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Hurricane Michael's Damage to Florida Agriculture

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On October 10, 2018, hurricane Michael made landfall as a category 4 hurricane near Mexico Beach in Bay County, Florida. Hurricane Michael was an unprecedented storm among Atlantic hurricanes making landfall in the continental US in terms of wind speeds (most powerful since hurricane Andrew in 1992) and barometric pressure (lowest pressure since hurricane Camille in 1969). Michael currently stands as the most powerful Atlantic hurricane to strike the US mainland this century.

Hurricane Michael devastated communities across the Florida panhandle, with category 3 and 4 winds cutting a path of destruction that extended into the state of Georgia. Michael's winds caused heavy losses to several segments of Florida's agricultural industry, including heavy crop losses and catastrophic damage to production and processing structures. Field reports from all agricultural industries also mention widespread loss of housing in the region.

The devastation from hurricane Michael will have deep and long lasting impacts on northwest Florida's predominantly rural communities. The losses to agricultural producers summarized in this document, in addition to losses to other business sectors, catastrophic damage to residential and commercial structures, and damage to critical infrastructure, will reverberate across the region for months, possibly years. For the region to fully recover, rural economic development programs must become a priority of the state and Federal governments.

This document provides an early summary of the estimated losses to North Florida's 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 Service[1], the UF-IFAS Reports on crop damage from hurricane Michael[2], Timber Damage Estimates prepared by the Florida Forest Service, and

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

[2] Hodges AW, Court CD, Stair CA (2018) Economic Losses for Florida Agriculture Resulting from Hurricane Michael. Released October 26, 2018;
Hodges AW, Court CD (2018) Preliminary estimates of agricultural crop and upland forest losses to hurricane Michael in Northwest and Northeast Florida counties. Released October 13, 2018.

individual assessment surveys the Florida Department of Agriculture and Consumer Services conducted with industry leaders and individual producers. These are early estimates, and

The purpose of this document is to inform policy-makers about the extent of the damage and losses experienced by agricultural producers in Florida in the wake of Hurricane Michael. The estimates are based on the best available information, including satellite imagery, published agricultural statistics, and surveys with agricultural producers who are in the midst of recovery efforts.

This document does not constitute a request to the State or Federal governments; rather it is meant to inform policy-makers.

This document summarizes estimated **crop losses** and **total losses** for each commodity group. **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 losses to production agriculture are estimated at **$1,481,843,193.58.**

1. **Forestry $1,289,023,465**

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, a large proportion of which is clustered in Northwest Florida.

Hurricane Michael's winds inflicted catastrophic damage on North Florida's forest industry. Nearly 347,000 acres of productive forest were completely destroyed by the category 3 and 4 winds, with losses ranging between 90% and 100%. An additional 1 million acres of forestland experienced severe damage due to high wind speeds, with losses around 75%. Another 1.4 million acres experienced tropical storm force winds, with estimated losses of 15%.

Salvaging fallen timber in these conditions is extremely challenging. Fallen trees blocked road access throughout rural areas, making transportation of timber and equipment a challenge. Several mills that could have been used to process the salvaged timber sustained heavy damage and were operating at a portion of their capacity.

Timber losses will have unexpected consequences across the rural economies of the impacted region. Several farmers (growing crops other than timber) use their timber stands as collateral for loans used to operate their farms, and many people in the area use their timber stands as a safety net or a savings/retirement plan.

Towns and cities in the region have also lost a significant amount of their urban forest canopy due to wind damage or tree death resulting from flooding. Urban trees have positive impacts on property prices and people's health. Thus, the loss of urban trees will have consequences that go well beyond the value of lost timber.

Total losses to the timber stock are estimated at $1,289,023,465.

2. Cotton: $49,877,183

Cotton is a major crop in Northwest Florida, as well as in the neighboring states of Georgia and Alabama. The cotton crop is generally harvested in October, and only around 5%-10% of Florida's acreage had been harvested by the time hurricane Michael moved into the area. An estimated 51,404 acres experienced category 3 or 4 winds, resulting in a total loss with no cotton to be salvaged. An estimated 25,478 acres experienced severe damage with losses in the range of 85%. Lastly an estimated 39,538 acres experienced significant damage with losses estimated around 50%.

Reports from the field also mention heavy damage to farm structures such as barns, sheds, equipment, and farm houses, in addition to significant expenses in debris clean up. We estimate these ancillary losses to be at least $6,190,870.

We estimate crop losses in cotton to be $49,877,182.

Total estimated losses to Florida's cotton growers are $ $56,068,052.

3. Cattle: $43,319,925.75

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. There are an estimated 1,507 cattle ranches and 106,438 head of cattle in the areas that experienced hurricane force winds during hurricane Michael.

