

Elk Meadow Nest Box Monitoring – 2007

In 2006, we re-invigorated nest-box monitoring at the Elk Meadow Open Space. We made a few trips that year and located 31 boxes placed along a three and one-half mile loop. Because we found many boxes occupied by bluebirds and swallows, we decided to increase our monitoring efforts in 2007.

Between 11 March and 19 August 2007, we made 13 visits to monitor productivity in the 31 nest boxes. This period covered the entire breeding cycle of the six species we found nesting in the boxes (Mountain Bluebird, Western Bluebird, Tree Swallow, Violet-green Swallow, Mountain Chickadee, and House Wren). Breeding chronology of Mountain Bluebirds, Western Bluebirds, and Tree Swallows, the three most abundant species, is provided in Table 1. Although Western Bluebirds arrived two weeks later than Mountain Bluebirds, they completed nests and had laid a full clutch of eggs about a week ahead. The heavy snows and cold weather we had in late March and early April appeared to disrupt breeding of Mountain Bluebirds. Tree swallows arrived more than six weeks after Mountain Bluebirds and, because of their later breeding season, did not re-nest after raising successful broods.

Overall, 128 young of all species were produced in the nest boxes in 2007, for an average productivity of 4.1 young per box. All boxes, except one, were occupied by a breeding pair at some point in the breeding season. Although Mountain Bluebirds made more nests and laid more eggs during their first nesting attempt, Western Bluebirds were far more productive (Table 2). Several first clutches of Mountain Bluebirds appeared to be abandoned during cold, snowy weather. Half of the Mountain and Western Bluebirds that raised successful broods re-nested; productivity for both species was higher during their second nest attempts (Table 2). However, we did find some dead chicks in second nests, which we did not find in first nesting attempts. Because our visits were fairly widely spaced, our estimates of productivity might be on the high side.

Relative to both bluebird species, which combined laid 29 clutches, few clutches were produced by the remaining four species (12 clutches). Productivity varied a lot among species; no Violet-green Swallow young were produced from boxes, but three Mountain Chickadee pairs produced 20 young (Table 2).

We plan to continue monitoring efforts in 2008. If you would like to participate, please contact Brad Andres (303-670-0101; heatherbrad1@yahoo.com) or Kay Niyo (303-679-6646; kay@kayniyo.com).

- Brad Andres, Kay Niyo, and Heather Johnson

Table 1. Breeding chronology of bluebirds and Tree Swallows using nest boxes in Elk Meadow Open Space, Evergreen, CO – 2007.

	Mountain Bluebird	Western Bluebird	Tree Swallow
Males arrive	11 March	25 March?	29 April
Pairs evident	18 March	1 April	12 May
Nest completed	29 Apr	22 Apr	19 May
Full clutch in nest	15 May	9 May	7 June
Hatchlings in nest	29 May	23 May	21 June
Chicks fledged	18 June	13 June	11 July
Eggs in second nest of successful pair	2 July	24 June	—
Last young of re-nest fledged	6 Aug	12 Aug	—

Table 2. Breeding success of birds using nest boxes in Elk Meadow Open Space, Evergreen, CO – 2007.

	Mountain Bluebird		Western Bluebird		Tree Swallow	Violet-green Swallow	Mountain Chickadee	House Wren
	1 st	2 nd	1 st	2 nd	1 st	1 st	1 st	1 st
Nest attempt	16		11		7	2	3	3
No. pairs	16		11		7	2	3	3
No. nests built	14	3	10	4	6	2	3	3
No. nests with eggs	13	3	9	4	5	2	3	2
No. successful	8	2	6	4	3	0	3	1
Clutch size	4.85	4.67	5.33	4.75	4.20	2.50	7.00	6.00
% hatch	46	50	71	79	71	0	95	50
% fledge	46	50	71	75	71	0	95	50
No. chicks fledged/pair	1.81	2.33	3.09	4.25	2.14	0.00	6.67	2.00
Young produced	29	7	34	17	15	0	20	6

Elk Meadow Nest Box Monitoring – 2008

Between 16 March and 21 August 2008, we made 11 visits to monitor bluebird and other cavity-nester use of the 31 nest boxes placed in Elk Meadow Park. Male Mountain Bluebirds were seen in Elk Meadow by 29 February, and several pairs were found around boxes during our first visit on 16 March. Pairs of Western Bluebirds were first observed on our 5 April visit. Although swallows were present in Elk Meadow on 4 May, we did not find eggs of any species until our 17 May visit. The cool spring may have delayed egg-laying by bluebirds.

Similar to use in 2007, nests were constructed in all 31 boxes. Overall, 139 young of six species were produced in the nest boxes in 2008, for an average productivity of 4.5 young per box. Compared to 2007, nest boxes were occupied by fewer Mountain Bluebirds (-15%) and more Western Bluebirds (+40%) in 2008. Productivity of bluebirds was higher in 2008 (Table 1), which resulted in an increase in the number of young produced, relative to 2007, by Mountain Bluebirds (+28%) and Western Bluebirds (+35%). Only five bluebird pairs re-nested, of which four pairs successfully fledged young. Because our visits only occurred every two weeks, we may have somewhat overestimated productivity.

Relative to both bluebird species, which combined laid 29 clutches, few clutches were produced by the remaining four species (5 clutches). House Wrens appeared to destroy the nests or eggs of at least 4 pairs of bluebirds, and swallows appeared to displace 2-3 pairs of Mountain Bluebirds. As the current nest boxes deteriorate, placement of new boxes in more open areas should reduce nest and egg predation by House Wrens.

We plan to continue monitoring efforts in 2009. If you would like to participate, please contact Brad Andres (303-670-0101; heatherbrad1@yahoo.com) or Kay Niyo (303-679-6646; kay@kayniyo.com).

- Brad Andres, Kay Niyo, and Heather Johnson

Table 1. Breeding success of birds using nest boxes in Elk Meadow Open Space, Evergreen, CO – 2008.

	Mountain Bluebird		Western Bluebird		Tree Swallow	Violet-green Swallow	Mountain Chickadee	House Wren
	1 st	2 nd	1 st	2 nd	1 st	1 st	1 st	1 st
Nest attempt	13		14		2	1	1	4
No. pairs	13	2	14	3	2	1	1	4
No. nests built	11	2	13	3	2	1	1	1
No. successful nests	9	1	11	3	2	1	1	1
Clutch size	4.91	4.00	4.85	4.33	6.00	5.00	9.00	7.00
% eggs laid that hatch	80	50	89	100	75	40	100	71
% eggs laid that fledge	78	50	89	100	75	40	89	71
No. chicks fledged/pair	3.81	2.00	4.00	4.33	4.50	2.00	8.00	5.00
No. young produced - 2008	42	4	56	13	9	2	8	5
No. young produced - 2007	29	7	34	17	15	0	20	6

Elk Meadow Nest Box Monitoring – 2009

Between 1 March and 10 August 2009, we made 12 visits to monitor bluebird and other cavity-nester use of the 31 nest boxes placed in Elk Meadow Park. Male Mountain Bluebirds were seen in Elk Meadow by 1 March, but nesting did not get going until mid-May. Pairs of Western Bluebirds were first observed on our 11 April visit. We did not find Tree Swallows with eggs until 13 June. Snow and cold weather seems to have delayed bluebird nesting activity in Elk Meadow in 2009.

Similar to the past two years, nests were constructed in all 31 boxes in Elk Meadow. Overall, 144 young of six species were produced in the nest boxes in 2009, for an average productivity of 4.6 young per box. Again in 2009, fewer boxes were used by Mountain Bluebirds, whereas Western Bluebirds increased their use of Elk Meadow boxes. Western Bluebirds produced 80 young in 2009 compared to just 30 young produced by Mountain Bluebirds. Only 1 pair each of Mountain Bluebirds and Western Bluebirds produced a second clutch, and only the Western Bluebirds were successful. Because our visits only occurred every two weeks, we may have somewhat overestimated productivity. Since 2007, Western Bluebirds have been increasing in their use of Elk Meadow nest boxes.

