

**SOUTHERN NATIONAL FORESTS' MIGRATORY AND RESIDENT
LANDBIRD CONSERVATION STRATEGY
(R8BIRD)**

**OZARK-ST. FRANCIS NATIONAL FORESTS
ANNUAL FIVE-YEAR BIRD MONITORING
AND
DATABASE STATUS REPORT**

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INTRODUCTION

This report serves two functions: (1) to present and discuss the 2007-2011 dataset and statistical analysis; and (2) to discuss the 2011 R8BIRD database troubleshooting efforts. To simplify the flow of presentation, troubleshooting efforts are presented first.

TROUBLESHOOTING

My current sampling indicates the R8BIRD Database (version 5) is calculating temporal trend totals and respective relative-abundance-by-survey-point quotients correctly with respect to regional datasets currently being centrally-served by the Kansas City Data Center. However, specific types of canned reports have not always run successfully. Additionally, the database is not configured to produce advanced statistical output and analyses. Therefore, to verify reliability and produce advanced functionality, I externally processed the dataset for this report. That said, after comparing the 2009-2010 sampling efforts to those of 2010-2011, the Ozark-St. Francis National Forests (OSF) dataset per se seems to have remained stable. However, to pay due diligence to the ongoing maintenance of database integrity, thus, preventing corruption such as was propagated in previous versions of the database as outlined in Thomas (2011d), continued rigorous vigilance is still required to monitor dataset stability. Continuously since 2004, the OSF has successfully met this goal by assigning the maintenance of system stability (e.g., restriction of all raw data entry; purging of erroneous data; assignment of regional liaison duties) to one individual data steward with global administrative database permissions. To review and understand the history of the R8BIRD Database system and its use by the Ozark-St. Francis National Forests, see Thomas (2011d).

THE 2007-2011 DATA SET

The five-year observations dataset is displayed in the form of a complex spreadsheet (Table 1; Thomas 2011c), which presents a considerable amount of usable information, including forest-wide species totals from 2007 through 2011. Totals were externally processed to derive descriptive statistics for: (1) each individually-recorded species; and (2) each year for all species combined (Tables 1 and 2). Additionally, to comport with recent annual five-year observations reports (e.g., Thomas 2010 and 2011a), the dataset with descriptive statistics continues to be available in a read-only MS-Excel file (Thomas 2011c). This file is not suitable for further sorting in its current

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format, as the data categories are necessarily freeze-framed, so that data can be scrolled horizontally or vertically to focus on specific values in relation to category of choice. Additionally, linear regression analyses for species detections and individual bird observations are contained herein. The output, code, and data analyses for this paper were generated using Minitab® (Version 16) and SigmaPlot® (Version 12) software. Each was respectively copyrighted in 2010 by Minitab, Inc., State College, PA, USA, and Systat Software, Inc., Chicago, IL, USA.

DESCRIPTIVE ROW-STATISTICS describing the annual total numbers of observations per species can be respectively viewed in the columns on the right side of the worksheet (Table 1). The year-column data (i.e., 2007 through 2011) reveal how many individuals of a given species were observed in a specific year. The N column denotes how many of the five years in which a given species was recorded. Species are sorted in order of descending abundance per the five-year SUM column. Further columns include: MEAN, MEDIAN, STD DEV (standard deviation), SE Mean (standard error of the mean), Minimum, Maximum, Range, and quartiles one (Q1) and three (Q3).

DESCRIPTIVE COLUMN-STATISTICS for each year's number of recorded species and total observations for each (Table 2; Thomas 2011c) are sorted by row for each year with their respective statistics shown in columns. The N column shows the number of species recorded per year. The N*column presents the number of unrecorded species per year (i.e., those that were recorded in ≥ 1 of the other years [2007-2011] presented). The MEAN and MEDIAN columns are calculated on total annual observations per species when all species are viewed in combination. Similarly as before, further columns include: STD DEV, SE Mean, Minimum, Maximum, Q1, and Q3. Additionally, a trimmed mean (i.e., TrMean) was calculated, whereby, ten percent of the most extreme data (i.e., five percent of the lowest and highest values, respectively) were omitted before computing the mean.

LINEAR REGRESSION ANALYSES for each avian Management Indicator Species (MIS) from 2007 through 2011 were performed (Figures 5 through 17). Additional regression analyses were performed for total numbers of individual bird observations for: (1) all MIS combined (Figure 3) and (2) all species combined (Figure 2). While not a regression analysis, a bar graph was created to illustrate the five-year mean for each MIS (Figure 4). Finally, a regression analysis was performed for the total numbers of combined species detections per year (Figure 1). *The number of points used in the analyses, the values of R^2 , and the width of the confidence bands should be considered when interpreting the respective trends.* Additionally, a respective comparison of the avian MIS linear regression analyses contained herein to those I recently submitted for inclusion with other categories of forest-wide data in the comprehensive OSF five-year monitoring review (2006-2010; OSF unpublished data) reveals the differences – some subtle, some striking – per species that shifting from one five-year bracket to another (e.g., 2006-2010 to 2007-2011, where data for one year is dropped and another added) can produce. For example, the respective 2006-2010 and 2007-2011 R^2 values for the Northern Parula (*Parula americana*) were 0.00 and 0.01 (Figure 13; OSF unpublished data). Contrastingly, the respective 2006-2010 and 2007-2011 R^2 values for the Pileated Woodpecker (*Dryocopus pileatus*) were 0.07 and 0.95 (Figure 8; OSF unpublished data). Therefore, expansion of the currently-used five-year time-brackets for MIS linear regression analyses to fifteen years (or greater) will be given due consideration for inclusion in future editions of this report.

RESULTS AND DISCUSSION

The trend line for total observations revealed a sustained yearly increase for surveys conducted from 2007 through 2010 (Table 1; Figure 2; $R^2 = 0.64$; Range = 320). The yearly increases by themselves were not necessarily dramatic. However, the sustained increase from 2008 through 2010 seems to continue to illustrate that the destructive effects of the January 2009 ice storm did not negatively impact short-term avian breeding dynamics in storm-affected districts. However, there was a modest decline in observations from 2010 to 2011 (Table 1; Figure 2; $R^2 = 0.64$; Range = 89), which is within the historical range of similar annual declines. Additionally, the trend line for total numbers of species detected per year revealed a general increase from 2007 through 2011 (Table 2; Figure 1; $R^2 = 0.11$; Range = 8). However, only 72 species, the lowest yearly total recorded from 2007 to 2011, were tallied during 2007, 2008, and 2011. Respectively, species totals for 2009 and 2010 were 78 and 80.

