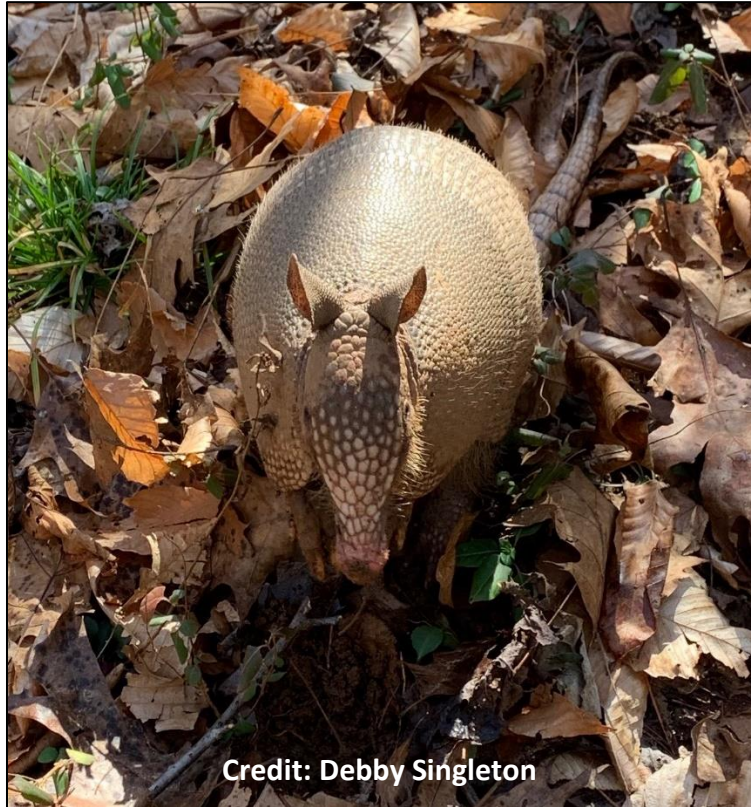


NORTH CAROLINA ARAMADILLO RANGE EXPANSION 2007 THROUGH 2021

N. C. WILDLIFE RESOURCES COMMISSION

Colleen Olfenbuttel, Black Bear and Furbearer Biologist



Credit: Debby Singleton

Funding for the monitoring armadillo range expansion was partially provided through a Pittman-Robertson Wildlife Restoration Grant. The Federal Aid in Wildlife Restoration Act, popularly known as the Pittman-Robertson Act, was approved by Congress on September 2, 1937, and began functioning July 1, 1938. The purpose of this Act was to provide funding for the selection, restoration, rehabilitation and improvement of wildlife habitat, wildlife management research, and the distribution of information produced by the projects. The Act was amended October 23, 1970, to include funding for hunter training programs and the development, operation and maintenance of public target ranges.

Funds are derived from an 11 percent Federal excise tax on sporting arms, ammunition, and archery equipment, and a 10 percent tax on handguns. These funds are collected from the manufacturers by the Department of the Treasury and are apportioned each year to the States and Territorial areas (except Puerto Rico) by the Department of the Interior on the basis of formulas set forth in the Act. Funds for hunter education and target ranges are derived from one-half of the tax on handguns and archery equipment.

Each state's apportionment is determined by a formula which considers the total area of the state and the number of licensed hunters in the state. The program is a cost-reimbursement program, where the state covers the full amount of an approved project then applies for reimbursement through Federal Aid for up to 75 percent of the project expenses. The state must provide at least 25 percent of the project costs from a non-federal source.



The Black Bear and Furbearer Biologist with the North Carolina Wildlife Resources Commission (NCWRC) has monitored, verified, and compiled observations of the Nine-banded Armadillo (*Dasyus novemcinctus*) since the first credible observation was received in 2007. The NCWRC actively seeks observations from the public to help determine range expansion and population establishment in North Carolina. To participate, volunteers who spot an armadillo in the wild are asked to upload and share their photos on the [NC Armadillo](#) project, which is on the free online platform iNaturalist. Volunteers can upload their photos via a computer at [iNaturalist.org](#) or they can download the free iNaturalist app, which is available for iPhone and Android. People who want to report observations but do not want to use iNaturalist can send their armadillo observations to armadillo@ncwildlife.org. The email should include a photo of the armadillo (if available), when it was observed (date and time), the disposition (alive or dead), and the location where it was found (GPS coordinates are best, but a detailed location description is acceptable). While photos help us confirm the observation, they are not necessary and we are interested in all observations.

In 2007, the agency received the first confirmed sighting of a nine-banded armadillo in North Carolina (Macon County) and in the last 15 years, has received 671 reports (unconfirmed, credible, and confirmed) in 67 counties (see page 13). Confirmed observations are those in which a photograph or carcass was available to confirm species identification and location of observation. Credible observations are those in which a photograph or carcass was not available but based on other information provided and the observer (e.g., biologist, researcher), the observation was determined to be that of an



armadillo. Unconfirmed observations are reports in which no evidence is provided or available, and the NCWRC cannot confirm that the observation was definitively an armadillo. For example, the NCWRC has determined some reports of vehicle-killed armadillos were in fact misidentification of vehicle-killed snapping turtles. When we determine an unconfirmed armadillo observation was a misidentification, it is removed from our armadillo observation database. Based on observations, it appears the armadillo is naturally expanding its range throughout North Carolina, rather than being helped by human intervention (e.g., brought in illegally).

