

2026 Mast Survey Report
Kentucky Department of Fish and Wildlife Resources
Jimmy Woods, Trey Prather, and Zak Danks
21 October 2026

Summary of Key Findings

This year's mast survey indicated generally poor mast production. Statewide, Red Oak production rated Poor, while Hickory and American Beech production rated as Failures. The exception was White Oak production, which rated Good statewide. Mast production in the western region of the state appeared slightly better than the eastern Appalachian/Cumberland region, but the difference was not significant statistically. Compared with the 2017–2025 average, only White Oak production increased; Red Oak, Hickory, and Beech production declined significantly. These results signal limited hard-mast availability for wildlife this fall and winter.

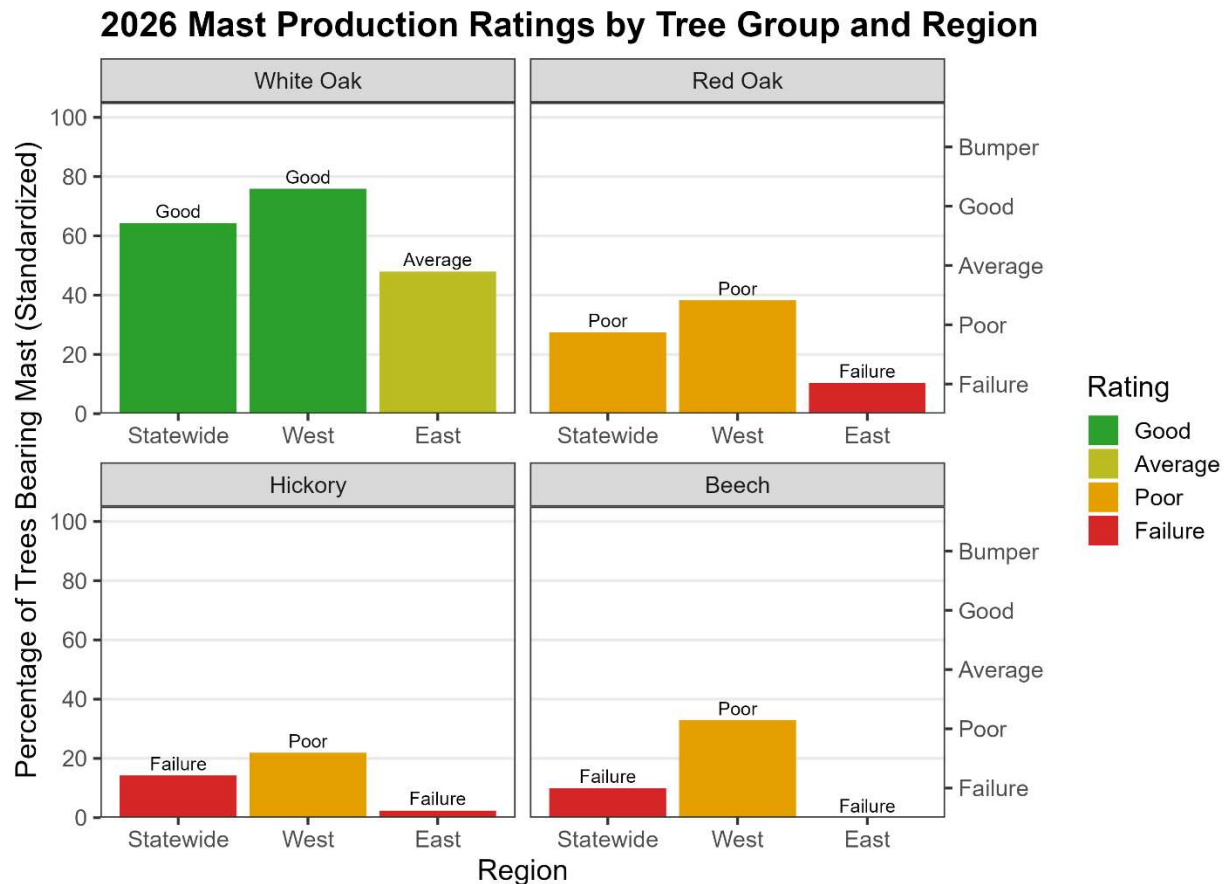


Figure 1. Mast production ratings from the 2026 KDFWR mast survey. Panels show findings for each of four tree groups. Bars within panels show statewide and regional averages. Left vertical axis shows the percentage of trees bearing mast, standardized across years. Right vertical axis shows ratings based on the percentages.

