PRELIMINARY ESTIMATE OF PECAN ACREAGE AFFECTED BY HURRICANE HELENE

PREPARED FOR:	Anne Warden/American Pecan Council
PREPARED BY:	Joel Crowther/Land IQ
	Chris Stall/Land IQ
	Joel Kimmelshue/Land IQ
DATE:	October 25, 2024

INTRODUCTION

On the night of September 26, 2024, Hurricane Helene made landfall in the Big Bend region of Florida as a major Category 4 hurricane, with peak winds of 140 mph, causing catastrophic damage across parts of Florida, Georgia, North and South Carolina, and Tennessee (Powell, 2024).

Following the storm, the American Pecan Council contracted with Land IQ to utilize the existing orchard-level spatial dataset of improved pecans in Georgia and Florida along with meteorological data and initial damage reports to produce a preliminary estimate of pecan acreage affected by Hurricane Helene. This should be considered as an initial assessment. If more detailed analysis is required, a more robust image analysis effort can be conducted to refine the estimates of affected acres presented here and acres of downed trees.

This report summarizes the data resources used, the assumptions made, and the methodology followed to generate a county-level estimate of affected pecan acreage and estimates of potentially harvestable 2024 pecan yield remaining after Hurricane Helene.

BACKGROUND INFORMATION

Beginning with the 2017 crop year, Land IQ has produced an orchard-by-orchard map of all improved pecan acreage in 15 US states for the American Pecan Council (APC). This work established both the field area and planting year of each pecan orchard. The pecan acreage in Georgia was updated for the American Pecan Council for the 2019 crop year, and it was updated again for the 2021 crop year for South Georgia Pecan (Valdosta, GA). Pecan orchards in the state of Florida have been mapped once, for the 2019 crop year.

An assessment of pecan tree loss due to a hurricane was previously conducted by Land IQ in 2020 in response to Hurricane Michael, a Category 5 hurricane which affected Florida, Georgia, and Alabama in October 2018 (NWS, 2018). For this analysis, individual pecan orchards in Georgia were assessed visually by comparing high-resolution aerial and satellite imagery before and several months after the hurricane

and estimating tree loss as a percentage of orchard acres. Tree loss ranged from 0 to 100%, in increments of 10%.

For the purposes of analyzing Hurricane Michael, _lost acres_ represented the area of pecan trees which were completely blown over because of the hurricane. _Affected acres_ represented the total area of an orchard that experienced at least 10% loss. For example, a pecan orchard with an area of 100 acres that was given a tree loss score of 30% would have 30 _lost acres_, but 100 _affected acres_.

The analysis of pecan damage from Hurricane Michael found that numerous factors affected the degree to which an orchard experienced tree loss during a hurricane. These included: orchard age, distance from the hurricane track, hurricane wind swath rating, and the position of the orchard relative to the hurricane's forward motion.

- **Orchard Age** – There was an association between tree age and lost acres, with Hurricane Michael disproportionately affecting older trees. Trees over 20 years old made up 78% of Georgia's pecan acreage but were responsible for 92% of lost acres. This is likely due to the increased canopy surface area of mature trees being exposed to high winds (Reighard et al., 2001).
- **Distance from Hurricane Track** – For Hurricane Michael, 97% of lost pecan acres were located within 30 miles of the hurricane track, with just under half of lost acres occurring within 10 miles of the track.
- **Hurricane Wind Swath Rating** – The National Hurricane Center (NHC) releases spatial data for all tropical cyclones within their forecast area (NOAA, 2024a). These products include a working best track wind swath, which is created by accumulating the best track wind radii over the course of an ongoing tropical cyclone. The wind swath shows areas potentially affected by sustained winds of tropical storm force (34-knot), 50-knot, and hurricane force (64-knot) from a tropical cyclone. For Hurricane Michael, 99.3% of pecan tree loss occurred in areas with either a 50- or 64-knot wind swath rating.
- **Position Relative to Hurricane's Forward Motion** – For a tropical cyclone located in the Northern Hemisphere, the wind flows counterclockwise around the eye. Because the storm's forward motion by itself will create wind, the strongest winds are nearly always found on the right side of the storm's forward motion, most often in the right-front quadrant (NOAA, 2023). For Hurricane Michael, pecan orchards on the right axis of the hurricane track (relative to the hurricane's forward motion) were disproportionately affected.

Figures 1 and 2 display pecan orchards together with spatial data of the hurricane best track and wind swath rating obtained from the NHC for Hurricane Michael and Hurricane Helene, respectively (NHC, 2024). Comparing the characteristics of Hurricane Michael and Hurricane Helene showed several similarities. While Michael made landfall as a Category 5 on the Saffir-Simpson Hurricane Wind Scale (NOAA, 2021), both storms entered Georgia as Category 4 hurricanes. The width and shape of the 50-knot and 64-knot wind swaths were also similar.

