The State of our Preserve

Year Seven

A Report on the Trinity Episcopal School Wildlife Preserve
from Bill Earley, LS Faculty
August 2019

Trinity Episcopal School, Austin, Texas

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Trinity Episcopal School Wildlife Preserve

An Introduction to the Trinity Wildlife Preserve

Bill Earley

All photos were taken by Bill on Trinity's campus.

GENERAL LAND DESCRIPTION

Trinity Episcopal School, Austin, Texas was established in 1999. The School immediately purchased an 8.48 acre tract of land at 3901 Bee Cave Road (Original tract) and began construction on its first classroom building. Ninety-nine students, grades kindergarten through third, moved onto this original tract in November of 2000. Subsequent adjacent land purchases include the Nelson tract, the Putnam tract, the Harren tract, the Cornerstone tract, and most recently the tract at 950 Westbank. The total size of Trinity's campus, as of August 2019, is 20.991 acres and the student population is about 550. The Trinity Wildlife Preserve was established in 2012.

Trinity's campus is surrounded on three sides by major thoroughfares: Camp Craft Road (west), Bee Cave Road (north), and Westbank Drive (east). The southern border includes Eanes Creek, formally known as Smith Creek or Dry Creek, which is a spring-fed creek that flows roughly ⅔ of the year, becoming a dry creek during the summer months. The general landscape of Trinity Episcopal School and the surrounding area consists of a series of short hills that are dissected by small canyons created by streams flowing into the Colorado River. The entire preserve is underlain by the Glen Rose Limestone formation, a Cretaceous formation (145 - 65 million years old) that consists of layers of hard limestone that include flint outcrops. The limestone layer typically erodes into stair step topography, and this feature is evident in different parts of the Trinity Wildlife Preserve. Slopes are gentle to moderate except in a few areas which are steep. Karst features formed from the dissolution of soluble limestone have created cave systems that are currently being used by Trinity's middle school students.

The Trinity Preserve is part of the Eanes Creek Watershed and is located on the south side of Lady Bird Lake between Loop 360 and MOPAC. The uppermost portion of the watershed is within the cities of Rollingwood and West Lake Hills. This creek system begins at its confluence with Lady Bird Lake and ends six miles upstream in west Austin. The portion of the watershed below the creek crossing with Camp Craft Road lies over the southern Edwards Aquifer recharge zone.

USE OF THE TRINITY PRESERVE

In keeping with Trinity's Mission and Values, the Preserve is intended to be used by students and teachers primarily as an outdoor learning environment for conducting field studies. Students also experience opportunities to engage in various habitat restoration projects from year to year.

- Trinity's Wildlife Preserve affords opportunities for parents to partner with their children who take part in yearly service projects through the Girl Scouts, Cub Scouts, and Boy Scouts.
- There are many areas in the Preserve where Trinity teachers of any discipline can take a class of students -- for quiet reading, writing, or lecture. The outdoor chapel, built by a Trinity alum as an Eagle Scout project in 2016, is ideal as this type of learning environment.
- A roughly one-mile trail system winds through the Preserve and is dotted by informational kiosks that teach about native flora and fauna. The trails are suitable for walking/jogging and available to the entire Trinity community.

- The trails have a system of trail cameras collecting wildlife footage 24 hours a day. This footage is collected and organized in the classroom and used by fourth grade students to conduct yearly studies on the health of individual wildlife species.
- Vegetables from Trinity's Garden Center are routinely served in our dining hall and this past school year Trinity composted over 3000 pounds of food waste which is used to enrich the soil of the meadows along the southern periphery of our Preserve.

This outdoor work has allowed Trinity students, from kindergarten thru eighth grade, to take part in unique learning experiences. Each year, fourth grade students at Trinity take part in various habitat restoration projects. Such projects include the establishment of pocket meadows, the development of ponds, drainage and erosion work, the construction of nest boxes and dens, establishing brush pile habitats using the cuttings from invasive plants, and maintaining our trail system. The students truly experience an intimate interaction with and connection to nature. Equally important, students experience academic subjects of reading, writing, technology, mathematics, science and social studies in an authentic and integrated manner and in ways that are meaningful and have a purpose.

THE REPORT

After seven years of habitat restoration work on our campus, I can enthusiastically say that the Trinity Preserve has come along nicely! As a result of our work, the wildlife community has become more diverse and wildlife populations have grown more numerous. Research, looking at yearly wildlife populations, indicates our restoration work is really making a difference.

The intent of this document is to provide information about our restoration work and to share research related to our wildlife community. As you will see, this research helps us to better understand the impacts our restoration work has on individual species as well as the community as a whole.

Many thanks to Trinity parents and friends for their continued and faithful generosity in making the dreams of a Trinity Wildlife Preserve come true through their gifts of talent and treasure. Also, my great appreciation to Marie Kidd, Jennifer Morgan, Shanna Weiss, and the Development Dept. staff for their unwavering support of the Preserve.

Bill Earley
August 2019

The State of the Trinity Wildlife Preserve

Text and Photos by Bill Earley

Our preserve has a number of different habitats that run throughout the property. The forest is the largest habitat space on Trinity's campus. This habitat has two different microhabitats: a bottomland creek habitat and an upland juniper-oak woodlands habitat. In our bottomland creek habitat, Eanes Creek travels through our wooded area and runs for about 2/3 of the year before going dry during the summer months. The creek generally dries by early to mid-June and will stay dry until mid-October each year. Any infrequent storms may add some water to the creek but the flow decreases quickly as the limited water is absorbed quickly into the limestone helping to replenish the Edwards Aquifer.

Because Eanes Creek runs dry, we have constructed five different pond sites on campus that keep water year-round in our preserve. These water sources are critical for the success of many species of animals living on Trinity's campus. These ponds not only provide water but also represent a unique aquatic habitat for our Leopard Frogs, crawfish, toads, snakes, fish, dragonflies, and tadpoles. Our leopard frogs couldn't establish themselves in our preserve if it weren't for our ponds. In addition to the mammals that drink from the ponds, these water sources are critical to the bird species on campus as well. Many backyard birds get their water from our ponds. Additionally, there are owls, roadrunners, hawks, and aquatic birds who look for water and food in Trinity's ponds. Some animals that spend most of their time in the forested bottomland creek habitat include armadillos, raccoons, and coyotes. One bird that spends the spring not only hunting in the creek but also nesting and raising its young, is the Yellow-crowned Night Heron.

This bird arrives as early as mid-March and can stick around until early summer before leaving. Currently, we have had a pair of Night Herons coming back to live in the same nest on campus for the past three years.

A few major trees that thrive in the bottomland creek habitat include Sycamore, Black Walnut, Cedar Elm, and American Elm. We are currently working to establish Black Cherry and Red Mulberry trees to this micro-climate as well.

When our habitat work began, the upper juniper-oak woodlands habitat area was consumed by an invasive plant called Chinese Privet. Over the years we have removed large amounts of this invasive plant so native plants could take their place. We have left some parts of our woods with privet as it does a good job of providing cover for wildlife. We manage both the Chinese ligustrum and the privet each year. The privet grows so densely in the understory of the canopy that it suppresses slower growing natives such as native Black Cherry, Carolina Buckthorn, Texas Buckeye, Rusty Blackhaw, Texas Persimmons, Evergreen Sumac, American Beautyberry, Wafer Ashe, Agarita, and Elbow Bush, from growing. Once a few larger spaces were cleared of invasive plants, our native species began an immediate reappearance. It is a good sign to see that, if an area can be cleared, the native species are quick to take up that space once again.

This upper woodland habitat is a favorite space for our grey squirrels, rock squirrels, and rabbits. An assortment of birds live in this habitat space as well. In addition to our residential year-round birds, we have some migratory birds that spend the winter in our forest. Insect foragers such as the Orange-crowned Warbler, Ruby Kinglet,

and Yellow-rumped Warbler spend the winter residing in our preserve before heading north in mid-March. Additionally, flock birds who come to eat berries over the winter include American Robins and Cedar Waxwings.

Unfortunately, berries from the invasive Chinese Ligustrum are particular favorites of the Waxwings. The Waxwings have been spreading this seed across woodland spaces throughout Central Texas for years and this fast growing tree has begun to cause ecological succession along our creeks and drainage areas. The Chinese Ligustrum have large thick leaves that shade the ground areas making it very difficult for our native sun-loving seeds to germinate. As a result, a good number of our unique natives are being squeezed out of their natural habitat. It is very important to keep an eye out in our natural spaces for an influx of invasive plants. It is a good sign, however, that we've seen firsthand how quickly natives come back once the invasive plants have been removed.

As we remove the invasive plants, we are keeping a close eye on the native species that are beginning to take their place. The American Elm is a bit of a rare tree due to the impact of Dutch Elm disease that has decimated these trees over decades throughout the US. We are fortunate to have a small population of these trees in the Trinity Preserve. We have one healthy adult standing about 80 feet in height. We have also discovered another on the banks of the creek that is about ten feet high and has a diameter of about two inches. We have had to cut back some of the Ligustrum trees to allow this tree to receive the sunlight it needs to continue to growing and staying healthy. In addition, we have come across three sapling elms about 1-2 feet high in areas that were once consumed by invasive privet.

Another precious find has been a Black Cherry sapling. We discovered this species growing in our upper woodland area two years ago. This species is significant because of the fruit it bears in mid to late summer. These fruits provide an

abundance of food for wildlife. This tree was only able to germinate because of our invasive plant removal projects. Recently, seeds of both the Black Cherry and the Red Mulberry have been collected and are being dispersed throughout the Preserve in areas close to water or around water run-offs. The Red Mulberry tree can grow 30-50 feet tall and produces an abundance of fruits in early summer.

