

Arkansas Game and Fish Commission Aerial Waterfowl Survey Report January 7-9, 2019

Arkansas Game and Fish Commission staff conducted the 2019 midwinter waterfowl survey Jan. 7-9 in the Mississippi Alluvial Valley (Delta), Arkansas River valley (ARV) and southwest Arkansas. Observers estimated just over 1 million ducks in the Delta, about half of which were mallards (Table 1). Duck population estimates in the ARV were about average for total ducks but low for mallards, with an estimated 39,620 ducks (18,237 mallards). Cruise surveys in southwest Arkansas indicated low mallard numbers; observers counted a total of 30,973 total ducks but only 3,507 mallards (Table 2). Observers in the Delta again estimated high numbers of arctic-nesting geese, including over a million light (lesser snow and Ross's) geese and nearly 270,000 greater white-fronted geese. Observers were J.J. Abernathy, Jason Carbaugh, Jason Jackson, Cameron Tatom and Alex Zachary.

The Delta total duck population estimate was above the 2009-2018 long-term midwinter average (Figure 1). However, the Delta mallard estimate was only about 64% of the long-term average. Mallards typically account for 71% of all ducks during the midwinter survey, but only made up 53% of all ducks in this year's survey. Ducks were spread widely across the Delta, presumably in response to widespread habitat made available by a relatively wet fall and early winter. The highest mallard estimate was in a survey zone – the Lower St. Francis – that is not typically a hot spot. More typical mallard strongholds accounted for a large portion of remaining mallards; these survey zones included the Bayou Meto-Lower Arkansas, Black-Upper White and Lower White (Table 1).

Estimates for all ducks in the Arkansas River valley increase substantially (over 75%) from December while mallard estimates only increased by about 3,000. Both estimates were lower than average midwinter counts since formal surveys began in 2013 (Figure 2). Like in December, roughly half the mallards observed in this survey were in the Point Remove-Plumerville survey zone, with fair numbers in the West Dardanelle Reservoir survey zone (Table 2). However, the highest concentration of ducks in the Point Remove-Plumerville zone was in the waterfowl rest area (not in huntable areas) at Ed Gordon Point Remove Wildlife Management Area. The mallard count in southwest Arkansas was noticeably low.

These surveys are much better for estimating duck numbers than goose numbers; nonetheless, indices of greater white-fronted goose (specklebelly) abundance continue to be high in the Delta (Figure 3).

Habitat conditions were good for ducks during this survey period. Key rivers such as the Black, Cache, St. Francis and White were flooded out of their banks in some locations, creating widespread habitat. Duck density maps reveal a wider distribution of relative "hot spots" during this survey (Figures 4 and 5). Added to the habitat found in these riparian corridors was habitat created by water pooling in flooded agricultural fields, and observers noted many ducks in these areas. Ducks appeared to be responding to hunting pressure by concentrating in habitat that appeared not to be hunted. In contrast, duck use seemingly declined some in managed public waterfowl rest areas, in all likelihood because ducks found refuge in an abundance of unmanaged habitats. Comments from hunters continue to suggest lackluster hunting success this season, surely impacted by relatively high habitat availability and weather conditions not conducive to duck movement and persistent hunting success in a single location. Ducks have lots of options, little need to move and quickly respond to hunting pressure by finding alternative habitats.

Table 1. Waterfowl abundance estimates in Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2019, in the Mississippi Alluvial Valley (MAV) using stratified random sampling of transects.

