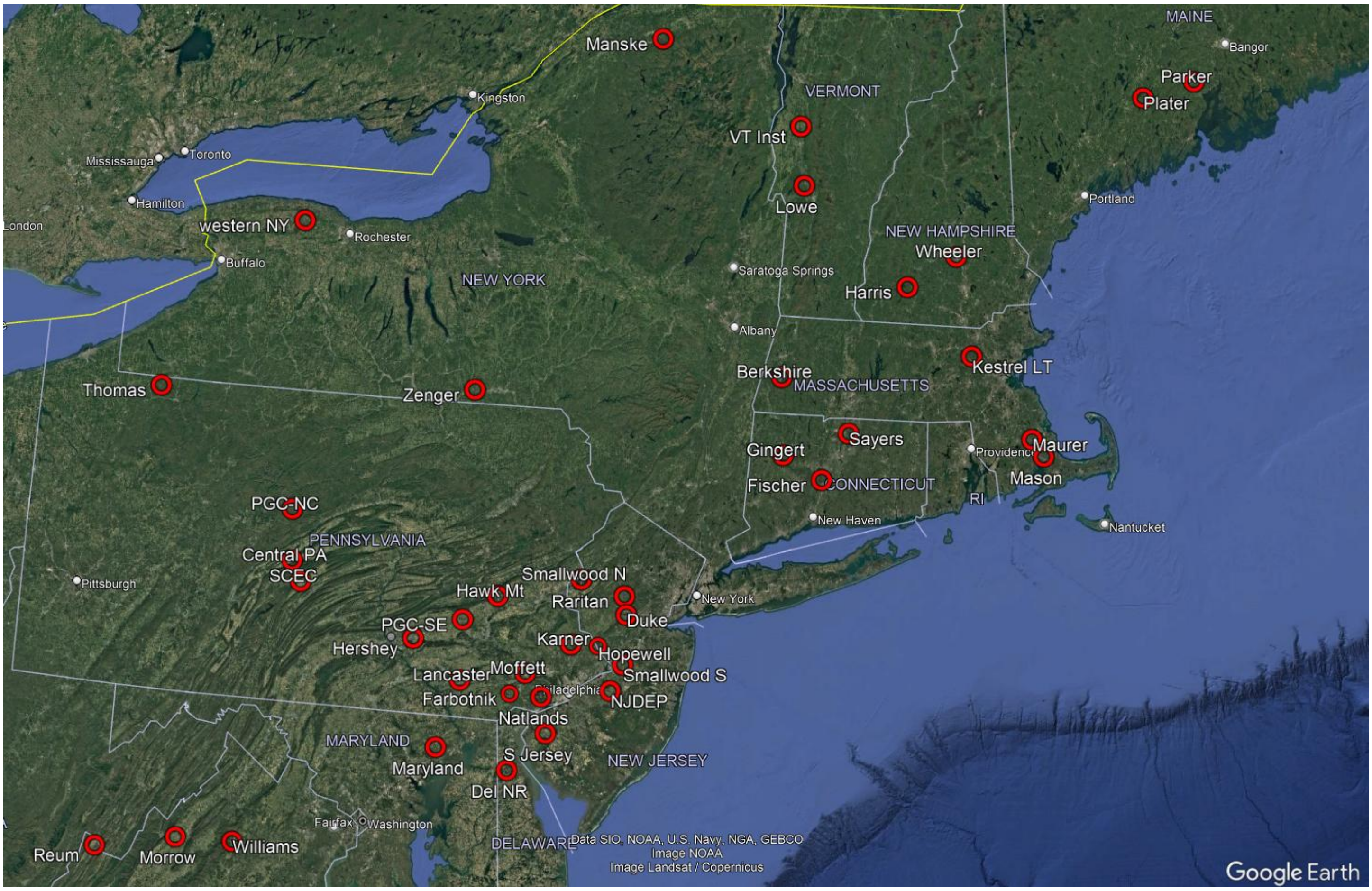
American Kestrel Northeast Region
8th Annual Nest Box Program Report – 2025



Field-site map with red circles locating individual kestrel nest box program centers, not program boundaries.

How do I know what I think until I see what I say?
E.M. Forster

Don't write what you know but what you want to know.
Anonymous

Never doubt that a small group of thoughtful and committed citizens can change the world.
Indeed, it is the only thing that ever has.
Margaret Mead

South Jersey Land & Water Trust

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Occasionally, I find other bird species' eggs – usually starling eggs – with kestrel eggs, but I've never found any instances where these other species' eggs are incubated to hatch stage by kestrels. However, Dawson and Bartoletti (1997) cite one instance where kestrels incubated a Bufflehead duck egg until it hatched: the duck chick was noted as trying to get out of the box. Two kestrel young also hatched and fledged from this box. Breen and Parrish (1996) cite an instance of Screech Owls incubating a kestrel egg until it hatched along with owl eggs: 3 young owls fledged but the kestrel young was not seen in a subsequent nest check.

