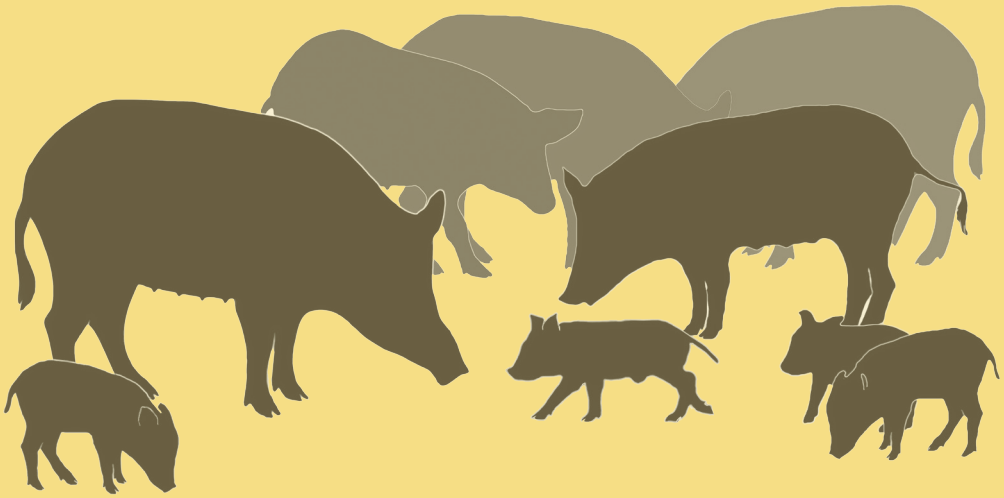
Dollar Estimates of Feral Hog Damage to Agriculture in Louisiana

Dr. Shaun M. Tanger, Dr. Kurt Guidry, Huizhen Nui,
Celine Richard and Maristela Abreu

Agricultural Economics and Agribusiness
LSU AgCenter



LSU AgCenter
Research · Extension · Teaching

Table of Contents

The Issue 1
Background on Feral Hogs 1
Survey Approach 2
Study Results 3
Implications 3
References 5
Tables and Figures 6
Figure 1. Frequency of ZIP codes for Louisiana Farmers Who Responded to the Survey 6
Figure 2. Respondents Reporting 'Yes' to Presence of Feral Hogs in 2013 7
Figure 3. Total Farm Value of Commodities Included in the Analysis for 2013 8
Table 1. Lost Production Value by Commodity Type – Statewide Losses for 2013 . . 9
Table 2. Damage Estimates Associated With Feral Hog Activity (Nonproduction Values) in 2013 9

The Issue

While the awareness and concern regarding feral hogs has increased significantly over the past few years in Louisiana, quantifying damage by this invasive species have been largely anecdotal.

A 2004 study conducted in Texas estimated damage to agriculture in that state at $52 million. Since the food and fiber sector is such a large contributor to Louisiana's state economy (average more than $10 billion annually over the past five years), it is critical to more closely and accurately examine the economic damage related to feral hog activity.

Background on Feral Hogs

All hogs, whether feral or domestic, originated in Asia – making them an invasive species in North America. Louisiana feral hogs arrived with French and Spanish colonists, and populations have been augmented by intentional and unintentional releases in more recent times. The proportion of feral hogs descended from French and Spanish colonial times compared with modern releases is unknown in Louisiana.

Regardless of origin, feral hogs are prolific breeders. Sows breed throughout the year or seasonally beginning at eight to 10 months old. Capable of producing two litters every 12 to 18 months, with an average of four to eight piglets per litter. Older sows may have litters of 10 to 13.

Most recent population and density studies estimate population growth of feral hogs in Texas to be in the range of 18 percent to 20 percent annually. Given this growth rate, hog populations could conceivable double within five years.[1] (Timmons et al. 2012). The most recent census estimates in Louisiana are that 500,000 wild hogs were present in the state in 2013.

As generalists, feral hogs essentially can exploit, and even thrive, in any habitat type. The only real constraints on their numbers and movement are associated with seasonally-available forage resources and access to well-distributed water, shade and escape cover, because they seemingly have few predators if they can make it to full maturity[2][3].

They can live in remote areas and densely populated areas close to human civilization, but they prefer the former when resources are available. The species also is renowned for its ability to evade human trapping efforts. All in all, they present a worst case scenario with regard to management of an invasive pest species.

