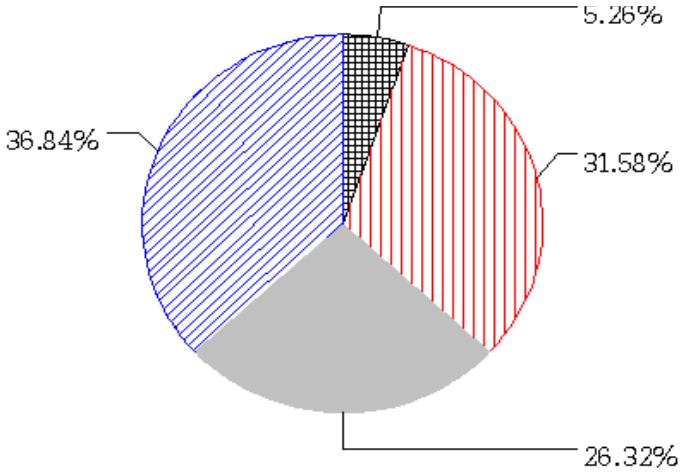
Timber theft should be handled differently from other larceny cases



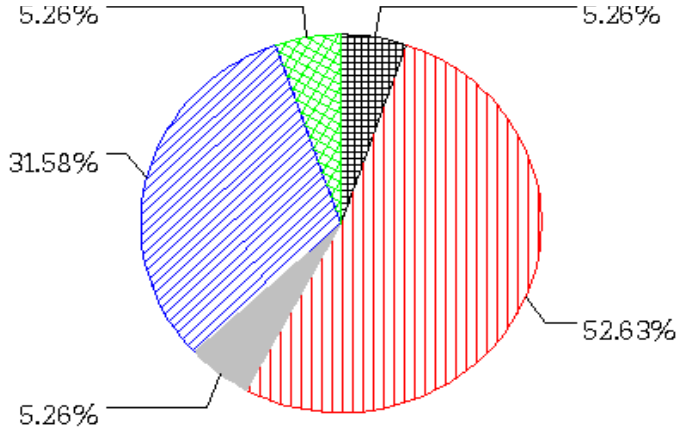
Timber theft laws, as currently written, are sufficient to deter would-be timber thieves



There are sufficient instances of timber theft to justify re-examining the laws surrounding it

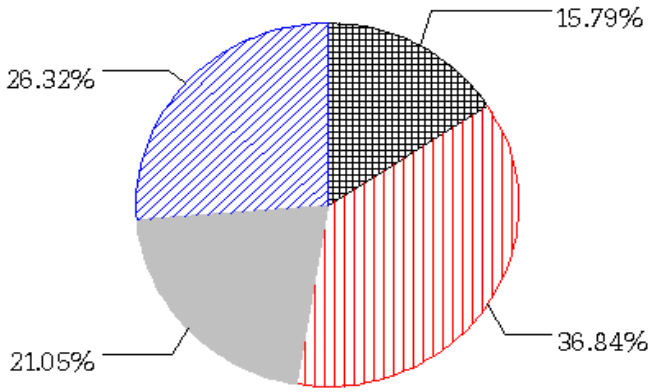


Civil remedies provide suitable compensation for victims of timber theft, should criminal proceedings fail

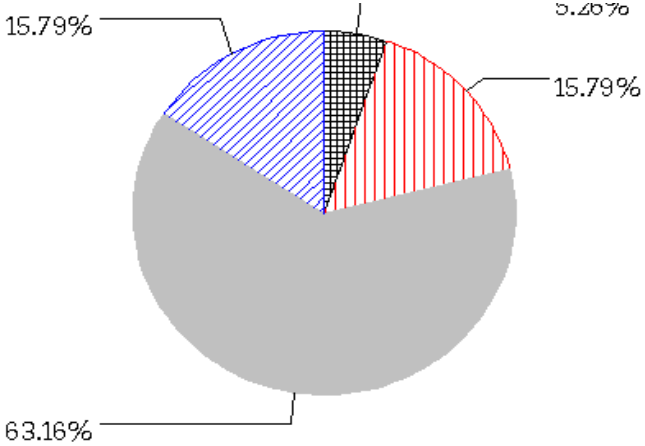


Question 17 — strongly agree; agree; neither agree nor disagree; disagree; strongly disagree

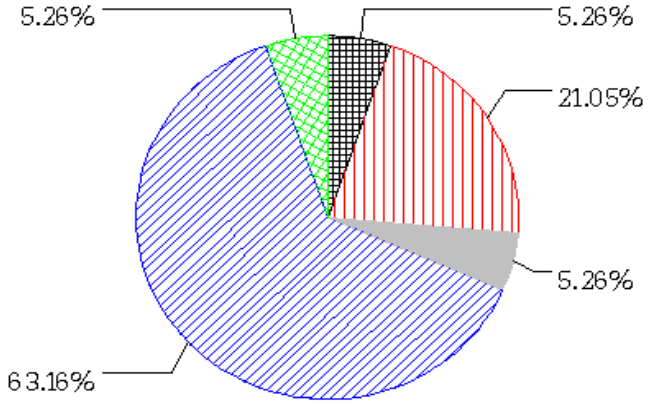
Convictions for timber theft are difficult to obtain



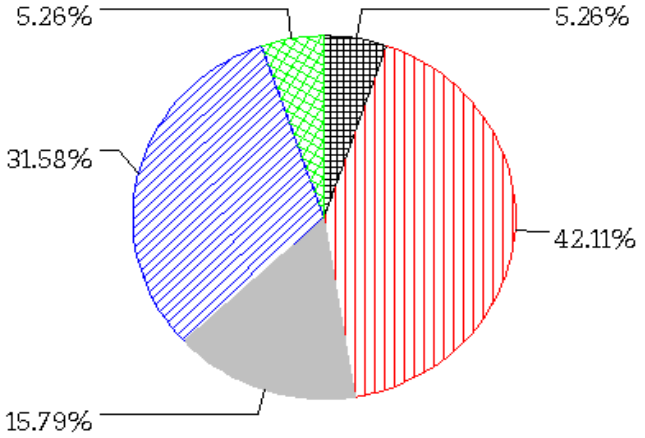
Timber theft cases frequently have sufficient evidence to carry the burden of proof



Timber theft is a crime that primarily affects large corporations

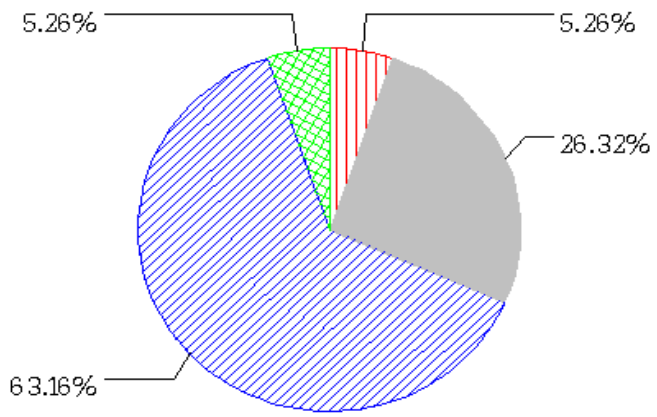


Timber theft is a crime that primarily affects small landowners

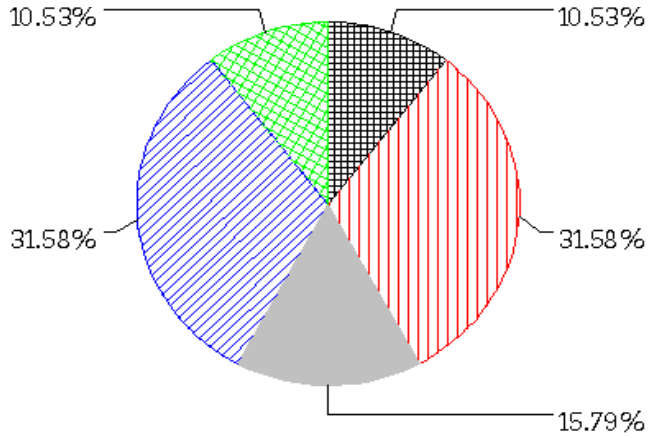


Question 17 — strongly agree; agree; neither agree nor disagree; disagree; strongly disagree

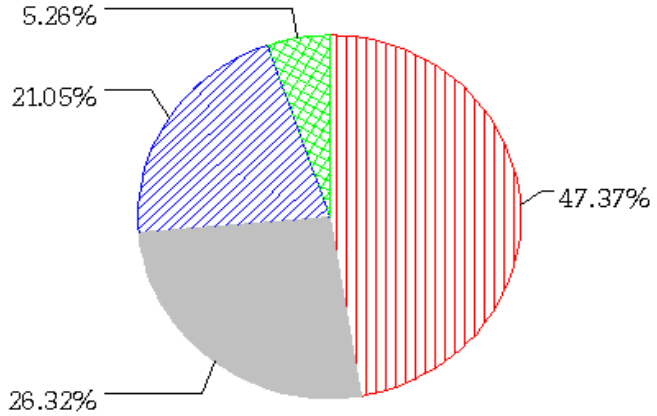
Timber theft is a crime that primarily affects public land



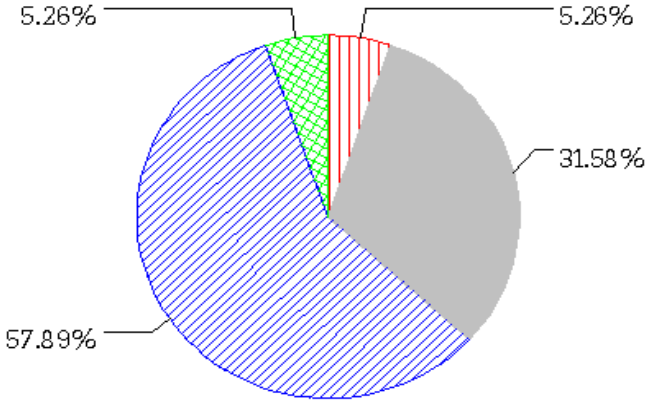
In the event of timber trespass, landowners should try and negotiate with culprits for some amount, even if the act is criminal, in order to avoid the uncertainty of a trial

