

# A Photographic Guide For Aging Nestling Cooper's Hawks

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(*Accipiter cooperii*)**

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## ACKNOWLEDGMENTS

This guide is a collaboration between the U.S. Fish and Wildlife Service (USFWS) Southwest Region Migratory Birds Program, the USFWS National Raptor Program, and a private citizen, working together to better inform researchers, rehabilitators, and birdwatchers.

We thank Denise Coil with Wildlife Rescue Inc. of New Mexico for incubating and hatching the eggs from two nest removals in Albuquerque.

Unless otherwise noted, all photographs of wild birds were taken by Tig Tillinghast and all photos of captive birds were taken by Kristin Madden. We extend our deep appreciation for all those that shared photos with us.

## INTRODUCTION

The ability to accurately age nestling raptors is important to biologists, wildlife rehabilitators, and bird watchers alike. For researchers, age can be a deciding factor in determining when to enter a nest for tagging or sampling, as well as for estimating the onset of incubation, determining reproductive success, and tracking changes in phenology. Land managers and law enforcement officers often base guidance regarding human-raptor conflicts or requests for nest relocation on chick age estimates made by biologists. Wildlife rehabilitators use this information to make decisions regarding renesting chicks, dietary needs, and expected behavioral development. And birdwatchers not only maintain their own records but they also often contribute to citizen science by documenting observations on sites like eBird.

Limited resources exist for accurately aging raptor chicks. Some species-specific published photographic guides exist (Moss 1979, Moritsch 1983a, Moritsch 1983b, Moritsch 1985, Griggs and Steenhof 1993, Boal 1994). A few guides are available on the Internet by wildlife photographers and rehabilitators but these are often limited in measurements and descriptions, as well as in the photographs available. Poole (1989) argued that photographic guides are insufficient in estimating age to within a few days and based his estimates on growth rates of primary remiges. Like other measurement-based estimates, this method's use is limited to those that have direct access and the ability to take the necessary measurements. As a result, photographic guides, in conjunction with regular nest monitoring, remain the best resource for field-based observers to estimate raptor chick ages.

Prior to feather development, differentiating between *Accipiter* species can be extremely difficult. Sizes at the edge of documented ranges (e.g. female sharp-shinned vs male Cooper's hawk) can overlap and feather development is very similar. *Accipiter* identification continues to be a challenge after feather development.

The objective of this guide like this is to show relative age, not precise age to the day. It should be noted that factors such as nutrition, weather, birth order (see picture below) and potentially regional differences can affect growth rates.

## METHODS

Kristin Madden photographed Cooper's hawks hatched in captivity after nests within the Albuquerque, NM city limits were removed in 2011 and 2014. The latter nest was cut down by local tree trimmers. Chicks were photographed daily during the first two weeks to show growth rate and feather and talon development. All chicks were eventually released back into the wild. In addition, she regularly photographed Cooper's hawks held under wildlife rehabilitation and education permits.



Tig Tillinghast photographed a nesting pair of Cooper's hawks with long lenses over a two-year period in Thetford Center, Vermont. He used intervalometers to take regular pictures at intervals ranging from four to six seconds during daylight over the nesting period. During times of inclement weather, the cameras were removed temporarily. The cameras were mounted in a tree 24 m (80 ft) over from the nest tree and 1.5 m (5 ft) above the nest, 23 m (75 ft) above the ground. Hatch date was determined in 2015 by the sudden apparent cessation of incubation. In 2016, hatch date was established based on the first date a chick was observed in the nest. Tig may be contacted at [tig@forest-metrix.com](mailto:tig@forest-metrix.com) by those interested in the free academic use of his photographs.

Additional photographs were taken opportunistically in the field and during banding efforts by Brian Millsap.



## RESULTS

In the following, we present photographs and descriptions from hatch through fledging to illustrate developmental changes in nestling Cooper's hawks. We also include a section depicting plumage and eye color changes in adults to assist readers in estimating age beyond fledging.

### Days One–Ten

Hatchlings in the wild are extremely difficult to see by a ground-based observer until 7-10 days of age. Indications that hatch has occurred may include eggshells on the ground or tiny spots of whitewash beneath the nest (see Fig. 21). However, whitewash from chicks is rarely observed in the first few days.

By three days post hatch, the chick shows white natal down, dark eyes, and flesh-colored talons (Fig. 1-2). The "egg tooth" is still visible at this age (Fig. 1, 4). Figures



Figure 1: Three days after hatch.  
Albuquerque, NM



Figure 2: Three days after hatch.  
Albuquerque, NM

3 and 5 show the first day a chick was observed in this nest. It is an estimated 2-4 days post hatch. Chicks are able to move well enough to defecate at or over the edge of the nest before 3 days of age. At this age, the chick is still very difficult to see from the ground.

By day five, the chick is slightly larger and more active but retains the natal white down (Fig. 5-11). Beginning around 6 days after hatch (Fig. 12-14), the talons begin to darken. During this time, the white natal down is replaced by a longer, white or buffy second down (Fig. 12-22).