Feral hogs cause a number of negative human/wildlife interactions. Urban areas in Texas and Georgia have had traffic problems and car accidents from hogs. Female hogs can be very defensive and have killed dogs. Feral hogs potentially can transfer diseases to backyard wildlife, livestock and companion animals. Although feral hogs are unlikely to attack humans, it has happened in Georgia. As feral hog numbers grow, their indirect effects increase as well. They are known to carry waterborne pathogens that can affect drinking water, including E. coli, Campylobacter, Salmonella, Cryptosporidium and Giardia (Environmental Protection Agency, 2009; Kaller and Reed, 2010), so they present a very real threat to contaminating freshwater sources.

Feral hogs are a serious concern for wildlife and agricultural professionals in Louisiana and nearby states[4]. Hogs have been found to reduce the number of tree species by rooting for mast (Campbell and Long, 2009), preferring mostly hard mast species. A side effect of this behavior is the loss of vegetative ground cover and litter layer that invertebrates and small vertebrates depend on for cover. Consequently, conditions necessary for seedling establishment and growth in forests are jeopardized (Chavarria et al., 2007). With respect to wildlife; hogs will root up food plots, eat corn at deer feeders, show aggression toward other

[1] http://www.caller.com/sports/outdoors/less-expensive-way-to-control-texas-feral-hog
[2] http://www.extension.org/pages/64381/feral-hog-behavior#.VfBNZBG6eM8
[3] http://www.extension.org/pages/63656/natural-predators-of-feral-hogs#.VfBNkhG6eM8
[4] Timmons et al. 2012 SP-467

wildlife (i.e., turkey and quail) and prey on young game.

Likewise, feral hogs can be a threat to agricultural producers' crops and enterprise stock. The following blurb from eXtension provides a good snapshot:

> *"Studies indicate the majority of damage in agriculture fields is from trampling, with only 5-10 percent due to actual consumption*[5]*. Rooting around the base of trees or shrubs (e.g., pecan trees) can undermine root systems and weaken trees. Feral hogs will travel great distances to reach crops that have ripened or matured. They will feed on most life stages of an agricultural crop – from seeds through mature plants. Feral hogs are known to root straight down a row of newly planted corn field and consume the seeds, but most reported damage occurs when the crops are nearly mature. They also will feed on grains stored in wire-mesh silos or bins if hog-proof fencing was not erected."*

Quantifying these agricultural commodity costs in Louisiana are the focus of this research bulletin, and the methods, results and implications of feral hog activity on farming operations are addressed in the subsequent sections.

Survey Approach

During the period from winter 2014 to spring 2015, a questionnaire was mailed to more than 4,000 agricultural producers in Louisiana, with those contacted based on tax records for 2013. The mailing list was purchased from Best Mailing Lists. The purpose of this survey was to determine trends and patterns in feral hog damage to farming operations in the state, examining both commodity losses and other damages. The questionnaire was pretested with several extension economists and farm operators and revised before the final mailing. Mailing procedures followed the tailored design method (Dillman 2000) and included a pre-notification postcard, the first questionnaire mailing with a postage-paid return envelope, a reminder postcard and a second mailing to first-mailing nonrespondents. Personalized cover letters that accompanied the questionnaires were signed by the principal investigator(s) and were addressed to agricultural producers in the state by name and address.

For each commodity listed in the survey, respondents were asked to provide the total number of acres produced in 2013, the number of acres that were damaged by feral hogs and an estimate of the percentage of yield loss or reduction experienced as a result of feral hogs. Price and yield data was obtained from the LSU AgCenter publication, Louisiana Summary: Agriculture and Natural Resources. The survey responses on the number of acres affected and estimated percentage yield losses were then combined with published data on state average yields and average prices for each commodity. The average yield per harvested acre in 2013, as reported by the Louisiana Summary, was used as the "normal" or "expected" yield producers would have experienced without feral hog damage. The average price received by producers in 2013, as reported by the Louisiana Summary, was used as the sales price producers were expected to make on their 2013 production.

With the published price and yield data , along with the survey estimates of acres affected and percent yield loss, the estimated economic impact of production losses to a particular commodity could simply be calculated as:

(1) Economic Impact (by Commodity type) =
Acres Affected x (Yield x Yield Loss Percent) x Price.

It should be noted that this economic impact reflects only losses associated with yield reductions and does not reflect any potential effects from any quality losses that might have been experienced.