Also, unusually high daily temperatures were experienced during May and June of 2011. In the future, if similar annual declines in breeding season observations occur during periods of atypical weather, climatic patterns should be investigated as potential linking factors (Finch et al., 2011). In concert with the past, Red-eyed Vireos (*Vireo olivaceus*; \bar{x} = 339.8; Table 1) and Indigo Buntings (*Passerina cyanea*; \bar{x} = 252.2; Table 1) were the most observed species each year. While there were no newly recorded species for the R8BIRD surveys during 2011, the Great Egret (*Ardea alba*) was observed for the first time since 2007. Additionally, the Orchard Oriole (*Icterus spurius*) – recorded in 2010 for the first time since 2002 – was again observed in 2011.

Total observations per year for all MIS combined showed a general decrease from 2007 through 2011 (Figure 3; R^2 = 0.53). While the majority of trends for individual MIS remained stable, or nearly so, declining trends were produced for four species: Northern Bobwhite (*Colinus virginianus*; Figure 5; R^2 = 0.44); Pileated Woodpecker (*Dryocopus pileatus*; Figure 8; R^2 = 0.95); Ovenbird (*Seiurus aurocapillus*; Figure 11; R^2 = 0.72); and Prairie Warbler (*Dendroica discolor*; Figure 14; R^2 = 0.35). In the future, annual trends for these four species and the availability and conditions of their respectively typical habitat types should be closely monitored. For example, Prairie Warbler observations have generally decreased across its range since 1970 (Nolan et al. 1999). The apparent need for continual planning and maintenance of sufficient areas of suitable early-successional breeding habitat for this species should be closely considered. Additionally, areas of sufficient habitat for specific species (MIS and other) should be annually assessed – and modified or created, as needed.

As mentioned previously in Thomas (2010; 2011a), to enhance the description of OSF species composition and abundance, all respective habitat types by which OSF survey plots were originally characterized should be recorded in the database. Table 3 shows the original numbers of each type respective to district, but these optional classifications have never been entered for plots other than those established on the Sylamore, Big Piney (North), and St. Francis Ranger Districts. Using this table as a starting point, it remains necessary for all districts to characterize their individual plots accordingly, modifying classifications where needed.

SUMMARY


R8BIRD VERSION 5 DATABASE – While it remains wise to externally verify the output of the R8BIRD Version 5 Database canned reports, on balance, the current integrity of the dataset files per se seems stable. Therefore, exporting select datasets to external statistics platforms remains the most secure and reliable method to perform precise data analysis. Additionally, as archives must be continually scanned through time to verify dataset stability, continual reviews of all facets of data integrity remain central to all components of a proactive database maintenance regime.

DATA ANALYSIS – Even though, on balance, there was an ascending trend line regarding total observations for all species combined from 2007 through 2010 (Table 1; Figure 2; R^2 = 0.64; Range = 320), there was still a slight decrease in total observations from 2010 to 2011 (Table 1; Figure 2). Also, there was a gentle increase in the trend line for total numbers of species detections per year from 2007 through 2011 (Table 2; Figure 1; R^2 = 0.11; Range = 8). Red-eyed Vireos (*Vireo olivaceus*; \bar{x} = 339.8; Table 1) and Indigo Buntings (*Passerina cyanea*; \bar{x} = 252.2; Table 1) remained the most recorded species in 2011. On balance, total observations for all MIS combined showed a general decrease from 2007 through 2011 (Figure 3; R^2 = 0.53).

HABITAT MAINTENANCE – Finally, future descriptions of species abundance and composition will substantially benefit from coordinating bird observation data with the original habitat-type matrix used to select and survey plots. Doing so will foster and enhance the analysis and discussion of species richness and evenness – components of biological diversity – which may or may not be correlated with one another and with patterns of species abundance. Then, we may start the critical assessment of patterns and trends in terms of community structure and organization – freeing us, at long last, to begin the comprehensive creation of avian wildlife management plans that are more wholly grounded in terms of what we really do and do not know.

