



2022 DWR Acorn Production Report:

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Acorn production across the state in 2022 can be categorized overall as average to above average for white oak and below average to poor for red oak species (Figures 1-4). Based on the annual hard mast survey, white oak routes came in above the long term survey average for the first time in 4 years while red oaks stayed below average for the second year in a row. As with all years, acorn production is highly variable and very site dependent. Many routes had areas of “bumper” mast production even if their overall site average was below average. Red oak was generally poor across all sites and elevations this year with very limited pockets of average production. Conversely, white oak production was above average primarily in the Piedmont region and in lower elevations of mountain routes. While acorn production is variable from year to year for many reasons (weather, insects, tree species), for some of our survey sites we are probably approaching the biological end of production due to tree age. Unfortunately, finding “new” stands of mature oak in the 50-70 year age range is becoming more and more difficult due to aging forests and lack of sufficient regeneration. Replacing aging trees/survey sites could be quite a challenge moving forward.

The annual hard mast survey has been an ongoing effort between the VA Department of Wildlife Resources and many partner agencies for many years. Many of the mountain survey sites have been in place since the 1950s. In 2022, staff from VA Department of Wildlife Resources, US Forest Service, US Fish and Wildlife Service, DCR-VA State Parks, VA Department of Forestry, US Department of Defense/Department of Military Affairs, National Park Service, and Smithsonian Conservation Biology Institute surveyed 31 hard mast production sites across Virginia. Sites are located across all regions of the state, although a majority are currently found in the mountains. Continued efforts are being made to add sites to the Northern Piedmont and Tidewater areas.

Production by Region: White Oak (Appendix 1)

- **Mountains:** White oak production across most of the mountain region (17 survey sites) was above average. The North Mountain region averaged well above the long term median with excellent production found at several sites, across all elevations. The southern and central mountain routes had pockets of above average production and overall came in just above the long term average. Oak regeneration is a serious conservation issue in all of these areas and ongoing habitat management efforts have been underway by DWR and partner agencies to enhance areas with significant oak decline.
- **Piedmont:** White oak production across the Piedmont (11 sites) varied, but was highest in the Central and Southern Piedmont with an average PCA (percent crowns with acorns) of 32% and 30% respectively (well above the long term median of 10.8%). The northern Piedmont was just shy of the long term median at 10%. Anecdotal reports of “bumper” white oak trees have been received from throughout the Piedmont region this fall. These may be worth looking into, especially during the archery season!
- **Tidewater:** The Tidewater area has our lowest sample size with 3 sites. In 2022, 2 out of the 3 sites came in above the long term median (17% and 12%) while one site fell just shy (9%). This was a significant rebound though over the extremely poor productivity in 2021 (2% PCA). With low sample numbers it’s hard to make any hard and fast conclusions about acorn production in



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this area, but anecdotal reports of sites with good hard mast production have come in from this region throughout the late summer/early fall along with bumper crops of persimmons, crabapple, and other soft mast fruits.

Production by Region: Red Oak (Appendix 2)

- **Mountains:** Red oak production was sporadic across the mountain region with pockets of average production, particularly in the north and south mountain regions. The northern mountain region had the highest average of trees with positive acorn production, although all fell below the long term survey median (19.7%). Out of the 17 mountain sites, only one in the southern mountains came in above the median.
- **Piedmont:** Red oak production was below the long term median in all three Piedmont zones surveyed. Production across all sites trended lower than that found in the mountain region with very few reports of “bumper” crop trees. The Central Piedmont had the lowest average (7%) while the Northern and Southern Piedmont came in at 15% and 17% respectively.
- **Tidewater:** The Tidewater region averaged below the long term median, but did have 1 site with near average red oak production. The other Tidewater sites did report a few pockets of “good to fair” production in slightly drier soils.

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- Figure 1: Statewide white oak acorn production (average percent of tree crowns with acorns), presented as long term median (2007-2021) with 95% confidence intervals.
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- Figure 4: Statewide red oak acorn production (PCA) broken into categorical rankings based on 4 group cluster analysis with 95% confidence intervals.

Figure 1: Statewide white oak acorn production (average percent of tree crowns with acorns), presented as long term median (2007-2022) with 95% confidence intervals.

