

Arkansas Game and Fish Commission Aerial Waterfowl Survey Report November 12-16, 2018

Arkansas Game and Fish Commission staff conducted Nov. 2018 aerial waterfowl surveys Nov. 12-16 in the Mississippi Alluvial Valley (Delta), Nov. 15 in the Arkansas River Valley and southwest Arkansas Nov. 14. Observers estimated over 837,000 ducks in the Delta, including over 360,000 mallards (Table 1), and a total of 32,670 ducks in the Arkansas River Valley, many of which were mallards (32,670; Table 2). The southwest Arkansas total duck count was 26,969, including just under 10,000 mallards. Observers in the Delta estimated strong number of arctic-nesting geese, including over 828,000 light (lesser snow and Ross's) geese and over 420,000 greater white-fronted geese. Observers were J.J. Abernathy, Jason Carbaugh, Jason Jackson, Cameron Tatom and Alex Zachary.

The Delta mallard population estimate was about 100,000 higher than the 2009-2018 long-term November average. Total duck population estimates were similar to the long-term average (Figure 1). Nearly one-third of mallards in the Delta were in the Cache survey zone, followed closely by the Black-Upper White survey zone. Notable duck concentrations that did not fall along randomly selected transect lines included Lake Ashbaugh, Big Lake NWR, south of Big Lake NWR and WMA, Cache River north of Amagon, and Bald Knob NWR. Estimates for all ducks and mallards in the Arkansas River valley were slightly higher than normal, with the highest counts in the Point Remove-Plumerville survey zone and fair numbers in the Petit Jean, Frog Bayou and Fourche LaFave survey zones (Figure 2). Only about one-third of ducks observed in southwest Arkansas were mallards, with gadwalls making up the majority of ducks in the area during the survey.

Observers found nearly 40 percent of mallards in the Delta in rice fields, followed by other agricultural fields and moist-soil habitat. In the Arkansas River valley, biologists saw about 36 percent of mallards in moist-soil habitat, with about 20 percent each in bottomland hardwood wetlands and flooded corn fields.

Habitat conditions during the survey period were much better than during typical for November. What is historically one of the driest periods of the year turned out to be abnormally wet, leading to much more water on the landscape during the survey period. Persistent rainfall during October and November also has slowed harvest in agricultural fields, likely to the detriment of farmers but a bonus for waterfowl. Wet conditions also appears to have slowed fall tillage of harvested fields. Observers did note many fields that may have stayed flooded with later rains were drained to allow farmers to complete harvest. Abnormally cool temperatures provided good migration conditions for ducks and geese preceding surveys. Dry conditions are not typical during early fall, and early rain (even snow) and cold during typically dry periods provided a migration pulse earlier than normal, but duck migrations and higher duck counts typically coincide with historic periods of natural flooding (i.e. mid-December and early January) so, as in most years, additional mallard migrations should be coming in the next month.

Staff will conduct the next aerial waterfowl survey the week of Dec. 10.

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, 2009-2018, in the Mississippi Alluvial Valley (MAV) using stratified random sampling of transects.

