Arkansas Game and Fish Commission Aerial Waterfowl Survey Report
January 20-23, 2019

Arkansas Game and Fish Commission staff conducted the 2019 late-January waterfowl survey Jan. 20-23 in the Mississippi Alluvial Valley (Delta), Arkansas River valley (ARV) and southwest Arkansas. Observers estimated nearly 1 million ducks in the Delta, a little over half of which were mallards (Table 1). The duck population estimate in the ARV was 27,347 ducks, 16,797 of which were mallards. A cruise survey in southwest Arkansas again indicated low mallard numbers; observers counted only about 6,000 mallards out of over 25,000 total ducks (Table 2). Observers in the Delta encountered high numbers of arctic-nesting geese, including over 1.5 million light (lesser snow and Ross's) geese and over 280,000 greater white-fronted geese (specklebelly). Observers were J.J. Abernathy, Jason Carbaugh, Jason Jackson, Cameron Tatom and Alex Zachary.

The Delta total duck population estimate was about 27% below the 2009-2019 late-January long-term average (LTA), while Delta mallard counts were nearly identical to 2019 midwinter survey estimates and about 34% below the LTA (Figure 1). Mallards typically make up a smaller portion of the total duck estimate in late January than during the midwinter survey (62% and 71%, respectively), likely a result of non-mallard ducks beginning their spring migration into Arkansas from points south while mallard numbers show little change. Mallards accounted for 57.5% of all ducks during this survey. Perhaps non-mallard ducks had not moved this far north on spring migration in response to cold conditions in Arkansas and to the north before and during the survey period. The Cache and Lower White survey zones led Delta mallard counts, followed closely by the Bayou Meto-Lower Arkansas survey zone; in fact, well over half of all mallards were in these three zones (Table 1).

Estimates for all ducks in the Arkansas River valley decreased by about one-third from the midwinter survey, while mallard estimates only slightly decreased. Both estimates were lower than average late-January counts since formal surveys began in 2013 (Figure 2). The most notable mallard concentrations were in the West Dardanelle Reservoir survey zone, with fair numbers in the Petit Jean, Point Remove-Plumerville and West Dardanelle Reservoir survey zones. Similar to the midwinter survey, the mallard count in southwest Arkansas was noticeably low.

Indices of light goose and white-fronted goose abundance continue to be high in the Delta (Figure 3). Both were above the all-survey LTA.

Observers noted skim ice on many shallowly flooded habitats as the survey began, especially in the north Delta. About 35% of mallards were using rice fields, about 25% other agricultural fields and 15% moist-soil habitat. An unusually high percentage of mallards were in deeper-water habitats (e.g. agricultural reservoirs, buckbrush wetlands, oxbows; 18%) in response to icy conditions. Soybean and rice fields supported nearly 40% each of observed light geese. Habitat use by white-fronted geese was similar, but with 20% of these geese seen in moist-soil habitat.

Habitat conditions remained good for ducks throughout most of the 2018-19 wintering period. Key rivers provided habitat for at least part of the winter, creating widespread habitat and offering many choices for ducks. A few hot spots emerged within high-count strata during this survey, the most notable located in the Grand Prairie centered in the northwest corner of Arkansas County (Figures 4 and 5). Hotspots were limited in the Arkansas River valley (Figures 6 and 7). Many ducks continued to use habitat created by water pooling in

flooded agricultural fields, even though flocks were a little more concentrated in unfrozen fields during this survey.

Atypical rain and cold weather right before duck season this year led to increased anticipation and expectations among many duck hunters. Throughout the season, however, comments from hunters indicated overall tough hunting and few noticeable migration events that can lead to at least temporary increased hunting success. Hunter expectations built again as a late-season cold front and snow settled into the midcontinent immediately preceding the last week of duck season and this survey. However, this cold front toward the end of the wintering period did not result in a detectable influx of mallards into Arkansas. As noted in the last aerial survey report, high habitat availability and overall mild weather (with the exception of a late-arriving cold front) do not promote intense duck movements and hunting success in a single location throughout a season. Ducks are well-adapted to quickly respond to changing conditions (e.g. flooding, hunting pressure) by finding alternative habitats and had lots of options during the 2018-19 wintering period.

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.