The Trinity Preserve also has a handful of Texas Walnut trees. We have two large adults and a handful of young adults with trunk diameters of about 5 inches. Over the years, we have cut out the invasive Chinese Ligustrum which had outgrown these trees and prevented them from receiving the sunlight they needed to continue growing well. These trees now have exposure to the sunlight to stay healthy. We have one adult Blackhaw Viburnum tree in our preserve. There are 2-3 young saplings close by to this parent tree and these trees also produce fruits for wildlife consumption.

One last rare tree we have growing in the Trinity Preserve is the Orange Osage tree. Another name to this tree is the "Bois D'arc," which is French for "bow-wood." This wood was the favorite for bows for Native Americans. This tree was also used extensively as hedgerows and livestock pens before the invention of barbed wire. The tree in our preserve is most likely a relic grandchild of earlier settlement days.

In addition to some unique native trees in the Trinity Preserve, we are also seeing more and more native bushes and understory shrubs begin to occupy our woodland spaces now that we have cleared areas of invasive plants. Many of these are berry-producing plants beneficial for wildlife. The Evergreen Sumac, Agarita, Texas Persimmon, and American Beautyberry plants produce edible berries for wildlife. We have a Native Mustang Vine that produces

edible grapes in early to mid summer. The Yaupon, Lindheimer's Silktassel, Mountain Laurel, Texas Redbud, Texas Buckeye, Fragrant Sumac, Brasil Wood, Elbowbush, and Texas Kidneywood are all shrubs that are now found in the Preserve and growing more numerous since our restoration work began. Over the summer, the seeds from the uncommon Northern Spicebush and the Carolina Buckthorn plants have been collected and will be spread in areas that are most suitable for their growth. As we continue to keep invasives at bay, the woodlands will once again become filled with more and more of the native plants that once abundantly occupied these spaces in the past.

There is a special reptile species living in the Trinity Preserve that deserves mentioning. This reptile is called the Texas Alligator Lizard and it lives in the rocky areas of the Preserve. The Trinity Preserve may be the farthest eastern boundary of where this species lives as the habitat for this species occupies the Edwards Plateau subregion. This is another species that once lived in this area in abundance but whose population has been pushed farther west due to urban sprawl and habitat fragmentation. Presently, there may be some isolated pockets of this reptile east of Highway 360 but urbanization has fragmented their natural habitat so much that it is difficult for these reptiles to have the adequate resources to retain healthy populations.

In the Trinity Preserve, there have been 4-5 sightings over the seven years which indicates a relatively small population. The latest sighting was in Winter 2019 when a young adult was found in a puddle. It looked like the lizard had been dug up and captured but the predator must have dropped it. An effort was made to rehabilitate the injured reptile but unfortunately it passed the next day. Trinity second grade students in Mr. Earley's science class preserved this reptile and is now a classroom specimen. Because there is such a small population of these reptiles, we are doing everything we can to provide an ideal habitat to help increase the population. The rocky spaces in the Trinity Preserve are quite exposed and this makes it difficult for the Texas Alligator Lizard to move about easily without being detected by predators. We have begun to cover some of the rocky habitat spaces with brush to give the lizards better cover from predators. We are hoping over time our work provides greater protection for these reptiles so that their numbers can increase.

Texas Alligator Lizard

One native species that has been introduced to the Trinity Preserve is the Leopard Frog. These frogs were brought to campus once we had our ponds established. Because our creek dries up each year, the tadpoles of these frogs wouldn't have enough time to grow from tadpole to adult frog. Over the years, the frogs have used our ponds to lay their eggs. Additionally, we are finding that the frogs prefer living along the creek amongst the brush throughout the year when the water is flowing. These sheltered spaces close to the water decrease their chances of being preyed upon. This past summer, a number of invasive ligustrum were removed from a flat bottomland area near the creek.

In addition to this space being part of a project to reintroduce native hardwood trees to the creek area, the removal of these invasives will allow quite a bit of sunlight to this space once again. This is especially beneficial to the Leopard Frog population. Even though this space had a lot of brush and cover for the frogs, the deep shade from the invasive ligustrum prevented it from being a suitable habitat. Now that those trees have been removed, this space will be an excellent habitat for the frog population providing both dense understory cover and plentiful sunlight.

As it stands, the frog population is slowly increasing in numbers in the Trinity Preserve. This was an especially big year for increasing numbers because of how long the creek stayed running with water. Over the course of the year many tadpoles were washed into the creek from our ponds after heavy rainfalls. It was observed that many of the larger tadpoles that were in the creek had enough time to become frogs because the creeks stayed flowing until the first week in July. We are encouraged that the Leopard Frogs will thrive for years to come. This is especially important because they are a prey species for many animals.

Leopard Frog

In the spring, we see many different migrating warblers and other songbirds who are flying north to their breeding grounds. These birds will stop off in Central Texas wooded areas and green-belts beginning in March each year to live and wait out the remaining winter months. There are a lot of insects in the trees for these birds to eat in early spring. Because of the food surplus, some of the migratory birds will actually nest and raise young before continuing on to their summer habitat around mid/late June. Others just stay for a short time to fatten up before continuing north. Early spring is the best time to go bird watching for these rarely sighted birds on our campus. There are so many different kinds of birds who fly south and come back through our woods in the spring that we continue to observe new species of birds on Trinity's campus each year. This year it was the Hermit Thrush, the Mourning Warbler, and the Great-crested Flycatcher that were identified for the first time on our campus.

Hermit Thrush

Mourning Warbler

Great-crested Flycatcher

Another new type of Trinity Wildlife Preserve habitat space on campus are the meadow habitats, established in the spring of 2015. Most of our meadow spaces are recovered Bermuda grass spaces. We have reclaimed these spaces and added soil, native wildflowers, and grasses to begin the process of creating new meadow habitats. From the first seedings in the fall of 2014, our meadow spaces have been maturing well each year. This school year our meadow spaces span most of the southern boundary of the Preserve. This is a long stretch of open space on the edges of our woodlands that allows for an entirely different community of wildlife to thrive.

This year our meadow spaces were as dense and diverse with both plants and wildlife as they have ever been. Late this summer some of the meadows will be cut back as we will enrich the grounds with composted soil. Additionally, we are in the process of pushing back the invasive Chinese Ligustrum that is always trying to encroach into the meadow spaces. We are working to create a brush barrier between the ligustrum and our meadows to help keep this invasive from pushing into these open spaces.

The meadow spaces are full of life in the spring. A native bee study is conducted annually and we continue to discover new species each year. Presently, 26 different bee species in Trinity's native meadows have been confirmed. Four new species were identified this year. Even though we have a honey bee hive on our campus, our native bee populations are every bit as numerous as our honey bees. Fortunately, the campus has many places for tree and ground-nesting native bees to construct their homes and egg cell sites.

In addition to large populations of different invertebrates in our meadows, we have birds that forage for seeds in our meadow spaces as well. The House Finch and the Lesser Goldfinch are two such birds. Another bird species that frequents our meadows are the hummingbirds. Early in the Preserve's history, only the Ruby Throated Hummingbird was found and they were only attracted to the schoolyard garden plants. As our meadows became established over time, eventually the Black-chinned Hummingbird arrived and took up residence along the fringes of the forest. This bird thrives in open native spaces, nectaring from native plants.

Apidae, Emphorini, Diadasia

Apidae, Eucerini - Martinapis

Megachile Lithurgopsis

Megachile Centuncularis

These meadow spaces are also a boon to our reptile species as well. The thick brush conceals them and they have a seemingly limitless food source. They, in turn, provide a plentiful food source to a host of larger prey animals in the Trinity Preserve.

Each year Mr. Earley and his fourth grade students discuss the needs all wildlife must have in order to thrive. Food, water, homes, and shelter are the needs for all wildlife. We have addressed the resource of water as an essential need. In addition to Eanes Creek, we have five different pond locations throughout the preserve that provide both water to wildlife and serve as established aquatic habitats. Wildlife never need worry about a lack of water on Trinity's campus.

Mr. Earley has spent the past four years addressing food resources, the second essential need for all wildlife. Both Eanes Creek and our man-made ponds have food sources that attract wildlife. Trinity's meadows either directly or indirectly provide food for invertebrates as well as reptiles, birds, and mammals. The vegetation throughout the preserve's woodlands also provide food for many animals either directly or indirectly.

Shelter is another essential need for wildlife. Our brush piles are a significant addition to the restoration of the Preserve. Large piles of brush slowly break down over time. This allows the wood material to eventually decompose back into soil. It is in this area, where wood meets the soil, that organisms live and make their homes - underneath the piles. These become hot-spot food sources for wildlife. It was observed over the summer, when one of these brush piles was

removed, that there were thousands of crickets living at the bottom of the pile. These crickets are an important food source for many of the Preserve's wildlife. Additionally, these brush piles become a safe hideout for larger prey animals and, in some cases, they become homes to wildlife who den underneath. Our armadillos, skunk, and rabbits are mammals who have constructed dens under our brush piles.

In addition to the brush piles, we have tried to help our wildlife community have the best home conditions to thrive in the Preserve. It was decided that the preserve needed more safe home spaces for wildlife. Over the years we had constructed or purchased nest boxes that mounted onto trees for birds and mammals. This past year Trinity's fourth grade students focused on constructing burrows. During the course of this past school year, five burrow homes were constructed for wildlife. Upon construction of each burrow, a brush layer was added to help conceal and cover the openings to the burrows.