Given these similarities, it was decided that, as an initial test, Hurricane Michael would be used as an analogue for Hurricane Helene, with the extent of damage predicted based on factors relating to each orchard's age, hurricane wind swath rating, position relative to the hurricane's forward motion, and Saffir-Simpson category.
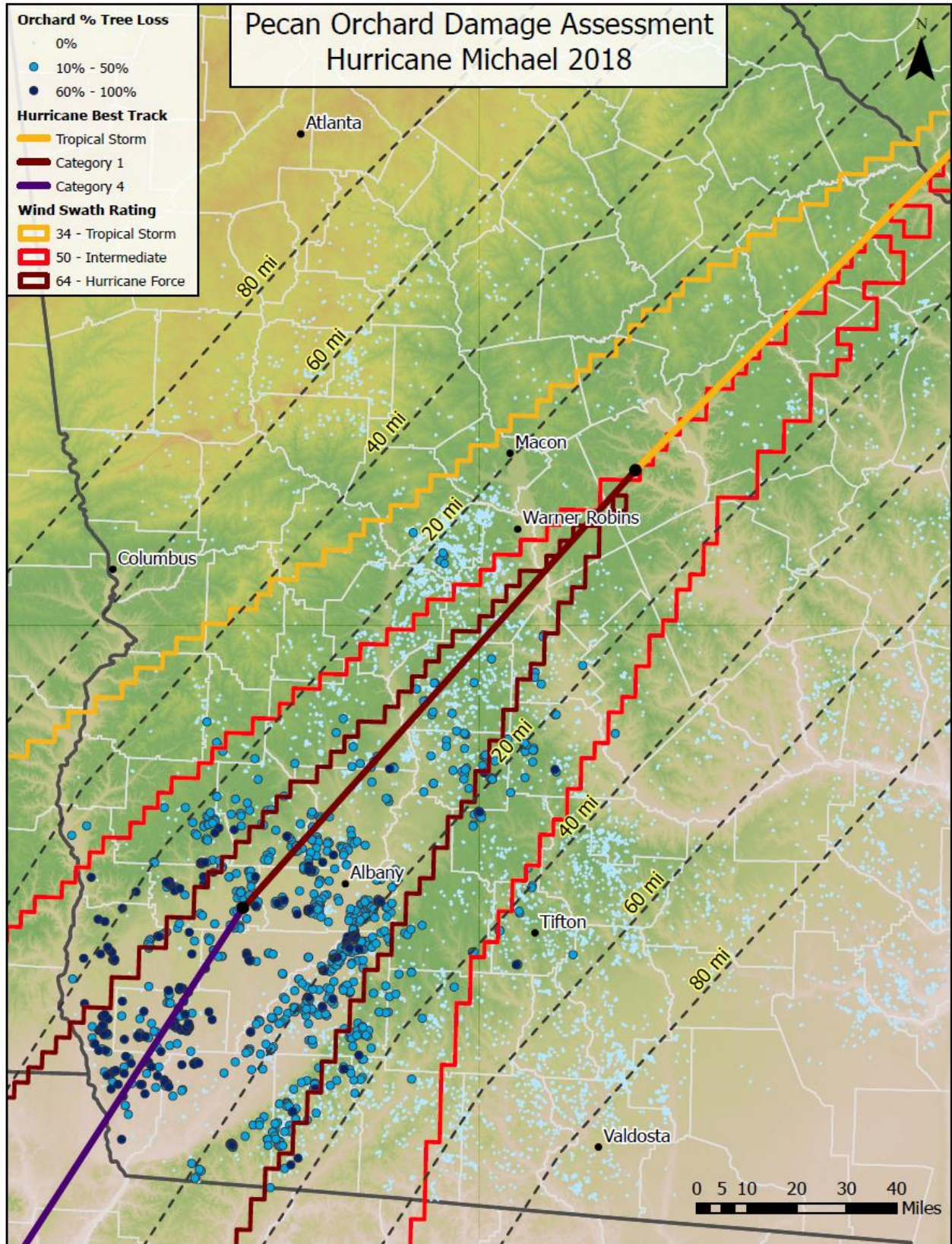
Figure 1. Extent of Georgia pecan orchard damage following Hurricane Michael displayed with Hurricane Michael final best track and wind swath rating.
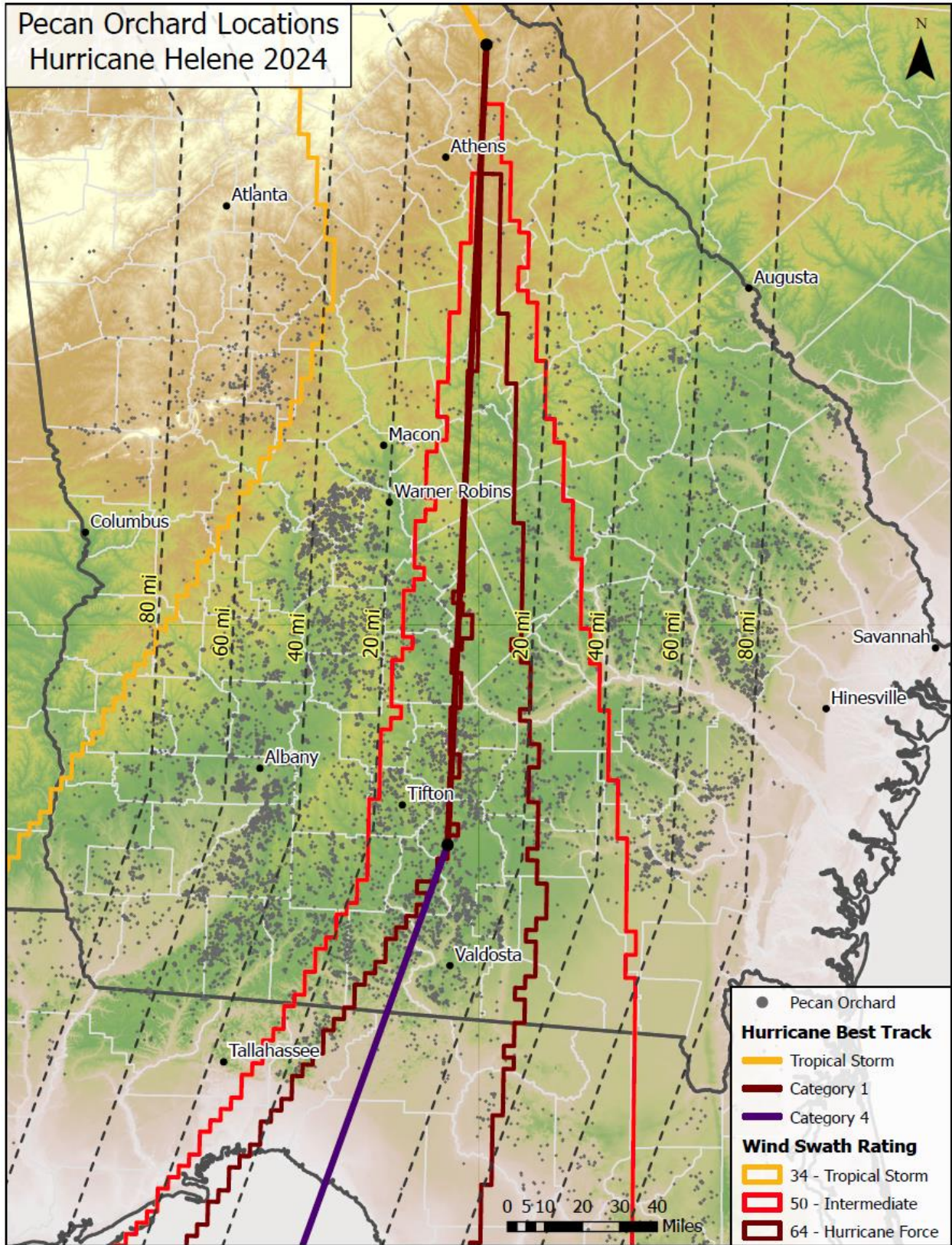
Figure 2. Georgia and Florida pecan orchard locations displayed with Hurricane Helene preliminary best track and wind swath rating.

METHODOLOGY

Using the field-level data for Georgia pecan orchards standing at the time of Hurricane Michael and data for Georgia (2021 mapping) and Florida (2019 mapping) pecan orchards assumed to be standing at the time of Hurricane Helene, meteorological information about the hurricane's wind swath and track location was attached to each pecan orchard.

A comprehensive multifactor analysis was conducted that categorized the 2018 pecan acreage based on different variables, followed by the calculation of the proportion of lost acres within each category. Subsequently, these proportions were applied to the pecan acreage that existed during Hurricane Helene, which had been categorized in a similar manner using the same criteria, but incorporating meteorological data specific to Hurricane Helene.

While the extent of damage initially seemed to track well with field reports within the 50- and 64-knot wind area, the analysis appeared to poorly reflect damage occurring further from the hurricane best track in the tropical storm force (34-knot) wind areas. During Hurricane Michael, fewer than 1% of pecan acreage in the tropical storm force wind swath was affected, with over 99% of damage occurring within 40 miles of the hurricane track.

However, field reports from Dr. Lenny Wells, Professor of Horticulture and Extension Horticulture Specialist at the University of Georgia, and Andrew Sawyer, Southeast Georgia Area Pecan Agent with University of Georgia Extension, indicated extensive damage to pecan orchards more than 70 miles east of the hurricane track in counties like Richmond, Burke, and Screven (Wells, 2024a; Wells, 2024b; Sawyer, 2024).

TOPOGRAPHY

A review of the topography in and adjacent to the paths of Hurricane Michael and Hurricane Helene shows one key difference. Hurricane Michael entered Georgia in Seminole County near the southwest corner of the state, and it moved roughly northeast through the Flint River Valley. On the valley's southeastern side, there is a ridge rising several hundred feet from the valley floor to over 400 feet in elevation, located between 20 and 30 miles from the hurricane track. Relatively little damage to pecan orchards occurred beyond the peak of this ridge to the southeast. We postulate that the winds may have rapidly dissipated beyond this ridge due to the increased friction associated with greater surface roughness of this elevated region.

Conversely, when reviewing the area to the right side of Hurricane Helene, no such ridge topography exists. Instead, the surface elevation decreases gradually eastward all the way to the Atlantic coast. This lack of surface friction means that likely a greater proportion of pecan acreage beyond 30 miles from the track would have been exposed to higher winds and would therefore have seen significant tree loss.