			Survey Zone											
			Bayou Bartholomew - Bayou Boeuf	Bayou Macon	Bayou Meto - Lower Arkansas	Big Creek	Black - Upper White	Cache	L' Anguille	Lower White - Bayou Des Arc	Little River Ditches	Lower St. Francis	Lower White	MAV Total
Survey Period	Nov-09	Mallards												124,065
		Total Ducks												794,405
	Dec-09	Mallards												648,955
		Total Ducks												2,046,969
	MWS-10	Mallards												2,309,453
		Total Ducks												2,887,810
	Jan-10	Mallards												2,063,243
		Total Ducks												3,153,410
	Nov-10	Mallards												180,198
		Total Ducks												1,133,126
	Dec-10	Mallards												1,247,697
		Total Ducks												1,860,894
	MWS-11	Mallards												671,982
		Total Ducks												1,192,518
	Jan-11	Mallards												1,311,245
		Total Ducks												1,786,677
	Nov-11	Mallards	4,750	-	15,717	66	9,968	47,902	7,577	10,896	2,432	36	32,736	132,080
		Total Ducks	52,662	19,346	174,725	1,367	32,914	77,686	36,010	78,700	40,038	61	114,332	627,841
	Dec-11	Mallards	39,569	2,136	90,328	10,161	73,576	226,861	48,173	206,485	367,290	122,032	283,418	1,470,029
		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	7,956	989	110,141	87,360	35,244	318,991	51,493	43,618	51,721	8,604	37,862	753,979
		Total Ducks	29,124	2,318	161,830	161,081	51,447	368,370	89,139	60,802	75,241	51,660	65,861	1,116,873
	Jan-12	Mallards	22,365	5,917	48,569	82,272	47,069	102,400	38,682	232,214	80,546	11,193	82,291	753,518
		Total Ducks	47,985	17,165	87,045	114,331	128,018	162,763	105,318	321,724	86,482	70,673	122,334	1,263,838
	Nov-12	Mallards	2,543	7,176	44,732	5,298	50,797	112,327	97,712	14,306	19,136	36,967	51,127	442,121
		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	37,887	11,126	40,660	4,525	157,624	54,417	45,467	8,517	29,542	8,993	17,448	416,206
		Total Ducks	121,538	22,648	70,813	18,267	233,838	81,262	95,628	30,981	35,021	45,649	31,270	786,915
	MWS-13	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
		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
	Jan-13	Mallards	28,836	8,921	90,090	36,204	93,035	62,369	26,058	7,344	3,511	93,337	27,036	476,741
		Total Ducks	128,058	48,672	127,548	48,364	138,314	103,878	52,116	9,588	3,665	145,229	32,483	837,915
	Nov-13	Mallards	13,582	2,841	24,371	2,900	25,948	66,501	54,163	-	13,242	1,445	39,840	244,833
		Total Ducks	200,157	38,409	107,960	18,100	148,225	111,257	99,517	49,598	46,545	4,206	114,572	938,546
	Dec-13	Mallards	73,158	20,062	71,142	7,904	72,485	25,429	63,845	54,023	37,107	27,422	22,806	475,383
		Total Ducks	154,707	31,980	145,453	26,009	98,951	36,088	122,202	77,353	47,533	33,835	60,612	834,723
	MWS-14	Mallards	104,455	33,520	164,150	3,070	66,080	216,061	934	56,508	25,124	13,835	123,399	807,136
		Total Ducks	114,764	44,313	182,263	3,070	75,082	247,069	1,196	80,835	25,124	17,143	136,817	927,676
	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
		Total Ducks	83,914	51,660	234,759	80,425	70,814	29,520	12,382	45,023	171,835	80,469	132,448	993,249
	Dec-14	Mallards	81,653	48,048	53,377	7,836	159,637	12,105	36,370	8,308	23,966	16,198	172,746	620,244
		Total Ducks	107,261	50,700	168,894	12,430	212,520	18,005	72,920	15,300	24,196	46,082	251,119	979,427
	MWS-15	Mallards	113,960	29,818	162,687	99,270	110,723	25,064	31,083	10,033	8,855	162,042	172,026	925,561
		Total Ducks	130,296	30,988	188,203	106,124	148,309	39,287	55,675	18,601	8,855	321,514	180,142	1,227,994
	Nov-15	Mallards	3,599	43,200	17,915	19,253	15,382	46,418	7,625	15,597	9,093	40,889	42,941	261,912
		Total Ducks	203,640	120,492	126,942	25,333	49,581	149,017	18,051	22,088	14,459	43,547	116,041	889,191
	Dec-15	Mallards	6,103	1,287	59,153	17,784	107,474	109,493	13,682	5,814	11,408	9,242	5,837	347,277
		Total Ducks	98,739	25,214	106,887	100,928	223,106	221,060	65,282	40,127	21,975	28,436	16,697	948,451
	MWS-16	Mallards	31,506	13,806	84,035	14,558	53,900	97,829	106,172	20,482	60,454	-	170,364	653,106
		Total Ducks	55,172	32,204	125,780	37,662	91,665	164,831	155,016	28,744	74,250	3,943	226,832	996,099
	Jan-16	Mallards	22,606	9,068	59,169	22,800	80,590	135,110	-	116,169	-	74,942	96,330	616,784
		Total Ducks	94,269	21,294	75,702	33,212	105,643	184,233	-	291,312	-	74,942	111,648	992,255
	Nov-16	Mallards	0	0	26,781	21,094	0	1,792	3,007	285	16,572	0	12,381	81,912
		Total Ducks	5,983	17,179	71,612	57,213	1,167	24,772	29,140	1,064	33,788	9,724	17,919	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
		Total Ducks	72,010	8,361	207,710	43,213	26,332	115,977	30,448	43,642	30,147	86,977	85,357	750,174
	MWS-17	Mallards	72,405	40,448	219,106	22,908	14,102	128,174	20,651	12,460	8,873	41,202	70,677	651,004
		Total Ducks	95,012	57,394	250,439	26,358	38,389	236,142	36,784	13,479	9,892	75,996	75,677	915,562
	Jan-17	Mallards	7,154	15,135	146,710	20,187	41,860	159,212	47,507	19,013	8,116	31,646	63,039	559,579
		Total Ducks	73,706	66,649	225,301	28,396	87,546	277,917	85,046	57,463	10,021	51,226	91,663	1,054,934
	Dec-17	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
		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	2,458	34,577	390,205	92,504	40,402	132,049	35,330	1,402	12,274	54,505	153,625	949,331
		Total Ducks	3,027	62,533	415,037	110,084	44,660	140,405	58,871	3,845	13,969	122,781	180,326	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
		Total Ducks	42,652	35,963	118,023	116,275	10,768	22,626	17,671	2,313	39	143,833	69,635	579,794
	Nov-18	Mallards	251	476	66,867	7,222	91,284	110,677	43,214	1,572	40,305	-	2,226	364,094
		Total Ducks	57,431	17,075	131,319	11,649	214,432	265,268	73,438	3,900	57,849	2,040	2,997	837,398
	Dec-18	Mallards	2,770	7,210	118,723	124,685	33,242	145,660	84,416	9,825	31,723	45,074	83,800	687,126
		Total Ducks	37,533	59,037	202,869	147,520	48,481	185,811	236,571	18,709	43,519	110,004	91,944	1,181,998
	MWS-19	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
		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
	Jan-19	**Mallards**	**3,592**	**12,942**	**91,603**	**21,192**	**53,730**	**132,098**	**49,299**	**19,298**	**3,937**	**50,190**	**117,601**	**555,481**
		Total Ducks	**35,277**	**48,923**	**125,488**	**65,460**	**94,400**	**247,074**	**99,281**	**45,922**	**4,810**	**63,203**	**134,519**	**964,356**