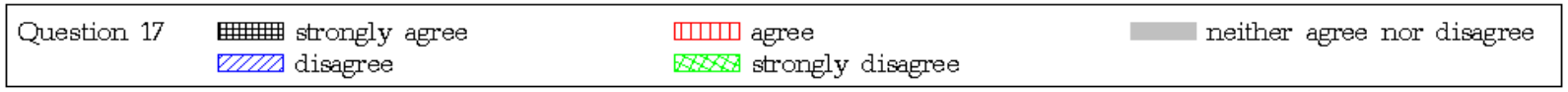


Prosecuting crimes that are considered less severe than timber thief, but which are more prevalent in the county, is a better use of this office's resources



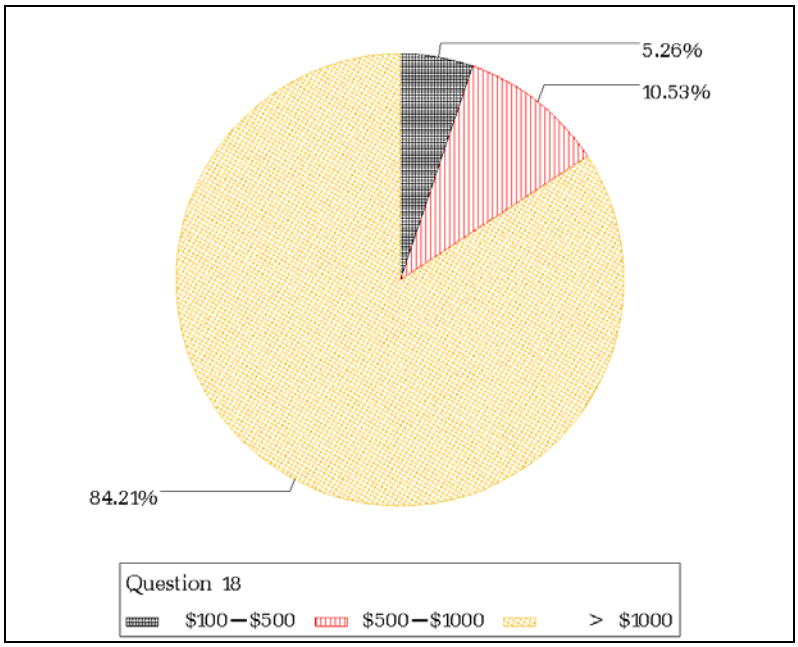
Prosecuting crimes that are less severe than timber thief, but easier for which to obtain convictions, is a better use of this office's resources





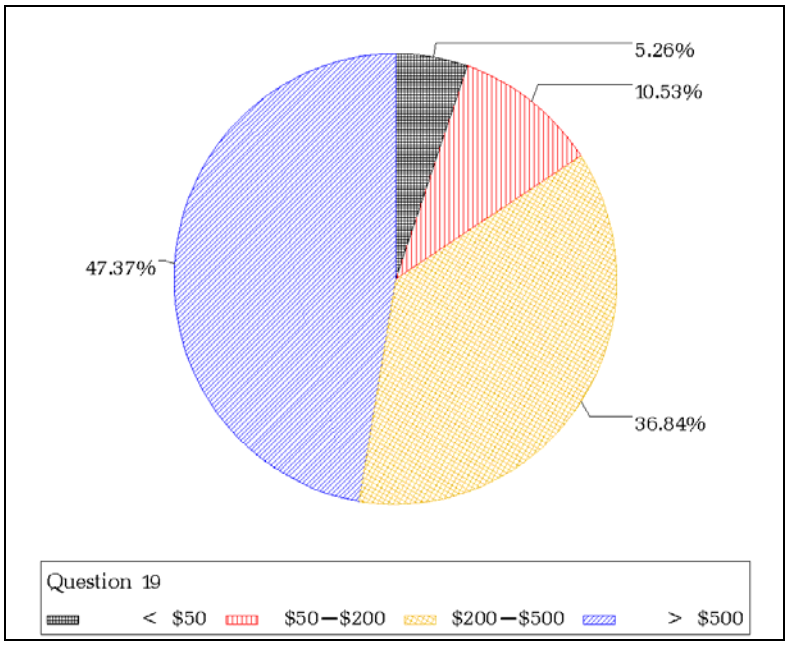
18) In your estimation, what is an acre of mixed hardwood timber in this region worth?

____ less than $100 ____ $100 – 500 ____ $500 – 1000 ____ more than $1000

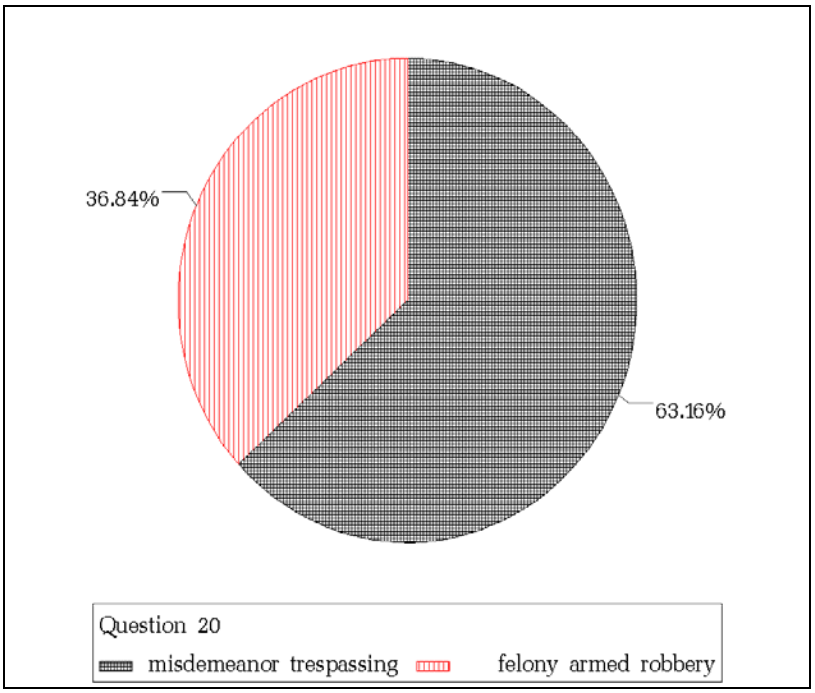


19) In your estimation, what is a high quality 16-foot black cherry log worth?

____ less than $50 ____ $50 – 200 ____ $200 – 500 ____ more than $500



20) Would you rate the "seriousness to society" of timber theft closer to misdemeanor trespassing or felony armed robbery?



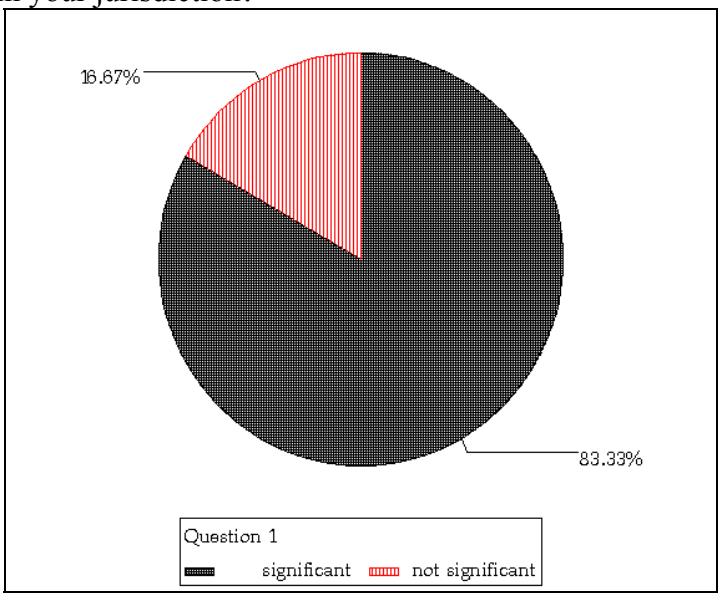
Why?

Misdemeanor: 92% no risk of injury in timber theft
Felony: 71% values represented by timber would make it felonious

Appendix B: Law Enforcement Survey and Responses

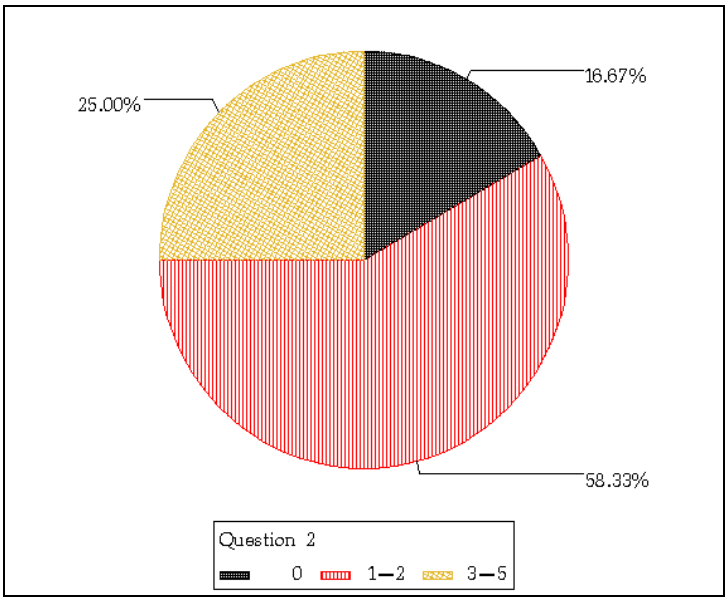
Timber Theft Law Enforcement Survey

1) Timber theft is a crime which has received essentially no previous research. As a result, very little information is available about both the crime and its extent. In your experience, is timber theft a relatively significant or relatively insignificant problem in your jurisdiction?



