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Economic Impact of

FERAL SWINE DAMAGE

to Agricultural Lands in Louisiana

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Executive summary

Feral swine populations continue to expand across Louisiana and much of the United States, causing substantial physical damage to agricultural lands. This report presents results from a statewide survey to estimate economic losses from feral swine activity on agricultural lands in Louisiana. Based on statewide expansion of 2020 survey results from more than 900 respondents, the total annual economic loss from the presence and activity of feral swine on agricultural and timber lands in Louisiana was estimated to be $91.1 million. This economic loss value is based on the estimation of $66.2 million in agricultural commodity production losses and another $24.9 million in non-production losses.

Introduction

Feral swine exist in all 64 parishes of Louisiana, causing substantial economic loss from damage to agricultural and timber lands. Due to the high reproductive rate of feral swine, statisticians have estimated that approximately 70% to 75% of the population must be harvested to control feral swine numbers. In Louisiana, hunters harvest less than half that so populations continue to grow according to the Louisiana Department of Wildlife and Fisheries. Current estimates of feral swine populations in Louisiana range as high as 900,000 animals. A 2013 study by the LSU AgCenter, published in 2015, estimated that feral swine caused annual economic damages or losses of approximately $74 million to agricultural land in Louisiana (Tanger, et al., 2015). This total loss estimate included $53 million in annual crop production losses, primarily related to yield reduction due to crop damage, and $21 million in increased costs (non-production losses) on agricultural land. In 2021, the LSU AgCenter conducted a statewide survey to provide more current estimates of economic losses from feral swine in the state. Results from the survey are presented in this report.

Background

Feral swine continue to be a growing problem to farmers, ranchers, foresters and landowners in many areas of the U.S. and are considered to be one of the most damaging invasive species in existence, causing significant economic damage to crops, forests and agricultural land. First brought to the country in the 1500s by early explorers and settlers as a source of food, free-range livestock management practices and escapes from enclosures eventually led to the first establishment of feral swine populations within the United States. In the 1900s, the Eurasian or Russian wild boar was introduced into parts of the U.S. for sport hunting. Today, feral swine are a combination of escaped domestic pigs, Eurasian wild boars and hybrids of the two according to the U.S. Department of Agriculture Animal and Plant Health Inspection Service (APHIS).

Feral swine are the most prolific large mammal in North America, and given adequate nutrition, populations can double in only four months (Kaller and Reed, 2010). Sexual maturity is reached as early as six months, with sows producing two litters per year. Litter size varies with age and nutritional intake but can average five to six young pigs per litter. As a result, where adequate food and cover are available, feral swine populations can explode and spread quickly. From 1982 to 2016, the feral swine population estimates in the United States increased from about 2.4 million to more than 6 million hogs (Kinsey, 2022). Although precise numerical estimation is difficult, current estimates of feral swine population numbers in the U.S. range as high as 9 million animals. The Louisiana Department of Wildlife and Fisheries reports that feral swine are found in all 64 parishes of Louisiana, with an estimated state population of approximately 700,000 to as many as 900,000 animals.

Feral swine have been reported in at least 35 states (APHIS, 2022). Their population is estimated at more than 6 million and is rapidly expanding. Range expansion over the last few decades is due to a variety of factors including their adaptability to a variety of climates and conditions, translocation by humans and a lack of natural predators. In Louisiana, feral hogs can be found in a wide variety of habitats ranging from tidal marshes to timbered areas (Kaller and Reed, 2010). They prefer hardwood forests that produce acorns as a primary food source but will frequent pine forests. In remote areas or where human disturbance is minimal, they can often be found in open ranges or pastures. Although feral swine generally prefer less interaction with humans, their rapidly expanding population and constant search for food sources is causing increasing interactions with producers and foresters on agricultural lands.

The expansion of feral swine population numbers over the past few decades has resulted in increased interaction with commercial agricultural and forestry operations, causing significant economic losses. Although precise estimation of economic losses from feral swine presence is difficult, current approximations of economic damage are substantial in magnitude. A 2016 APHIS report estimated crop damage totaling $190 million annually for six major agronomic row crops over 11 states in the southeastern United States (Anderson, et al., 2016). A commonly reported national value from a USDA-APHIS report in 2020 indicated that a conservative national estimate of economic loss impact could be in the range of $1.5 billion annually, using estimations of $300 of damage per animal

with a conservative approximation of 5 million feral swine in existence across the country (Glow, VerCauteren, and Snow, 2020). With current national feral swine numbers of more than 6 million, annual economic loss from their activities could well exceed $2 billion per year across the United States.