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Nov-14 Mailards 14,00 17,00 136,741 22,901 34,196 19,007 3,454 22,216 12,848 69,511 84,007 54,74 Nov-14 Mailards 83,914 51,660 234,759 80,425 70,814 29,520 12,382 45,023 171,835 80,469 132,448 993 Dec-14 Mailards 81,653 48,048 53,377 7,836 159,671 12,003 13,500 24,196 46,082 251,119 97 MWS-15 Total Ducks 113,960 29,818 162,687 99,270 110,723 25,664 310,831 100,338 8555 152,074 118,0014 142,12 122,088 14,459 43,547 116,041 885 Nov-15 Total Ducks 203,640 120,492 126,942 25,333 49,581 149,017 18,051 22,088 14,459 43,547 116,041 885 Dec.15 Total Ducks 51,03 1,287 59,153 17,744	MWS-14	Mallards	104,455	33,520	164,150	3,070	66,080	216,061		56,508		13,835	123,399	807,136
Nov-14 Tota Ducks 83,914 51,660 234,759 80,4759 78,36 159,637 12,105 36,370 83.08 23,2966 161,88 172,746 622 Dec-14 Total Ducks 107,261 50,700 168,894 12,430 212,520 18,005 72,920 15,300 24,196 46,082 251,119 975 MWS-15 Total Ducks 130,296 30,988 188,203 106,124 148,309 39,287 55,675 18,601 8,855 321,514 180,142 1,225 Nov-15 Total Ducks 203,640 120,492 126,942 25,333 149,581 14,9017 18,051 22,088 14,459 43,547 116,014 88 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 Total Ducks 93,799 25,214 106,881 14,550 53,900 97,829 106,172 20,	,		114,764	44,313	182,263	3,070		247,069		80,835				927,676
Indu and bucks 63,914 31,600 234,739 60,4739 70,614 29,200 12,322 43,023 17,1633 80,469 12,446 933 Dec-14 Total Ducks 107,261 50,700 166,894 12,430 212,520 18,005 72,920 15,300 24,196 46,082 251,119 975 MWS-15 Total Ducks 113,2960 29,818 1162,687 100,723 25,064 31,083 1033 8,855 321,514 180,0142 1,22 Nov-15 Total Ducks 130,296 30,988 188,203 106,124 148,309 39,287 55,675 18,601 8,855 321,514 180,0142 1,22 Nov-15 Total Ducks 203,640 12,0492 126,942 25,333 49,581 149,017 18,051 22,088 14,459 43,547 116,041 882 Dec-15 Total Ducks 98,739 25,214 106,887 100,928 223,106 21,060 65,282 40,127 21,975 <td>Nov-14</td> <td></td> <td>9,409</td> <td>17,100</td> <td>136,741</td> <td></td> <td>34,196</td> <td></td> <td></td> <td>22,216</td> <td></td> <td>69,511</td> <td></td> <td>547,560</td>	Nov-14		9,409	17,100	136,741		34,196			22,216		69,511		547,560
Dec-14 Total Ducks 107,261 50,700 168,894 12,430 212,520 18,005 72,920 15,300 24,196 46,082 251,119 977 MWS-15 Total Ducks 130,296 30,988 188,203 106,124 148,309 39,287 55,675 18,601 8,855 162,042 172,056 92,73 Mov-15 Total Ducks 203,640 120,492 126,942 25,331 46,418 7,625 15,597 9,093 40,889 42,941 26,837 347 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 MWS-16 Mallards 31,506 13,806 84,035 14,558 53,900 97,829 106,172 20,482 60,454 - 170,364 653 MWS-16 Mallards 22,606 9,068 59,169 22,800 80,500 135,110 - 116,166				18 048	234,739		150,614	29,520	26 270	45,025				993,249 620,244
MWS-15 Mailards Total Ducks 113,960 29,818 162,687 99,270 110,723 25,064 31,083 10,033 8,855 162,042 172,026 9927 Nov-15 Mailards 35,599 43,200 17,915 19,253 15,382 46,418 7,625 15,597 9,093 40,889 42,941 261 Mov-15 Mailards 6,103 1,287 59,153 17,784 107,471 19,051 22,088 14,459 43,547 116,041 88 Dec-15 Total Ducks 98,739 25,214 106,887 100,928 223,106 221,060 65,282 40,127 21,975 28,436 16,697 94 MWS-16 Total Ducks 55,172 32,204 125,780 37,662 91,665 164,831 155,016 28,744 74,250 3,943 226,832 96 Jan-16 Total Ducks 55,172 32,204 125,702 33,212 105,643 144,233 - 74,942 96,303 <td>Dec-14</td> <td>Total Ducks</td> <td>107 261</td> <td>50 700</td> <td>168 894</td> <td>12 430</td> <td>212 520</td> <td>18 005</td> <td>72 920</td> <td>15 300</td> <td>23,500</td> <td>46.082</td> <td></td> <td>979,427</td>	Dec-14	Total Ducks	107 261	50 700	168 894	12 430	212 520	18 005	72 920	15 300	23,500	46.082		979,427
MWS-15 Total Ducks 130,296 30,988 188,203 106,124 148,309 39,287 55,675 18,601 8,855 321,514 180,142 1,222 Nov-15 Total Ducks 3,599 43,200 17,915 19,253 15,382 46,418 7,625 15,597 9,038 42,941 26,042 25,333 49,581 149,017 18,051 22,088 14,459 43,547 116,041 889 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 MWS-16 Mallards 31,506 13,806 84,035 14,558 53,900 97,829 106,172 20,482 60,454 - 170,364 653 Jan-16 Mallards 22,606 9,068 59,169 22,800 80,590 135,110 - 116,169 - 74,942 96,330 616 Jan-16 Total Ducks 59,833			113,960	29.818	162.687	99.270	110.723	25.064	31.083	10.033	8.855	162.042	172.026	925,561
Nov-15 Mailards Total Ducks 3,599 43,200 17,915 19,253 15,382 46,418 7,625 15,597 9,093 40,889 42,941 261 Dec-15 Total Ducks 203,640 120,492 126,942 25,333 49,581 149,017 18,051 220,888 14,459 43,547 116,041 88 Dec-15 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 MWS-16 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 Jan-16 Mailards 22,606 9,068 59,169 22,800 80,590 135,110 - 116,169 - 74,942 96,330 616 Total Ducks 5,983 17,179 71,612 57,712 31,167 24,772 29,140 1,064 33,788	MWS-15		130,296	30,988	188,203		148,309	39,287	55,675	18,601		321,514		1,227,99
India Ducks 205,040 120,492 126,942 25,353 49,511 149,017 160,31 22,085 14,439 49,547 110,041 68 Dec-15 Total Ducks 98,739 25,214 106,887 100,928 223,106 221,060 65,282 40,127 21,975 28,436 16,697 944 MWS-16 Total Ducks 95,172 32,204 125,780 37,662 91,665 164,831 155,016 28,744 74,250 3,943 226,832 996 Jan-16 Mallards 22,606 9,068 59,169 22,800 80,590 135,110 - 116,169 - 74,942 96,330 616 Total Ducks 59,83 17,179 75,702 33,212 105,643 184,233 - 291,312 - 74,942 111,648 902 Nov-16 Mallards 0 0 2,724 17,919 226,332 11,367 24,772 29,140 1,064 33,788 9,724	No. 15		3,599	43,200		19,253		46,418		15,597				261,912