2) We are interested in determining how much timber theft is reported to law enforcement authorities. On average, approximately how many cases of timber trespass or theft are you contacted about each year?

___ 0 ___ 1-5 ___ 6-10 ___ 11-15 ___ 16 – 20 ____ more than 20



3) Of those, approximately what percentage do you investigate each year?

95% Lower limit = 50% Median = 100% 95% Upper Limit = 100%

4) Approximately what percentage of the cases that are investigated result in an arrest?

95% Lower limit = 8.5% Median = 25% 95% Upper Limit = 50%

5) In how many of these cases was the alleged thief able to be identified?

95% Lower limit = 51% Median = 100% 95% Upper Limit = 100%

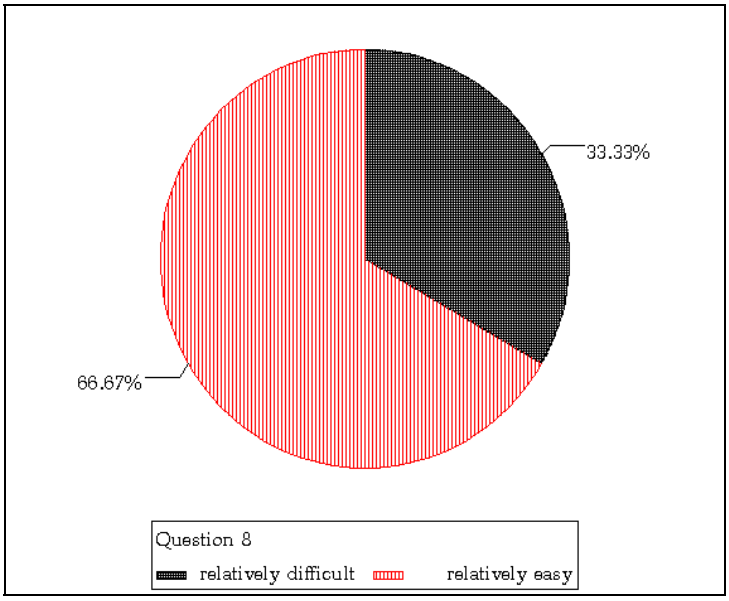
6) Of the timber theft instances which were investigated by this office, how many were sent to the county prosecuting attorney for a criminal trial?

95% Lower limit = 1.5% Median = 20% 95% Upper Limit = 58.5%

7) What were the reasons for not sending more of these cases to the county prosecutor?

57% Cases are civil in nature
29% Cases settled out of court

8) Are most timber theft cases relatively easy or relatively difficult to successfully investigate?



Why?

Relatively difficult: 67% Boundary issues
Relatively easy: 50% Cases end up being easy to investigate

9) What resources are critical to successful investigation of timber theft cases in your jurisdiction?

56% Surveyors/existing boundary markers
33% Consultant foresters

10) We are interested in determining how severe a crime timber theft is viewed to be. Please rank the following crimes in order of severity, numbering from 1 to 7 with 1 being the most severe.

_____ Grand theft auto

_____ Arson

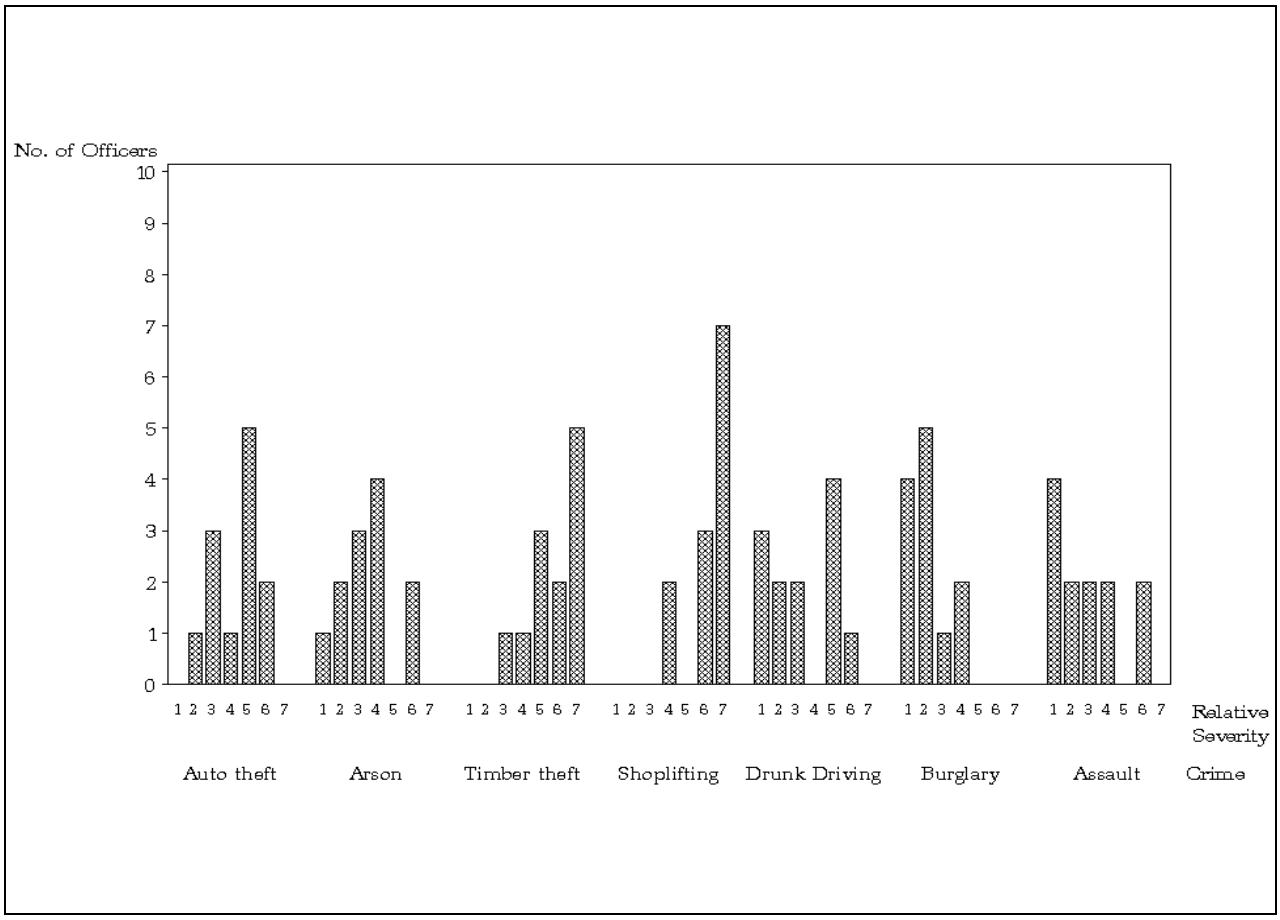
_____ Timber theft

_____ Shoplifting

_____ Driving while intoxicated

_____ Burglary

_____ Assault



11) Based on the answer card provided please state the extent to which you agree or disagree with each of the following statements.

a. Timber theft should be handled differently from other larceny cases.

b. Timber theft laws, as currently written, are sufficient to deter would-be timber thieves.

c. There are sufficient instances of timber theft to justify re-examining the laws surrounding it.

d. Convictions for timber theft are difficult to attain.

e. Timber theft is a crime which primarily affects large corporations.

f. Timber theft is a crime which primarily affects small non-industrial landowners.

g. Timber theft is a crime which primarily affects public land.

h. In the event of timber trespass, landowners should try and negotiate with culprits for an amount equal to the value stolen, even if the act is criminal, in order to avoid a trial.

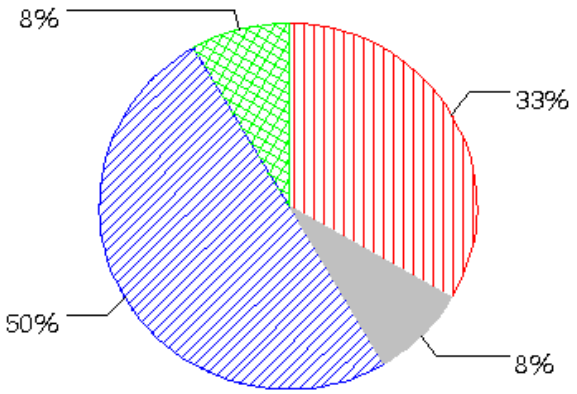
i. A more thorough understanding of the timber business would help in investigating timber theft crimes.

j. Many county residents do not seem to feel timber theft is a serious offense.

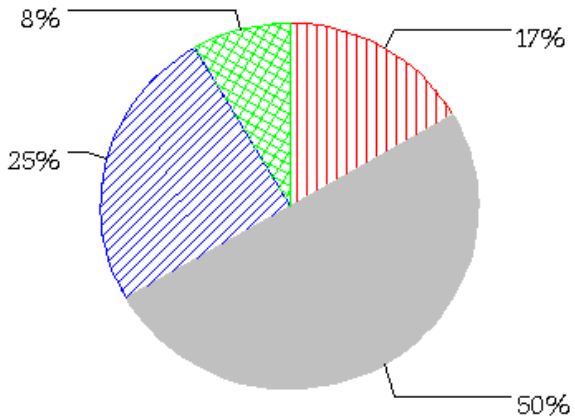
k. An indifference of county residents towards timber thefts makes successfully investigating timber theft cases difficult.

l. Thorough investigation of all reported timber thefts is not always possible due to the number of more severe crimes which warrant investigation first.

