



Arkansas Game and Fish Commission Aerial Waterfowl Survey Report

January 15-20, 2016

January 2016 Survey Summary

Arkansas Game and Fish Commission biologists conducted aerial waterfowl surveys Jan. 15 in the Arkansas River Valley (ARV), Jan. 18 in southwest Arkansas and an abbreviated survey Jan. 18-20, 2016 in the Mississippi Alluvial Valley (MAV or Delta). The Delta the duck population index was just under a million ducks, including slightly over 600,000 mallards (Table 1). Observers counted about 20,000 ducks in southwest Arkansas, almost 15,000 of which were mallards (Table 2). Population estimates in the ARV were slightly over 34,000 and 47,000 for mallards and all ducks, respectively (Table 2). Biologist observers were Jason Carbaugh, Jason Jackson, J.J. Abernathy, Mike Harris and Alex Zachary.

Duck population estimates were nearly unchanged since the 2016 Midwinter Waterfowl Survey (MWS) and remain below average. The Delta mallard estimate was well below the long-term average, declining slightly from the 2016 MWS estimate (Figure 1). Southwest Arkansas counts were in line with typical counts for mallards and total ducks (Table 2). In contrast, the mallard population estimate in the ARV rose slightly after a substantial increase from December 2015 to the 2016 MWS (Table 2). Duck (Figure 2) and mallard (Figure 3) distribution across the Delta showed few concentration areas, while mallard and all duck distribution shifted noticeably eastward in the ARV (Figures 4 and 5).

One of the strangest waterfowl seasons in recent memories continues to lead to unpredictable and sometimes inexplicable patterns of duck abundance, or lack thereof. Despite extremely mild conditions throughout this wintering period this aerial survey was hampered by two rounds of wintry weather. Thus, this survey was not complete. Both the L'Anguille and Little River Ditches survey zones and portions of other survey zones were not flown so MAV-wide population indices likely are underestimates. Typically these two zones account for about 8% of the mallards in the MAV, so if they had about an average number of mallards this survey period the MAV mallard total might be closer to 715,000, still a relatively low count. Nonetheless, indices suggest relatively precise population estimates, so survey totals likely represent actual duck numbers as well as a complete survey would have.

Duck counts from neighboring states and weather data shed light on this year's duck migration. From the 2000s until present, Missouri counts typically peak around Thanksgiving, roughly following a bell curve. This year's migration into Missouri started later into November and peaked in December before falling. The peak was nearly two weeks later than normal and about the same number of ducks as the 5-year peak. Habitat conditions were wet in much of the state at least once, if not two or three times, this season leading to unusually high habitat availability. In Louisiana, the 1.85 million ducks estimated during the Midwinter Waterfowl Survey was only 70% of the December survey total of 2.64 million, only 55% of the January 2015 MWS total of 3.38 million, and about 39% lower than the most recent 5-year average of 2.97 million and the long-term average of 3.03 million. It is the lowest January estimate

since 2009's total of 1.59 million, the lowest on record for this survey. It is the 5th lowest January survey estimate, exceeding those of 1983, 1987, and 2008 as well as 2009. Also in Louisiana, the decline in ducks counted from December to January was even greater on the NE Louisiana survey (closest to the Arkansas portion of the Delta), where only 106,000 ducks and 88,000 geese were counted on selected habitats. That was less than a third of the 363,000 ducks and 199,000 geese counted in December. In Mississippi, December duck estimates increased from the previous survey period, and were similar to recent years' early January estimates. Estimates for mallards and diving ducks were also very similar to the long-term average for all early January surveys, but estimates for other dabbling ducks and overall ducks remained well below their long-term averages for early January. Estimates for all categories of ducks showed increases from the December survey.

Thanks to colleagues in each of these states for the above information.