2026 Mast Production Ratings by Site and Tree Group

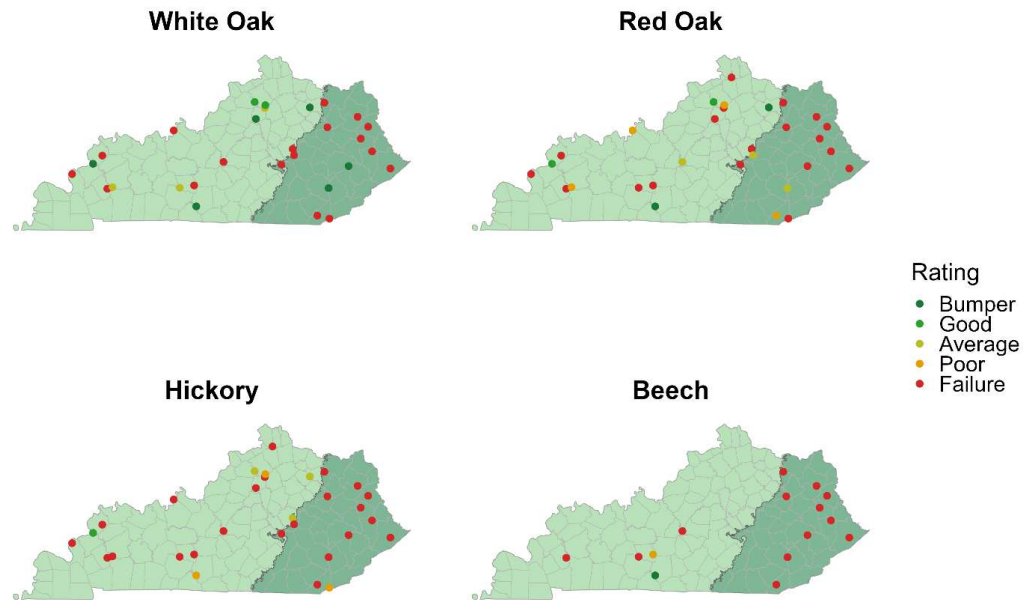


Figure 2. Mast production ratings by survey site from the 2026 KDFWR mast survey.