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										
			Bigelow - Lake Conway	Cadron	East Dardanelle Reservoir	Fourche La Fave	Frog Bayou	Holla Bend	Petit Jean	Pt. Remove - Plumerville	West Dardanelle Reservoir	Arkansas River Valley Total	Southwest Arkansas Total
Survey Period	Nov-09	Mallards										13,731	5,480
		Total Ducks										31,416	19,140
	Dec-09	Mallards										18,580	19,230
		Total Ducks										31,304	31,820
	MWS-10	Mallards										58,815	34,590
		Total Ducks										81,685	36,060
	Jan-10	Mallards										14,359	19,840
		Total Ducks										20,336	27,705
	Nov-10	Mallards										96	14,010
		Total Ducks										5,966	30,300
	Dec-10	Mallards										25,064	2,390
		Total Ducks										28,054	21,106
	MWS-11	Mallards										26,318	15,027
		Total Ducks										40,470	21,267
	Jan-11	Mallards										41,850	-
		Total Ducks										60,635	-
	Nov-11	Mallards										12,225	-
		Total Ducks										19,870	-
	Dec-11	Mallards										21,389	-
		Total Ducks										40,919	-
	MWS-12	Mallards										7,264	-
		Total Ducks										13,339	-
	Jan-12	Mallards										13,900	-
		Total Ducks										21,000	-
	Nov-12	Mallards										1,182	13,090
		Total Ducks										7,732	21,935
	Dec-12	Mallards										13,975	10,245
		Total Ducks										22,417	17,105
	MWS-13	Mallards										16,893	8,165
		Total Ducks										26,058	14,630
	Jan-13	Mallards	-	408	10,000	372	1,837	630	627	1,843	917	16,634	-
		Total Ducks	-	1,428	10,180	372	1,971	990	902	3,687	7,857	28,011	-
	Nov-13	Mallards	240	187	4,660	800	0	144	0	754	253	7,038	4,455
		Total Ducks	320	187	14,320	1,920	0	1,080	528	965	3,307	22,627	19,145
	Dec-13	Mallards	576	245	5,472	1,728	358	162	1,320	3,429	2,176	15,466	10,130
		Total Ducks	1,604	2,713	8,672	1,728	1,836	3,132	1,501	4,329	3,941	29,456	29,070
	MWS-14	Mallards	11,767	816	2,898	4,800	-	2,160	715	13,703	3,449	40,306	18,385
		Total Ducks	14,441	816	8,711	5,124	-	2,934	957	22,177	6,087	61,247	35,875
	Nov-14	Mallards	926	7,140	12,114	704	924	4,518	10,428	7,125	392	44,271	15,890
		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
		Total Ducks	1,242	530	33,805	1,296	373	4,194	4,059	6,991	299	52,789	29,400
	MWS-15	Mallards	3,929	143	5,813	221	-	11,138	0	2,107	3,531	26,882	19,245
		Total Ducks	10,594	755	18,649	221	-	13,455	224	2,107	9,871	55,876	28,695
	Nov-15	Mallards	270	-	1,867	-	149	2,430	561	4,785	64	10,126	21,580
		Total Ducks	270	449	2,898	-	1,170	14,760	726	7,042	64	27,379	37,060
	Dec-15	Mallards	1,440	340	320	160	140	563	165	2,864	1,027	7,019	11,425
		Total Ducks	4,140	374	3,140	992	140	7,088	165	6,913	3,274	26,226	17,950
	MWS-16	Mallards	411	775	352	496	14,000	3,042	726	2,544	6,070	28,416	10,310
		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
		Total Ducks	634	918	3,817	1,536	1,966	2,088	18,777	11,815	5,478	47,029	19,565
	Nov-16	Mallards	-	-	818	-	0	-	-	-	99	917	5,165
		Total Ducks	-	-	6,530	-	814	-	-	-	100	7,444	14,690
	Dec-16	Mallards	112	-	-	739	187	2,612	296	234	8,186	12,364	34,946
		Total Ducks	333	-	3,165	1,016	988	3,248	550	1,788	10,192	21,278	39,360
	MWS-17	Mallards	24	1,538	180	831	242	448	5,050	1,808	2,333	12,454	19,386
		Total Ducks	325	2,137	453	12,788	2,167	547	5,499	4,461	14,900	43,277	31,679
	Jan-17	Mallards	17	627	16,432	3,812	1,019	5,394	1,561	14,818	4,768	48,448	13,682
		Total Ducks	17	1,647	17,810	11,308	2,595	5,638	1,825	14,836	4,917	60,593	26,594
	Dec-17	Mallards	-	-	821	-	0	1,184	-	-	2,129	4,134	15,487
		Total Ducks	-	-	2,558	-	2,972	3,654	-	-	4,264	13,448	34,822
	MWS-18	Mallards	0	0	10,862	1,013	4,784	22,254	0	5,269	6,711	50,893	18,412
		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
		Total Ducks	3,420	4,489	20,281	227	3,826	174,542	3,150	3,313	5,381	218,629	32,928
	Nov-18	Mallards	-	-	273	2,956	3,617	198	4,733	7,074	429	19,280	9,721
		Total Ducks	-	-	5,878	3,319	3,895	253	8,867	9,956	502	32,670	26,969
	Dec-18	Mallards	235	326	2,440	73	179	3,292	462	7,426	605	15,038	9,241
		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
		Total Ducks	58	748	4,417	192	2,446	100	3,875	23,206	4,582	39,620	30,973
	Jan-19	**Mallards**	**1,628**	**-**	**1,603**	**169**	**728**	**607**	**2,234**	**1,928**	**7,900**	**16,797**	**5,978**
		Total Ducks	**5,295**	**-**	**2,252**	**2,762**	**869**	**785**	**2,381**	**2,488**	**10,513**	**27,347**	**25,540**

Figure 1. Duck 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.

