

## FLYING SQUIRRELS - NIGHT GLIDERS

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While there are two species of flying squirrels, northern and southern, the southern, *Glaucomys* (Greek for gray mouse) *volans* (Latin for flying) is the one you will find in Ohio.

Flyers are nocturnal and their eyes are equipped for low light conditions, however they cannot see in total darkness. Activity peaks for several hours just after dusk and again just before dawn. They are the only nocturnal member of the squirrel (Sciuridae) family in North America. They do not hibernate and are active year round. The southern will, in extreme weather, hole up in its nest for several days. Communal nesting is also common, usually averaging 3-10 to a den. The largest group ever recorded in an aggregate nest was 50 individuals in a tree hollow in Illinois. (*The Smithsonian Book of North American Mammals*, 1999 pg 464)

They are known, of course, for the gliding membrane (patagium) that attaches to the front and hind legs which, when extended, gives them aerodynamics much like that of a hang glider. Glides have been recorded in the 90-91 m range (295-299 ft.) but glides of 6-20 m (20-66 ft) are more common. The broad flat tail also adds surface area that increases the squirrels total airfoil. There is still debate in the scientific world as to what the tail is used for. Is it just used for stabilization during flight, to aid in breaking when landing, possible elevation during flight? The jury is still out. Below is a cute and interesting description of a flyer's tail in action.

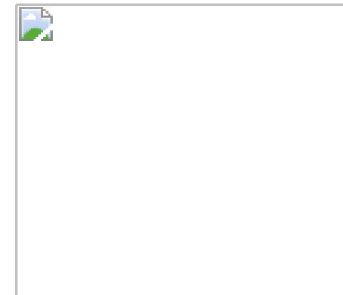
“While the squirrel glides, its flattened tail merely trails behind, flowing out with a slight curve to the left or right, or with the tip flapping from side to side like a flag blown by a gentle breeze. The tail's function during glide is not fully understood, but referring to it as a rudder is misleading. The tail does not control glide direction. More accurately, it serves as a balancing organ, similar to the tail of a kite, stabilizing the glider in midair.” (*Wells-Gosling, Gliders in the Dark*, 1985 pg. 69)

The southern flying squirrel's home range is most of the eastern United States, south into Texas, Mexico and Honduras, and north into a small section of Canada bordering the U.S. It is absent from the northern part of New England. While the southern is primarily associated with hardwood forests, it will inhabit conifer and mixed conifer-hardwoods. Southerns are also found in wooded city or urban parks as well as residential areas. Nesting sites are natural wood cavities or old woodpecker holes in live or dead trees; they also construct outside nests in trees or masses of hanging vines or Spanish moss. There is evidence that they may also nest at ground level or even underground. Human dwellings, attics, insides of walls and crawl spaces are also attractive nesting sites.

The southern's diet consists of a wide variety of food stuffs, fruits, nuts, seeds, bark, buds, flowers and sap. They also consume fungi and lichens and also contribute to the dispersal of mycorrhizal fungi, thus also contributing to the health of forests. They are also more carnivorous than many other squirrels, eating insects, birds, eggs, nestlings, mice and occasionally carrion. Their main predators include hawks, owls, house cats, bobcats, weasels, raccoons and snakes. Accidents such as drowning, striking objects while gliding, and also catching their patagium on barbed wire fencing also account for some deaths. While the *Sciurus* part of the family tree are scatter hoarders, southerns are known as larder hoarders, preferring to cache their food all in one or two spots. On occasion they have been known to cross over and do a bit of scatter hoarding.

**Rehabilitation:** the basics are always warmth and hydration. Small fleece pouches can be used to keep the little ones in a nest-like environment. Put the pouch in a small container and put the container on a heating pad or other heat source (set on low) being sure to turn the babies every so often. Since they are too young to thermoregulate, turning helps warm them on all sides equally. Incubators, whether homemade or commercial, are excellent for warming. A hypothermic baby will not be able to absorb subQ fluids, so warm the baby first. Noninvasive methods are always best and if the animal is conscious and can take fluids orally, that is the route to go. If the animal is also emaciated, restrain the desire to feed and take care of the basics first.

