



## Arkansas Game and Fish Commission Aerial Waterfowl Survey Report

**December 4, 7-10, 2015**

### **December 2015 Survey Summary**

Arkansas Game and Fish Commission biologists conducted the Dec. 2015 aerial waterfowl survey Dec. 4 in southwest Arkansas, Dec. 7-10 in the Mississippi Alluvial Valley (Delta) and Dec. 9 in the Arkansas River Valley. Observers estimated 948,451 ducks in the Delta, including only 347,277 mallards (Table 1), and a total of 26,226 ducks in the Arkansas River Valley, including just 7,019 mallards (Table 2). The southwest Arkansas duck population estimate was slightly under 20,000, including 11,425 mallards (Table 2). Biologist observers were Jason Carbaugh, Jason Jackson, J.J. Abernathy, Mike Harris and Alex Zachary.

The Delta mallard population estimate is much lower than the 2009-2015 long-term December average of nearly 750,000 and is the lowest December mallard count since formal surveys began in 2009. The December duck population estimate also was much lower than the long-term average (Figure 1). Observers encountered most Delta mallards in the Black-Upper White and Cache survey zones (Table 1; Figure 6). Like during the November survey, Arkansas River Valley estimates for all ducks and mallards were low, with the only noticeable concentration in the Plumerville-Point Remove survey zone.

Over 30 percent of mallards in the Delta were observed in rice fields with about 14 percent in bean fields and 13 percent in other agricultural fields, while over 24 percent were in moist-soil habitats. Mallards in the Arkansas River Valley were distributed among oxbow lakes, cypress-tupelo wetlands, moist-soil habitats and rice fields.

The continued effect of an unusually warm fall is evident in these survey results. Weather patterns dominated by a strong El Niño brought earlier-than-normal rainfall and flooding to many parts of Arkansas at the beginning of the 2015-16 duck season. However, these weather patterns have also resulted in above-average temperatures in much of the U.S., including Arkansas and other parts of the Mississippi and Central Flyways. The result in Arkansas is abundant habitat but little in the way of favorable conditions for southerly duck migration, particularly for mallards. For example, the Missouri Department of Conservation's waterfowl surveys indicate migration is running about two weeks later than normal. Observations as part of the Mallard Migration Network also suggest a migration stall-out in mid-latitude states. Unfortunately, long-range forecasts don't leave much cause for optimism (e.g., at this writing the forecast high in Stuttgart on Christmas Day is 71 degrees). A major mallard migration almost certainly will occur this season, but when it does it likely will happen quickly and not provide the pulses of migration from the first or second week of December through early January that typically provide sustained duck hunting success across Arkansas.

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, 2009-2015, 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	<b>Mallards</b>	<b>6,103</b>	<b>1,287</b>	<b>59,153</b>	<b>17,784</b>	<b>107,474</b>	<b>109,493</b>	<b>13,682</b>	<b>5,814</b>	<b>11,408</b>	<b>9,242</b>	<b>5,837</b>	<b>347,277</b>	
	<b>Total Ducks</b>	<b>98,739</b>	<b>25,214</b>	<b>106,887</b>	<b>100,928</b>	<b>223,106</b>	<b>221,060</b>	<b>65,282</b>	<b>40,127</b>	<b>21,975</b>	<b>28,436</b>	<b>16,697</b>	<b>948,451</b>	

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, 2009-2015. 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									Arkansas River Valley Total	Southwest Arkansas Total
			Bigelow - Lake Conway	Cadron	East Dardanelle Reservoir	Fourche La Fave	Frog Bayou	Holla Bend	Petit Jean	Pt. Remove - Plumerville	West Dardanelle Reservoir		
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	

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, 2009-2015.