Dec-1s Total Ducks 98,79 25,214 106,887 100,928 223,106 221,060 65,282 40,127 21,975 28,436 16,697 948 MWS-16 Total Ducks 31,506 13,806 84,035 14,558 53,900 97,829 106,172 20,482 60,454 - 170,364 653 Jan-16 Mallards 22,606 9,068 59,169 22,800 80,590 135,110 - 116,169 - 74,942 96,330 616 Jan-16 Mallards 0 0 26,781 21,094 0 13,210 - 74,942 96,330 616 Mov-16 Mallards 0 0 26,781 21,094 0 13,242 3,007 285 16,572 0 12,381 81, Dec-16 Mallards 15,104 475 150,571 31,456 23,246 91,324 19,088 8,160 20,241 20,767 64,914 445 445	1100-13	Total Ducks									14,459			889,191
MWS-16 Mallards 31,506 13,806 84,035 140,558 223,106 211,000 05,222 40,127 21,973 21,913 21,973 21,931 21,973 21,931 21,973 21,931 21,973 21,931 21,931 21,931 21	Dec-15													347,277
MWS-16 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 Jan-16 Total Ducks 22,606 9,068 59,169 22,800 80,590 135,110 - 116,169 - 74,942 96,330 616 Nov-16 Mallards 0 0 26,781 21,094 0 1,792 30,007 285 16,572 0 12,381 81, Dec-16 Total Ducks 59,833 17,179 71,612 57,213 1,167 24,772 29,140 10,644 33,788 9,724 17,919 266 Dec-16 Mallards 15,104 475 150,591 31,456 23,246 91,324 19,088 8,160 20,241 20,677 64,914 445 Mws-17 Total Ducks 72,405 40,448 219,106 22,908 14,102 12,8174 13,479 9,822 75,996 75,677 <td>500 15</td> <td></td> <td>948,451</td>	500 15													948,451
India Ducks 35,172 32,204 125,769 27,802 91,695 164,811 155,016 26,744 74,250 3,943 228,032 995 Jan-16 Total Ducks 94,269 21,294 75,702 33,212 105,643 184,233 - 291,312 - 74,942 96,330 616 Mallards 0 0 26,781 21,094 0 1,722 3,007 285 16,572 0 12,381 81, Dec-16 Mallards 15,104 475 150,591 31,456 23,246 91,324 19,088 8,160 20,767 64,914 4455 Dec-16 Mallards 72,010 8,361 207,710 43,213 26,332 115,977 30,448 43,642 30,147 86,977 85,357 750 MWS-17 Mallards 7,154 15,15 146,710 20,187 41,202 26,574 13,479 9,822 75,996 75,677 915 Jan-17 <	MWS-16			13,806		14,558					60,454			653,106
Jahrle Total Ducks 94,269 21,294 75,702 33,212 105,643 184,233 - 291,312 - 74,942 111,648 992 Nov-16 Total Ducks 5,983 17,179 71,612 57,213 1,167 24,772 29,140 10,644 33,788 9,724 17,919 266 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 Dec-16 Mallards 72,405 40,448 219,106 22,908 14,102 128,174 20,651 12,460 8,873 41,202 70,677 651 MWS-17 Total Ducks 95,012 57,394 250,439 26,338 38,389 236,142 36,784 13,479 9,892 75,996 75,677 915 Jan-17 Total Ducks 73,706 66,649 225,301 28,396 87,546 27,701 85,466 57,463 10,021 </td <td></td> <td>996,099 616,784</td>														996,099 616,784
NOV-16 Total Ducks 5,983 17,179 71,612 57,213 1,167 24,772 29,140 1,064 33,788 9,724 17,919 265 Dec-16 Total Ducks 15,014 475 150,791 31,456 23,246 91,324 19,088 8,160 20,241 20,767 64,914 445 Total Ducks 72,010 8,361 207,710 8,213 26,332 115,977 30,448 43,642 30,147 86,977 85,357 750 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 Jan-17 Mallards 7,154 15,155 146,710 20,187 41,860 159,212 47,503 10,021 51,226 91,663 1,055 Jan-17 Mallards 4,921 3,151 116,026 19,729 84,718 38,466 26,874 2,400 26,622 91,663 1,055 </td <td>Jan-16</td> <td></td> <td></td> <td></td> <td>75,702</td> <td>33,212</td> <td></td> <td>184 233</td> <td></td> <td>291 312</td> <td>-</td> <td>74,942</td> <td></td> <td>992,255</td>	Jan-16				75,702	33,212		184 233		291 312	-	74,942		992,255
Nov-16 Total Ducks 5,983 17,179 71,612 57,213 1,167 24,772 29,140 1,064 33,788 9,724 17,919 265 Dec-16 Total Ducks 15,014 475 150,591 31,456 23,246 91,324 19,088 81,600 20,241 20,767 64,914 445 Total Ducks 72,010 83,611 207,710 43,213 26,332 115,977 30,448 43,642 30,147 86,977 85,357 750 MWS-17 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 Jan-17 Mallards 7,154 15,155 146,710 20,187 41,860 159,212 47,563 10,021 51,226 91,663 1,05 Jan-17 Mallards 4,921 3,151 116,026 19,729 87,546 277,917 85,046 57,463 10,021 51,226			0									0		81,912
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 Mollards 72,010 8,361 207,710 43,213 26,332 115,977 30,448 43,642 30,147 86,977 85,357 750 MWS-17 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 Jan-17 Total Ducks 97,076 66,649 225,301 28,974 41,002 12,476 8,166 30,147 8,166 63,039 559 Jan-17 Total Ducks 73,706 66,649 225,301 28,974 27,097 151,426 10,021 51,226 91,663 10,021 51,226 91,663 10,052 95,08 432 Dec-17 Mallards 2,458 34,577 390,205 92,504 40,402 132,049 35,330 1,	Nov-16													269,563
Dec-16 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 MWS-17 Total Ducks 72,010 40,448 219,106 22,908 14,102 128,174 20,651 12,460 8,873 41,202 70,677 651 Jan-17 Total Ducks 95,012 57,394 250,439 26,358 38,389 26,142 36,784 13,479 9,892 75,996 75,677 911 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 Dec-17 Mallards 4,921 3,151 116,026 19,729 84,718 38,466 26,874 24,00 26,662 100,522 91,663 1,05 Dec-17 Total Ducks 28,720 12,448 192,672 24,770 158,347 70,974 64,906 39,102	D== 10	Mallards	15,104	475	150,591	31,456	23,246	91,324	19,088	8,160	20,241	20,767	64,914	445,364