Once the animal is warmed and hydrated, gradually start introducing formula. If the animal is holding hydration we have found that using plain water works well for the formula break-in period. Time between feedings depends on the age and condition of the babies. If they are emaciated, small frequent feedings are in order. Neonatal flyers should be fed every 1 1/2 hours to start, with one late feeding at 2 am and the next feeding no later than 6 am. If you can see the milk line it can be used as an excellent gauge as to how often to feed. ( The milk in the stomach of a neonatal animal is visible under the hairless skin on the belly - extending crosswise in the area of the umbilicus. This is the milk line.) Never let the milk line completely vanish before the next feeding; there should be a thin line left. Times between feedings can gradually be increased as the squirrel grows. Again, checking the milk line when



possible will help you to determine if feedings can be spaced out a bit more, it is usually best to do this in 1/2 hour increments. A simple way to figure amount to be fed, following the 5% rule is to divide the weight in grams by 2.

**Example:** 15 g squirrel divide the weight by 2 and you get 0.7 ml/cc's a feeding. While this is a good guideline, starting out with a bit less with very small babies is advisable. We have found that 4 to 4.5% works well with the tiny guys. Weigh daily in the morning before first feeding. Flyers are very fast growers so the amount of formula per feeding will need to be adjusted on a daily basis. A word of warning here, neonatal flyers, because of their small size, can dehydrate right before your eyes so additional humidity of some sort should be provided and, like all squirrels, extra heat needs to be supplied until after eyes open.

**Formula:** Using the correct formula is of vital importance to any animal we rehabilitate. Using homemade formulas or inexpensive formulas that can be bought at many outlet and discount stores will have disastrous effects on the animal. The only mother's milk analysis available is for the e. grey squirrel. While not perfect, a formula that matches closely works well with flying squirrels.

We recommend using Zoologic 33/40. If babies are very tiny (unfurred) mix 1 part powder to 2 parts water, gradually working up to 1 part powder to 1 1/2 parts water as they grow. You can also, after they are furred, start adding in a little Zoologic 30/55 until the powder mix is 2 parts 33/40 to 1 part 30/55, then take 1 part of the powder mix and blend it with 1 1/2 parts water. The 30/55 is not necessary though; the flyers will do well on 33/40 alone.

Once the baby is eyes open or close to it, adding a good commercially prepared staple diet, such as Lab Blocks or ZuPreem Primate Diet, will get them used to eating what will eventually make up 80% of their diet while in rehabilitation. The other 20% of the diet is made up of various fruits, and vegetables, a few native nuts when available or other in-shell nuts, (peanuts are not nuts but legumes). 'Treats' from outdoors can also be provided: buds, bark and various insects, crickets, June bugs and Asian ladybugs are favorites. Mealworms now and again are also appreciated. Once they are up and about, water should always be in the cage; shallow, heavy, small crockery bowls are our preference, but water bottles can also be used. If you do use water bottles, check periodically to make sure they are in proper working order. Once outside in prerelease pens, the flyers will have a grand time catching their own night-time insects. The weaning diet and prerelease diet are critical. Because of their light bone structure Metabolic Bone Disease (MBD) can set in quickly. Obviously such a condition is much easier to prevent than to try and correct.. **Like any species, flying squirrels should not be raised as singles. Because of the flyer's natural social behavior this is doubly important.**

**Housing:** Neonatal and eyes-closed babies do well in small containers. Small plastic totes with small air holes punched in the top, or a larger hole with 1/2" hardware cloth glued or taped over the hole make for a secure warm container (remember at this age they still need an additional heat source). Incubators, commercial or homemade, are the best choice; ones with added humidity are optimal. Once eyes are open they can be moved into a small cage, bar spacing never being more than 1/2" in one direction, or aquariums with secure tops. Flying squirrels are escape artists and if they can get the head through, the rest of the body follows nicely. We also use dog clips for extra security on the doors for the same reason. Small wicker wren houses hung on the side of the cage make nice inside nest boxes. Various small branches and limbs are added for exercise and exploration, bones and/or pieces of deer antler are in all the cages. Cage size should be increased as they become more active. Once no longer needing to be hand fed, contact should be kept to cleaning the cage and feeding

At approximately 8 weeks old they are ready to be moved into the outside prerelease pen. Suitable wooden nest boxes, with warm bedding, are provided as well as the other standard cage 'furniture,' i.e. limbs, logs etc.