Additionally, we found areas in the rocky hillsides that looked to have burrows already established and we covered these areas with privet brush to better protect entrances to burrows. The hope is that these burrow spaces are better protected at the openings and that allows greater safety when wildlife are entering and exiting. It is important that the burrows are covered with brush to allow young animals to emerge from the den under cover and not be as exposed to predation. Our trail-camera footage allows students to observe when burrows become occupied as well as how well they are fortified against predators. Since the new burrows have been constructed students are observing that they are quickly be occupied by different wildlife species. This evidence has helped confirm the importance and necessity for new home sites.

Chimney Swift Tower
Est. 2018

One other new feature that has been added to our campus in the parking lot on the north side of campus is the Chimney Swift tower. The Chimney Swift migrates to the Amazon in South America each year. As they come back in early May, these birds begin looking for suitable homes. Last year, our tower was occupied within two weeks of being constructed. This year we have already confirmed birds once again flying into the tower. These birds are an important species to Trinity's campus. Chimney Swifts forage on the wing and consume flying ants, flying termites, and mosquitos. Because of their appetite for "pest" insects, it is a benefit to have a home on campus to keep them close by and eating the nuisance bugs. We are hoping these birds construct a nest in the tower this year and raise young swifts.

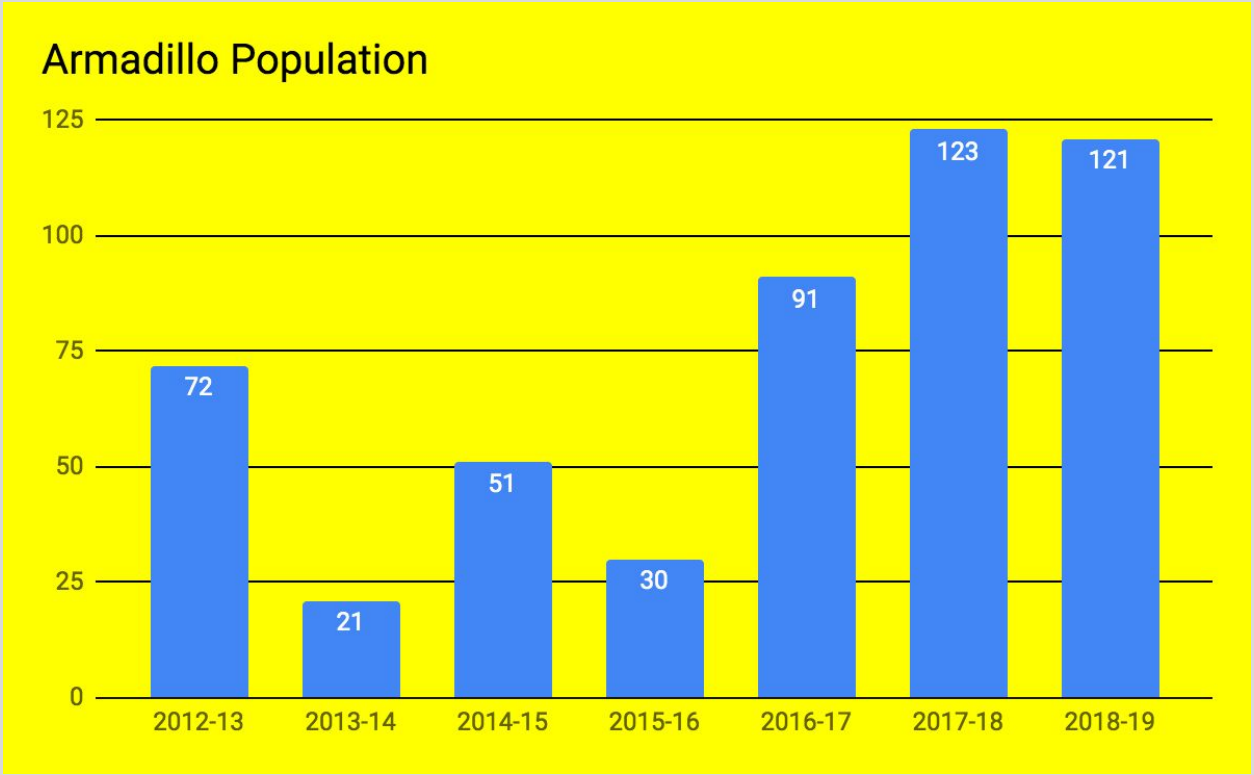
Another busy area for bird wildlife is Trinity's Garden Center. During the spring, an assortment of birds use our school garden as a food source. The Eastern Phoebe, Great-crested Flycatcher, Blue Jays, Cardinals, Northern Robins, and Mockingbirds can all be seen regularly foraging in the compost pile and catching flying insects above the garden beds. The compost piles have a wide assortment of organisms living in them and always provides a source of food for our bird populations.

Over the past seven years, the Trinity Wildlife Preserve has provided habitat for a wide range of wildlife. Our goal is to create a healthy and diverse wildlife community that thrives in these natural spaces while, at the same time, providing students with rich educational opportunites for conducting scientific studies as well as engaging students in various habitat restoration projects. If we can provide water, food, shelter, and suitable homes in their natural setting, wildlife should be able to thrive without being a pest in our school yard. Trinity data suggests we are developing a healthy and diverse wildlife community where wildlife are not found to be a nuisance on our campus. Their habitat provides the necessary requirements for them to be healthy and keep mostly to their wildlife settings.

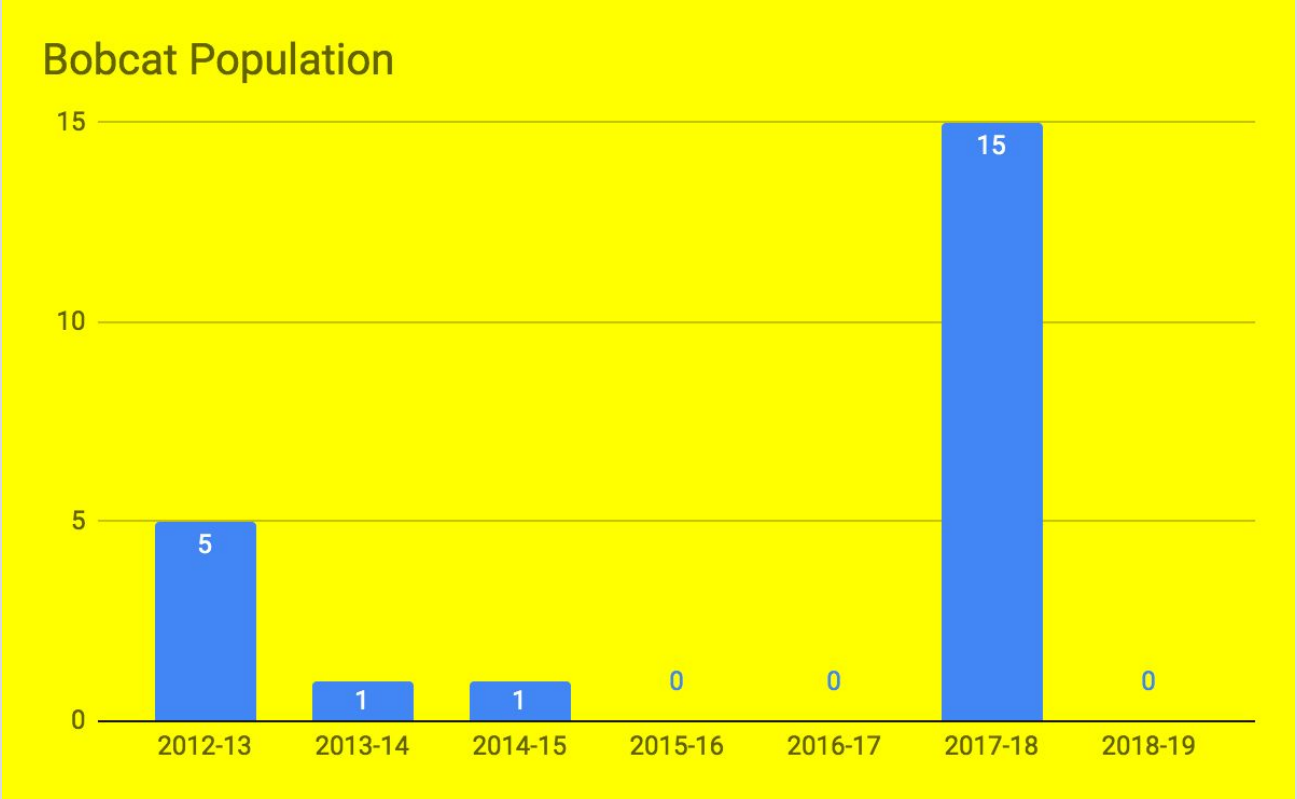
2018 -19 Species Population Totals and Species Summaries

The following pages show the population totals for most of the mammal species that reside in the Trinity Preserve. The graphs illustrate how the populations have changed from year to year and serve an indicators of the general health for each species living on Trinity's campus. Our fourth grade students analyze this data annually to determine the general overall health of the species living in the preserve. From this data, fourth graders can determine wildlife that are in decline, identify the issues at play, and find ways to improve the habitat and solve problems for distressed species.

Trinity's armadillo population has been steadily rising over the past three years. We presently have two grown adults. Because of their size, they do not have to fear predation like immature armadillos do. The width and thickness of a grown adult, with its armor, are often too much for a coyote to penetrate. Our current population is nearly double what it was when we began making observations in 2012. Last year was the first year to witness young armadillos. We initially observed three in April, 2018. After a few weeks, two were still being observed rummaging through the leaves in the preserve. Our final sightings of the young armadillos was in late May. We have not had any video evidence that the young have survived or stayed in the preserve through the summer months. There were no young this year.