This year's weather set records (<http://www.ncdc.noaa.gov/sotc/national/201512>; see figures below). The average contiguous U.S. temperature during December was 38.6°F, 6.0°F above the 20th century average. This was the warmest December on record for the Lower 48, besting the previous record of 37.7°F set in 1939. The average maximum (daytime) temperature was 48.1°F, 5.3°F above the 20th century average, the second highest maximum value on record behind 1939, and the average minimum temperature was 29.2°F, 6.6°F above average. Record warmth engulfed the eastern half of the nation, where 29 states had the warmest December on record. During December, there were 18.8 times more record warm daily maximum and minimum temperature records compared to cold daily maximum and minimum temperature records. The December precipitation total for the contiguous U.S. was 3.93 inches, 1.58 inches above the 20th century average, ranking as the wettest December on record. This surpassed the previous record of 3.76 inches set in 1982. In summary, December 2015 marks the only month in the 121-year period of record that holds the title of both warmest and wettest month on record. Clearly, this year has been far from "normal".

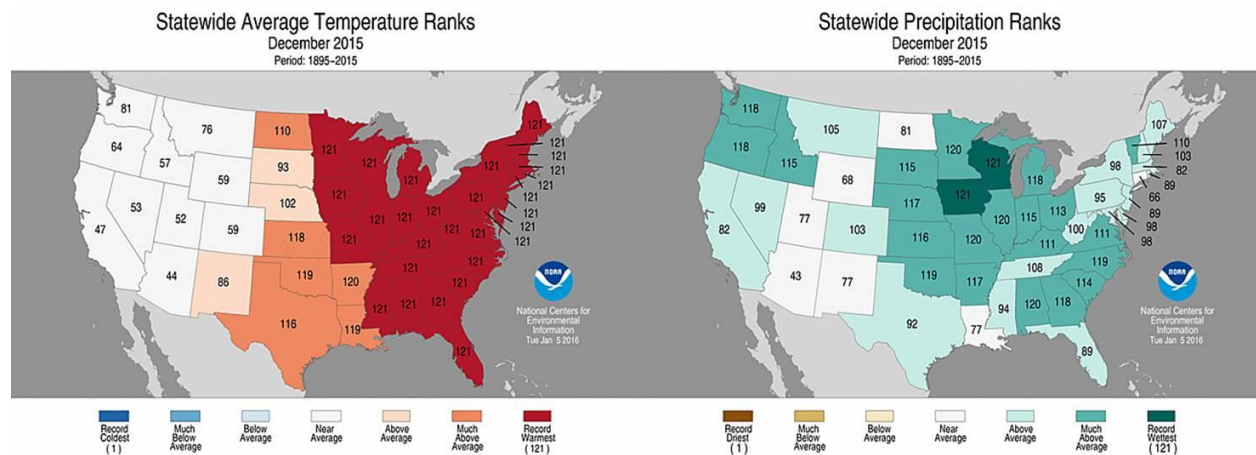


Table 1. Waterfowl abundance estimates in Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2016, in the Mississippi Alluvial Valley (MAV) using stratified random sampling of transects.

			Survey Zone											MAV Total	
			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		
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	

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, 2009-2016. 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	

Figure 1. Duck abundance estimates in the Mississippi Alluvial Valley of Arkansas during the late-November, mid-December, early-January Midwinter Survey and late-January aerial waterfowl survey periods, 2009-2016.