11 American Kestrel nest box program states in northeast region

Data is from kestrel nest box program managers in the northeast states from Virginia to Maine. The following 2025 banding-age nestling counts are limited to contributors who provided data from both 2024 and 2025:
2024 banding-age nestling count: **5,834** (PA Game Commission NE Region not included)
2025 banding-age nestling count: one-year decrease: **%**

1. **Pennsylvania: 2186** (down 15% from 2,569 in 2024)
   59 by Emily H. Thomas and Don Watts in northwest PA (down 33% from 88 in 2024)
   455 (a minimum since all boxes weren't checked) by PA Game Commission, SE, led by Dan Mummert
   772 by Central PA Conservancy, led by Steve Eisenhauer (down 6% from 817 in 2024)
   92 by Shaver's Creek Environmental Center, led by Jon Kauffman (down 9% from 101 in 2024)
   49 by Steve Eisenhauer in Lancaster County (up 29% from 38 in 2024)
   25 by Jim Moffett in Chester & Berks Counties (down 11% from 28 in 2024)
   41 by Claudia Winters at and near Natural Lands eastern PA preserves (down 10% from 45 in 2024)
   81 by Jeff Musser in Lancaster County (down 31% from 117 in 2024)
   172 by Hawk Mt. Sanctuary in Berks County, led by JF Therrien (up 10% from 157 in 2024)
   107 by Hershey Area Raptor Partnership, led by McKelvie, Holzman & Hess (down 2% from 109 in 2024)
   Incomplete count from NC Region of PA Game Commission, led by Mario Giazzon
   430 by the Paul Karner Memorial Banding Team in Bucks & Northampton counties as follows:
      239 by Devich Farbotnik in Bucks County (down 18% from 290 in 2024)
      126 by Kevin Kelly in Northampton County (down 44% from 226 in 2024))
      65 by Jere Schade in Bucks County (down 25% from 87 in 2024)
2. **Virginia: 1,202** (down 12% from 1,365 in 2024)
   260 by Lance & Jill Morrow in Shenandoah Valley (same count as 2024)
   762 by Alan Williams and associates (down 11% from 853 in 2024)
   180 Highland County Kestrel Project, led by Patti Reum (down 29% from 252 in 2024)
3. **New Jersey: 485** (down 14% from 564 in 2024)
   80 by Friends of Hopewell Valley Open Space (down 1% from 81 in 2024)
   28 by Raritan Headwaters and Morris County Parks (down 50% from 42 in 2024)
   159 by Natural Lands in southern NJ, led by Steve Eisenhauer (down 7% from 171 in 2024)
   161 by NJDEP/ENSP in central and northern NJ, led by Bill Pitts (down 6% from 171 in 2024)
   8 by Duke Farms in central NJ, (down from 23 in 2024)
   49 by John Smallwood in Sussex and Warren Counties (down 36% from 76 in 2024)
4. **Connecticut: 306** (down 17% from 368 in 2024)
   171 Northeast CT Kestrel Project, led by Tom Sayers (down 4% from 178 in 2024)
   133 Northwest and Northcentral CT Project, by Art Gingert and Mike Dudek (down 28% from 186 in 2024)
   2 in 9 boxes by Larry Fischer (down from 4 in 2024)
5. **New Hampshire: 330** (up 2% from 322 in 2024)
   309 by Steve Wheeler (up 4% from 297 in 2024)
   21 by Phil Brown of Harris Center for Conservation Education (down 16% from 25 in 2024)
6. **New York: 320** (up 10% from 292 in 2024)
   250 by Mark Manske in northern NY (up 6% from 235 in 2024)
   37 by Manske associate in western NY (up 6% from 35 in 2024)
   5 by Manske associate in Crown Point (same number as in 2024)
   28 at NY Iroquois NWR and nearby WMAs, by Carl Zenger (up from 17 in 2023)
   23 by Berkshire Bird Observatory's Ben Nickley (new entry)
7. **Vermont: 69** (Brian Lowe count not received in 2025)
   68 by Jim Armbruster and Emily Fraser of VT Institute of Natural Science (up 19% from 57 in 2024)
   1 by Manske associate (5 reported in 2024)
8. **Maryland: 94** (down 4% from 98 in 2024) by Andrew Brown of Maryland Farmland Raptor Program
9. **Massachusetts: 92** (Kestrel Land Trust count not received in 2025)
   12 by Joey Mason (down from 36 in 2024)
   0 by Mike Maurer (same as 2024: none of 11 boxes occupied)
   24 by Kestrel Land Trust (down 27% from 33 in 2023)
   6 by Arcadia Wildlife Sanctuary with Kestrel Land Trust assistance (down 54% from 13 in 2023)
   80 by Berkshire Bird Observatory's Ben Nickley (up 21% from 66 in 2024)
10. **Maine: 47** (down 8% from 51 in 2024)
   15 by Maine Natural History Observatory, Logan Parker (same number as 2024)
   32 by St. Albans Kestrel Nest Box Project, led by Marek Plater (down 11% from 36 in 2024)