Figure 3: First day this chick was visible in the nest.  
Thetford Center, VT



Figure 4: Days 2-5.  
Albuquerque, NM



Figure 5: First day this chick was visible in the nest.  
Thetford Center, VT



Figure 6: Five days after hatch.  
Albuquerque, NM



Figure 7: Five days after hatch.  
Albuquerque, NM

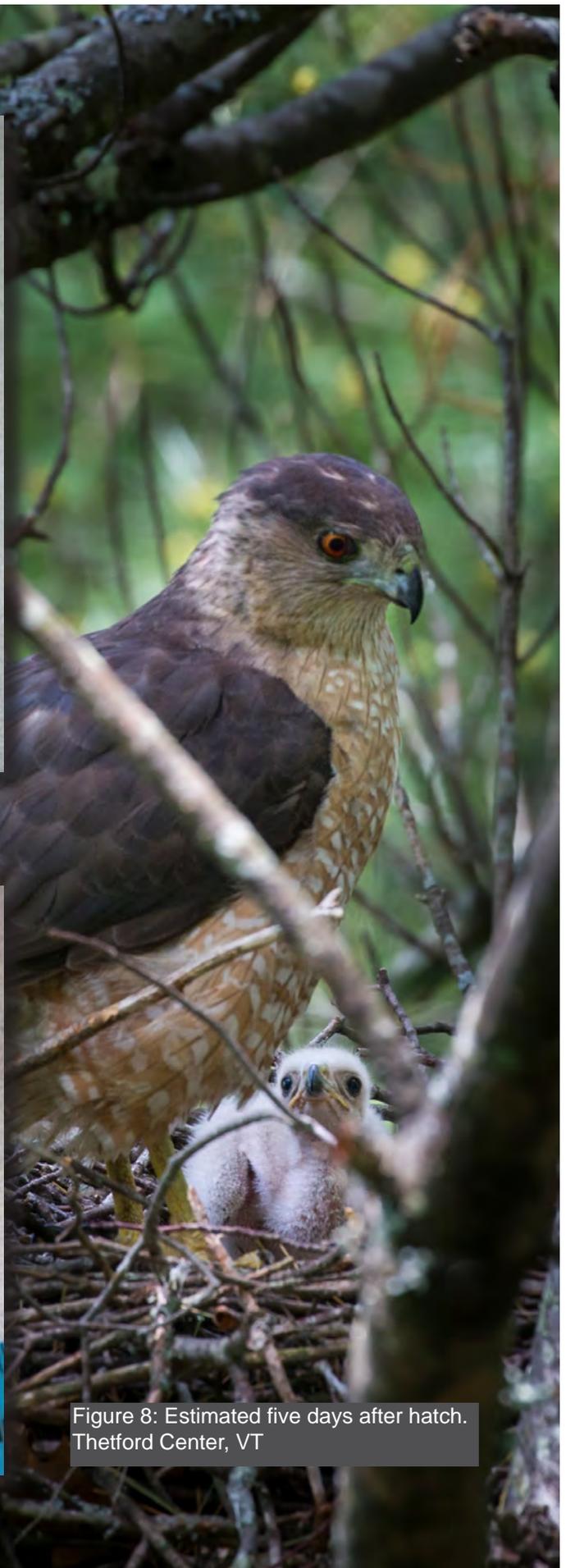


Figure 8: Estimated five days after hatch.  
Theftford Center, VT



Figure 9: Estimated five days after hatch. Thetford Center, VT



Figure 10: Estimated five days after hatch. Thetford Center, VT

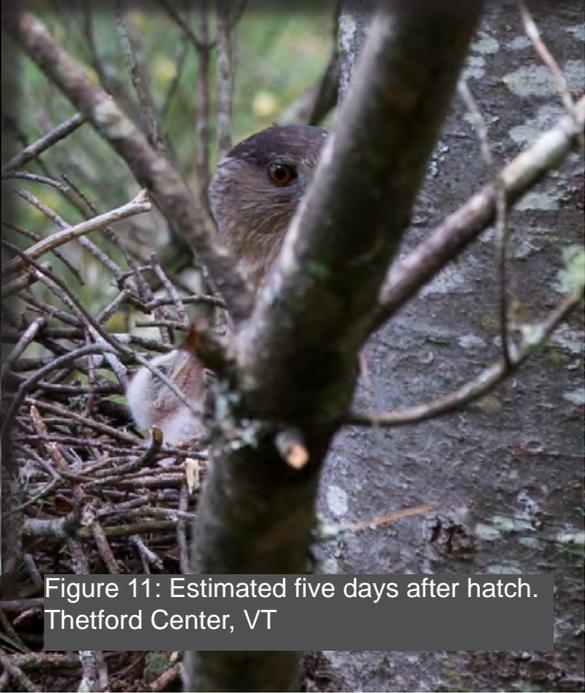


Figure 11: Estimated five days after hatch. Thetford Center, VT



Figure 12: Six days after hatch.  
Albuquerque, NM



Figure 13: Ten days after hatch.  
Albuquerque, NM



Figure 14: Estimated eight days after hatch.  
Thetford Center, VT



Figure 15: Estimated eight days after hatch.  
Thetford Center, VT



Figure 16: Estimated eight days after hatch.  
Thetford Center, VT



Figure 17: Estimated 9-12 days after hatch.  
Thetford Center, VT

Figure 18: Estimated 9-12 days after hatch.  
Thetford Center, VT

## Days 10–14

By days 9-10, chicks should be visible to a ground-based observer and will stretch or flap wings (Fig. 17-20).

Dots of whitewash can be seen beneath the nest (Fig. 21).

The egg tooth is no longer present.

Between 11–13 days of age, sheaths of juvenile feathers begin to emerge (Fig. 22-25).