WIND SPEED DATA

This hypothesis was supported using wind speed data obtained from the University of Georgia (UGA) Weather Network (College of Agricultural & Environmental Sciences, University of Georgia, 2024) for September 26-28, 2024. This weather station network includes 89 locations throughout Georgia (Figure 3) that collect continuous data for multiple parameters (air temperature, precipitation, wind speed, etc.), averaged across 15-minute intervals.
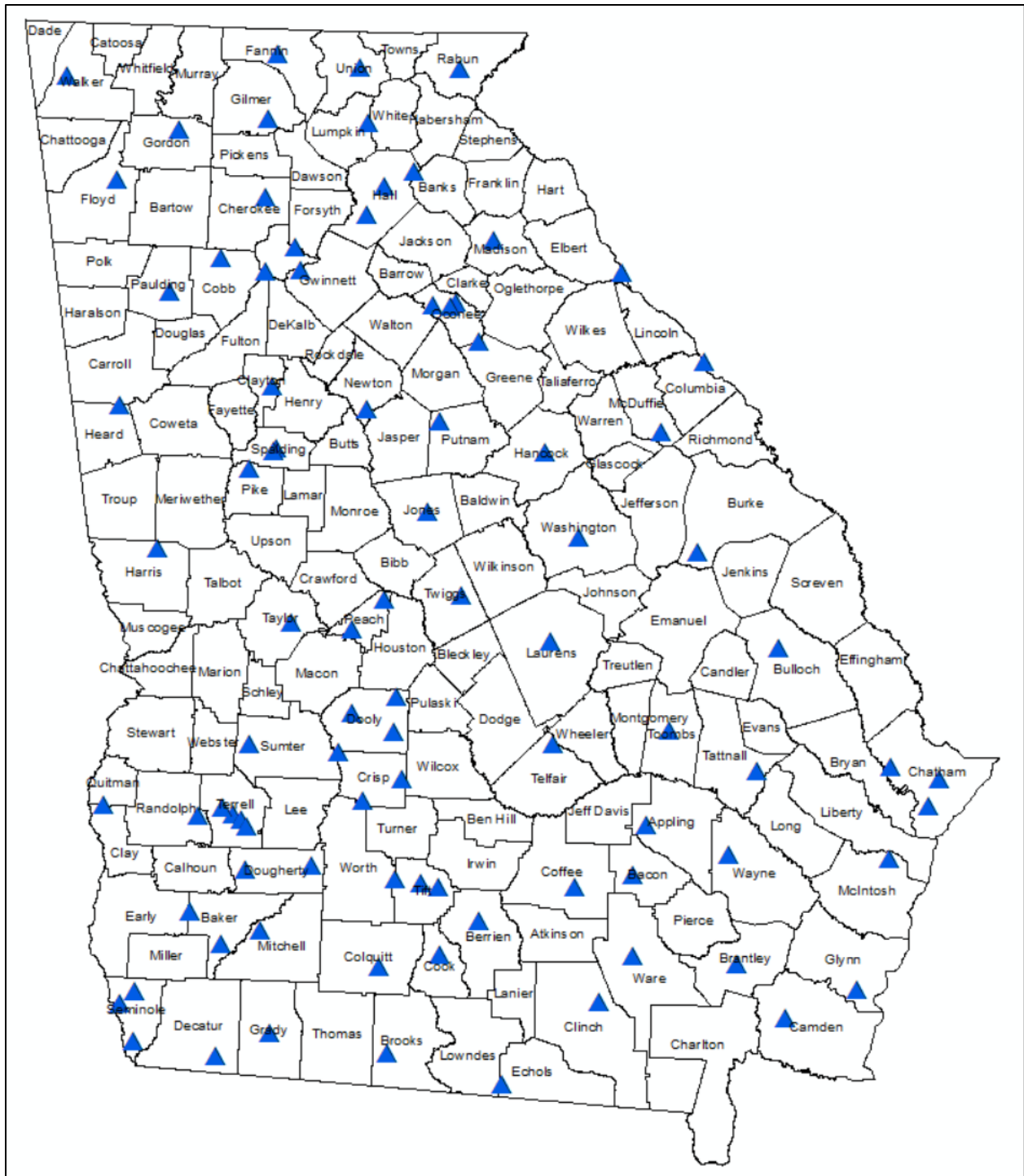
Figure 3. Location of UGA weather network stations.

For each location, the maximum wind speed and the duration of time wind speeds exceeded 35 miles per hour during the three-day period were calculated. Figure 4 shows the maximum wind speed recorded at 15-minute intervals across the three-day period for a weather station in Bacon County, which recorded one of the highest wind speeds within the station network during Hurricane Helene. The

station recorded a maximum wind speed of 88.2 mph and had sustained winds exceeding 35 mph for six hours.

Based on the land-specific application of the Beaufort Wind Scale (NOAA, 2024b), wind speeds of 47 mph have the capacity to break tree limbs. At wind speeds of 55 mph, trees can break or uproot, and potential massive tree loss can occur at windspeeds in excess of 73 mph.

Using Gaussian Kriging, these wind speed data were interpolated to create a continuous surface of maximum wind speed (Figure 5) and the duration of time the maximum wind speed exceeded 35 miles per hour (Figure 6) for the state of Georgia.
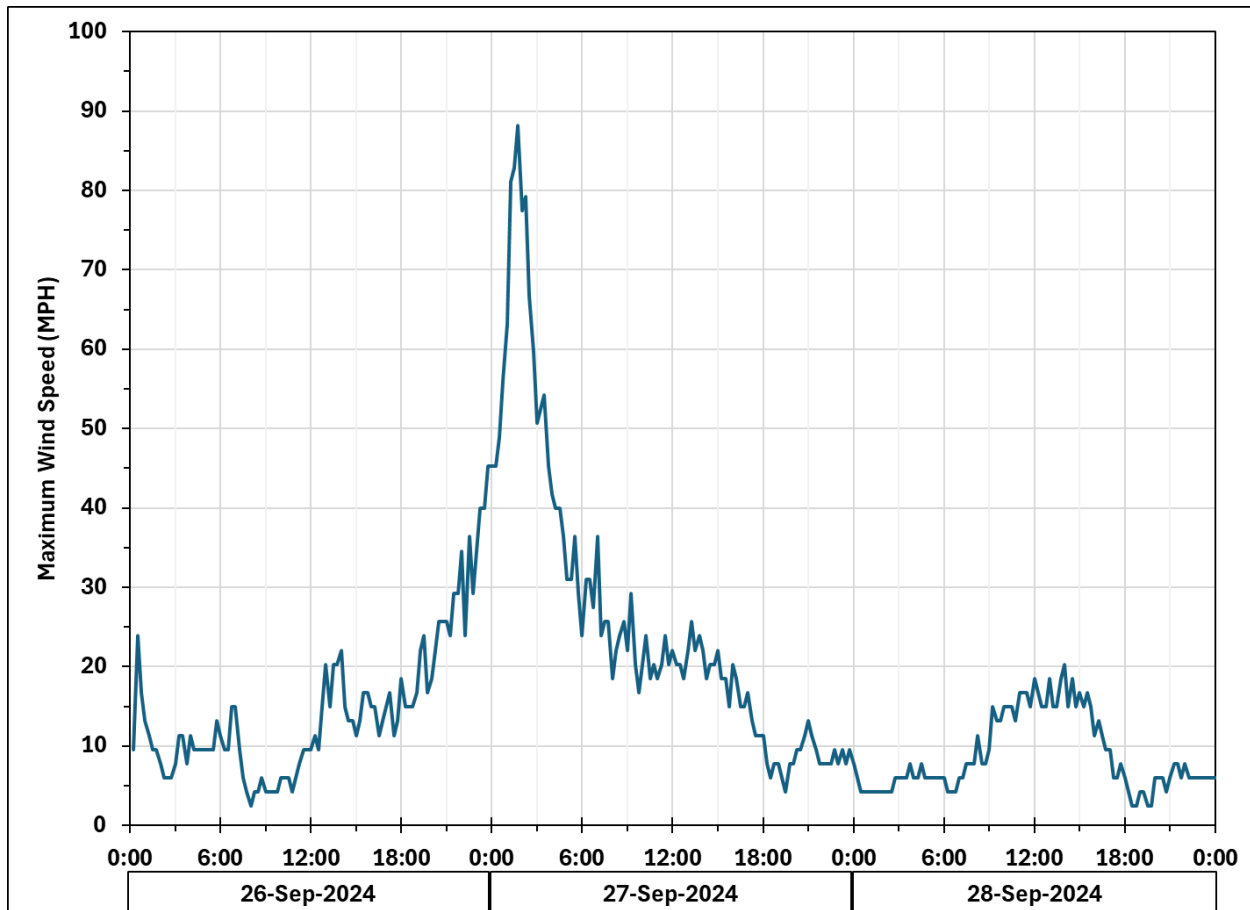