Relative to both bluebird species, which combined laid 28 clutches, few clutches were produced by the remaining four species (7 clutches). We had our first White-breasted Nuthatch using a box this year. In three years of monitoring, only two Violet-green Swallows have been produced from the boxes, although we have observed nesting in aspens in Elk Meadow. House Wrens appeared to destroy the nests or eggs of at least two pairs of Mountain Chickadees, and Western Bluebirds displaced two pairs of Mountain Bluebirds. As the current nest boxes deteriorate, placement of new boxes in more open areas should reduce egg predation by House Wrens and attract more bluebird pairs.

We plan to continue monitoring efforts in 2010. In addition, we are developing a project with the University of Colorado-Denver where we will expand the nest boxes in Elk Meadow and begin banding individual bluebirds and track their site fidelity and survival. We believe this will be a great opportunity for Evergreen Audubon members to be more involved with a bird science project. If you would like to participate in further monitoring efforts, please contact Brad Andres (303-670-0101; heatherbrad1@yahoo.com).

This project would not happen without the help of Mike Wilson, Barbara Nabors, Rachel Hutchinson, Kay Niyo, and Heather Johnson. Thanks to you all!

- Brad Andres

Table 1. Breeding success of birds using nest boxes in Elk Meadow Open Space, Evergreen, CO – 2009.

	Mountain Bluebird		Western Bluebird		Tree Swallow	White-breasted Nuthatch	Mountain Chickadee	House Wren
Nest attempt	1 st	2 nd	1 st	2 nd	1 st	1 st	1 st	1 st
No. pairs	11	1	14		2	1	3	3
No. nests built	10	1	14	3	2	1	3	3
No. nests with eggs	9	1	13	3	2	1	1	1
No. successful nests	7	0	11	3	2	1	1	1
Clutch size	5.55	5.00	4.85	4.33	6.00	5.00	5.00	7.00
% eggs laid that hatch	60	0	89	100	75	100	100	100
% eggs laid that fledge	60	0	89	100	75	100	100	100
No. chicks fledged/pair	3.33	0	4.00	4.33	4.50	5.00	5.00	7.00
No. young produced - 2009	30	0	75	5	17	5	5	7
No. young produced - 2008	42	4	56	13	9	-	8	5
No. young produced - 2007	29	7	34	17	15	-	20	6

Elk Meadow Nest Box Monitoring – 2010

With funding Evergreen Audubon received through a National Audubon TogetherGreen grant, we purchased materials to build replacement boxes and expand the nest box trail in Elk Meadow Park in 2010. The trail in Elk Meadow now stands at 35 boxes. We also replaced a number of boxes at Three Sisters Park and established a two-mile-loop trail that now contains 25 nest boxes. We added boxes gradually throughout the summer at Three Sisters, so we did not undertake a full monitoring program there. Through Sean Kluesner, a Natural Resources Specialist, we have developed a good working relationship with Jefferson County Open Space, and they are supportive of our expanded efforts.

In 2010, we made 11 visits to monitor the bluebird, swallow, and other cavity-nester use of the 36 nest boxes placed in Elk Meadow Park (we left one old box because of bluebird activity but removed it at the end of the season). Mountain Bluebirds were almost a week late in returning to Elk Meadow this year. We observed 27 males and 2 females on the north end of the property on 6 March, but only two birds were observed around boxes on 13 March. No bluebirds were found in Elk Meadow on a snowy box check on 27 March. Numerous pairs of Mountain Bluebirds were observed around nest boxes on 11 April, and a Tree Swallow was first observed on 25 April.

Similar to past years, 35 of 36 boxes were occupied by Western and Mountain Bluebirds, Tree Swallows, House Wrens, and a White-breasted Nuthatch. Most of the new nest boxes were taken up by Tree Swallows, and our removing boxes from trees and placing them in more open areas resulted in lower box use by Mountain Chickadees. Despite arriving almost a month after Mountain Bluebirds, the first egg date of Western Bluebirds was only one day later (21 May) than Mountains (20 May). The first eggs of Tree Swallows were found on 5 June.

Overall, 147 young of five species were produced in the nest boxes in 2010, for an average productivity of 4.1 young per box. Again in 2010, more Western Bluebirds built nests and laid eggs in boxes than Mountain Bluebirds, although productivity for Western Bluebirds was down by 44% from 2009 (see Table 1). No bluebirds, or any other species, produced a second clutch after successfully raising a brood. Increasing the number of boxes in Elk Meadow increased productivity of Tree Swallows by about 150% over 2009, and a total of 42 swallow young fledged in 2010. Mountain and Western Bluebirds and Tree Swallows contributed 88% of the total nest box productivity in Elk Meadow; 17 additional young were produced by one pair of White-breasted Nuthatches and four pairs of House Wrens. The White-breasted Nuthatch pair and one pair of House Wrens had their nests destroyed and re-nested. Hot weather in mid-summer likely caused some chick deaths in the boxes.

A few pairs that initially set up territories at a box were subsequently replaced by other species, although the five shifts we observed were not consistent between species and included: Tree Swallow to Western Bluebird; Mountain Bluebird to Tree Swallow; House Wren to Western Bluebird; House Wren to Mountain Bluebird; and Mountain Bluebird to House Wren.

We plan to continue monitoring efforts in Elk Meadow in 2011 and expand our monitoring efforts to Three Sisters. If you would like to participate in nest box monitoring efforts in 2011, please contact Brad Andres at birdmon@evergreenaudubon.org.

This project would not happen without the help of Jeffrie Anderson, Judith Bird, Pat Carter, Rachel Hutchinson, Heather Johnson, Barbara Nabors, and Kay Niyo. Thanks to you all! We appreciate the support of Jefferson County Open Space.

- Mike Wilson and Brad Andres

Table 1. Breeding success of birds using nest boxes in Elk Meadow Park, Evergreen, Colorado – 2010.

	Western Bluebird	Mountain Bluebird	Tree Swallow	House Wren	White-breasted Nuthatch	Mountain Chickadee
Pairs	14	11	10	4	1	-
Nests built	12	9	10	5	2	-
Nests with eggs	12	8	10	4	2	-
Successful nests	12	8	10	3	1	-
Clutch size	5.08	5.13	5.60	5.50	5.00	-
% hatched of eggs laid	87	90	77	65	40	-
% fledged of eggs laid	85	88	75	65	40	-
Chicks fledged/pair	4.33	4.50	4.20	3.75	2.00	-
Young produced - 2010	52	36	42	15	2	-
Young produced - 2009	75	30	17	7	5	5
Young produced - 2008	56	42	9	5	-	8
Young produced - 2007	34	29	15	6	-	20

Nest Boxes Results from 60 Nestboxes at Elk Meadow and Three Sisters

By the start of the bluebird breeding season in 2011, we had established a trail of 35 nest boxes placed in Elk Meadow and 25 boxes placed in Alderfer/Three Sisters. Because of doubling the number of boxes at these two parks, we needed more help maintaining our two-week monitoring schedule, which we committed to Jefferson County Open Space, so thanks to all who helped achieve our monitoring plan!

In 2011, we made 12 visits to Elk Meadow and 11 visits to Three Sisters to monitor nest box use between 17 March and 20 August. During this period, all of the 35 boxes in Elk Meadow were occupied by breeding bird pairs, whereas only 80% (20 of 25) of the boxes in Three Sisters were occupied. Mountain Bluebird pairs laid eggs in 20 nest boxes at both sites, followed by Western Bluebirds (17 nests) and Tree Swallows (11 nests). There were differences in composition of nest box users between Elk Meadow and Three Sisters. Of 39 nests with eggs in Elk Meadow, 29 were laid by bluebirds (74%), whereas bluebirds had eggs in only 35% (8 of 23) of the nestbox attempts in Three Sisters. Absent from Elk Meadow, Violet-green Swallows (5 nests) and Mountain Chickadees (1 nest) used nest boxes in Three Sisters.

