



FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES COMMISSIONER ADAM H. PUTNAM

Hurricane Irma's Damage to Florida Agriculture

October 4, 2017

Hurricane Irma made landfall on the Florida Keys as a category 4 hurricane, and again in Southwest Florida as a category 3 hurricane. Irma was the largest, most powerful hurricane ever recorded on the Atlantic Ocean, and is among the strongest hurricanes ever to make direct landfall in the United States. Besides causing major devastation to Florida's coastal communities, Irma was large and powerful enough to bring hurricane and tropical storm conditions to every one of Florida's 67 counties. Hurricane Irma's path coincided with some of Florida's most productive agricultural landscapes, and consequently it caused major losses to all segments of production agriculture.

In the wake of this historic storm, Commissioner Putnam received innumerable calls from industry leaders across the state describing the overwhelming impacts this storm had on not only their current year crop losses, but the further devastation of damaged infrastructure: destroyed fences, shade structures, ground cover for row crops; uprooted or cracked trees and bushes, laid down sugarcane; and animals whose long-term welfare was impacted by the excessive wind and rain.

This document provides an early summary of the estimated losses to Florida's diverse agricultural sectors, accounting for the loss in current year crop production, as well as the associated losses to direct, on-farm inputs and related infrastructure. These estimates are based on data obtained from the USDA National Agricultural Statistics Service¹, the UF-IFAS "Impacts of Hurricane Irma on Florida Agriculture: Update #4" Report², UF-IFAS crops budgets³, Timber Damage Estimates prepared by the Florida Forest Service, and early surveys the Florida Department of Agriculture and Consumer Services conducted with industry leaders and individual producers.

¹ https://www.nass.usda.gov/Statistics_by_State/Florida/index.php

² Clouser R, Hodges A, Court C, Vansickle J, and Stefanou S (2017) Impacts of Hurricane Irma on Florida Agriculture: Update #4. Released October 2, 2017

³ Singerman A, Burani-Arouca M, Williamson JG, England GK (2016) Establishment and Production Costs for Southern Highbush Blueberry Orchards in Florida: Enterprise Budget and Profitability Analysis. UF-IFAS EDIS FE1002

The purpose of this document is to inform policy-makers on the extent of the damage and losses experienced and expected by agricultural producers in Florida in the wake of Hurricane Irma. The estimates are based on the best available information, including satellite imagery, published agricultural statistics, and early surveys with agricultural producers who are in the midst of a large-scale recovery effort. These estimates will be updated as additional information is gathered and becomes available. Most importantly, this is not a request to the State or Federal governments; rather it is meant to inform policy-makers.

This document summarizes estimates of **crop losses** and **total losses**. **Crop losses** include reduced agricultural sales due to wind or flood induced product losses, decreased yields, spoiled product, and dead livestock. **Total losses** include crop losses in addition to ancillary losses experienced by producers such as debris cleanup, additional feed or harvest costs, damage to land, infrastructure, and equipment. In other words, total losses are the sum of crop losses and ancillary losses.

Total crop losses are estimated at \$2,014,481,961; while total losses to production agriculture are estimated at \$2,558,598,303.

1. Citrus: \$760,816,600

Citrus is Florida's signature crop, and nearly 60% of all the citrus consumed in the US is produced in the state. While Florida's citrus crop has been declining over the last decade due to the deadly citrus greening disease, annual sales of citrus still range around \$1 billion. Today, a large portion of the citrus industry is concentrated in southwest Florida, which experienced some of the heaviest winds and flooding in mainland Florida.

An estimated 421,176 acres of citrus production were affected by hurricane or tropical storm force winds, with 94,144 acres in Collier and Hendry (Tier I) counties experiencing major hurricane force winds and a projected loss of \$2,500 per acre; 254,956 acres in Lee, Brevard, Glades, Charlotte, St. Lucie, Highlands, Indian River, Okeechobee, DeSoto, Hardee, and Osceola (Tier II) counties experiencing hurricane force winds and a projected loss of \$1,750 per acre; and 72,076 acres in Polk and Martin (Tier III) counties tropical storm force winds and a loss of \$1,100 per acre. Losses in this industry are reported to be very heavy, with some farms reporting 100% fruit drop. To add insult to injury, many of the state's citrus trees were just a few weeks from harvest at the time Irma hit. Total losses in this industry are estimated at a value of \$760,816,600.