Figure 21, Photo by Karl Madden: Whitewash beneath a nest in Albuquerque, NM



Figure 22: Estimated 9-12 days after hatch. Thetford Center, VT

Figure 23: Twelve days after hatch in Albuquerque, NM



Figure 24: Twelve days after hatch.  
Albuquerque, NM



Figure 25: Twelve days after hatch.  
Albuquerque, NM

Figure 26: Estimated 13 days after hatch.  
Theford Center, VT

## Days 14–20

By the latter part of this time frame, the rectrices, scapulars, and remiges are apparent (Fig. 27-36). At approximately 18 days, the dorsal contour plumage is quite obvious along the spinal track (Fig. 27-29). Between 18-21 days, contour feathers emerge along the ventral tract around the crop (Fig. 33-34, 37-41). These older chicks also begin to show a threat display. Chicks are larger and more active in nest. As a result, they are increasingly obvious to a ground-based observer.

Figure 27: Estimated 14 days after hatch.  
Thetford Center, VT

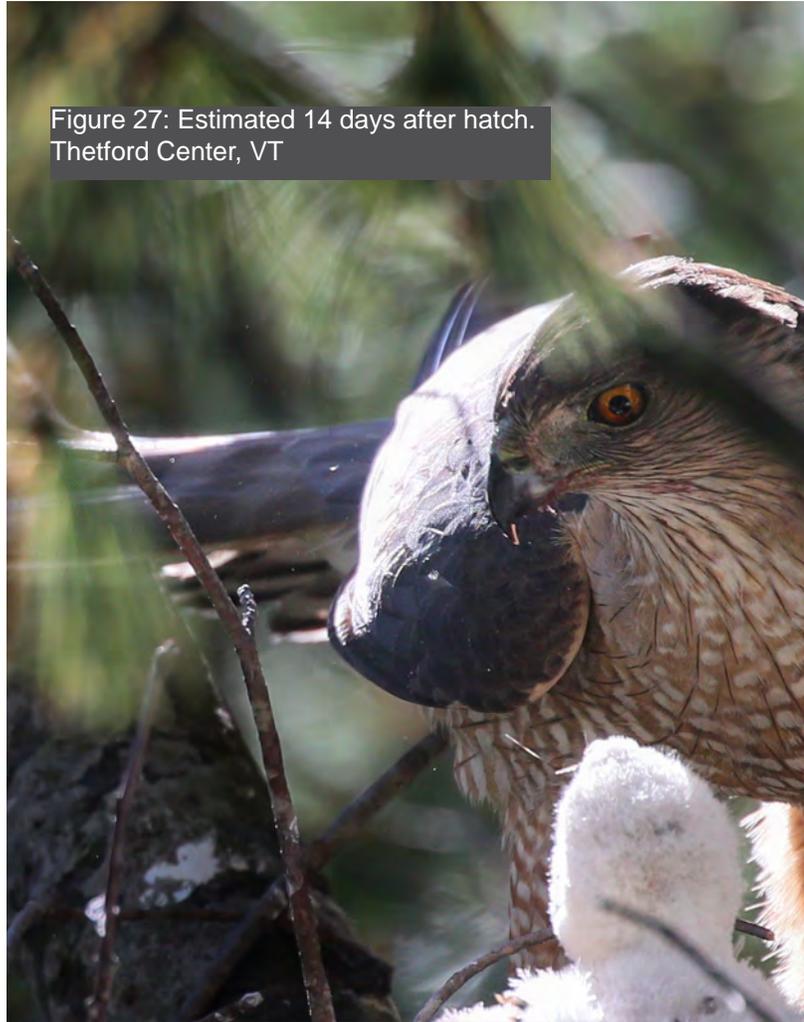


Figure 28: Fifteen and seventeen days  
after hatch in Albuquerque, NM



Figure 29: Eighteen days after hatch in  
Albuquerque, NM



Figure 30: Estimated 16 days after hatch.  
Thetford Center, VT



Figure 31: Estimated 16 days after hatch.  
Thetford Center, VT

Figure 32: Estimated 17 days after hatch.  
Thetford Center, VT

Figure 33: Estimated 18 days after hatch.  
Thetford Center, VT

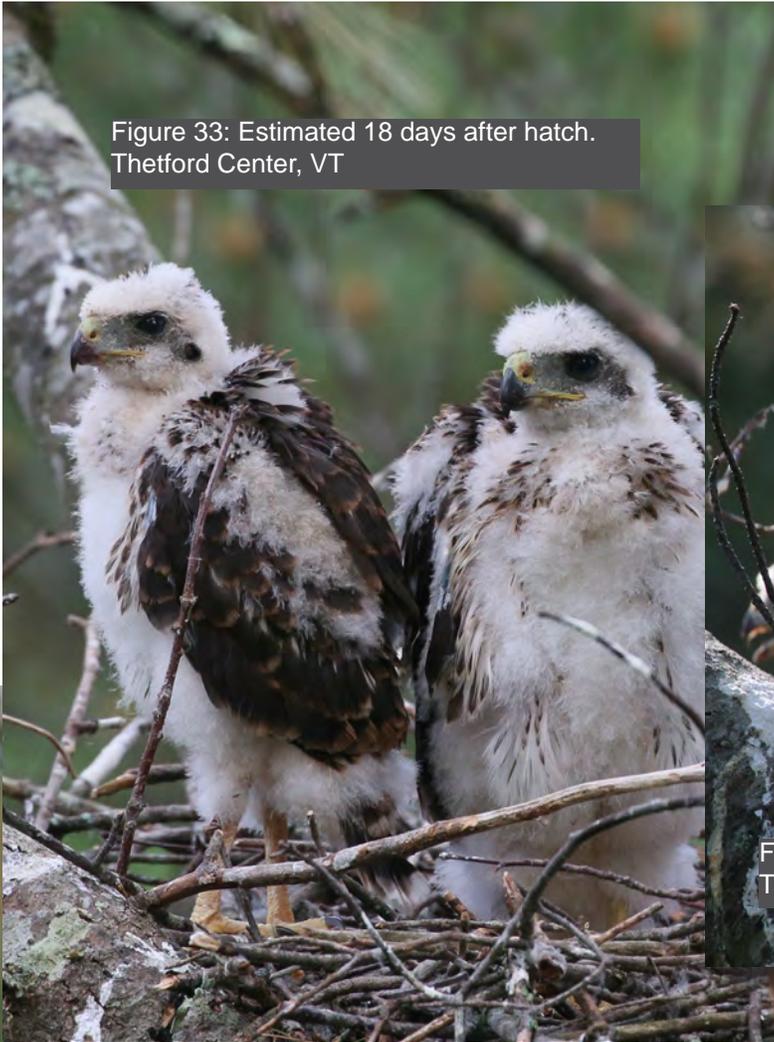


Figure 34: Estimated 18 days after hatch.  
Thetford Center, VT



Figure 35: Estimated 18 days after hatch.  
Thetford Center, VT



Figure 36: Estimated 21 days after hatch.  