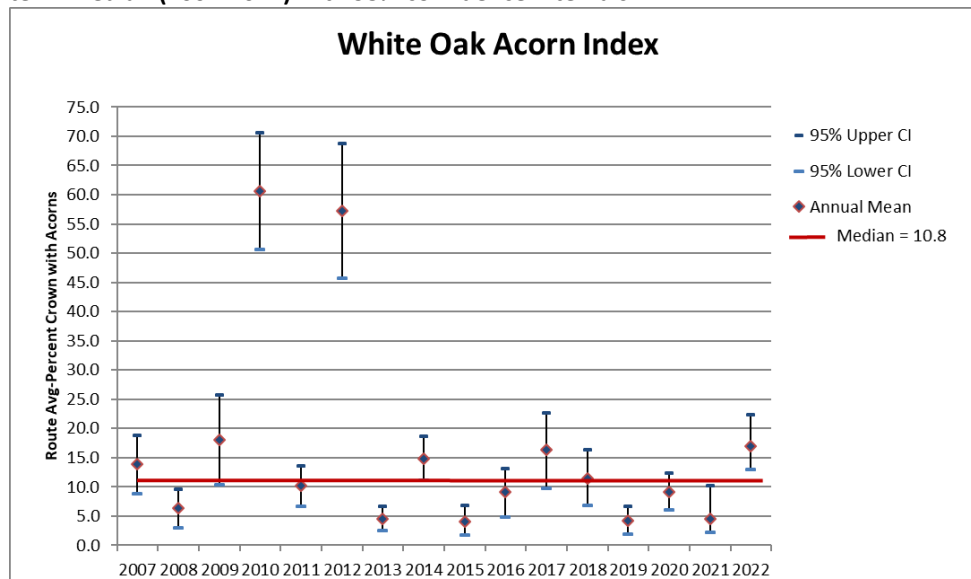




Figure 2: Statewide white oak acorn production (PCA) broken into categorical rankings based on 4 group cluster analysis with 95% confidence intervals.