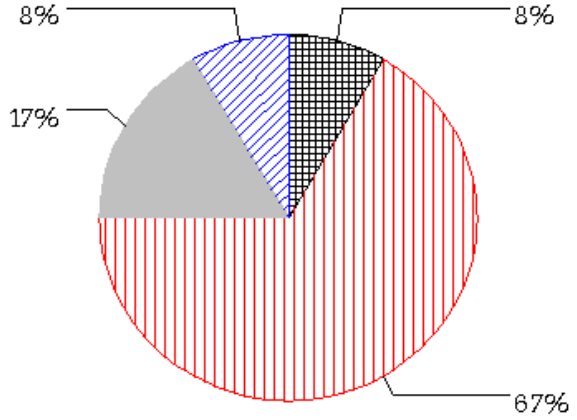
Timber theft should be handled differently from other larceny cases



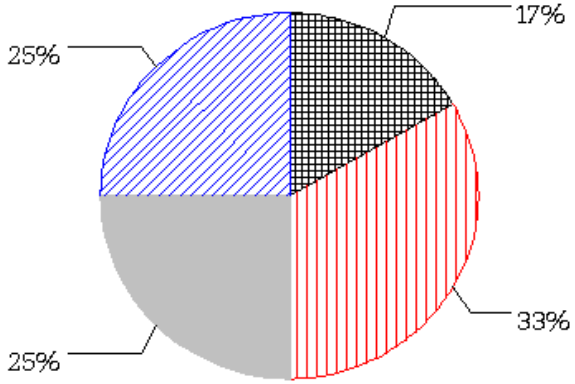
Timber theft laws, as currently written, are sufficient to deter would-be timber thieves

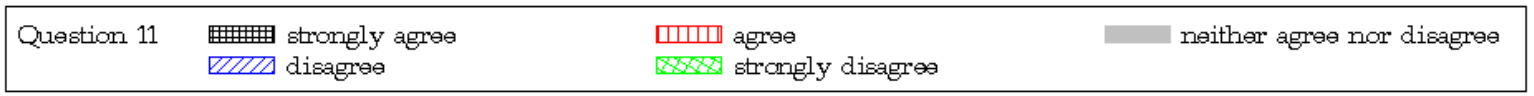


There are sufficient instances of timber theft to justify re-examining the laws surrounding it

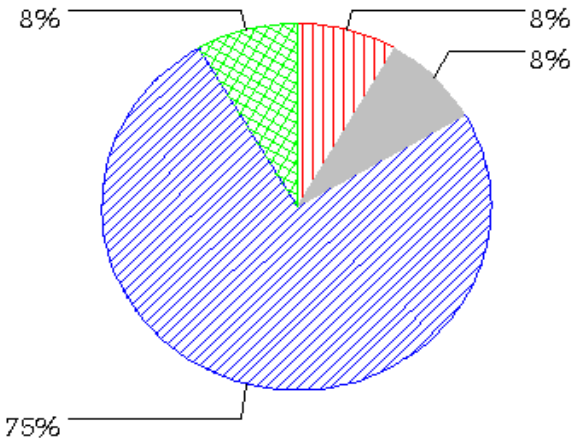


Convictions for timber theft are difficult to obtain

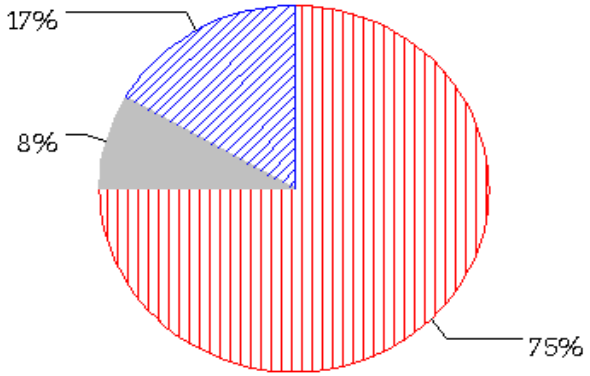




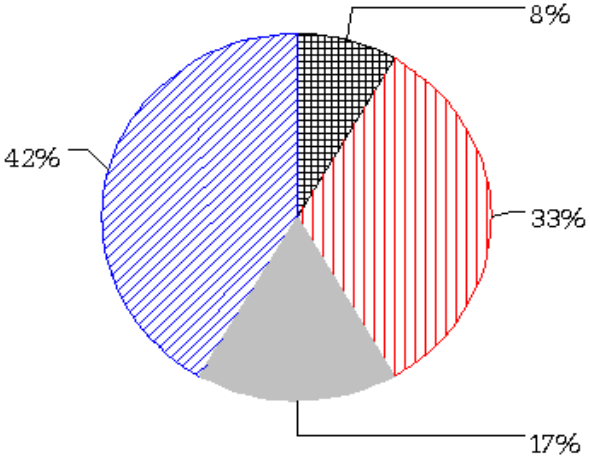
Timber theft is a crime that primarily affects large corporations



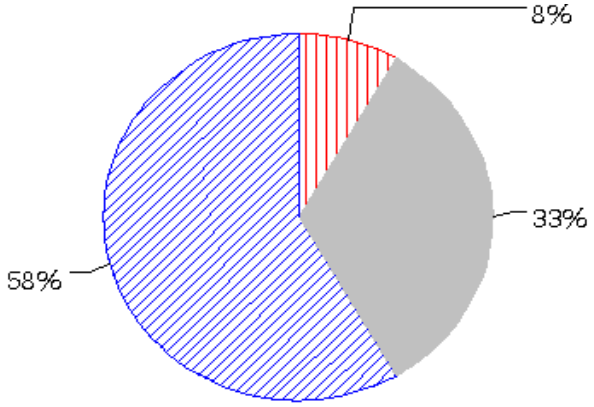
Timber theft is a crime that primarily affects small landowners

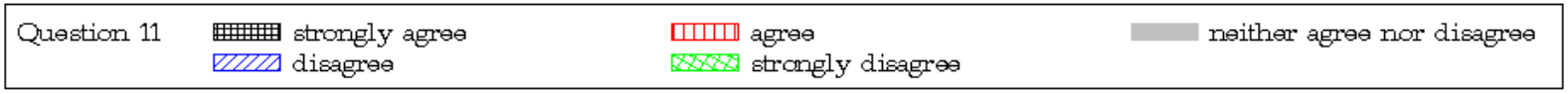


Timber theft is a crime that primarily affects public land

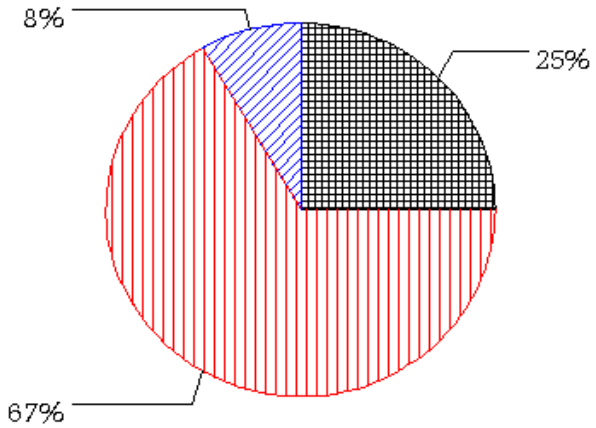


In the event of timber trespass, landowners should try and negotiate with culprits for an amount equal to the value stolen, even if the act is criminal, in order to avoid a trial

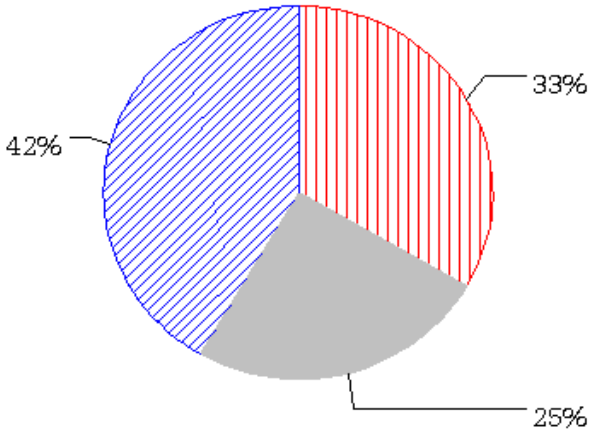




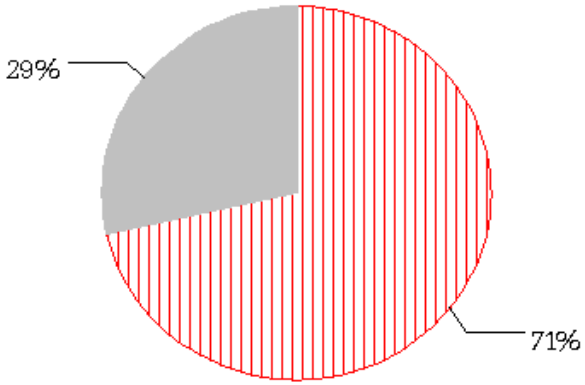
A more thorough understanding of the timber business would help in investigating timber theft crimes



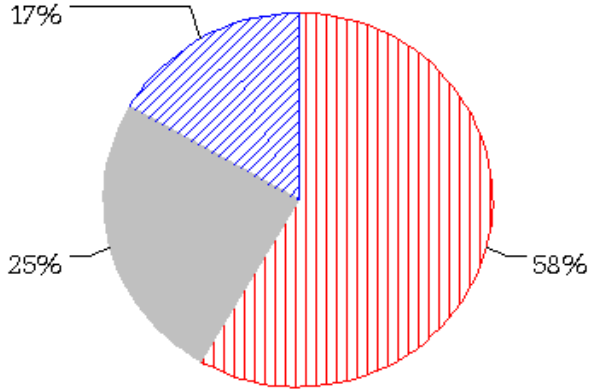
Many county residents do not seem to feel timber theft is a serious offense