At both sites, 247 young of six species were produced in the nest boxes in 2011, for an average productivity of 4.1 young per box. Western Bluebirds produced the most young (89 fledged chicks), followed by Mountain Bluebirds (74 chicks) and Tree Swallows (43 chicks). Boxes at Three Sisters produced 13 Violet-green Swallow young, and 14 White-breasted Nuthatch young fledged from Three Sisters and Elk Meadow nestboxes. Very few birds renested after losing their eggs or chicks (three Mountain Bluebirds and 1 Tree Swallow) and occupants at two boxes switched species after an unsuccessful attempt.

Productivity (number of fledged young/nest where eggs were laid) of bluebirds in Elk Meadow was higher in 2011 than the average for the previous four years (3.5 chicks/nest versus 3.3 for Mountain Bluebirds and 5.2 versus 4.5 for Western Bluebirds. Working with Mike Wunder at the University of Colorado-Denver, we were able to band 36 individual bluebirds for future studies. We plan to continue monitoring efforts in Elk Meadow in 2012 and Three Sisters. If you would like to participate in nest box monitoring efforts in 2012, please contact Brad Andres at birdmon@evergreenaudubon.org.

This project would not happen without the assistance of Chuck Aid, Lisa Carter (and family), Pat Carter, Peggy Durham, Heather Johnson, Kathanne Lynch, Barbara Nabors, and Kay Niyo. Thanks to you all! We appreciate the support of Jefferson County Open Space.

Mike Wilson, Rachel Hutchison, and Brad Andres

Breeding success of birds using nest boxes in Elk Meadow and Alderfer/Three Sisters Parks, Evergreen, Colorado – 2011.

	Western Bluebird	Mountain Bluebird	Tree Swallow	Violet-green Swallow	House Wren	White-breasted Nuthatch	Mountain Chickadee
Elk Meadow							
Nests built	15	15	8	-	1	1	-
Nests with eggs	15	14	8	-	1	1	-
Successful nests	15	12	6	-	1	1	-
Clutch size	5.53	4.07	5.25	-	5.00	6.00	-
% hatched of eggs laid	95	86	83	-	80	100	-
% fledged of eggs laid	94	86	69	-	80	100	-
Chicks fledged/pair	5.20	3.50	3.63	-	4.00	6.00	-
Young produced	78	49	29	-	4	6	-
Three Sisters							
Nests built	2	6	3	5	3	2	1
Nests with eggs	2	6	3	5	2	2	1
Successful nests	2	5	3	4	1	2	1
Clutch size	6.00	5.00	5.00	3.80	6.50	5.00	7.00
% hatched of eggs laid	92	100	93	100	38	80	71
% fledged of eggs laid	92	83	93	68	38	80	71
Chicks fledged/pair	5.50	4.17	4.67	2.60	2.50	4.00	5.00
Young produced	11	25	14	13	5	8	5

High Production of Mountain Bluebirds at Elk Meadow and Three Sisters in 2012

We continued our monitoring efforts of 35 nest boxes in Elk Meadow Park and 25 boxes in Alderfer/Three Sisters Park in 2012. Also this year, Jessica Fish, a student of Dr. Michael Wunder of the University of Colorado Denver, began a graduate project on bluebirds and will be using Elk Meadow and Three Sisters as two of her study sites. With the help of Evergreen Audubon members, Jessica was able to band 14 adult and 76 young bluebirds in Elk Meadow and 8 adult and 35 young bluebirds in Three Sisters. She also placed geolocators on 13 bluebirds at both sites. Geolocators use sunrise and sunset data to determine the locations of marked birds, and information obtained from the devices will be used to determine the wintering grounds of our breeding bluebirds.

We made 13 visits to Elk Meadow (32.5 hours) and 12 visits to Three Sisters (25 hours) to monitor nest box use between 5 March and 10 August, 2012. During this period, all of the 35 boxes in Elk Meadow were occupied by breeding bird pairs, and all but one box (total of 24) was occupied in Three Sisters. One occupied box in Three Sisters was destroyed by a black bear, so we did not include information from this box in our analysis.

For first nest attempts at both sites, Mountain Bluebirds laid eggs in 24 boxes, Western Bluebirds in 17 boxes, and Tree Swallows in 13 boxes; these three species constituted 92% of all nests with eggs. House Wrens and Violet-green Swallows each laid eggs in two nest boxes, and a Mountain Chickadee laid a single clutch at Three Sisters. This year, Violet-green Swallows nested only in Elk Meadow, whereas five pairs occupied boxes in Three Sisters in 2011. Unlike 2011 when no pairs re-nested or made late-season attempts, 20 pairs of birds initiated a second nest attempt in 2012. Most (85%) of the second attempts were in Elk Meadow and were initiated there primarily (53%) by Mountain Bluebirds.

At both sites, 254 young of six species were produced in the nest boxes in 2012 (an average productivity of 4.3 fledged young per box), which was similar to the 247 young produced in 2011. Mountain Bluebird pairs produced 117 young, Western Bluebirds 66 young, and Tree Swallows 39 young. The dry early summer conditions of 2012 appeared to favor production of Mountain Bluebirds; production of Mountain Bluebirds in 2012 was 58% higher than in 2011, whereas production of Western Bluebirds was 26% lower. Tree Swallow production was similar between 2011 (43 young) and 2012 (39 young). Since beginning our nest box placement and monitoring in 2007, we have more than doubled the production of bluebirds and swallows at these two parks.

The following folks assisted with this year's nest box checks: Chuck Aid, Brad Andres, Chelsea Bebee, Karel Buckley, Pat Carter, Andrea Contreras, Fernando Diaz, Jessica Fish, Linda Fisher, JoAnn and Bill Hackos, Rachel Hutchison, Heather Johnson, Andrea Minoletti, Barbara Nabors, Pandora Reagan, Dee Sacks, David Wald, Natalie Wehrwein, Mike Wilson, Mike Wunder. These observers spent a total of 160 person-hours monitoring the nest boxes in 2012, and Dee Sacks spent an additional 16 hours assisting Jessica. Thanks to you all! We appreciate the support of Sean Kluesner and Jefferson County Open Space.

- Rachel Hutchison, Mike Wilson, and Brad Andres

Breeding success of birds using nest boxes in Elk Meadow and Alderfer/Three Sisters Parks, Evergreen, Colorado – 2012. Second attempts are clutches laid, by either the same or different species, after the success or failure of the initial clutch.