The second area of the cost section of the survey was designed to elicit information about other damage experienced due to the presence of feral hogs. These are identified as nonproduction costs and include increases to production costs (re-planting and additional field cultivation), losses of stored commodities, losses to hunting lease income, losses of livestock and repairs and replacement of damaged equipment and farm infrastructure. Respondents were asked simply to provide their estimates of the costs associated

[5] http://www.extension.org/pages/63623/feral-hogs-and-agricultural-crops#.VfCQ4RG6eM8

with each issue provided in a list of potential damage issues that may have been experienced as a result of the presence of feral hogs on their operations. Those costs were then tabulated for the entirety of responses and transformed into state-level estimates based on the survey sample responses.

Study Results

Referring to the maps (Figures 1 and 2), hogs were reported to be most prevalent in cropland along the Mississippi River and the Red River flood plains. This may be simply an artifact of the survey sample. Because farmers were the respondents, those areas where farming is most common are showing up most in the maps that were designed from the responses. Another interpretation is that the hogs are merely sticking close to waterways, which provide areas rich in the organisms hogs browse upon. A further explanation is that as populations warrant, hogs also are attempting to locate in areas where humans are not.

Anecdotal evidence indicates that during deer and turkey hunting season, feral hogs tend to migrate more frequently. It may be that these river systems act as a sort of hog superhighway that allows them to move when pressures, both ecological and anthropomorphic, dictate. It is clear that, according to the survey results, hogs are most likely to be found along the flood plains of the Red River and Mississippi River and the washout surrounding Interstate 10from Lake Charles to Lafayette. Damage reported by respondents (Figure 2) correlates very tightly with the overall distribution of responses.

Tables 1 and 2 shows dollar values attached to commodity type losses and nonproduction loss estimates. Total production losses were tabulated to be approximately $4.1 million from the study respondents. Using Equation 3, referenced in the previous section, the statewide estimate for production-related losses is approximately $53 million. Commodity loss categories indicate soybeans were hit hardest by feral hogs (28 percent) in terms of overall damage, followed by corn, hay and rice (19 percent,16 percent and 13 percent, respectively); with pastures and wheat (7 percent and 6 percent) rounding out the top five . All other crops reported commodity losses of 3 percent or less. With respect to the largest percentage of acres damaged of each commodity, pecans were the largest (21 percent), with oats, pastures, sorghum and hay all in the teens (ranging from 13 to 16 percent).

Using Equation 2 and the total nonproduction-related losses of approximately $1.1 million, statewide estimates were around $21 million. Costs incurred (or dollar losses not related to lost production) indicate re-planting costs were by far the largest (29 percent of all noncommodity damage reported). The second largest were re-discing costs (11 percent). Damage to pastures and levees also accounted for approximately 10 percent. Total damage losses were tabulated to be approximately $1.1 million dollars ($21.3 million in statewide losses).

Implications

Losses to individual crops varied, with soybeans, wheat, rice and corn suffering the greatest monetary losses. Survey responses were combined with published data on the size of the agricultural industry in Louisiana in 2013 to develop statewide estimates of the effects of feral hogs. Results suggest feral hogs caused $53 million dollar in production losses and an additional $21 million in increased costs, for a total economic impact of $75 million to the state's agricultural sector in 2013.

Those numbers do not include losses associated with state and federal lands or other public areas within the state, nor do they include private lands (nonfarms). The loss estimates here are strictly related to farming operations. Therefore, this total loss estimate is thought to be conservative.

Nonetheless, this loss still represents a large enough economic loss that it should be considered a priority for state and federal policymakers to formulate prescriptions to mitigate these feral hog populations. Multiple public and private policy options should be cultivated to help stakeholders anticipate, recognize, evaluate and control the effects of this invasive species in the future.

Implications of the results are apparent from the data in the tables. Perhaps most alarming is the effect on crops where damage in dollars is high but only a small

percentage of acres of production were represented or reported as damaged (i.e., soybeans, where the estimate of $14 million damage came from only 5 percent of the acres reported). In 2013, soybeans generated $775 million in farm-gate value (LSU AgCenter 2013), so roughly 2 percent of overall value was destroyed by feral hog activity. Referring back to the population growth estimates for feral hogs, which predicts a doubling of the population in five years, indications are that the economic effects on soybean farmers could be quite devastating.