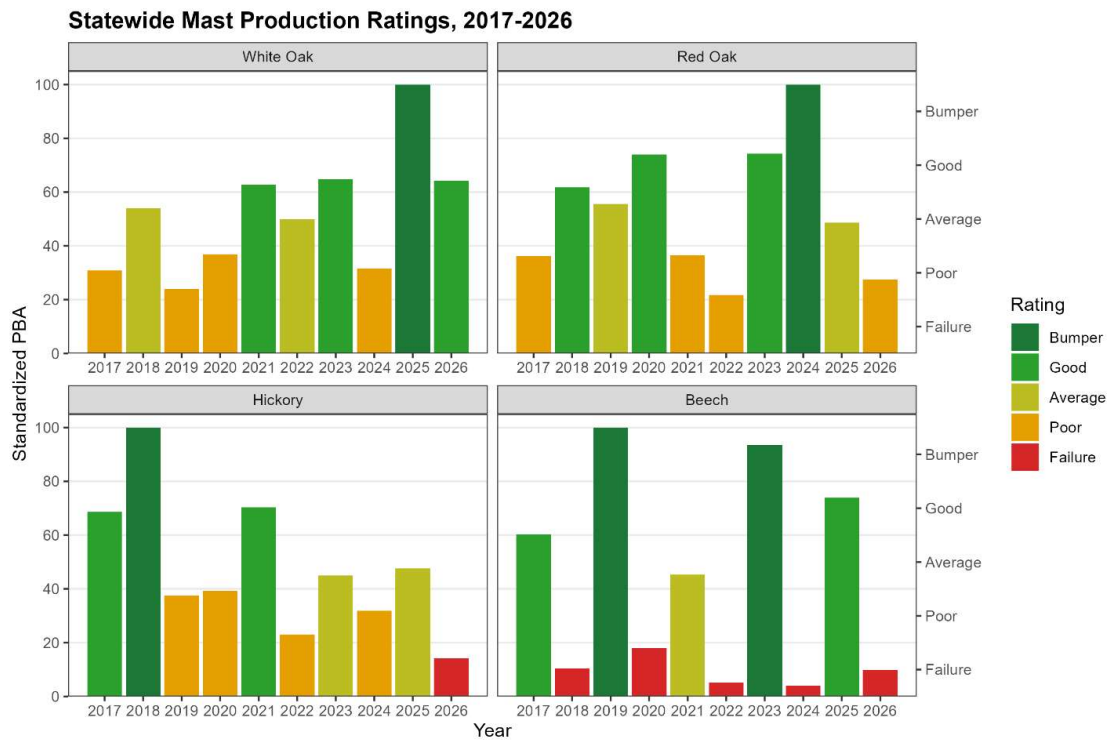


Figure 3. Mast production trends over the past ten years, 2017-2026. Panels show findings for each of four tree groups. Bars within panels show annual statewide ratings.

Introduction

Mast refers to the fruit of woody vegetation. Hard mast includes nuts like acorns, hickory nuts, beechnuts, walnuts, hazelnuts, and chestnuts. Soft mast includes wild grapes, dogwood berries, serviceberries, and persimmons, among others. Both hard and soft mast foods are important to wildlife, but hard mast availability in fall and winter is of primary concern for wildlife managers due to its influence on the movements, body condition, and population dynamics of many species. Deer, wild turkey, squirrels, and black bears all rely heavily on hard mast during this period: acorns can dominate deer foraging time during mast fall, and deer may shift home ranges to incorporate acorn-producing stands (McShea and Schwede 1993), while seasonal oak masting directly shapes feeding behavior in white-tailed deer and gray squirrels (Lashley et al. 2024). Acorns also comprise a large portion of the autumn diet of black bears (Kluge et al. 2024).

Hard mast production varies from year to year and place to place. Although scientists don't fully understand why (e.g., weather or other factors), measuring the hard mast crop may help predict wildlife behavior. Hard mast conditions estimated from surveys have been strongly related to black bear gun harvests (Ryan et al. 2004). For wild turkeys, fall harvest rates have been shown to increase in years of below-average acorn production, as turkeys concentrate on remaining food sources (Norman and Steffen 2003).

For many years, the Kentucky Department of Fish and Wildlife Resources has conducted an annual survey of oak, hickory, and American beech trees. Since 2007, the survey has followed a rapid hard-mast index method backed by scientific research (Greenberg and Warburton 2007). This report summarizes 2026 mast conditions across the Commonwealth compared to the past 10 years (2017–2026). Mast ratings are provided for 4 tree species groups (the white oak group, the red oak group, hickories, and American beech).

Methods

Mast surveys are conducted across the state by KDFWR biologists and partners from other organizations. The survey data set includes 26 different species (Appendix), each of which falls within 1 of the 4 tree groups. Surveyors scan the crown of each survey tree for 30 seconds, then estimate the percentage of its crown area bearing mast (PCA).

We tally up trees with a PCA value of at least 33.5% to determine the percentage of trees bearing any mast (PBA). We scale PBA averages observed each year by the maximum PBA observed during all years, producing a standardized PBA value. Then we group the standardized PBA values into the following rating categories, serving as a main takeaway for readers: Failure (0-19%), Poor (20-39%), Average (40-59%), Good (60-79%), and Bumper (80-100%).