		Mountain Bluebird		Western Bluebird		Tree Swallow		Violet-green Swallow	House Wren		Mountain Chickadee
Elk Meadow											
	Nesting attempt	1 st	2 nd	1 st	2 nd	1 st	2 nd	2 nd	1 st	2 nd	1 st
	Nests built	16	9	9	4	9	1	2	1	1	-
	Nests with eggs	16	9	9	4	8	1	2	1	1	-
	Successful nests	15	7	8	3	7	0	2	1	1	-
	Clutch size	5.13	4.56	4.78	5.00	5.00	4.00	3.50	8.00	6.00	-
	% hatched of eggs laid	80	59	79	55	73	0	100	100	100	-
	% fledged of eggs laid	72	59	60	55	45	0	100	100	100	-
	Chicks fledged/pair	3.69	2.67	2.89	2.75	2.00	0	3.50	8.00	6.00	-
	Young produced	59	24	26	11	18	0	7	8	6	-
Three Sisters											
	Nesting attempt	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	1 st	2 nd	1 st
	Nests built	8	2	8	-	5	1	-	1	-	1
	Nests with eggs	8	2	8	-	5	1	-	1	-	1
	Successful nests	7	1	7	-	5	1	-	1	-	1
	Clutch size	5.25	4.50	4.50	-	4.80	4.00	-	7.00	-	8.00
	% hatched of eggs laid	71	56	92	-	96	75	-	86	-	63
	% fledged of eggs laid	69	56	81	-	75	75	-	86	-	63
	Chicks fledged/pair	3.63	2.50	3.63	-	3.60	3.00	-	6.00	-	5.00
	Young produced	29	5	29	-	18	3	-	6	-	5

Bluebirds have a Moderate Year at Elk Meadow and Three Sisters in 2013

We continued our regular monitoring of the nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2013. We made 11 complete visits and several spot checks to each park between 17 March and 4 August, spending a total of 29 survey hours at Elk Meadow and 25 hours at Three Sisters. During this period, we found that 32 of the 35 boxes at Elk Meadow were occupied by breeding bird pairs, and 21 of 25 boxes were occupied at Three Sisters. Nest box occupancy in 2013 was 88% (both parks), which was lower than past years.

For first nest attempts at both parks, Mountain Bluebirds laid eggs in 22 boxes, Western Bluebirds in nine boxes, and Tree Swallows in 17 boxes; these three species constituted 91% of all nests with eggs. House Wrens made three first attempts at nesting, and Violet-green Swallows made two first nesting attempts. Western Bluebirds built nests in only about half of the nest boxes they did in 2012. Likely because we have moved more boxes onto metal poles, we did not find any nesting chickadees or nuthatches in 2013. Compared to 2012 when we had 20 pairs that made second or late-season nesting attempts, only five pairs of birds initiated a second nest attempt in 2013.

At both parks, 198 young of five species were produced in the nest boxes in 2013, with an average productivity of 3.5 fledged young per box. Young produced in 2013 was down 22% from the production out of nest boxes in 2012. Again this year, Tree Swallows on average produced less chicks (2.44 chicks per pair) than bluebirds (3.77 chicks per pair). We believe that some swallow chicks died of starvation, so differences in productivity could relate to the differences in feeding behavior and prey availability between swallows and bluebirds.

The percentage of Mountain and Western Bluebirds nesting in Elk Meadow has fluctuated significantly among years (see figure), ranging from almost even (50:50) in 2008–2009 to a dominance of Western Bluebirds in 2009–2011 to a dominance of Mountain Bluebirds the last two years. We are unsure about what might be driving this annual variation. When Western Bluebirds were on the rise, it seemed they were more aggressive than Mountain Bluebirds and were out-competing them for boxes.

Jessica Fish continued her Master's degree study of bluebirds and was assisted by Holly Beveney. Concentrating at Three Sisters, they banded every chick that hatched and also banded nine new adults and recaptured four adults from previous years' banding efforts. One female Mountain Bluebird was re-captured in the same box where she was originally captured in 2012. She actually kicked out a pair of swallows at the beginning of the 2013 season to get it back! Two other adults were captured at different boxes, and one recaptured female was banded as a nestling in 2011. So far, this is the only bird banded as a nestling that has been recaptured at either park; all other recaptures were returning adults.

They also banded some birds at Elk Meadow, including 42 chicks and 13 new adults. They also re-captured two adults, both that had geo-loggers. Recall that these devices are used to determine the wintering locations and migration pathways of migrant birds. In addition to banding, they also collected fecal and blood samples from most captured adults at both parks, which will be used to answer questions regarding trade-offs between immune defense and

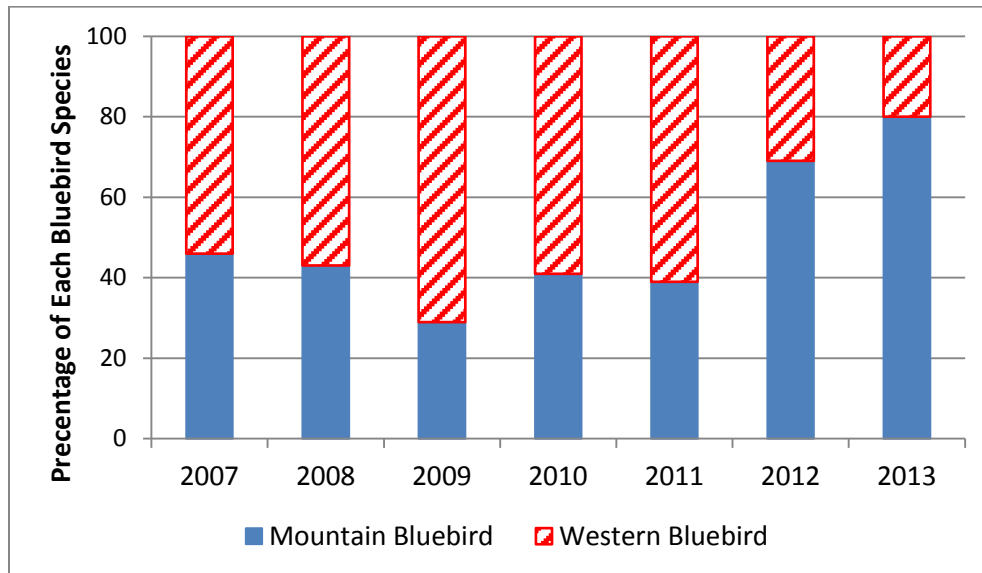
reproductive investment. They will be analyzing the fecal samples to look for microbial diversity and the presence of pathogens. They also weighed chicks periodically determine reproductive investment. Finally, they collected feather samples from captured adults to determine wintering regions, especially for the birds who returned geo-loggers.

The following folks assisted with this year's nest box checks: Brad Andres, Holly Bevency, Pat Carter, Bill Hackos, Rachel Hutchison, Heather Johnson, Barbara Nabors, Chris Pfaff, Dee Sacks, and Larry White. Thanks to you all! We appreciate the support of Sean Kluesner and Jefferson County Open Space. If you would like to participate in nest box monitoring efforts in 2014, please contact Rachel Hutchison (rachelhutchison@comcast.net) or JoAnn/Bill Hackos (birdmon@evergreenaudubon.org).

- Rachel Hutchison, Dee Sacks, and Brad Andres

Breeding success of birds using nest boxes in Elk Meadow and Alderfer/Three Sisters Parks, Evergreen, Colorado – 2013. Second attempts are clutches laid, by either the same or different species, after the success or failure of the initial clutch.

Elk Meadow		Mountain Bluebird		Western Bluebird		Violet-green Swallow		Tree Swallow	House Wren
	Nesting attempt	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	1 st
	Nests built	15	1	3	1	1	1	11	2
	Nests with eggs	15	1	3	1	1	1	11	2
	Successful nests	14	1	3	1	1	1	9	2
	Clutch size	5.47	2.00	4.67	5.00	4.00	4.00	3.82	6.50
	% hatched of eggs laid	85	100	93	100	100	100	90	100
	% fledged of eggs laid	85	100	93	100	100	100	52	100
	Chicks fledged/pair	4.67	2.00	4.33	5.00	4.00	4.00	2.00	6.50
	Young produced	70	2	13	5	4	4	22	13
Three Sisters		Mountain Bluebird		Western Bluebird		Violet-green Swallow		Tree Swallow	House Wren
	Nesting attempt	1 st	2 nd	1 st	2 nd	1 st	1 st	2 nd	1 st
	Nests built	7	-	6	1	1	6	1	1
	Nests with eggs	7	-	6	1	1	6	1	0
	Successful nests	6	-	4	1	1	5	1	-
	Clutch size	4.14	-	4.83	5.00	5.00	4.00	5.00	-
	% hatched of eggs laid	66	-	52	80	100	83	80	-
	% fledged of eggs laid	66	-	52	80	100	79	60	-
	Chicks fledged/pair	2.71	-	2.50	4.00	5.00	3.17	3	-
	Young produced	19	-	15	4	5	19	3	-



Percentage of Mountain and Western Bluebirds using nest boxes in Elk Meadow Open Space Park, 2007-2013.