Figure 4. Maximum wind speed recorded at 15-minute intervals by UGA weather station at the Alma location.
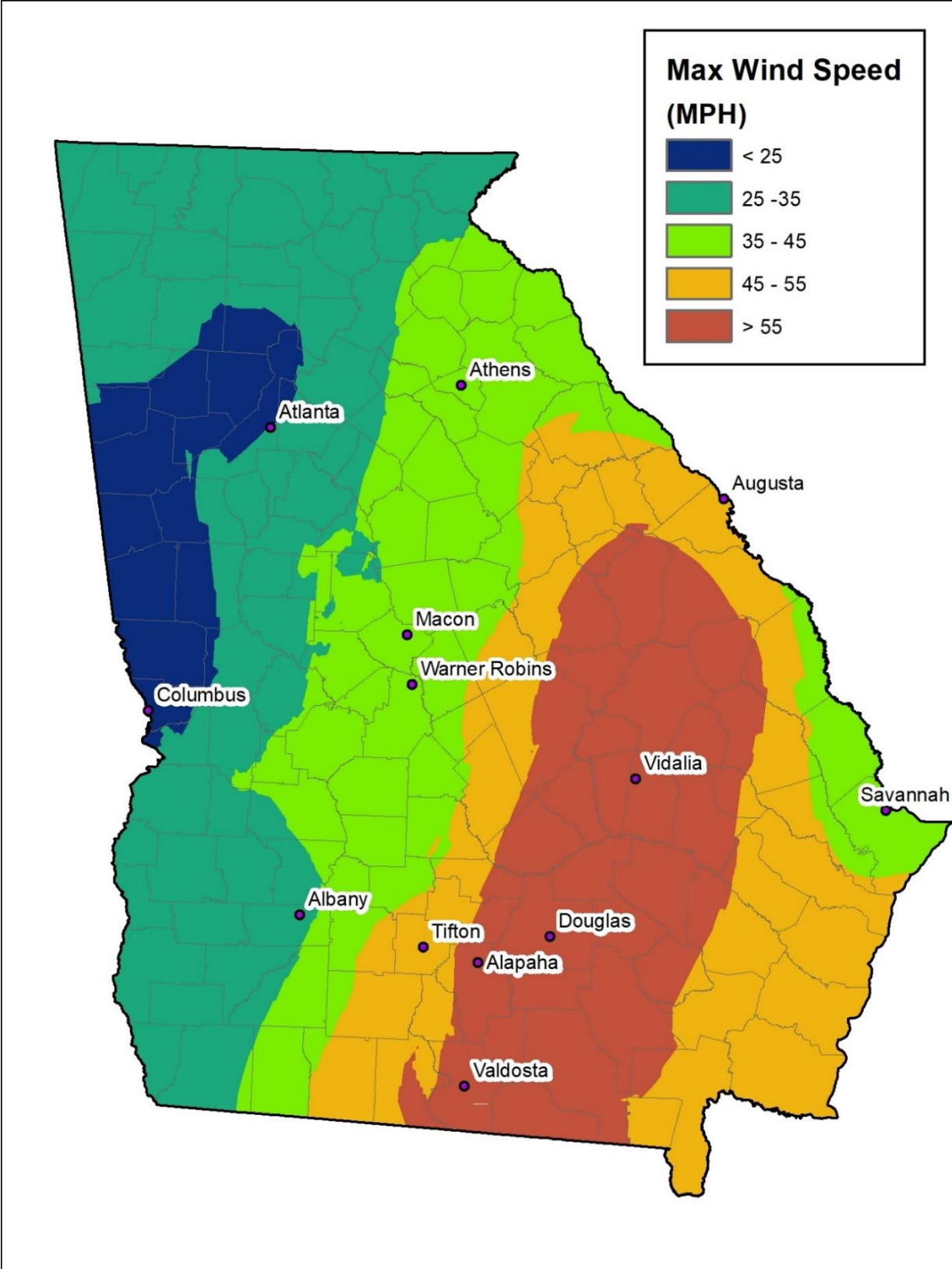
Figure 5. Interpolated (Gaussian Kriging) maximum wind speed, September 26-28, 2024 (UGA weather station data).
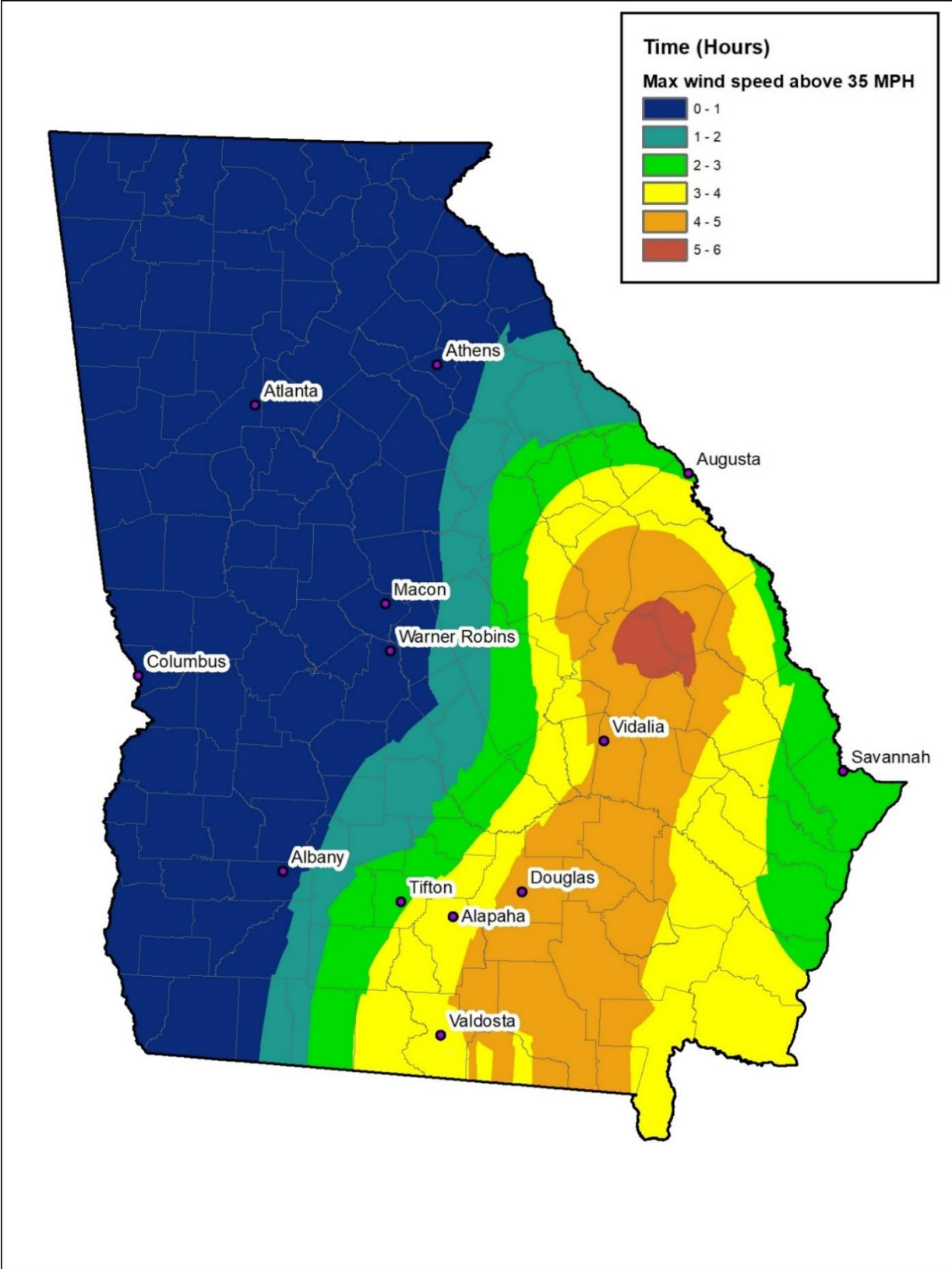
Figure 6. Interpolated (Gaussian Kriging) time maximum wind speed exceeding 35 mph, September 26-28, 2024 (UGA weather station data).