Update from 2021 Observations

The number of counties with confirmed observations increased from 23 in 2020 to 26 counties in 2021. The additional three counties with confirmed observations during 2021 were Avery, Robeson, and Rowan counties. However, the nine-banded armadillo is likely in more

counties, based on both credible and unconfirmed observations. Confirmed observations stretch from Cherokee to Dare counties (see page 13). There are now 25 counties with credible observations, with credible observations reported in Durham and Surry counties during 2021. We have received unconfirmed observations of armadillos from 15 other counties, with 8 counties added in 2021. There are 34 counties in which there have been no observations of armadillos, with most of these counties in the far eastern and northern regions of the state (see page 13).

Through 2020, we had determined that armadillo populations were becoming established in 4 western counties (Cherokee, Jackson, Macon, Transylvania counties), based on the description provided in confirmed reports from those counties. We can verify population establishment, in which breeding and reproduction is occurring, through confirmed reports of multiple armadillos observed together. During 2021, we received a confirmed report of multiple armadillos observed together in Clay County, now our 5th county with a verified population. In addition, based on the number of confirmed and credible reports of individual armadillos we have received from Buncombe County (n=34), we suspect the armadillo population is becoming established in that county.

The NCWRC now has enough data to be able to detect trends within our expanding armadillo population. Reports of armadillos in North Carolina have increased in frequency since 2007 (Figure 1). While the increase in reports in from 2019 through 2021 partly reflects increased efforts by the NCWRC to promote our interest in armadillo observations ([NC Armadillo](#) project), overall the increase since 2007 likely reflect both armadillo range expansion and an increase in the armadillo population.

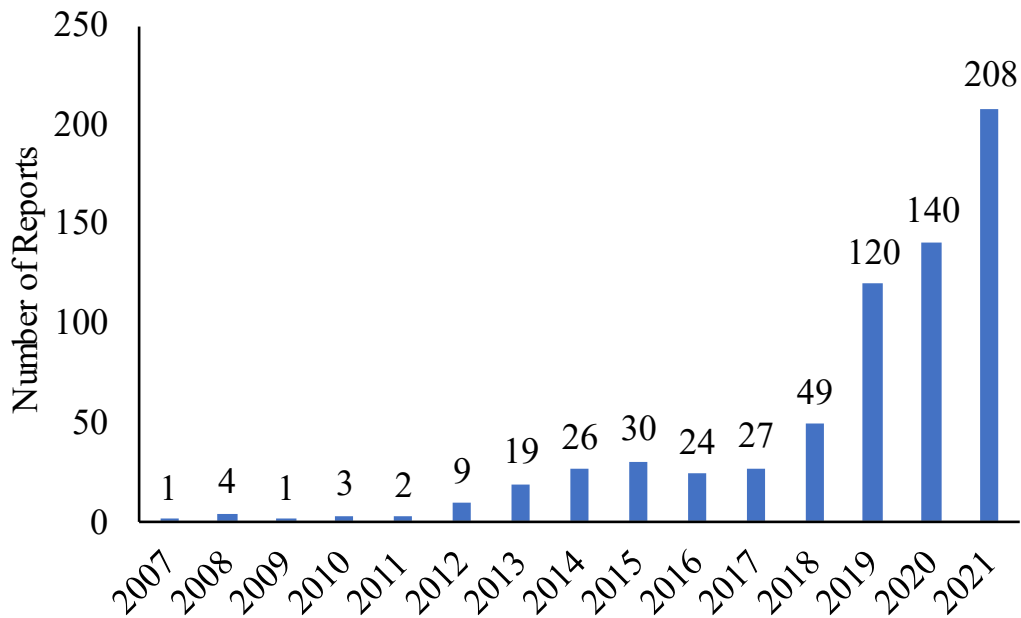


Figure 1. Number of nine-banded armadillo reports received by year from 2007 through 2021 in North Carolina. Reports include unconfirmed, credible, and confirmed observations.

Most reports are received in the summer months from June through September, which likely reflects increased movements and activity by armadillos, as well as more members of the public spending time outdoors (Figure 2). Observations decline in winter months, but armadillos will remain active during this time period, primarily during the day when it is warm. When the disposition of the armadillo is reported by the public, just over half of all armadillo reports (52%) the NCWRC has received through 2021 are of dead armadillos, with motor vehicle collisions the primary cause of mortality (58%). For the remaining reports of dead armadillos, the cause of death is unknown, though cold weather is suspected for a few of these reports, based on the location, time of year, and appearance of the armadillo.