Late Snow Storm Lowers Bluebird Productivity in Elk Meadow

We continued our regular monitoring of the nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2014. We made 11 complete visits and several spot checks to each park between 16 March and 2 August, spending a total of 28.5 survey hours at Elk Meadow and 19 hours at Three Sisters. During this period, we found that 33 of the 35 boxes at Elk Meadow were occupied by breeding bird pairs, and 23 of 25 boxes were occupied at Three Sisters, which resulted in an overall occupancy rate of 93%.

For first nest attempts at both parks, Mountain Bluebirds laid eggs in 23 boxes, Western Bluebirds in 11 boxes, Tree Swallows in 11 boxes, and Violet-green Swallows in 6 boxes; these four species constituted 91% of all nests with eggs. House Wrens made four first attempts at nesting, and a single Mountain Chickadee pair used a box at Three Sisters. Numbers of nesting Western Bluebirds remained proportionally low in 2014.

The snow storm during Mother's Day weekend caused the failure of 11 bluebird nests in Elk Meadow. Accordingly, there were more second- and late-nesting attempts in 2014 (19 attempts) than in 2013, which consisted primarily of Mountain Bluebirds (12). Besides the late snow, we also lost four boxes to bears throughout the season.

Despite the late snow storm, bears, and a cool wet summer, productivity of pairs using the nest boxes in 2014 was 8% higher than productivity in 2013. At both parks, 216 young of six species were produced, for an average productivity of 3.79 fledged young per box. Unlike past years, bluebirds were slightly less productive (2.7 chicks fledged per pair) than swallows (2.9 chicks fledged per pair), likely due to the late snow storm.

The following folks assisted with this year's nest box checks: Brad Andres, Linda Bolinger, Sue Dunlop Barbara Jean Gard, Steve Garman, Rachel Hutchison, Kathy Madison, Rose Paslay, Chris Pfaff, Dee Sacks, and Kathy Twieg. Thanks to you all! We appreciate the support of Sean Kluesner and Jefferson County Open Space. If you would like to participate in nest box monitoring efforts in 2015, please contact Rachel Hutchison (rachelhutchison@comcast.net) or Brad Andres (heatherbrad1@yahoo.com).

- Rachel Hutchison and Brad Andres

Breeding success of birds using nest boxes in Alderfer/Three Sisters Park, Evergreen, Colorado – 2014. Second attempts are clutches laid, by either the same or different species, after the success or failure of the initial clutch. MOCH = Mountain Chickadee.

	Bluebirds				Swallows			House Wren		MOCH
	Mountain		Western		Tree	Violet-green				
Nesting attempt	1 st	2 nd	1 st	2 nd	1 st	1 st	2 nd	1 st	2 nd	1 st
Nests with eggs	5 (4)	1	8 (7)	1	4	4	1	1	1	1
Successful nests	3	1	5	1	4	2	0	1	1	1
Clutch size	5.00	5.00	4.75	5.00	5.25	4.25	2.00	6.00	6.00	6.00
% hatched of eggs laid	64	100	55	80	95	53	0	100	83	100
% fledged of eggs laid	64	100	42	80	86	18	0	100	17	83
Chicks fledged/pair	4.00	5.00	2.67	4.00	4.50	0.75	0.00	6.00	1.00	5.00
Young produced	16	5	16	4	18	3	0	6	1	5

Breeding success of birds using nest boxes in Elk Meadow Park, Evergreen, Colorado – 2014. Second attempts are clutches laid, by either the same or different species, after the success or failure of the initial clutch.

	Mountain Bluebird		Western Bluebird		Tree Swallow		Violet-green Swallow		House Wren
	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st
Nesting attempt									
Nests with eggs	18 (17)	11	3	1	7	2	2	1	3
Successful nests	6	11	2	1	6	2	1	1	3
Clutch size	4.44	5.00	4.67	6.00	5.29	4.5	3.5	5.00	7.00
% hatched of eggs laid	34	91	64	100	71	25	65	100	95
% fledged of eggs laid	30	76	64	100	57	100	71	100	95
Chicks fledged/pair	1.41	3.82	1.50	6.00	3.00	4.50	2.50	5.00	7.00
Young produced	24	42	9	6	21	9	5	5	21

Rainy Spring Causes Bluebirds to Compensate in Elk Meadow – 2015

We continued our regular monitoring of the nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2015. We made 11 complete visits and several spot checks to each park between 22 March and the end of August, spending a total of 34.5 survey hours at Elk Meadow and 19.5 hours at Alderfer/Three Sisters. During this period, we found that 34 of the 35 boxes at Elk Meadow were occupied by breeding bird pairs and 20 of 22 boxes were occupied at Three Sisters, which resulted in an overall 95% occupancy rate (see Table 1).

For all nest attempts at both parks, Mountain Bluebirds laid eggs in 30 nests, Western Bluebirds in 18 nests, Tree Swallows in 13 nests, and Violet-green Swallows in 8 nests; these four species constituted 92% of all nests with eggs. House Wrens made five attempts at nesting, and a single Mountain Chickadee pair used a box at Alderfer/Three Sisters. The number of nesting Western Bluebirds was more equitable to the number of Mountain Bluebirds in 2015 than in the previous two years.

The rainy spring likely caused failures in bluebirds and Tree Swallows in Elk Meadow. Most failures occurred after hatching, with either complete or partial brood loss. Our suspicion is that insect activity was negatively affected by the rain, and adult birds were not able to forage effectively enough to feed chicks. Later nesting pairs and those breeding at Alderfer/Three Sisters (which tends to be later) were not affected like the initial nesters in Elk Meadow (Table 1). However, pairs compensated by re-nesting and ended up fledging a greater number of chicks by the end of the season than in the previous two years. Note that total bluebird and swallow production has only varied 10-14% among the last three years (Table 2). It seems bluebirds have the ability to adjust their breeding strategy to compensate for the variable spring weather we have at Evergreen's elevation. We do not know, however, how this variable weather affects adult survival.

Thanks to the following folks for assisting with this year's nest box checks: Chuck Aid, Brad Andres, Pat Carter, Marjorie Clinton, Margo Constable, John Dunlop, Susan Dunlop, Barbara Jean Gard, Rachel Hutchison, Linda Mellor, Rose Perillo, Chris Pfaff, Dee Sacks, Don Twieg, and Kathy Twieg. We appreciate the support of Sean Kluesner and Jefferson County Open Space. If you would like to participate in nest box monitoring efforts in 2016, please contact Rachel Hutchison (rachelhutchison@comcast.net) or Brad Andres (baandres1@yahoo.com).

- Brad Andres, Rachel Hutchison, Dee Sacks

Table 1. Breeding success of birds using nest boxes in Elk Meadow and Alderfer/Three Sisters Parks, Evergreen, CO – 2015. Second attempts are clutches laid, by either the same or different species, after the success or failure of the initial clutch.