Finally, we examine the precision of our mast production estimates with statistical models; these provide probability intervals around the averages, providing a measure of precision or confidence. The models account for the hierarchical structure of the data; trees at a given site

are related to each other more than they are to trees at other sites, and such spatial dependence can affect statistical inferences we make from data.

Results

2026

This year, a total of 2,482 trees were surveyed across 30 sites (Figure 4). Figure 1 (on page 1) shows this year's mast production ratings by tree group for the state overall and for the two survey regions, West and East. Table 1 below lists the number of sites and trees surveyed, along with observed PBA values and subsequent ratings for each tree group at statewide and regional scales. Figure 2 shows mast ratings for each site, symbolized with the same 5-category Rating color scale as Figure 1. The site-level mast ratings are presented in list form in Table 2.

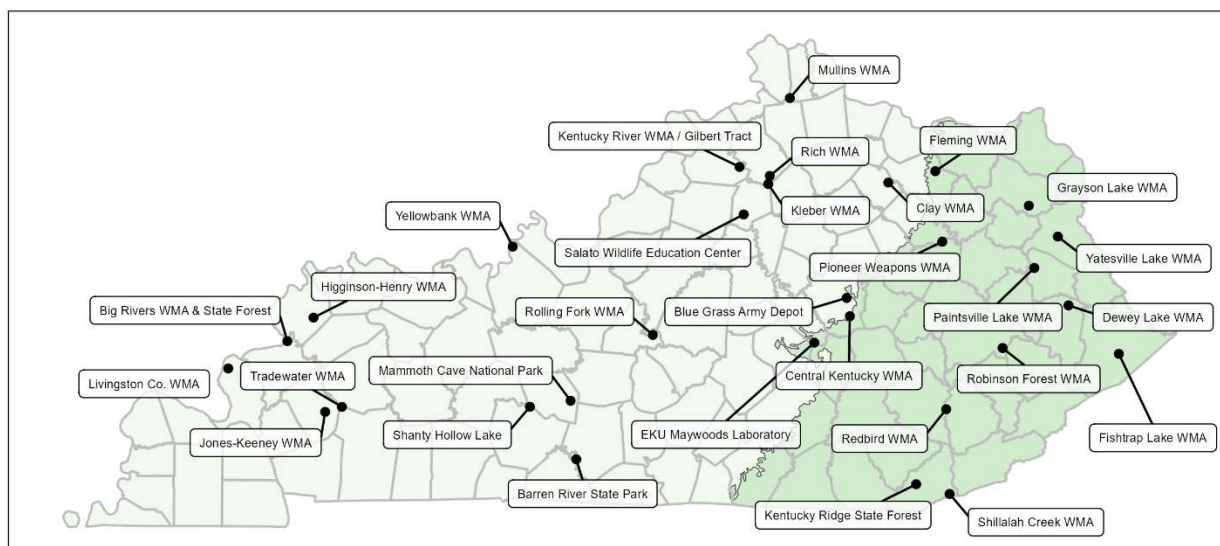


Figure 4. Sites surveyed in the 2026 KDFWR mast survey.

Table 1. Summary of statewide and regional mast production metrics from the 2026 KDFWR mast survey.

Tree Group	Region	# Sites	# Trees	% of Trees Bearing Mast ^a	Standardized % of Trees Bearing Mast ^b	Mast Production Rating ^c
White Oak	Statewide	29	692	13.4	64.3	Good
	West	17	403	15.9	75.9	Good
	East	12	289	10.0	48.0	Average

Tree Group	Region	# Sites	# Trees	% of Trees Bearing Mast ^a	Standardized % of Trees Bearing Mast ^b	Mast Production Rating ^c
Red Oak	Statewide	30	718	14.1	27.4	Poor
	West	18	438	19.6	38.2	Poor
	East	12	280	5.4	10.4	Failure
Hickory	Statewide	30	692	4.2	14.2	Failure
	West	18	416	6.5	21.9	Poor
	East	12	276	0.7	2.4	Failure
Beech	Statewide	15	318	5.0	9.9	Failure
	West	5	96	16.7	32.8	Poor
	East	10	222	0.0	0.0	Failure

^aThe percentage of trees bearing any mast (PBA), defined as trees with a percent crown area bearing mast (PCA) of at least 33.5% (Greenberg and Warburton 2007).