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 OZARK-ST. FRANCIS NATL. FORESTS: R8BIRD DESCRIPTIVE STATISTICS, 2007-2011																		
COMMON NAME	ALPHA CODE	YEAR					N	DESCRIPTIVE ROW STATISTICS										
		2007	2008	2009	2010	2011		SUM	MEAN	MEDIAN	STD DEV	SE Mean	Minimum	Maximum	Range	Q1	Q3	
RED-EYED VIREO	REVI	347	354	316	365	317	5	1699	339.8	347	22.22	9.94	316	365	49	316.5	359.5	
INDIGO BUNTING	INBU	204	251	234	278	294	5	1261	252.2	261	35.6	15.9	204	294	90	219.0	286.0	
OVENBIRD	OVEN	191	202	185	152	158	5	888	177.6	185	21.62	9.67	152	202	50	155.0	196.5	
EASTERN TUFTED TITMOUSE	ETTI	132	134	160	162	148	5	731	146.2	143	14.15	6.33	132	162	30	133.0	161.0	
AMERICAN CROW	AMCR	179	141	132	128	140	5	717	143.4	140	20.94	9.36	125	179	54	128.5	160.0	
CAROLINA WREN	CARW	119	138	144	166	122	5	689	137.8	138	18.95	8.48	119	166	47	120.5	155.0	
HOODED WARBLER	HOWA	107	141	139	120	164	5	670	134.0	138	21.74	9.72	107	164	57	113.5	152.5	
CAROLINA CHICKADEE	CACH	86	102	121	116	150	5	577	115.4	116	24.6	11	86	152	66	94.0	136.5	
SCARLET TANGIER	SCTA	94	128	89	117	112	5	542	108.4	112	15.82	7.08	89	128	39	92.5	122.5	
FINE WARBLER	FINA	94	99	103	116	79	5	491	98.2	99	13.48	6.03	79	116	37	86.5	109.5	
EASTERN WOOD-PEWEE	EAMP	81	100	96	101	105	5	483	96.6	100	9.29	4.15	81	105	24	88.4	103.0	
ACADIAN FLYCATCHER	ACFL	89	88	97	109	80	5	463	92.6	89	10.97	4.91	80	109	29	84.0	103.0	
NORTHERN CARDINAL	NOCA	69	75	88	97	93	5	422	84.4	88	11.95	5.34	69	97	28	72.0	95.0	
BLUE-GRAY Gnatcatcher	BGGN	80	72	79	90	88	5	409	81.8	80	7.29	3.26	72	90	18	75.5	89.0	
PILEATED WOODPECKER	PIND	91	85	81	71	58	5	386	77.2	81	12.97	5.8	58	91	33	64.5	88.0	
BLUE JAY	BLJA	79	65	81	61	66	5	348	69.6	66	8.17	3.66	61	81	20	63.0	78.0	
WHITE-EYED VIREO	WEVI	54	68	71	86	61	5	340	68.0	68	12.02	5.38	54	86	32	57.5	78.5	
BLACK-AND-WHITE WARBLER	BAWW	59	71	73	59	60	5	322	64.4	60	6.99	3.12	59	73	14	59.0	72.0	
WHITE-BREADED NUTHATCH	WBNU	65	39	53	68	69	5	294	58.8	65	12.77	5.71	39	69	30	46.0	68.5	
YELLOW-BILLED CUCKOO	YBCU	61	49	56	57	71	5	294	58.8	57	8.07	3.61	49	71	22	52.5	66.0	
YELLOW-BREADED Chat	YBCH	57	50	70	42	61	5	280	56.0	57	10.65	4.76	42	70	28	46.0	65.5	
SUMMER Tanager	SUTA	45	46	68	47	47	5	253	50.6	47	9.76	4.37	45	68	23	45.5	57.5	
NORTHERN PARULA	NOPA	38	41	64	43	44	5	250	50.0	44	11.68	5.22	38	64	26	40.5	62.5	
RED-BELLIED WOODPECKER	REBW	48	24	50	49	54	5	225	45.0	49	11.96	5.35	24	54	30	36.0	52.5	
DOWNY WOODPECKER	DOWN	38	35	43	49	52	5	216	43.2	43	6.98	3.12	35	52	17	36.5	50.0	
WOOD THRUSH	WOTH	33	48	47	39	44	5	211	42.2	44	6.22	2.78	33	48	15	36.0	47.5	
EASTERN TOWHEE	EATO	38	38	37	36	41	5	190	38.0	38	1.871	0.897	36	41	5	36.5	39.5	
KENTUCKY WARBLER	KEWA	29	27	46	49	24	5	175	35.0	29	11.6	5.13	24	49	25	25.5	47.5	
MOURNING DOVE	MODO	28	22	25	43	39	5	157	31.4	28	9.13	4.08	22	43	21	23.5	41.0	
AMERICAN GOLDFINCH	AMGO	9	24	35	34	30	5	132	26.4	30	10.64	4.76	9	35	26	16.5	34.5	
WORM-EATING WARBLER	WENA	19	21	23	13	24	5	100	20.0	21	4.36	1.95	13	24	11	16.0	23.5	
PRAIRIE WARBLER	PRAW	14	18	12	14	11	5	69	13.8	14	2.68	1.2	11	18	7	11.5	16.0	
LOUISIANA WATERTHRUSH	LONA	6	10	14	19	15	5	64	12.8	14	4.97	2.22	6	19	13	8.0	17.0	
YELLOW-THROATED VIREO	YTVI	6	8	10	15	16	5	55	11.0	10	4.36	1.95	6	16	10	7.0	15.5	
Hairy Woodpecker	HAWD	6	11	9	19	7	5	54	10.8	9	4.82	2.15	7	19	12	7.5	15.0	
YELLOW WARBLER	YWAR	4	10	12	22	6	5	54	10.8	10	7.01	3.14	4	22	18	5.0	17.0	
CHIMNEY SWIFT	CHSW	7	6	13	9	18	5	53	10.6	9	4.93	2.2	6	18	12	6.5	15.5	
ROSI-THROATED HUMMINGBIRD	RYHU	18	5	16	4	8	5	51	10.2	8	6.42	2.87	4	18	14	4.5	17.0	
CHIPPING SPARROW	CHSP	8	16	6	6	12	5	46	9.2	6	4.6	2.06	6	16	10	6.0	14.0	
GREAT CRESTED FLYCATCHER	GCFL	8	10	8	10	12	5	45	9.0	10	2.65	1.18	5	12	7	6.5	11.0	
BLACK-THROATED GREEN WARBLER	BTWG	5	11	9	4	12	5	42	8.4	9	3.36	1.5	4	12	6	5.0	11.5	
BROWN-HEADED COWBIRD	BHCO	9	4	7	8	9	5	37	7.4	8	2.074	0.927	4	9	5	5.5	9.0	
CERULEAN WARBLER	CERW	4	7	8	9	6	5	34	6.8	7	1.924	0.86	4	9	5	5.0	8.5	
NORTHERN BOBWHITE	NOBO	16	4	4	6	4	5	34	6.8	4	5.22	2.33	4	16	12	4.0	11.0	
TURKEY VULTURE	TUVU	6	4	11	3	8	5	32	6.4	6	3.21	1.44	3	11	8	3.5	9.5	
EASTERN PHOENIX	EAPH	7	6	9	2	7	5	31	6.2	7	2.59	1.16	2	9	7	4.0	8.0	
GREAT BLUE HERON	GBHE	8	11	7	2	1	5	29	5.8	7	4.21	1.88	1	11	10	1.5	9.5	
BLUE-WINGED WARBLER	BWNA	6	11	5	4	2	5	28	5.6	5	3.36	1.5	2	11	9	3.0	8.5	
RED-HEADED WOODPECKER	REHW	3	6	9	3	6	5	27	5.4	6	2.51	1.12	3	9	6	3.0	7.5	
YELLOW-THROATED WARBLER	YTWNA	2	3	9	6	7	5	27	5.4	6	2.88	1.29	2	9	7	2.5	8.0	
RED-SHOULDERED HAWK	RSRH	8	3	4	6	5	5	26	5.2	5	1.924	0.86	3	8	5	3.5	7.0	
NORTHERN FLICKER	NOFL	6	4	7	6	2	5	25	5.0	6	2	0.894	2	7	5	3.0	6.5	
BARRED OWL	BDOO	3	8	5	6	**	4	22	5.5	5.5	2.08	1.04	3	8	5	3.5	7.5	
BROAD-WINGED HAWK	BWHA	6	3	5	3	**	5	22	4.4	5	1.342	0.6	3	6	3	3.0	5.5	
YELLOW-CROWNED NIGHT HERON	YCNH	13	3	**	5	1	4	22	5.5	4	5.26	2.63	1	13	12	1.5	11.0	
FIELD SPARROW	FISP	5	3	3	4	3	5	18	3.6	3	0.894	0.4	3	5	2	3.0	4.5	
PROTONOTARY WARBLER	PROW	3	7	4	1	3	5	18	3.6	3	2.191	0.98	1	7	6	2.0	5.5	
WILD TURKEY	WTUR	1	3	10	2	**	4	16	4.0	2.5	4.08	2.04	1	10	9	1.3	8.3	
COMMON YELLOWTHROAT	COYE	2	3	2	3	3	5	13	2.6	3	0.548	0.245	2	3	1	2.0	3.0	
BLACK VULTURE	BLVU	**	6	3	1	2	4	12	3.0	2.5	2.16	1.08	1	6	5	1.3	5.3	
FISH CROW	FICR	**	**	6	5	2	11	5.5	5.5	0.707	0.5	5	6	1	**	**		
WARBLING VIREO	WAVI	**	**	2	2	7	3	11	3.7	2	2.89	1.67	2	7	5	2.0	7.0	
YELLOW-BELLIED SAPSUCKER	YBSA	2	1	3	2	2	5	10	2.0	2	0.707	0.316	1	3	2	1.5	2.5	
BLUE GROSBEAK	BLGR	1	**	2	5	1	4	9	2.3	1.5	1.893	0.946	1	5	4	1.0	4.3	
EASTERN BLUEBIRD	EABL	**	3	2	1	3	4	9	2.3	2.5	0.957	0.479	1	3	2	1.3	3.0	
BELTED KINGFISHER	BEKI	2	2	2	1	1	5	8	1.6	2	0.548	0.245	1	2	1	1.0	2.0	
BROWN-HEADED NUTHATCH	BHNU	3	**	1	1	2	4	7	1.8	1.5	0.957	0.479	1	3	2	1.0	2.8	
RED-TAILED HAWK	RYHA	4	**	1	2	**	3	7	2.3	2	1.528	0.882	1	4	3	1.0	4.0	
AMERICAN REDSTART	AMRE	**	1	4	**	1	3	6	2.0	1	1.73	1	1	4	3	1.0	4.0	
EASTERN KINGBIRD	EAKI	3	1	**	2	**	3	6	2.0	2	1	0.577	1	3	2	1.0	3.0	
PURPLE MARTIN	POMA	4	**	1	**	**	3	6	2.0	1	1.73	1	1	4	3	1.0	4.0	
GREAT KORET	GREK	4	**	**	**	**	2	5	2.5	2.5	2.12	1.5	1	4	3	**	**	
HERMIT THRUSH	HETH	**	**	2	3	**	2	5	2.5	2.5	0.707	0.5	2	3	1	**	**	
PAINTED BUNTING	PABU	**	**	3	**	**	1	3	5	1.7	1	1.155	0.667	1	3	2	1.0	3.0
VEERY	VEER	**	1	1	3	**	3	5	1.7	1	1.155	0.667	1	3	2	1.0	3.0	
BALTIMORE ORIOLE	BAOR	**	2	2	**	**	2	4	2.0	2	0	0	2	2	0	**	**	
LITTLE BLUE HERON	LBHE	2	**	**	1	1	3	4	1.3	1	0.577	0.333	1	2	1	1.0	2.0	
MISSISSIPPI KITE	MIKI	**	2	1	**	**	1	3	4	1.3	1	0.577	0.333	1	2	1	1.0	2.0
ORCHARD ORIOLE	OROR	**	**	**	1	3	2	4	2.0	2	1.41	1	1	3	2	**	**	
CHESTNUT-SIDED WARBLER	CSWA	**	**	**	**	**	1	3	3.0	3	**	**	3	3	0	**	**	
SHARP-SHINNED HAWK	SSHA	**	**	1	2	**	2	3	1.5	1.5	0.707	0.5	1	2	1	**	**	
AMERICAN ROBIN	AMRO	**	**	1	**	**	1	2	1.0	1	0	0	1	1	0	**	**	
BROWN THRASHER	BRTH	**	**	2	**	**	1	2	2.0	2	**	**	2	2	0	**	**	
CEDAR WAXWING	CEWV	**	1	**	1	**	2	2	1.0	1	0	0	1	1	0	**	**	
COMMON GRACKLE	COGR	**	**	**	2	**	1	2	2.0	2	**	**	2	2	0	**	**	
EASTERN SCREECH-OWL	EASO	1	**	1	**	**	2	2	1.0	1	0	0	1	1	0	**	**	
NASHVILLE WARBLER	NANA	**	2	**	**	**	1	2	2.0	2	**	**	2	2	0	**	**	
ROSE-BREADED GROSBEAK	RBSG	**	2	**	**	**	1											