Methodology

A survey instrument was designed to collect information related to feral swine presence and damage on agricultural land in Louisiana. The purpose of the survey was primarily to obtain information related to estimates of agricultural crop loss due to feral swine damage as well as estimates of increased costs due to damage of physical features and assets on agricultural land. Information was also collected on respondents' experience with feral swine presence on their land as well as their view on effective remediation measures. During the winter and early spring of 2021, approximately 6,000 mail surveys were sent to agricultural producers across Louisiana. The survey requested information related to calendar year 2020. Over the data collection period, 1,231 surveys were received, with 952 respondents indicating that they owned or managed agricultural land. These 952 survey responses were used to estimate statewide impacts of feral swine damage in 2020.

Total survey acreage in agricultural farm operations across the state was 659,887 acres. Approximately 50 percent of these acres (329,702) were in cropland. This survey acreage distribution corresponds approximately to the distribution of statewide farm acreage in Louisiana. The 2017 Census of Agriculture reported that cropland acreage on Louisiana agricultural farms (4.34 million acres) accounted for approximately 54 percent of the total land on farms (7.99 million acres). Non-cropland acreage on farms in the state includes woodland, permanent pasture and land in farmstead, buildings, ponds and other permanent structures.

Production losses

The first of two components of economic loss related to feral swine damage on agricultural land is the value of production loss, i.e., the value of production lost due to crop destruction resulting from the presence and activity of feral swine. Information related to production loss was collected for the 2020 calendar year.

For each commodity listed in the survey, respondents were asked to provide the total number of acres produced in 2020, the number of acres that were damaged by feral swine, and an estimate of the percent yield loss or reduction experienced as a result of feral swine. The survey responses on the number of acres impacted and estimated percent yield loss were then combined with published data on state average yields and average prices for each commodity surveyed to develop estimates of the value of production losses for each commodity. Price and yield data were obtained from the LSU AgCenter publication, 2020 Louisiana Summary: Agriculture and Natural Resources. The average yield per harvested acre in 2020 as reported by the Louisiana Summary was used as the expected yield producers would have experienced without the feral hog damage. The average market price received by producers in 2020 as reported by the Louisiana Summary was used as the market price producers were expected to receive on their 2020 production. The estimated economic impact to survey respondents from production losses for a particular commodity was calculated as follows:

Production loss per acre (survey) =
(expected yield x avg. percent yield loss) x market price

Production losses (survey) = acres impacted (survey)
x production loss per acre (survey)

Expansion of production losses for survey respondents to a statewide level loss estimate were determined by using the production loss estimate per acre from the survey, the percent of acres impacted from the survey and the total statewide harvested acreage for each commodity. Statewide harvested acreage data were taken from the 2020 Louisiana Summary. This calculation provided an approximation of the statewide production losses incurred annually from feral swine crop damage. This estimation process assumes that production losses observed from survey respondents are representative of production losses occurring at the statewide level. Mathematically, the statewide estimate of the economic impact for each commodity was calculated as follows:

Production losses (state) = % acres impacted (survey)
x total state acres x per acre damage (survey)

Although production loss data were collected for a wide range of commodities in the survey, production loss estimates for 10 major commodities are presented in this report. Those include: soybeans, corn, rice, hay, cotton, wheat, pecan, sugarcane, sorghum and timber. For the nine agronomic crops, statewide production losses from feral swine activity were estimated as described above. For timber, a statewide production loss estimate was

determined by multiplying the percent of timber acres damaged from the survey times the average timber yield loss reported in the survey to yield an estimate of average percent loss of timber value. This average percent loss was then applied to the statewide stumpage value estimate for 2020 to yield an estimate of production loss to timber producers.

Non-production losses

The second component of economic loss consists of non-production loss which is related to damages from feral swine presence or activity. These values include costs incurred for replanting or re-disking fields, loss of stored commodities, loss of income from hunting leases, as well as values for damage to a range of farm structures, such as equipment, fences and ponds, and physical features, such as natural waters, drains and levees. Respondents were simply asked to provide their estimate of the total cost associated with each type of non-production loss provided in a list of potential damage instances that they experienced in 2020 as a result of the presence of feral hogs on their operation.