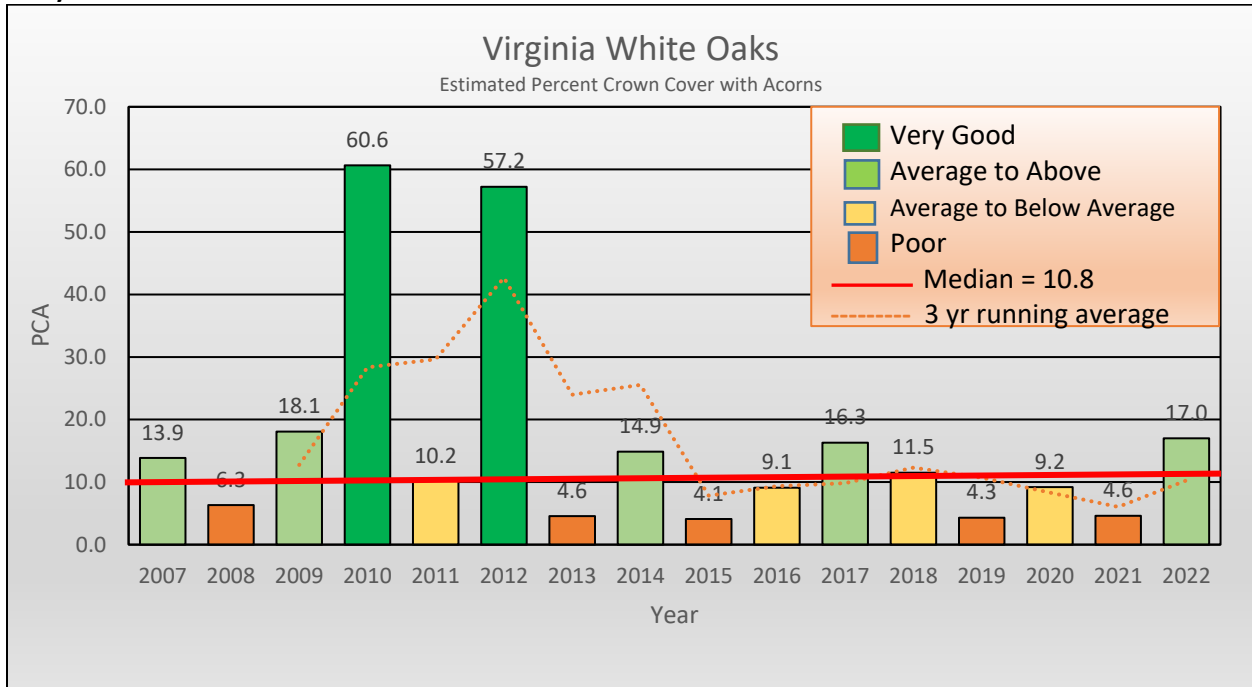
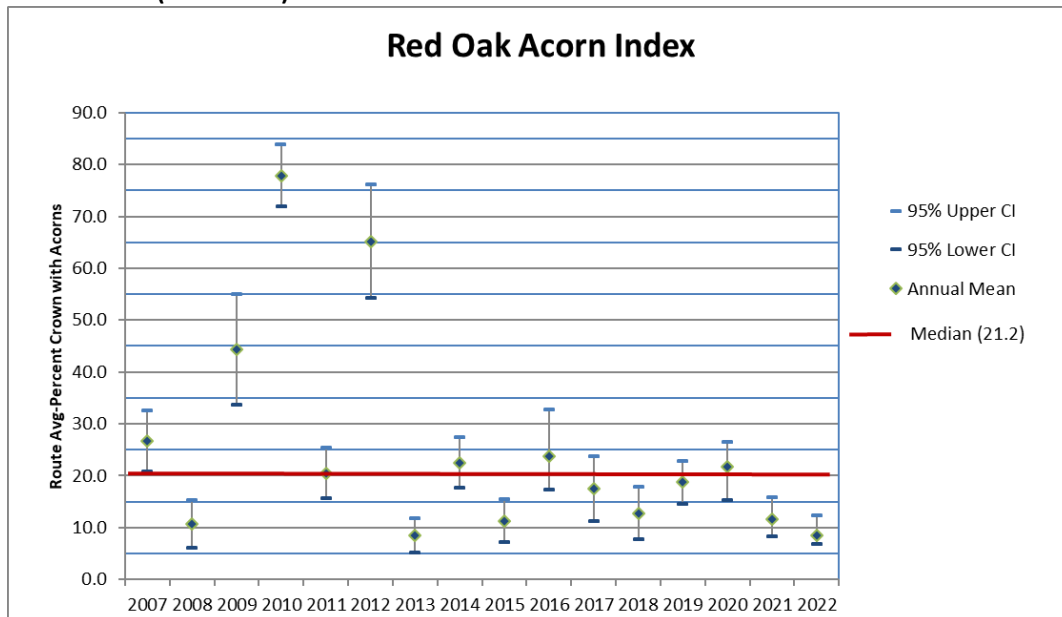