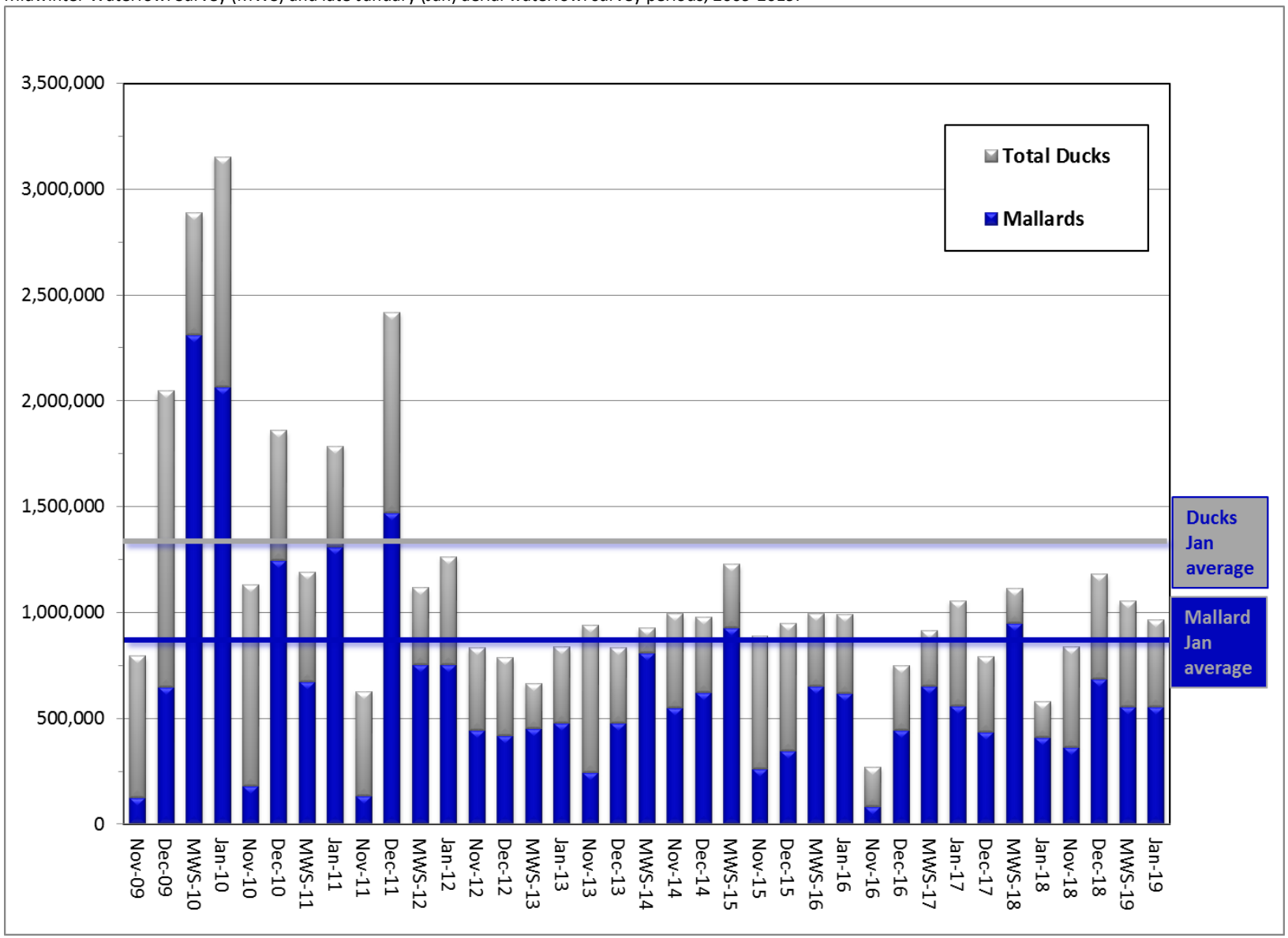


Figure 2. Duck abundance estimates in the Arkansas River valley of Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Waterfowl Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2019.