DESCRIPTIVE COLUMN STATISTICS, 2007-2011

Year	N	N*	Mean	Median	TrMean	StDev
2007	72	22	40.03	8.50	30.58	59.87
2008	72	22	41.96	11.00	32.33	63.62
2009	78	16	40.46	9.50	32.24	58.92
2010	80	14	40.03	7.00	30.93	63.48
2011	72	22	43.24	12.00	34.00	63.07

Year	SE Mean	Minimum	Maximum	Q1	Q3
2007	7.06	1.00	347.00	4.00	60.50
2008	7.50	1.00	354.00	3.00	64.00
2009	6.67	1.00	316.00	3.00	68.50
2010	7.10	1.00	365.00	2.25	55.00
2011	7.43	1.00	317.00	3.00	61.00

Table 2. Descriptive statistics used to characterize annual bird observation point-count columnar data (2007 through 2011) presented in Table 1 of Thomas (2011c) for the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD). N = number of species observed per year. N* = number of unobserved species per year that were recorded in one or more of the other years presented. Other data categories characterize individual bird observations (e.g., Year 2007 mean = 40.03, which is the mean number of individual birds recorded for all species combined; Year 2007 Maximum = 347, which is the largest number of individual birds recorded for a given species [in this instance, Red-eyed Vireo (*Vireo olivaceus*)])