Likewise, the overall losses for rice and corn, given the low percentage of acres damaged, seem to indicate these three crops could be affected to a far greater extent than other commodities in the state. Sugarcane seems to be quite prone to feral hog activity, although the per-acre losses were dramatic due in large part to the per acre yields.

Further, hay and pasture losses give rise to concern for different reasons. While the losses in and of themselves are large, it's the acres not captured in the survey that are a concern. Public land areas, which contain fragile and threatened plants and animals, along with a multitude of hunting opportunities, are not captured in the survey results but make up more than 2 million of the acres in the state.

This survey also takes no account of lawns and yards in rural and suburban locations – areas most likely to experience hog activity if populations continue to grow. It is not hyperbole to project a problem of hundreds of millions of dollars for Louisiana if feral hog activity proceeds unabated. Damage related to nonproduction losses reinforces the comments about soybeans, rice and corn.

Re-planting and re-discing comprised 41 percent of the total non-production losses. These activities are associated with those three crops, and so along with any increases in feral hog activity, those costs also are expected to rise as damage to those commodities increases.

References

Armstrong, J. Scott and T.S. Overton. Estimating nonresponse bias in mail surveys. Marketing Papers (1977).

Bruner, G.C., James, K.E., & Hensel, P.J. (2001), Marketing Scales Handbook, A Compilation of Multi-item Measures, Volume III. Chicago: American Marketing Association.

Campbell, T.A. and D.B. Long. 2009. Feral swine damage and damage management in forested ecosystems. Forest Ecology and Management 257: 2319-2326.

Chavarra, P.M., R.R. Lopez, G. Bowser, and N.J. Silvy. 2007. A landscape-level survey of feral hog impacts to natural resources of the Big Thicket National Preserve. Human-Wildlife Conflicts 1: 199-204.

Churchill, Gilbert A., Jr. (1987), Marketing Research, Methodological Foundations, Chicago, Illinois: The Dryden Press, 756-777.

Dillman, D.A. 2000. The Tailored Design Method. New York, N.Y.: John Wiley & Sons, Inc.

Kaller, M.D., and W.E. Kelso. 2006. Swine activity alters invertebrate and microbial communities in a coastal watershed. The American Midland Naturalist 156: 165-179.

Kaller, M.D. and W.E. Kelso. 2003. Effects of feral swine on water quality in a coastal bottomland stream. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 57: 291-298.

Kaller, M.D., J.D. Hudson III, E.A. Achberger, and W.E. Kelso. 2007. Feral pig research in western Louisiana: Expanding populations and unforeseen consequences. Human-Wildlife Conflicts 1: 168-177.

Kaller, M.D. and D.R. Reed. 2010. Invasive feral swine in Louisiana. Louisiana Agriculture 53: 16-18.

Kotanen, P.M. 1995. Responses of vegetation to a changing regime of disturbance: Effects of feral pigs in a California coastal prairie. Ecography 18: 190-199.

Pimental, D. 2002. Biological invasions: Economic and environmental costs of alien plant, animal, and microbe species. CRC Press.

Timmons, J.B, B. Alldredge, W.E. Rodgers, and J.C. Cathey. 2012. Feral hogs negatively affect native plant communities. SP-467.

Timmons, J.B, B. Higginbotham, R. Lopez, J.C.Cathey, J. Mellish, J. Griffin, A. Sumrall, and K. Skow. 2012. Feral hog population growth, density and harvest in Texas. SP-472.

United States Environmental Protection Agency. 2009. Review of zoonotic pathogens in ambient waters. EPA 822-R-09-002.

Tables and Figures

Figure 1. Frequency of ZIP codes for Louisiana Farmers Who Responded to the Survey.