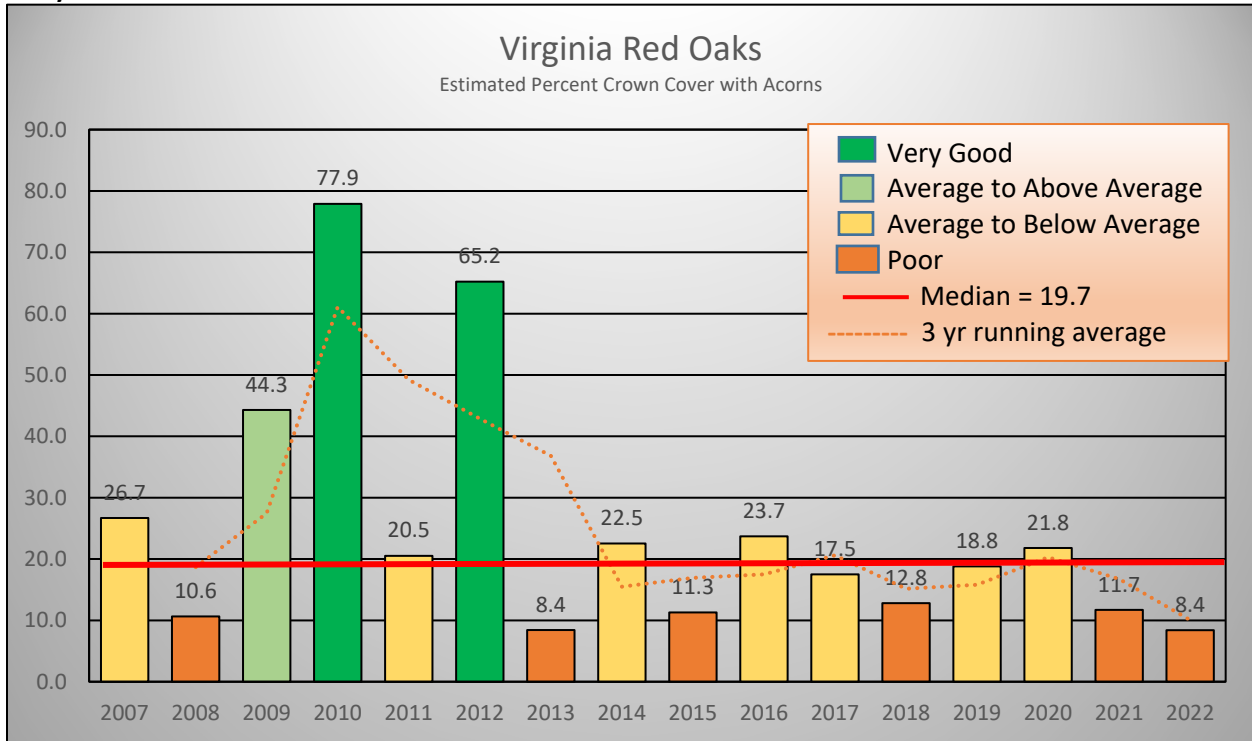
Figure 3: Statewide red oak acorn production (average percent of tree crowns with acorns), presented as long term median (2007-2022) with 95% confidence intervals.





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Figure 4: Statewide red oak acorn production (PCA) broken into categorical rankings based on 4 group cluster analysis with 95% confidence intervals.





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Appendix 1: Virginia Mast Survey Sites, White Oak PCA (2007-2022)