Habitat Types	Sylamore	Big Piney North	Big Piney South	Pleasant Hill	Boston Mtn	Magazine	St Francis	Total
Glade	3	2	3	2	3	2	0	15
Yellow Poplar	0	0	0	0	0	0	2	2
Pine Early	1	0	4	2	1	2	0	10
Pine PT Closed	0	1	3	2	1	2	0	9
Pine Open PT/ST	2	1	4	1	2	4	0	14
Pine Closed ST	3	4	10	5	5	7	0	34
Hwd Dry Open	3	4	3	2	4	1	2	19
Hwd Mesic ST Closed	7	18	12	10	13	1	5	66
Hwd Dry Closed	3	6	4	4	2	1	2	22
Bottomland Hwd Wetland	0	0	0	0	0	0	10	10
Riparian	2	4	3	4	3	1	2	19
Hwd Early	1	2	1	1	2	0	2	9
Mixed PT Closed	0	2	1	2	1	1	1	8
Mixed ST	1	3	1	2	1	1	0	9
Total	26	47	49	37	38	23	26	246

Table 3. Ozark-St. Francis National Forests’ plot totals by district and habitat type for the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD).

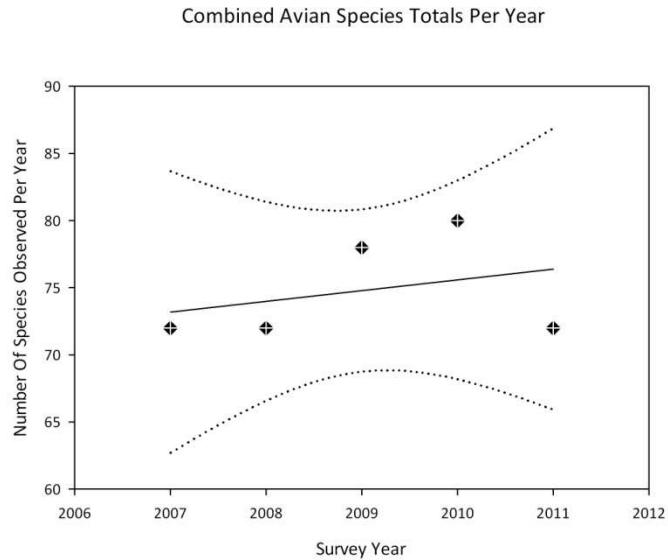


Figure 1. Numbers of combined annual totals of all avian species (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.11$) with 95-percent confidence bands (dotted lines).

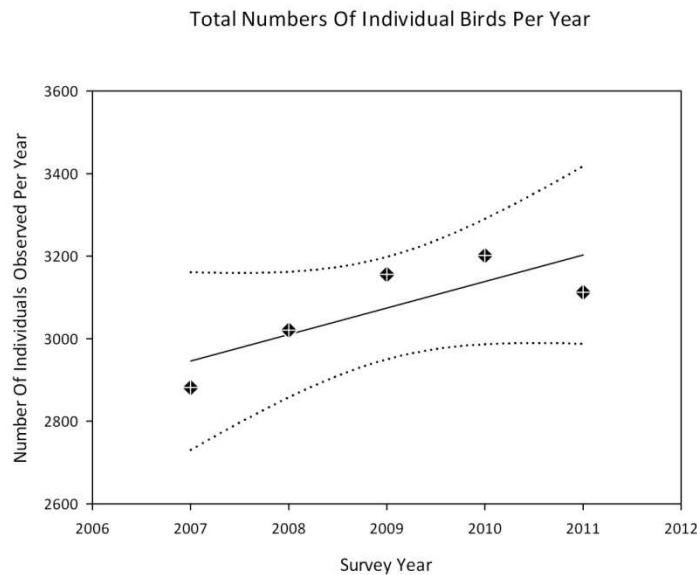


Figure 2. Numbers of combined annual totals of individual bird observations of all species (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.64$) with 95-percent confidence bands (dotted lines).

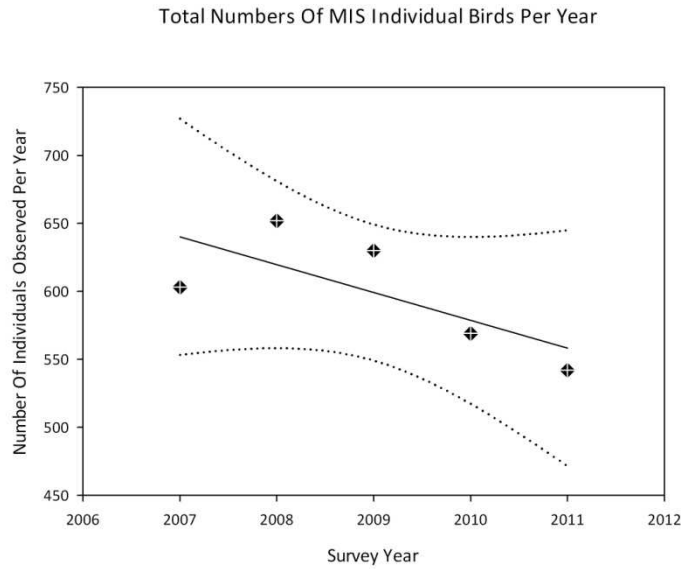


Figure 3. Numbers of combined annual totals of individual bird observations for all avian Management Indicator Species (MIS) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.53$) with 95-percent confidence bands (dotted lines).

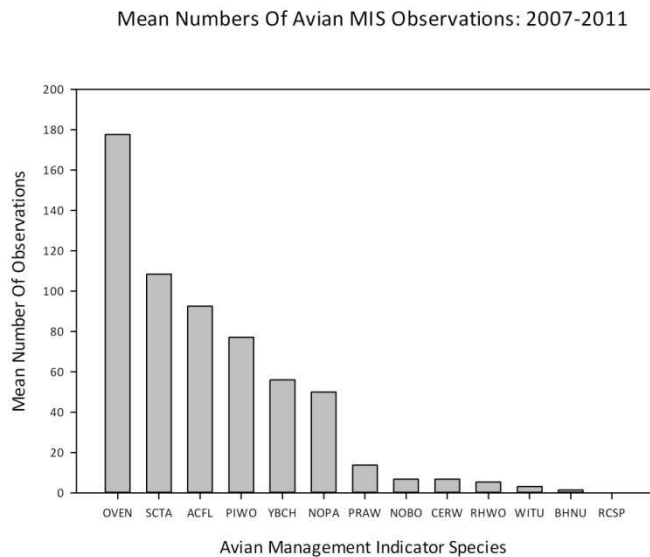


Figure 4. Five-year mean numbers (bars) for each avian Management Indicator Species (MIS). Means were derived from total yearly observations of MIS individual birds recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Species are listed by their four-letter English-name alpha codes and sorted in the descending numerical order of their respective five-year means.