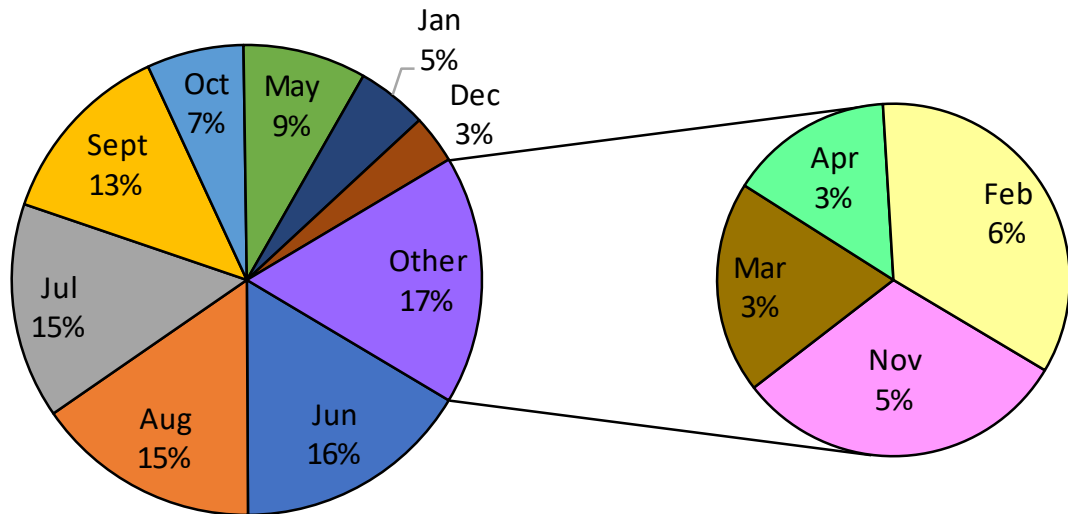


Figure 2. Number of nine-banded armadillo reports received by month from 2007 through 2021 in North Carolina. Reports include unconfirmed, credible, and confirmed observations.

Brief Background on Nine-banded Armadillos:

Armadillos are native to Central and South America but have gradually expanded their range into the southeastern United States. There are 20 species of armadillos, but only the Nine-banded Armadillo lives in the southeastern United States. The Nine-banded Armadillo was first recorded in Texas in 1849, but have since expanded their range north and east, crossing the Mississippi River sometime in the early 1940's, appearing in western Tennessee in 1980 and reaching North Carolina in the late 2000s, primarily from natural dispersal from adjacent states. The Nine-banded Armadillo is a unique mammal, with its armor-like skin and long, scaly tail. They are the only mammal species that has a shell and the common name, armadillo, is derived from a Spanish term meaning "little armored one". It is named for the bands (range from 7-11) across its midsection. It has deer-like ears and has been nicknamed "Armored pig" for its long, pig-like snout, which it keeps to the ground to forage by smell. They often travel slowly, in an erratic, wandering pattern as they forage, and sometimes can be heard grunting like a pig.

Armadillos have small, peg-like teeth that are used to mash and grind their food, capturing most of their prey with their long, sticky and flexible tongue.

Mild winter temperature conditions are good for armadillos. Since they lack thick insulation (i.e., fur, body fat) and must dig for most foods, freezing conditions can cause them to starve or freeze to death. However, North Carolina is experiencing fewer long stretches of below freezing weather, which is allowing armadillos to expand northward. The expansion northward also reflects the increased abundance of the Nine-Banded Armadillo population in neighboring states and in North Carolina.

To learn more about our newest North Carolina wildlife resident, please visit ncwildlife.org/armadillo. And if you observe an armadillo in North Carolina, please e-mail armadillo@ncwildlife.org or upload your photo to the [NC Armadillo](#) project.