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 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 Jan-17 Total Ducks 73,706 666,649 225,301 28,396 87,546 277,917 85,046 57,463 10,021 51,226 91,663 1,05 Dec-17 Total Ducks 73,706 666,649 225,301 28,396 87,546 277,917 85,046 57,463 10,021 51,226 91,663 1,05 Dec-17 Total Ducks 28,720 12,448 192,672 24,770 158,347 70,974 64,906 39,102 37,663 139,882 21,15 791 MWS-18 Mallards 2,458 34,577 390,205 92,504 40,402 132,049 35,330 1,402 12,744	Dec-16	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
India rds 37,594 250,792 26,335 26,336 250,142 36,784 15,479 9,892 75,976 75,677 913 Jan-17 Mallards 7,154 15,155 146,710 20,187 41,860 159,212 47,507 19,013 8,116 31,646 63,039 55 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 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 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 MWS-18 Mallards 3,276 10,690 104,937 116,012 8,117 13,845 13,969 122,781 180,326 1,15 <tr< td=""><td>M/M/S-17</td><td>Mallards</td><td>72,405</td><td>40,448</td><td>219,106</td><td>22,908</td><td>14,102</td><td>128,174</td><td>20,651</td><td>12,460</td><td>8,873</td><td>41,202</td><td>70,677</td><td>651,004</td></tr<>	M/M/S-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
Jail-1/2 Total Ducks 73,706 66,649 225,301 28,396 87,546 277,917 85,046 57,463 10,021 51,226 91,663 1,05 Dec-17 Total Ducks 4,921 3,151 116,026 19,729 84,718 38,466 26,874 2,400 26,662 100,522 95,08 432 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 MWS-18 Mallards 2,458 34,577 390,205 92,504 40,402 132,049 35,330 1,402 12,274 54,505 153,625 945 Total Ducks 3,027 62,533 415,037 110,084 44,660 140,405 58,871 3,845 13,969 122,781 180,326 1,15 Jan-18 Mallards 3,276 10,690 116,012 8,117 21,685 36,963 575 Jan-18 <	1V1VV 3=17			57,394				236,142		13,479		75,996		915,56
Dec-17 Mallards 4,921 3,151 116,026 19,729 84,718 38,466 26,874 2,400 26,622 9,103 1,033 1,033 10,021 31,220 91,003 1,033 Dec-17 Mallards 4,921 3,151 116,026 19,729 84,718 38,466 26,874 2,400 26,662 100,21 31,220 91,003 1,033 Mws-18 Mallards 2,8,720 12,448 192,672 24,770 158,347 70,974 64,906 39,102 37,663 139,882 21,915 791 MWS-18 Mallards 2,458 34,577 390,205 92,504 40,402 132,049 35,330 1,402 12,274 54,505 153,625 946 Jan-18 Mallards 3,276 10,690 104,937 110,084 44,660 140,405 58,871 3,846 13,969 122,781 180,326 1,15 Jan-18 Mallards 3,276 10,690 104,937 116,0	Jan-17	Mallards	7,154		146,710		41,860	159,212	47,507	19,013		31,646		559,57
Dec-17 Total Ducks 28,720 12,448 192,672 24,770 158,347 70,974 64,966 39,102 37,663 139,882 21,915 791 MWS-18 Mallards 2,458 34,577 390,205 92,504 40,402 132,049 35,330 1,402 12,274 54,505 133,625 949 MWS-18 Total Ducks 3,027 62,533 415,037 110,084 44,660 140,405 58,871 38,969 122,781 180,326 1,15 Jan-18 Mallards 3,276 10,690 104,937 116,012 8,117 21,688 11,050 555 36 70,030 63,378 409 Jan-18 Mallards 3,276 10,690 118,023 116,275 10,768 22,626 17,671 2,313 39 143,833 69,635 579 Mony-18 Mallards 251 476 66,867 7,222 91,284 110,677 43,214 1,572 40,305 -			/3,/06		225,301	28,396		2//,917		57,463	10,021	51,226	91,663	1,054,93
MWS-18 Mallards 2,458 34,577 390,205 92,504 40,402 132,049 35,302 12,743 55,505 133,645 137,655 133,655 94 MWS-18 Total Ducks 3,027 62,533 415,037 110,084 44,660 140,405 58,871 3,845 13,665 133,626 1,15 Jan-18 Mallards 3,276 10,690 104,937 116,012 8,117 21,688 11,055 36 70,030 63,378 409 Mallards 3,276 10,690 104,937 116,027 10,768 22,626 17,671 2,313 39 143,833 69,635 579 Mallards 22,51 476 66,867 7,222 91,284 110,677 43,214 1,572 40,305 - 2,226 36,435 Nov-18 Mallards 251 476 66,867 7,222 91,284 110,677 43,214 1,572 40,305 - 2,2266 36,435 <td>Dec-17</td> <td>Total Ducks</td> <td>4,921</td> <td>5,151</td> <td></td> <td>24 770</td> <td></td> <td>70 97/</td> <td>20,874</td> <td>2,400</td> <td></td> <td>130 882</td> <td></td> <td>432,97 791,39</td>	Dec-17	Total Ducks	4,921	5,151		24 770		70 97/	20,874	2,400		130 882		432,97 791,39
Multiards 3,027 62,533 415,037 110,084 44,660 140,405 58,871 3,845 13,969 122,781 180,326 1,15 Jan-18 Mallards 3,276 10,690 104,937 116,012 8,117 21,688 11,055 36 70,030 63,378 400 Mallards 42,652 35,963 118,023 116,275 10,768 22,626 17,671 2,313 39 143,833 69,635 579 Nov-18 Mallards 251 476 66,867 7,222 91,284 110,677 43,214 1,572 40,305 - 2,226 364			20,720	34 577	390 205	92 504		132 049	35 330	1 402	12 274	54 505		949,33
Jan-18 Mallards Total Ducks 3,276 10,690 104,937 116,012 8,117 21,688 11,050 555 36 70,030 63,378 409 Jan-18 Total Ducks 42,652 35,963 118,023 116,275 10,768 22,626 17,671 2,313 39 143,833 69,635 579 Nov-18 Mallards 251 476 66,867 7,222 91,284 110,677 43,214 1,572 40,305 - 2,226 364	MWS-18					110.084								1,155,53
Jain-18 Total Ducks 42,652 35,963 118,023 116,275 10,768 22,626 17,671 2,313 39 143,833 69,635 579 Nov-18 Mallards 251 476 66,867 7,222 91,284 110,677 43,214 1,572 40,305 - 2,226 364			3,276	10,690	104.937			21,688	11,050			70,030		409,769
Nov-18 Mallards 251 476 66,867 7,222 91,284 110,677 43,214 1,572 40,305 - 2,226 364	Jan-18		42,652	35,963	118,023	116,275	10,768	22,626	17,671	2,313		143,833	69,635	579,794
Nov-18		Mallards	Ť.		66,867	7,222	91,284	110.677	43.214	1,572	40.305	-		364,094
	Nov-18	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