HURRICANE TRACK ERROR

In addition to topographical differences between hurricanes and the results of interpolating wind speeds from UGA weather stations, field reports confirm not only that pecan damage occurred in a wider swath than was seen in Hurricane Michael, but that the preliminary best track released by NHC is likely inaccurate through the state of Georgia. Rather than travelling roughly straight north from Valdosta to just east of Athens, the track appears to have traveled north-northeast from Valdosta to Augusta (Wells, 2024a; Sawyer, 2024).

In a phone interview on October 18, 2024, Dr. Wells provided further information on the damage across the counties he had visited. He confirmed that the worst damage appeared to be in a line roughly from Valdosta to Alapaha, from Douglas to Mt. Vernon, and from Vidalia to Augusta.

A review of an animation of GOES-East satellite imagery captured during the hurricane shows the eyewall appearing to travel roughly in a straight line from Valdosta to Augusta (VideoFromSpace, 2024).

FINAL METHODOLOGY

These lines of evidence resulted in a new methodology for estimating the pecan acreage affected by Hurricane Helene. Poor results were obtained when the analysis was performed based on each orchard's location relative to a hurricane track which available evidence suggests is inaccurately placed. Instead, evidence from University of Georgia weather stations, field damage reports, and knowledge about the approximate true hurricane path was used to estimate affected pecan acreage at the county level.

A summary of county-level field damage reports from Dr. Wells (Wells, 2024a; Wells, 2024b; Wells, personal communication) and Andrew Sawyer (Sawyer, 2024) can be found in Table 1.

For each county, three impact severity scenarios—low-end impact, predicted scenario impact, and high-end impact—are given to establish the range of potential affected pecan acreage. Separate estimates are given for orchards 10 years or younger and for orchards older than 10 years old.

For Hurricane Helene, our definition of *affected* acreage is modified slightly to represent the proportion of acreage that will likely go unharvested during 2024. Based on communication with Dr. Wells, an orchard experiencing 20-30% tree loss will likely be damaged to such an extent that they will have very little to no harvest in the current year. This is due both to the inability to maneuver around downed trees and to the degree of nut loss from high winds in trees that remain standing.

Our reported estimates for *affected* acreage represent the proportion of pecan acreage in each county we believe will have at least 20% tree loss. This affected acreage should be considered near-term only, as trees that remain standing can be expected to produce a crop in future years, assuming they are not removed by the grower.

A possible subsequent investigation will be performed when high-resolution imagery is available that will estimate the proportion of downed trees at an orchard level. This secondary analysis will provide a measure of the long-term effects on production that can be expected in subsequent harvests, until any acreage replanted after Hurricane Helene comes into production. In the meantime, data comparing lost and affected acreage from Hurricane Michael can be used to estimate the range of lost acreage possible from Hurricane Helene.

Table 1. County-Level Pecan Damage Reports from Hurricane Helene

County	Notes
Brooks	Damage extremely heavy
Lowndes	Damage extremely heavy
Atkinson	Damage extremely heavy
Coffee	Damage extremely heavy
Bacon	Damage extremely heavy
Toombs	Damage extremely heavy; consistent tree loss/pecan damage throughout
Treutlen	Damage extremely heavy
Montgomery	Consistent tree loss/pecan damage throughout; three orchards exhibited 80% loss of trees >10 years old
Pierce	Unable to access very back of one orchard
Appling	A few orchards found to have survived; changes from more consistent (60%+) tree loss to varying 30% to 70% tree loss on the eastern edge
Tattnall	Severe damage south and southwest of Reidsville; east of Reidsville looked much better in terms of tree loss
Tift	Almost all damage found east of I-75
Telfair	Large trees toppled while small trees remained standing, this was consistent throughout other counties in the damage area
Dodge	Between Eastman and Abbeville, 30% tree loss seen
Laurens	Cadwell had significant tree loss
Emanuel	Tree loss around 60-80%, mostly older orchards, all on the east side of the county
Jenkins	One orchard sustained greater than 90% tree loss; all other orchards sustained 20-30% tree loss; one orchard found that can likely be harvested (to a degree)
Burke/Jefferson	Significant loss just below Augusta, one orchard with 90% loss, two with 40% loss
Washington	East side of county hit hard
Richmond	In the Augusta area, one orchard lost almost all 6–10-year-old trees and at least 50% of old trees

Wells, 2024a; Wells, 2024b; Sawyer, 2024.

YIELD LOSS CALCULATION METHODOLOGY

Total yield loss was calculated using a modified version of an age-specific pecan yield table published in the Southeastern Pecan Growers Handbook (Nesbitt & Wells, 2007). In personal communication with Dr. Wells, he indicated that the table in this publication contained the potential yields of newer pecan varieties. Older pecan varieties and orchards that are not managed to their full potential reduce the

average yield per acre and more appropriately represent actual conditions. In communication with Dr. Wells, Land IQ adjusted this published table of age-specific yield, while maintaining yield ratios between age groups and validating the yield range with USDA figures. Age-specific yield estimates were applied to Land IQ mapped pecan acreage by orchard age to estimate the proportion of potentially harvestable 2024 pecan yield remaining post Hurricane Helene.

RESULTS

AFFECTED ACREAGE

We estimate that Hurricane Helene affected between 41,509 and 62,115 acres in the state of Georgia and between 2,642 and 3,962 acres in the state of Florida (Table 2). This represents 19-29% of statewide pecan acreage in Georgia and 34-51% of statewide pecan acreage in Florida. Of this affected acreage, between 38,795 and 57,040 acres (about 93%) are of bearing age (≥8 years) in Georgia. In Florida, between 2,574 and 3,962 acres (about 98%) of affected acreage was of bearing age.