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			Bayou Bartholomew -		Bayou Meto -		Black - Upper			Lower White -	Little River	Lower St.		
	Nov-09	Mallards	Bayou Boeuf	Bayou Macon	Lower Arkansas	Big Creek	White	Cache	L' Anguille	Bayou Des Arc	Ditches	Francis	Lower White	MAV Total 124,065
	1100-03	Total Ducks Mallards												794,405 648,955
	Dec-09	Total Ducks												2,046,969
	MWS-10	Mallards Total Ducks												2,309,453 2,887,810
	Jan-10	Mallards												2,063,243
		Total Ducks Mallards												3,153,410 180,198
	Nov-10	Total Ducks												1,133,126
	Dec-10	Mallards Total Ducks												1,247,697 1,860,894
	MWS-11	Mallards												671,982
	10100 2-11	Total Ducks Mallards												1,192,518 1,311,245
	Jan-11	Total Ducks												1,786,677 132,080
	Nov-11	Mallards Total Ducks	4,750	- 19,346	15,717 174,725	66	9,968 32,914	47,902 77,686	7,577 36,010	10,896	2,432	36 61	32,736 114,332	132,080
		Mallards	52,662 39,569	2,136	90,328	1,367 10,161	73,576	226,861	48,173	78,700 206,485	40,038 367,290	122,032	283,418	627,841 1,470,029
	Dec-11	Total Ducks	135,903	14,267	298,196	32,799	171,366	306,191	94,423	360,232	417,990	247,685	339,894	2,418,946
	MWS-12	Mallards Total Ducks	7,956 29,124	989 2,318	110,141 161,830	87,360 161,081	35,244 51,447	318,991 368,370	51,493 89,139	43,618 60,802	51,721 75,241	8,604 51,660	37,862 65,861	753,979 1,116,873
	Jan-12	Mallards	22,365	5,917	161,830 48,569	82,272	51,447 47,069	368,370 102,400	38,682	232,214	80,546	11,193	65,861 82,291	1,116,873 753,518
ŀ		Total Ducks Mallards	47,985 2,543	17,165 7,176	87,045 44,732	114,331 5,298	128,018 50,797	162,763 112,327	105,318 97,712	321,724 14,306	86,482 19,136	70,673 36,967	122,334 51,127	1,263,838 442,121
	Nov-12	Total Ducks	11,037	38,220	95,784	34,352	79,726	171,744	164,874	68,621	25,852	66,825	75,764	832,799
	Dec-12	Mallards Total Ducks	37,887 121,538	11,126 22,648	40,660 70,813	4,525 18,267	157,624 233,838	54,417 81,262	45,467 95,628	8,517 30,981	29,542 35,021	8,993 45,649	17,448 31,270	416,206 786,915
	14145 42	Mallards	30,438	12,508	75,690	16,112	48,272	57,409	32,133	20,437	48,267	4,633	105,865	451,764
poi	MWS-13	Total Ducks	54,951	19.145	120,222	22,876	60,929	84,871	68,389	27,503	56,231	7,511	142,842	665,470 476,741
	Jan-13	Mallards Total Ducks	28,836 128,058	8,921 48,672 2,841	90,090 127.548	36,204 48,364	93,035 138,314	62,369 103.878	26,058 52.116	7,344 9,588	3,511 3,665	93,337 145,229	27,036 32.483	837.915
	Nov-13	Mallards	13,582	2,841	127,548 24,371	2,900	25,948	103,878 66,501	52,116 54,163	-	13,242	145,229 1,445	32,483 39,840	837,915 244,833
		Total Ducks Mallards	200,157 73,158	38,409 20,062	107,960 71,142	18,100 7,904	148,225 72,485	111,257 25,429	99,517 63,845	49,598 54,023	46,545 37,107	4,206 27,422	114,572 22,806	938,546 475,383
Per	Dec-13	Total Ducks	154,707	31.980	145,453 164,150	26,009	98,951	36,088	122,202	77.353	47,533	33,835 13,835	60,612	834,723 807,136
e	MWS-14	Mallards Total Ducks	104,455 114,764	33,520 44,313	164,150 182,263	3,070 3,070	66,080 75,082	216,061 247,069	934 1,196	56,508 80,835	25,124 25,124	13,835 17,143	123,399 136,817	807,136 927,676
Survey Period	Nov-14	Mallards	9,409	17,100	136,741	22,901	34,196	19,077	3,454	22,216	128,948	69,511	84,007	547,560