The total economic impact of these non-production losses to the operations of the survey respondents was determined by combining the total reported non-production losses over all survey respondents. The total survey cost value was divided by total farm acres in the survey to yield an estimate of average non-production loss per acre over all farm operations. This calculation based on survey date yielded an average loss estimate of $3.12 per acre over all survey acres. This average per acre survey loss estimate was then multiplied by total land in farms, as reported by the 2017 Census of Agriculture for Louisiana, to provide an estimate of statewide non-production losses from feral swine presence over all farming operations. Mathematically, the statewide estimate of non-production losses from feral swine activity was calculated as follows:

Avg. loss per acre (survey) =
sum of non-production losses (survey) / total survey acres

Non-production losses (state) =
total state acres x avg. loss per acre (survey)

Non-production losses, which are fixed by farm operation, were expanded to statewide estimates using number of farm acres rather than number of farm operations due to the greater reliability of farm acreage estimates as compared with estimates of farm operation numbers.

Results

Recent experience with feral swine

Survey respondents were asked a series of questions to obtain information concerning recent experiences with feral swine on their land. Of the 952 respondents who owned or managed agricultural land in the survey, 47.5 percent indicated that feral swine were currently present on their land (Table 1). Just over half of the respondents (54.3 percent) indicated that feral swine have caused some type of damage on their land and 55.6 percent indicated that they felt damage from feral swine has been increasing over the past few years. More than half of the respondents also indicated that feral swine population numbers have been increasing on their land in recent years as well. In terms of the type of damage incurred from feral swine, almost all of the respondents reported rooting land as the primary damage observed. Wallowing, trampling and cutting paths were also reported as observed damages by large numbers of survey respondents.

Respondents indicated several reasons they believed were responsible for the increase in feral swine numbers. Natural reproduction, including multiple litters per year, was cited by 82.1 percent of respondents as the primary reason for the expansion of feral swine populations (Table 2). More than half of the respondents indicated that lack of hunting pressure was also a major contributor to herd numbers. Other cited reasons for observed expansion of feral swine populations in the state included inadequate state or federal wildlife policies, local government inaction, illegal release or transfer, and absentee property owners.

Other than crop production losses, survey respondents were asked what types of non-production losses they had experienced from feral swine activity on their land. Non-production losses result in incurred costs to repair or replace damaged land or structures. Almost one quarter of the respondents (23.1 percent) indicated damage to pastures as the leading non-production loss from feral swine activity (Table 3). Other frequently reported types of damage included damage to wildlife food plots, land damage requiring re-disking, damage to drains or levees, and damage to planted fields required replanting. Damage was also reported to farm landscape, natural waters, fences, stock ponds and other equipment or structures.

Viewpoints on impact of feral swine

Survey respondents were asked a series of questions to solicit their viewpoints over a range of issues related to the varied impacts of feral swine activity (Table 4). For a given list of stated issues, respondents were asked to

select their viewpoint choices from the following options: strongly disagree, somewhat disagree, neutral or no opinion, somewhat agree or strongly agree.

Some of the strongest viewpoints were related to the impacts on farming operations and the need for more control measures. Summaries of survey responses indicated that 69.4 percent of respondents reported that feral swine activity interfered with their farming operations and 63.9 percent reported that they have experienced crop damage from feral swine over the past year. An estimated 80.0 percent of respondents felt feral swine activity negatively impacts wildlife habitat and 86.2 percent think that feral swine control should be a priority for state eradication programs. A majority of those surveyed felt that more work needs to be done to control the size and impacts of herd populations. Approximately 60 percent of the respondents indicated that they felt feral swine are not being properly managed by state or federal officials.

Other respondent viewpoints were more mixed in nature. While more than 60 percent of respondents felt feral swine should be managed for hunting opportunities, approximately the same percentage felt that the presence of feral swine negatively impacts soil and water quality. Roughly half of the survey respondents agreed that feral swine transmit harmful diseases to humans, wildlife or farm animals.

Remediation measures employed

Information was collected from survey respondents regarding the type of control methods they have used and what was their perceived impact on feral swine numbers from the use of those measures. Most respondents indicated that they utilized more than one control measure (Table 5). Trapping and hunting/shooting were the most used measures of control, with 70.3 percent of respondents indicating they utilized trapping and 92.2 percent indicating they utilized hunting control. Results of these two leading control measures were mixed as approximately one half of the respondents indicated that they observed no change in feral swine population numbers from the use of those methods, with the remainder of respondents fairly evenly split between observed increases or decreases in herd numbers. Three-fourths of survey respondents indicated that they would utilize these two control methods again.