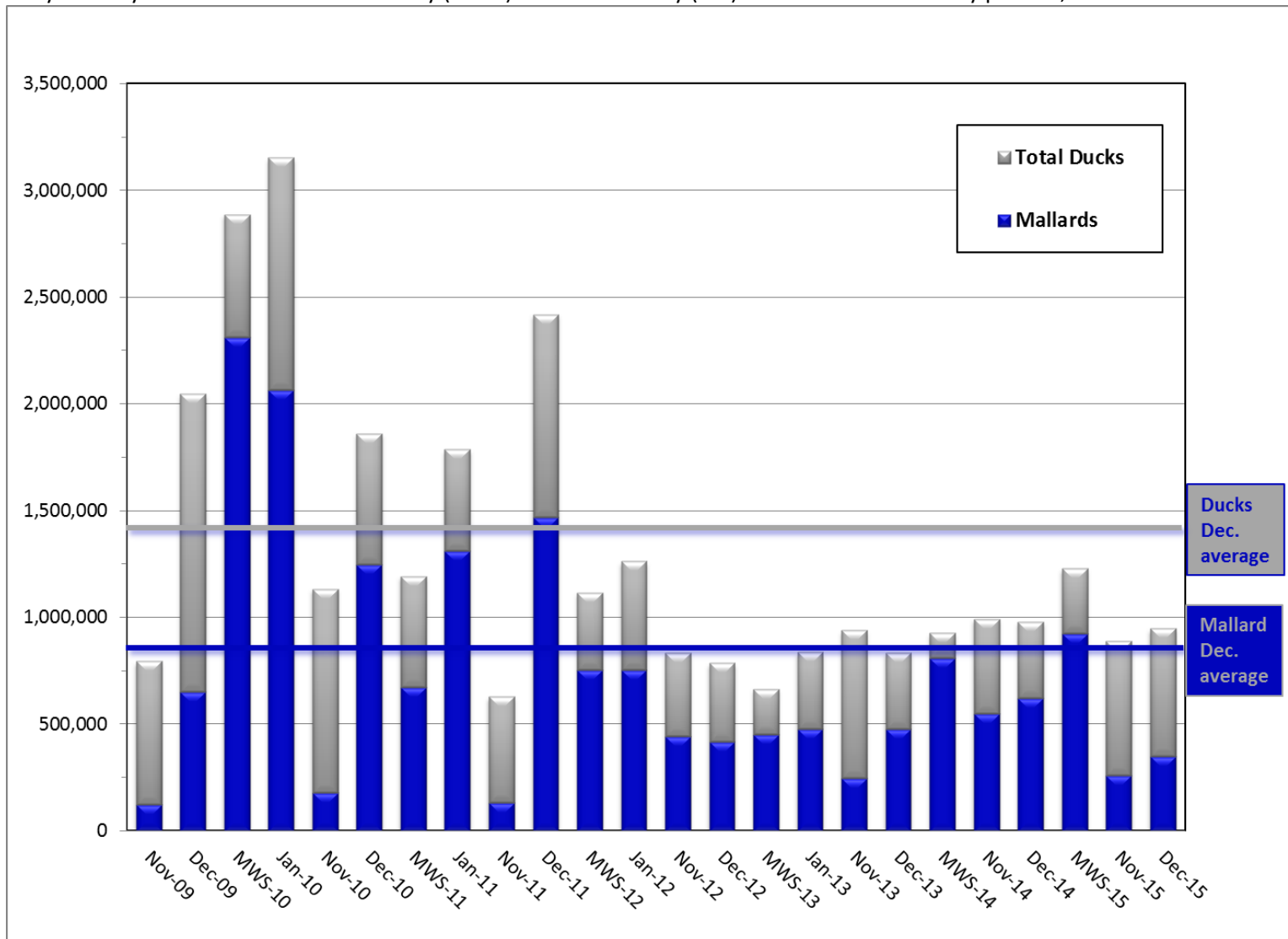


Figure 2. Duck distribution in the Mississippi Alluvial Valley of Arkansas during the December 2015 aerial waterfowl survey period.