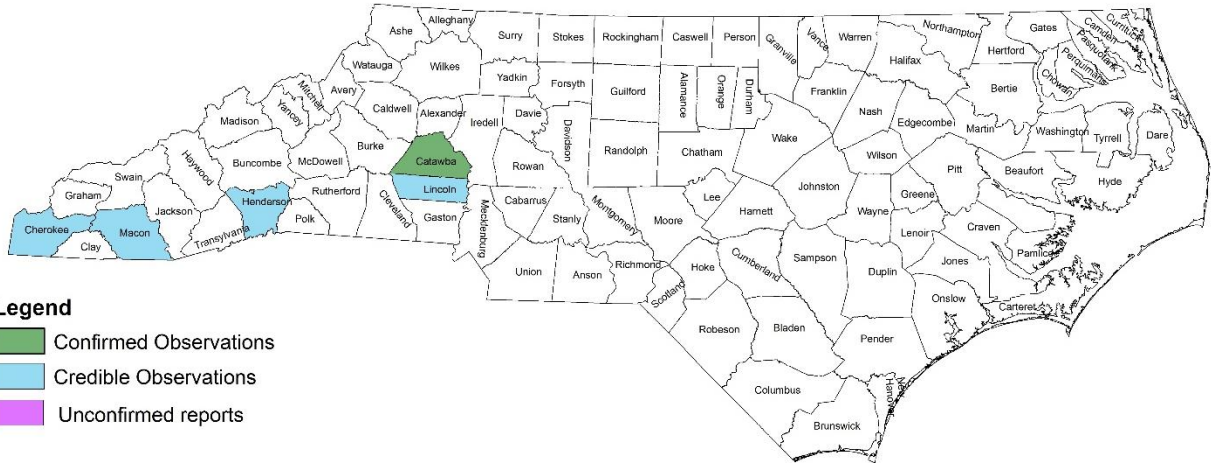


North Carolina Confirmed, Credible and Unconfirmed Armadillo Observations 2007





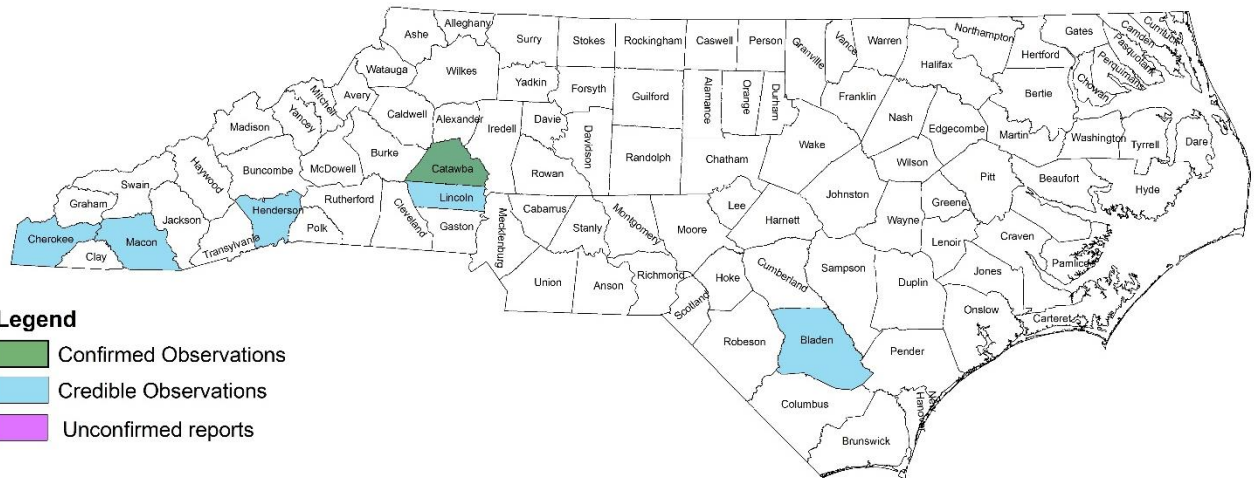
North Carolina Confirmed, Credible and Unconfirmed Armadillo Observations 2008



- Legend**
- Confirmed Observations
 - Credible Observations
 - Unconfirmed reports



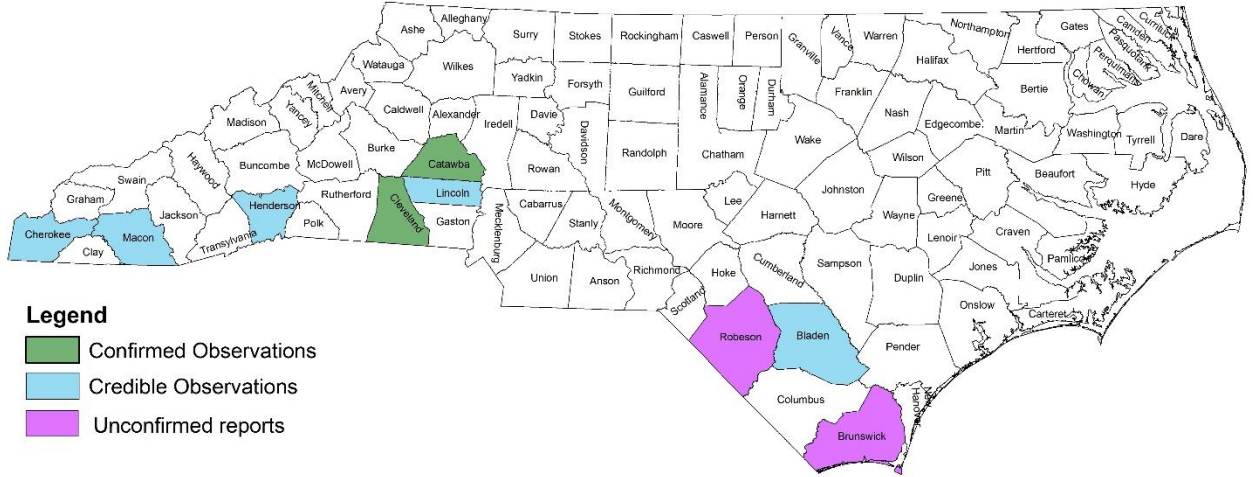
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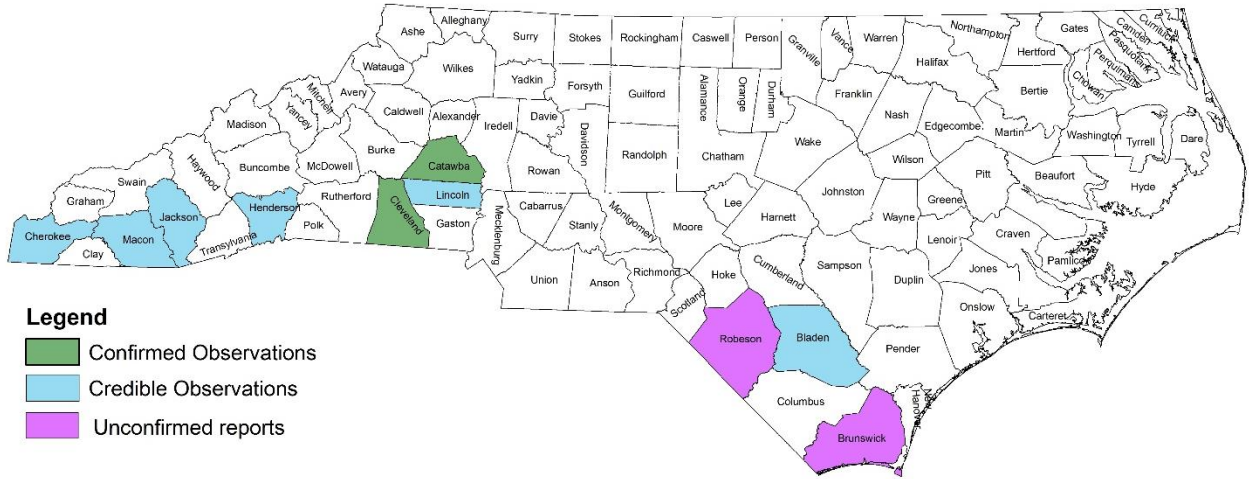