An indifference of county residents towards timber thefts makes successfully investigating timber theft cases difficult



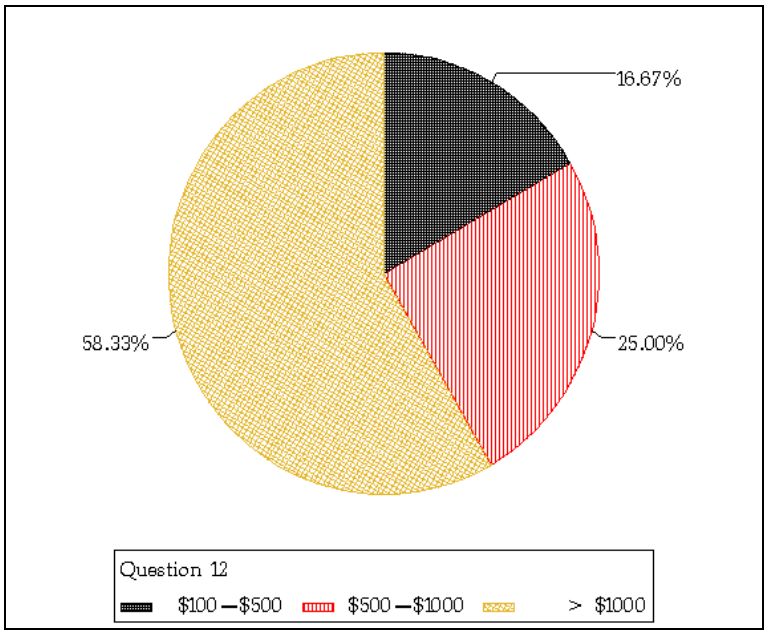
Thorough investigation of all reported timber thefts is not always possible due to the number of more severe crimes which warrant investigation first



Question 11 — strongly agree; agree; neither agree nor disagree; disagree; strongly disagree

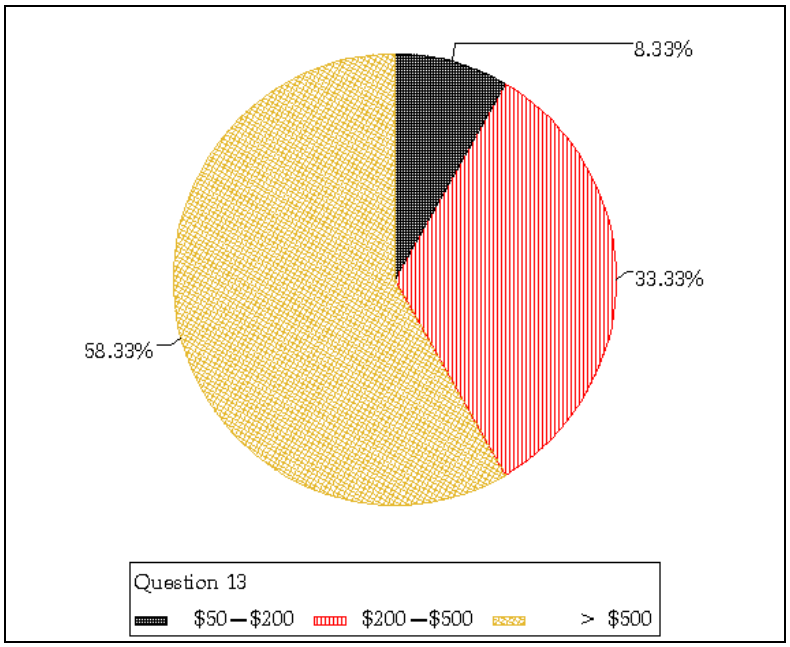
12) In your estimation, what is an acre of mixed hardwood timber in this region worth?

____ less than $100 ____ $100 – 500 ____ $500 – 1000 ____ more than $1000



13) In your estimation, what is a high quality 16-foot black cherry log worth?

____ less than $50 ____ $50 – 200 ____ $200 – 500 ____ more than $500



Appendix C: Industrial Landowner Survey and Responses

Timber Theft Industrial Landowner Survey

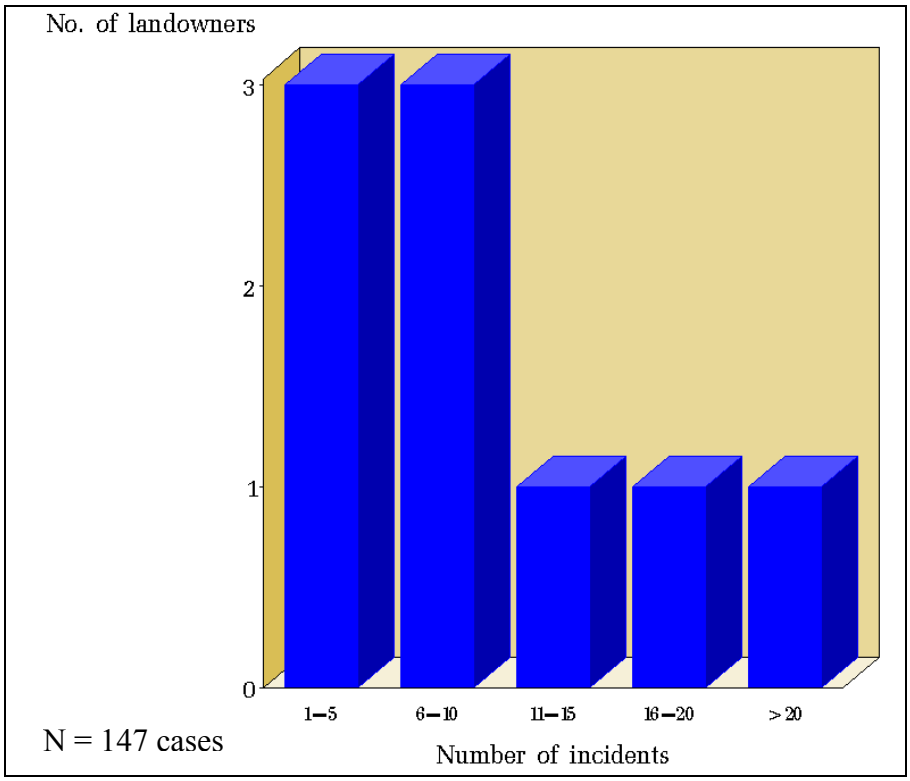
1) Timber theft is a crime which has received essentially no previous research. As a result, very little information is available about both the crime and its extent. In your opinion, is timber theft a relatively significant or relatively insignificant problem in your area?

100% relatively significant

2) Have you had any incidents of timber trespass or theft on your property in the past 3 years? [If NO, end the interview.]

100% have had incidents

a. How many incidents have you had?



3) Who perpetrated these acts?

% loggers harvesting an adjoining tract
95% lower limit = 10% ***Median = 37.5%*** ***95% upper limit = 70%***

% private individuals stealing individual trees
95% lower limit = 30% ***Median = 62.5%*** ***95% upper limit = 90%***

4) Approx. how many acres/trees were stolen (over the course of three years)?

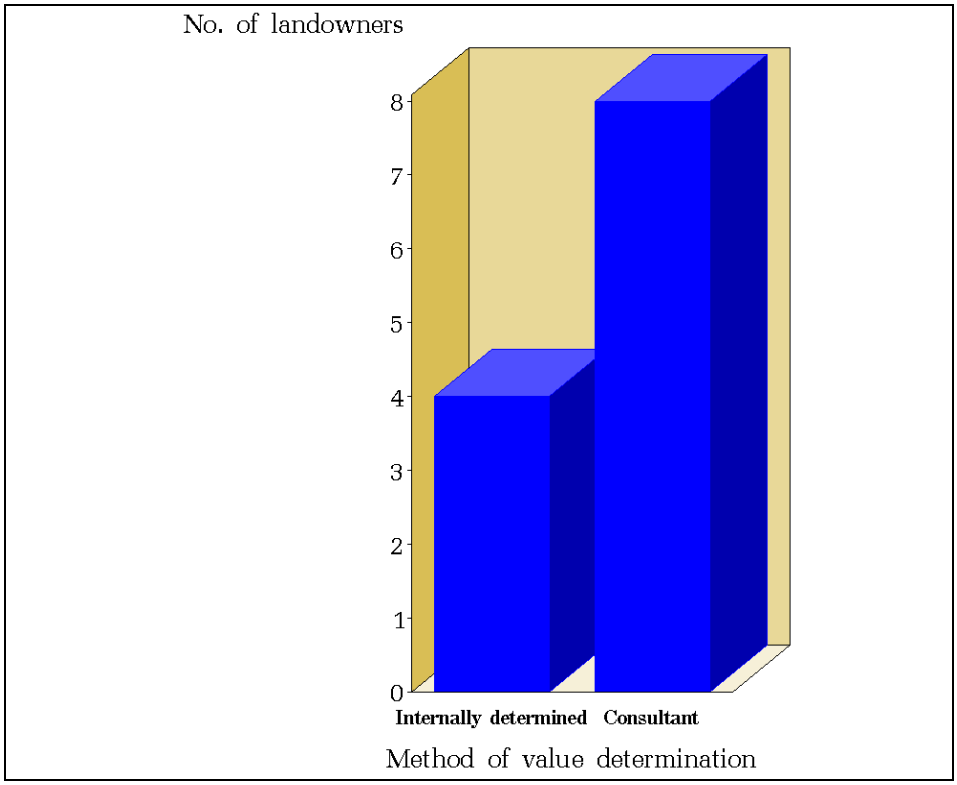
From 25 trees to 150 acres

5) What was the approx. value of the stolen timber (trees)?