11. Delaware: 30 (up from 11 in 2024) by Jordan Brown with Delaware Division of Fish & Wildlife

- <u>**New York City update for 2025**</u>: data from Chris Soucy, Executive Director
  The Raptor Trust (Bird Rehabilitation Center): located in northern NJ but receives kestrels mostly from New York City. **35** fledgling and juvenile kestrels received from NYC boroughs (down from **56** in 2024). **5** more fledgling/juveniles received from NJ cities just across the Hudson River from NYC. **34** of this total released at the Great Swamp National Wildlife Refuge. Our wish is for a better indicator of the NYC kestrel population, but this is the most reliable one we have at this time.

Since nearly all of my own kestrel boxes are located within or adjacent to pasture land (my success elsewhere has been spotty), I'm always interested to understand other kestrel-nesting habitats. Other than numerous on-line articles and posts about the NYC kestrel population, the only source I could find in the "peer-reviewed" category is the book *Urban Ornithology: 150 years of birds in NYC* (Buckley et al. 2018). The following few sentences within the two American Kestrel pages are of particular interest to nest box program managers:

> *In 2010 an estimated 60-100 pairs were breeding in strictly urban environments throughout New York City, with 25 pairs estimated in Manhattan alone (http://www.battaly.com/nehw/AmericanKestrel/news/). Breeders are significantly underestimated citywide, and there have been no significant attempts to assess the Bronx breeding population; it is a regular breeder at Pelham Bay Park (Kunstler). Strategically-placed placement of predator-proofed, properly crafted nest boxes in each of the 4 extant subareas would help mitigate local declines in breeders (p.238).*

<u>**Historical summaries of 37 American Kestrel nest box programs' banding-age young counts**</u>

State	Program	2018	2019	2020	2021	2022	2023	2024	2025	8-yr. count	Yrs. Active	Yr. started
CT	Sayers	149		160	164	167	178	178	171	1167	16	2010
CT	Gingert	156	149	160	167	147	145	186	133	1243	49	1977
CT	Fischer	1	7		5	5	8	4	2	32	8	
DE	DE State	15	22	13	24	28	33	11	30	176	10	2016
MA	Kestrel	21	27	52	42	42	30	24		260	14	2012
MA	Maurer		9	9	6	5	0	0	0	29	37	1989
MA	Mason	17	13	21	27	25	12	36	12	163	37	1989
MA	Berkshire					18	31	66	80	167	4	2022
MD	Maryland							98	94	192	2	2024
ME	Plater	53	33	64	37	69	37	36	32	361	12	2014
ME	Parker			12	9	14		15	15	65	5	2021
NH	Harris						17	25	21	63	4	2022
NH	Wheeler	50	48	97	191	266	310	297	309	1568	52	1974
NJ	NJDEP	127	126	179	222	255	257	297	277	1740	21	2006
NJ	S Jersey	84	70	108	94	139	152	171	159	977	11	2015
NJ	Smallwood	52	47	55	44	46	81	76	49	450	31	1995
NJ	Hopewell**		12	35	46	66	66	81	80	386	7	2019
NJ	Raritan**		10	8	8	11	18	42	28	125	7	2019
NJ	Duke**						21	23	8	52	3	2023
NY	Manske	270	240	311	255		287	270	250	1883	24	2002
NY	west NY*			18	7	27	57	35	37	210	6	2020
NY	Zenger				18	31	26	17	28	120	21	2004
PA	Farbotnik	217	217	253	256	273	234	290	239	1979	8	
PA	Karner***	93	137	196	186	149		226	191	1178	38	1978
PA	Hawk Mt	80	80	88	108	118	113	157	172	916	46	1980
PA	Central PA	48	134	307	485	646	728	817	772	3937	8	2018

PA	Hershey	44	56	71	70	75	112	109	107	644	13	2013
PA	Musser							117	81	198		
PA	Thomas	35	62	59	41	74	48	88	59	466	55	1971
PA	PGC-SE	86	165	226	377	418	507	466	455	3020	10	2016
PA	PGC-NC			34	95	101	83			313	10	2016
PA	Lancaster							38	49	87	2	2024
VA	Morrow	260	270	283	283	298	307	260	260	2221	18	2008
VA	Williams			219	395	621	916	853	762	3766	6	2020
VA	Reum			194	162	145	192	252	180	1125	13	2013
VT	Lowe			148	103	127	110	86		574	31	1995
VT	VT Inst					24	48	57	68	197	5	2021