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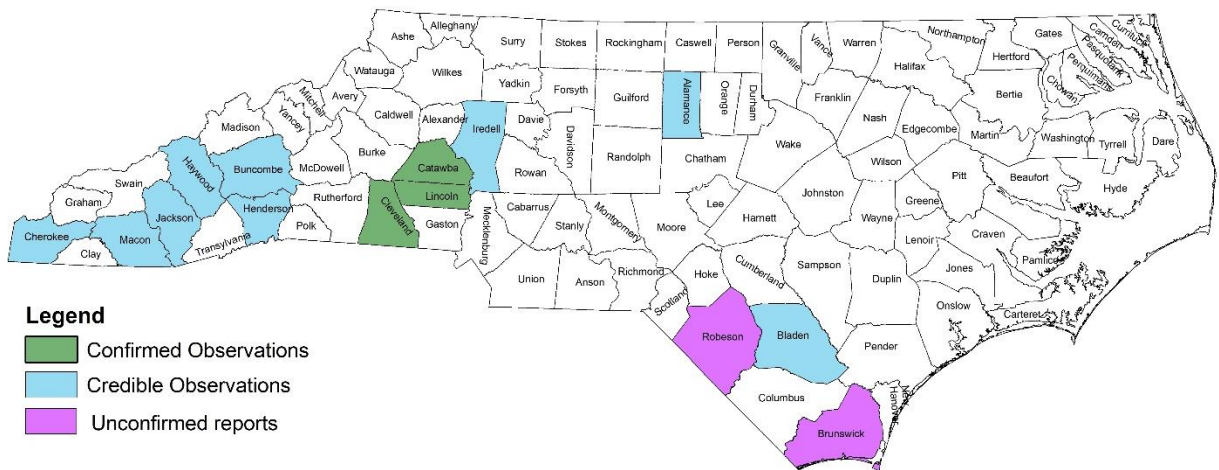




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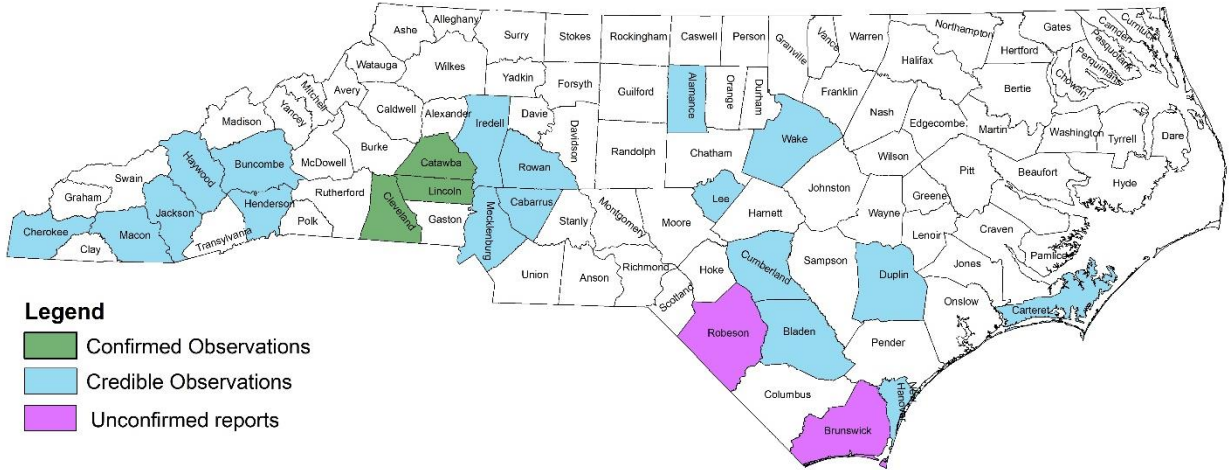