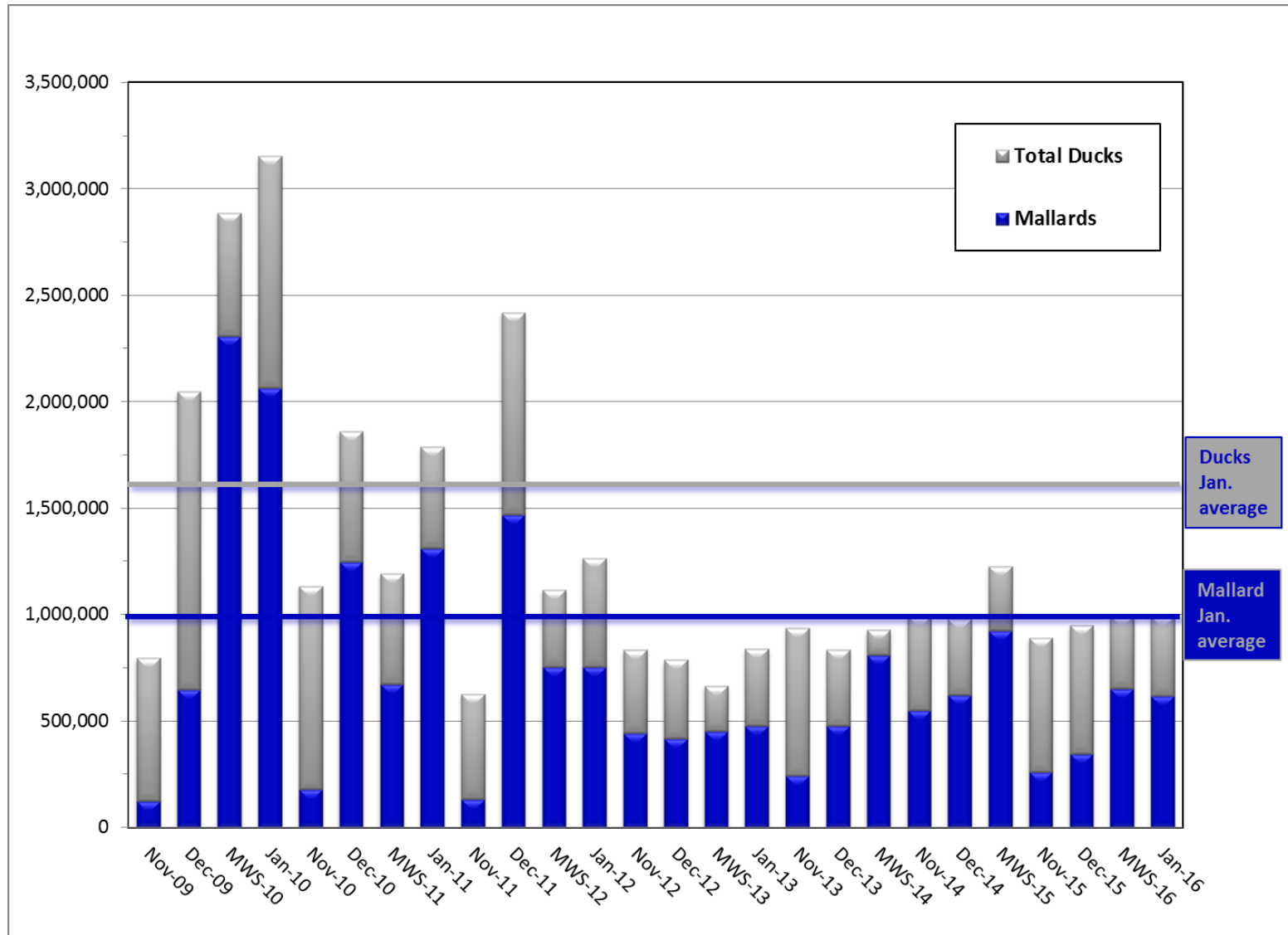


Figure 2. Duck distribution in the Mississippi Alluvial Valley of Arkansas during the January 2016 aerial waterfowl survey period.