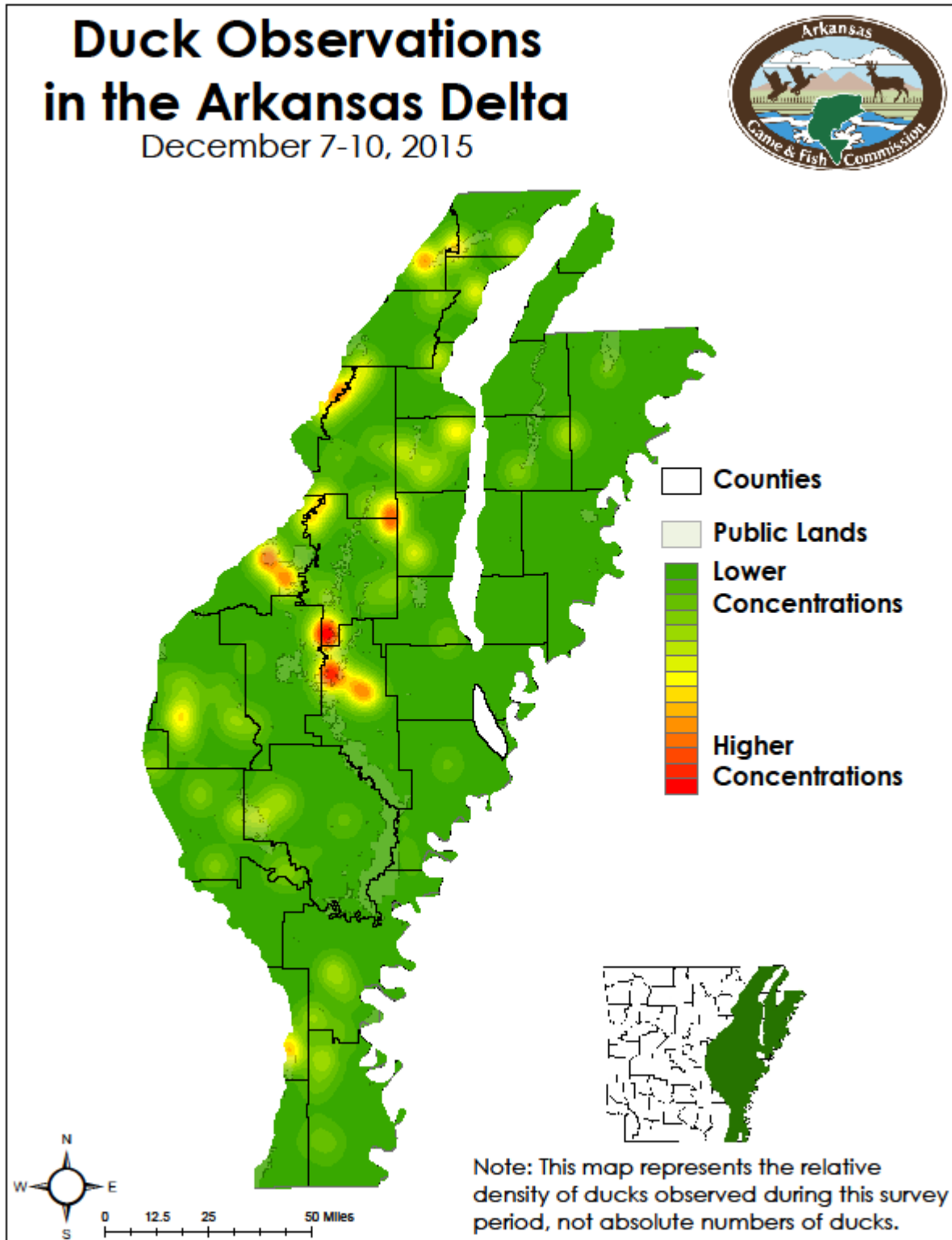


Figure 3. Mallard distribution in the Mississippi Alluvial Valley of Arkansas during the December 2015 aerial waterfowl survey period.

