

## **Brown Anole** *(Anolis sagrei)*

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### **Introduction**

The brown anole (*Anolis sagrei*) is an exotic species of small lizard that was introduced and became established in south Florida sometime in the 1940s, though it probably survived in the Florida Keys long before then. Like several other introduced Caribbean anoles, it was able to flourish in the sub-tropical climate and habitat of the Florida peninsula, but unlike the other invaders, the brown anole is the only species that has steadily increased its range into other southeastern states. Today brown anoles are common residents of several southern Georgia counties along the Florida border and Atlantic coast. There have also been colonies of brown anoles found as far north as Houston County in central Georgia, but it is not known if these colonies survive the winter or reform during the warm months.

### **Taxonomy**

Family Iguanidae

Subfamily Polychrotinae

Genus *Anolis* – anoles

There are more than 300 species in the genus *Anolis*, and they occur throughout South America, Central America, North America and the Caribbean. Of those species, only one is native to the United States—the green anole, *Anolis carolinensis*. However, over the past century six to eight species of Caribbean anoles have been accidentally introduced to south Florida. Only the brown anole has been able to colonize parts of Georgia.

The brown anoles first introduced to south Florida actually came from two different islands. The Cuban brown anole (*Anolis sagrei sagrei*) was considered a separate subspecies from the Bahaman brown anole (*Anolis sagrei ordinatus*). However, when the two subspecies came together in Florida they began to interbreed. Today the brown anoles of the United States belong to neither subspecies, but have characteristics of both. Because of this secondary contact between the two subspecies they are referred to as only *Anolis sagrei* with no subspecies epithet.

People often refer to anoles as “chameleons,” though they are actually quite different than chameleons. True chameleons, which belong to the family Chamaeleonidae, are native to Africa, Madagascar, and India and have curly prehensile tails and independently movable eyes. Like chameleons though, anoles are able to change their body color in response to mood or temperature.

This species may also be listed under the scientific name *Norops sagrei*.

## Status

The brown anole is an introduced species and is actually extending its range in the U.S. and Georgia. In suitable habitat it can be extremely common, and it is often found around human dwellings. The brown anole is not protected under Georgia or federal law.

## Description

The brown anole is a small brown or gray lizard that may reach a total length of 5 to 9 inches, though its tail may be longer than its body. The brown anole may be any shade of brown, gray, or even black. In addition, the anole can change its color rapidly, especially if it feels threatened. However, a background shade of brown is usually apparent. Some anoles also develop small yellow dots on the sides of the body when excited.

In addition to color, some key characteristics of a brown anole include a fairly stout body and a less elongated head than the green anole, variable markings such as dark spots, half moons, triangles, or lines running down the back, and light bands on the legs. On closer inspection of a brown anole one can see slightly expanded toe-pads (so they can walk on very slick surfaces) and a pale streak down the throat (under the chin). The pale streak is a dewlap, a flap of brightly colored skin (though the bright color is hidden when the dewlap is tucked in) that can be extended from the neck to help protect a territory or attract a mate.

## Distribution

The original range of the brown anole included Cuba, the Bahamas, Swan Island, Honduras, Cayman Brac, and Little Cayman. However, brown anoles have been widely introduced throughout the world and now have established populations in Jamaica, Grand Cayman, Belize, Mexico, Florida, Texas, Louisiana, and Georgia. There has recently been some evidence that the brown anole has also been introduced to Hawaii and Taiwan. In Georgia, brown anoles have breeding populations throughout the southern 1/4 of the state, with sightings as far north as Houston County in the interior of the state and Camden and Glynn Counties on the Atlantic coast. It is thought that their expansion has been aided by “rafting” on vehicles traveling north on Interstate 75 and Interstate 95. Breeding populations have been found further north than expected at rest stops along both Interstates in south and central Georgia.