	1404-14	Total Ducks Mallards	83,914 81,653	51,660 48,048	234,759 53,377	80,425 7,836	70,814	29,520 12,105	12,382 36,370	45,023 8,308	171,835 23,966	80,469 16,198	132,448 172,746	993,249 620,244
	Dec-14	Total Ducks	107,261	50,700	168,894	12,430	159,637 212,520	18,005	72,920	15,300	24,196	46,082	251,119	979,427
	MWS-15	Mallards Total Ducks	113,960 130,296	29,818	162,687 188,203	99,270	110,723	25,064 39,287	31,083	10,033	8,855 8,855	162,042	172,026 180,142	925,561 1,227,994
		Mallards	3,599	30,988 43,200	17,915	106,124 19,253	148,309 15,382	46,418	55,675 7,625	18,601 15,597	9,093	321,514 40,889	42,941	261,912
	Nov-15	Total Ducks	203,640	120,492	126,942	25,333	49,581	149,017	7,625 18,051	22,088	14,459	43,547	116,041	889,191
	Dec-15	Mallards Total Ducks	6,103 98,739	1,287 25,214	59,153 106,887	17,784 100,928	107,474 223,106	109,493 221,060	13,682 65,282	5,814 40,127	11,408 21,975	9,242 28,436	5,837 16,697	347,277 948,451
	MWS-16	Mallards	31,506	13,806 32,204	84,035 125,780	14,558 37,662	53,900	97,829	106,172	20,482 28,744	60,454	-	170,364 226,832	653,106 996,099
ŀ		Total Ducks Mallards	31,506 55,172 22,606	32,204 9,068	125,780 59,169	37,662 22,800	91,665 80,590	164,831 135,110	155,016	28,744 116,169	74,250	3,943 74,942	226,832 96,330	996,099 616,784
	Jan-16	Total Ducks	94,269	21,294	75,702	33,212	105,643	184,233	-	291,312	-	74,942 0	111,648	992,255
	Nov-16	Mallards Total Ducks	0 5,983	0 17,179	26,781 71,612	21,094 57,213	0 1,167	1,792 24,772	3,007 29,140	285 1,064	16,572 33,788	0 9,724	12,381 17,919	81,912 269,561
	Dec-16	Mallards	15,104	475	150,591	31,456	23,246	91,324	19,088	8,160	20,241	20,767	64,914	445,364
ŀ		Total Ducks Mallards	72,010 72,405	8,361 40,448	207,710 219,106	43,213 22,908	26,332 14,102	115,977 128,174	30,448 20,651	43,642 12,460	30,147 8,873	86,977 41,202	85,357 70,677	750,174 651,004
	MWS-17	Total Ducks	95,012	57,394 15,135	250,439	26,358 20,187	38.389	236,142 159,212	36,784 47,507	13,479 19,013	9,892	75.996	75,677	915,562 559,579
	Jan-17	Mallards	7,154 73,706	15,135 66,649	146,710 225,301	20,187 28,396	41,860 87,546	159,212 277,917	47,507 85,046	19,013 57,463	8,116 10,021	31,646 51,226	63,039 91,663	559,579 1,054,934
	Doc 17	Total Ducks Mallards	4,921	3,151	116,026	19,729	84,718	38,466	26,874	2,400	26,662	100,522	9,508	432,977
	Dec-17	Total Ducks	28,720	12,448	192,672	24,770	158,347	70,974	64,906	39,102	37,663	139,882	21,915	791,399
	MWS-18	Mallards Total Ducks	2,458 3,027	34,577 62,533	390,205 415,037	92,504 110,084	40,402 44,660	132,049 140,405	35,330 58,871	1,402 3,845	12,274 13,969	54,505 122,781	153,625 180,326	949,331 1,155,538
	Jan-18	Mallards	3,276	10,690	104,937	116,012	8,117	21.688	11,050	555	36	70,030	63,378	409,769
ŀ		Total Ducks Mallards	42,652 251	35,963 476	118,023 66,867	116,275 7,222	10,768 91,284	22,626 110,677 265,268	17,671 43,214	2,313 1,572	39 40,305	143,833	69,635 2,226	579,794 364,094
	Nov-18	Total Ducks	57,431	17,075	66,867 131,319	7,222 11,649	91,284 214,432	265,268	73,438	1,572 3,900	57,849	2,040	2,226 2,997	837,398
	Dec-18	Mallards Total Ducks	2,770 37,533	7,210 59,037	118,723 202,869	124,685 147,520	33,242 48,481	145,660 185,811	84,416 236,571	9,825 18,709	31,723 43,519	45,074 110,004	83,800 91,944	687,126 1,181,998
		Mallards	50,569	7,541	80,381	22,208	81,122	85,902	38,201	16,263	13,588	119,119	40,885	555,779
	MWS-19	Total Ducks	123,101	28,889	127,772	28,331	168,597	137,596	76,985	24,204	50,781	211,288	77,009	1,054,553