*part of Manske program but not included in his total
**part of NJDEP program and included in NJDEP total
***includes Kevin Kelly and Jere Schade totals

2025 was a "down" year for northeast region kestrel nest box production

Year	2019	2020	2021	2022	2023	2024	2025
% change from previous year*	+4%	+37%	+25%	+16%	+12%	+13%	-%

*includes only programs that provided counts in consecutive years

Introduction

For 28 of the 39 programs that provided counts, 2025 was a down year for kestrel young production in the northeast states. I was expecting a drop in numbers in my southern NJ study area since this area had one of the worst droughts in history in the 2024 summer season. I assumed this would affect survival, particularly of the young. The count dropped from 171 to 159, which isn't particularly unusual since this study area had two similar small drops in its 11-year history. But my 2025 central PA study area drop from 817 to 772 was a surprise, since this area has seen a big increase each of its previous 7 years. I received concerned calls and emails from a few nest box managers experiencing similar declines. Alan Williams in Virginia explained his drop from 853 in 2024 as follows:

> *A large loose group of organizations and volunteers monitored 444 boxes in our part of VA in 2025. Of those 444 boxes, 256 had at least one kestrel egg. From those eggs we had 762 young make it to around 10 days old. We were able to band 573 of these young. We noticed quite a few boxes with some level of brood reduction including boxes where all of the young died in the box before fledging. Also, it seemed that quite a few boxes were occupied last year but not this year. Possibly a snowy winter was harder on birds that did not migrate, and then a rainy spring season reduced foraging efficiency and contributed to lower young survival...*

In July, Devich Farbotnik in Pennsylvania noted concerns with his nesting kestrels:

> *It has been a weird season. They started about 3 weeks later than previous years. Some of my most reliable boxes had birds hanging around early on, then went empty the rest of the season, more nest failures and predation despite installing a bunch of predator guards etc.*

Although most counts in the program were down, some were up and others were stable. In New Hampshire, Steve Wheeler's count was 309, which essentially matches his highest recent count of 310 in 2023. Wheeler has managed his program for 52 years. He's a great inspiration to me: his count in 2019 (when he was 72-years-old: my age today) was 48. His occupancy rate then was low but, after adopting Tom Sayers telescoping pole box mounting method that eliminated digging holes for boxes, his successful box count soon rose dramatically. He uses eBird data to help decide where to mount new boxes.

Hopefully, 2026 will be a bounce-back year for the programs that experienced declines. Which brings up the question: Do these counts of ≥10-day-old young from nest boxes reflect or influence the population status of the American Kestrel in our region? I address this complex question in the "Data collection" and "Conclusions" sections of this report, starting on page 14.

Update on minimizing issues related to kestrels laying eggs on bare wood floors

As previously noted in our 2019 Annual Report, with both European and American Kestrel species, starlings sometimes build nests on top of the installed nest box bedding material, such as wood chips and shavings, and often remove all installed wood chips and shavings before initiating any nest building (Varland and Loughin 1993). In the latter case kestrels may then select these bare floor boxes for nesting, resulting in a low likelihood of hatching due to the eggs rolling around, the lack of a kestrel-created scraped hollow to keep eggs together during incubation and/or the reduced insulation from colder temperatures of a thin wood floor compared to a cushion of chips, shavings or other debris. Podofillini et al (2018) suggested that debris from past nesting in boxes provides thermal insulation that is helpful in incubation. Their work with Lesser Kestrels (*Falco naumanni*) found that dirty boxes with a thick layer of organic debris were preferred, occupied earlier, more frequently, and had higher hatching success than clean boxes without organic debris. Once I recognized this bare floor problem in my first two years of managing kestrel boxes, I searched the literature and found suggested solutions, mostly from European sources working with non-American falcon species:

- Use of pea or aquarium gravel as a substrate. Some peregrine falcon nest managers have found success with this substrate. One British kestrel nest box manager who tried this substrate notes the pea gravel needs to be replaced each year since it becomes like concrete when kestrel excrement is mixed with it. He recommends a layer of wood chips be placed on top of the gravel so some chip debris mixes with the gravel.
- When kestrel eggs are found in a bare floor nest box, the eggs could be lifted up and a layer of chips or shavings placed beneath the eggs. Although one New Jersey nest box manager noted success with doing this, I did this once and it resulted in the box being abandoned.
- Glue (non-toxic Elmer's glue is suggested) the first layer of wood chips to the bottom of all boxes.
- Use excelsior wood shavings (also called wood wool), which is the packing material often used with wine bottle shipments. Excelsior is essentially woven together, making it difficult for starlings to remove it from a nest box through a 3" hole. I tried using this material but found it too difficult to install properly in nest boxes.
- Use peat moss/soil mixed with sawdust as bedding substrate.