Thetford Center, VT

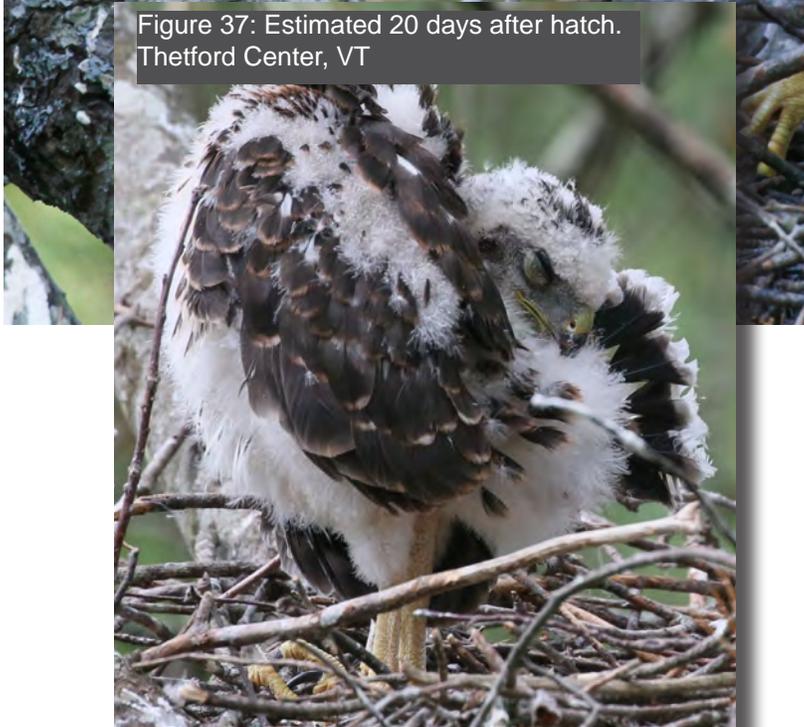


Figure 37: Estimated 20 days after hatch.  
Thetford Center, VT



Figure 38: Twenty days after hatch in  
Albuquerque, NM

## Days 21–27

Juvenile feathering is complete by the end of this time frame (Fig. 38-47), though rectrices and remiges will remain short until 45-50 days. By this time, chicks are able to dismember prey and are

far more active. They begin to “branch”, moving out of the nest and onto nearby branches, as early as 24 days (Fig. 45, 47-49). They move around within the nest tree, then make short hops to nearby trees or other structures. They can be seen jumping on pine cones and chasing each other along tree branches.



Figure 39: Twenty three days after hatch.  
Albuquerque, NM



Figure 40: Estimated 21 days after hatch.  
Thetford Center, VT



Figure 41: Estimated 21 days after hatch.  
Thetford Center, VT



Figure 42: Estimated 23 days after hatch.  
Thetford Center, VT

Figure 43: Estimated 23 days after hatch.  
Thetford Center, VT

Figure 44: Estimated 23 days after hatch.  
Thetford Center, VT



Figure 45: Estimated 25 days after hatch.  
Thetford Center, VT



Figure 46: Twenty five days after hatch.  
Albuquerque, NM



Figure 47: Estimated 28 days after hatch.  
Theford Center, VT



Figure 48: Estimated 28 days after hatch.  
Theford Center, VT



Figure 49: Estimated 28 days after hatch.  
Theford Center, VT

## Days 28–38

Most chicks will take their first real flights during this time. By 34 days, they are flying and can be seen chasing prey and each other in and around the natal territory.