Table 2. Waterfowl abundance estimates in western Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2019. Beginning in Jan. 2013, surveys in the Arkansas River Valley (ARV) were conducted using stratified random sampling of transects, while past ARV surveys and surveys in southwest Arkansas were conducted using "cruise" surveys.

	-,-	Survey Zone											
		ŀ	Bigelow - Lake		East Dardanelle	Fourche La			Pt. Remove -		West Dardanelle	Arkansas River	Southwest
			Conway	Cadron	Reservoir	Fave		Holla Bend	Petit Jean	Plumerville	Reservoir	Valley Total	Arkansas Total
	Nov-09	Mallards										13,731	5,480
	1404-03	Total Ducks										31,416 18,580	19,140 19,230
	Dec-09	Mallards Total Ducks										31,304	31,820
		Mallards										58,815	34,590
	MWS-10	Total Ducks										81,685	36,060
	Jan-10	Mallards										14,359	19,840
		Total Ducks Mallards										20,336 96	27,705 14,010
	Nov-10	Total Ducks										5,966	30,300
	Doc 10	Mallards										25,064	2,390
	Dec-10	Total Ducks										28,054	21,106
	MWS-11	Mallards Total Ducks										26,318 40,470	15,027 21,267
		Mallards										41,850	-
	Jan-11	Total Ducks										60,635	-
	Nov-11	Mallards										12,225	-
		Total Ducks Mallards										19,870 21,389	-
	Dec-11	Total Ducks										40,919	-
1	MWS-12	Mallards										7,264	-
	IVIVV 3-12	Total Ducks										13,339	-
	Jan-12	Mallards Total Ducks										13,900 21,000	-
		Mallards										1,182	13,090
	Nov-12	Total Ducks										7,732	21,935
	Dec-12	Mallards										13,975	10,245
		Total Ducks Mallards										22,417 16,893	17,105 8,165
	MWS-13	Total Ducks										26,058	14,630
	Jan-13	Mallards	-	408	10,000	372	1,837	630	627	1,843	917	16,634	-
	Ja11-13	Total Ducks	-	1,428	10,180	372	1,971	990	902	3,687	7,857	28,011	
-	Nov-13	Mallards Total Ducks	240 320	187 187	4,660 14,320	800 1,920	0	144 1,080	0 528	754 965	253 3,307	7,038 22,627	4,455 19,145
Period		Mallards	576	245	5,472	1,728	358	162	1,320	3,429	2,176	15,466	10,130
Per	Dec-13	Total Ducks	1,604	2,713	8,672	1,728	1,836	3,132	1,501	4,329	3,941	29,456 40,306	29,070
- -	MWS-14	Mallards	11,767	816	2,898	4,800	-	2,160	715	13,703	3,449	40,306	18,385
Survey	111115 21	Total Ducks Mallards	14,441 926	816 7,140	8,711 12,114	5,124 704	924	2,934 4,518	957 10,428	22,177 7,125	6,087 392	61,247 44,271	35,875 15,890
Su	Nov-14	Total Ducks	5,040	10,540	45,485	4,256	3,248	4,518	19,932	12,039	624	105,682	29,790