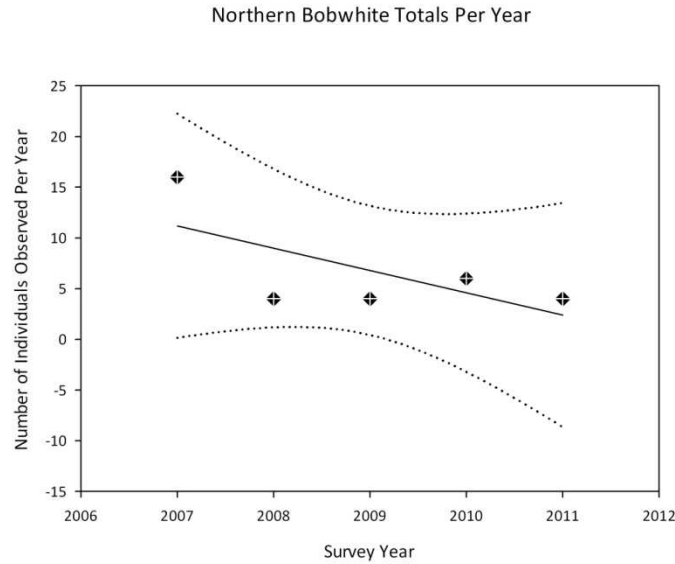


Figure 5. Numbers of Northern Bobwhite (*Colinus virginianus*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.44$) with 95-percent confidence bands (dotted lines).

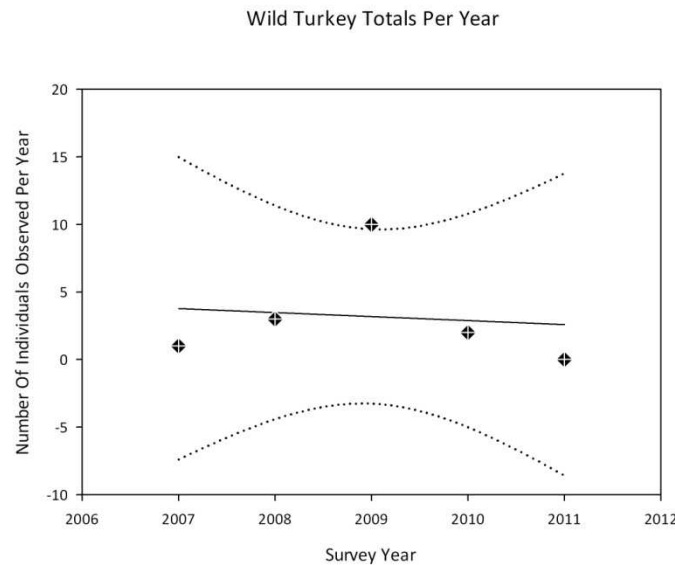


Figure 6. Numbers of Wild Turkey (*Meleagris gallopavo*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.01$) with 95-percent confidence bands (dotted lines).

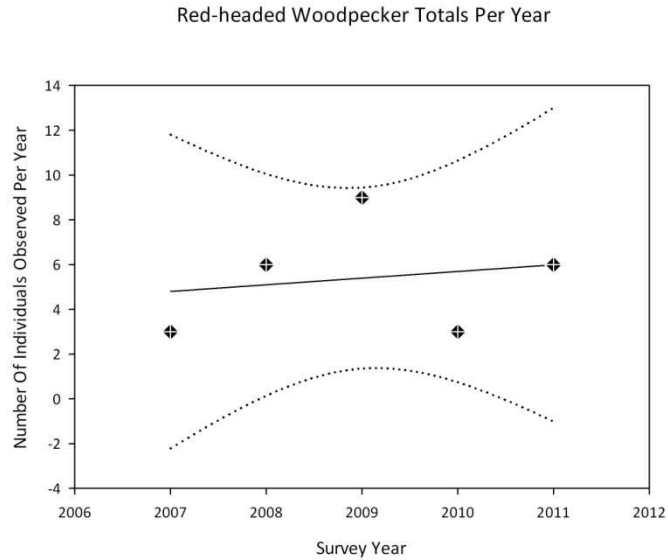


Figure 7. Numbers of Red-headed Woodpecker (*Melanerpes erythrocephalus*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.04$) with 95-percent confidence bands (dotted lines).

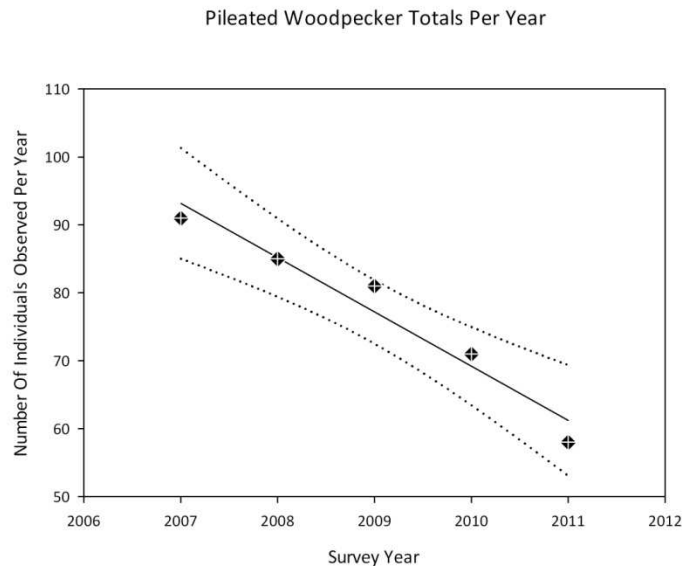


Figure 8. Numbers of Pileated Woodpecker (*Dryocopus pileatus*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.95$) with 95-percent confidence bands (dotted lines).