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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, 2009-2018. 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		East Dardanelle					Pt. Remove -	West Dardanelle		Southwest
_			Conway	Cadron	Reservoir	Fave	Frog Bayou	Holla Bend	Petit Jean	Plumerville	Reservoir	Valley Total	Arkansas Total
	Nov-09	Mallards Total Ducks										13,731 31,416	5,480 19,140
		Mallards										18,580	19,230
	Dec-09	Total Ducks										31,304	31,820
	104/6 10	Mallards										58,815	34,590
	MWS-10	Total Ducks										81,685	36,060
	Jan-10	Mallards										14,359	19,840
	5411 10	Total Ducks										20,336	27,705
	Nov-10	Mallards										96	14,010 30,300
		Total Ducks Mallards										5,966 25,064	2,390
	Dec-10	Total Ducks										28,054	21,106
		Mallards										26,318	15,027
	MWS-11	Total Ducks										40,470	21,267
	Jan-11	Mallards										41,850	-
	1911-11	Total Ducks										60,635	-
	Nov-11	Mallards										12,225	-
1		Total Ducks Mallards										19,870 21,389	-
	Dec-11	Total Ducks										40,919	-
		Mallards										7,264	-
1	MWS-12	Total Ducks										13,339	-
	Jan-12	Mallards										13,900	-
	Jan-12	Total Ducks										21,000	-
	Nov-12	Mallards										1,182	13,090
		Total Ducks Mallards										7,732 13,975	21,935 10,245
	Dec-12	Total Ducks										22,417	17,105
		Mallards										16,893	8,165
	MWS-13	Total Ducks										26,058	14,630
	lan 12	Mallards	-	408	10,000	372	1,837	630	627	1,843	917	16,634	-
p	Jan-13	Total Ducks	-	1,428	10,180	372	1,971	990	902	3,687	7,857	28,011	-
ri	Nov-13	Mallards	240	187	4,660	800	0	144	0	754	253	7,038	4,455
Period		Total Ducks	320 576	187	14,320	1,920	0 358	1,080	528	965	3,307	22,627	19,145
e<	Dec-13	Mallards Total Ducks	1,604	245 2,713	5,472 8,672	1,728 1,728	1,836	162 3,132	1,320 1,501	3,429 4,329	2,176 3,941	15,466 29,456	10,130 29,070
Survey		Mallards	11,767	816	2,898	4,800	-	2,160	715	13,703	3,449	40,306	18,385
S	MWS-14	Total Ducks	14,441	816	8,711	5,124	-	2,934	957	22,177	6,087	61,247	35,875
	No. 14	Mallards	926	7,140	12,114	704	924	4,518	10,428	7,125	392	44,271	15,890
	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
	500 11	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	320	160	140	563	165	2,864	1,027	7,019	11,425
	Dec-15	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 Mallards	617 634	775 918	6,752 2,743	896 576	17,562 373	6,102 1,548	990 14,388	3,808 8,479	15,019 4,622	52,521 34,281	16,715 14,735
	Jan-16	Total Ducks	634	918 918	3,817	1,536	373 1,966	2,088	14,388 18,777	8,479 11,815	4,622 5,478	47,029	14,735
		Mallards		-	818	-	0	- 2,088	-	-	99	917	5,165
	Nov-16	Total Ducks	-	-	6,530	-	814	-	-	-	100	7,444	14,690
1	Dec-16	Mallards	112	-	-	739	187	2,612	296	234	8,186	12,364	34,946
1	Dec-10	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 Mallards	325 17	2,137 627	453 16,432	12,788 3,812	2,167 1,019	547 5,394	5,499 1,561	4,461 14,818	14,900 4,768	43,277 48,448	31,679 13,682
	Jan-17	Total Ducks	17	1,647	17,810	11,308	2,595	5,638	1,825	14,818	4,708	60,593	26,594
	n 1-	Mallards	-	-	821	-	0	1,184	-	-	2,129	4,134	15,487
	Dec-17	Total Ducks	-	-	2,558	-	2,972	3,654	-	-	4,264	13,448	34,822
1	MWS-18	Mallards	0	0	10,862	1,013	4,784	22,254	0	5,269	6,711	50,893	18,412
	141 AA 3-TQ	Total Ducks	510	0	13,785	2,114	5,880	36,695	0	13,843	7,553 5,214	80,380	38,114
	Jan-18	Mallards Total Ducks	2,080 3,420	3,144 4,489	11,881 20,281	135 227	1,115 3,826	141,074 174,542	845 3,150	3,361 3,313	5,214 5,381	168,849 218,629	10,849 32,928
			3,420	4,407	1								
	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