Survey respondents were asked to choose their single preferred method of feral swine control. Approximately one-third of respondents selected hunting/shooting and another one-third selected trapping as the best control measures (Table 6). Approximately 15 percent viewed methods utilizing poison or sterilization as the preferred control option and 11 percent viewed the use of wildlife service professionals for control of populations as the best measure. Other control method choices selected by small numbers of respondents included snaring, use of contracted companies for eradication, population harassment, ariel gunning, and using pigs with radio collars to locate other populations.

Production and non-production loss estimates

The primary purpose of the survey was to obtain data on impacts of feral swine presence in the state which could be used in the estimation of current economic damages from feral swine activity to update earlier estimates of economic losses from a survey conducted in 2013 (Tanger, et al.). Following a similar estimation procedure as used in the earlier study, economic losses were estimates for both production and non-production damage impacts.

Estimated statewide production losses from feral swine activity for major agricultural and forestry commodities, based on 2020 production data, are shown in Table 7. Statewide production loss estimates were greatest for sugarcane, rice, corn, hay, soybeans and timber. Losses for these commodities ranged between $6.9 million (timber) and $14.8 million (sugarcane). For the agronomic crops, survey values of loss per acre and percent of acres impacted were applied to statewide data on harvested acreage to calculate estimates of statewide production loss damage. For timber, survey estimates of percent of acres impacted and average percent loss were applied to the statewide timber stumpage value for 2020. Data on average percent yield loss on impacted acres shown in the table reveals the significant impact feral swine can have on farm production acreage. Although the percent of acres impacted can vary from crop to crop in a given year, the average yield loss on impacted acres is significant for all of the 10 major commodities listed. The statewide estimated economic production losses from feral swine damage on the 10 major agricultural and forestry commodities listed totaled $66.2 million for the 2020 crop year. This value compares similarly in magnitude and slightly higher than the production loss estimate from the 2013 survey of $52.8 million.

Estimated statewide non-production losses from feral swine activity Louisiana agricultural lands are shown in Table 8. These loss values represent costs incurred in 2020 to repair or replace farm assets (land, roads, structures, etc.) damaged by feral swine activity. Costs values incurred from the survey were expanded to a statewide estimate using an expansion factor of 12.12, calculated as the ratio of total acres included in the survey to total land in farms for Louisiana from the 2017 Ag Census. Damage to pastures was the most reported damage type from farming

operations with 23 percent of the respondents reporting some pasture damage from feral swine. Other significant costs incurred relative to non-production losses were damage to wildlife plots, damage to drains and levees, and having to re-disk or replant fields. Total value of non-production losses over all survey respondents equated to $2.055 million for 2020. Expansion of this value to a statewide estimate yielded a value of $24.9 million as an approximation of the annual statewide cost incurred in non-production losses as a result of feral swine activity in the state. This value compares similarly in magnitude and slightly higher than the non-production loss estimate from the 2013 survey of $21.3 million.

Summary

The purpose of this study was to conduct a survey to obtain information to update estimates of the economic impact of feral swine presence and activity on agricultural land in Louisiana. An earlier study conducted in 2013 found that feral swine were causing significant economic loss associated with damages to agricultural crops, landscape, infrastructure and natural resources in the state. The 2013 study estimated statewide annual economic loss caused by feral swine at approximately $74.1 million. This economic loss estimated included $52.8 million in estimated production loss and another $21.3 million in non-production losses. The current study presented in this report, conducted in 2020, found similar results. Feral swine continue to be a significant and growing invasive species problem, causing substantial physical and economic damage. Almost half of the survey respondents who owned or managed agricultural land indicated that feral swine were currently present on their land and just over half of the respondents indicated that feral swine have caused some type of damage on their land and felt damage from feral swine has been increasing over the past few years. Based on statewide expansion of 2020 survey results from over 900 respondents, the current total annual economic loss from the presence and activity of feral swine on agricultural and timber lands in Louisiana was estimated to be $91.1 million. This economic loss value is based on the estimation of $66.2 million in agricultural commodity production losses and another $24.9 million in non-production losses.