Now is also a good time to add more of the foods they would find in the wild. Again, it is important to keep contact to a minimum. Do not talk to or try to touch the squirrels; this is easily accomplished since being nocturnal they are asleep when you are feeding and watering. Regular checking, from a distance at dusk, will let you know how they are progressing. Cages should meet or exceed NWRA/IWRC minimum standards for squirrels. Some rehabilitators use 1/4x1/4" welded wire on their outside cages, we use 1/2x1/2" and have found it to be secure.

**Release:** After about 2-3 weeks in the outside pen the flyers should be ready for release. By observing them at dusk you should have a good idea of their gliding skills and overall condition. They should be in good weight and quite active, readily opening nuts. While they might not dive for cover at the approach of a human (being a very curious animal by nature) they should show a certain amount of standoffish/ wariness when a human approaches the cage. If all the above criteria are met, they are ready to go. It is best if you can release on-site into an established flyer colony. Just cut a small hatch in the wire of the pen (if you do not already have a release hatch) and let them come and go, providing back-up food for a few days until they blend into the local population. Many times the site where they were found, often private property, is available to have the squirrels released there. We do not use these sites if the property owners have free- roaming cats.

If you must release off-site, as many of us do, it is important to establish if there are flyers in residence. Then you determine if the habitat is actually suitable. Even though southern flyers are found in urban areas, we prefer to release in more remote areas. Flying squirrels prefer older growth woods, with plenty of rotten logs, den trees and access to some sort of water source, be it a marsh, swamp, or bog area. We will go take a look at the woods during the daylight and look for nuts that have been eaten. Flyers have a unique nut-opening pattern that is theirs alone. An empty nut shell with a round smooth-edged opening at one end is an unmistakable sign that flyers are in the area. Red (pine) squirrels also make a round opening but the edges are quite jagged, white-footed mice must gnaw several smooth-edged openings to get at all the nutmeat. Other tree squirrels such as the fox and grey tear the nut to pieces. Once you have a spot picked out there are several ways the release can be accomplished. We have pens set up on site and it is a simple procedure to put wire over the nest box hole and move nest box, squirrels and all, to the site. After about 3 or 4 days the release hatch is opened. If it is midsummer we provide back-up food for a few days; if the late summer mast (nut crop) is on we make a couple checks back at the pen and that's it. If you don't have or are unable to set up a pen at the release site, cover the hole, take box and all and hang it in a suitable tree at the site you have picked out. Let the squirrels settle a bit if they have awakened during the move, then remove the wire from the hole. Again, back-up food should be provided for a few days depending on the time of year.



**Southern Flying Squirrel** (*Glaucomys volans*)

- Total length: 198-255 mm (7.7-10")
- Weight: 46-85 g
- Dorsal color: grayish-buff, may have some golden tint
- Underparts: white to skin
- Often have two litters per year, breeding season varies with latitude. Average litter size 3, ranging from 1-6
- Gestation: 40 days
- Babies born blind, mostly hairless except for the vibrissae and short hairs on snout and chin, ears sealed shut.
- Birth weight: 4 g
- Born with patagium
- Ears become erect between 2 and 6 days of age.
- Hair visible over most of body at 7 days
- Eyes open: 24-30 days
- Weaning: 5-7 weeks, approximate weight 43g. Resemble miniature adults.
- Young begin to molt to first adult pledge at 12 weeks
- At 12 weeks still usually with mother and may stay with her until she has another litter.
- Life span in the wild: 5-6 years