Figures 7 and 8 show maps of county-level estimates of the predicted scenario proportion of affected acreage for orchards older than 10 years and orchards 10 years old or younger, respectively. County-level estimates of proportion-affected and acreage-affected for all three severity scenarios—low-end impact, predicted scenario impact, and high-end impact—for Georgia and Florida are shown in Tables 3 and 4, respectively, as well as in the attached Excel spreadsheet.

Table 2. Pecan Acreage Affected by Hurricane Helene

State	Total Pecan Acreage*	Affected Pecan Acreage (% of Total)		
		Low	Predicted	High
Georgia	216,105	41,509 (19%)	54,568 (25%)	62,115 (29%)
Florida	7,710	2,642 (34%)	3,441 (45%)	3,962 (51%)
Total	**223,815**	**44,151 (20%)**	**58,009 (26%)**	**66,077 (30%)**

*Georgia: 2021, Florida: 2019

While lost acreage, or the acreage of downed trees in each orchard, will not be known until an analysis using high-resolution imagery is complete, using statistics from Hurricane Michael can be informative. During Hurricane Michael, a total of 19,551 acres were given a tree loss score of 20% or higher. Of that affected acreage, a total of 7,915 tree acres, or 40%, were blown over. Applying that estimate to Hurricane Helene, we can estimate that between 17,874 and 26,750 acres may have been blown over during Hurricane Helene.

Dr. Wells reported that "Hurricane Michael destroyed many orchards in its path, but even within the storm's path, there seemed to be more variability from one orchard to the next regarding Michael's destruction. Helene seems to be much more uniform in its damage" (Wells, 2024a). If this statement proves to be correct, this estimate of lost acres is likely to be low.
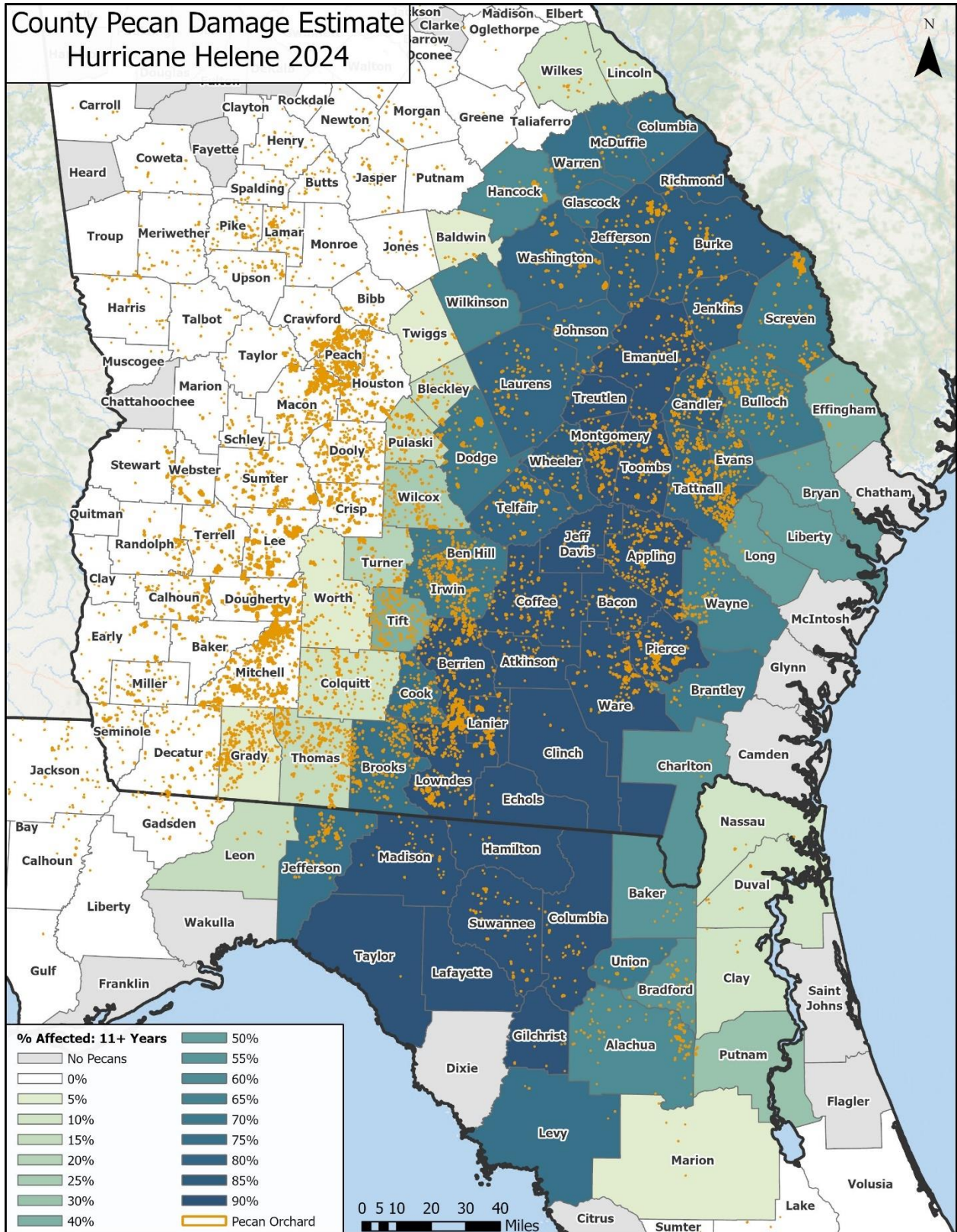
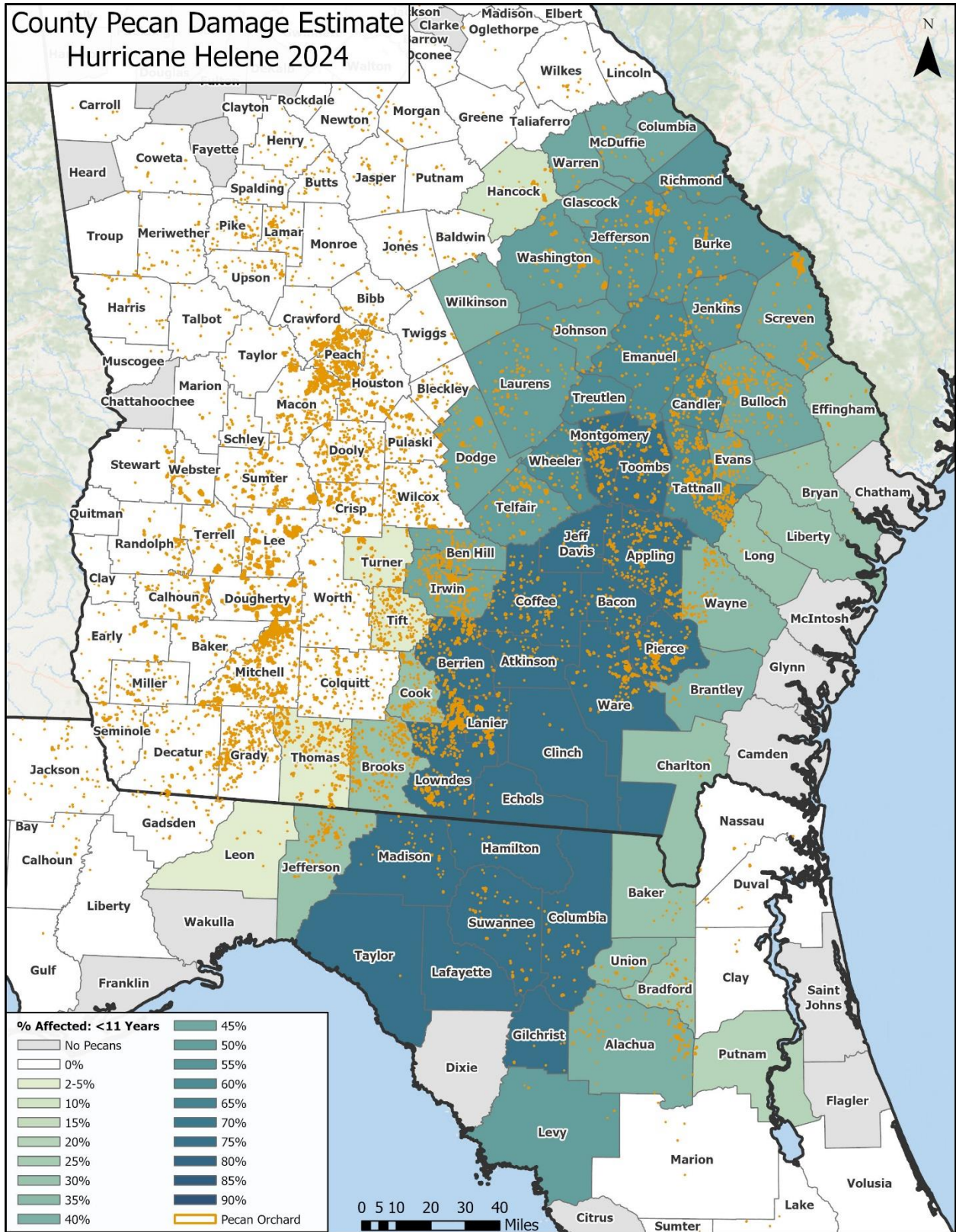**Figure 7. County-level estimates of percent affected acreage for orchards older than 10 years (predicted scenario).**