		White Oak PCA (Percent of Crown with Acorns)																	
Region	Site Number	Site Name	White Oak														2022	2027-22	
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020			2021
North Mt.	VA-1	Conservation Center	3	1	4	60	1	8	3	8	4	3	28	11	0	0	17	10	
North Mt.	VA-2	Shenandoah NP	40	11	44	56	2	33	4	25	8	2	35	4	1	0	4	12	
North Mt.	VA-3	Lee District	22		22	70	1	88				37	1	68		0	11	42	
North Mt.	VA-4	Rapidan WMA	1	1	17	57	1	37		18	0	12	5						
North Mountain Region			17	4	22	61	1	42	4	17	12	5	34	8	0	0	8	24	16
Central Mt.	VA-5	Deerfield RD	13	2	10	10	34	32	2		9	0					17	12	
Central Mt.	VA-6	Highland WMA	14	0	8		16	60	5	2	7	4	14		0	1	1	10	
Central Mt.	VA-7	Warm Springs RD	13		3	35	2	28	5	8	1	9	9	19	2	3	4	15	
Central Mt.	VA-8	Little North Mt WMA	5	9	18	20	11	18	0	2	8	1	15			1	9		
Central Mt.	VA-9	Gathright WMA	1	2	0	28	14	35	9	3	1	2	16		0	2	1	2	
Central Mt.	VA-10	James River RD	9	0	13	63	5	30	4	13	1	4	4	18	1	9	3	21	
Central Mt.	VA-13	Pedlar RD	2	3	0	38	11	70	1	11	6	3	14	3	1	6	1	20	
Central Mt.	VA-17	Glenwood RD	2	6	0	25	12	40	8	1	0	0	0	0	0	0	0	1	
Central Mountain Region			7	3	7	31	13	39	4	6	4	3	10	10	1	3	2	13	10
South Mt.	VA-18	New Castle	22	0	5	38	12	53	0	6	0	4	0	9	0	4	1	20	
South Mt.	VA-19	Stoney Creek - Giles Co	18	2	5	63	28	60	6	37	1	4	6	1	1	0	1	0	
South Mt.	VA-20	Dismal - Giles & Bland Co	10	5	10	63	18	25	7	19	0	1	2	4	0	1	0	6	
South Mt.	VA-24	Round Mt.	23	2	23	88	8	38	9	13	0	8	4	22	1	10	7	28	
South Mt.	VA-25	Clinch Mt. WMA	23	18	3	70	13	80	1	8	5	6	11	2	5	17	6	5	
South Mt.	VA-26	High Knob	10	2	0	70	0	73	0	9	0	18	3	1	2	1	2	4	
South Mt.	VA-27	Walker Mt.	28	2	25	83	2	80	3	26	1	3	1	1	4	3	2	21	
South Mt.	VA-28	Mt. Rogers NRA	28	0	0	73	21												
South Mt.	VA-31	Cumberland Gap NP	47	26	63	85	22	100	30	28	3			13	13	22	5	31	
South Mountain Region			23	6	15	70	14	64	7	18	1	6	4	7	3	7	3	14	16
N. Piedmont	VA-30	Quantico MCB	38	1	58	80	10	93	5	11	5	35		50	0	18	37	5	
N. Piedmont	VA-32	Ft. Belvoir							0	23	25	36	27	31	23	18	47	5	
N. Piedmont	VA-40	Oakley Forest WMA														11	5	21	
N. Piedmont	VA-41	Leesylvania State Park																2	
North Piedmont Region			38	1	58	80	10	93	3	17	15	36	27	41	12	16	30	10	30
C. Piedmont	VA-11	Hardware River WMA	0	21		100	2	90	4		3		50	1	0	6	7	20	
C. Piedmont	VA-14	James River WMA	1	1	60	20	5	20	1	14	3	1	32	9	0	19	3	19	
C. Piedmont	VA-15	Powhatan WMA	1	20		93	25	100	5	5	5								
C. Piedmont	VA-16	Horsepen WMA	0	21	7	47	5	87	7	8	0	6	30	14	6	16	3	40	
C. Piedmont	VA-29	Briery Creek WMA	7		25	95	5	93	6	13	4	22	15	8	15	20	13	41	
Central Piedmont Region			2	16	31	71	8	78	5	10	3	10	32	8	5	15	7	30	21
S. Piedmont	VA-22	White Oak Mt. WMA	15		20	70	8	33	6	39	0	26	11	20	16	19	4	30	
S. Piedmont	VA-23	Fairystone Farms WMA	6	2	45	98	1	98	5	22	0	21	32	16	15	20	1	22	
S. Piedmont	VA-36	Fort Pickett								15	0	22	23	11	8	19	5	44	
South Piedmont Region			11	2	33	84	5	66	6	25	0	23	19	17	13	19	3	32	22
S. Tidewater	VA-37	Southampton Correctional								1	0		1	4	1	13	1	17	
S. Tidewater	VA-38	Hog Island-Steward Tract											0	2	2	0	1	12	
S. Tidewater	VA-39	Big Woods WMA												26	3	26	5	9	
South Tidewater Region										1	0	1	11	2	13	2	13	5	
State			13.9	6.3	18.1	60.6	10.2	57.2	4.5	12.9	4.1	9.1	16.3	11.5	4.3	9.2	4.6	17.0	16.2





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Appendix 2: Virginia Mast Survey Sites, Red Oak PCA (2007-2022)