By 2017, I came up with a possible solution I'm still using in a revised form today. Using a section of 2x12 or 2x10 inch framing wood (classified as "whitewood" which is usually pine, hemlock or fir) I cut it to fit the bottom of my boxes, then use a 6.5" circular saw to form a ¾" deep 4" circumference concave area in the box floor center. Under this bottom board I attach with TiteBond III glue a ½" section of exterior plywood a bit smaller in size than the bottom to prevent the whitewood from splitting. This produces a 2" thick floor. The early results were promising: kestrel eggs hatched in boxes where starlings had removed the wood chips or shavings. But until this year I hadn't compiled the data to see if this extra work was worth the time and effort. The 2018 to 2025 data are as follows:

17 nest boxes in PA and NJ had kestrel eggs on bare wood floors with installed concave centers (see below photos)
3 boxes failed with no eggs hatching
3.6 young/box produced from the 17 boxes (the 3 failed boxes calculated in as zeros)

These results suggest it's worthwhile for me to continue using these thick concave box floors.

Another factor that helps me minimize the "eggs on bare floor" problem is that – increasingly over the past 3 years – I no longer completely clean out my nest boxes at the end of the season. I leave an inch or so of the messy nest debris (usually shavings, prey and pellet remnants, excrement, dust) on the box floors and put a couple inches of aspen wood shavings on top of this. I've found that starlings might remove the shavings but usually leave some of the old debris in boxes. Kestrel eggs laid on almost any kind of debris is better than eggs laid on bare floors, even when I cut concave areas into the floors. In 2024, of kestrel-occupied boxes in my 3 study areas, 6 had kestrel eggs laid on bare wood floors (when some old debris was left on the floors in **most** of the boxes). In 2025, in my sample size of 270 occupied boxes, no boxes had kestrel eggs on bare wood floors (when some old debris was left in **all** boxes). This finding suggests that leaving some debris in boxes – placing additional bedding on top of this debris – may be as effective in minimizing the bare floor problem as having thick concave floors.

Banded female kestrel in box with one egg in depression on bare wood floor. Prey feathers scattered around. Three young fledged from this box.

5 young fledged from this box

5 young fledged from this box.

4 young fledged from this box

Red-headed Woodpecker nest attempts?

Red-headed Woodpecker and American Kestrel habitats overlap in my study areas. This year I had one confirmed and two probable instances of these woodpeckers nesting in my central PA kestrel boxes. All were late in the season nest attempts, with one of these in a box where the kestrel young had fledged. In one box I confirmed the species as Red-headed Woodpecker. In the other two boxes I tried to identify the species by the size, shape and color of the eggs, and the siting of Red-headed Woodpeckers in the vicinity, but my species identification is uncertain since Northern Flicker and other woodpecker species' eggs look similar. None of these three nest attempts successfully produced young. But Alan Williams in Virginia reports that a Red-headed Woodpecker pair successfully nested in one of his kestrel boxes. In the above photo the kestrel feather evidence indicates at least one adult kestrel was predated prior to the white eggs being laid.

The above August 15 photo shows what appear to be eggs from a woodpecker species in a kestrel box, with the eggs laid on my aspen shavings and no apparent attempt by woodpeckers to create their own bedding from the inside box sides. For the past five years I've usually had one or two American Flicker nests in my central PA kestrel boxes, with flickers apparently satisfied with laying their eggs on wood shaving bedding rather than creating their own.

Update on spacing boxes less than ½ mile (≈800 meters) apart

In 2019, the 2nd Annual Report described our early work with close spaced boxes. That work has continued. Many of our successful nest boxes are now ≤800 m apart, particularly in the good habitat found in the central PA study area where boxes as close as 110 m each produced 5 healthy kestrel young. Two boxes facing in opposite directions on the same utility pole were successful in 2024, but they were occupied one-after-the-other, not concurrently in the same season. Two other boxes 290 m apart in 2024 were both double occupied: 17 healthy young were produced. The below chart shows examples of close spaced box success in two years. The key is an adequate food supply around the boxes. If you have a box up that is consistently occupied and producing 4 or 5 healthy young, then it's worth considering adding another box or two 300 to 500 m away. As an added benefit, I find that any concentration of successful kestrel boxes deters starlings more than a single occupied box. At a PA berry farm where 2 boxes 420 m apart were occupied in 2025, the farm owner brags about how the kestrels have reduced his problem with birds, especially starlings, that eat his cash crop. In their publication "*Falcons using orchard nest boxes reduce fruit-eating bird abundances and provide economic benefits for a fruit-growing region",* Shave et al. (2018) provide support for this observation.