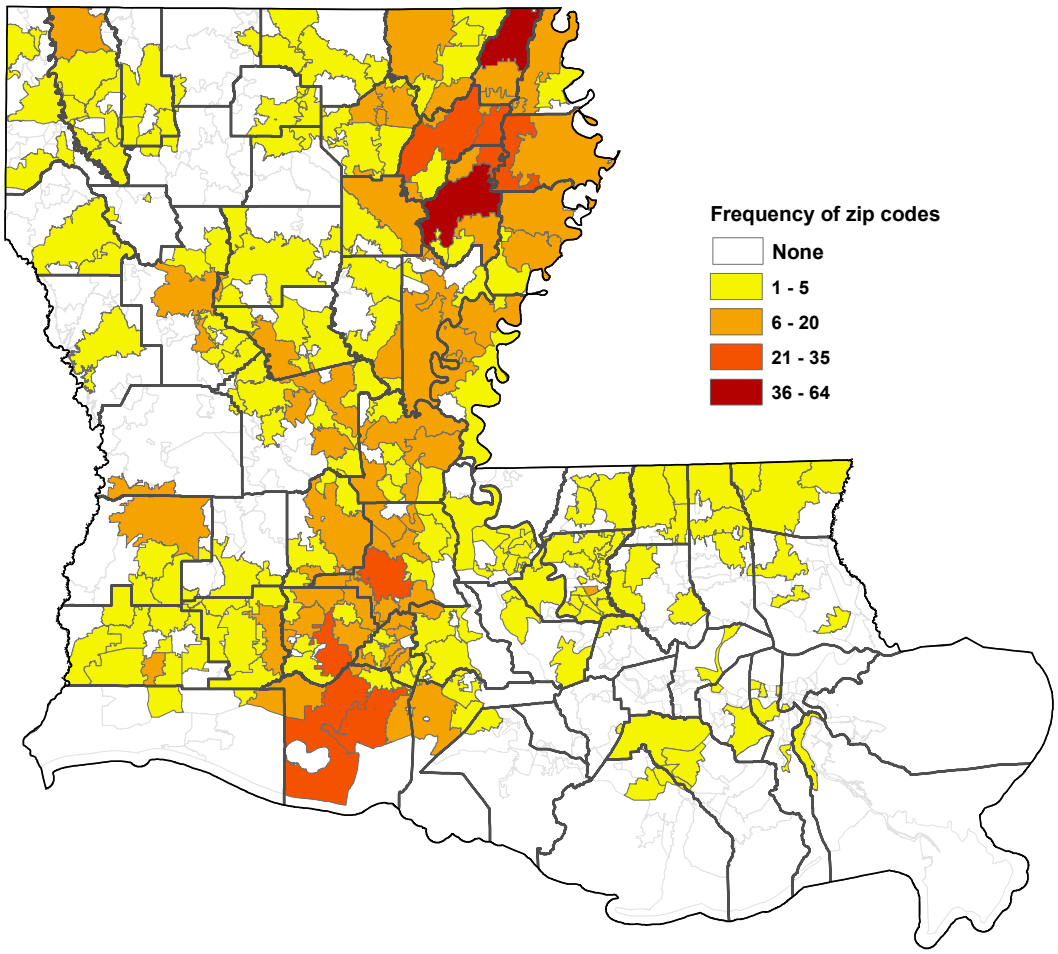


Figure 2. Respondents Reporting 'Yes' to Presence of Feral Hogs in 2013.

