

PRELIMINARY ASSESSMENT OF AGRICULTURAL LOSSES AND DAMAGES RESULTING FROM HURRICANE DEBBY

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Photo courtesy of survey respondent.

Hurricane Debby wind swath

- Landfall on August 5, 2024, near Steinhatchee, FL
- Counties experiencing hurricane force winds:
 - Dixie
 - Lafayette
 - Suwannee
 - Taylor
- 34 additional counties experienced tropical stormforce winds



Figure 1. Wind swath pattern of Hurricane Debby as it impacted Florida.

Source: Geospatial data on the wind swath of Hurricane Debby are derived from NOAA NHC (https://www.nhc.noaa.gov/gis/).



Precipitation before, during, and after Hurricane Debby

- Cumulative rainfall between August 2 and August 8 exceeded 15 inches in parts of northern Florida along the path of the hurricane's center.
- Areas of southwest Florida also experienced significant precipitation over this same period.



Figure 2. Cumulative precipitation totals in Florida (08/02-08/08, 2024).

Source: Precipitation data are derived from NOAA National Weather Service (<u>https://water.weather.gov/precip/download.php</u>).



Modeled flooding associated with Hurricane Debby

- Estimated flood inundation depth between August 5 and August 12 exceeded 12 feet for some barrier islands and coastlines.
- The most severe flooding was predicted to impact the Gulf of Mexico coastline from the Big Bend region to the Charlotte Harbor region.
- Inland regions were also predicted to experience flooding in or downstream of areas that experienced heavy precipitation.



Figure 3. Estimated flood inundation depth caused by Hurricane Debby in Florida.

Source: Estimated flood inundation data are retrieved from Pacific Northwest National Laboratory's Rapid Infrastructure Flooding Tool (<u>https://open-rift-pnnl.hub.arcgis.com/maps/0a38c4d97a6b47369de20fb0c59231c6/about</u>).



Agricultural lands impacted by Hurricane Debby

- Over 2.2 million acres of agricultural land affected
 - 68% grazing land
- Nearly 48,000 acres experienced highintensity weather conditions (HCII 10 – 15)
- Over 1.2 million acres experienced moderateintensity weather conditions (HCII 4 – 9)
- Over 930,000 acres experienced lowintensity weather conditions (HCII 1 – 3)



Figure 4. Hurricane Composite Intensity Index (HCII) level for agricultural lands impacted by Hurricane Debby in Florida.

Source: The agricultural lands geospatial data are from the Florida Statewide Agricultural Irrigation Demand (FSAID) Agricultural Lands Geodatabase (ALG) developed by the Florida Department of Agriculture and Consumer Services (FDACS) (https://www.fdacs.gov/Agriculture-Industry/Water/Agricultural-Water-Supply-Planning).



Estimated acreage of impacted agricultural lands by commodity group and HCII level

Table 2. Estimated acreage of impacted agricultural lands by commodity group and HCII level for Hurricane Debby.

	Hurricane Composite Intensity Index (HCII)							
Commodity Group	1-3	4-6	7-9	10-12	13-15	Iotal		
Animals and Animal Products ¹	753,151	723,041	149,318	27,262	1,025	1,653,797		
Field and Row Crops ²	71,532	225,241	67,709	16,125	1,324	381,931		
Citrus ³	64,938	25,074	3,100	375	5	93,492		
Vegetables, Melons, and Potatoes	22,287	48,561	5,658	1,010	6	77,522		
Greenhouse/Nursery	17,657	9,292	1,320	288	19	28,576		
Fruit and Tree Nuts ⁴	2,743	2,909	756	248	20	6,675		
Total	932,307	1,034,120	227,860	45,307	2,399	2,241,994		

Notes: ¹Animals and Animal Products acreage includes grazing land. ²Field and Row Crops acreage includes field crops, hay, and sugarcane. The acreage of cotton is adjusted with the county level harvested acres of cotton from USDA 2022 Census data. ³ Citrus acreage includes non-bearing acreage and was adjusted to reflect the 2023 Commercial Citrus Inventory Preliminary Report from USDA NASS. ⁴ The acreage of pecan in the Fruit and Tree Nuts group is adjusted with the county level bearing and non-bearing acres of pecan from USDA 2022 Census data.



Estimated annual value of production on impacted agricultural lands by commodity group and HCII level

Table 3. Estimated value of annual production (2024\$, Thousands) on impacted acreage by commodity group and HCII level.