	Dec-14	Mallards	720	224	1,028	640	373	3,006	2,541	1,343	299	10,174	21,200
	Dec-14	Total Ducks	1,242	530	33,805	1,296	373	4,194	4,059	6,991	299	52,789	29,400
	MWS-15	Mallards Total Ducks	3,929 10,594	143 755	5,813 18,649	221 221	-	11,138 13,455	0 224	2,107 2,107	3,531 9,871	26,882 55,876	19,245 28,695
		Mallards	270	-	1,867	-	149	2,430	561	4,785	64	10,126	21,580
	Nov-15	Total Ducks	270	449	2,898	-	1,170	14,760	726	7,042	64	27,379	37,060
	Dec-15	Mallards	1,440	340 374	320	160 992	140 140	563	165 165	2,864	1,027	7,019	11,425
		Total Ducks Mallards	4,140 411	775	3,140 352	496	14,000	7,088 3,042	726	6,913 2,544	3,274 6,070	26,226 28,416	17,950 10,310
	MWS-16	Total Ducks	617	775	6,752	896	17,562	6,102	990	3,808	15,019	52,521	16,715
	Jan-16	Mallards	634	918	2,743	576	373	1,548	14,388	8,479	4,622	34,281	14,735
	30.7 10	Total Ducks	634	918	3,817 818	1,536	1,966	2,088	18,777	11,815	5,478 99	47,029 917	19,565 5,165
	Nov-16	Mallards Total Ducks	-	-	6,530	-	0 814	-	-	-	100	7,444	14,690
	Doc 16	Mallards	112	-	-	739	187	2,612	296	234	8.186	12.364	34,946
1	Dec-16	Total Ducks	333	-	3,165	1,016	988	3,248	550	1,788	10,192	21,278	39,360
	MWS-17	Mallards Total Ducks	24 325	1,538 2,137	180 453	831 12,788	242 2,167	448 547	5,050 5,499	1,808 4,461	2,333 14,900	12,454 43,277	19,386 31,679
1		Mallards	17	627	16,432	3,812	1,019	5,394	1,561	14,818	4,768	48,448	13,682
	Jan-17	Total Ducks	17	1,647	17,810	11,308	2,595	5,638	1,825	14,836	4,917	60,593	26,594 15,487
1	Dec-17	Mallards	-	-	821	-	0	1,184	-	-	2,129	4,134	15,487
		Total Ducks Mallards	0	0	2,558 10,862	1,013	2,972 4,784	3,654 22,254	0	5,269	4,264 6,711	13,448 50,893	34,822 18,412
	MWS-18	Total Ducks	510	0	13,785	2,114	5,880	36,695	0	13,843	7,553	80,380	38,114
	Jan-18	Mallards	2,080	3,144	11,881	135	1,115	141,074	845	3,361	5,214	168,849	10,849
	Ja11-10	Total Ducks	3,420	4,489	20,281	227	3,826	174,542	3,150	3,313	5,381	218,629	32,928
1	Nov-18	Mallards Total Ducks	-	-	273 5,878	2,956 3,319	3,617 3,895	198 253	4,733 8,867	7,074 9,956	429 502	19,280 32,670	9,721 26,969
	n	Mallards	235	326	2,440	73	179	3,292	462	7,426	605	15,038	9,241
	Dec-18	Total Ducks	240	330	4,483	73	630	3,472	1,771	10,920	605	22,514	35,236
	MWS-19	Mallards	58	382	841	120	389	89	2,413	9,527	4,418	18,237	3,507
	14144 2-19	Total Ducks	58	748	4,417	192	2,446	100	3,875	23,206	4,582	39,620	30,973