Red Oak PCA (Percent Crown Cover with Acorns)																			
Region	Number	Name	Red Oak														2007-22		
			2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		2021	2022
North Mt.	VA-1	Conservation Center	0	2	17	84	1	8	1	39	6	7	18	10	25	11	16	16	
North Mt.	VA-2	Shenandoah NP	23	19	24	64	16	32	5	22	13	5	30	5	8	1	6	14	18
North Mt.	VA-3	Lee District	11		33	95	7	80			25	41	48		29	16	5	17	34
North Mt.	VA-4	Rapidan WMA	15	4	8	57	18	87		18	10	5	12						23
North Mountain			12	8	21	75	11	52	3	26	14	15	27	8	21	9	6	16	20
Central Mt.	VA-5	Deerfield RD	15	2	56	65	9	18	2		0	3						3	19
Central Mt.	VA-6	Highland WMA	36	4			6	87	7	18	1	36	24		20	17	3		22
Central Mt.	VA-7	Warm Springs RD	39		18	85	11	45	11	43	2	53	67	10	27	43	20	6	32
Central Mt.	VA-8	Little North Mt WMA	49	10	15	75	33	85	5	24	1	25	14		15				29
Central Mt.	VA-9	Gathright WMA	24	10	28	83	31	43	3	10	1	12	16		6	8	3	2	19
Central Mt.	VA-10	James River RD	45	5	13	80	30	68	4	57	5	33	48	18	40	55	10	12	33
Central Mt.	VA-13	Pedlar RD	18	4	3	30	26	85	2	15	15	23	32	9	10	20	20	7	20
Central Mt.	VA-17	Glenwood RD	24	6	13	85	37	57	10	10	1	4	2	0	0	2	2	1	16
Central Mountain			31	6	21	72	23	61	6	25	3	24	29	9	17	23	10	5	23
South Mt.	VA-18	New Castle	15	8	63	88	11	65	2	3	0	43	8	0	3	27	1	3	21
South Mt.	VA-19	Stoney Creek - Giles Co.	16	27	50	74	4	83	13	21	4	28	9	0	17	22	4	0	23
South Mt.	VA-20	Dismal - Giles & Bland Co	16	48	78	68	13	38	5	10	30	45	21	0	16	21	1	1	26
South Mt.	VA-24	Round Mt.	21	32	68	93	12	100	18	8	17	38	24	0	13	38	20	9	32
South Mt.	VA-25	Clinch Mt. WMA	20	15	43	65	13	73	26	16	7	25	22	4	12	29	31	9	26
South Mt.	VA-26	High Knob	9	5	48	70	6	58	1	9	4	25	7	0	5	6	1	2	16
South Mt.	VA-27	Walker Mt.	8	5	35	93	24	73	13	23	5	34	20	2	21	40	40	23	29
South Mt.	VA-28	Mt. Rogers NRA	11	20	65	80	35												42
South Mt.	VA-31	Cumberland Gap NP	39	12	88	88	26	100	16	28	3		44	28	14	24	22	13	36
South Mountain			17	19	60	80	16	74	12	15	9	34	19	4	13	26	15	8	26
N. Piedmont	VA-30	Quantico MCB	36	9	78	75	21	88	2	15	12	24	19	44	19	40	16	11	32
N. Piedmont	VA-32	Ft. Belvoir							39	39	50	32	8	35	32	27	11	27	30
N. Piedmont	VA-40	Oakely Forest WMA														11	12	8	12
N. Piedmont	VA-41	Leesylvania State Park																8	8
North Piedmont			36	9	78	75	21	88	21	27	31	28	14	40	26	26	13	15	34
C. Piedmont	VA-11	Hardware River WMA	36	0		90	20	95	0				1	9	4	8	25	6	25
C. Piedmont	VA-14	James River WMA	17	5	50	100	50	88	0	32	41	2	2	19	28	51	1	0	30
C. Piedmont	VA-15	Powhatan WMA	32	8		78	19	0	0	5									20
C. Piedmont	VA-16	Horsepen WMA	37	6	38	53	7	100	10	40	11	6	3	29	23	14	7	14	25
C. Piedmont	VA-29	Briery Creek WMA	60		85	85	44	75	13	30	20	19	8	34	19	44	13	6	37
Central Piedmont			36	5	58	81	28	72	5	27	24	9	4	23	19	29	12	7	27
S. Piedmont	VA-22	White Oak Mt. WMA	40		46	83	28	40	1	41	13	8	7	10	25	22	8	28	27
S. Piedmont	VA-23	Fairystone Farms WMA	61	0	90	95	37	55	3	21	31	81	6	20	31	6	15	14	35
S. Piedmont	VA-36	Ft. Pickett								21	13	5	1	10	21	9	12	8	11
South Piedmont			51	0	68	89	33	48	2	28	19	31	5	13	26	12	12	17	28
S. Tidewater	VA-37	Southampton Correctional Center								8	1	3	11	13	4	15	16	9	9
S. Tidewater	VA-38	Hog Island-Steward Tract										1	3	7	6	6	8	5	5
S. Tidewater	VA-39	Big Woods WMA											22	41	40	20	6	26	26
South Tidewater										8	1	2	12	20	17	14	10	10	10
State			26.7	10.6	44.3	77.9	20.5	65.2	8.4	22.5	11.3	23.7	17.5	12.8	18.8	21.8	11.7	8.4	25.1