Total = $323,000

Per Landowner:
Lower 95% limit = $14,000 ***Median = $20,000*** ***Upper 95% limit = $70,000***

a. How did you determine this value?

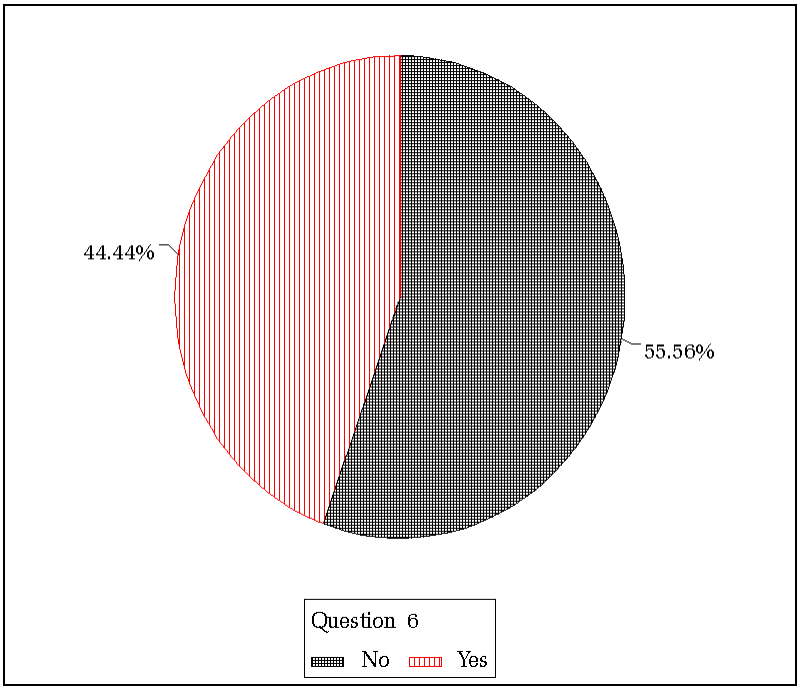


b. Approximately what % was that of the total value of timber on your property?

Per Landowner:

Lower 95% limit = 1% ***Median = 7.75%*** ***Upper 95% limit = 25.5%***

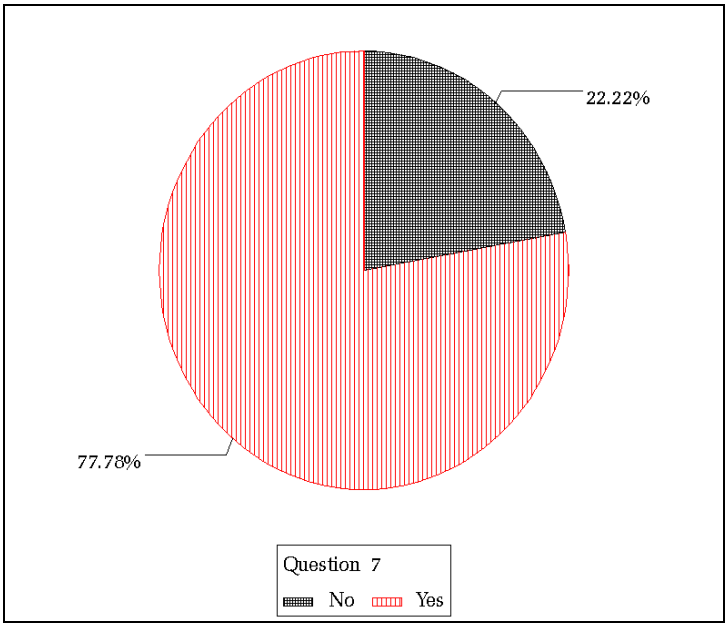
6) Did you contact your state forestry agency about the theft incident(s)?



a. What assistance did they provide?

80% performed criminal investigation (West Virginia)

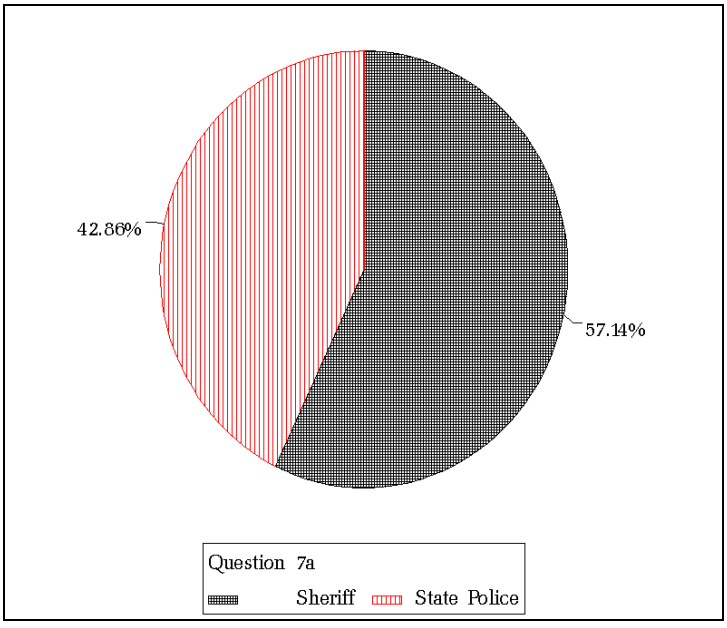
7) Was law enforcement notified about the theft?



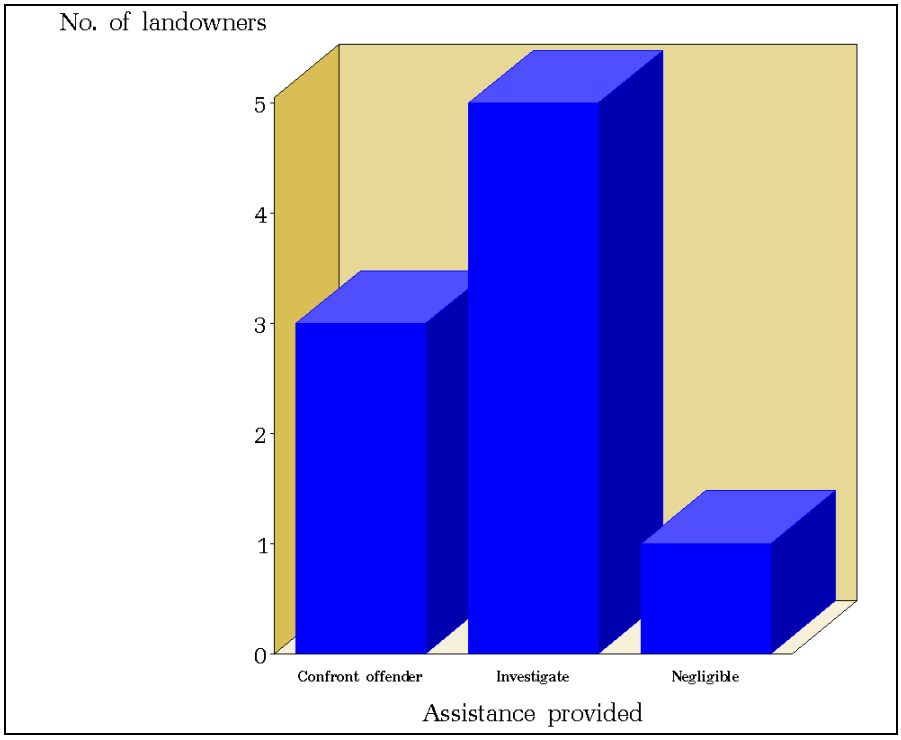
Total incidents for which law enforcement was contacted = 99

Percent notification for individual landowners:
Lower 95% limit = 7.1% Median =22.5% Upper 95% limit = 55.9%

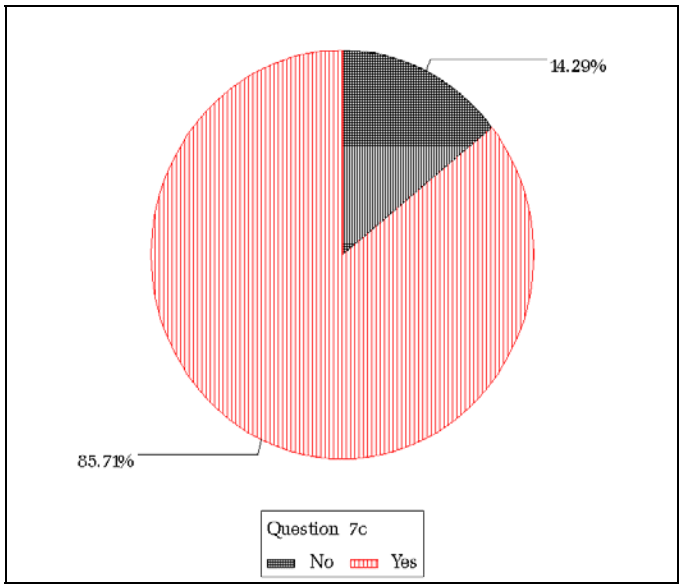
a. If YES, Which agency?



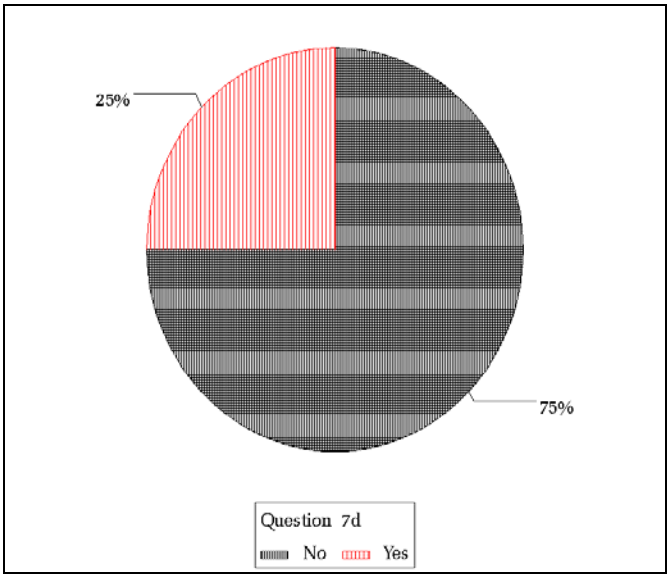
b. What action was taken by that agency?