Midwinter Waterfowl Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2019. 3,500,000 **■** Total Ducks 3,000,000 ■ Mallards 2,500,000 2,000,000 1,500,000 **Ducks MWS** average 1,000,000 Mallard MWS average 500,000 Nov-10 Jan-10 Jan-11 MWS-11 Dec-10 MWS-12 Dec-11 Nov-11 Jan-12 Dec-12 Nov-12 MWS-13 Jan-13 Dec-13 Nov-13 Nov-14 MWS-14 Dec-14 Nov-15 MWS-15 Dec-15 Jan-16 MWS-16 Dec-16 Nov-16 Jan-17 MWS-17 Dec-17 Jan-18 MWS-18 Nov-18 MWS-19 Dec-18

Figure 1. Duck abundance estimates in the Mississippi Alluvial Valley (Delta) of Arkansas during the late November (Nov), mid-December (Dec), early-January

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Figure 2. Duck abundance estimates in the Arkansas River valley of Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Waterfowl Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2019.

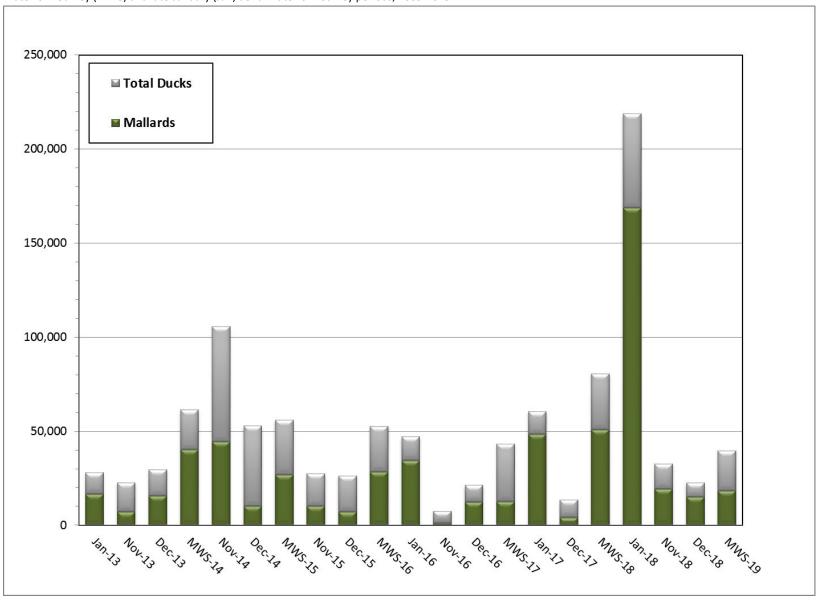


Figure 3. Greater white-fronted goose (GWFG) abundance estimates in the Mississippi Alluvial Valley (Delta) of Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Waterfowl Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2019.

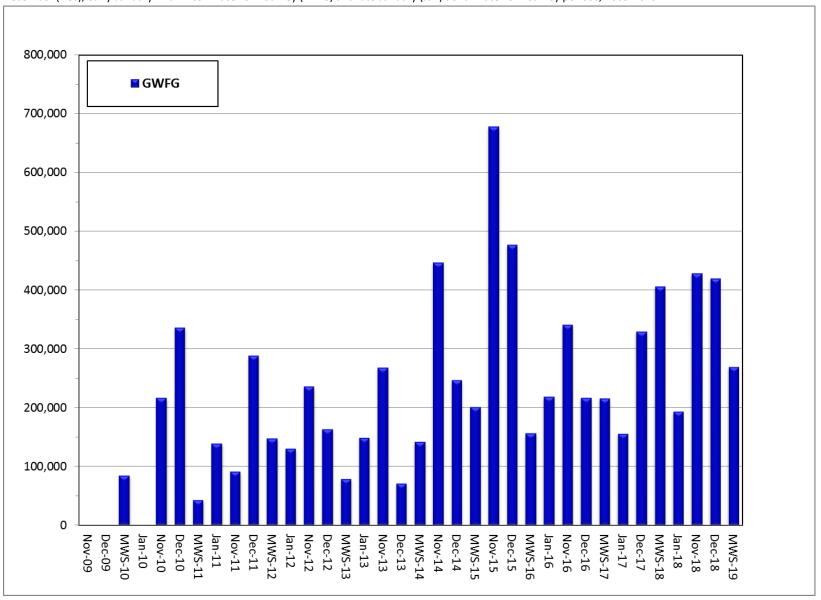


Figure 4. Duck distribution in the Mississippi Alluvial Valley of Arkansas during the 2019 Midwinter Waterfowl Survey.

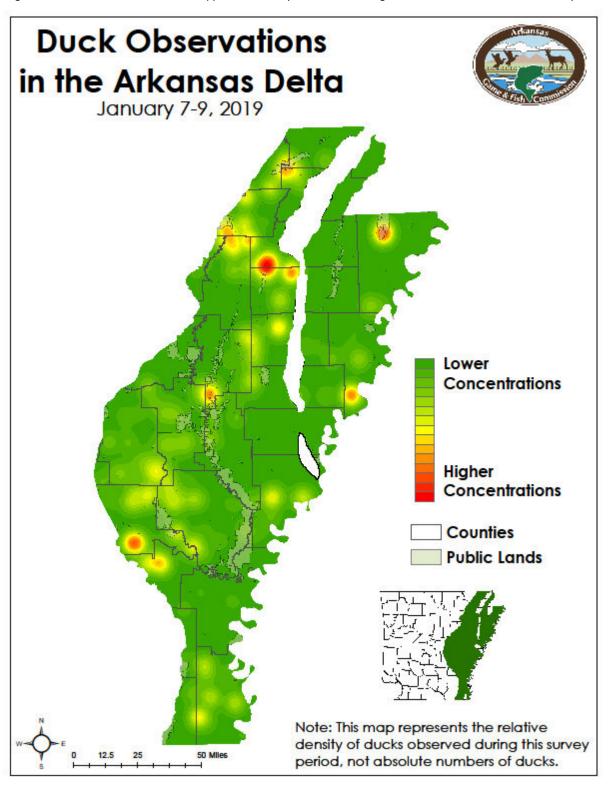


Figure 5. Mallard distribution in the Mississippi Alluvial Valley of Arkansas during the 2019 Midwinter Waterfowl Survey.