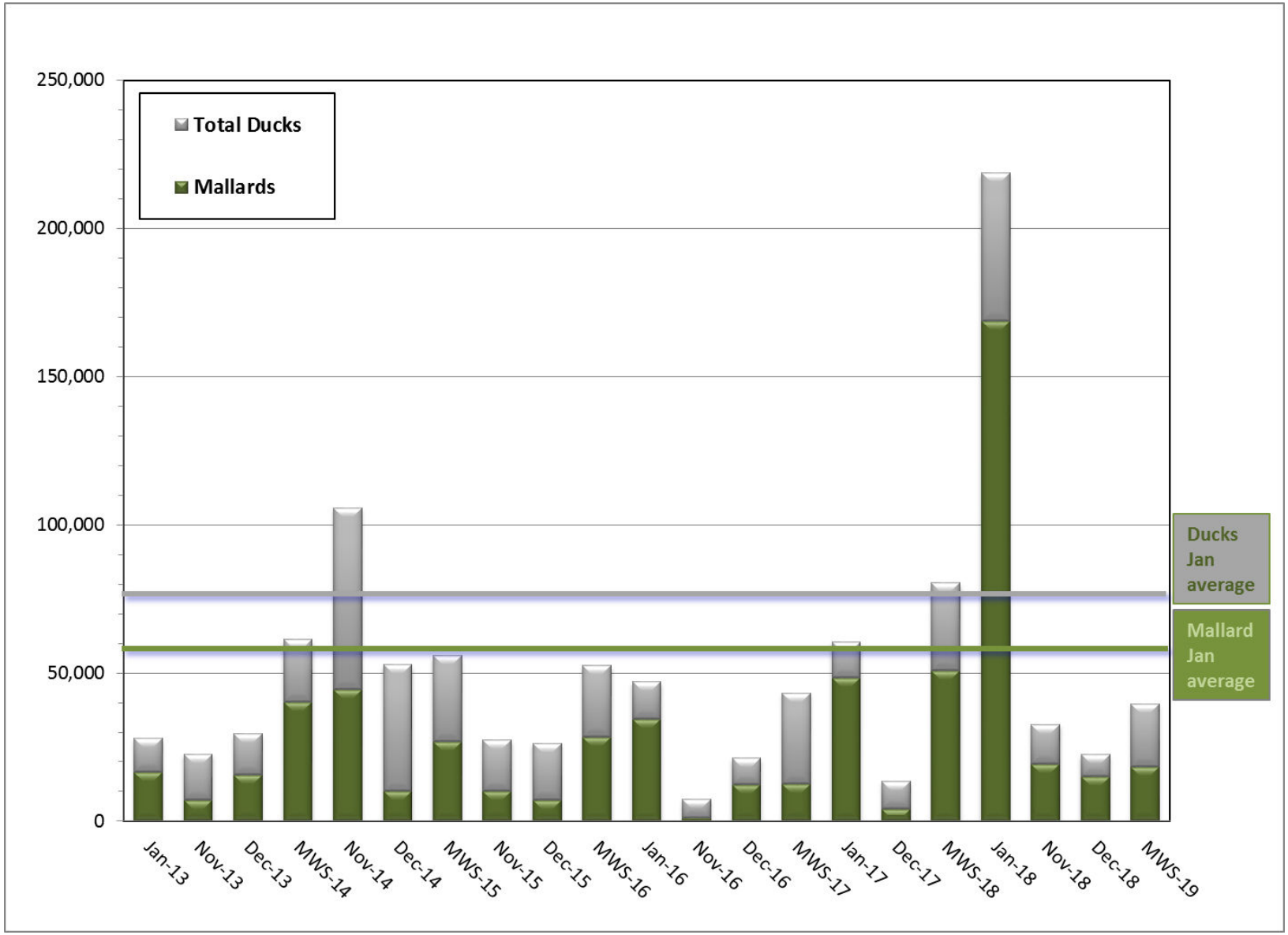


Figure 3. Midcontinent light goose (MCLG; lesser snow, blue and Ross's goose) abundance estimates in the Mississippi Alluvial Valley (Delta) of Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Waterfowl Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2019.

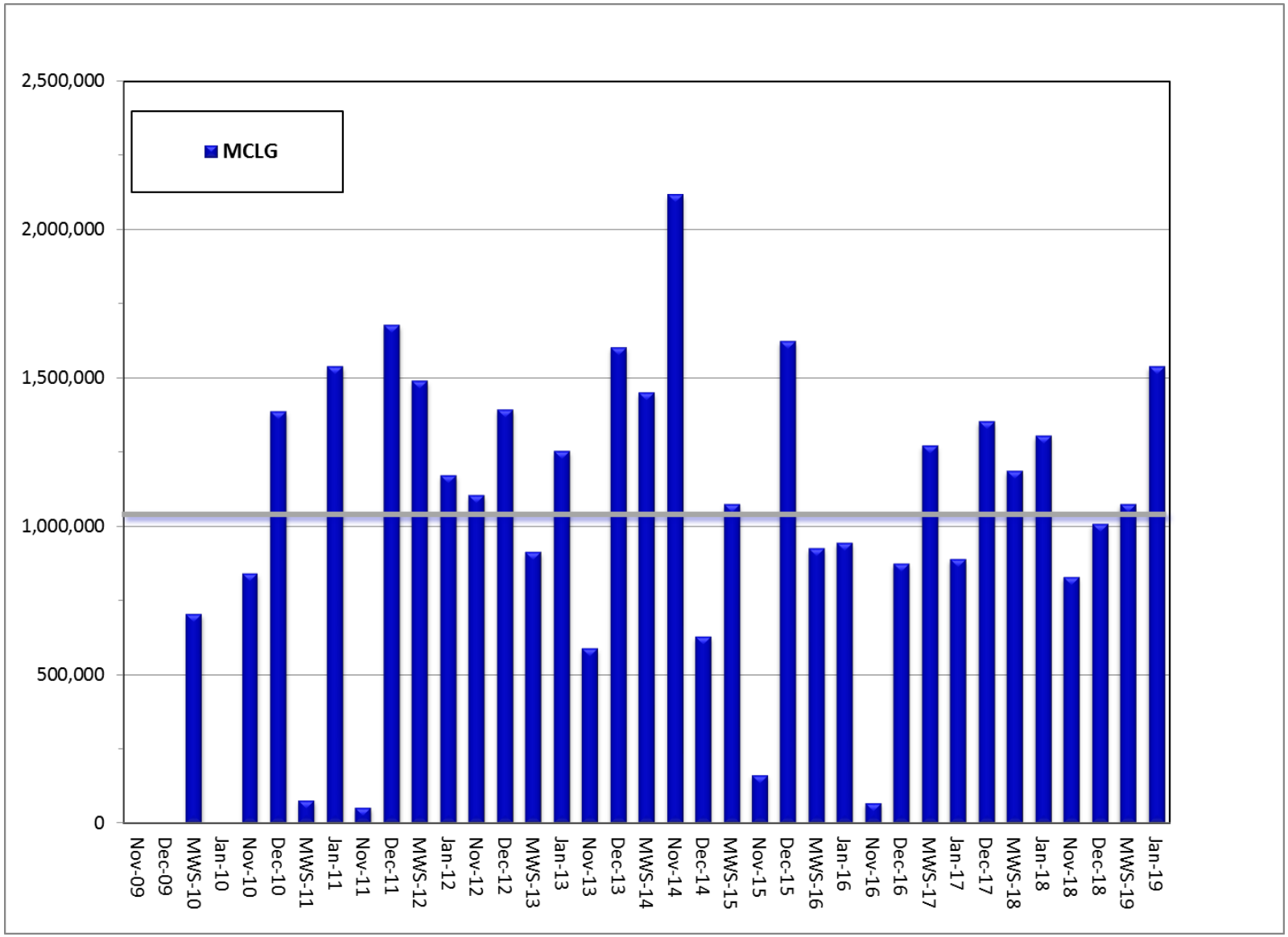


Figure 4. Duck distribution in the Mississippi Alluvial Valley of Arkansas during the January 2019 aerial waterfowl survey.