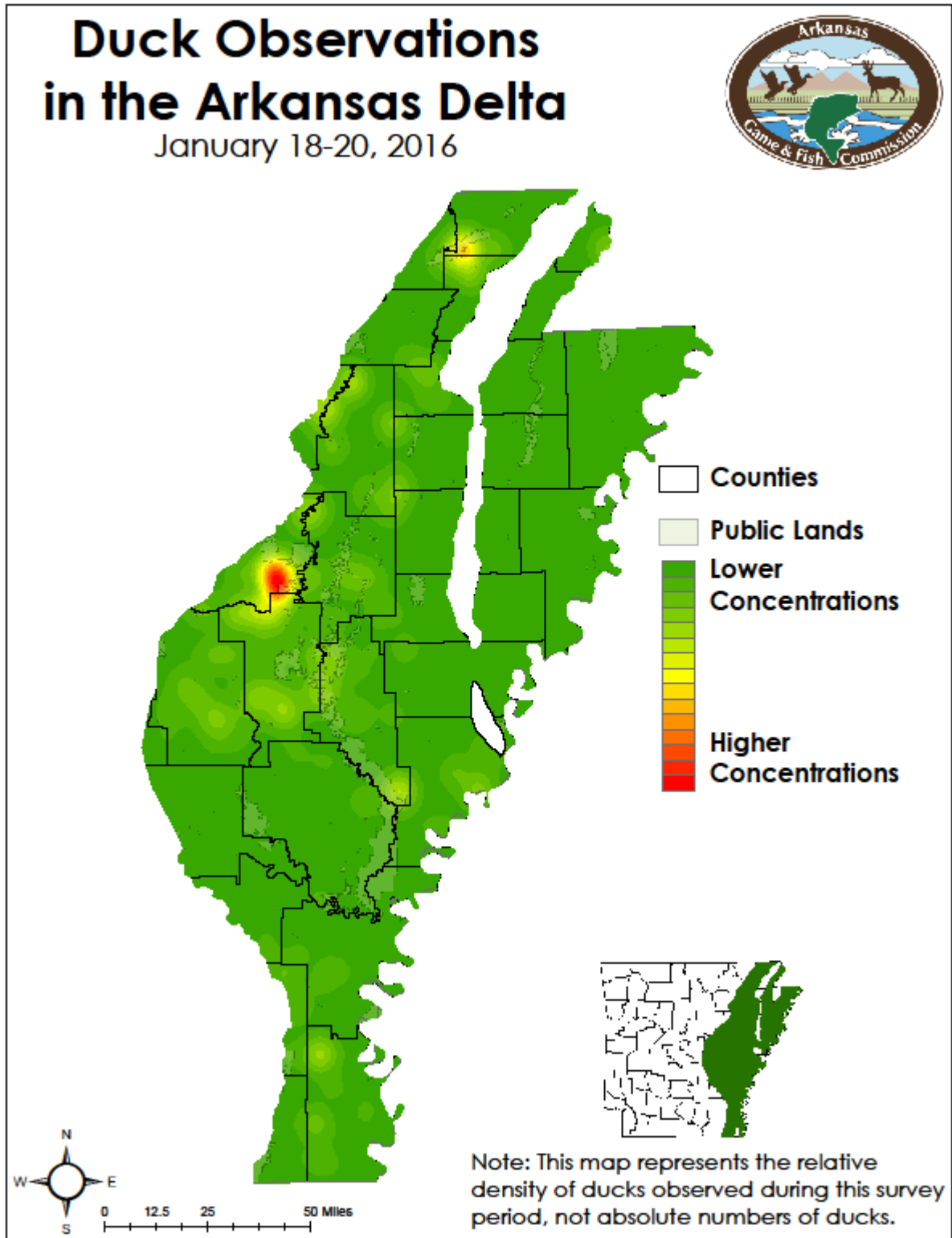


Figure 3. Mallard distribution in the Mississippi Alluvial Valley of Arkansas during the January 2016 aerial waterfowl survey period.