^bStandardized PBA = (PBA/PBAm_{max}) x 100; i.e., scaling PBA by the historical (2017-2026) statewide maximum.

^cSubjective rating based on Standardized PBA: Failure (0-19%), Poor (20-39%), Average (40-59%), Good (60-79%), Bumper (80-100%).

Table 2. Site-level mast production ratings from the 2026 KDFWR mast survey.

Region	Site	White Oak	Red Oak	Hickory	Beech
West	Barren River State Park	Bumper	Bumper	Poor	Bumper
	Big Rivers WMA & State Forest	Bumper	Good	Good	
	Blue Grass Army Depot	Failure	Failure	Average	
	Central Kentucky WMA	Failure	Average	Failure	
	Clay WMA	Bumper	Bumper	Average	
	Higginson-Henry WMA	Failure	Failure	Failure	
	Jones-Keeney WMA	Failure	Failure	Failure	Failure

Region	Site	White Oak	Red Oak	Hickory	Beech
East	Kentucky River WMA / Gilbert Tract	Good	Good	Average	
	Kleber WMA	Average	Failure	Failure	
	Livingston Co. WMA	Failure	Failure	Failure	
	Mammoth Cave National Park	Failure	Failure	Failure	Poor
	Mullins WMA		Failure	Failure	
	Rich WMA	Good	Poor	Poor	
	Rolling Fork WMA	Failure	Average	Failure	Failure
	Salato Wildlife Education Center	Bumper	Failure	Failure	
	Shanty Hollow Lake	Average	Failure	Failure	Failure
	Tradewater WMA	Average	Poor	Failure	
	Yellowbank WMA	Failure	Poor	Failure	
	Dewey Lake WMA	Failure	Failure	Failure	Failure
	EKU Maywoods Laboratory	Failure	Failure	Failure	
	Fishtrap Lake WMA	Failure	Failure	Failure	Failure
	Fleming WMA	Failure	Failure	Failure	Failure
	Grayson Lake WMA	Failure	Failure	Failure	Failure
	Kentucky Ridge State Forest	Failure	Poor	Failure	Failure
	Paintsville Lake WMA	Failure	Failure	Failure	Failure
	Pioneer Weapons WMA	Failure	Failure	Failure	Failure
	Redbird WMA	Bumper	Average	Failure	Failure
	Robinson Forest WMA	Bumper	Failure	Failure	Failure
	Shillalah Creek WMA	Failure	Failure	Poor	
	Yatesville Lake WMA	Failure	Failure	Failure	Failure

Mast ratings through time

Figure 3 on page 2 shows the past decade (2017-2026) of statewide mast production ratings by tree group. Table 3 lists this information in tabular form, showing observed PBA, standardized PBA, and rating, with years sorted from greatest to least production based on the standardized PBA for each tree group.

Table 3. Annual mast production by tree group for 2017-2026 KDFWR mast surveys. Rows within each tree group are years sorted from greatest to least production (Standardized PBA).

Tree Group	Year	N	PBA (%)	Standardized PBA	Rating
White Oak	2025	813	20.9	100.0	Bumper
	2023	782	13.6	64.8	Good
	2026	692	13.4	64.3	Good
	2021	915	13.1	62.7	Good
	2018	930	11.3	54.0	Average
	2022	1,018	10.4	49.8	Average
	2020	973	7.7	36.9	Poor
	2024	817	6.6	31.6	Poor
	2017	761	6.4	30.8	Poor
	2019	979	5.0	23.9	Poor
Red Oak	2024	813	51.4	100.0	Bumper
	2023	777	38.2	74.3	Good
	2020	1,001	38.1	74.0	Good
	2018	938	31.8	61.8	Good
	2019	1,018	28.6	55.6	Average
	2025	820	25.0	48.6	Average
	2021	966	18.8	36.6	Poor
	2017	766	18.7	36.3	Poor
	2026	718	14.1	27.4	Poor