Figure 8. County-level estimates of percent affected acreage for orchards 10 years old or younger (predicted scenario).

Table 3. Georgia County-Level Percent Affected (by both Age Categories) and Resulting Affected Acreage by Severity Scenario

County[1]	% Affected (≤10 yrs old)			% Affected (>10 years old)			Affected Acreage		
	Low	Pred	High	Low	Pred	High	Low	Pred	High
Berrien	60%	75%	90%	75%	90%	95%	4,641	5,627	6,145
Lowndes	60%	75%	90%	75%	90%	95%	3,631	4,403	4,813
Appling	60%	75%	90%	70%	90%	95%	1,760	2,255	2,422
Lanier	60%	75%	90%	75%	90%	95%	1,775	2,153	2,353
Pierce	60%	75%	90%	75%	90%	95%	1,549	1,876	2,045
Montgomery	60%	75%	90%	70%	90%	95%	1,164	1,490	1,607
Ware	60%	75%	90%	75%	90%	95%	1,206	1,460	1,587
Emanuel	35%	60%	70%	70%	90%	95%	1,074	1,437	1,542
Toombs	60%	75%	90%	70%	90%	95%	976	1,250	1,340
Coffee	60%	75%	90%	75%	90%	95%	802	970	1,052
Bacon	60%	75%	90%	75%	90%	95%	314	384	430
Atkinson	60%	75%	90%	75%	90%	95%	176	212	225
Jeff Davis	60%	75%	90%	75%	90%	95%	97	125	134
Treutlen	35%	60%	70%	70%	90%	95%	69	90	95
Clinch	60%	75%	90%	75%	90%	95%	30	36	38
Echols	60%	75%	90%	75%	90%	95%	17	21	23
Burke	30%	55%	65%	70%	85%	95%	1,594	2,037	2,296
Jefferson	30%	55%	65%	70%	85%	95%	1,403	1,767	1,987
Candler	35%	60%	70%	65%	85%	90%	855	1,121	1,189
Jenkins	30%	55%	65%	70%	85%	95%	437	545	612
Wheeler	40%	60%	70%	70%	85%	90%	243	304	326
Richmond	30%	55%	65%	70%	85%	95%	224	283	318
Tattnall	35%	60%	70%	75%	80%	90%	3,138	3,447	3,889
Washington	35%	50%	65%	70%	80%	85%	2,157	2,565	2,845
Telfair	30%	50%	65%	70%	80%	85%	1,110	1,284	1,376
Laurens	30%	50%	65%	70%	80%	85%	772	890	950
Johnson	35%	50%	65%	70%	80%	85%	167	191	204
Brooks	20%	30%	40%	50%	75%	85%	1,664	2,495	2,853
Cook	20%	30%	40%	50%	75%	80%	718	1,076	1,218

Evans	35%	45%	55%	60%	75%	80%	548	687	742
McDuffie	20%	45%	55%	60%	75%	80%	111	139	148
Warren	20%	45%	55%	60%	75%	80%	108	135	144
Glascock	20%	45%	55%	60%	75%	80%	81	112	124
Columbia	20%	45%	55%	60%	75%	80%	16	20	21
Screven	35%	45%	55%	60%	70%	80%	1,867	2,227	2,587
Irwin	20%	45%	55%	50%	70%	80%	1,148	1,805	2,105
Bulloch	35%	45%	55%	60%	70%	80%	1,232	1,443	1,654
Ben Hill	20%	45%	55%	50%	70%	80%	778	1,151	1,328
Dodge	20%	45%	55%	60%	70%	75%	631	995	1,147
Brantley	30%	40%	55%	50%	70%	80%	55	77	89
Wayne	25%	35%	50%	40%	65%	75%	375	594	710
Wilkinson	15%	40%	50%	55%	65%	70%	35	44	48
Hancock	0%	10%	20%	50%	60%	75%	273	369	493
Charlton	20%	30%	40%	40%	55%	70%	7	9	12
Long	20%	30%	45%	35%	50%	65%	9	13	17
Liberty	20%	30%	45%	35%	50%	65%	3	5	6
Bryan	20%	30%	45%	35%	50%	65%	3	4	5
Tift	0%	5%	10%	25%	40%	50%	345	571	728
Effingham	20%	30%	45%	30%	40%	65%	21	28	46
Wilcox	0%	0%	5%	5%	25%	35%	101	503	742
Turner	0%	2%	5%	0%	20%	30%	0	259	395
Thomas	0%	5%	10%	0%	15%	25%	0	665	1,117
Pulaski	0%	0%	5%	0%	15%	25%	0	298	524
Bleckley	0%	0%	5%	0%	15%	25%	0	111	204
Colquitt	0%	0%	5%	0%	10%	20%	0	235	523
Wilkes	0%	0%	5%	0%	10%	15%	0	19	29
Lincoln	0%	0%	5%	0%	10%	15%	0	2	3
Grady	0%	0%	0%	0%	5%	10%	0	188	375
Worth	0%	0%	0%	0%	5%	10%	0	50	99
Twiggs	0%	0%	0%	0%	5%	10%	0	12	25
Baldwin	0%	0%	0%	0%	5%	10%	0	5	9

[1] Counties not listed in Table 3 had either no predicted damage to pecans or contain no mapped pecan orchards.