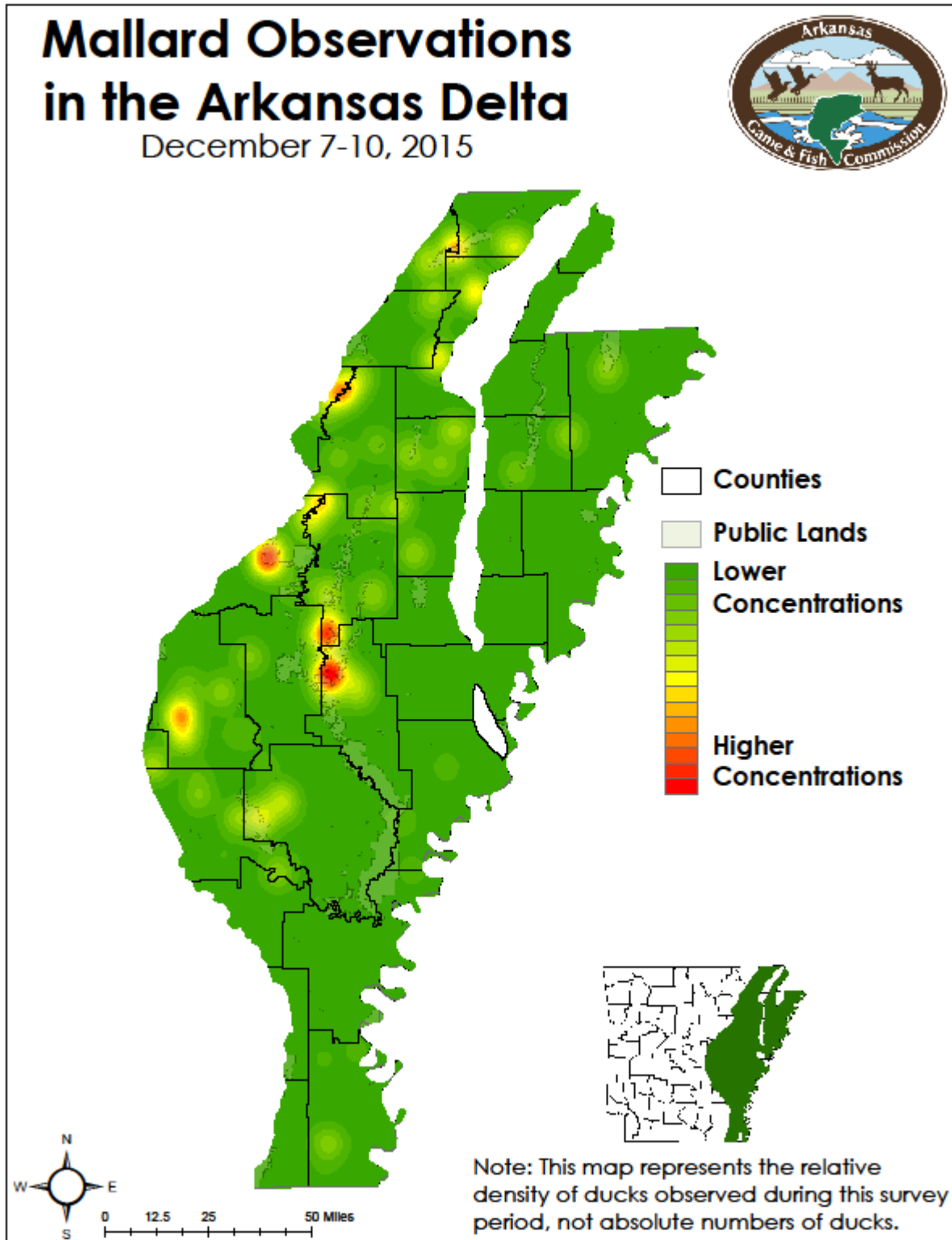


Figure 4. Duck distribution in the Arkansas River Valley (ARV) of Arkansas during the December 2015 waterfowl survey period.