Central Pennsylvania close spaced kestrel occupied boxes 2023 & 2024

occupied box ≥ one egg in box *close spaced ≤ 600 m apart*

Site ID approximate location	In 2023 with meters apart & young produced in boxes	In 2024 with meters apart and young produced in boxes
Waggoner's Gap		1 m (same pole) 6 in 2†
Loysville SE	600, 440 m 15 in 3	600, 440 m 16 in 3
Loysville NW1	600, 370, 300, 150 m 20 in 5	600, 370, 300, 150 23 in 5
Loysville NW2	430, 510 10 in 3	430, 510 14 in 3
Port Royal SW1	430 m 9 in 2	390, 320 9 in 3
Port Royal SW2	430, 520 m 13 in 3	430, 520 m 12 in 3
Lewistown	400, 290 m 10 in 3 - 1 failure	400, 290 m 12 in 3
Milroy NE	370, 430 m 16 in 3	370, 430 m 14 in 3
Siglerville orchard	220, 280 m 4 in 3 – 1 failure	410 m 10 in 2
Belleville N	290 m 13 in 2 w/1 box 2 broods	290 m 17 in 2 double broods
Belleville NW	160 m 9 in 2 w/14 eggs in 1 box††	160 m 10 in 2
Belleville SW	430 m 8 in 2	430 m 5 in 2 – 1 failure
Allensville SW1 S&E	380, 550 m 13 in 3	380, 550 m 14 in 3
Allensville SW2 JB	370, 440 m 13 in 3	440 m 10 in 2
Allensville SW3 BM		110 m 10 in 2
Allensville SW4 RM	400 m 10 in 2	400 m 5 in 2 - 1 failure, 1 double brood success
Cunningham	340 m 4 in 2 – 1 failure	340 m 9 in 2
Summit	450, 450, 390 m 16 in 4	450, 450, 390 m 20 in 4

Chaney	490 m 10 in 2	490 m 10 in 2
Ewing	390, 500 m 15 in 3	390 m 9 in 2
Myton E	370, 520 m 14 in 3	370, 560, 490, 390 m 23 in 5
Myton W		320 m 10 in 2
Globe Run	380 m 8 in 2	
Chesney	550, 550 m 14 in 3	470, 560 m 13 in 3
Eberle	460, 600 m 15 in 2	460 m 8 in 2
Bethel CM&P	340, 600 m 14 in 3	see Nelson, Bethel below
Bethel & 305	470, 460 m 5 in 3 – 1 failure	470, 460 m 3 in 3 - 1 failure
Nelson	280, 520 m 15 in 3	see Nelson, Bethel below
Nelson, Bethel CM&P		290,340,600,280,520 35 in 7
Tadpole	490 m 10 in 2	
Buffalo	420 m 10 in 2	420 m 8 in 2
Orchard-Darius		260 m 10 in 2
Rock	550 m 9 in 2	570 m 8 in 2
Horse	550, 550 m 10 in 3	550 m 6 in 2
Hospital	330, 440 m 10 in 3	440, 540 m 14 in 3
Linden	530 m 11 in 2	
Tussey	330, 330, 420 m 20 in 4	330, 330, 470 m 17 in 4
Milky	410 m 9 in 2	410 m 10 in 2
Middle	470 m 10 in 2	
Middle W		230 m 10 in 2
Gunpowder	410, 510 m 15 in 3	410, 510 m 13 in 3
Hoy	360 m 10 in 2	
Spring	250 m 8 in 2	
Black Hawk	450 m 5 in 2 – 1 failure	450 m 5 in 2 – 1 failure
Penns Valley N		250 m 8 in 2
Bristow		420 m 9 in 2
Earlystown		260 m 10 in 2
Brush Valley Windmere		350, 440 m 8 in 3

Powells		340, 480 m 12 in 3
Ridge	410 m 9 in 2	410 m 9 in 2
Barr	320 m 7 in 2	360, 360, 330 m 18 in 4
Swine		300 m 9 in 2
Totals	446 in 104 = 4.3 young/box	511 in 118 = 4.3 young/box
	Failures calculated in as zeros	Failures calculated in as zeros

[†]young in one box fledged before eggs were laid in other paired box

[††]9 kestrel eggs laid in box were later covered by grass bedding (apparently from starlings) then 5 new kestrel eggs were laid on the grass, producing 5 kestrel young that were banded. Photos and details available at americankestrel.online 6th annual nest box program report - 2023, p. 1

Data collection for peer-reviewed publications

I took a one-week statistical monitoring workshop 30 years ago when I worked for The Nature Conservancy, a nonprofit land trust. I still hear in my head the professor's opening statement: "In statistics, there is only one thing worse than no data (a long pause followed . . . .): BAD DATA!" So, is our data – kestrel young in a nest box ≥10 days old – good data or bad data? I searched peer-reviewed kestrel research sources for the answer. One source says 12 days old is the floor age, another says 16, and another says 20. But does any source say 10 days, and if so, is it a solid source we can cite? Yes: in the Journal of Field Ornithology, Katzer et al. (2005) define a banding-age kestrel nestling as being 10-25 days of age. Like other researchers in the peer-reviewed journals, banding-age young are alternativey referred to by Katzer et al. (2005) as fledglings rather than nestlings. Like some journal sources, I usually use "young" since nestling, in my mind, means a kestrel young in the box and fledgling means one that just fledged. I'm not seeing any accepted consensus on these definitions.