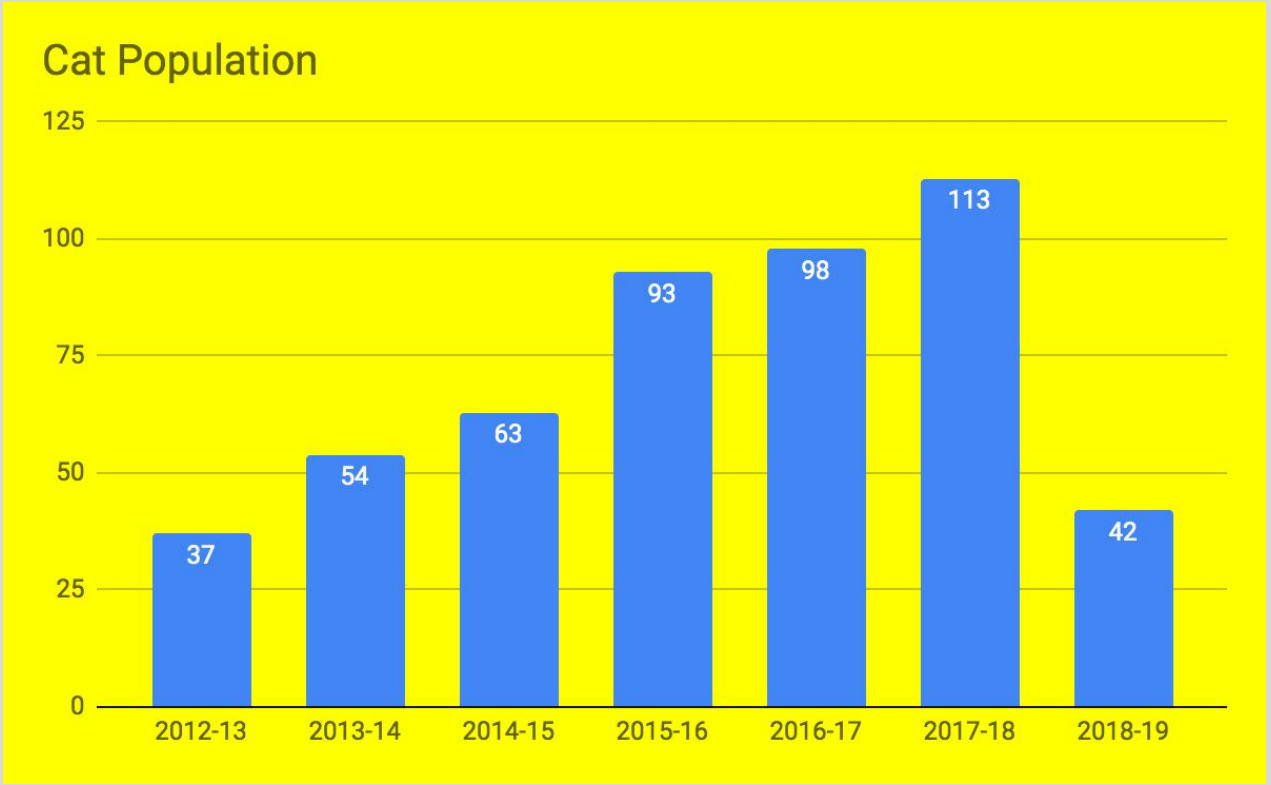


This year there were no observations of bobcats moving through the Trinity Preserve. Based on the sighting patterns of the past seven years, we have concluded that our relatively few sightings in any given year are most likely young bobcats who have moved from the Barton Creek greenbelt or the Wild Basin greenbelt. These cats follow the creeks in search of new habitats. Young bobcat are eventually pushed from the territory where they were born and raised by their mothers after a period of time. Due to the small size of the Trinity Preserve, our habitat space would not be suitable for a bobcat. These cats need much more space and territory than our preserve can provide. It is most likely that we will continue to have a few sightings here and there over the years. The preserve has plenty of water and food for bobcats to possibly spend a month or two but eventually any cats who move through our preserve will have to move on to look for a more suitable habitat. Last year we did have a bobcat spend a couple of winter months hunting in the Trinity Preserve before moving on. This would be the best we could hope for in any given year.

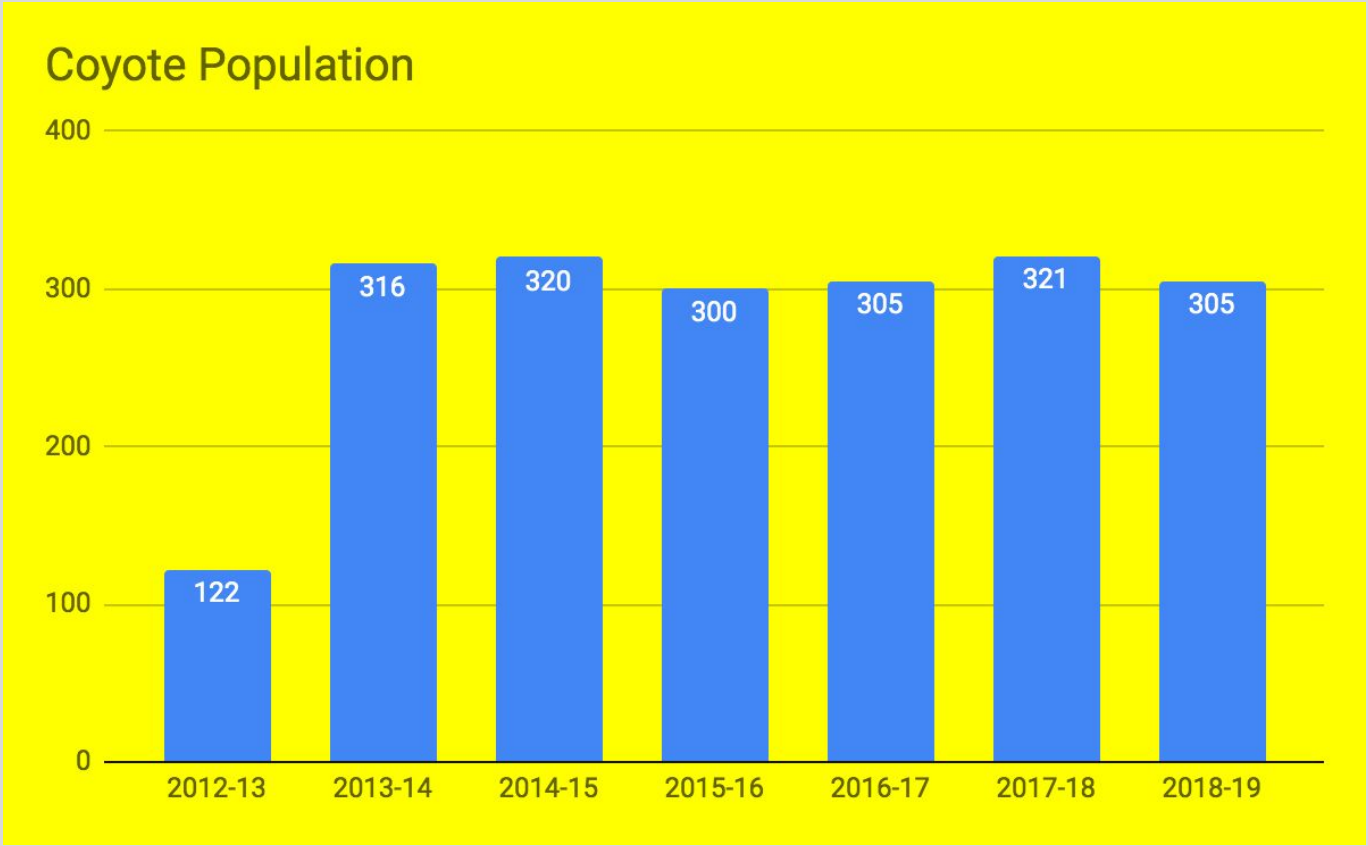


The sightings of feral cats in the Trinity Preserve has taken a steep decline from past years. Throughout the first six years of observations, the feral cat population had been steadily rising year-to-year. Sightings peaked at 113 during the 17-18 school year. This year, feral cat sightings have been reduced by more than 60% from the previous year. Fortunately, this is the one species where a decline in sightings is a welcome sight.

Cats are extremely proficient hunters. Their presence can decimate native species like lizards, snakes, and birds. The decline is most likely due to a combination of competition from predators, like foxes and coyotes, and a loss of a safe shelter space. In the past, it was known that the cats would use the school's drainage systems to move about and hide. It is possible that the tunnel spaces have been used more and more by raccoons and other larger wildlife making these underground tunnels less suitable for the feral cats. Additionally, we have foxes that have been residing closer to our buildings and as they prepare their dens for young kits in the spring, they may have been more aggressive towards the cats, moving them away from these safe shelter spaces that are close to the fox den.