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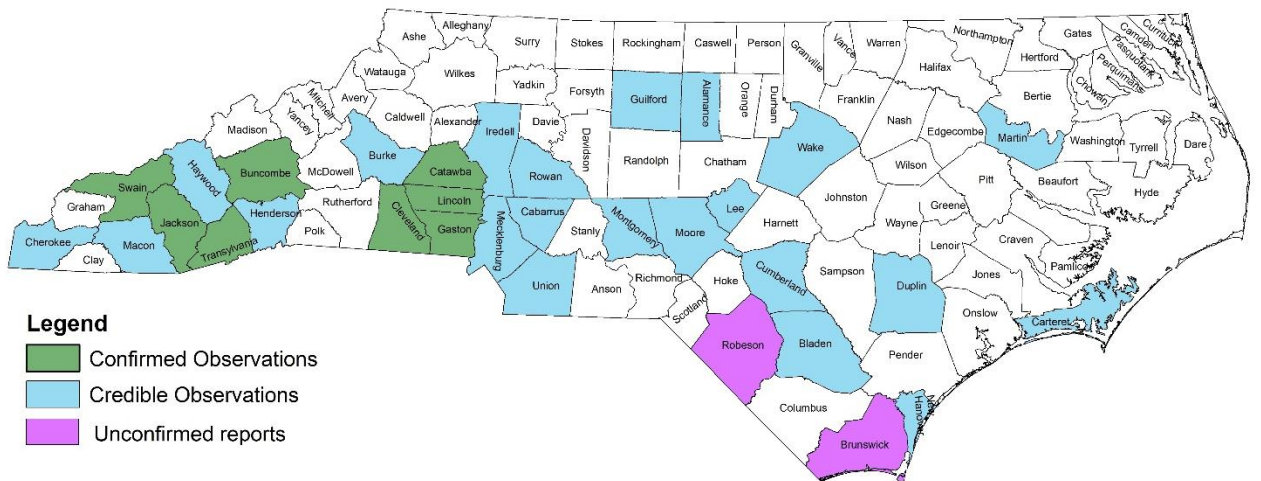




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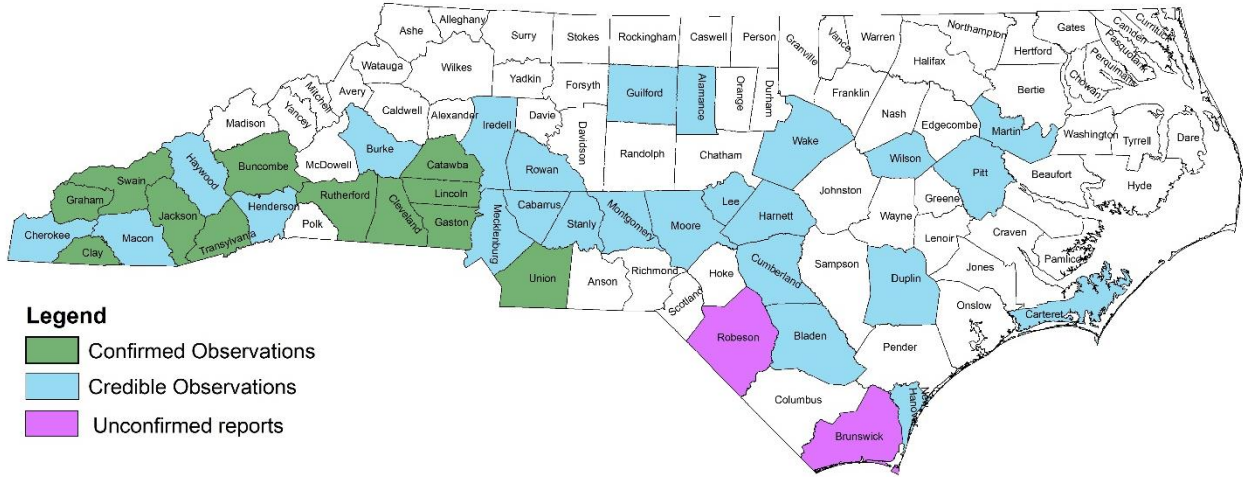


North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2014





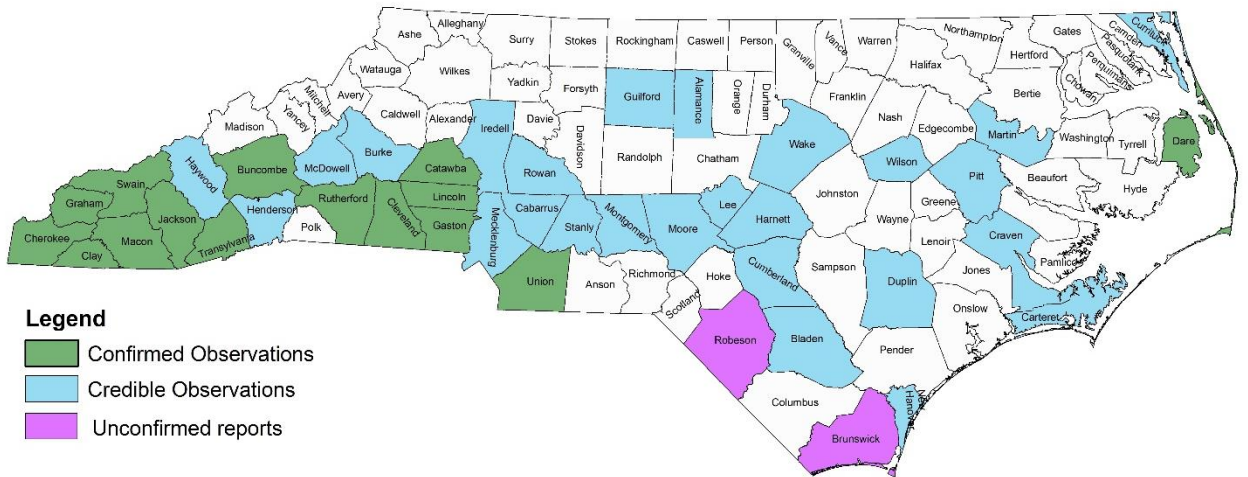
North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2015



- Legend**
- Confirmed Observations
 - Credible Observations
 - Unconfirmed reports



