Final Update
Shenandoah Valley Raptor Study Area
August 16, 2022

This was a "successful" year for kestrels – but then again it was just "average" – it depends on which stats you look at! The kestrel nest boxes in the Shenandoah Valley Raptor Study Area (SVRSA) produced the highest number of young kestrels since we established the study area way back in 2008! This year we banded a total of 298 kestrel nestlings, which is about 5% higher than our next best season. We attribute this season's high success rate to good weather, experienced breeders, and abundant prey.

A late brood with a fresh passerine clutched in one's foot. Note the spotted feathers (downy woodpecker, most likely) lying in the debris and the rather large differences in sizes of babies.

Some 2022 SVRSA kestrel statistics

- # of available boxes = 80
- % available boxes occupied by kestrels = 91.3%
  (higher than our long-term average 2008-2020 of 82%)
- # nest attempts = 82 (including 9 second nest attempts)
- # nest attempts that failed = 11 (13.4%) (lower than our long-term average of 25%)
- # eggs laid = 413 (highest yet)
- # eggs per nest attempt = 5.0 (higher than long-term average 2008-2020 of 4.6)
- # nest attempts that succeeded = 71 (88.8%) (higher than our long-term average of 75%)
- # kestrels survived to banding age = 298 (highest yet)
- # kestrels per nest attempt = 3.6

  (higher than our long-term average 2008-2020 of 3.1)
- # kestrels per **successful** nest attempt = 4.2

  (equals the long-term average 2008-2020). In other words, “average” for this, the most important metric of kestrel productivity.

Exchanging banded kestrels

As usual, we tried to capture every breeding female using our SVRSA nest boxes. We caught 81 of 82 breeding females: darn that one bird! In retrospect, we realized (**after it was too late**) that one of our boxes had had a second nest attempt and we'd missed the first breeding female! Our analysis of the captured breeding SVRSA females is as follows: 32% were unbanded ("wild" birds that can only be aged as 1 year old or "older"), 40% were previously banded "wild" kestrels (who can be aged as a **minimum** of 2-8 years old based on years elapsed since they were banded), and the remaining 28% were "known-age" kestrels, meaning that they were produced and banded as nestlings. Nineteen of the 21 known-age kestrels came from SVRSA boxes and the other 2 came from other nest box programs in Virginia. To wit, Alan Williams produced a female kestrel in one of his boxes in Luray last year and Charles ("Zig") Ziegenfus produced a female kestrel in one of his boxes near the Cross Key area outside of Harrisonburg last year. Both of these yearling females were captured breeding in SVRSA boxes.

This has, by far, been the best year for exchanging kestrels with other nest box programs. The SVRSA gained the aforementioned 2 yearling females, and it "gave" 4 female kestrels who originated in SVRSA boxes to other nest box programs. The study area produced 2 yearling female kestrels who flew over to bred in Alan's boxes this past year, and the SVRSA lost 2 "wild" females who are at least 3 years old, had previously bred in the SVRSA, and who also "defected" to Alan William's nest boxes this year. We are extremely pleased for each of these exchanges of banded birds, as they add to scientific knowledge about kestrel reproductive habits and movements. Thanks to all who are running the various kestrel nest box programs locally, we

welcome the efforts of anyone who cares enough to learn about our native birds and how to conserve them!

2nd nest attempts and ages of breeding females

As usual, there were failed kestrel nest attempts in the SVRSA. This year 11 out of 82 (13%) of nest attempts failed. We've always been interested in figuring out why and how nests fail, as it is the flip side of nest success (which doesn't tell us much). By working out the factors associated with failed nests, it may be possible to mitigate some of these factors (for example, stop predation of nests by installing a predator guard) and thus, increase nest success. Although SVRSA kestrels achieved a very high 88.8% nest success rate (normally 75%) this year, the number of young per successful nest was merely average (4.2) when compared to the long-term (14 year) average from 2008-2021.

This year 5 female kestrels in the SVRSA made two nest attempts each but only one pulled off an actual double brood, meaning both nest attempts were successful. Here is the history of a SVRSA female kestrel – as an example of the data we have collected over her lifetime:

In box 132A the 1st nest attempt was made on March 19, 2022. We captured a banded female incubating 5 eggs. From the 1st nest: 3 of 5 eggs hatched and 3 nestlings eventually fledged, the other 2 eggs remained unhatched so were removed from the nest box. Almost exactly 3 months after laying her 1st clutch, this same female laid another 4 eggs in the same box. We know this because we recaptured her on both clutches of eggs. However, this 2nd nest attempt failed by the

end of July when it appeared to be abandoned. We suspect that kestrels know approximately when eggs are supposed to hatch, and this second nest was found abandoned several days after the estimated hatch date. By then, 1 of 4 eggs had disappeared from the nest, 2 were infertile, and the last egg contained a fully developed kestrel chick who never hatched (for unknown reasons). We know this mother kestrel very well, as she was hatched in a SVRSA box in 2016 and has bred in box 132A her entire career except when she was 3 years old. She is 6 years old now and we can calculate her lifetime productivity of fledged progeny: 2017 = **3**; 2018 = **4**; 2019 = **none** (she nested in 2 different boxes and failed in both); 2020 = **4**; 2021 = **4**; 2022 = **3**, for a grand total of **18** babies over 6 breeding seasons, during which she attempted 8 nests (that we know of)! For at least a few more years, we expect to capture her breeding in the same box.

The oldest female kestrel we've caught breeding in SVRSA is a minimum of 7 years old. However, we haven't been capturing and banding enough female kestrels for as long as required to determine the oldest known-age breeding birds in SVRSA. We suspect the oldest breeding age could be up to 12 because the oldest wild female kestrel band recapture on record is 13 years, 7 months old (per Bird Banding Laboratory (usgs.gov)). According to our SVRSA accumulated recapture data, we've learned that around 50% of the adult female kestrels in the SVRSA survive and are recaptured annually. A similar rate of annual kestrel "mortality" was found in an Idaho nest box program. Of course, this capture/recapture scheme as a measure of mortality isn't perfect: birds could migrate out of the SVRSA, we cannot distinguish death from migration – but it is one method of assessing wild populations. Thus, using the power of exponential decay, we back calculated that we'd need to band at least 512 (2^9) **female** kestrels in order to recapture one who survives to breed at 9 years of age. And, since 50% of the nestling kestrels are male, we'd need to produce and band 1024 nestlings for

one female to survive and breed at 9 years old! That is why bigger and long-term nest box programs are better for collecting population data. Any of you math wizards – feel free to correct our logic and/or calculations!

Recaptures of banded birds outside SVRSA

Here are a couple of recaptures of our banded birds found elsewhere during 2022:

- In 2017 we captured a wild female on eggs in box 438 and haven't seen her since. This year, on 20 March, she was found dead near Edinburg Virginia about 15 miles NE of the box she used once 5 years ago. This kind of data implies kestrels sometimes leave SVRSA nest boxes and are likely breeding in "natural" cavities or in other people's nest boxes who do not capture and/or report banded breeding birds.

- Another recapture of an SVRSA banded kestrel was on 5 July 2022. She was just banded as a nestling in SVRSA box 35B this May and traveled over 40 miles NW of her natal box where she was found dead near a dairy farm in Grant County WV. We estimate she survived about 42 days post-fledging. Like we always say, "It is a steep learning curve for young kestrels to learn how to survive". Indeed, our recapture data also suggest that only 4-5% of fledglings survive their first winter.

- Here is a redtail hawk recapture story that is a bit more upbeat (at least the hawk survived her first winter). On 15 October 2010 we captured and banded an immature redtail hawk at our ridge trapping site near New Market Gap. This spring a fellow bird bander noticed

a road killed hawk (or perhaps saw it get hit by a truck) on Interstate 81, read the band number and reported it on 22 March 2022. This hawk lived to nearly 12 years of age and had traveled 193 miles NE from the banding site.

Lance holding a ridge-trapped immature redtail; note band on its leg!

Since we caught it on it's first migration, we do not know where it hatched but we do know where it died: near mile marker 71.3 on I-81 in Schuylkill County, Pennsylvania. Unfortunately, the Virginia Dept. of Wildlife Resources (who control our state banding permit) decided that our ridgetop banding station didn't collect enough data on enough birds - so they have denied us permission to band any raptors we trap there. Apparently, the decision makers did not understand the value of long-term banding projects…

More cute squirrels!

On July 19th we were checking boxes for late clutches and put in the endoscope in box 65 (first photo below). This box had produced 5 fledgling kestrels in early June, and we thought perhaps there was a second kestrel nest inside. However, the scope showed us a gray squirrel lying atop her babies in the dried grass nest she built. When we opened the top of the box, the mother squirrel bolted out, scurried down the pole, and ran to climb the nearest tree.

Two newly born gray squirrels in box 65. The mother, in her haste to escape the box, had apparently scratched the babies with her claws. We had never seen squirrel babies this young in our boxes and were amazed/intrigued but also wanted to see if their injuries were serious.

As you can see, it looks a couple of severe scratches and a nearly severed ear but all the bleeding had stopped, so they were returned to their nest. The best guestimate for their age is under 5 days old. We are honored and privileged to be permitted to observe nature at this level.

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