The most significant issue identified in field reports was the widespread destruction of fences as a result of fallen trees. Ranchers had to spend significant resources to keep cattle together and out of harm's way. Hay and feed barns, equipment sheds, center pivot irrigation systems and similar structures or equipment were completely destroyed in several areas. Another major problem reported was that due to the electricity blackout, ranchers could not operate the pumps that are used to fill water troughs, and simply providing water for animals became an issue. Dead cattle were also reported.

Loss of hay and feed as a result of widespread damage in hay and feed barns in addition to heavy rain will need to be offset by purchases of additional forage, feed, and nutritional supplements. Cattle in ranches that experienced Category 3 and 4 winds will need an estimated 45 days of replacement feed, while cattle in ranches that experienced hurricane force winds will need an

estimated 25 days of replacement feed. Valued at $1.85 per day per head, the estimated cost of replacement feed will be $7,130,029.50.

As a result of widespread damage, we also expect that 10% of cows in ranches that experienced category 3 or 4 winds, and 5% of cows in ranches that experienced hurricane force winds will not carry calves to weaning or even breed this year. This is an estimated loss of 3,989 calves, each with a value of $787, or $3,139,146.25.

The cost of cleaning debris and rebuilding fences is substantial. We estimate that ranches that experienced category 3 or 4 winds will spend an average $5,000 per ranch, while ranches that experienced hurricane force winds will spend an average $2,500 per ranch. Total cleanup and fence rebuilding costs are estimated to be $5,596,250.

Damage to barns, sheds, farm housing, farm roads, and other farm infrastructure was also significant. We estimate that ranches that experienced category 3 or 4 winds have suffered $15,000 per ranch in damages to farm infrastructure, while ranches that experienced hurricane force winds have suffered $9,000 per ranch in damages to farm infrastructure. Total losses and damages to farm infrastructure in cattle ranches is estimated to be $17,952,000.

Michael's winds have also destroyed large amounts of farm equipment. We estimate that ranches that experienced category 3 or 4 winds lost and average of $3,000 per ranch in farm equipment, while ranches that experienced hurricane force winds lost an average of $2,000 in farm equipment. Total estimated equipment losses of farm equipment are $3,745,500.

Total ancillary losses for cattle are estimated to be $37,562,925

Total crop losses to beef cattle producers are estimated to be $5,757,000.

Total losses to cattle producers, including crop and ancillary losses, are estimated to be $43,319,925.

4. Peanuts: $23,049,369

Peanuts are also a major crop in North Florida and are often grown in rotation with cotton. A good portion of this year's peanut crop had been already harvested by the time hurricane Michael made landfall, but nearly 50% of the crop was still in the field. Peanuts are a ground crop and can better withstand the impacts of strong winds, leading to lower losses than in more vulnerable crops. However, peanut processing facilities were heavily impacted by Michael's strong winds, and most facilities were out of power for several days. Processing peanuts requires heat drying, which relies on electricity. Without heat drying, peanuts must be dried in the field, which leads to crop losses.

An estimated 48,001 acres experienced category 3 and 4 winds, with losses around 60%. Nearly 23,335 acres experienced losses around 45%, and an estimated 108,205 acres experienced losses of around 35%.

Losses to important peanut infrastructure—drying facilities, warehouses, and sampling stations—are estimated at $6.5 million.

Crop losses in peanuts are estimated at $23,049,369.

Total losses for the Florida peanut industry are estimated at $29,549,369.

5. Nurseries and Floriculture: $16,117,366

Florida's nurseries provide live plants for landscapers and agricultural producers throughout the US, and their annual sales are in the range of $2.75 billion. Just in the impacted region, plant nurseries are responsible for nearly $80 million in annual sales.

Growers incurred substantial labor costs in preparing nurseries in advance of hurricane Michael, as well as cleaning up debris after the storm passed. Growers have reported an estimated $1 million in preparation and debris clean-up costs.

Crop losses for greenhouse, nursery, and floriculture producers are estimated to be $15,117,366.

Total losses, including crop losses, for greenhouse and floriculture producers are estimated to be $16,117,366.

6. Poultry and Eggs: $10,026,000

Poultry and eggs are important livestock industries in Florida, with nearly $378 million in annual sales. A large portion of this industry is clustered in Northwest Florida, and some producers were in the path of hurricane Michael.

Total losses in poultry and eggs are estimated to be $10,026,000.

7. Vegetables: $8,613,841

Vegetables are a major component of Florida's diverse agricultural industry, with more than $1.3 billion in annual sales. While the vast majority of the state's vegetable production takes place in south and central Florida, there are sizable vegetable and melon growing areas in northwest Florida, and many of these were impacted by hurricane Michael.

Field reports indicate that in areas with category 3 and 4 winds, tomatoes, peppers, and cucurbits suffered catastrophic losses with no product to salvage. In areas with severe winds, losses in tomatoes ranged between 75% to 90%. Several growers had vegetable crops survive the storm, but their already stressed crops died in the aftermath as there was no electricity to run irrigation systems. Heavy infrastructure damage to packinghouses in the area has also been reported.