Table 1: Observations related to feral hog activity in 2020

Recent Experience	Type and/or Percent			
Are feral hogs currently present on your land?		**No** 46.8%	**Yes** 47.5%	**Unsure** 5.7%
Have feral hogs ever caused any type of damage on your land?		**No** 41.1%	**Yes** 54.3%	**Unsure** 4.6%
Change in feral hog damage in recent years		**Declined** 15.3%	**Unchanged** 29.1%	**Increased** 55.6%
Cause of damage from feral hogs*	**Rooting** 96.9%	**Trampling** 39.6%	**Wallowing** 57.8%	**Cutting Paths** 33.8%
Did damage result in loss of land or lease value?		**No** 63.3%	**Yes** 22.3%	**Unsure** 14.4%
Change in feral hog numbers on property		**Declined** 12.7%	**Unchanged** 36.0%	**Increased** 51.3%

**Response percentage sum exceeds 100% as respondents would select multiple causes observed.*

Table 2: Stated reasons for increase in feral hogs

Issue	Rank
Natural causes (multiple litters per year)	82.1%
Lack of hunting pressure	52.7%
Inadequate state wildlife department policy	34.2%
Inadequate federal wildlife department policy	32.1%
Local government action or inaction	25.0%
Illegal release or transfer	20.2%
More absentee property owners	13.1%
Neighbor's management practices	11.0%
Law enforcement action or inaction	9.5%
Other	8.0%
Release of hogs by hunting clubs	7.4%
Inadequate stock laws	6.5%

Responses are from respondents reporting an increase in feral hogs. Percentages sum to more than 100% since respondents could choose more than one reason.

Table 3: Damage from feral hogs other than crop production losses

Issue	Rank
Damage to pastures	23.1%
Damage to wildlife food plots	18.7%
Re-Disking costs	15.3%
Damage to drains or levees	13.9%
Replanting costs	12.8%
Landscape damage	8.7%
Damage to natural waters	7.0%
Damage to fences	6.9%
Damage to pine/hardwood seedlings	6.6%
Damage or consume livestock feed or grain	6.6%
Damage to stock ponds or tanks	5.4%
Damage to equipment	3.8%
Lost income from hunting leases	2.2%
Damage or injury to pets	0.7%
Loss of stored commodities	0.6%
Damage or injury to livestock	0.5%

Percentages sum to more than 100% as respondents could choose more than one type of damage.

Table 4: Respondent views on impacts of feral hogs

Issue	Strongly Disagree	Somewhat Disagree	Neutral or No Opinion	Somewhat Agree	Strongly Agree
Interfere with farming operations	10.9%	2.8%	16.9%	21.1%	48.3%
Take time away from activities that would be spent in managing farm operations	10.3%	3.7%	22.1%	24.1%	39.7%
Have caused damage to my crops in the past year	14.9%	3.1%	18.0%	14.9%	49.0%
Should be a priority for state eradication programs	4.7%	0.9%	8.2%	14.0%	72.2%
Negatively impact wildlife habitat	7.6%	2.4%	10.0%	18.2%	61.8%
Negatively impact air quality	10.9%	6.8%	56.7%	14.4%	11.2%
Negatively impact soil quality	6.0%	3.8%	24.7%	32.2%	33.2%
Negatively impact water quality	4.8%	4.7%	23.2%	32.4%	34.9%
Reduce production of agricultural crops	2.5%	2.0%	8.8%	20.8%	66.0%
Should be managed for hunting opportunities	16.5%	5.3%	14.9%	19.2%	44.1%
Have made me concerned for the safety of myself or family	11.8%	7.2%	31.7%	28.1%	21.2%
Have made me concerned for the safety of my pets	12.8%	7.2%	36.3%	25.0%	18.7%
Have injured myself or a family member	42.9%	7.1%	46.2%	2.1%	1.7%
Are being properly managed by state wildlife officials	39.3%	18.9%	27.6%	10.2%	3.9%
Are being properly managed by federal wildlife officials	41.8%	17.6%	28.2%	8.0%	4.4%
Populations have grown noticeably in the land that own or manage over the past five years	9.7%	4.2%	16.8%	18.7%	50.6%
Should be managed for human consumption by the USDA	25.6%	8.9%	34.4%	16.4%	14.7%
Transmit diseases harmful to humans	4.1%	6.3%	39.0%	23.1%	27.5%
Transmit diseases harmful to wildlife	3.7%	4.2%	34.5%	26.4%	31.1%
Transmit diseases harmful to farm animals	3.6%	4.4%	34.1%	26.1%	31.8%