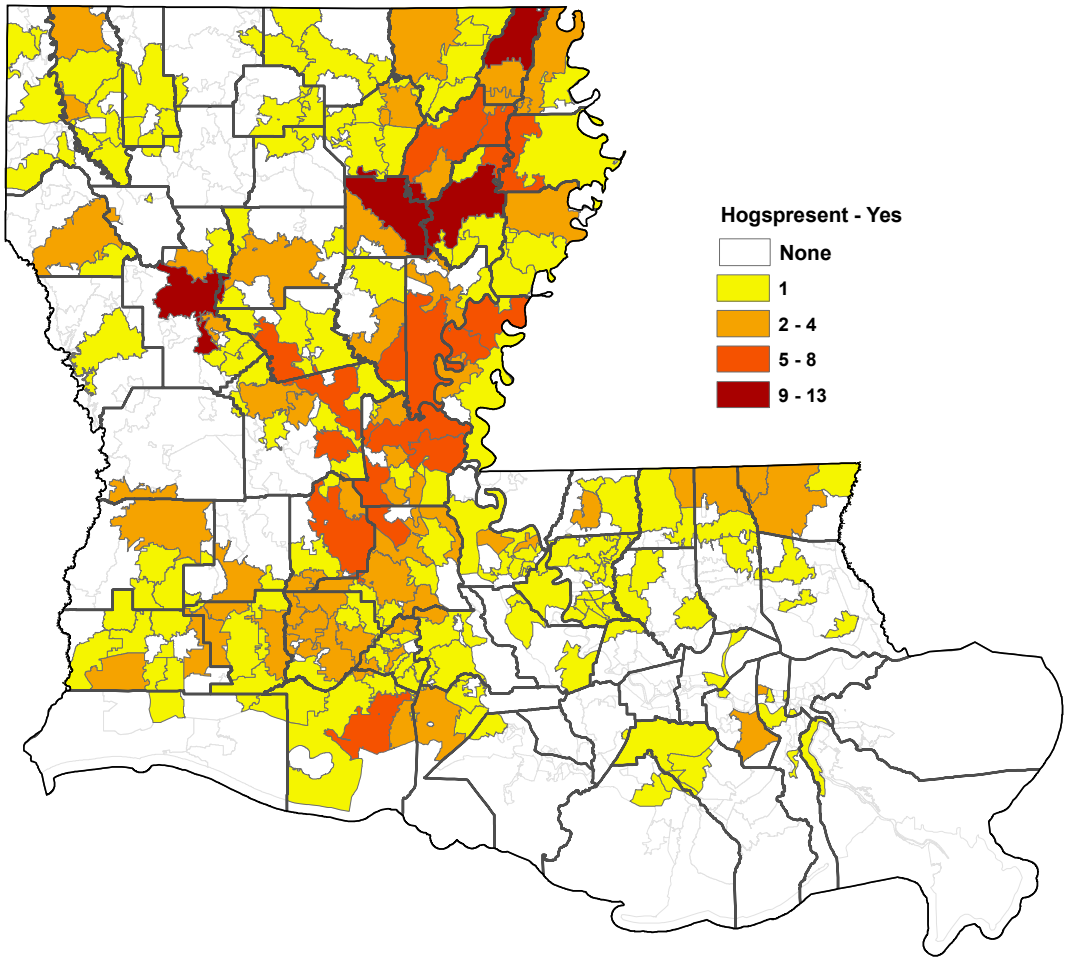


Figure 3. Total Farm Value of Commodities Included in the Analysis for 2013.