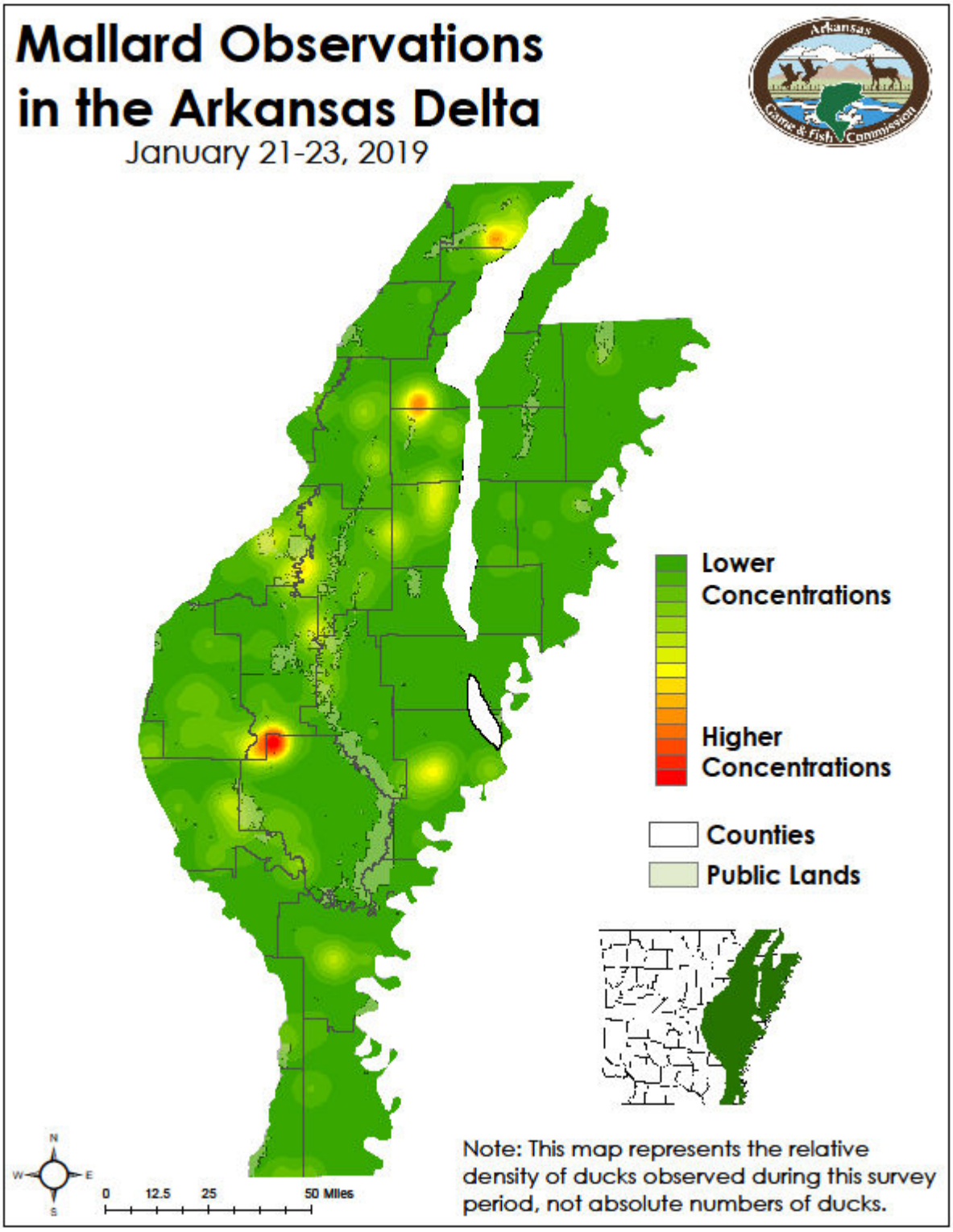


Figure 5. Mallard distribution in the Mississippi Alluvial Valley of Arkansas during the January 2019 aerial waterfowl survey.

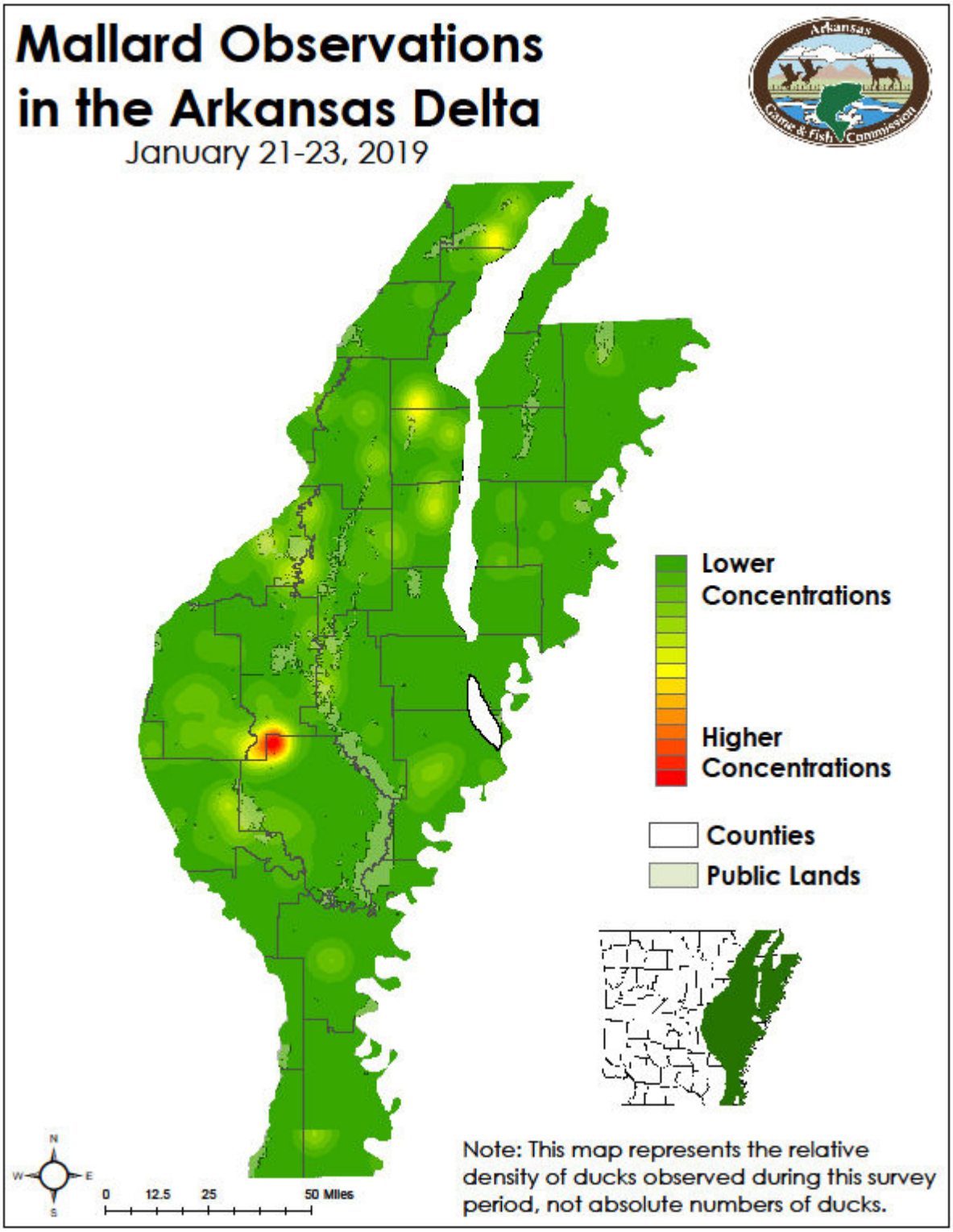


Figure 6. Duck distribution in the Arkansas River Valley of Arkansas during the January 2019 aerial waterfowl survey.