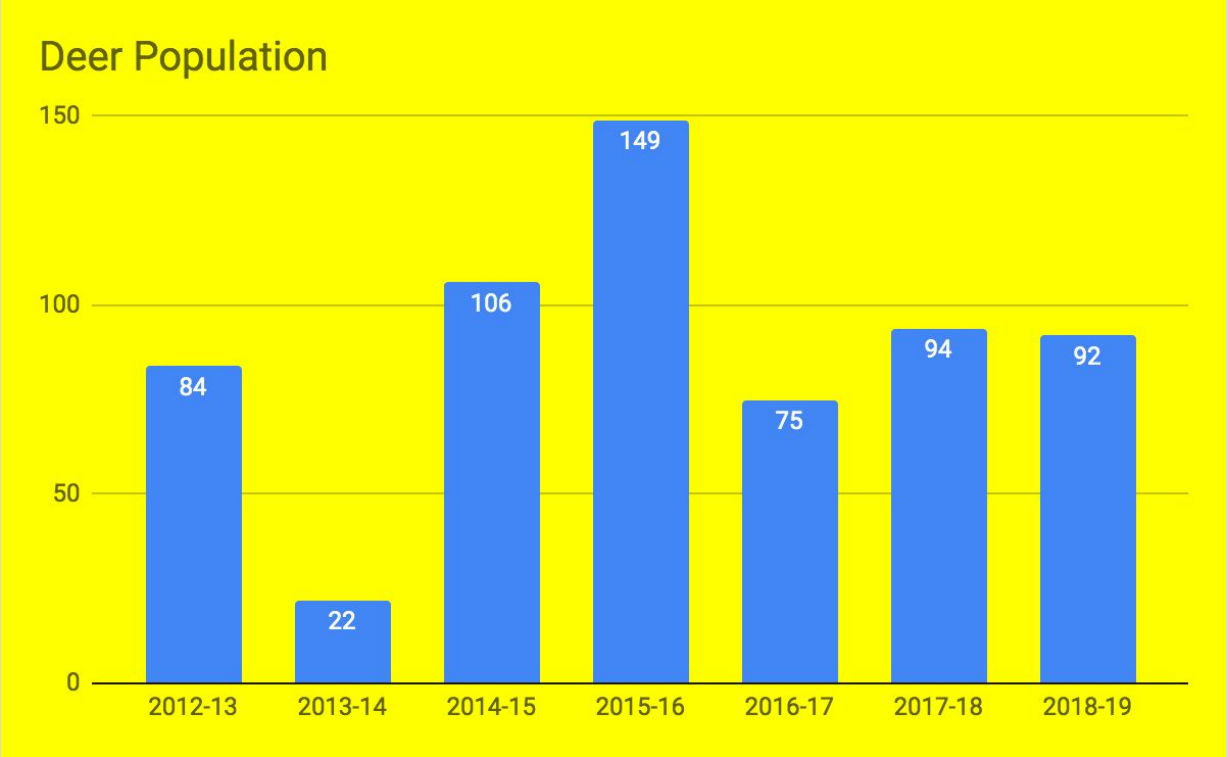
Coyote sightings in the Trinity Wildlife Preserve have been extremely consistent over the past six years. Aside from a first-year total of 122 sightings, our coyote sightings have hovered around the 300 count each of the last six years and the range of sightings only differs by 21 sightings in each of the past six years. These findings suggest that coyotes have made the preserve a regular stop in their movements over the course of any given year. The year-round water source and the abundance of food and prey make the Trinity Preserve a suitable habitat for the coyote to use on almost on a daily basis.



Deer sightings have fluctuated from year to year. We ended 18-19 just a bit above the first-year sightings. One reason for the fluctuations could be due to changes in their surrounding habitat space over the years. Deer need open space in their habitat in order to keep a watchful eye on coyotes.

The year-two plummet was likely due to their loss of habitat when Trinity's Spirit Field was being constructed. The population increased again once the field was finished but the Bee Cave Road project had begun in 2016 and the machinery, night time construction, and altered terrain most likely restricted the movement of deer from the north side of Bee Cave. Our data shows some consistency over the past two years at just above 90 sightings.

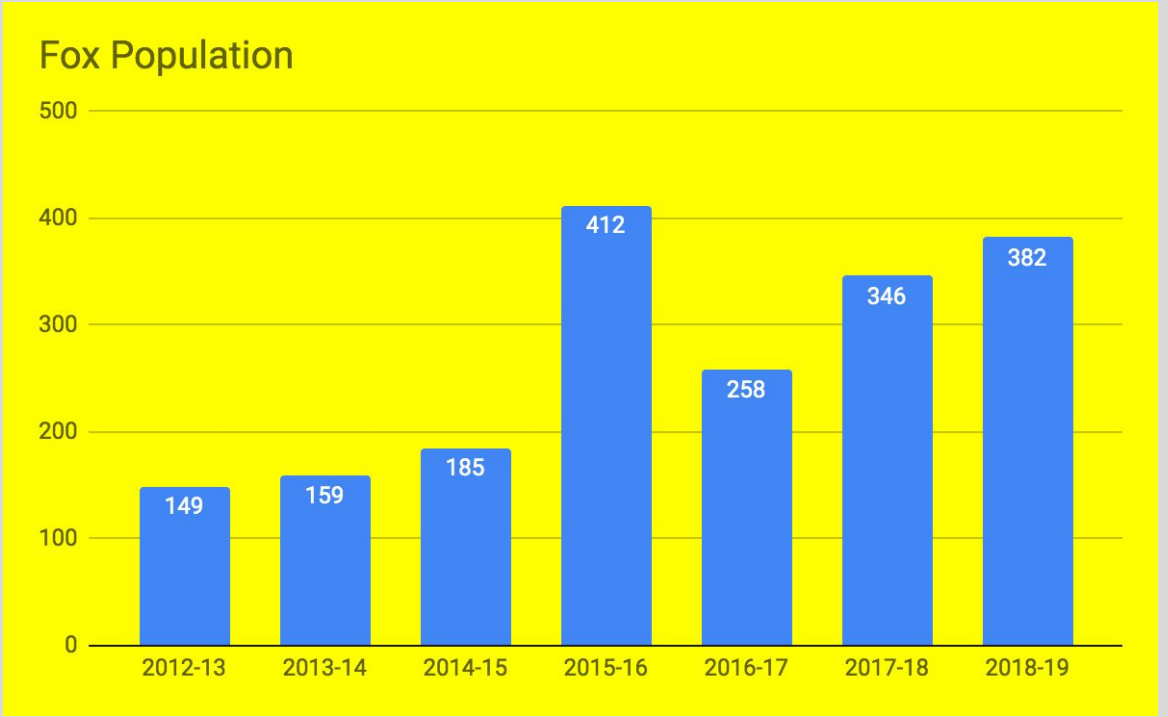
It will be interesting to see what happens next year. The Trinity Preserve is not ideal for deer, as much of the open areas on campus have fences that restrict movement. Our preserve space behind the buildings is suitable but is a bit too confining and dense for the deer to feel comfortable with coyotes so close by all the time. The layout of the Preserve simply does not provide deer with the kind of open habitat space they need to feel safe from predators. Our data suggests a normal range of deer presence to be between 75-95 sightings per year.



The fox population has continued its trend upwards in the Preserve over the past seven years. Trinity's Preserve can sustain only one family of foxes. The male and female foxes are territorial and the fox pair we have on campus will not tolerate another fox family. The two years with the greatest sightings occurred when year-old kits were still living in the Preserve with their parents. The additional foxes increased the sightings on our campus. In 2017-18 there was an "intruder" fox that moved in and was observed moving throughout the Preserve most of the year. It was a large fox that was missing a tail. This fox could potentially have been a threat to the residing male because of his size. By the summer months however, this fox had moved on and was not observed on our campus again.

Over the course of this past school year, the two year-old foxes were often seen with their parents during this past school year. In the spring of 2019 however, there is video footage of the mother starting to show signs of pushback once she had her new litter in April. By the middle of the summer, both year old kits had finally moved on from the Trinity Preserve to find their own territories.

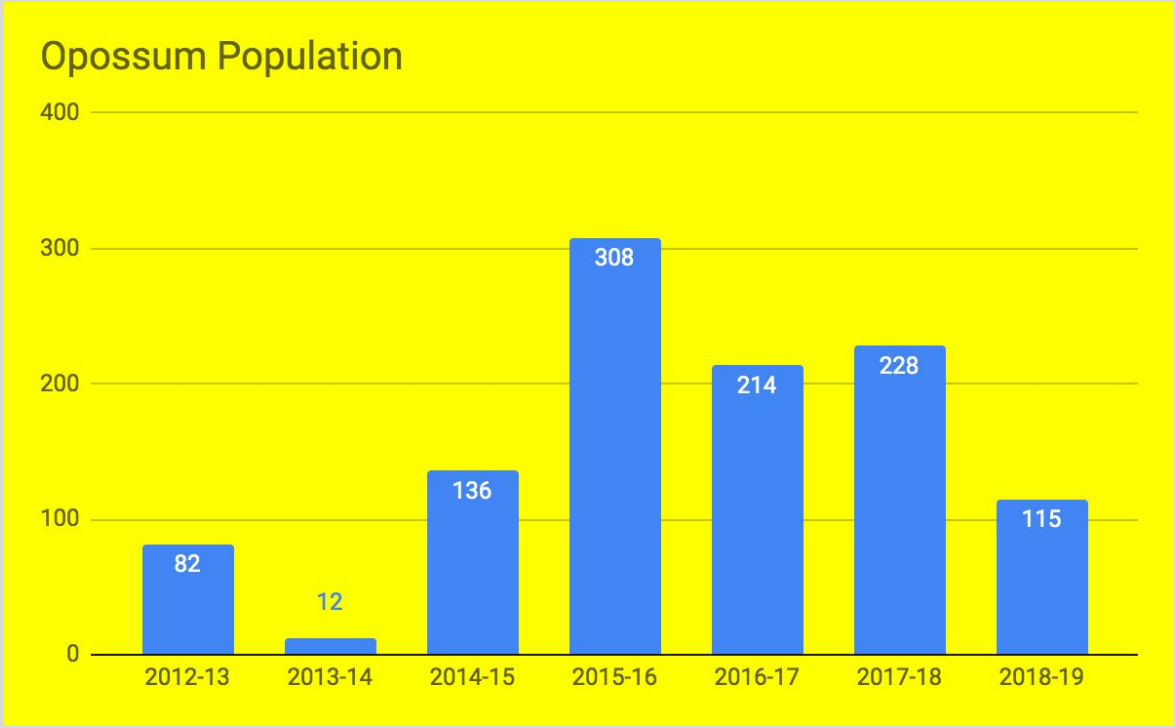
This year, in the spring of 2019, our resident female fox had 4 kits. As it stands now, it appears that none of this year's litter has survived past August. The last survivor was hit by a vehicle crossing Camp Craft Road on August 23rd.