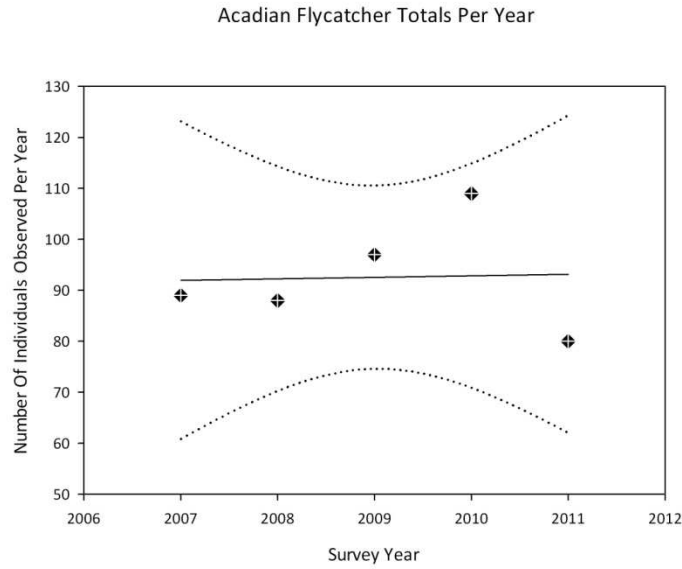


Figure 9. Numbers of Acadian Flycatcher (*Empidonax virescens*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.00$) with 95-percent confidence bands (dotted lines).

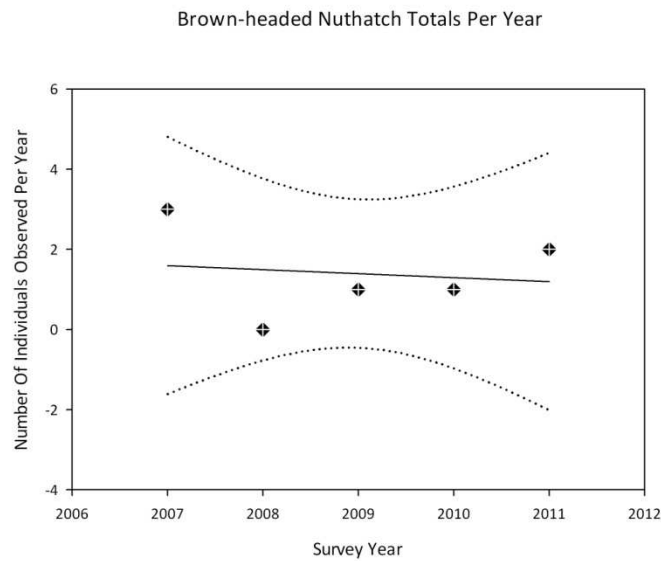


Figure 10. Numbers of Brown-headed Nuthatch (*Sitta pusilla*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.02$) with 95-percent confidence bands (dotted lines).

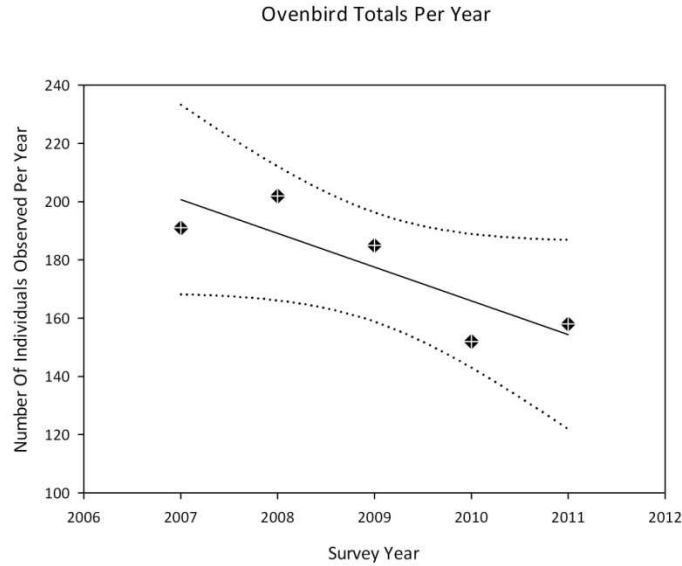


Figure 11. Numbers of Ovenbird (*Seiurus aurocapillus*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.72$) with 95-percent confidence bands (dotted lines).

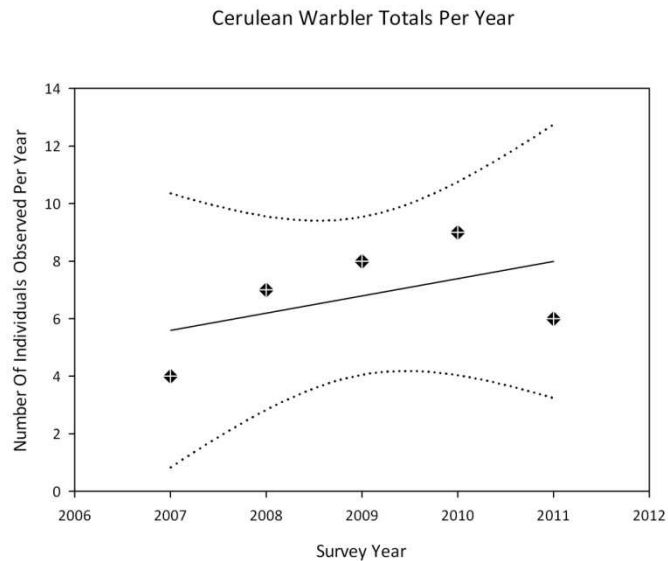


Figure 12. Numbers of Cerulean Warbler (*Dendroica cerulea*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.24$) with 95-percent confidence bands (dotted lines).

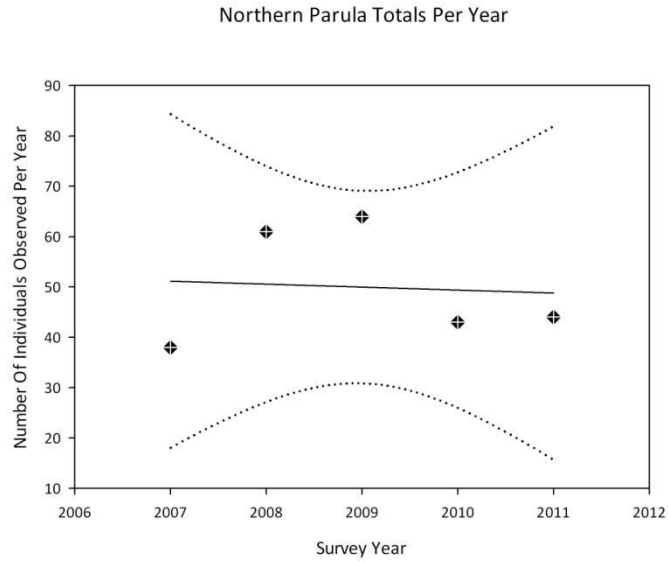


Figure 13. Numbers of Northern Parula (*Parula americana*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.01$) with 95-percent confidence bands (dotted lines).