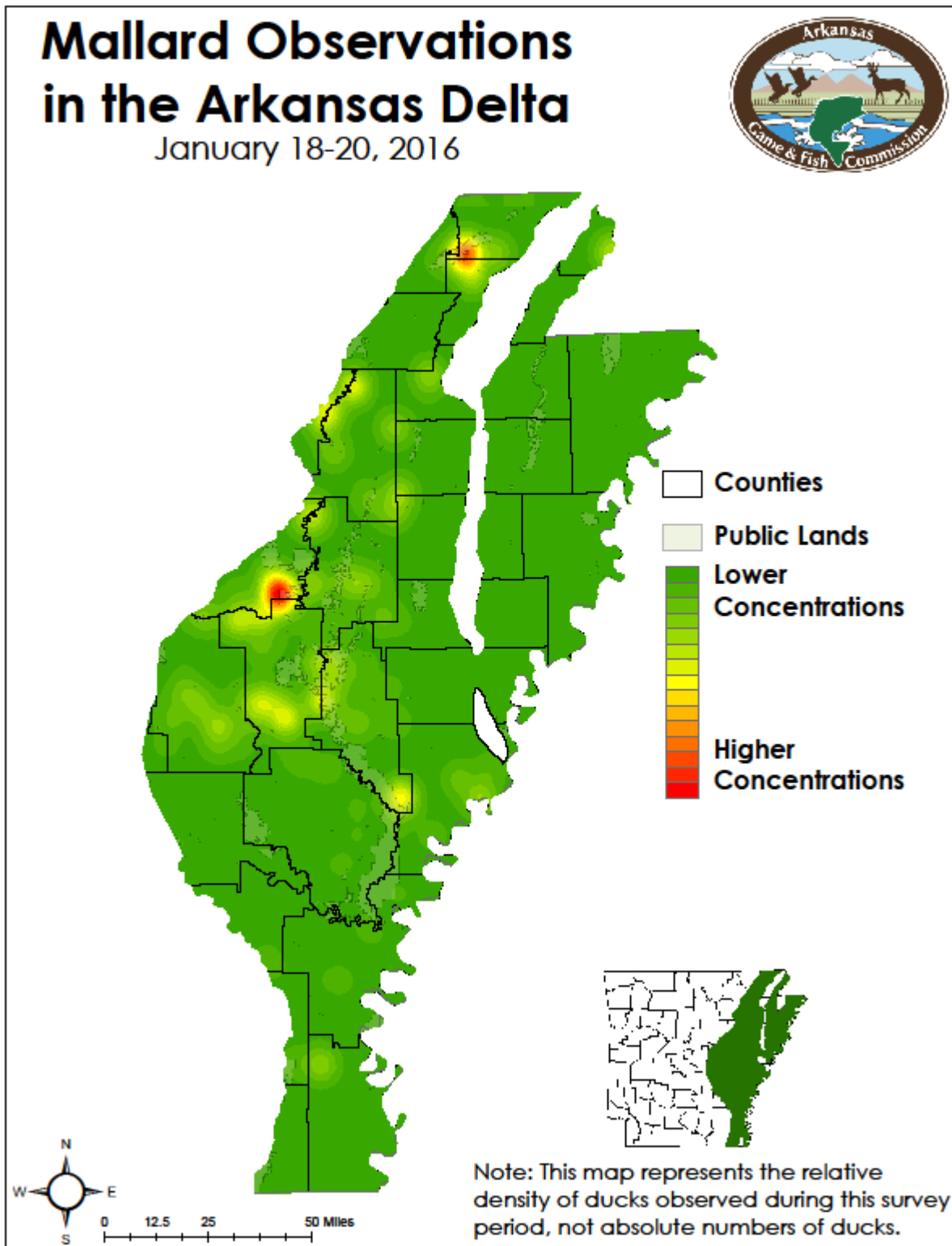


Figure 4. Duck distribution in the Arkansas River Valley (ARV) of Arkansas during the January 2016 aerial waterfowl survey period.