Total losses for vegetable producers are estimated to be $8,613,841.

8. Other Field Crops: $7,282,946

Corn, soybeans, oats, and different types of hay or forage crops are generally used in rotation with peanuts and cotton in Northwest Florida farms. Although these crops make a small portion of Florida's agricultural portfolio, there is significant acreage of these crops in the affected region. Significant portions of the harvest for these crops had already taken place before hurricane Michael.

An estimated 57,331 acres of these crops were located in the area that experienced catastrophic category 3 and 4 winds, with catastrophic losses. An estimated 58,781 acres were located in the area that experienced severe winds with estimated losses as high as 80% for some crops. An estimated 220,598 acres were located in the area that experienced heavy winds, with losses as high as 35% for some crops.

Total losses to other field crops are estimated at $7,282,946.

9. Dairy: $6,435,000

Florida is home to over 100 dairies and 125,000 dairy cows, with annual milk sales over $500 million.

Significant amounts of milk had to be dumped before and after the storm due to supply chain disruptions. Feed was also in short supply in the aftermath of the hurricane, due at least in part to blocked roads. The biggest issue reported from the field was the large consumption of diesel used to run generators that were being used to power milk parlors during the electricity blackouts.

Total losses to the dairy industry are estimated to be $6,435,000.

10. Aquaculture: $5,000,887.13

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 in Northwest Florida is dominated by shellfish grown in submerged leases, but there is also a large farm where sturgeon are reared to produce high-value caviar.

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.

Shellfish aquaculture takes place close to the coast in submerged leases. Some of the equipment is difficult to secure, and the heavy waves, storm surge, and strong winds of hurricane Michael destroyed significant amounts of this equipment.

Reports from the field indicate catastrophic losses in areas struck with the heaviest winds, while areas affected by severe and moderate winds have reported with losses ranging between 25% to 80%. In addition, we have reports that storm surge impacted aquaculture production areas throughout the Big Bend region, causing losses to the south and east of the areas impacted by hurricane force winds.

We also have reports of shellfish seedstock facilities that lost large amounts of shellfish seed (very small clams and oysters that are then placed in cages or bags) due to power outages. Shellfish seedstock has been in short supply in Florida for several years, and hurricane Michael will make this shortage even worse.

Several aquaculturists are also reporting heavy infrastructure and equipment losses, as well as significant amount of storm debris that must be cleaned up. In addition, significant resources were used in storm preparation.

In the aftermath of the storm, several harvesting areas have also been closed due to water quality issues.

Total losses to aquaculture producers are estimated to be $5,000,887.

11. Fruits: $4,356,663

Fruits are a major component of Florida's agriculture and include notable products such as citrus and avocados. While the vast majority of the fruit acreage is located in Central and South Florida, the impacted counties in Northwest Florida produce nearly $12 million in annual fruit sales. In recent years a small specialty citrus industry has flourished in this region, producing high-value easy to peel citrus varieties such as mandarins and tangerines. Fruit trees in the impacted area suffered heavy crop losses.

Total losses to the fruit industry are estimated to be $4,356,663.

12. Tree Nuts (including Pecans): $4,089,676

Pecans are not a large industry in Florida, but there is significant acreage in the panhandle region and it is a high-value crop. Heavy winds strip trees of pecan nuts, and in many cases can inflict heavy damage on trees, which take several years to grow from planting to production.

An estimated 94 acres of nut trees were estimated to be in the area that experienced catastrophic category 3 and 4 winds, where losses are estimated to be 100%. Nearly 1,682 acres experienced severe winds with estimated losses around 50%, and an additional 4,246 acres experienced heavy winds with losses around 10%.

Total losses to nut tree growers are estimated to be $4,089,676.

13. Apiary $1,960,000

The apiary industry—beekeepers rearing colonies for commercial honey production or professional pollination services—is a strong component of Florida's diverse agricultural economy. Florida's honey industry is consistently ranked among the top five in the nation with annual sales of $27 million. It is estimated that there are more than 450,000 managed bee colonies in Florida.

The catastrophic devastation brought by hurricane Michael destroyed pollinating plants, including much of Florida's forests, and most of the plant crops in the area.

There are an estimated 50,000 colonies in the areas impacted by hurricane Michael.

Total losses for the apiary industry are estimated to be $1,960,000.

14. Commercial Fisheries

We have also received field reports from Florida's seafood industry in the impacted area. Hurricane Michael's catastrophic winds have destroyed boats, fish houses, and fishing gear, making getting back to business a major challenge. In addition, many Floridians who work in this industry have lost their homes, and housing is in short supply in the area.

While we have been unable to compile enough data to estimate losses to commercial fisheries as a result of hurricane Michael, we know that losses to this industry and the people who work in it were substantial.

For questions related to this document, please contact:

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