Table 4. Florida County-Level Percent Affected (by both Age Categories) and Resulting Affected Acreage by Severity Scenario

County[1]	% Affected (≤10 yrs old)			% Affected (>10 years old)			Affected Acreage		
	Low	Pred	High	Low	Pred	High	Low	Pred	High
Suwannee	60%	75%	90%	75%	90%	95%	477	573	604
Columbia	60%	75%	90%	75%	90%	95%	182	221	243
Madison	60%	75%	90%	75%	90%	95%	176	211	225
Gilchrist	65%	75%	90%	75%	90%	95%	62	74	78
Hamilton	65%	75%	90%	75%	90%	95%	48	56	65
Lafayette	60%	75%	90%	75%	90%	95%	3	4	4
Taylor	60%	75%	90%	75%	90%	95%	3	3	3
Jefferson	20%	30%	40%	50%	75%	85%	905	1,357	1,540
Levy	40%	50%	65%	55%	75%	85%	15	20	23
Union	30%	35%	50%	55%	70%	85%	114	145	176
Alachua	30%	40%	60%	55%	60%	75%	536	585	731
Bradford	20%	30%	40%	40%	55%	70%	87	120	153
Baker	20%	30%	40%	40%	55%	70%	13	18	23
Putnam	10%	20%	30%	20%	30%	50%	22	33	56
Leon	0%	5%	10%	0%	15%	25%	-	8	13
Duval	0%	0%	0%	0%	10%	20%	-	5	10
Nassau	0%	0%	0%	0%	10%	20%	-	4	9
Clay	0%	0%	0%	0%	10%	20%	-	2	4
Marion	0%	0%	0%	0%	5%	10%	-	1	2

[1] Counties not listed in Table 4 had either no predicted damage to pecans or contain no mapped pecan orchards.

PREDICTED YIELD LOSS

Land IQ estimates that following Hurricane Helene, between 70% and 79% of the predicted 2024 pecan yield remains potentially harvestable in the state of Georgia. In Florida, between 48% and 66% of the predicted 2024 pecan yield remains potentially harvestable (Table 5). These calculations use the mapped acreage, age of each orchard and adjusted pecan yield by age prediction tables to find the proportion of statewide yield that is located within pecan orchards with less than 20% tree loss. The yield lost in orchards which had some tree loss, but that did not exceed 20%, is not considered in this estimate.

Table 5 shows the estimate of 2024 pecan yield in Georgia and Florida remaining potentially harvestable for each of three severity scenarios. Note that as the severity scenario increases, the proportion of 2024 pecan yield remaining potentially harvestable decreases due to increasing affected acreage.

Table 5. Percentage of Predicted Pecan Yield Remaining Harvestable for 2024 by Severity Scenario

State	Percent of 2024 Pecan Yield Still Harvestable		
	Low	Pred	High
Georgia	79%	73%	70%
Florida	66%	55%	48%

Before the arrival of Hurricane Helene, the 2024 total pecan yield for the state of Georgia was estimated at up to 130 million pounds (Wells, 2024c). From 2021 to 2023, Georgia pecan yields ranged between 90 and 130 million pounds (USDA, 2024). Taking the average of this range (110 million pounds) and applying the predicted yield loss estimates, the range of total pecan yield remaining potentially harvestable in 2024 would be 77 to 87 million pounds (A yield loss of 23 to 33 million pounds). If the most optimistic report of nearly 130 million pounds were correct for the 2024 Georgia pecan yield, this would leave approximately 91 to 103 million pounds remaining for harvest (a yield loss of 27 to 39 million pounds).

Estimates for total pecan yield in Florida are scarce. USDA most recently reported pecan acreage and yield for Florida in 2015. The three most recent statewide yields for Florida were 700,000, 100,000, and 900,000 pounds in 2013, 2014, and 2015, respectively (Florida Department of Agriculture and Consumer Services, 2024). Using an average of the last three reported years (570,000 pounds), the range of total pecan yield remaining potentially harvestable in 2024 would be 276,000 to 374,000 pounds (a yield loss of 196,000 to 294,000 pounds).

CONCLUSIONS

Utilizing an existing orchard-level spatial dataset of improved pecans in Georgia and Florida along with meteorological data and initial damage reports, Land IQ has produced a preliminary estimate of pecan acreage and yield affected by Hurricane Helene. The total estimated affected acreage for both Georgia and Florida ranges between 44,151 and 66,077 acres.

A subsequent investigation using high-resolution imagery will estimate the proportion of downed trees on an orchard level, narrowing and refining this initial estimate, and providing a measure of the long-term effects on production that can be expected in subsequent harvests.

REFERENCES

College of Agricultural & Environmental Sciences, University of Georgia. 2024. UGA Weather Network. Available at https://georgiaweather.net (verified 25 October 2024).

Florida Department of Agriculture and Consumer Services. 2024. Florida Agriculture by the Numbers 2022. Available at https://ccmedia.fdacs.gov/content/download/114369/file/Florida-Ag-by-the-Numbers-2022-Final.pdf (verified 25 October 2024).

Nesbitt, M. and L. Wells. 2007. Estimation of pecan tree value, p. 135-136. *In* Wells (ed.) Southeastern Pecan Growers Handbook. Univ. of Georgia Coop. Ext. Serv. Bulletin 1327.

NHC, 2024. NHC Data in GIS Formats. Available at https://www.nhc.noaa.gov/gis/. (verified 25 October 2024).

NOAA, 2021. The Saffir-Simpson Hurricane Wind Scale. Available at https://www.nhc.noaa.gov/pdf/sshws.pdf (verified 25 October 2024).

NOAA, 2023. Learning Lesson: Quadraphonic Wind. Available at https://www.noaa.gov/jetstream/tc-tcm/learning-lesson-quadraphonic-wind (verified 25 October 2024).

NOAA, 2024a. NHC Data in GIS Formats. Available at https://www.nhc.noaa.gov/gis/ (verified 25 October 2024).

NOAA, 2024b. Beaufort Wind Scale. Available at https://www.weather.gov/mfl/beaufort (verified 25 October 2024).

NWS, 2018. Catastrophic Hurricane Michael Strikes Florida Panhandle October 10, 2018. Available at https://www.weather.gov/tae/hurricanemichael2018 (verified 25 October 2024).

Powell, E. 2024. Hurricane Helene Post-Storm Summary Report. Available at https://climatecenter.fsu.edu/images/docs/Hurricane-Helene-Summary-Report.pdf (verified 25 October 2024).

Reighard, G. L., Parker, M. L., Krewer, G. W., Beckman, T. G., Wood, B. W., Smith, J. E., and Whiddon, J. 2001. Impact of Hurricanes on Peach and Pecan Orchards in the Southeastern United States. HortScience, 36(2), 250-252. Available at https://doi.org/10.21273/HORTSCI.36.2.250 (verified 25 October 2024).

Sawyer, A. 2024. Southeast Georgia Pecan Damage from Hurricane Helene. Available at https://site.extension.uga.edu/pecan/2024/10/southeast-georgia-pecan-damage-from-hurricane-helene/ (verified 25 October 2024).

USDA. 2024. Pecan Production (January 2024). Available at https://downloads.usda.library.cornell.edu/usda-esmis/files/5425kg32f/nv936p236/00001m546/pecnpr24.pdf (verified 25 October 2024).

VideoFromSpace. 2024. Category 4 Hurricane Helene makes landfall and barrels north in satellite time-lapse [Video]. YouTube. https://www.youtube.com/watch?v=czfSn2U4Nll (verified 25 October 2024).

Wells, L. 2024a. Preliminary Information on Hurricane Helene's Effect on Georgia Pecans. Available at https://site.extension.uga.edu/pecan/2024/09/preliminary-information-on-hurricane-helenes-effect-on-georgia-pecans/ (verified 25 October 2024).

Wells, L. 2024b. Update on Hurricane Helene Impact on Georgia Pecans. Available at https://site.extension.uga.edu/pecan/2024/10/update-on-hurricane-helene-impact-on-georgia-pecans/ (verified 25 October 2024).

Wells, L. 2024c. Mid-Season Status of Georgia Pecan Crop. Available at https://site.extension.uga.edu/pecan/2024/06/mid-season-status-of-georgia-pecan-crop/ (verified 25 October 2024)