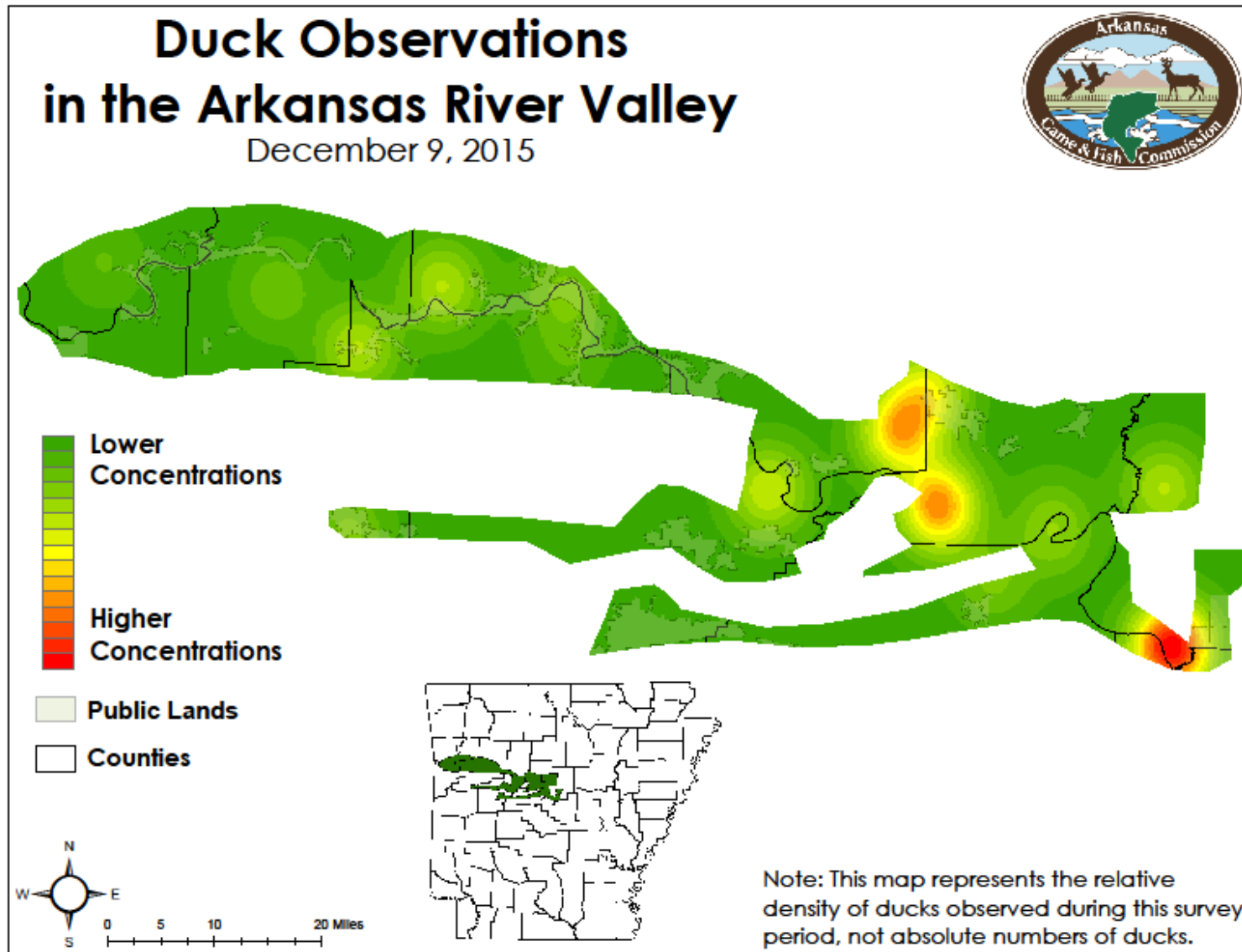