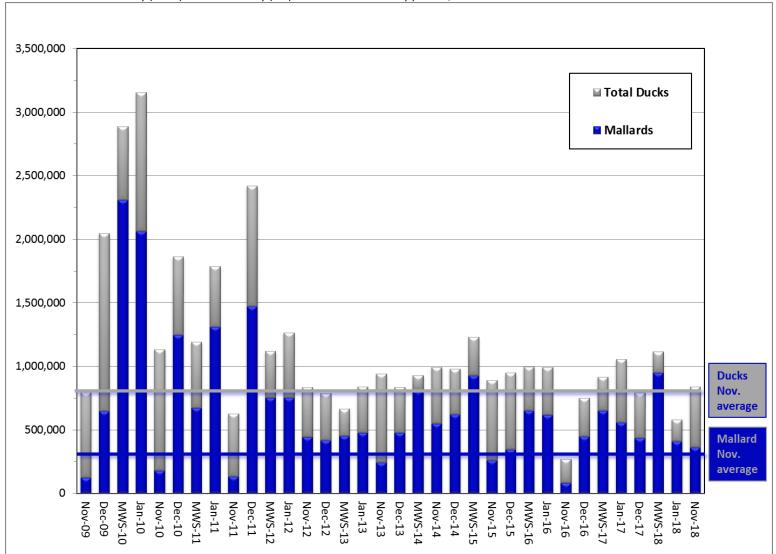


Figure 1. Duck abundance estimates in the Mississippi Alluvial Valley (Delta) of Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Waterfowl Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2018.