Tree Group	Year	N	PBA (%)	Standardized PBA	Rating
Hickory	2022	1,027	11.2	21.8	Poor
	2018	916	29.6	100.0	Bumper
	2021	928	20.8	70.3	Good
	2017	768	20.3	68.7	Good
	2025	810	14.1	47.6	Average
	2023	788	13.3	45.0	Average
	2020	965	11.6	39.2	Poor
	2019	945	11.1	37.6	Poor
	2024	838	9.4	31.9	Poor
	2022	1,012	6.8	23.0	Poor
Beech	2026	692	4.2	14.2	Failure
	2019	514	50.8	100.0	Bumper
	2023	398	47.5	93.5	Bumper
	2025	381	37.5	73.9	Good
	2017	454	30.6	60.3	Good
	2021	435	23.0	45.3	Average
	2020	529	9.1	17.9	Failure
	2018	529	5.3	10.4	Failure
	2026	318	5.0	9.9	Failure
	2022	463	2.6	5.1	Failure
	2024	341	2.1	4.0	Failure

Modeling to quantify uncertainty and borrow strength

Table 4 and Figure 5 and 6 show current-year mast metrics (PBA and PCA) estimated from statistical models. The values in parentheses are uncertainty intervals representing a range of plausible values consistent with the data and the model assumptions (technically, they are 90th percentile credible intervals of Bayesian posterior distributions). They show how precisely we

estimated PCA and PBA from the data. Another useful feature of the models is “borrowing strength” or partial pooling (Kéry and Kellner 2024). Some tree group/region combinations have relatively few surveyed trees – for example, beech in the East showed 0% of trees bearing mast this year (Table 1), which is unrealistic. The models address this by pulling estimates gently toward an overall pattern based on the amount of data available: small samples pulled more than larger samples. The resulting estimates are more biologically plausible yet still reflect each region’s own data. For beech in the East, partial pooling raises the estimate from 0 to about 3.7% (Table 4, Figure 5).

Table 4. Model-estimated percent crown area with mast (PCA) and percent of trees bearing mast (PBA) in 2026. Modeling accounted for the multilevel structure of the data: trees within sites, sites within regions. Estimates are means and 90% percentile intervals of posterior distributions from a multilevel logistic regression model.

Tree Group	Region	# Trees	Estimated PCA	Estimated PBA	Rating
White Oak	Statewide	692	11.5 (10.8-12.2)	13.4 (11.5-15.4)	Good
	West	403	12.0 (11.2-12.7)	16.0 (13.8-18.2)	Good
	East	289	10.8 (10.0-11.6)	9.9 (8.1-11.7)	Average
Red Oak	Statewide	718	17.4 (16.4-18.4)	14.1 (12.2-16.1)	Poor
	West	438	18.6 (17.5-19.7)	17.0 (14.8-19.3)	Poor
	East	280	15.6 (14.6-16.7)	9.5 (7.9-11.2)	Failure
Hickory	Statewide	692	10.8 (9.9-11.6)	4.3 (3.2-5.5)	Failure
	West	416	11.3 (10.4-12.2)	4.7 (3.5-6.0)	Failure
	East	276	10.0 (9.1-10.9)	3.6 (2.6-4.8)	Failure
Beech	Statewide	318	13.7 (11.9-15.7)	5.2 (3.5-7.2)	Failure
	West	96	12.2 (10.5-14.1)	8.6 (5.8-11.7)	Failure
	East	222	14.4 (12.3-16.6)	3.7 (2.4-5.4)	Failure