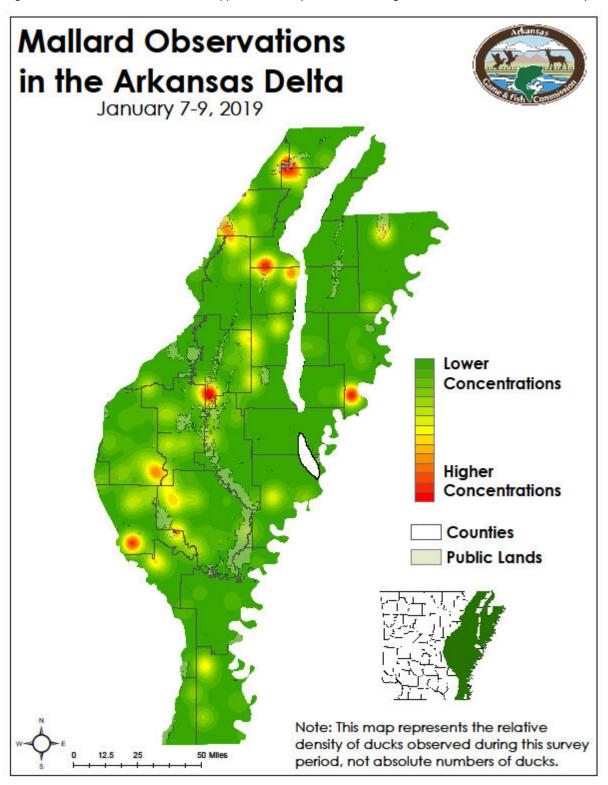


Figure 6. Duck distribution in the Arkansas River Valley of Arkansas during the 2019 Midwinter Waterfowl Survey.

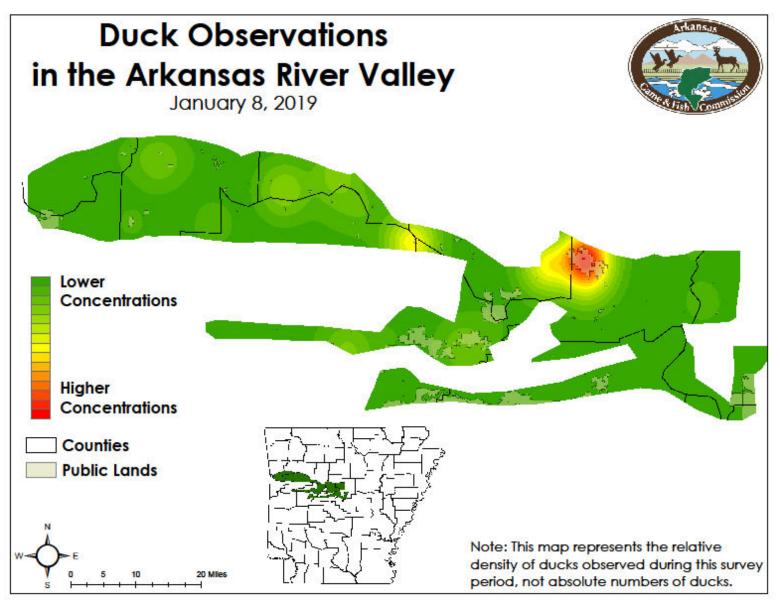
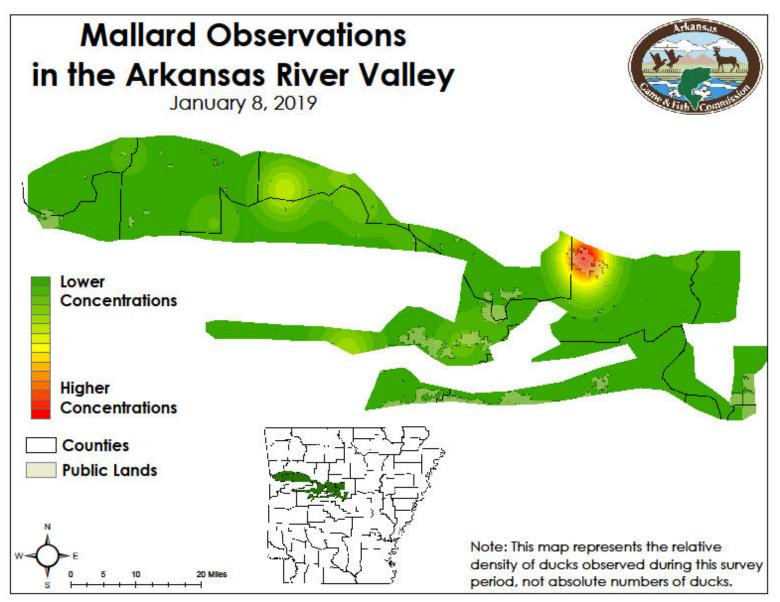