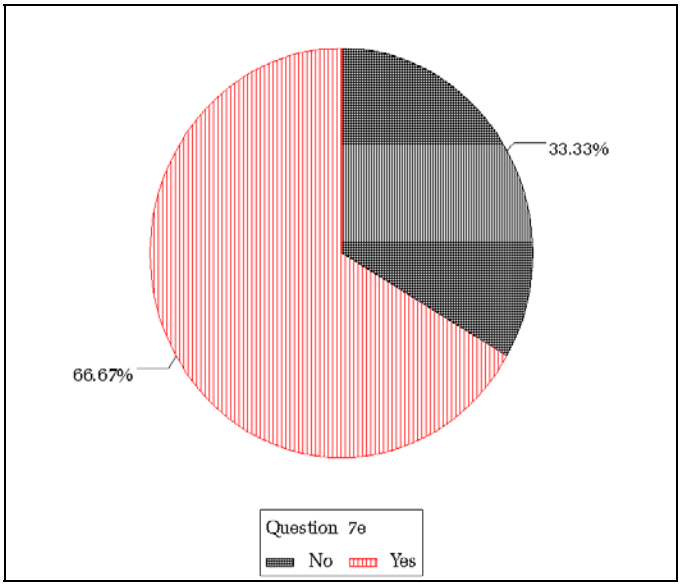
c. Was the perpetrator identified prior to contacting law enforcement?



d. If NO, Was the perpetrator identified by law enforcement?

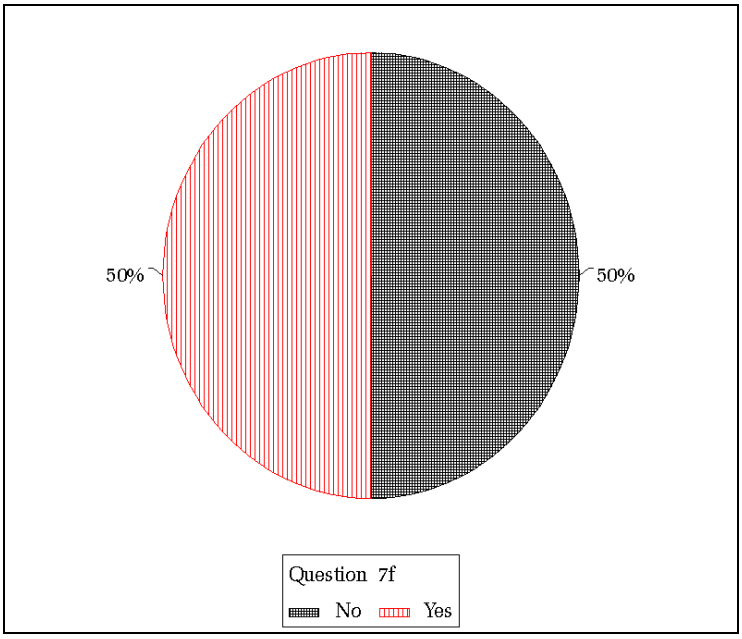


e. Was the perpetrator arrested?



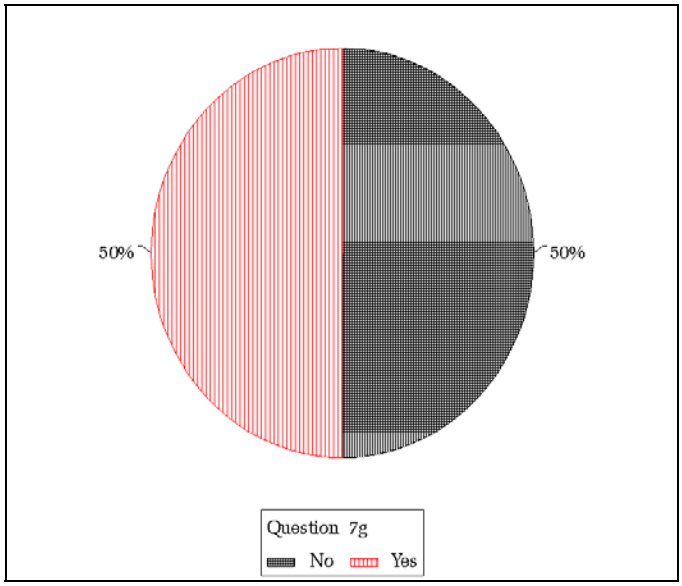
Total arrests = 22

f. Was there a trial?



Total trials = 6

g. Was the perpetrator found guilty?

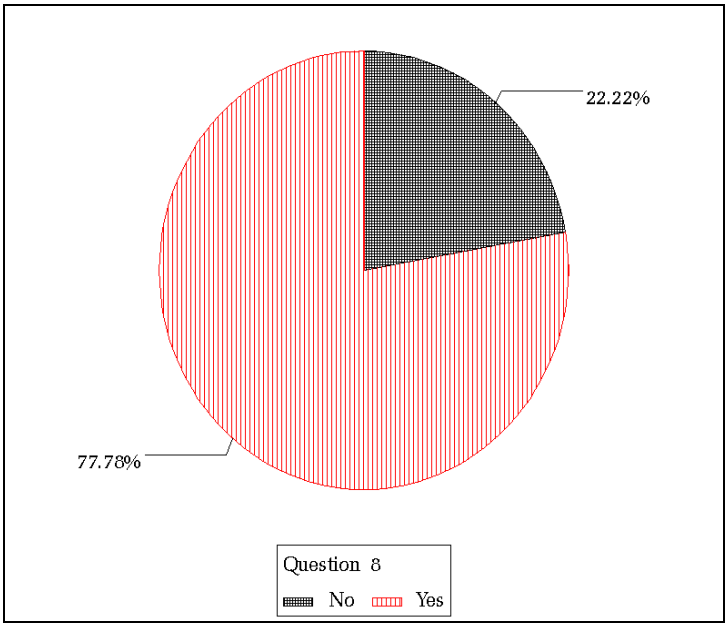


Total convictions = 4

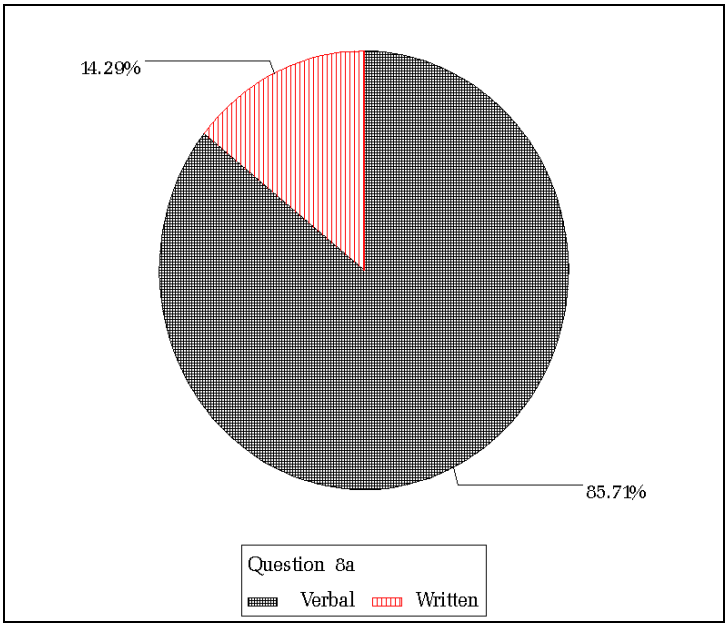
h. If YES, what was the penalty?

Fines and restitution

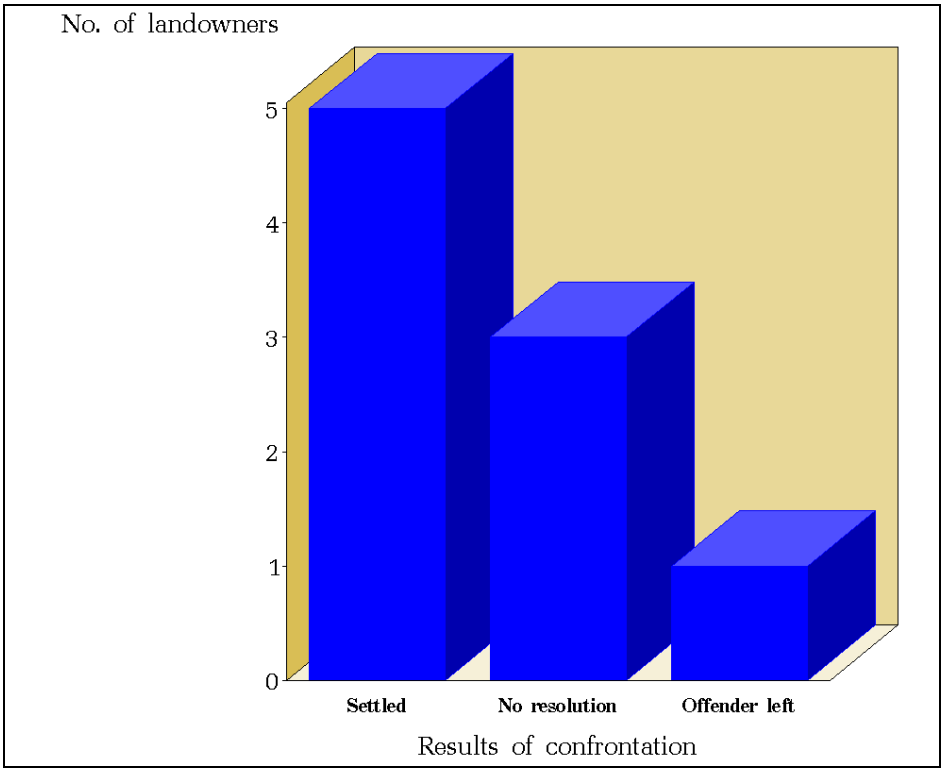
8) Did you take any action prior to legal involvement to try to recover the value lost to theft?