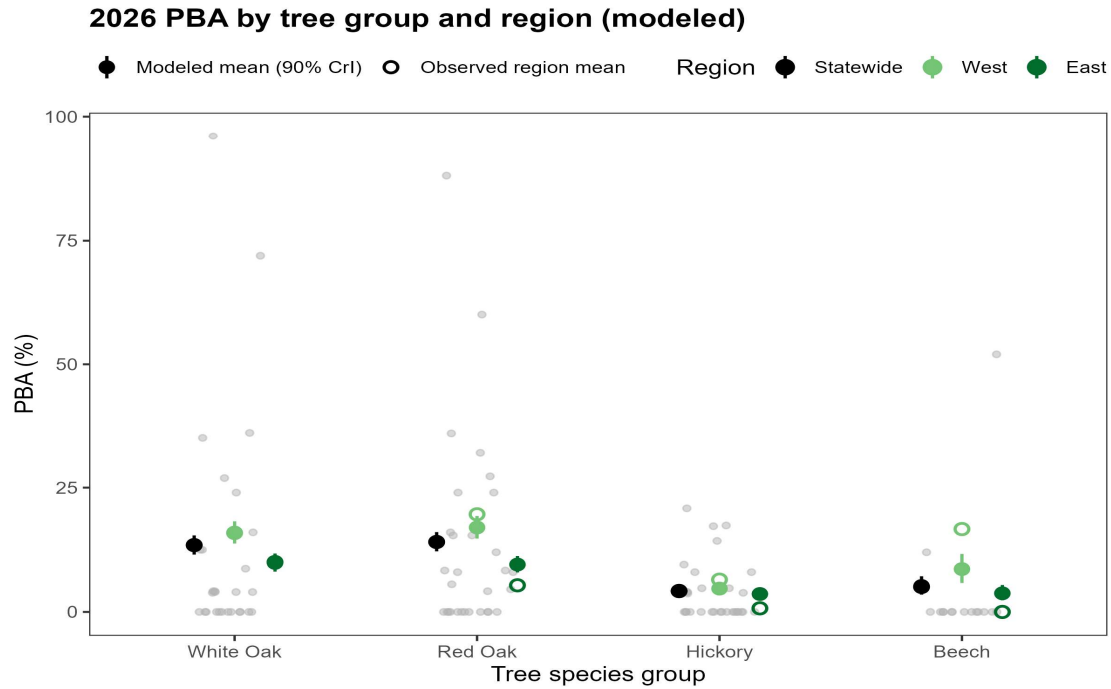


Figure 5. Model-estimated percent of trees bearing mast (PBA): posterior mean (filled circles with 90% credible intervals), observed region mean (hollow circles), observed site means (gray dots).