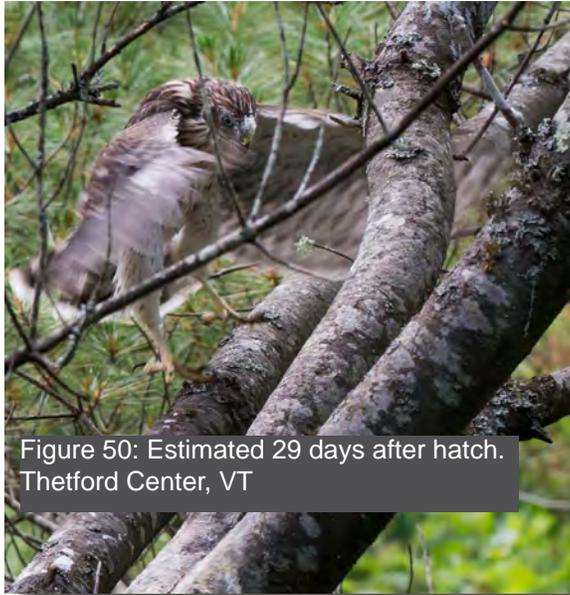


Figure 50: Estimated 29 days after hatch.  
Thetford Center, VT



Figure 51: Estimated 28 days after hatch.  
Thetford Center, VT

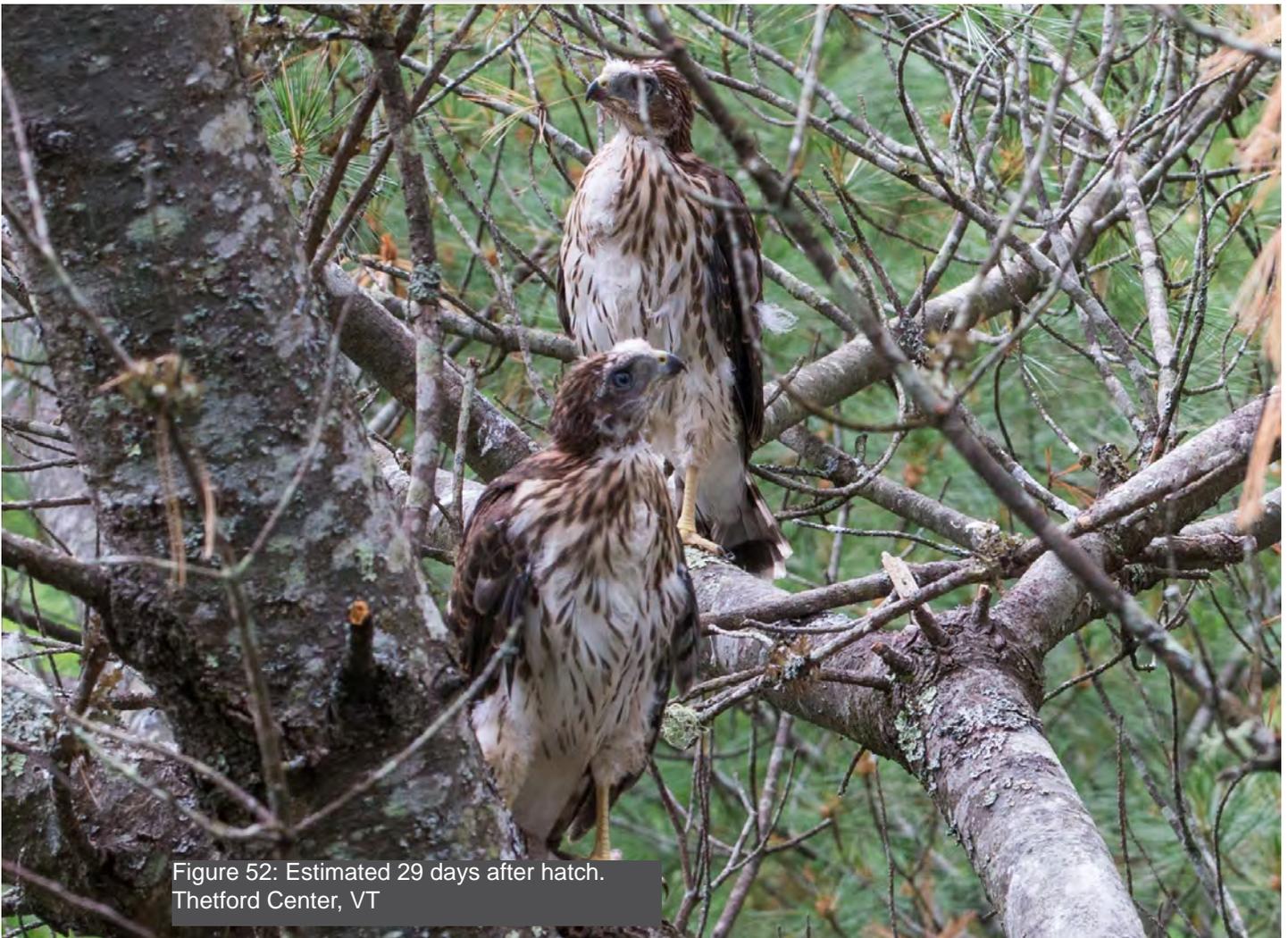


Figure 52: Estimated 29 days after hatch.  
Thetford Center, VT



Figure 53: Estimated 29 days after hatch.  
Thetford Center, VT

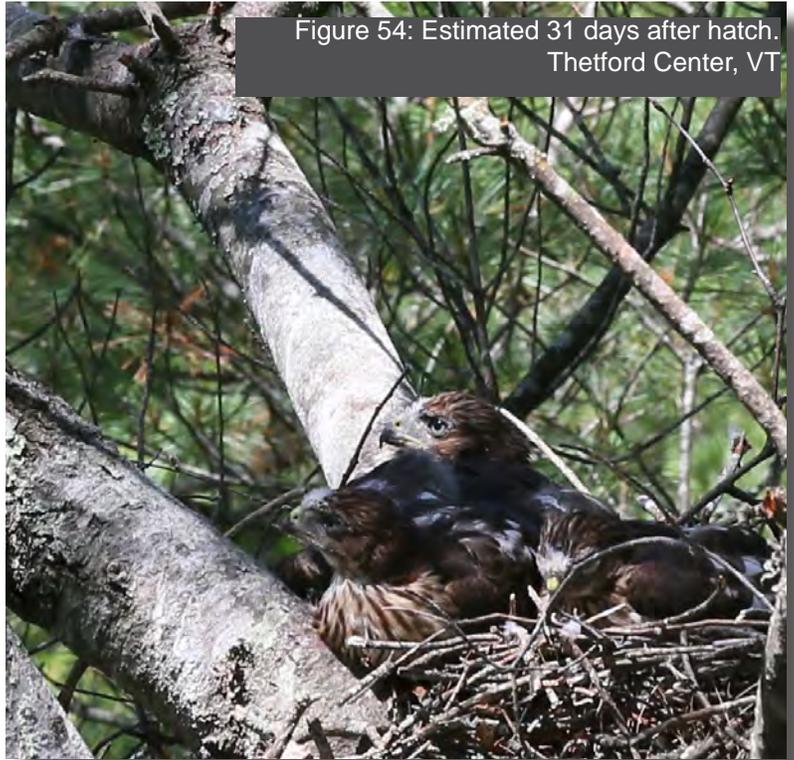


Figure 54: Estimated 31 days after hatch.  