Growers are also reporting heavy infrastructure damage, and there are major concerns of flood-caused tree mortality in the near future. However, there is not enough information to estimate these losses at this time.

Total losses, including crop losses, for citrus producers are estimated to be \$760,816,600.

2. Beef Cattle: \$237,476,562

Beef cattle is one of Florida's most important land uses, with more than 1.7 million animals grazing in approximately 6.5 million acres of pasture and woodlands, and annual sales of \$549.1 million.

A statewide survey of cattle ranches in the aftermath of hurricane Irma revealed the following losses and damages:

An estimated 100 dead animals, each with a market value of \$800, at a loss of \$80,000.

An estimated 187,000 calves awaiting to be shipped to out-of-state feedlots, currently in stressful conditions, will each lose about 50 lbs in weight (loss of \$75 per calf), with losses valued at \$14,025,000.

Forage crops have been severely affected by floods, and as a result many ranchers who lost forage crops to flooding will have to purchase additional hay and supplements to feed their animals during the coming winter. An estimated 45 additional feeding days (hay and supplement valued at \$1.85 per day per head) for 601,250 cows, will result in unexpected hay and supplement purchases valued at \$50,054,062.

As a result of floods and widespread damage to ranch infrastructure, we also expect that up to 7% of our cows will not carry calves to weaning or even breed this year. This is an estimated loss of 52,500 calves, each with a value of \$787, or \$41,317,500.

An estimated 150,000 acres of pasture has experienced significant erosion and flood damage as a result of Hurricane Irma. Renovating these areas will cost around \$40 per acre in replanting and related costs, for a total cost of \$6,000,000.

Of the more than 18,000 beef cattle ranches in Florida, an estimated 6,000 suffered significant damages to structures, fences, and equipment, and also have large amounts of storm debris that must be cleaned up. These damages will result in the following estimated costs:

- \$4,000 per ranch in debris cleanup and rebuilding fences: \$24,000,000.
- \$15,000 per ranch in damage to barns, sheds, housing, roads, and other infrastructure: \$90,000,000.
- \$2,000 per ranch in equipment damage: \$12,000,000.

Total crops losses to beef cattle producers in Florida are estimated to be \$14,105,000.

Total losses, including crop losses, to beef cattle producers in the state are estimated to be \$237,476,562.

3. Dairy: \$11,811,695

Florida is home to over 100 dairies and 125,000 dairy cows, with annual milk sales over \$500 million. Most of the milk production is in South Florida where Hurricane Irma's destruction was heaviest, and where most of the damages occurred for the Florida dairy industry. However, since Irma impacted the entire state, all Florida dairy farms experienced some form of impact.

Many milk processing plants in Florida shut down operations before, during and after Hurricane Irma, and as a result there were no markets for milk for several days. Southeast Milk Inc., the farmer cooperative owned by the dairy farmers in South Florida, lost an estimated \$1,951,695 in lost revenue/sales because of dumped milked and milk being sold at lower pay prices in other milk markets. This issue will continue to impact the prices farmers receive for months to come.

Cooling systems and structures offering shade and temperature control for dairy cows were damaged during Hurricane Irma. In addition, most dairy farms lost electric power for several days during and after the storm, so even if cooling systems were not destroyed, dairies were unable to cool their animals. Heat stressed animals eat less and spend more energy simply cooling their bodies, resulting in weight loss and reduced milk production which will not recover for several months. Florida dairies estimated production losses associated with the Hurricane over the next four months to result in a total revenue loss of \$7,500,000.

Of the more than 100 dairies in Florida, an estimated 40 dairy farms suffered significant damages to structures, fences, and equipment, and have significant amounts of storm debris that must be cleaned up. At this time, there is no verified cost data on these damage repairs but the following are early estimates:

- \$4,000 per farm in debris cleanup and rebuilding fences: \$160,000.
- \$50,000 per farm in damage to barns, sheds, milk parlors, and other infrastructure: \$2,000,000.
- \$5,000 per farm in equipment damage: \$200,000.

Total crop losses to dairy producers in Florida are estimated at \$7,500,000.

Total losses, including crop losses, to dairy producers in the state are estimated to be \$11,811,695.