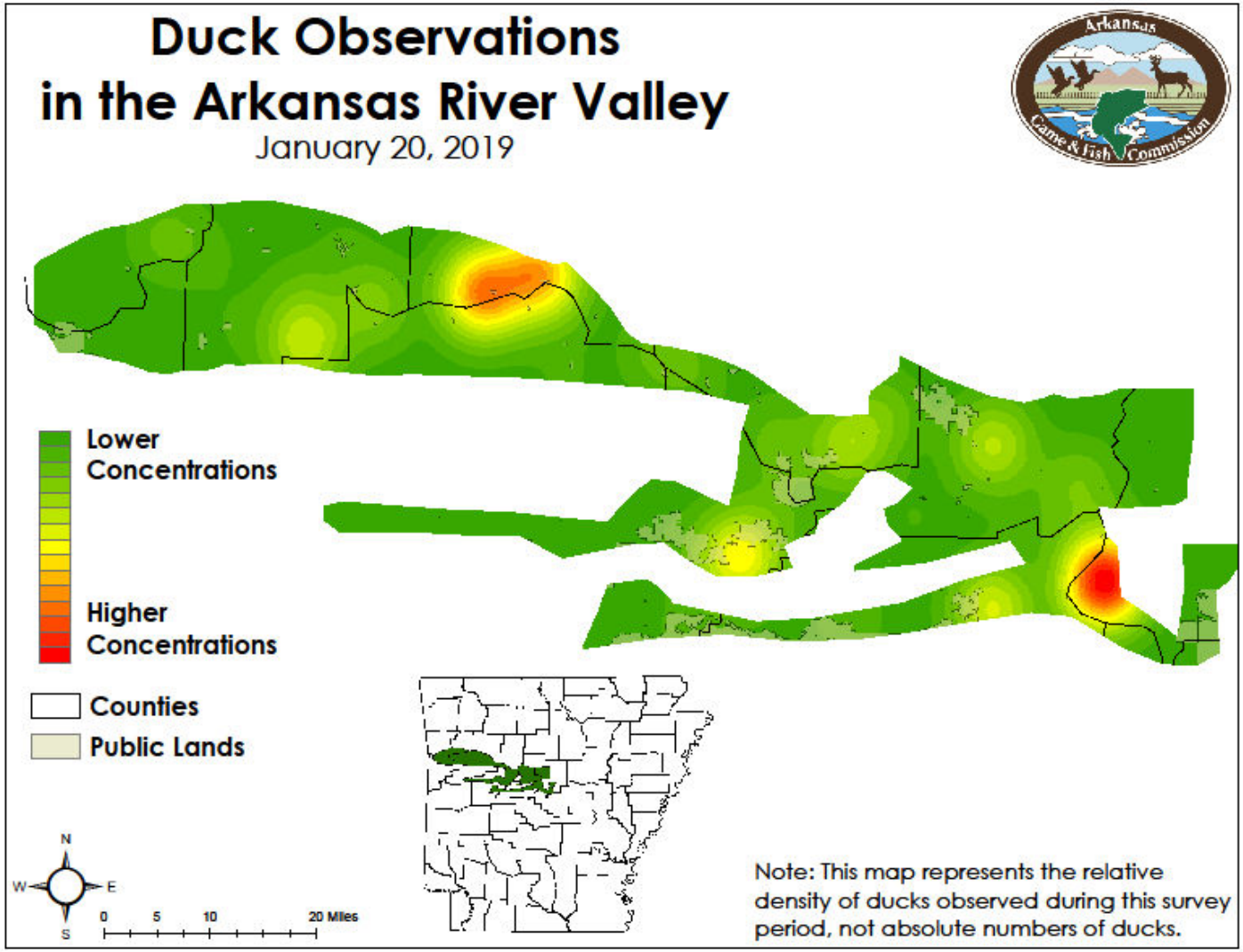
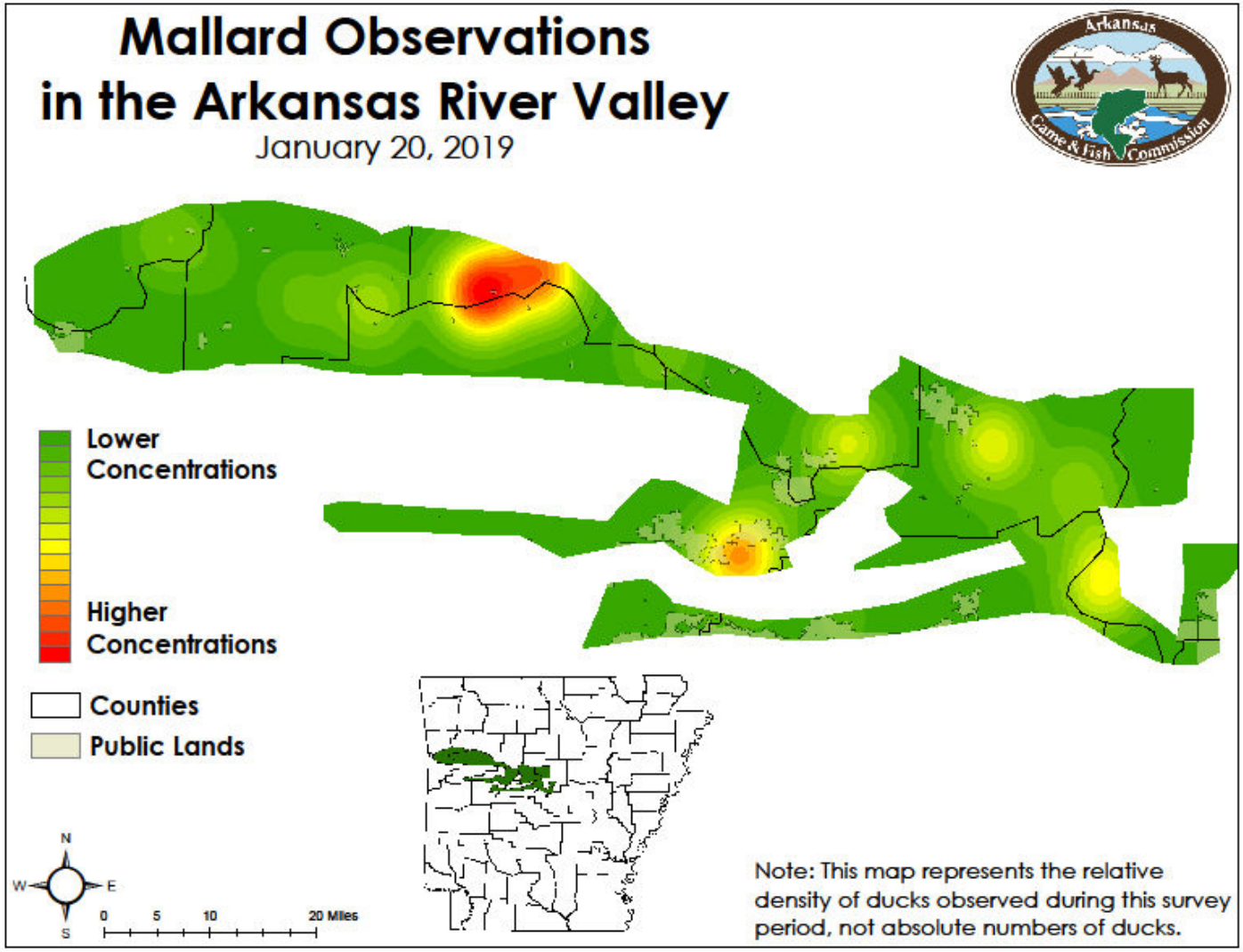