## Form and Function

Anoles have been studied by ecologists for many years because of their behavior of partitioning their habitat into different sections for different species. In places where multiple species of seemingly similar anoles co-exist, it is often because each species occupies a different part of the vertical habitat (e.g. ground, lower branches, and tree top). Anole species that developed in different places (such as



separate Caribbean islands) but occupy the same portion of the vertical habitat are grouped into ecomorphs. Brown anoles fall into the “trunk-ground” ecomorph, because they are usually found on the ground or on low-growing vegetation no more than a few feet off the ground. Their gray and brown coloration and pattern, like other anoles in the trunk-ground ecomorph, help to camouflage them against a backdrop of bark and dead leaves.

Brown anoles also exhibit significant sexual dimorphism, meaning that males and females have different physical characteristics. Females have a distinct, narrow white or yellow stripe running down their backs bordered by wavy or triangular lines. Males have a well-defined white stripe down the middle of the back. Both sexes have a dewlap, but it is smaller and rarely extended in females. When extended, the stretched skin can be pale yellow to bright red and may also change color. Excited males often extend a small crest along the back that can span the length of the neck, body, and tail. Male brown anoles (6 to 8 grams) are usually significantly larger than female brown anoles (3 to 4 grams).

## **Ecology**

**Reproduction:** Brown anoles breed during the summer but begin establishing and defending territories in the spring. Female brown anoles lay one egg at a time every one to two weeks throughout the breeding season. Moist covered habitat is essential for hatchling survival during development. The eggs hatch about four weeks after being laid and the independent hatchlings grow to adult size in less than one year. The average life span of a brown anole is about 18 months but they can live up to five years in the wild.

**Feeding:** Brown anoles will often eat hatchling green anoles, a behavior that may be affecting green anole populations in the United States. In their native habitats brown anoles eat insects, spiders, worms, snails, and slugs. In Florida, brown anoles also eat other small vertebrates including other small reptiles and amphibians.

**Behavior:** Like all anoles, male brown anoles, which are active during the day, also exhibit a series of behaviors that are meant to protect territory and threaten other anoles (as well as other creatures that happen to invade their territory). Male anoles will engage in a series of push-ups followed by several head bobs, and continue the ritual by flaring their bright dewlap multiple times. Some male brown anoles are also able to extend a crest of skin that runs down the length of their body along their spine. All of these techniques are thought to make the male anole look larger and more intimidating to any invaders he may come across.

The anole species that live in Georgia, in general, can be divided by what portion of the vertical habitat they occupy most often. In places (in the U.S.) where the green anole and the brown anole coexist, the brown anole usually stays on the ground or lower sections of the vertical habitat (lower vegetation, low tree trunks) whereas the green anole usually occupies higher bushes and trees and stays off the ground. In addition, if a brown anole feels threatened it will usually run down a tree trunk or run and hop along the ground to escape.

**Habitat:** Brown anoles are habitat generalists and can be found in practically any three-dimensional tropical or sub-tropical (year-round warm temperature and relatively high humidity) habitat type within their range. They are often found at forest edges, disturbed areas, and generally open sites. Edge habitats created by human development are also good sites for brown anoles. They can be very common in urban and suburban areas. They do climb shrubs and trees but are rarely found perching higher than five feet from the ground.

**Enemies:** While brown anoles are known for eating hatchling green anoles, the opposite is also true. Adult green anoles (as well as other brown anoles) also prey upon hatchling brown anoles. In addition, young and adult brown anoles are often preyed upon by large skinks, snakes, and birds.

When attacked by a predator, brown anoles have a unique method of escaping: they can literally lose their tail. The anole's tail snaps cleanly off the body and will continue to twitch, hopefully distracting the predator long enough for the anole to run away. Eventually the brown anole will grow a new tail, though it may be slightly smaller and different in color.