Elk Meadow	Mountain Bluebird		Western Bluebird		Tree Swallow		Violet-green Swallow		House Wren	
Nesting attempt	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd
Nests with eggs	18	6	8	1	6	2	3	4	1	3
Successful nests	14	6	7	1	5	1	2	3	1	3
Clutch size	4.78	5.17	5.50	5.00	5.00	3.50	4.33	4.25	7.00	5.33
% hatched of eggs laid	71	94	84	100	80	43	69	71	86	88
% fledged of eggs laid	50	85	52	100	43	43	69	71	86	81
Chicks fledged/pair	2.39	4.67	3.29	5.00	2.17	1.50	3.00	4.00	6.00	4.33
Young produced	43	28	23	5	13	3	9	12	6	13

Alderfer/Three Sisters	Bluebirds				Swallows		House Wren	Mountain Chickadee
	Mountain		Western		Tree	Violet-green		
Nesting attempt	1 st	2 nd	1 st	2 nd	1 st	1 st	1 st	1 st
Nests with eggs	5	1	8	1	4	1	1	1
Successful nests	5	1	7	1	4	1	1	1
Clutch size	4.80	4.00	4.88	5.00	5.00	5.00	6.00	7.00
% hatched of eggs laid	92	100	87	40	45	40	83	100
% fledged of eggs laid	92	100	77	40	20	40	83	100
Chicks fledged/pair	4.40	4.00	3.75	2.00	1.00	2.00	5.00	7.00
Young produced	22	4	30	2	4	2	5	7

Table 2. Productivity (number of young produced) and numbers of nest where eggs were laid for bluebirds and swallows in Elk Meadow and Alderfer/Three Sisters Open Space Parks, Evergreen,CO, 2013-2015.

	Elks Meadow			Alderfer/Three Sisters	
	number of young	number of nests		number of young	number of nests
2013	120	33		55	22
2014	121	42		62	22
2015	136	48		64	20

Low Nest Building and Production of Bluebirds in 2016

We continued our regular monitoring of nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2016. We made 11 complete visits and several spot checks to each park between 28 February and 7 August, spending a total of 33.6 survey hours at Elk Meadow and 22.75 hours at Alderfer/Three Sisters. Seventeen observers participated in the monitoring nest boxes, and we appreciate the assistance of: Chuck Aid; Pat Carter; Marjorie Clinton; Barbara Jean Gard; Heather Johnson; Catherine, Johanna and Sean Keefe; Melissa Leasia; Kristin and James Michalski; Chris Pfaff, and Jeanne and Tig Templeton. Thanks to Jefferson County Open Space for their continued partnership with the nest box monitoring. If you would like to participate in nest box monitoring efforts in 2017, please contact Rachel Hutchison (bluebirdrachel2@comcast.net) or Brad Andres (baandres1@yahoo.com).

This past year turned out to be one of the least productive years for bluebirds since we began monitoring in 2009. Over the entire season, only 16 of 22 boxes had eggs laid in them, by all species, in Alderfer/Three Sisters, which is lower than past years (Table 1). In Elk Meadow, we found that 33 of the 35 boxes had nests with eggs laid in them. A major difference in 2016 was that Mountain Bluebirds laid eggs in 39% fewer nests in Elk Meadow (compared to the average from 2009 to 2015) and 43% fewer nests in Alderfer/Three Sisters (2011-2015). Eggs laying pattern were similar for Western Bluebirds in Elk Meadow in 2016 (-52%) but less so in Alderfer/Three Sisters (-14%). Bluebirds nested later than in most years and consequently no bluebird pairs re-nested in 2016. Tree Swallows nesting at both sites combined was up 29% (compared to the 2011-2015 average), and House Wrens were more prevalent in boxes in Elk Meadow in 2016 (Table 1).

Despite the substantial negative differences in nesting, the hatching success of those bluebird pairs that did nest was not as dramatically lower, and in some cases was even higher, than the average of previous years at Elk Meadow and Alderfer/Three Sisters (Table 1). Western Bluebirds had drastic drop in fledging success in Elk Meadow, contributing to very low productivity. The lack of nesting, and also productivity in Western Bluebirds, resulted in far fewer young being produced at both sites in 2016 — 45% fewer Mountain Bluebird young and 58% fewer Western Bluebird young compared to the average of the previous years).

If you recall, the May snow in 2015 killed some eggs, but many bluebirds re-nested and had a very productive year. April was much snowier in 2016 and precipitation in June was lower than 2015. More years of data will help us understand how weather affects the annual productivity and adult survival of nest-box users. We can only hope for a stronger return of nesting bluebirds in 2017.

Brad Andres, Rachel Hutchison, Dee Sacks

Table 1. Breeding success of birds using nest boxes in 2016 and average success in Elk Meadow (2009-2015) and Alderfer/Three Sisters (2011-2015) Open Space Parks, Evergreen, Colorado.

	Mountain Bluebird	Western Bluebird	Tree Swallow	Violet-green Swallow	House Wren
Elk Meadow					
Nests with eggs in 2016	11	5	10	2	5
Average nests with eggs	18	10	8		
Successful nests in 2016	11	4	9	2	4
Clutch size in 2016	5.2	5.6	5.1	4.5	6.4
% hatched of eggs laid in 2016	89	71	71	89	84
Average % hatched of eggs laid	74	86	75		
% fledged of eggs laid in 2016	65	7	71	89	84
Chicks fledged/pair in 2016	3.4	0.4	3.6	4.0	5.4
Average chicks fledged/pair	3.5	3.9	3.1		
Young produced in 2016	37	2	36	8	27
Average young produced	58	44	24		
Alderfer/Three Sisters					
Nests with eggs in 2016	4	6	4	1	1
Average nests with eggs	7	7	5		
Successful nests in 2016	4	6	4	1	1
Clutch size in 2016	4.5	5.3	4.0	4.0	7.0
% hatched of eggs laid in 2016	83	88	88	75	100
Average % hatched of eggs laid	80	76	82		
% fledged of eggs laid in 2016	78	69	88	75	100
Chicks fledged/pair in 2016	3.5	3.7	3.5	3.0	7.0
Average chicks fledged/pair	3.8	3.7	3.4		
Young produced in 2016	14	22	14	3	7
Average young produced	25	22	16		

Poor Nest Box Production for Bluebirds in 2017

We continued our regular monitoring of nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2017. We made 10-11 visits to each park between March and mid-August to check the progress of boxes, spending a total of 29.0 survey hours at Elk Meadow and 16.5 hours at Alderfer/Three Sisters. We appreciate the assistance of Tom Kresse, Melissa Leasia, Kristin Michalski, and Chris Pfaff. Thanks to Jefferson County Open Space for their continued partnership with the next box monitoring. If you would like to participate in nest box monitoring efforts in 2018, please contact Rachel Hutchison (bluebirdrachel2@comcast.net) or Brad Andres (baandres1@yahoo.com).

Unfortunately following on the pattern of last year, 2017 also turned out to be one of the least productive years for bluebirds since we began monitoring in 2009, although Tree Swallows filled some of the void left by lack of bluebird nesting (see Table 1). In Elk Meadow, 30% fewer Mountain Bluebirds and 90% fewer Westerns completed nests and laid eggs in 2017 than in an average previous year. In Alderfer/Three Sisters, 35% fewer Mountain Bluebirds and 38% fewer Westerns completed nests and laid eggs in 2017 than in an average year in the past. Loss of eggs (those that did not hatch) in 2017 was greater than loss of chicks from nests where eggs hatched in both Mountain and Western Bluebirds at both sites combined. This lack of nest initiation and egg-laying resulted in a 65% reduction in productivity (chicks fledged per pair) in Mountain Bluebirds and a 69% reduction in Western Bluebirds for both parks combined.

In contrast, nesting by Tree Swallows was 60% higher in Elk Meadow and 24% higher in Alderfer/Three Sisters (Table 1). Tree Swallow productivity was 66% higher than average in Elk Meadow but 42% lower than average in Alderfer/Three Sisters. In contrast to bluebirds, Tree Swallow chick loss was three times greater than egg loss. For these three species combined, only 75 total young were produced in Elk Meadow compared to an average of 141 young, and only 25 young were produced in Alderfer/Three Sisters compared to an average of 58 young. The lack of nest initiation by bluebirds likely led to above average numbers of House Wrens and Mountain Chickadees using the boxes. Productivity in both of the species was higher than bluebirds or Tree Swallow.