There's no question that a bit more accurate count of nestlings that fledge is achieved by banding older (≥20 days) rather than younger (≥10 days) nestlings since some nestlings die or are predated in this 10 day window. But, like most kestrel nest box managers who are focused on helping this declining species by producing as many new kestrels as possible, my time is tight and I want to use it efficiently. I managed 340 kestrel boxes in three study areas in the 2024 and 2025 seasons. These boxes produced over 1,000 young each of these years. When I visit a box with 10-day-old young in it, and know I can't get back to this box within two weeks, I band them if they're healthy (determined mostly by weight). Underweight young I leave unbanded, but try to revisit the box at a later date. Katzner et al. (2005) address this time efficiency concern by recommending that more time be spent on the most frequently used boxes that produce the most kestrels and less time on low-use boxes:

> *Simply put, we could selectively reduce our current field effort (i.e., nest box maintenance and monitoring) by 25%, while decreasing total managed kestrel reproduction by only 2-7%. This relatively small decrease in productivity could be mitigated by redirecting the un-used field effort either toward placing additional new boxes in new areas, or in the development of new conservation actions (p. 224).*

I explored how peer reviewed journal researchers measure kestrel nest box productivity and count nestlings/fledglings:

- Smallwood et al. (2009) used percent occupancy of kestrel nest boxes. This study appears to have the most relevance to our work since it assesses nest box program productivity in the northeast states and other U.S. regions.
- Bloom and Hawks (1983) and Breen and Parrish (1997) used the percent occupancy measure but with more emphasis on other measures, such as young fledged per successful and per active box. Breen and Parrish (1997) box occupancy was only 3% average over the 2-year study period.
- Brown et al. (2013) compared "estimates of apparent nest success (ANS, the ratio of successful to total number of nesting attempts), Mayfield nesting success, and the logistic-exposure model of nest survival."

- Callery et al. (2022) used similarly complex tools but, like our measure, focused on the “number of young fledged from successful nests” and also on the number of kestrels fledged per nesting attempt.
- Craft and Craft (1996) used the Mayfield model, which focuses mostly on box occupancy percentages.
- Craig and Trost (1979) used: “The number of young American Kestrels fledged from a nest was determined by counting the number of young which were still in the nest no more than 3 days prior to the time it was vacated.”
- Gault et al. (2004) noted: “In order to avoid inducing young to fledge early, we last visited nests one week prior to the projected fledging date. If there were young still present at this last visit, we counted the nest as successful. . . . Nest success was calculated both as a proportion of the nests that successfully fledged young and also using the Mayfield method.”
- Hamerstrom et al. (1973) noted: “We made a point of banding just before fledging time.” They used number fledged as a primary measure.
- Jacobs (1995) noted: “Some nest failures may have been missed during incubation or after banding. To account for this I applied the Mayfield Model (Mayfield 1961) to my data for an estimate of the overall success rate of nests. This method is based on nest failures in relation to days of coverage. A nest box was considered successful if at least one young reached a band-able age (16-28 d). I used the number of young banded per successful nest as an index to the fledging rate.”
- Morrow and Morrow (2021) used percent occupancy and other standard measures, such as total young produced. One of their most relevant 8-program review findings is a 91% fledge rate of kestrel eggs that hatched.
- Rohrbaugh and Yahner (1997) used percentage occupancy as their primary measure.
- Kazner et al. (2005) analyzed their nest box data in three ways: “First, because data were generally not normally distributed, we used a nonparametric Wilcoxon rank-sum test to compare productivity measures between boxes that were occupied in less than half of the years monitored ("low-use boxes") with those that were occupied in more than half of the years monitored ("high-use boxes"). Second, to evaluate the extent to which kestrel use of nest boxes was random, we generated expected frequencies of nest box occupancy from a binomial distribution and compared observed and expected values with a G-test for goodness of fit (Sokal and Rohlf 1981). Third, we correlated average kestrel productivity with average nest box use frequency by evaluating average productivity measures at boxes in 10 use-frequency classes (i.e., 0-10%, 10-20%, 90-100%). We used a G-test for goodness of fit with Williams correction for a two-cell case to evaluate nest-box switching by banded kestrels that nested in more than one year of the study (Sokal and Rohlf 1981). Data were analyzed with SAS software (version 8.01, 1999).”