**General:** Anole species have shown their amazing ability to colonize multiple different Caribbean islands and are now continuing down that path in the United States. However, much of their most recent dispersal has been due to human intervention. It is thought that the brown anole has invaded new areas through shipments of tropical plants. Also, in the United States brown anole invasion pathways out of Florida seem to follow Interstates possibly due to anoles riding on northbound cars. The next threat to new invasions may come from irresponsible pet owners of brown anoles, which are now common in many pet stores around the country.

**Populations:** In most areas that have suitable climates and habitat requirements, brown anole populations are increasing in size and range, particularly in parts of the southeastern United States. In parts of Florida these lizards are so common that some people have called them the most common terrestrial vertebrate in the state.

## **Disease**

Brown anoles are not known to transmit any diseases to humans.

## **Economic Value**

Because the brown anole is an exotic species that is considered invasive to natural habitats in the United States it is not generally thought of as economically valuable. However, some studies have shown that brown anoles are important predators of insects that feed on sea grapes. In fact, experiments in their native island habitat have shown that when anoles are not present, sea grapes sustained greater damage due to insects. It is not known if populations in the United States consume enough insects to be beneficial to humans.

## **Damage**

Because brown anoles are an invasive exotic species, their presence in habitats in the United States may indicate that a native species is somehow compromised by this additional competition and use of resources, or direct predation. In the southeastern United States green anoles (our only native anole) occupy similar niches as brown anoles. In areas where brown anoles have been introduced, green anoles shift the portion of the habitat that they use from all vertical habitat to only trunk and crown areas of vegetation. Over time, green anoles often become scarcer and may eventually disappear altogether from disturbed habitats with high densities of brown anoles. Additionally, hatchling green anoles are often preyed upon by brown anoles.

Brown anoles have become so dense in some parts of Florida that there can be up to one brown anole for every square yard of ground, leaving little habitat and resources for the native green anoles.

Also, brown anoles eat large numbers of spiders, which may have a significant impact on other southeastern species dependent on arachnids as a food supply.

## **Medicinal Value**

Brown anoles do not have any known past or present medicinal value.

## **Legal Aspects**

Most native animal species (except certain exotic mammal species, venomous snakes, and pests) are protected under Georgia law and cannot be harmed, killed, or kept as pets without a special permit. However because brown anoles are not native to Georgia, they are not protected by state law.

## **Control to Reduce**

At this time there are no identified management tactics to reduce brown anole populations. Because they are habitat generalists easily able to adapt to different situations and have already established dense colonies in some areas, reduction and eradication of brown anoles would be very difficult or impossible. In addition, as human development continues to push into new areas and creates more disturbed and edge habitat, brown anoles will continue to increase in number and range.

A healthy ecosystem with native plants and animals may be better able to withstand or adjust to the impacts of a brown anole invasion. The best ways to encourage healthy ecosystems include conserving native habitat, reducing the use of pesticides, fertilizers, and other potential pollutants, and practicing good environmental stewardship.

The species, at this time appears to be geographically confined to parts of the United States with year-round warm temperatures and relatively high humidity.

## **Management to Enhance**

Because brown anoles are an exotic species that may become invasive, management to enhance this species is not recommended.

## **Human Use**

**Native Americans** – no known uses.

**Colonists** – no known uses.

## **Further Reading**

Behler, J. L. and F. W. King. 2004. *National Audobon Society Field Guide to Reptiles and Amphibians*. 21st printing. New York: Chanticleer Press, Inc. 743 p.

Conant, R. and J. T. Collins. 1998. *A Field Guide to Reptiles and Amphibians of Eastern and Central North America*. 3rd Edition, expanded. New York: Houghton Mifflin Company. 616 p.

Meshaka, W. E., Jr., B. P. Butterfield, and J. B. Hauge. 2004. The exotic amphibians and reptiles of Florida. Krieger, Melbourne, FL, USA. 166 pp.

The World Conservation Union, Invasive Species Specialist Group. 2006. "Global Invasive Species Database. <http://www.issg.org/database/welcome/>

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