Weather may have affected productivity in bluebirds and Tree Swallow. Although maximum and minimum monthly temperatures were close to average throughout the nesting period, monthly precipitation deviated substantially from normal conditions. Evergreen received 37 inches of snow in April and May, which was 68% above average, whereas rainfall in June and July was 53% below average. Heavy snow in April and May may have negatively affected nest initiation and hatching success of bluebirds. Dry conditions in June and July may have reduced food availability and increased chick loss in Tree Swallow nests. It will be interesting to see how bluebirds respond in 2018. We certainly hope they will return and begin to recover their former numbers.

Brad Andres and Rachel Hutchison

Table 1. Breeding success of birds using nest boxes in 2017 and average success in Elk Meadow (2009-2016) and Alderfer/Three Sisters (2011-2016) Open Space Parks, Evergreen, Colorado. Some nest boxes where eggs were laid were destroyed before outcomes could be determined.

	Bluebirds		Swallows		House Wren	Mountain Chickadee
	Mountain	Western	Tree	Violet-green		
Elk Meadow						
Nests with eggs in 2017	12	1	13	4	8	
Average nests with eggs	17	10	8			
Successful nests in 2017	9	1	13	2	6	
Clutch size in 2017	5.3	5.0	5.4	4.3	6.0	
% hatched of eggs laid in 2017	59	100	90	61	69	
Average % hatched of eggs laid	73	85	75			
% fledged of eggs laid in 2017	39	80	66	54	60	
Chicks fledged/pair in 2017	2.1	4.0	3.5	2.3	3.6	
Average chicks fledged/pair	3.3	3.8	3.0			
Young produced in 2017	25	4	46	7	29	
Average young produced	62	51	28			
Alderfer/Three Sisters						
Nests with eggs in 2017	4	4	6	1	3	3
Average nests with eggs	6	6	5			
Successful nests in 2017	2	3	5	1	3	2
Clutch size in 2017	4.8	5.0	4.5	5.0	7.0	4.5
% hatched of eggs laid in 2017	37	70	81	60	100	100
Average % hatched of eggs laid	71	69	69			
% fledged of eggs laid in 2017	26	60	30	60	100	89
Chicks fledged/pair in 2017	1.3	3.0	1.3	3.0	7.0	4.0
Average chicks fledged/pair	3.3	3.1	2.7			
Young produced in 2017	8	12	8	3	21	8
Average young produced	22	22	14			

Poor Nest Box Productivity for Bluebirds Again in 2018

We continued our regular monitoring of nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2018. With some reduction in the number of boxes, we are now monitoring 32 boxes in Elk Meadow and 22 boxes in Alderfer/Three Sisters. We made 8-9 visits to each park between April and mid-August to check the progress of boxes, spending a total of 46.4 survey hours at Elk Meadow and 18.5 hours at Alderfer/Three Sisters. We appreciate the assistance of Dina Baker, Pat Carter, Amy Crazier, Chris Eden, Barbara Jean Gard, Kristin Michalski and Kathy Twig. Thanks to Jefferson County Open Space for their continued partnership with the next box monitoring. If you would like to participate in nest box monitoring efforts in 2019 please contact Rachel Hutchison (treasurer@evergreenaudubon.org) or Brad Andres (vicepresident@evergreenaudubon.org).

For the third year in a row, productivity of Mountain and Western Bluebirds was below average in 2018. In contrast, productivity of Tree Swallows was above average (Table 1). In Elk Meadow, 46% fewer Mountain Bluebirds and 54% fewer Western Bluebirds completed nests and laid eggs in 2018 compared to an average previous year. In Alderfer/Three Sisters, 67% fewer Mountain Bluebirds and 53% fewer Western Bluebirds completed nests and laid eggs in 2018 than in an average year in the past. Loss of eggs (those that did not hatch) and loss of chicks differed between sites; chick loss was greater than egg loss in Elk Meadow, whereas egg loss exceeded chick loss in Alderfer/Three Sisters. This lack of nest initiation and egg laying in bluebirds resulted in a 62% reduction in the number of Mountain Bluebird chicks produced and a 55% reduction in production of Western Bluebirds for both parks combined.

In contrast, Tree Swallows laid eggs in nests 73% above the average of previous years in Elk Meadow and 3% above the average in Alderfer/Three Sisters (Table 1). Tree Swallow production was 76% higher than average in Elk Meadow and 19% higher than average in Alderfer/Three Sisters. In contrast to bluebirds, both egg and chick loss was lower in Tree Swallows. For Mountain and Western Bluebirds and Tree Swallows combined, only 89 total young were produced in Elk Meadow, compared to an average of 140 young, and only 34 young were produced in Alderfer/Three Sisters, compared to an average of 61 young.

The dry conditions may have affected the ability of bluebirds to provision young. Bluebirds tend to feed more on terrestrial invertebrates, whereas Tree Swallows are aerial insectivores. We plan to conduct a more thorough analysis of effects of weather on nest initiation and productivity in the next few years. In the meantime, we hope that bluebirds can reverse their declining trend next year.

Brad Andres and Rachel Hutchison

Table 1. Breeding success of birds using nest boxes in 2018 and average success in Elk Meadow (2009-2017) and Alderfer/Three Sisters (2011-2017) Open Space Parks, Evergreen, Colorado. Some nest boxes where eggs were laid were destroyed before outcomes could be determined.

	Bluebirds		Swallows		House Wren
	Mountain	Western	Tree	Violet-green	
Elk Meadow					
Nests with eggs in 2018	9	4	15	1	2
Average nests with eggs	17	9	9		
Successful nests in 2018	8	4	15	1	2
Clutch size in 2018	4.8	4.8	5.2	5.0	5.0
% hatched of eggs laid in 2018	79	100	86	80	90
Average % hatched of eggs laid	74	86	76		
% fledged of eggs laid in 2018	58	53	69	80	90
Chicks fledged/pair in 2018	2.8	2.5	3.6	4.0	4.5
Average chicks fledged/pair	3.2	3.8	3.1		
Young produced in 2018	25	10	54	4	9
Average young produced	59	50	31		
Alderfer/Three Sisters					
Nests with eggs in 2018	2	3	5		1
Average nests with eggs	6	6	5		
Successful nests in 2018	2	3	4		1
Clutch size in 2018	4.5	5.0	5.0		6.0
% hatched of eggs laid in 2018	56	80	100		100
Average % hatched of eggs laid	74	77	83		
% fledged of eggs laid in 2018	56	73	90		0
Chicks fledged/pair in 2018	2.5	3.7	4.5		0
Average chicks fledged/pair	3.5	3.3	3.0		
Young produced in 2018	5	11	18		0
Average young produced	23	23	15		

Poor Nest Box Productivity for Bluebirds Again in 2019

We continued our regular monitoring of nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2019. With some reduction in the number of boxes, we are now monitoring 32 boxes in Elk Meadow and 20 boxes in Alderfer/Three Sisters. We made 9-10 visits to each park between April and early-August to check the progress of boxes, spending a total of 35.7 survey hours at Elk Meadow and 21.1 hours at Alderfer/Three Sisters. We appreciate the assistance of Nicole Hutchison, Xander Hutchison, Heather Johnson, Iris Jones, Sybil Jones, Jan Kerr, Barbara Klaus, Melissa Leasia, Connor Leppert, Dan Leppert, Declan Roach, Hazel, Roach, Tobin Roach, and Dwight Souder. Thanks to Jefferson County Open Space for their continued partnership with the next box monitoring. If you would like to participate in nest box monitoring efforts in 2020 please contact Rachel Hutchison (treasurer@evergreenaudubon.org) or Brad Andres (vicepresident@evergreenaudubon.org).