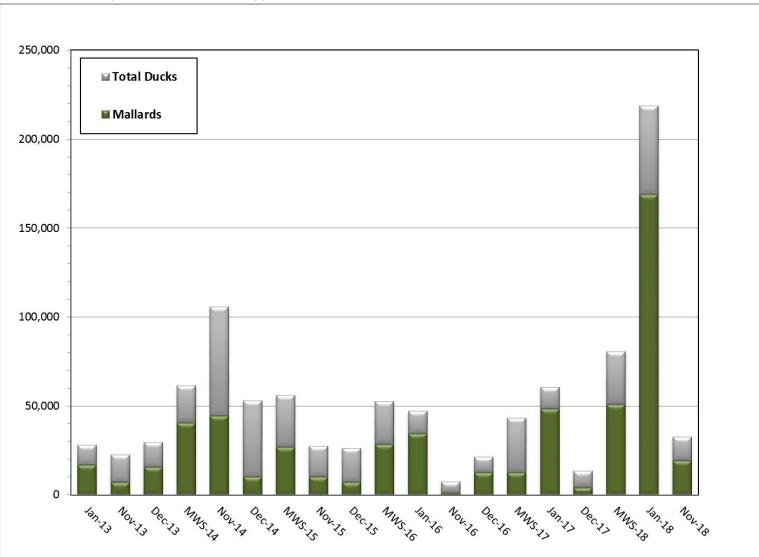


Figure 2. Duck abundance estimates in the Arkansas River valley of Arkansas during the late November (Nov), mid-December (Dec), early-January Midwinter Waterfowl Survey (MWS) and late-January (Jan) aerial waterfowl survey periods, 2009-2018.

Figure 3. Duck distribution in the Mississippi Alluvial Valley of Arkansas during the November 2018 aerial waterfowl survey period.

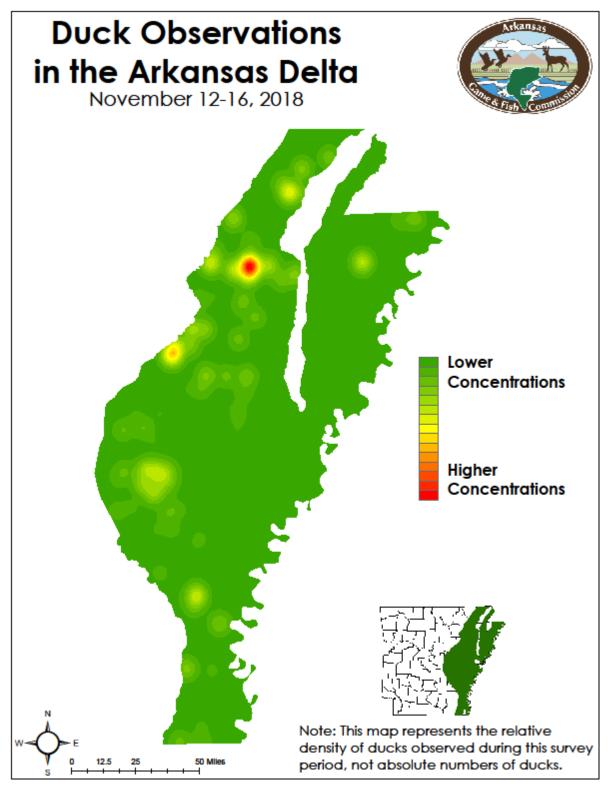
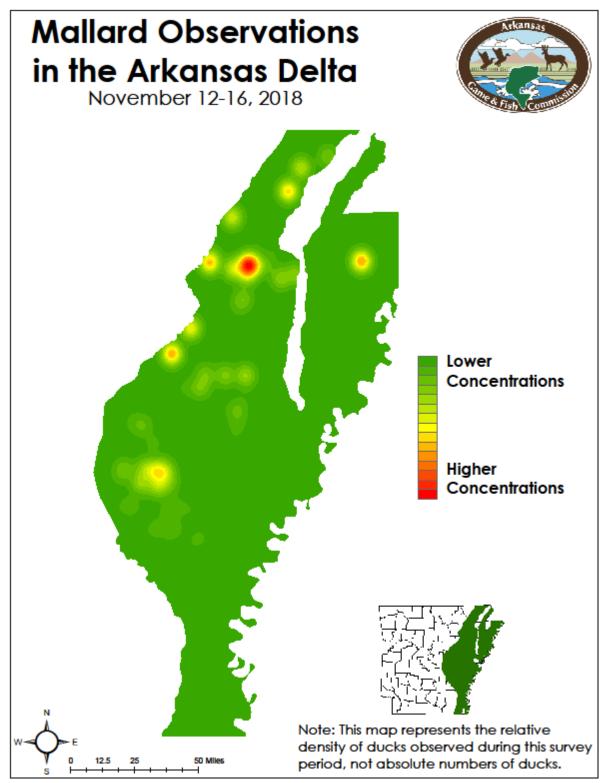


Figure 4. Mallard distribution in the Mississippi Alluvial Valley of Arkansas during the November 2018 aerial waterfowl survey period.