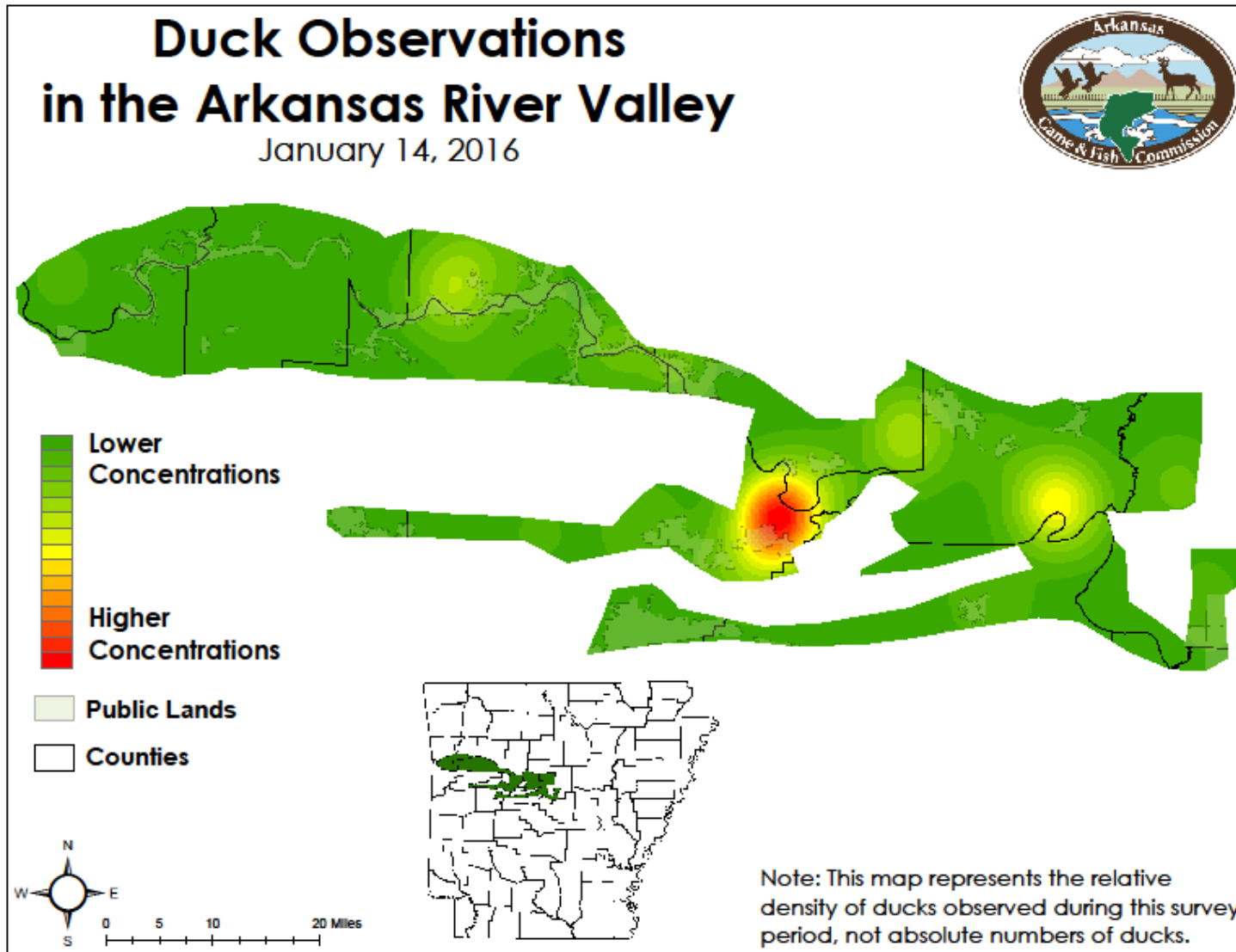