For the fourth year in a row, productivity of Mountain and Western Bluebirds on 2019 was below average, and productivity of Tree Swallows was slightly above average (Table 1). In Elk Meadow, 43% fewer Mountain Bluebirds and 64% fewer Western Bluebirds completed nests and laid eggs in 2019 compared to an average previous year. In Alderfer/Three Sisters, 82% fewer Mountain Bluebirds and 33% fewer Western Bluebirds completed nests and laid eggs in 2019 than in an average year in the past. Loss of eggs (those that did not hatch) and loss of chicks differed between sites; chick loss was generally greater than egg loss in Alderfer/Three Sisters, whereas egg loss exceeded or was similar to chick loss in Elk Meadow. This lack of nest initiation and egg-laying in bluebirds resulted in a 57% reduction in the number of Mountain Bluebird chicks produced and a 52% reduction in production of Western Bluebirds for both parks combined.

In contrast, Tree Swallows laid eggs in nests 51% above the average of previous years in Elk Meadow but was 18% below the average in Alderfer/Three Sisters (Table 1). Tree Swallow production was 28% higher than the average in Elk Meadow and 37% higher than the average in Alderfer/Three Sisters. For Mountain and Western Bluebirds and Tree Swallows combined, only 88 total young were produced in Elk Meadow, compared to an average of 139 young, and only 34 young were produced in Alderfer/Three Sisters, compared to an average of 57 young. One pair of Pygmy Nuthatches fledged nine young in Elk Meadow, and one pair of Mountain Chickadees fledged five young in Alderfer/Three Sisters.

The cold, wet spring and early may have affected the nesting of bluebirds and chick provisioning of bluebirds. Later nesting of Tree Swallows may have buffered some of the weather effects. We plan to conduct a more thorough analysis of effects of weather on nest initiation and productivity in the next few years. The overall decline in nest initiation and productivity of bluebirds at both sites is concerning.

Brad Andres and Rachel Hutchison

Table 1. Breeding success of birds using nest boxes in 2019 and average success in Elk Meadow (2009-2018) and Alderfer/Three Sisters (2011-2018) Open Space Parks, Evergreen, Colorado. Some nest boxes where eggs were laid were destroyed before outcomes could be determined.

	Bluebirds		Swallows		House Wren
	Mountain	Western	Tree	Violet-green	
Elk Meadow					
Nests with eggs in 2019	9	3	14	1	1
Average nests with eggs	16	8	9		
Successful nests in 2019	7	3	12	1	1
Clutch size in 2019	5.1	5.7	5.1	3.0	6.0
% hatched of eggs laid in 2019	86	88	85	75	100
Average % hatched of eggs laid	75	87	77		
% fledged of eggs laid in 2019	86	77	72	75	100
Chicks fledged/pair in 2019	4.43	4.33	3.67	3.00	6.00
Average chicks fledged/pair	3.17	3.71	3.16		
Young produced in 2019	31	13	44	3	6
Average young produced	57	48	34		
Alderfer/Three Sisters					
Nests with eggs in 2019	1	4	4	-	1
Average nests with eggs	6	6	5		
Successful nests in 2019	0	4	4	-	1
Clutch size in 2019	4.0	3.5	4.3	-	5.0
% hatched of eggs laid in 2019	0	93	77	-	83
Average % hatched of eggs laid	72	77	85		
% fledged of eggs laid in 2019	0	57	41	-	83
Chicks fledged/pair in 2019	0.00	2.00	1.75	-	5.00
Average chicks fledged/pair	3.30	3.14	2.59		
Young produced in 2019	0	8	7	-	5
Average young produced	22	22	13		

Low Numbers but High Productivity for Bluebirds in 2020

Despite the pandemic, we were able to continue our regular monitoring of nest boxes at Elk Meadow and Alderfer/Three Sisters Jefferson County Open Space Parks in 2020. However, most nest box visits were completed by individuals or very small groups. With some reduction in the number of boxes, we are now monitoring 32 boxes in Elk Meadow and 18 boxes in Alderfer/Three Sisters. We made 10-12 visits to each park between April and mid-August to check the progress of boxes, spending a total of 40.3 survey hours at Elk Meadow and 18.5 hours at Alderfer/Three Sisters. We appreciate the assistance of Linda Bollinger, Heather Johnson, Barbara Klaus, and Melissa Leasia. Rachel's grandkids (Declan, Hazel, Leah and Tobin Roach) tagged along on two visits. Thanks to Jefferson County Open Space for their continued partnership with the next box monitoring. If you would like to participate in nest box monitoring efforts in 2021 please contact Rachel Hutchison (treasurer@evergreenaudubon.org) or Brad Andres (president@evergreenaudubon.org).

Nests built by Mountain and Western Bluebirds were significantly lower than the average year between 2009/2011 and 2019, ranging from -13% to -80% (Table 1). Occupancy by Tree Swallows was up at Elk Meadow (44%) and down at Aldefer/Threes Sisters (-37%). At both sites combined, seven nest boxes were occupied by House Wrens, two by Violet-green Swallows, and one each by a Mountain Chickadee and Pygmy Nuthatch. Only 50% of the 18 nest boxes at Aldefer/Three Sisters were occupied by a bluebird or swallow. Late snows, which were absent in 2020, do not appear to be the reason for decreases in occupancy. Nest box occupancy by bluebirds at Elk Meadow, however, was slightly higher than the last three years.

Despite the lower numbers of nesting bluebirds, their productivity was substantially higher than the average of past years (Table 1). Productivity of Tree Swallows, in contrast, was somewhat lower at Elk Meadow (-11%). Loss of eggs or chicks for bluebirds was about the same between life history stages, whereas Tree Swallows lost more than twice as many chicks (35%) as eggs (15%). Because swallows nest later, higher temperatures and lower precipitation in July may have negatively affected swallow productivity.

We hope the up-turn in nest box occupancy is a signal of recovery of bluebird populations in Elk Meadow and Aldefer/Three Sisters. We hope to more thoroughly explore the effects of weather on occupancy and productivity in the future.

Brad Andres and Rachel Hutchison

Table 1. Breeding success of birds using nest boxes in 2020 and average success in Elk Meadow (2009-2019) and Alderfer/Three Sisters (2011-2019) Open Space Parks, Evergreen, Colorado. Some nest boxes where eggs were laid were destroyed before outcomes could be determined.

	Bluebirds		Swallows		House Wren
	Mountain	Western	Tree	Violet-green	
Elk Meadow					
Nests with eggs in 2020	11	5	14	1	2
Average nests with eggs	15	8	10	-	-
Successful nests in 2020	11	5	13	1	2
Clutch size in 2020	5.7	5.2	5.2	3.0	6.5
% hatched of eggs laid in 2020	92	100	85	75	77
Average % hatched of eggs laid	76	87	78	-	-
% fledged of eggs laid in 2020	87	100	55	75	77
Chicks fledged/pair in 2020	5.0	5.2	2.9	3.0	5.0
Average chicks fledged/pair	3.2	3.7	3.2	-	-
Young produced in 2020	55	26	40	3	10
Average young produced	56	47	36	-	-
Aldefer/Three Sisters					
Nests with eggs in 2020	1	5	3	1	5
Average nests with eggs	5	6	5	-	-
Successful nests in 2020	1	5	3	0	5
Clutch size in 2020	6.0	4.8	5.3	4.0	5.0
% hatched of eggs laid in 2020	100	92	87	0	93
Average % hatched of eggs laid	64	79	84	-	-
% fledged of eggs laid in 2020	100	87	87	0	74
Chicks fledged/pair in 2020	6.0	4.2	4.7	0	4.6
Average chicks fledged/pair				-	-
Young produced in 2020	6	21	14	0	23
Average young produced				-	-