Thetford Center, VT



Figure 55: Estimated 30 days after hatch.  
Thetford Center, VT

Figure 56: Estimated 29 days after hatch.  
Thetford Center, VT



Figure 57: Estimated 32 days after hatch.  
Thetford Center, VT



Figure 58: Estimated 35 days after hatch.  
Thetford Center, VT

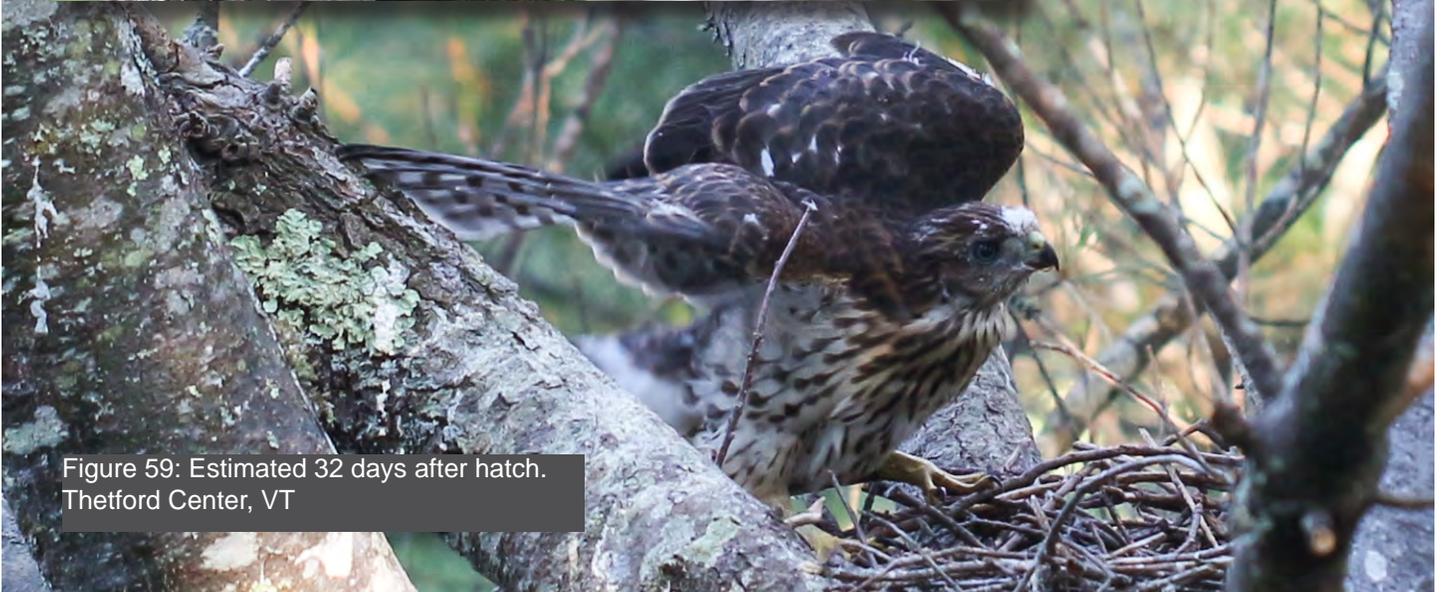


Figure 59: Estimated 32 days after hatch.  
Thetford Center, VT



Figure 60: Estimated 34 days after hatch.  