4. Aquaculture: \$36,850,000

Florida aquaculture is a highly diverse sector with annual sales in the range of \$70 million. Aquaculturists in Florida produce ornamental fish, mollusks, alligators, aquatic plants, live rock and coral, and a diversity of food fish, among other products.

Aquaculture farms depend heavily on electricity to run oxygenation and water circulation systems. Even short periods of time without electrical power may result in heavy losses, particularly when fish and shellfish are in larval or juvenile stages. In addition, if areas with

ponds or tanks get flooded, fish will likely die or escape, resulting in heavy losses. Responses from a statewide survey suggest that product losses are as high as 25%, equivalent to \$17,500,000.

Several aquaculturists are also reporting heavy infrastructure and equipment losses, as well as significant amount of storm debris that must be cleaned up. Of the 404 aquaculture operations reporting sales in Florida, an estimated 150 experienced heavy infrastructure, equipment and cleanup losses or costs:

- \$45,000 per operation in infrastructure loss: \$6,750,000.
- \$80,000 per operation in equipment loss: \$12,000,000.
- \$4,000 per operation in cleanup costs: \$600,000.

Total crop losses to aquaculture producers in Florida are estimated to be \$17,500,000.

Total losses, including crop losses, to aquaculture producers in the state are estimated to be \$36,850,000.

5. Fruits and Vegetables (Excludes Citrus): \$180,193,096

Florida is a major producer of fruits and vegetables, with more than \$2.2 billion in annual sales and nearly 200,000 acres in production. Major products include fresh tomatoes, bell peppers, melons, and avocados, among many others.

An estimated 163,679 acres of fruits and vegetables were affected by hurricane or tropical storm winds, with 40,816 acres experiencing winds exceeding 111 mph, 51,646 acres experiencing winds between 74-110 mph, and 71,216 acres experiencing winds between 39-73 mph.

Fortunately, the planting season for most of these crops was just getting started, and most crop losses will happen due to shortened production season, market distortions, and reduced yields resulting from higher pest pressure due to dilution of pesticides. Total crop losses in fruit and vegetables throughout this acreage are estimated at 10%, a value of \$72,324,496.

When fields experience storm surge with salt water inundation, the salt will remain in the soil for up to 3 years, depending on the amount of rainfall and irrigation practices over this period. We expect that up to 7,000 acres may experience this problem in the southern portions of the state, for a loss of \$30,926,000.

The planting season was getting into full gear as Hurricane Irma hit, and many fields lost the plastic and drip-tape irrigation that had been installed. Plastic and drip-tape irrigation costs about \$2,500 per acre. An estimated 10% of the affected acreage, or 16,368 acres, had blown plastic and drip-tape irrigation, for an estimated loss of \$40,920,000.

In addition to blown plastic and irrigation, growers have reported clean-up costs of \$300 per acre on all acreage that experienced hurricane strength winds. Given that 92,642 acres experienced hurricane force winds, this loss is estimated at \$27,738,600.

Some blueberry growers have also reported that the wind ripped entire blueberry bushes from the ground, with one grower reporting that 125 acres of blueberry bushes were completely ripped from their beds. Land preparation and planting costs for an acre of blueberries in Florida is around \$16,568 per acre, as reported in blueberry crop budgets. An estimated 500 acres statewide have suffered the same fate, bringing the cost of replanting berry bushes to \$8,284,000.

Several growers are also reporting heavy infrastructure losses, including flooding and damage to internal farm roads, dikes, water control structures, and retention areas. However, there is not enough information to estimate these losses at the current time.

Total crop losses for fruit and vegetable producers are estimated to be \$72,324,496.

Total losses, including crop losses, for fruit and vegetable producers are estimated to be \$180,193,096.

6. Greenhouse, Nursery, and Floriculture: \$624,819,895

Florida's nurseries provide live plants for landscapers and agricultural producers throughout the nation, and their annual sales are in the range of \$2.75 billion.

An estimated 46,204 acres of greenhouse, nursery, and floriculture production were affected by hurricane or tropical storm winds, with 24,267 acres experiencing winds exceeding 111 mph, 2,024 acres experiencing winds between 74-110 mph, and 19,914 acres experiencing winds between 39-73 mph. Losses in this industry are reported to be heavy, as live plants with any kind of minor damage, such as scarring of the bark, are deemed of much lower value. Total crop losses in this industry are estimated at a value of \$435,605,410.