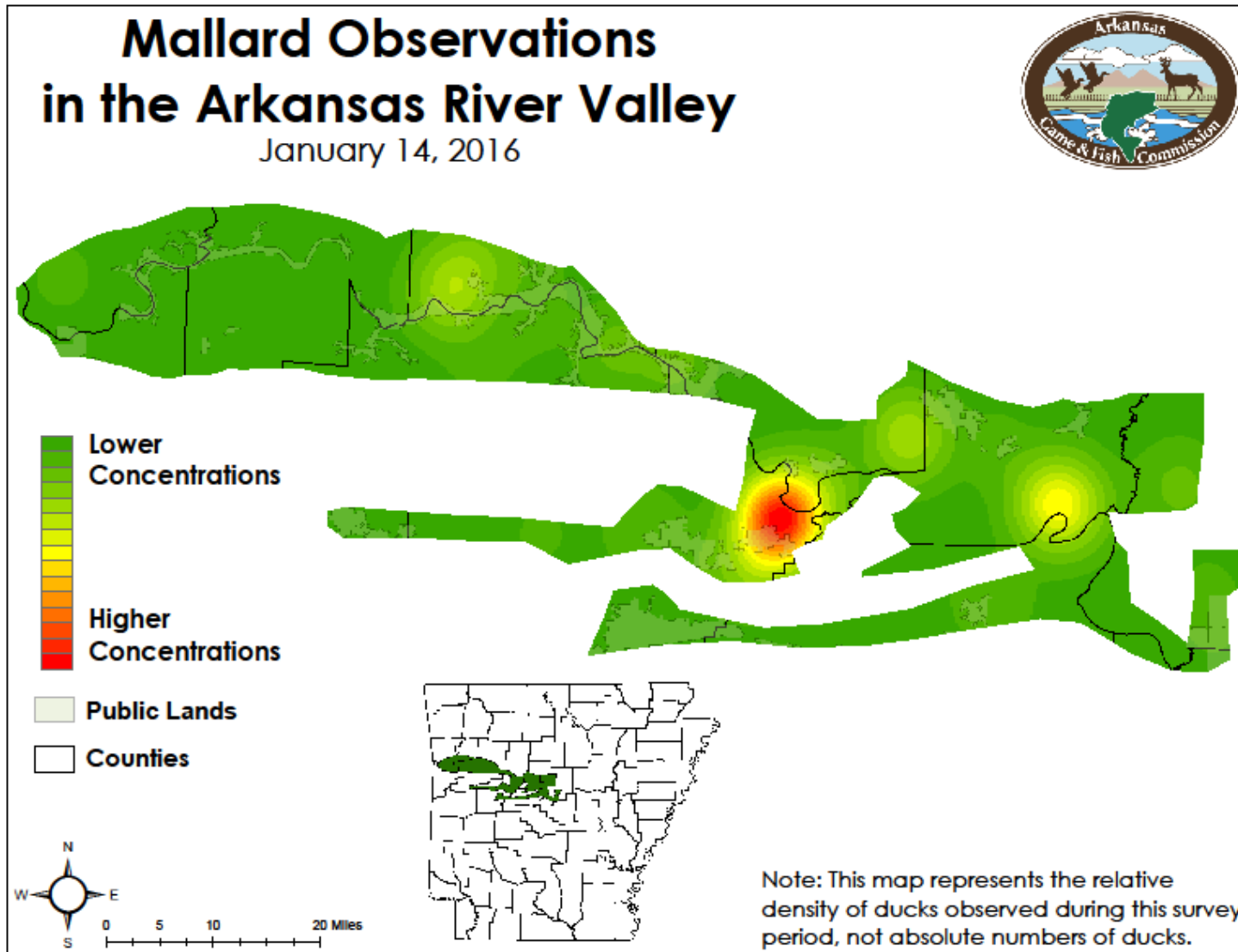