Thetford Center, VT



Figure 61: Estimated 33 days after hatch.  
Thetford Center, VT

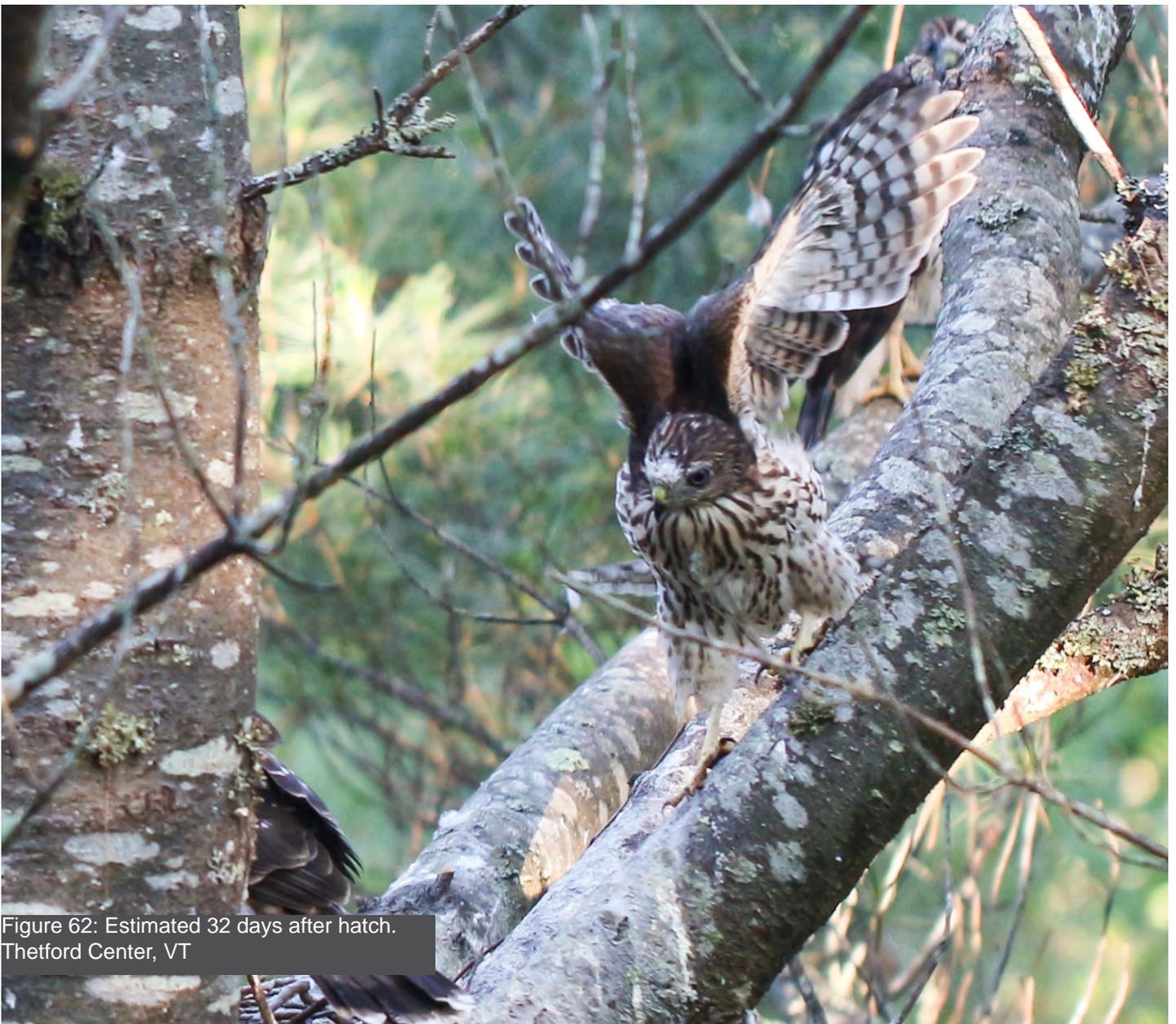


Figure 62: Estimated 32 days after hatch.  
Thetford Center, VT

## Days 39 +

During this period, there are no significant changes in plumage. Eye color changes from blue-green to yellow during this time. These young hawks disperse, and may migrate to areas where they will likely spend the winter.