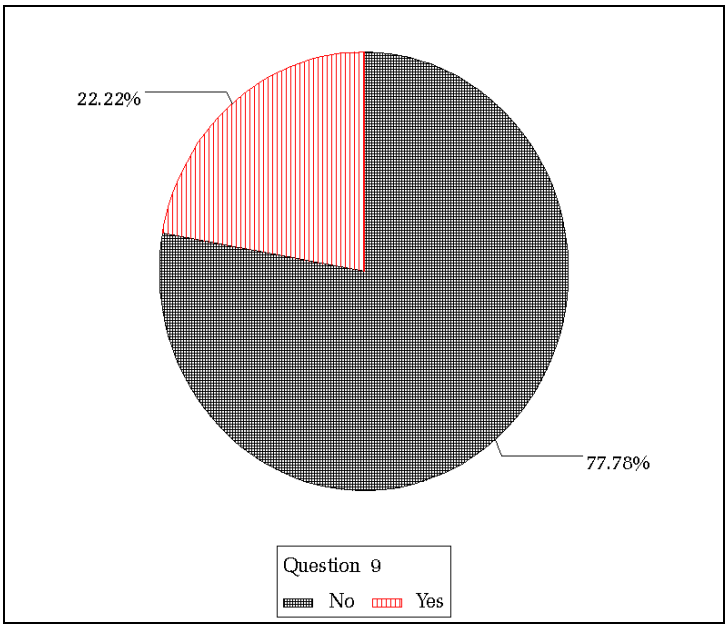
a. What type of action was taken (verbal, written, etc.)?



b. What were the results?



9) Was the matter pursued in civil court?



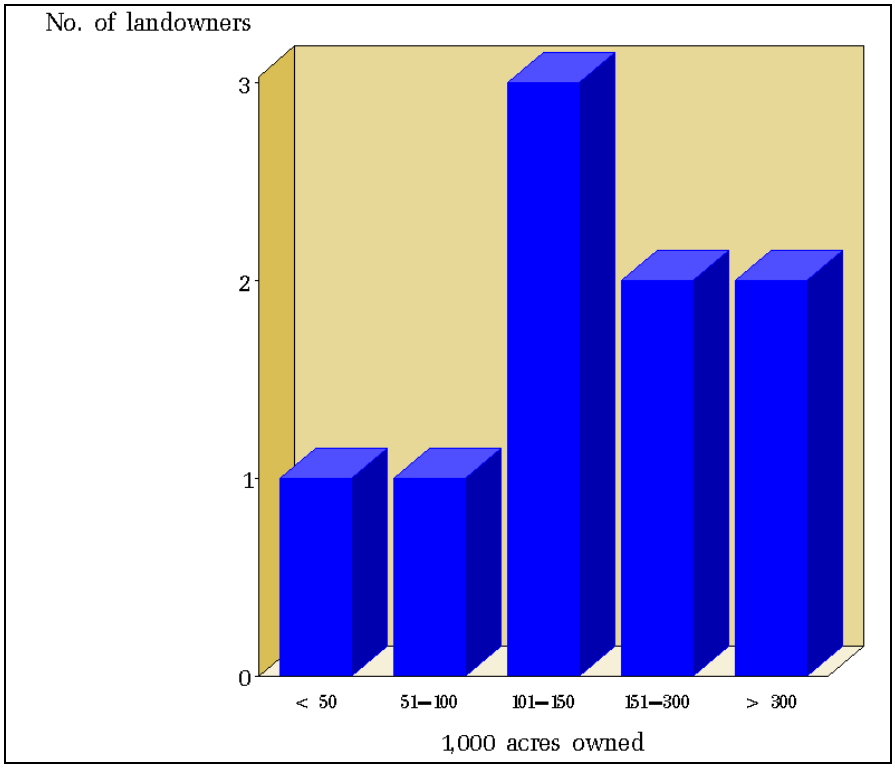
a. If YES, what was the outcome?

14% unresolved
86% judgment awarded

10) What was the damage award (check all that apply)?

100% 3 x stumpage
100% investigation costs

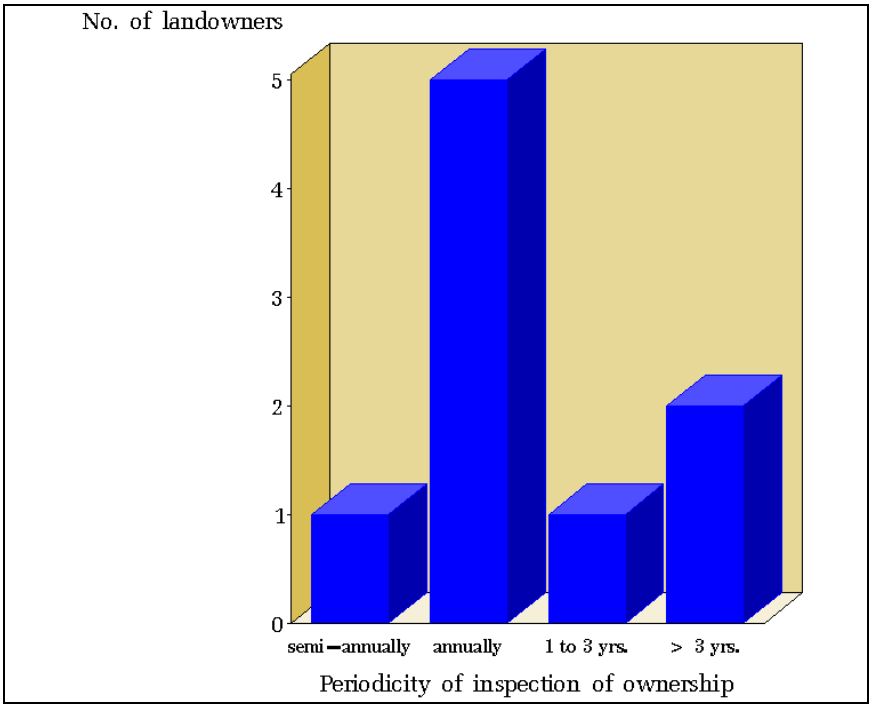
11) How many acres of forestland do you own/manage?



a. In what county or counties is it located?

Wide range including counties in TN, VA, KY, and WV

b. How often do you or someone reporting to you walk over your forestland?



c. Is there vehicle access to your property directly from a public road?

100% yes

d. Are there neighbors living along your property lines?

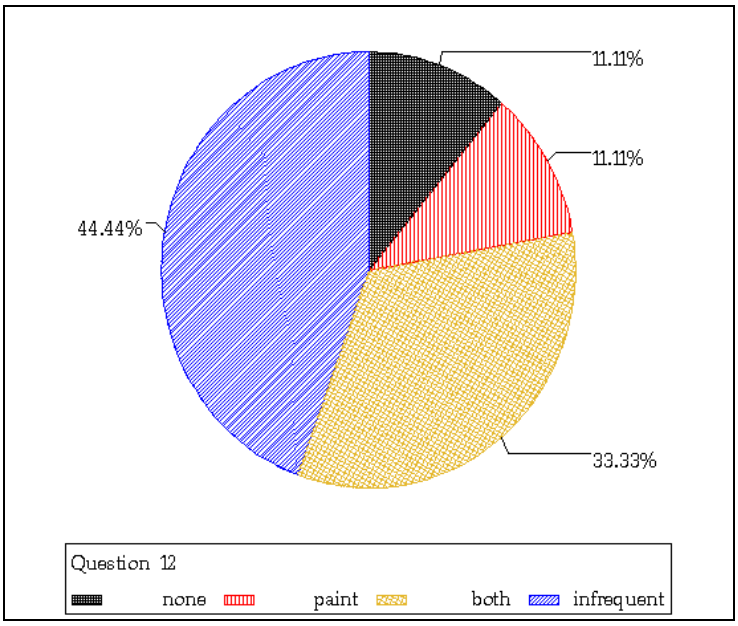
100% yes

e. Do you have a forest management plan?

100% yes

12) We are interested in determining what measures are taken to prevent timber trespass in this area. How are your boundaries delineated?

_____ paint _____ signs _____ both _____ other _____ none



a. How often are they refreshed?

Lower 95% limit = 5 yrs. ***Median = 7.5 yrs.*** ***Upper 95% limit = 15 yrs.***

13) What do you feel would best help you prevent further theft of your property?

- Require purchasers to document title
- More jail sentences for convictions
- Restrict purchases from unregistered loggers
- Faster prosecution
- Take thefts more seriously
- Complete surveys of property
- Increase awareness of crime, and importance in mind of attorneys/law enforcement

- Better investigation methods
- More oversight of property/ neighbor cooperation
- Easier/more effective prosecution

Vita

Shawn Baker, the son of Dale and Michelle Baker, was born in Monroe, LA on August 30, 1978. He graduated from Lloyd C. Bird High School in Chesterfield, VA in 1996, at which point, he enrolled in Virginia Tech University. In 1999 he began a 13 month co-op with Mead Paper in Chillicothe, OH. He received his B.S. in Forestry in 2001, and graduated as the outstanding senior in both the Department of Forestry and the College of Natural Resources and was the University's Distinguished Senior Co-op Student. Completion of this thesis is the final criteria for his M.S. in Forestry.