Like other prey species in the Preserve this year, the opossum population had a steep decline. During year two, there was a similar decline when large areas of privet brush were removed. The removal of invasive brush reduced the density of vegetation in the forest which allowed the coyotes to move through more easily without being detected. The result was a steep decline in many of our prey species.

The populations of prey species all made a rebound in year three. The opossum species began its population increase following year two and continued for four years after that. This year the opossum population was cut nearly in half. This steep decline can most likely be attributed to a new threat discovered hunting in Trinity's preserve this year.

In early May we observed a Great Horned Owl perched on the Spirit Field football goal posts. That was the first time this species has been documented on Trinity's campus. Because opossums move out of the woods at night to forage, they are susceptible to attack from this apex predator. Moving forward, this new predator will most likely be a significant factor in keeping some of our larger populated mammal species' numbers at lower levels than we have seen in the past. Prey species such as opossum, skunks, and rabbits, as well as young fox kits are at greatest risk. We discovered a very young opossum moving about the Preserve in late May and will be keeping an eye out to see how it fares as we move through the summer months.



Our rabbit population has fared similarly to our opossum and rock squirrel populations over the years. Like the other prey species, the rabbits had a steep year-two decline in observations before rebounding in year three. It is hard to determine accurately how many adult rabbits we have in the Preserve but it would seem likely that there are two adults and a possible year-old.

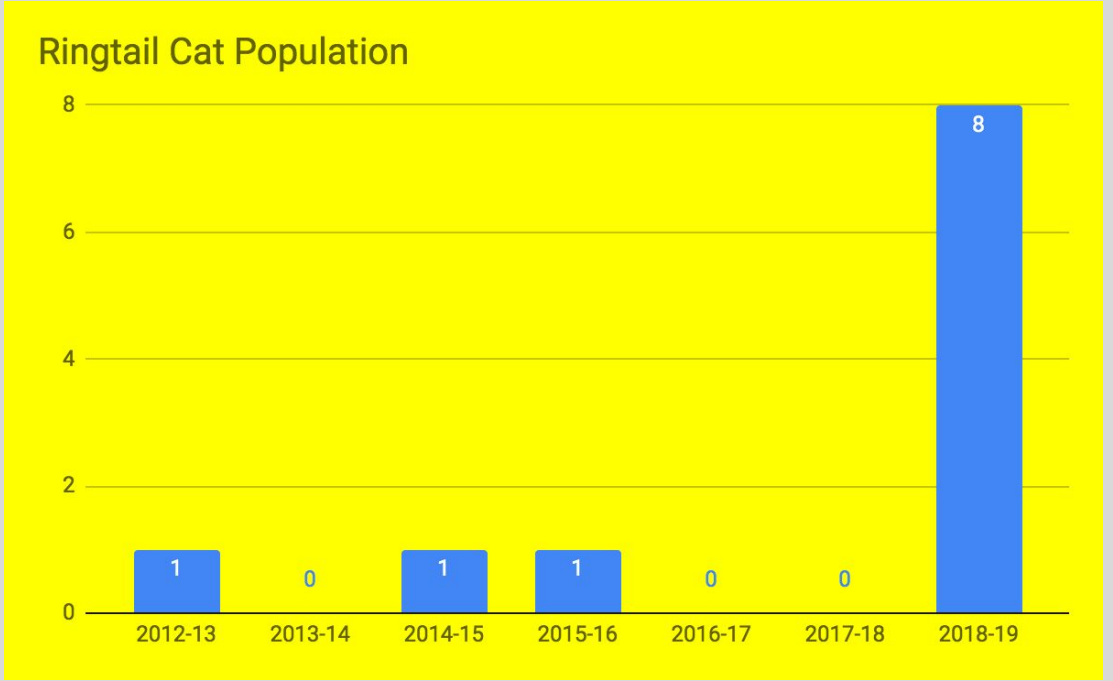
The rabbit population has declined from a 2016-17 high of 211 sightings. The past two years we have observed young rabbits but they often disappear in the following months. Last year was the first year where it seemed we might have had one of these youngsters reach adulthood. This year we lost the regular sighting of one of our elder rabbits who has had a den in the upper woodland brush piles. Fortunately, towards the end of the year, we picked up sightings of this rabbit from a camera station. It seems it may have just altered its route for a period of time. We have not observed any young rabbits this year.

The decrease in sightings also could be the loss of one of the rabbits we observe closer to Spirit Field. Because rabbits move into open areas to feed, they too are susceptible to predation from the Great Horned Owl. It is possible twe lost one of our rabbits during the course of the year. Because the numbers of rabbits are so few, this is one species I worry about long-term. In addition to added brush piles, we constructed some sturdy dens throughout the Preserve this year which might help increase any young rabbit's chances of survival.

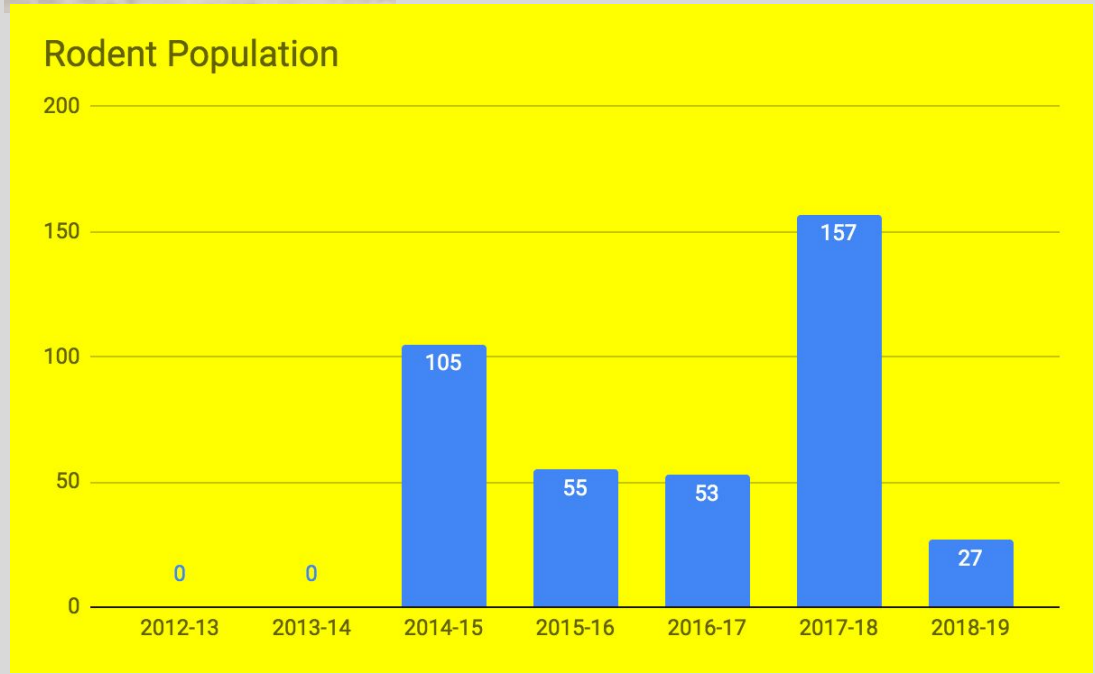
Prior to this year, Ringtail Cat sightings were few and far between. In total, three Ringtails were observed over the past six years. This year was a different. In all, we had eight sightings in the Trinity Preserve. More interestingly, all eight sightings were observed over the last six months. This might be an indication that we have a single Ringtail living in the preserve. During the 2015-16 school year we constructed a Ringtail box and mounted it on a tree in our preserve hoping that it would attract a ringtail. Over the course of this year, we have also constructed burrows and protected those spaces with brush coverings in our boulder areas for either Ringtail or rock squirrels to reside in. Ringtail are expert hunters of rodents. Additionally, we have ample supply of reptilian and amphibian food sources to sustain a Ringtail family.

The challenges for the Ringtail include competition with other predators such as coyotes, large rat snakes, owls, and foxes for the same food sources. In addition to food competition, predation is also a concern for the Ringtail. Fortunately the Ringtail they do not move into open areas as much so they are less likely to be caught by a Great Horned Owl. The decline in feral cats also helps make it more likely for Ringtail to establish themselves in the Preserve.