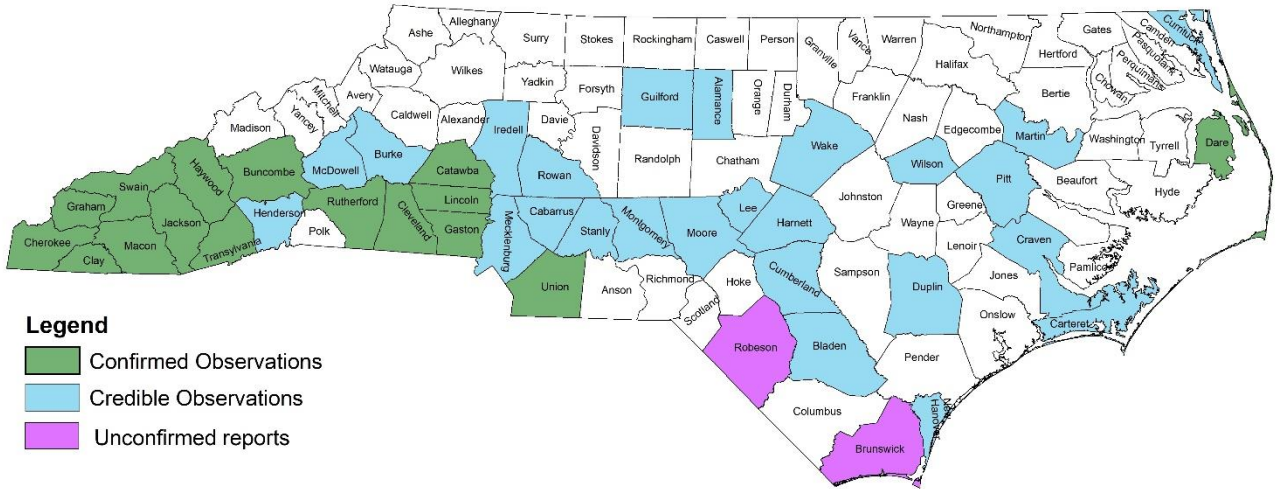
North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2016



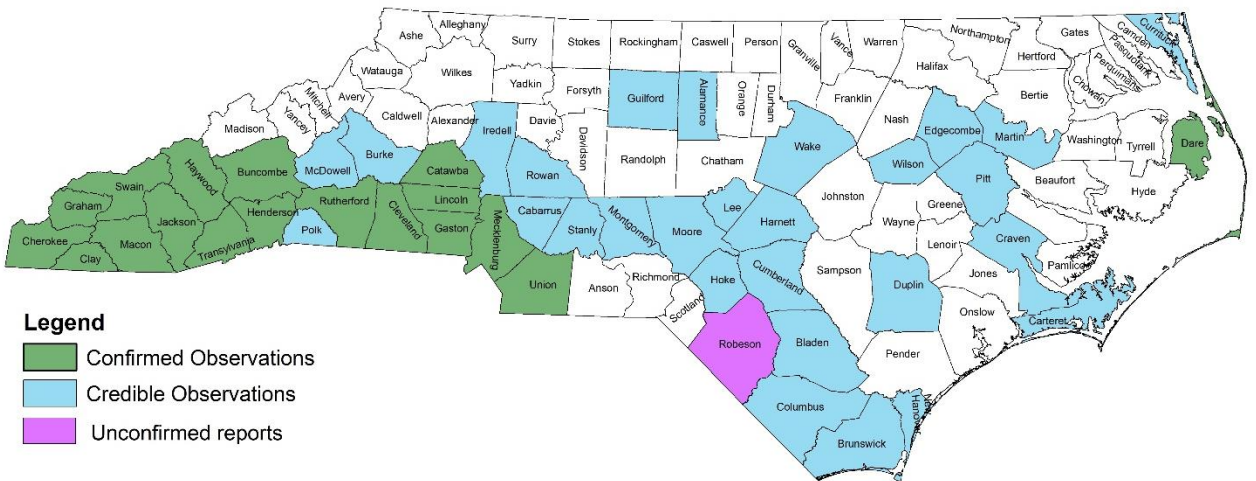
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- Confirmed Observations
 - Credible Observations
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North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2017