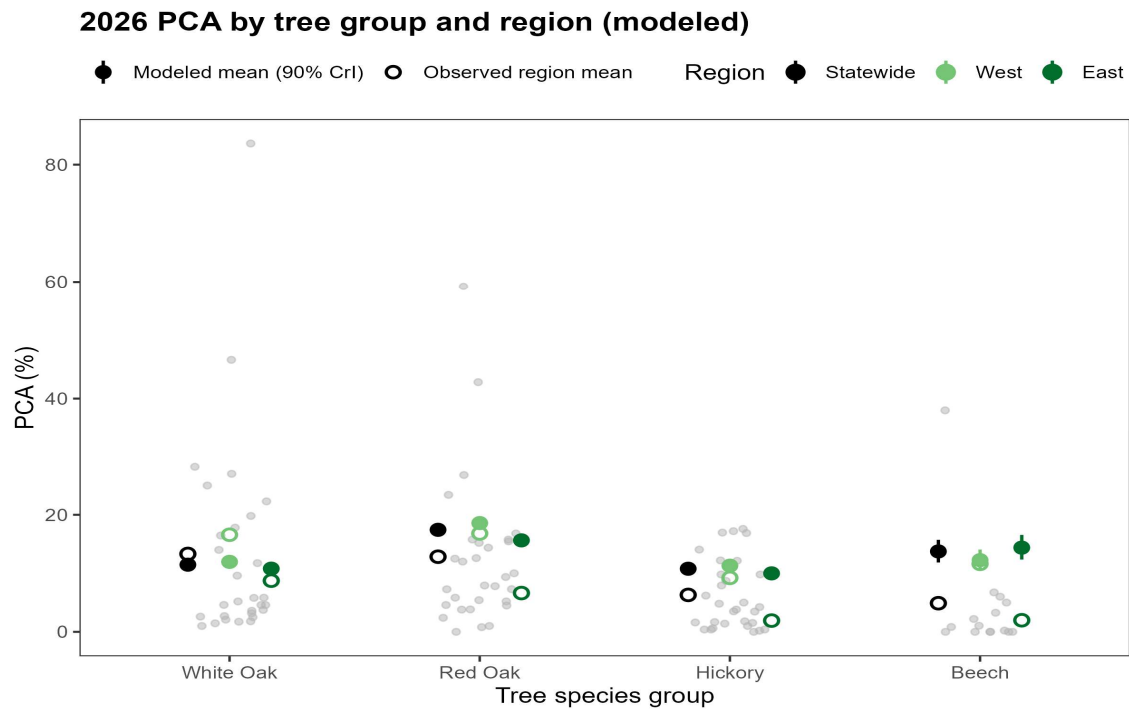


Figure 6. Model-estimate percent of crown area with mast (PCA): posterior mean (filled circles with 90% credible intervals), observed region mean (hollow circles), observed site means (gray dots).

Acknowledgments

We sincerely thank the many KDFWR staff and partners who conducted this year's mast survey, along with hunters who funded our work through the purchase of licenses and the matching federal funding via the Wildlife Restoration Program.

Literature Cited

Greenberg, C. H., and G. S. Warburton. 2007. A rapid hard-mast index from acorn presence-absence tallies. *Journal of Wildlife Management* 71:1654–1661.

Kéry, M., and K. F. Kellner. 2024. *Applied statistical modelling for ecologists*. Elsevier.

Kluge, C. M., et al. 2024. Harvest management and mast abundance affect black bear harvest demographics in the United States. *Journal of Wildlife Management* 89:e22710.

Lashley, K. M., et al. 2024. Intra-annual variation in oak masting affects wildlife feeding behavior. *Current Zoology* 71:79–88.

McShea, W. J., and G. Schwede. 1993. Variable acorn crops: responses of white-tailed deer and other mast consumers. *Journal of Mammalogy* 74:999–1006.

Norman, G. W., and D. E. Steffen. 2003. Effects of recruitment, oak mast, and fall-season format on wild turkey harvest rates in Virginia. *Wildlife Society Bulletin* 70:1147–1154.

Ryan, C. W., J. Pack, W. K. Igo, A. Rieffenberger, and B. Billings. 2004. Relationship of mast production to big-game harvests in West Virginia. *Wildlife Society Bulletin* 32:786–794.

Appendix. Common and scientific names of all tree species recorded in the 2017-2026 mast survey dataset.

Common Name	Scientific Name	Common Name	Scientific Name
American Beech	<i>Fagus grandifolia</i>	Pignut Hickory	<i>Carya glabra</i>
Bitternut Hickory	<i>Carya cordiformis</i>	Pin Oak	<i>Quercus palustris</i>
Black Oak	<i>Quercus velutina</i>	Post Oak	<i>Quercus stellata</i>
Black Walnut	<i>Juglans nigra</i>	Scarlet Oak	<i>Quercus coccinea</i>
Blackjack Oak	<i>Quercus marilandica</i>	Shagbark Hickory	<i>Carya ovata</i>
Cherrybark Oak	<i>Quercus pagoda</i>	Shellbark Hickory	<i>Carya laciniosa</i>
Chestnut Oak	<i>Quercus montana</i>	Shingle Oak	<i>Quercus imbricaria</i>
Chinkapin Oak	<i>Quercus muehlenbergii</i>	Shumard Oak	<i>Quercus shumardii</i>
Mockernut Hickory	<i>Carya tomentosa</i>	Southern Red Oak	<i>Quercus falcata</i>
Northern Red Oak	<i>Quercus rubra</i>	Swamp Chestnut Oak	<i>Quercus michauxii</i>
Nuttall Oak	<i>Quercus texana</i>	Swamp White Oak	<i>Quercus bicolor</i>
Overcup Oak	<i>Quercus lyrata</i>	White Oak	<i>Quercus alba</i>