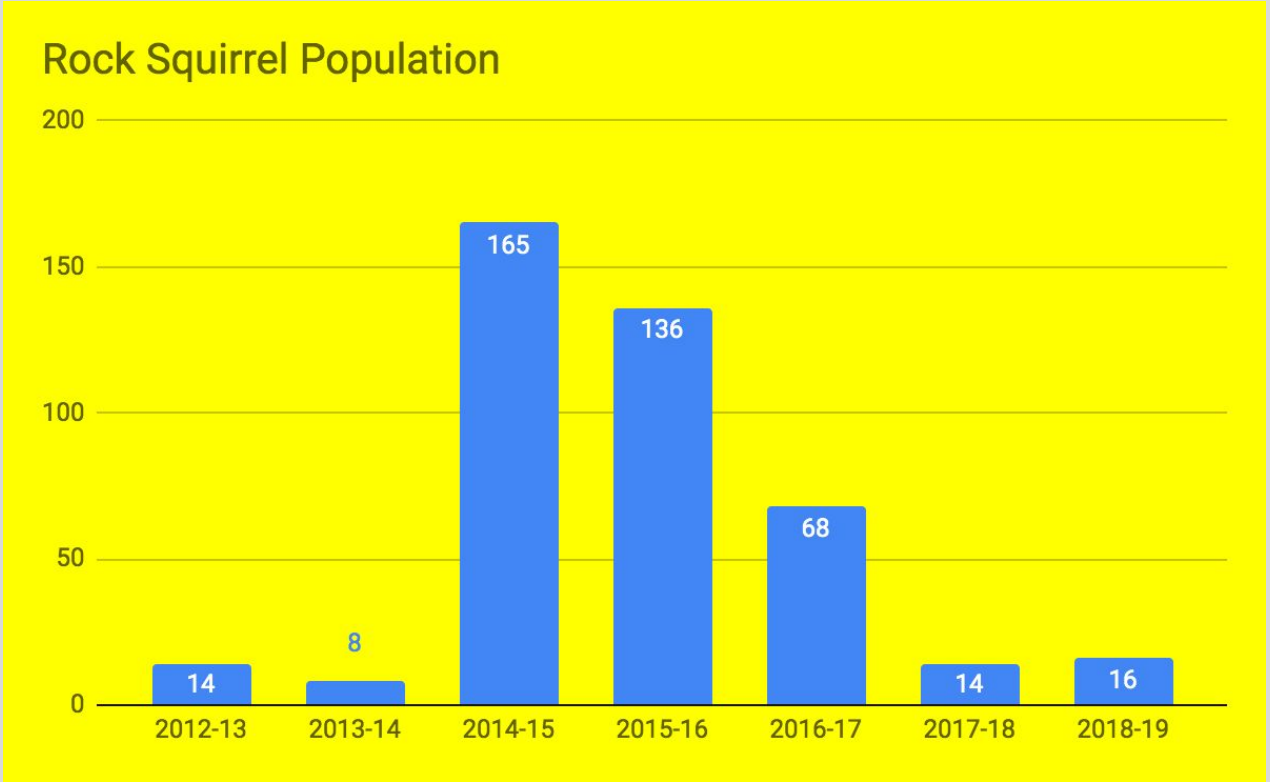
Finally, a safe and suitable home is critical for this species. Ringtail need a habitat where their homes are protected enough for their young to grow and move about without being preyed upon easily. Only time will tell if our nest box and burrow work. Hopefully we find that Trinity's Preserve can safely support a Ringtail family.



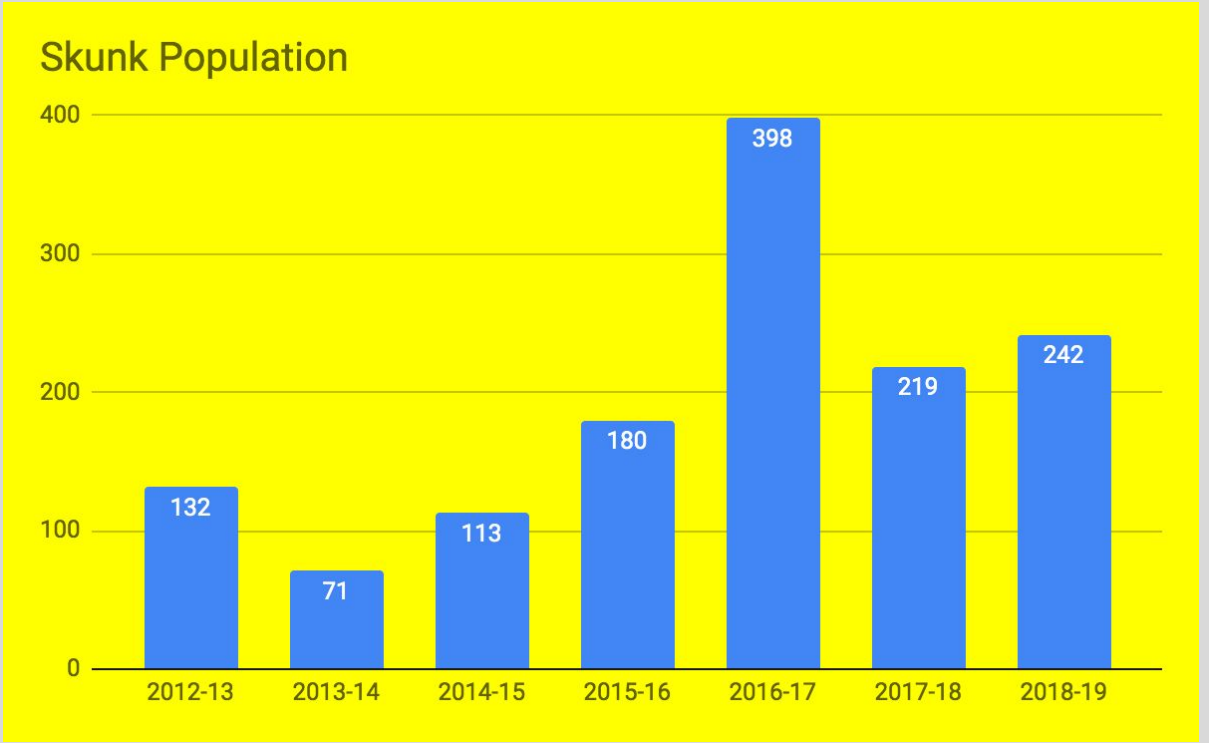
The pattern of population decreases of our prey species continues for our rodent population as well. Last year we had our greatest numbers of rodents at 157 sightings. This year those numbers plummeted to 27. There were long periods during the year when we did not have any sightings. During the winter months, one of the recently-constructed burrows quickly became a favorite for this rodent species. In no time at all, we had night sightings of rodents entering and exiting this new home. Since those sightings, a large amount of cut privet was piled on top of the burrows to help protect the home further. It is important for our rodent population to have a safe burrow. This is a key prey species for many predators and having a safe home space to live and raise their young will help keep this species surviving and maintaining a healthy population in our preserve. We look forward to an increase in sightings moving forward now that they have found a good den. Additionally, our expanding brush piles will always provide sufficient cover for these small mammals if their den is ever compromised. Our work has helped to create a healthy habitat for these small mammals. One rodent species we have not seen in many years is the Cotton Hispid Rat, a native mammal that was common to Central Hill Country in the past. The loss of habitat east of Highway 360 over the years has probably rendered this group of rodents to small isolated pockets within the wooded and grassy areas in the creek belt that flows towards Lake Austin from Highway 360. It has been some years since our last observation and hopefully we've established our meadows in time for a small population to grow and thrive on campus. There have been no signs of this mammal for four years.



Our Rock Squirrel population started small but made a significant jump during our third year. From there, the population has declined considerably. We had a family group in the rocks on the far southern end of our preserve nearest our canyon ponds beginning in the 2014-15 school year. This group probably had a hard time raising its young with homes areas that were inadequately protected. As a result, predation, especially of the young, made it hard to sustain a family population. Over the past two years we have gone long stretches without seeing any Rock Squirrels. Each year it seems as though a squirrel or two may move in but they are not successful raising their litter. This year an observation was made of a fox attacking a full grown rock squirrel. This indicates a real challenge for a successful den and family. Over the course of the year, we constructed numerous rock dens throughout our campus. We also covered the den areas with cut privet brush. The idea is that this bit of thicket covering of the dens will allow the adults and any young to exit their dens with greater cover around them. The brush prevents a predator from digging into the den or waiting just out of view from the exit hole. Our data has shown a steep decline and we have addressed the problem and come up with solutions. We will wait until next year to see if we have solved this problem of decline.



Our skunk population has been trending upwards since their year-two drop in numbers. Aside from year two when the Trinity Preserve began its transformation of invasive privet removal and prey species' numbers all posted declines as a result of this habitat change, our skunk population has continued to grow over the years. During the 2016-17 school year, there was an exceptionally high population burst. We believed there were at least two females living in our preserve along with a male who had staked our preserve habitat as his own territory. During mating season in January – March, male skunks will travel good distances in search of mates and, as a result, we probably had many male skunks in the Preserve looking to breed during the winter of that boom year. Fortunately, their numbers came down considerably the following year. It was during that 2015-16 that we realized the Preserve was missing the skunk's main predator, the Great Horned Owl. This apex predator is not affected by the skunk's spray. Because the skunk often moves out into open spaces at night, it is more susceptible to being preyed upon by this large predator. This past May we observed our first sighting of a Great Horned Owl hunting on our campus. It is believed this may be the first year the Great Horned Owl has found Trinity's Preserve as a suitable habitat to hunt. This year we had a decline in numbers for three different species who move into open spaces at night, leading us to believe this may be the result of predation by owl.



Total Wildlife Counts Through The Years

12/13	13/14	14/15	15/16	16/17	17/18	18/19
749	677	1376	1770	1668	1782	1473

The overall wildlife community population in the Trinity Preserve fell considerably from the prior three years. However, the total of 1473 is still higher than the seven year average by just more than 100 sightings.