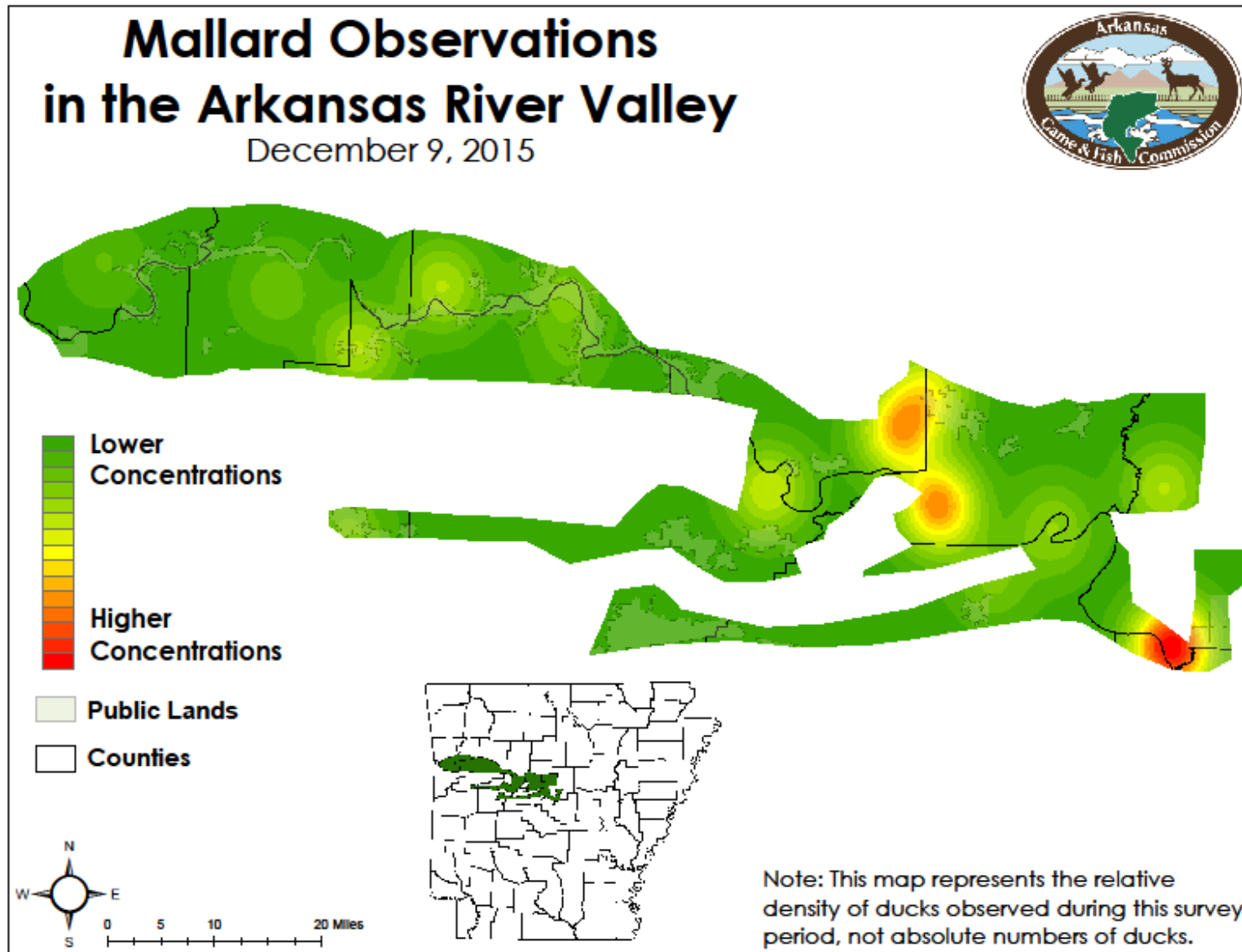