		Total					
Commodity Group	1-3	4-6	7-9	10-12	13-15	Total	
Animals and Animal Products	\$327,434	\$547,002	\$164,094	\$48,904	\$3,185	\$1,090,620	
Vegetables, Melons, and Potatoes	\$221,536	\$517,833	\$55,457	\$11,711	\$52	\$806,589	
Greenhouse/Nursery	\$466,099	\$251,308	\$21,196	\$2,789	\$109	\$741,502	
Field and Row Crops	\$52,176	\$166,374	\$50,174	\$12,000	\$1,028	\$281,752	
Citrus	\$128,951	\$49,792	\$6,156	\$745	\$9	\$185,653	
Fruit and Tree Nuts	\$27,809	\$30,118	\$7,827	\$2,568	\$202	\$68,525	
Total	\$1,224,007	\$1,562,426	\$304,905	\$78,717	\$4,586	\$3,174,641	



Production loss estimation methodology



Estimating production losses for Florida agriculture due to Hurricane Debby

- These production loss estimates are preliminary and might change as additional information specific to Hurricane Debby is collected.
- Production loss estimates convey the percentage/value of annual production (for calendar year 2024 or, in the case of some crops, marketing year 2024-25) that has been lost due to Hurricane Debby.
 - Some crops have multiple growing seasons in Florida and others sell product year-round, which has been roughly accounted for in estimated loss percentage values.
 - Adjustments have been made to estimated loss percentage values to account for planting and harvesting progress for some commodity groups, but further adjustments might be made as information on early harvesting prior to the event, delayed planting in the face of Hurricane Debby, or the potential for growers to replant damaged or destroyed acreage is shared.
 - Losses that might occur in calendar year 2025, marketing year 2025-2026, or beyond are not assessed and would be "in addition to" these estimates.
 - The Low and High scenarios should be interpreted as low and high estimates on averages for the relevant commodity group and wind speed zone and should not be interpreted as minimum and maximum values for individual producers or for commodity groups.
 - Production loss estimates do not include the value of stored inputs or stored harvested products that were damaged or destroyed nor does it include the value of damages to infrastructure (including perennial plantings and lost/deceased animals) that will require repair or replacement.
 - These estimates do not account for the fact that some crop losses might be eligible for or covered by crop insurance or other risk management tools available to producers.
- A range of potential production losses is provided as opposed to point values to reflect the uncertainty that remains surrounding percentage production losses (for reasons provided above and others).

Estimated range of agricultural production losses due to Hurricane Debby

Table 5. Estimated potential range of agricultural losses due to Hurricane Debby by commodity group and wind speed zone (2024\$, Thousands).

Hurricane Composite Intensity Index (HCII)									Tetal			
Commodity	1-3		4-6		7-9		10-12		13-15		Iotai	
Group	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario	Scenario
Animals and Animal Products	\$0	\$16,372	\$27,350	\$54,700	\$8,205	\$16,409	\$4,890	\$9,781	\$637	\$1,274	\$41,082	\$98,536
Greenhouse/ Nursery	\$0	\$23,305	\$12,565	\$25,131	\$2,120	\$4,239	\$279	\$837	\$27	\$44	\$14,991	\$53,556
Field and Row Crops	\$0	\$5,218	\$8,319	\$24,956	\$7,526	\$15,052	\$3,000	\$7,200	\$411	\$720	\$19,256	\$53,146
Vegetables, Melons, and Potatoes	\$0	\$2,215	\$10,357	\$25,892	\$1,109	\$2,773	\$586	\$1,171	\$3	\$5	\$12,055	\$32,056
Citrus	\$0	\$6,448	\$2,490	\$4,979	\$616	\$1,231	\$149	\$372	\$4	\$7	\$3,259	\$13,037
Fruit and Tree Nuts	\$0	\$2,781	\$1,506	\$6,024	\$783	\$2,348	\$642	\$1,541	\$81	\$162	\$3,012	\$12,856
Total	\$0	\$56,338	\$62,586	\$141,681	\$20,358	\$42,053	\$9,546	\$20,902	\$1,163	\$2,212	\$93,653	\$263,186

Source: Authors' own calculations based on preliminary analysis of survey data for Hurricane Debby along with observations from previously analyzed tropical cyclone events (Irma [2017], Michael [2018], Sally [2020], Ian [2022], Idalia [2023]).



Value of buildings, machinery, and equipment on the impacted agricultural lands

- Baseline data necessary to place a dollar value on infrastructure damages or to estimate repair/replacement costs for damaged/destroyed infrastructure do not exist but we can investigate infrastructure "at risk".
- County-level data on the value of agriculture-related buildings, machinery, and equipment published in the United States Department of Agriculture's 2022 Census of Agriculture were combined with event data to provide an estimate of the value of "at risk" infrastructure within the areas of Florida affected by Hurricane Debby.
- These estimates do not capture the value of buildings, machinery, or equipment built or acquired after the 2022 Census of Agriculture was completed.
- These values are not adjusted for buildings, machinery, or equipment that were demolished, destroyed, or are no longer present/used and they are not adjusted for depreciation over the period 2022-2024, which includes Hurricane Idalia.



Value of buildings, machinery, and equipment on the impacted agricultural lands



Figure 8. Estimated value of impacted agricultural buildings by HCII level.



Figure 9. Estimated value of impacted agricultural machinery and equipment by HCII level.



Asset and production damage

- Survey respondents reported damage to or destruction of the following types of agricultural assets:
 - Homes
 - Livestock sheds
 - Barns
 - Conservation structures
 - Aquaculture structures and equipment
 - Farm equipment (tractors, vehicles, greenhouse heating/cooling, etc.)
 - Fencing (exterior and interior)
 - Perennial plantings
- Survey respondents also reported damage to or destruction of stored harvested products and the following types of stored inputs:
 - Fertilizer
 - Stored hay
 - Bird scratch and feed
 - Seeds



Questions?

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