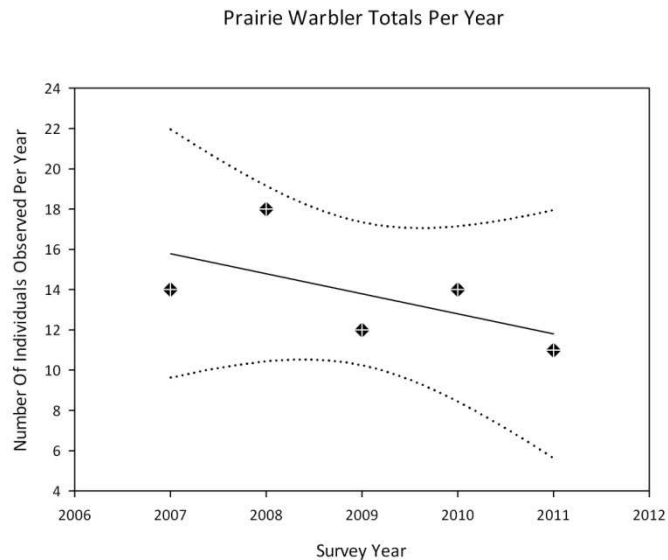


Figure 14. Numbers of Prairie Warbler (*Dendroica discolor*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.35$) with 95-percent confidence bands (dotted lines).

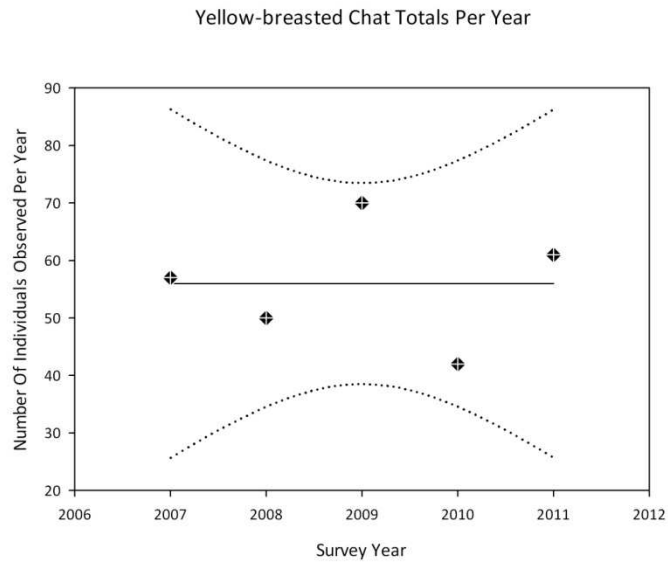


Figure 15. Numbers of Yellow-breasted Chat (*Icteria virens*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.00$) with 95-percent confidence bands (dotted lines).

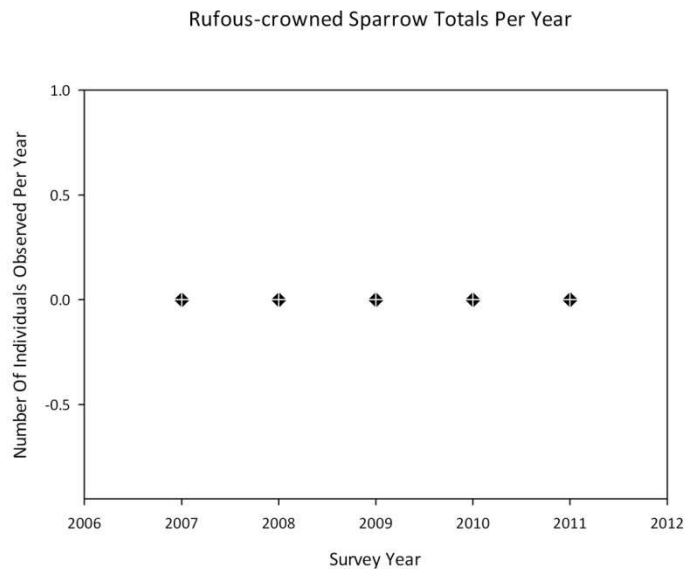


Figure 16. Numbers of Rufous-crowned Sparrow (*Aimophila ruficeps*) observations (diamonds) recorded during the Southern National Forests’ Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. No trend line is displayed due to the absence of any observations during this five-year period.

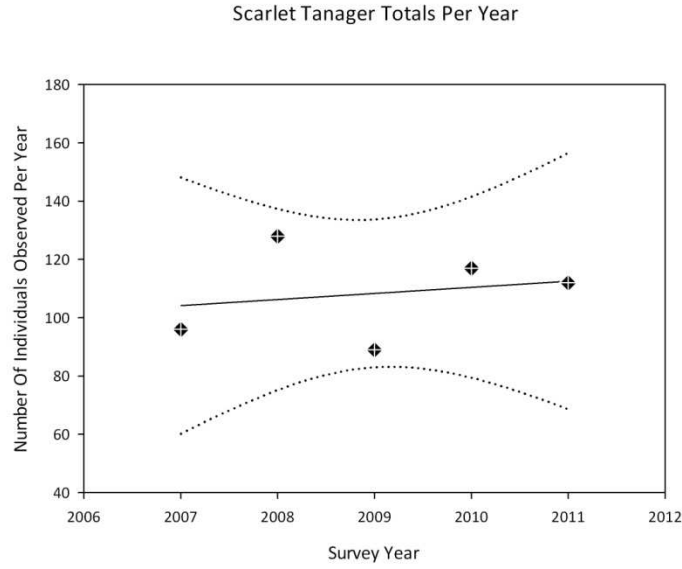


Figure 17. Numbers of Scarlet Tanager (*Piranga olivacea*) observations (diamonds) recorded during the Southern National Forests' Migratory and Resident Landbird Conservation Strategy (R8BIRD) breeding season point-count surveys conducted in the Ozark-St. Francis National Forests from 2007 through 2011. Trend (solid line) was estimated using simple linear regression ($R^2 = 0.04$) with 95-percent confidence bands (dotted lines).