Figure 5. Mallard distribution in the Arkansas River Valley (ARV) of Arkansas during the December 2015 waterfowl survey period.





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

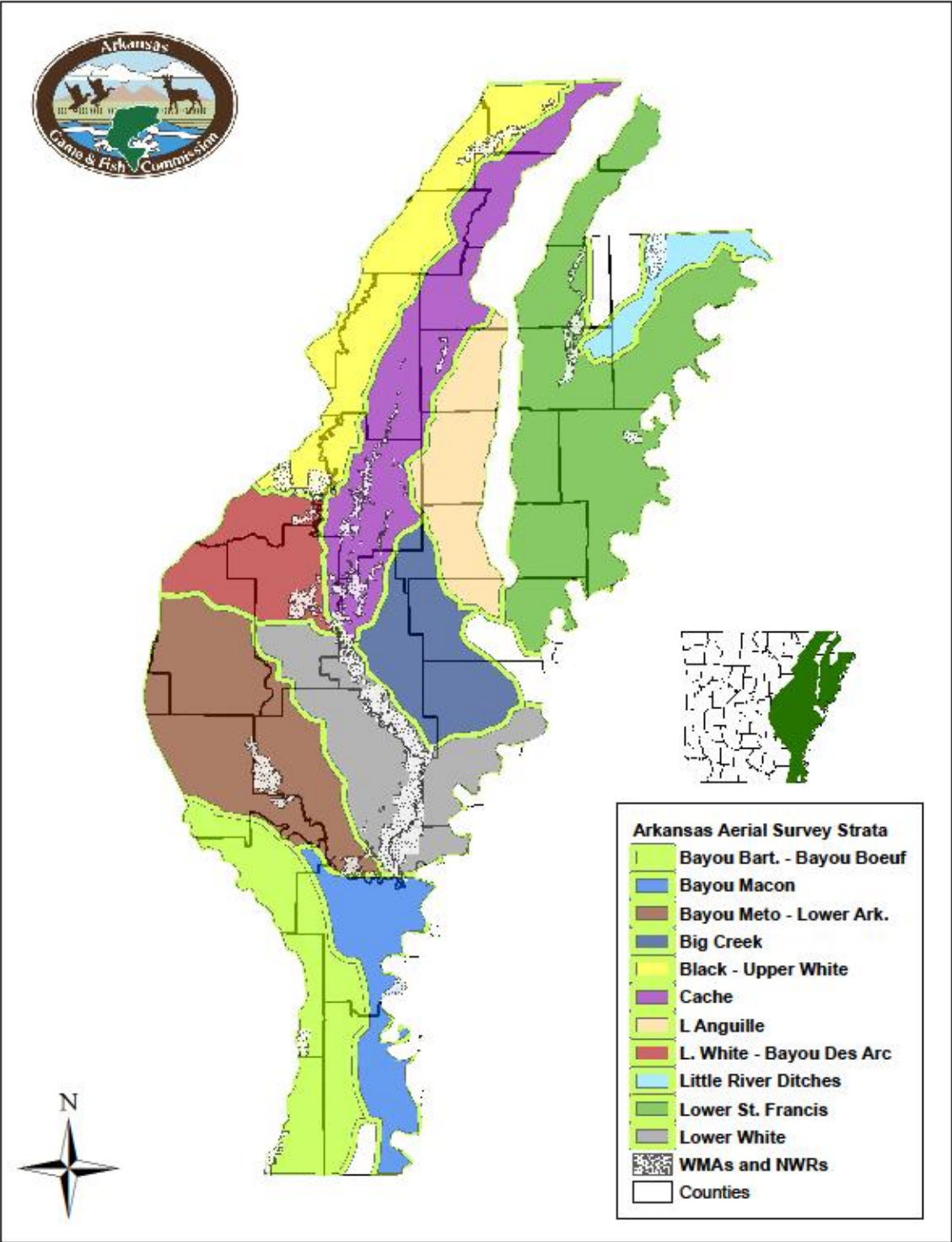


Figure 7. Aerial waterfowl survey strata in the Arkansas River valley (ARV) of western Arkansas.