I also looked at broader summaries of nest box monitoring methods, such as:

- *Nest Survival Estimation: A Review of Alternatives to the Mayfield Estimator* (Jehle et al. 2004) in The Condor: Ornithological Applications
- *Beyond Mayfield: measurements of nest-survival data* (Jones et al. 2004) in Studies in Avian Biology, which describes 14 alternative methods in 149 pages
- *Multi-way comparisons and generalized linear models of nest success: extensions of the Mayfield method* (Aebischer 1999) in Bird Study

My own statistical knowledge is too rudimentary, even after two master’s degrees, to process all of this. Luckily, my youngest daughter has a Ph.D in statistics and has published research on Golden Eagle migration. So if I want to submit something for possible publication in a journal, all the statitical stuff goes through her. I just feed her the data, as long as it’s good (i.e., usable) data, and the hypothesis is clearly addressed. In this year’s 8th Annual Report, you’ll find the remnants (less the statistics) of two journal submissions from earlier this year.

Our first journal submission – asserting that our kestrel young counts suggest a 2018 to 2024 northeast region nest box program positive trend – was accepted to be sent to peer reviewers. The first returned review was positive, with line-by-line corrections and suggestions for easily-attainable improvements. The second review was negative, stating the manuscript was unpublishable in its current form: it needed to be entirely rewritten. The final journal editor’s decision was that we need to include occupied box data to match the counts. I agree this is important. The studies I’ve referenced in our 3rd Annual Report (“Ruminations on sink/source issue”, p. 11) note the dividing line between source and sink boxes is probably somewhere between 3 and 2 young per occupied box: with boxes producing ≥3 young/box being source boxes and those producing ≤2 young/box being sink boxes. So, if a program is regularly producing 100 young in 50 occupied boxes (failed boxes calculated in as zeros) the net effect to the kestrel population might be more negative than positive. The journal editor informed me that if I obtain occupied box data to match with all the program participants' kestrel young counts, the manuscript would be reconsidered for publication. I still believe the counts alone have value as a measure of the kestrel population, just as I believe the occupancy data by itself presents a valid measure of breeding adults in a study area. However, together they make a stronger case.

Our second journal submission – asserting that nest box spacing <.5 mile apart can benefit the kestrel population – was returned by the journal's Associate Editor with revision suggestions and encouragement to resubmit after the revisions were complete. The AE's main concern was with the submission being too narrative and not scientific enough: more focus needed on testing predictions and answering questions. Since the review process took longer than expected, we have decided to hold off on the revisions so we can add in the 2025 and 2026 data. We continue to experiment with close box spacings in our central PA, Lancaster and southern NJ study areas, with most of the success in central PA.

Conclusions about our "down" year and our banding-age young counting system

Our region-wide kestrel young productivity count decreased this year, after seven years of increases. The 2026 count should help us see the 2025 decrease in a better perspective. Despite the use of other productivity measures in nearly all of the peer reviewed research, I believe a simple count of young reaching banding age ≥10 days may provide accuracy similar to or better than the other methods. Proof that our nest box programs help stop the kestrel decline in the northeast states will inevitably be in the Christmas Bird Count, Winter Raptor Survey (WRS), migration site and Breeding Bird Survey data. Hopefully, eBird data will also help answer this question. Although it may take a decade or so to see a leveling off or increase in our region's kestrel population, one local report suggests optimism. In the central Pennsylvania study area, the Shaver's Creek Environmental Center and Central PA Conservancy managed programs – starting at zero in 2018 – produced 864 young in 2025 and 918 young in 2024. Grove (2025) cites these programs' high counts as possibly helping explain the high WRS American Kestrel 2023 and 2024 counts in this region.

Nest box occupancy data is important, especially in studies submitted to peer-reviewed journals. I see an annual count of occupied boxes as a good measure of adult pairs in a study area, and productivity (i.e. number of banding-age young per box in a program with failures calculated in as zeros) as an important guide to decisions about addition of new boxes, need for predator guards, box relocations or removals, and box/mount alterations. Due to peer-reviewed journal advice, for future reports I'll be asking for "number of occupied boxes" in addition to the count of young: a "denominator to match the numerator" as it's been explained to me. We plotted this measure on page 7 of the 2020 Annual Report, but I've resisted asking for this data each year since I want to be as inclusive as possible: it's hard enough to get counts from everyone since so much of this work is done by volunteers and people on tight schedules.

Our regional nest box program calls to mind another declining species, the Purple Martin, a cavity-nesting species like the kestrel. It now nests east of the Mississippi River almost exclusively in man-made boxes and gourds (Raleigh et al. 2019). Purple Martins are a bit more tolerant of close human interaction than American Kestrels. But, as the human imprint on the landscape becomes more and more pervasive, both species benefit from strategic conservation interventions.

This report and all previous reports are posted on the following website: americankestrel.online

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