Heavy winds have also caused severe damage to greenhouses and related infrastructure and equipment. Growers have reported \$141,703,450 in infrastructure losses, and \$5,000,000 in equipment losses, as a result of Hurricane Irma.

In addition, growers incurred substantial labor costs in preparing nurseries in advance of Hurricane Irma, as well as cleaning up debris after the storm passed. Growers have reported \$42,511,035 in preparation and debris clean-up costs.

Total crop losses for greenhouse, nursery, and floriculture producers are estimated to be \$435,605,410.

Total losses, including crop losses, for greenhouse, nursery, and floriculture producers are estimated to be \$624,819,895.

7. Sugar: \$382,603,397

Florida is one of the major domestic producers of sugarcane, with total annual sales around \$676 million. The industry is heavily concentrated in South Florida on the south shore of Lake Okeechobee, which experienced heavy wind impacts during Hurricane Irma.

An estimated 534,324 acres of sugarcane production were affected by hurricane or tropical storm winds, with 205,262 acres experiencing winds exceeding 111 mph, 267,946 acres experiencing winds between 74-110 mph, and 61,115 acres experiencing winds between 39-73 mph. Losses in this industry are reported to be heavy, with most farms reporting cane lodged to the ground entirely by the wind. While much of the lodged sugarcane can be salvaged, doing so requires significant effort and results in higher harvesting costs. In addition, the salvaged sugarcane will be of lower quality and lower sucrose content. Hence, growers will have to use additional resources and will see lower yields. Total crop losses in this industry are estimated at a value of \$382,603,397.

Besides the loss of this year's crop, a major concern expressed by growers is the ability to locate and use sugarcane for seed to plant the next crop as planned. This issue may result in reduced acres planted for the first harvest in the 2018-2019 season. However, without seeing whether the current crop recovers, it is difficult to estimate quantitatively what this impact may be.

Growers are also reporting heavy infrastructure damage. However, there is not enough information to estimate these losses at the current time.

Total losses, including crop losses, for sugarcane producers are estimated to be \$382,603,397.

8. Field Crops: \$62,747,058

Florida has significant acreage in field crops, including an estimated 93,021 acres in cotton, 154,093 acres in peanuts, 61,600 acres in corn, 29,226 acres in soybeans, 26,598 acres in rice, and 61,700 acres in other field crops.

An estimated 426,238 acres of field crop production were affected by hurricane or tropical storm winds, with 22,461 acres experiencing winds exceeding 111 mph, 22,745 acres experiencing winds between 74-110 mph, and 381,032 acres experiencing winds between 39-73 mph. Losses in this industry are reported to be significant, with yield losses caused by wind damage and floods, which prevent timely harvest and are associated with spoilage.

Total losses, including crop losses, in field crops are estimated at a value of \$62,747,058.

9. Forestry \$261,280,000

Nearly 47% of Florida's land, or approximately 16.96 million acres, is forestland cover. Of the forestland cover in Florida, 49% is pine, 45% is hardwood or mixed hardwood-pine, and 6% is

cypress. These productive forests support a sizable forest products processing and manufacturing sector in the state.

Previous studies indicate that during storm events wind speeds between 30 and 57 MPH are associated with “light” tree damage, wind speeds between 58 and 73 MPH with “moderate” tree damage, wind speeds between 74 and 95 (Hurricane Category 1) cause “severe” tree damage, and wind speeds above 96 MPH (Hurricane Category 2 and above) cause “catastrophic” tree damage. Wind speeds of 94 MPH break all trees regardless of their species, diameter, height or elastic properties. Based on wind speeds experienced in Florida during Hurricane Irma, a proportion of all affected counties in each wind range category was calculated. Stand timber damages assigned to each wind category were 5 percent for “light”, 15 percent for “moderate”, 35 percent for “severe”, and 75 percent for “catastrophic” damages. Based on the recent state-wide forest inventory, known pine pulpwood and sawtimber tonnage in each county was then multiplied by standing timber prices and area affected in each county by wind category. This methodology indicates that the total loss experienced by Florida forest products industry in the current year is \$261,280,000.

Total timber losses in the current year are estimated at \$261,280,000.

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