Figure 7. Mallard distribution in the Arkansas River Valley of Arkansas during the January 2019 aerial waterfowl survey.



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).

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

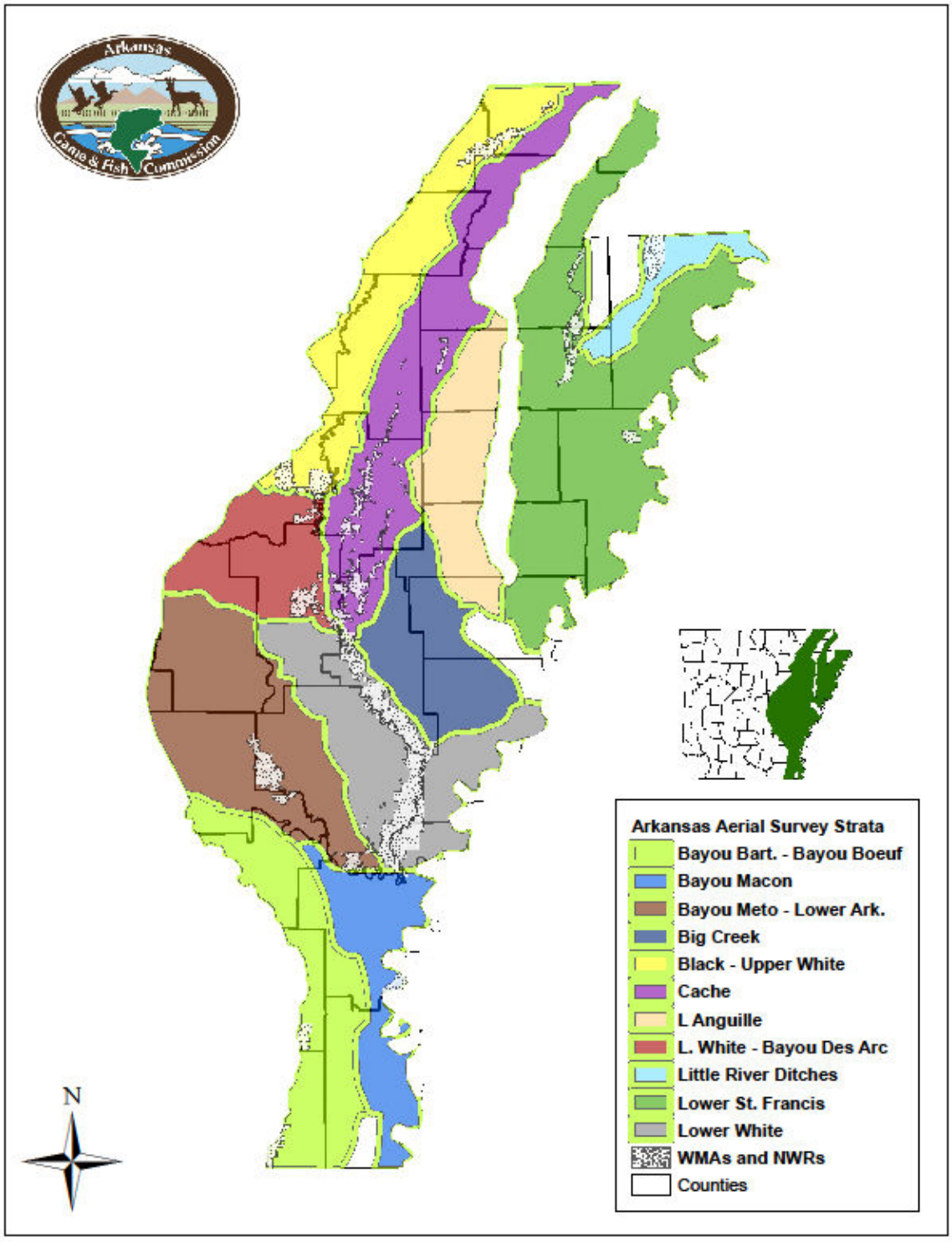


Figure 9. Aerial waterfowl survey strata in the Arkansas River valley (ARV) of western Arkansas.