Table 5: Remediation measures employed

Remediation method employed*	Method Employed**	(Observed change in hog population) Somewhat Increased	(Observed change in hog population) Neutral or no change	(Observed change in hog population) Somewhat decreased	Use again
Trapping	70.3%	24.9%	52.9%	22.1%	76.8%
Hunting/shooting	92.2%	27.4%	49.5%	23.1%	76.8%
Ariel gunning	6.7%	17.9%	53.6%	28.6%	72.4%
Snaring	12.4%	34.0%	50.0%	16.0%	64.8%
Harassment	20.7%	37.6%	47.1%	15.3%	63.3%
Contracted company	3.0%	8.3%	58.3%	33.3%	53.8%
Wildlife services	6.2%	8.0%	52.0%	40.0%	70.4%

**Reported by respondents who have previously had damage from feral hogs.*
***Percentages sum to more than 100% as respondents could choose more than one method.*

Table 6: Leading preferred methods of control

Remediation Method	Percent
Hunting/shooting	33.7%
Trapping	31.6%
Other (poison, sterilize)	15.5%
Wildlife services	11.0%

Respondents were asked to choose one preferred method of control. Other control method choices included snaring, use of contracted companies for eradication, population harassment, ariel gunning, and pigs with radio collars to locate other populations.

Table 7: Production loss estimates by commodity type associated with feral swine activity in 2020

Commodity	% of acres damaged	Avg. % yield loss	Per acre damage $	Study estimate losses $	Statewide estimate $	Farm gate value	% Losses of farm gate value
Soybeans	7.9%	25.0%	$123	$1,238,782	$9,319,589	$471,012,805	2.0%
Corn	10.2%	30.7%	$206	$1,523,635	$10,119,968	$324,437,969	3.1%
Rice	13.9%	22.9%	$206	$1,097,040	$13,318,929	$418,069,211	3.2%
Hay	27.3%	34.8%	$93	$416,283	$9,403,992	$98,873,794	9.5%
Cotton	5.1%	19.5%	$171	$303,666	$1,421,095	$142,830,024	1.0%
Wheat	12.8%	56.1%	$148	$19,889	$219,980	$3,052,105	7.2%
Pecan	20.0%	36.0%	$97	$31,407	$427,950	$5,933,703	7.2%
Sugarcane	2.0%	65.7%	$1,558	$852,277	$14,893,450	$1,106,216,200	1.3%
Sorghum	32.1%	19.8%	$70	$41,282	$175,680	$2,761,575	6.4%
Timber	19.5%	10.2%	na	na	$6,905,468	$347,703,554	2.0%
Total					**$66,206,101**	**$2,920,890,940**	**2.3%**

Table 8: Non-production loss estimates associated with feral swine activity in 2020

Damage type	% of farming operations reporting damage	Average cost per farm over operations reporting damage	Total economic damage reported across all operations	Statewide economic damage estimate
Re-planting	13%	$5,137	$462,330	$5,603,216
Re-disking	15%	$1,604	$186,070	$2,255,078
Damage to pets	1%	$1,680	$8,400	$101,804
Damage to wildlife plots	19%	$1,159	$129,850	$1,573,719
Damage/Consumed feed grain	7%	$3,781	$139,900	$1,695,520
Damage to livestock	1%	$1,367	$4,100	$49,690
Damage to pasture	23%	$3,780	$442,300	$5,360,462
Loss of stored commodities	1%	$2,738	$10,950	$132,709
Damage to farm equipment	4%	$1,511	$33,250	$402,974
Damage to fence	7%	$1,064	$41,514	$503,130
Damage to stock ponds/tanks	5%	$957	$25,829	$313,035
Damage to landscape	9%	$553	$20,454	$247,893
Damage to natural waters	7%	$2,162	$45,399	$550,214
Damage to drains/levees	14%	$4,900	$357,689	$4,335,018
Lost hunting lease	2%	$2,491	$34,879	$422,717
Other*	3%	$3,049	$112,804	$1,367,130
Total			**$2,055,718**	**$24,914,309**

**Includes costs incurred relative to damage to farm and field roads, turn rows, irrigation pipe, timber seedlings, etc.*

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