Figure 7. Mallard distribution in the Arkansas River Valley of Arkansas during the 2019 Midwinter Waterfowl Survey.



Survey Design Background

The Mississippi Alluvial Valley is an area of continental significance for migrating and wintering waterfowl, as outlined in the North American Waterfowl Management Plan, and the single most important region for wintering mallards. Habitats found in western Arkansas, including the Arkansas River Valley and southwest Arkansas, such as the Red and Sulphur River floodplains, provide additional critical habitat for migrating and wintering waterfowl. Biologists conduct regular waterfowl surveys in these regions by aircraft up to four times each wintering period.

Winter waterfowl surveys, including the Midwinter Waterfowl Survey, have been conducted across much of the United States since 1935. Many different counting techniques have been used, and recently AGFC and partners have conducted surveys in the MAV using stratified random sampling of aerial fixed width (250m) strips, or transects, that have the advantages of extensive coverage (i.e., no area is excluded from the sample), increased accuracy by counting on fixed strips rather than traditional "cruise" surveys only counting waterfowl on large concentration areas, and availability of measures of sampling error.

Beginning in 2011 in the MAV, survey strata – or sampling zones – follow watershed boundaries (Figure 8). A similar design was implemented in the Arkansas River Valley in 2013 (Figure 9). Watersheds in this case are simply land areas that are occupied by a drainage system consisting of a portion of a surface stream and all the tributary surface streams feeding it. For example, the Cache River strata includes lands surrounding and tributaries flowing into the Cache River from the Missouri border on the north to the Cache River's junction with the White River on the south. At the root of this sampling design is the idea that habitat within these zones will share common weather and flooding patterns and, knowing that ducks are keyed in on such patterns, duck distribution will vary among watersheds. This is not a concept foreign to those who follow ducks, particularly duck hunters, as they frequently discuss habitat and duck numbers in terms of conditions in the "Cache River bottoms," for instance. Systematically conducting aerial waterfowl surveys using this design will allow for more efficient allocation of sampling effort and provide precise estimates of waterfowl abundance in the MAV. Such a design offers an opportunity to track changes in abundance in response to changes in land use, flooding patterns or weather conditions, for example.

Before each survey period, transects to be flown are randomly selected within each strata. Biologists spend many hours in the air flying each of these transects – totaling over 3,500 miles each survey – recording all waterfowl observations using specialized computer software that collects location information in flight. Biologists also collect habitat information for each duck observation to track trends in habitat use. These data can then be used to generate population estimates for each strata and the entire MAV and develop visual representations of duck distribution (i.e., duck density maps).

Arkansas Aerial Survey Strata Bayou Bart. - Bayou Boeuf Bayou Macon Bayou Meto - Lower Ark. Big Creek Black - Upper White Cache L Anguille L. White - Bayou Des Arc Little River Ditches Lower St. Francis Lower White WMAs and NWRs Counties

Figure 8. Aerial waterfowl survey strata in the Mississippi Alluvial Valley (Delta) of Arkansas.

 $\label{thm:continuous} \textit{Figure 9. Aerial waterfowl survey strata in the Arkansas River valley (ARV) of western Arkansas. } \\$