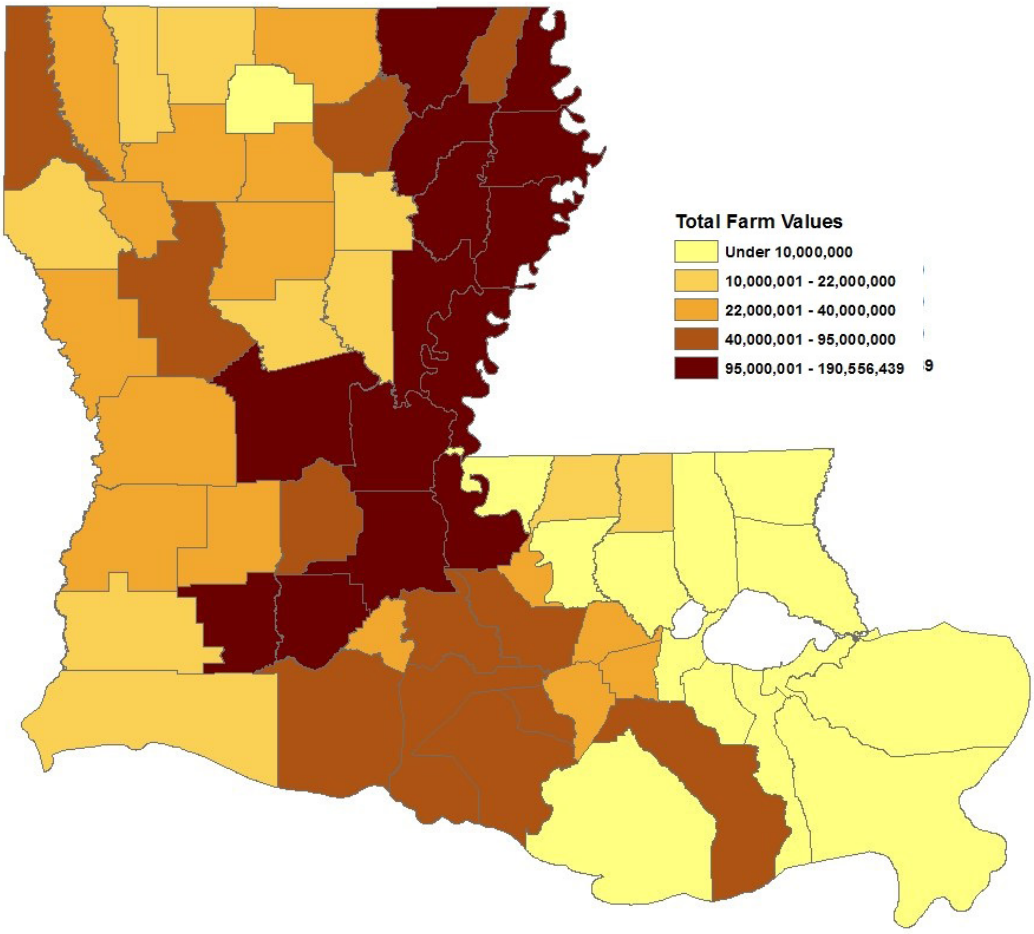


Table 1. Lost Production Value by Commodity Type – Statewide Losses for 2013.

Crop	Percentage of Acres Damaged	Per Acre Damage (in dollars)	Study Estimate Losses (in dollars)	Statewide Estimate (in dollars)	Farm-gate Value	Percentage Loss of Farm-gate Value
Soybeans	5%	$248.15	$1,480,469	$14,612,989	$773,443,391	1.89
Corn	5%	$271.45	$693,139	$8,476,516	$735,472,192	1.15
Rice	4%	$375.02	$720,406	$6,817,542	$494,415,302	1.38
Hay	14%	$206.07	$466,636	$9,967,050	$155,882,160	6.39
Cotton	3%	$180.02	$72,007	$621,146	$147,816,799	0.42
Wheat	8%	$170.24	$190,666	$3,170,692	$107,206,287	2.96
Pecans	21%	$90.03	$35,291	$416,397	$7,771,980	5.36
Sugarcane	1%	$415.93	$82,769	$1,496,419	$454,959,052	0.33
Sorghum	16%	$102.90	$255,124	$1,775,686	$55,133,118	3.22
Oats	14%	$270.43	$14,062	$134,688	$1,168,416	11.53
Pastures	13%	$17.46	$21,523	$3,808,056	n/a	n/a
Timber	4%	$35.00	$68,110	$1,546,483	$420,097,000	0.37
Totals	n/a	n/a	$4,100,206	$52,843,664	$3,353,365,697	1.58

Table 2. Damage Estimates Associated With Feral Hog Activity (Nonproduction Values) in 2013.

Damage Type	Percentage of Farming Operations Reporting Damage	Minimum Individual Damage Reported	Maximum Individual Damage Reported	Average Damage Reported by Farm	Total Economic Damage Reported Across All Operations	Statewide Economic Damage Estimate
Re-planting	8%	$15	$35,000	$3,418	$348,680	$6,263,416
RE-discing	8%	$5	$13,000	$1,402	$140,246	$2,519,270
Damage to Pets	1%	$173	$500	$61	$674	$12,107
Damage to Wildlife Plots	9%	$25	$5,000	$633	$72,843	$1,308,495
Damage/Consumed Feed Grain	3%	$60	$20,000	$2,220	$91,010	$1,634,833
Damage to Livestock	1%	$100	$10,000	$1,017	$12,200	$219,151
Damage to Pastures	7%	$50	$18,000	$1,429	$128,580	$2,309,711
Loss of Stored Commodities	1%	$200	$6,250	$614	$6,750	$121,252
Damage to Farm Equipment	2%	$100	$10,000	$1,195	$35,850	$643,981
Damage to Fences	3%	$50	$2,000	$342	$13,355	$239,899
Damage to Stock Ponds/Tanks	2%	$100	$5,000	$1,003	$29,075	$522,281
Damage to Landscape	3%	$100	$3,000	$546	$18,550	$333,218
Damage to Natural Waters	2%	$50	$10,000	$808	$19,400	$348,486
Damage to Drains/Levees	7%	$100	$8,000	$1,366	$113,350	$2,036,131
Lost	2%	$150	$10,000	$1,176	$22,350	$401,478
Other Damage	4%	$60	$30,00	$2,228	$133,710	$2,401,862
Total Damage	n/a	n/a	n/a	n/a	$1,186,623	$21,315,571

Visit our website: www.LSUAgCenter.com

William B. Richardson, LSU Vice President for Agriculture
Louisiana State University Agricultural Center
Louisiana Agricultural Experiment Station
Louisiana Cooperative Extension Service
LSU College of Agriculture

The LSU AgCenter and LSU provide equal opportunities in programs and employment.

Research Information Sheet 113 (online) 10-15