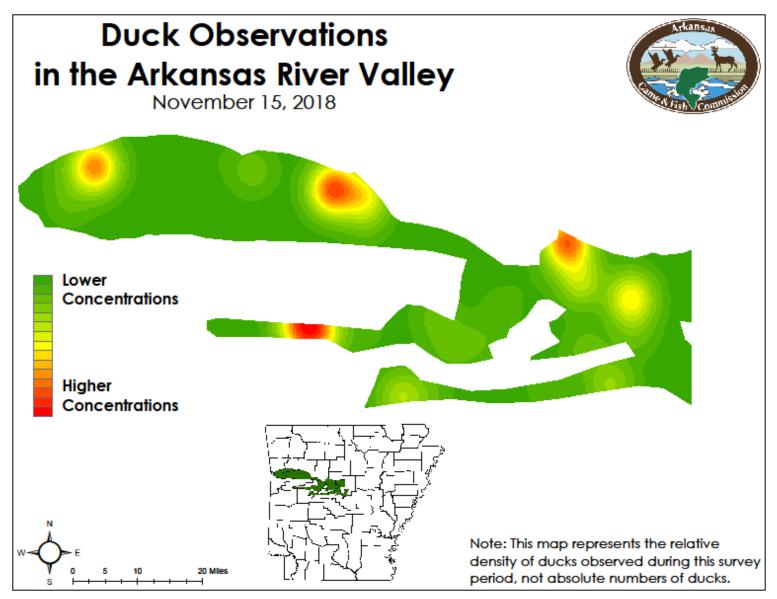


Figure 5. Duck distribution in the Arkansas River Valley (ARV) of Arkansas during the November 2018 waterfowl survey period.

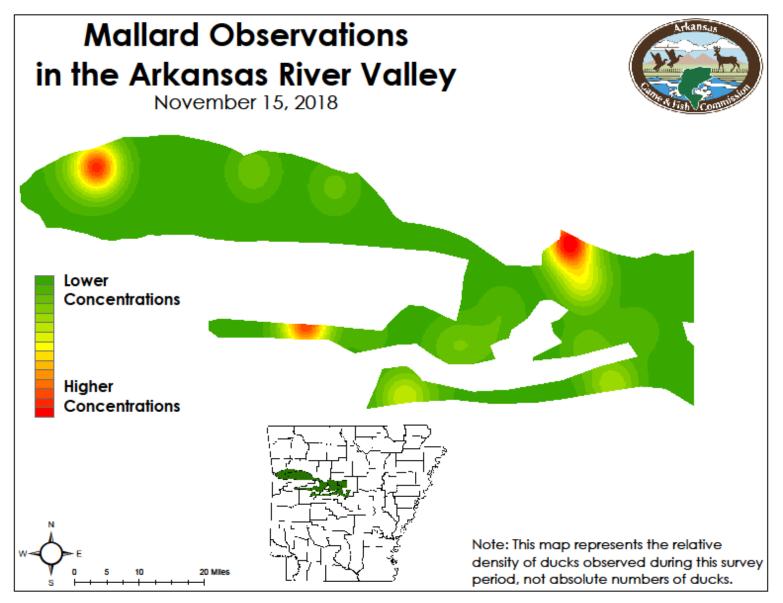


Figure 6. Mallard distribution in the Arkansas River Valley (ARV) of Arkansas during the November 2018 waterfowl survey period.

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).

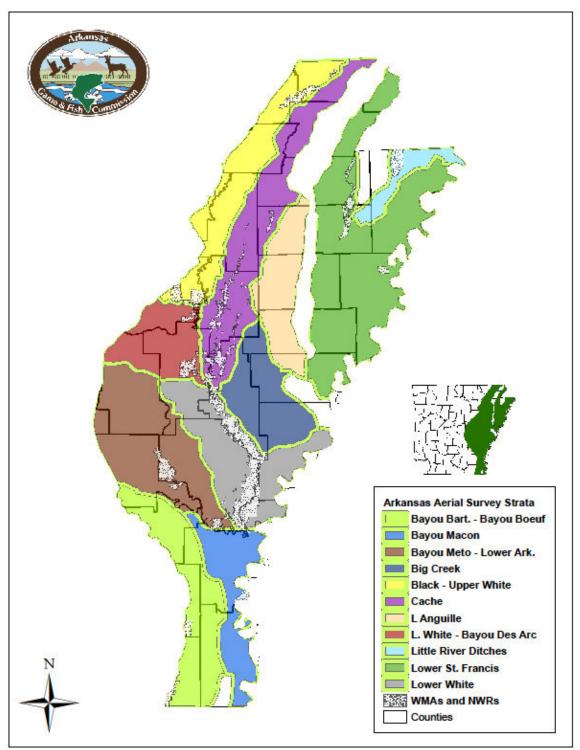


Figure 6. Aerial waterfowl survey strata in the Mississippi Alluvial Valley (Delta) of Arkansas.

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