Figure 5. Mallard distribution in the Arkansas River Valley (ARV) of Arkansas during the January 2016 aerial waterfowl survey period.



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 6). 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. A similar survey design was implemented beginning in Jan. 2013 in the Arkansas River Valley (Figure 7).

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

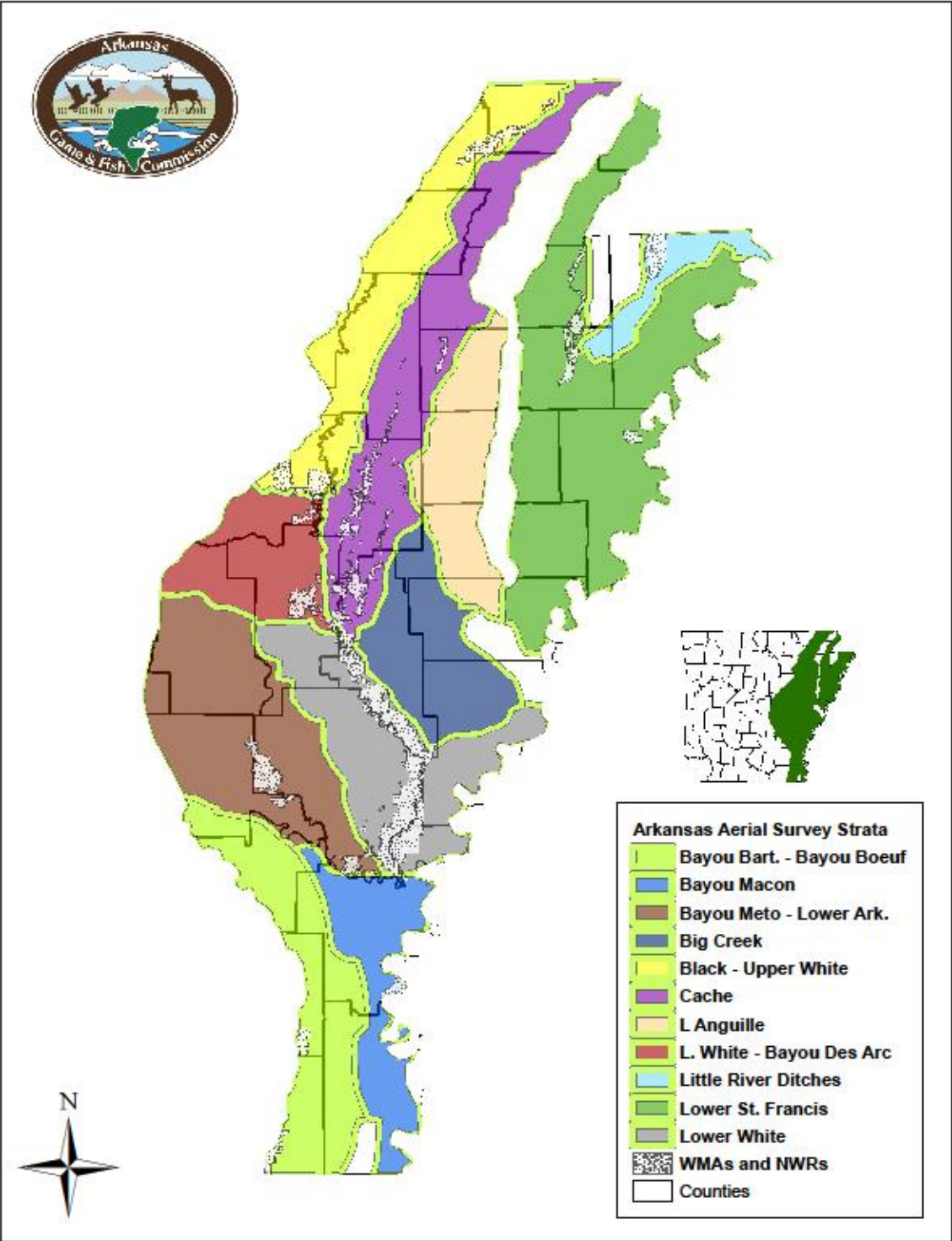


Figure 7. Aerial waterfowl survey strata in the Arkansas River valley (ARV) of western Arkansas.