Figure 63: Estimated 39 days after hatch.  
Thetford Center, VT



Figure 64: Estimated 39-40 days after hatch.  
Albuquerque, NM



Figure 65: Estimated 39 days after hatch.  
Thetford Center, VT

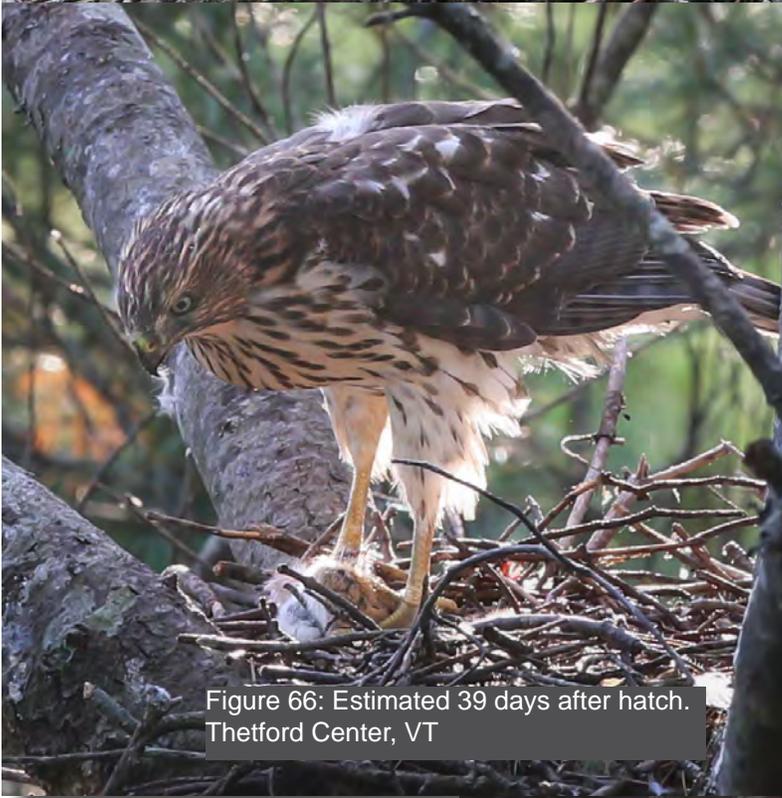


Figure 66: Estimated 39 days after hatch.  
Thetford Center, VT

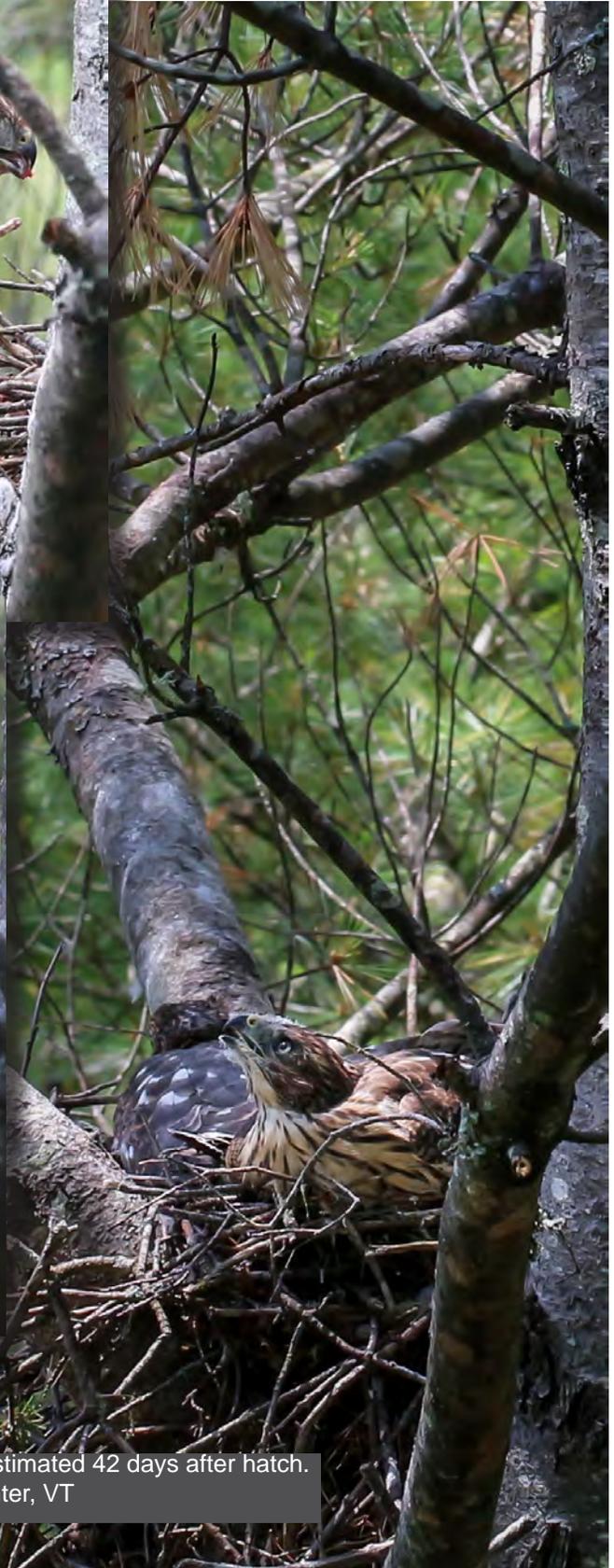


Figure 67: Estimated 42 days after hatch.  
Thetford Center, VT



Figure 68: Estimated 44 days after hatch.  
Theford Center, VT

## Adult Birds

The following photos should help in estimating the age of adult birds (Fig. 69-75). The molt to adult plumage begins at approximately one year of age, typically around the time incubation begins (Fig. 70). This molt takes several months to complete. While not a completely reliable indication of a specific age, eye color in Cooper's Hawks changes dramatically, from greyish as nestlings to yellow as immature birds and gradually deepening to red as adults (Figure 75).

Flecks of orange have been observed in the eyes of birds held under education permits by late Second Year (SY), but more commonly in the third year. In education birds, a reddish eye color is often not observed until the fifth year.



Figure 69: ASY adult male standing above SY female. Albuquerque, NM.

Figure 70: Molting SY female beside adult ASY male. Albuquerque, NM.





Figure 71: ASY adult on the left. Albuquerque, NM.



Figure 72: SY bird. Albuquerque, NM.

Figure 73: ASY bird soon after molting in adult plumage. Albuquerque, NM.



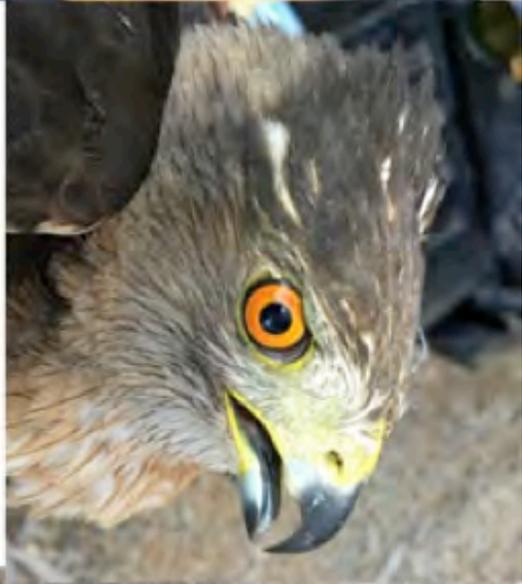
Figure 74: ASY bird at seven years old. Photo by Steven DeRoma. Albuquerque, NM.



Yellow



Yellow-Orange



Orange



Orange-Red



Red

Figure 75: Eye color change series. Albuquerque, NM.

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## GLOSSARY OF TERMS

ASY: After Second Year age classification.

Egg tooth: also pip tooth, a layer of keratin on the top of the beak that facilitates breaking out of the egg. The Cooper's hawk egg tooth falls off within 10 days of hatching.

Rectrices: the flight feathers of the tail. Cooper's hawks have 12 rectrices.

Remiges: the flight feathers of the wing, including the primaries, secondaries, and tertiaries.

Scapulars: feathers covering the shoulders of a bird.

SY: Second Year age classification.

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*Cooper's hawk chicks in nest.*  
Tig Tillinghast/USFWS

**April 2018**