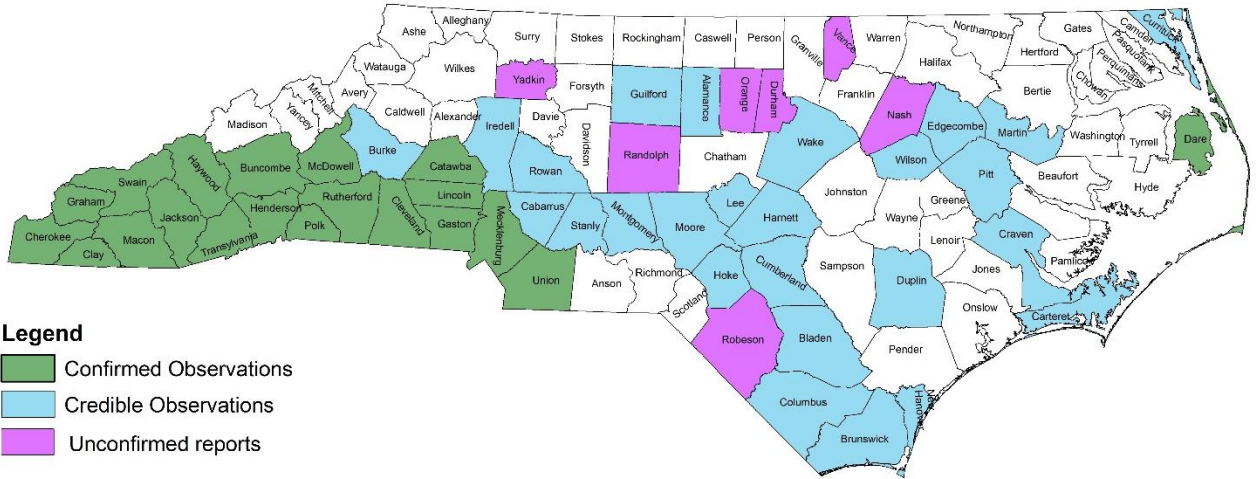


North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2018





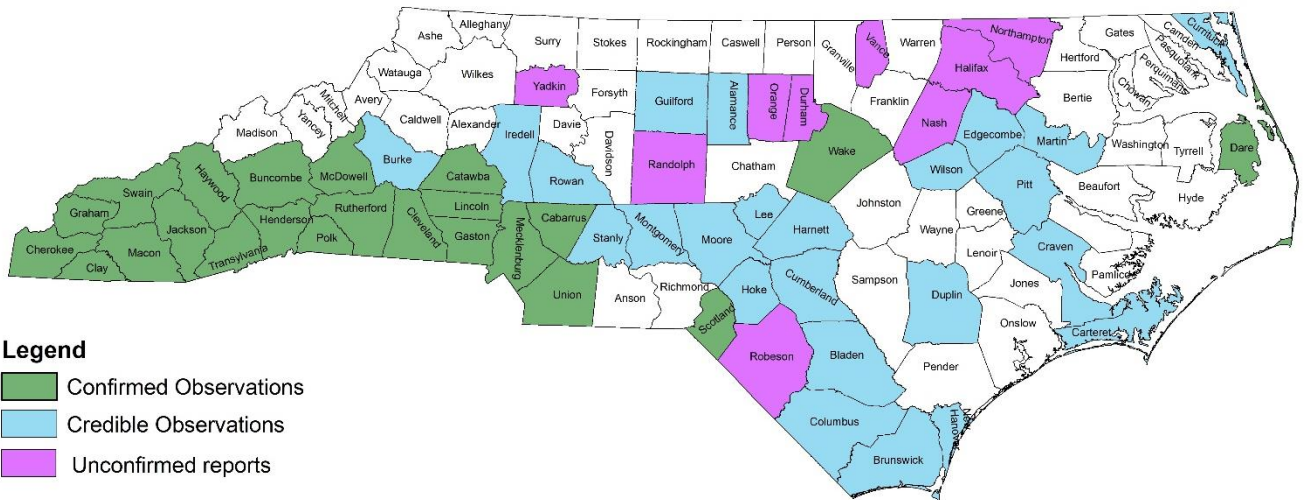
North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2019



- Legend**
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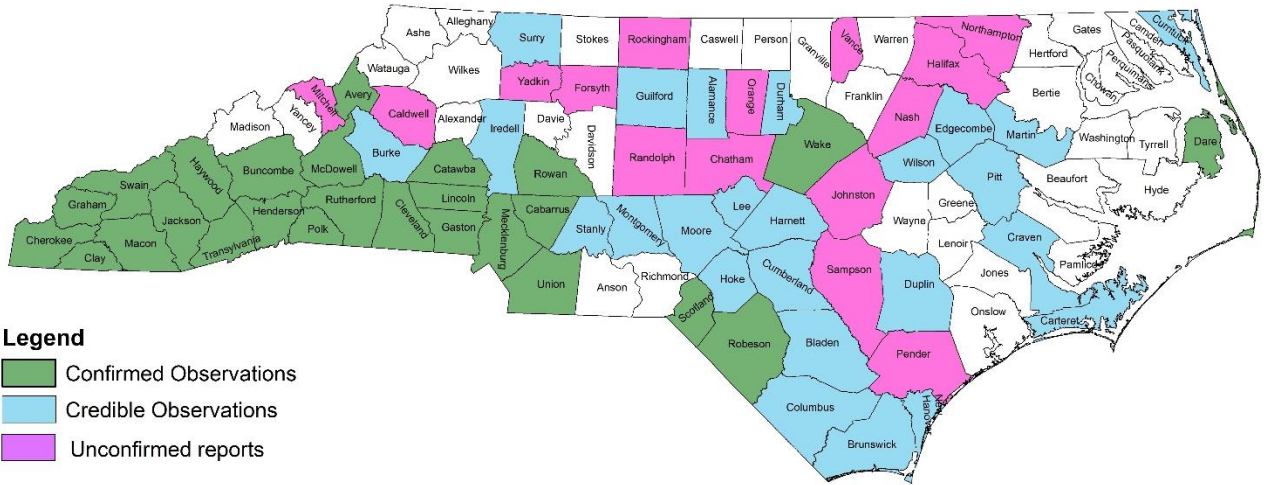
North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2020



- Legend**
- Confirmed Observations
 - Credible Observations
 - Unconfirmed reports



North Carolina Confirmed, Credible, and Unconfirmed Armadillo Observations 2007 through 2021



North Carolina Number of Confirmed, Credible, and Unconfirmed Armadillo Observations by County 2007 through 2021