One favorable outcome with the wildlife community this year is that the feral cats have been pushed out of campus almost altogether. We have observed the two cats that were often seen in the spring last year in the Preserve this year, just not nearly as often. There were only 5 sightings over the past four months. Last year, we had 83 sightings over those same months. Another observation is that the wildlife are now at risk from Great Horned Owl predation. This was the first year the owl has been observed hunting on campus.

Our skunks continue to thrive on our campus though they now have a predator threat they hadn't had in the past. Not only are the young susceptible to owl predation, the adults can be taken by a great horned owl as well. This apex predator should help keep our skunk numbers from increasing to unhealthy levels.

Total Numbers of Species

	12/13	13/14	14/15	15/16	16/17	17/18	18/19
Armadillo	72	21	51	30	91	123	121
Bobcat	5	1	1	0	0	15	0
Cat	37	54	63	93	90	113	42
Coyote	122	316	320	300	305	321	305
Deer	84	22	106	149	75	94	92
Fox	149	159	185	412	258	346	382
Opossum	82	12	136	308	214	228	115
Rabbit	43	6	126	101	211	152	124
Ringtail	1	0	1	1	0	0	8
Rock Squirrel	14	8	165	136	68	14	16
Skunk	132	71	113	180	398	219	242
Rodent	0	0	105	55	53	157	27

As a Percentage of the Wildlife Community

	12/13	13/14	14/15	15/16	16/17	17/18	18/19
Armadillo	9%	3%	4%	2%	5%	7%	8%
Bobcat	1%	0%	0%	0%	0%	1%	0%
Cat	5%	8%	5%	5%	3%	6%	3%
Coyote	16%	47%	23%	17%	17%	18%	21%
Deer	11%	3%	8%	8%	4%	5%	6%
Fox	20%	23%	13%	23%	15%	19%	26%
Opossum	11%	2%	10%	18%	12%	13%	8%
Rabbit	6%	1%	9%	6%	12%	9%	8%
Ringtail	0%	0%	0%	0%	0%	0%	.01%
Rock Squirrel	2%	1%	8%	3%	4%	1%	.01%
Skunk	18%	11%	8%	8%	23%	12%	16%
Rodent	0%	0%	8%	10%	3%	9%	.02%

One interesting data piece we look at with our collective sightings by species, is the predator-to-prey percentages in Trinity's Preserve. Ideally, we would want to see a ⅔ majority for our prey species to predator species. This would indicate that prey species numbers aren't in excess and would also show prey species to have a stable and sustainable population as an important food source for the predators. Presently our rodent, Rock Squirrel, rabbit, and opossum sightings are down as a percentage of the overall wildlife community. To address the decline in prey species this year we constructed durable rock burrows that favor these species and used brush to cover and protect those spaces. Our brush piles are an important contribution to the Preserve as they provide shelter and homes for our more vulnerable prey species. We are hoping to see a bounce back next school year for these species.

Over the years, the percentages of predator-to-prey have generally been in a healthy balance. Years one, three, five, and six have been in the 60 percentile range for our prey species, which would be a good balance. Year two the prey species were far below the predator species and were 30% below minimum expectations. Fortunately the prey species rebounded nicely the following year. This year is the second time the levels have dropped for the prey species to a concerning level. The predator/prey percentiles are nearly split. We have 47% predator species to 53% prey. This has pushed us to address cover and homes to help provide prey species to live and raise their young.

Predator/Prey Relationships in Trinity's Preserve

Grey Squirrel populations are kept in check by foxes, hawks, and snakes

Rodent populations are kept in check by foxes, snakes, ringtail, and owls

Rock Squirrel populations are kept in check by foxes, snakes, and hawks

Skunk populations are kept in check by Great Horned Owl

Deer populations are kept in check by coyotes

Rabbit populations are kept in check by coyotes, foxes, snakes, and hawks

Raccoon populations are kept in check by coyotes

Fox population are kept in check by coyotes

Snake populations are kept in check by coyotes, raccoons, foxes, skunks, and hawks

Lizard populations are kept in check by foxes, hawks, snakes, skunks, and roadrunners

Mosquito populations are kept in check by fish, dragonfly larva, frogs, dragonflies, and birds,

The State of the Trinity Wildlife Preserve
Summer 2019 Updates

This summer has been the wettest summer through June in the past seven years. As a result, our creek did not dry up until the first week of July. With the creek running longer than normal, this gave the many Leopard Frog tadpoles in the creek enough time to become frogs. During the first half of the summer, the creek system was full of frogs! This year, Trinity's Preserve had more frogs than any point over the past seven years. A thriving frog population is very beneficial to our preserve. Frogs are a food source for a number of predator species in our preserve. Snakes, skunks, raccoons, foxes, coyotes, owls, hawks, opossum, and Ringtail Cats will eat frogs.

This past spring and into the summer we continued to observe at least one Ringtail in the Preserve. We have finally attracted this species to our campus preserve! We only had 3 sightings in the first six years. This past school year we started seeing sightings towards the spring and ended with a total of 8 sightings. In June and July, we had 7 sightings. If we continue to observe this mammal, it is most certainly the easy access to water, the food availability, and a safe home den that will help keep them around long-term. These stealthy nocturnal hunters will prey on frogs and rodents and our trail camera videos reveal that they will also eat invertebrates species. The final piece helping the Ringtail successfully establish themselves was to provide good homes for them. In 2016-17 we constructed a wooden nest box specifically designed for Ringtails. Additionally, we created a number of rock dens that could have provided suitable living spaces. Trail camera videos show a Ringtail having entered one of our dens on a couple of occasions. Towards the end of the summer, a new spherical dome was constructed and mounted in the fork of a tree to further provide suitable homes for Ringtail Cats. There has been a trail camera placed to observe this new tree den to see if it

In addition to attracting Ringtails, we constructed a number of rock dens to also attract Rock Squirrels. Trail camera videos show the Rock Squirrel investigating three different rock-den sites and using one exclusively as a home site. This species had decline drastically over the past school year to just 16 sightings over a 12 month period. With the construction of a number of new den sites during the school year and over the summer, our June and July sightings totaled 25. These past two months have had more sightings than the past 12 months combined. This is a solid indication that the addition of safe dens sites have made a real difference for this species.

By July, our final year-old fox that was hanging around the Spirit Field area had finally left our preserve. Additionally, of the four documented fox kits this year, we were down to one in mid-July and we did not observe the kit the final two weeks in July. We will keep a close watch to see if we observe the kit moving forward.

A new woodpecker nest box was put up early in the summer. On July 25th, two woodpeckers were simultaneously observed in close proximity to the box. One other discovery observed on this date was from the preformed pond shell with an irreparable leak. The shell was inverted and used to create another den home space for wildlife and has attracted a small opossum this summer.

Other projects in the Preserve that were completed this summer included a new Leopard Frog habitat prepped as a restoration project for the coming year, an Eagle Scout erosion project along the creek was completed at the beginning of the summer by Trinity alum Harrison English, invasive ligustrum and privet removal in the woodland habitat located near Camp Craft, rebuilding and reinforcing a retaining wall for our canyon pond, the addition of two new pond liners to replace damaged liners, removing two yellow jacket hives along our trails to ensure safe passage for those using our trails, and general trail maintenance.

Some interesting wildlife observations included zero observations of feral cats through June and most of July. We did have three observations of the same two cats from last year during the last week of July. These sightings probably coincided with our fox family moving away from their den near the “paradise parking lot” behind Unity Hall. Ideally, we don’t want feral cats on our campus as they are destructive to native habitats overall. Because Ringtail Cats are expert rodent hunters, it would be preferred that they, rather than the feral cats, are moving around the Preserve and campus keeping our rodent populations in check.

Finally, there was time spent this summer collecting native plant seeds. Red Mulberry seeds were collected from a mature tree in downtown Austin close to the public library. Black Cherry, Carolina Buckthorn, and Northern Spicebush tree/shrub seeds were collected from different greenbelts in northwest Austin. Additionally, a large amount of Bluebonnet seeds were collected from around campus and the girl scout troops will spread the seeds in late fall in the meadows. Many of Trinity’s Bluebonnet plants are 15-18 years old and were planted annually by board member Susan Harris in 2000-2005 to honor her daughter Haley’s (Class of 2007) birthdays.

2019-20 Projects in Trinity's Preserve

- Back Field restoration project: Runoff erosion barrier, removal of invasive privet, brushple barrier, invasive switchgrass removal, native grass and seed drop, setting up bird nest boxes. (community Scouting Project)
- Leopard Frog bottomland creek habitat project: trail work, native grass seed drop, native tree seed drop, nest box setup, erosion barrier construction, invasive plant removal. (4th grade restoration project)
- Camp Craft open woodland restoration project: Trail system, removal of invasive privet, native grass and wildflower seed drop, nest box setup, collection of inland sea oat grass seeds. (4th grade restoration project)
- Meadow Restoration behind Trinity Center Gym: Soil drop, native grass and wildflower seed drop, Trail work, pushing invasive privet back, nest box setup. (4th grade restoration project)
- Preserve Trail maintenance: prepping trails for cross country season - Trinity community event
- Garden Center Projects: improving herb garden beds, preparing for blueberry bushes (in addition to weekly garden work with 7th grade students)

Preserve Habitats

Canyon Ponds

Est. 2015-16

Leopard Frogs in small amounts in this pond. This pond has regular visits from both Cooper and Red Shouldered hawks and the Yellow-crowned Night Heron. This pond also has a good sized non-venomous Blotched Water snake living in it. Raccoons are nightly visitors.

Camp Craft Ponds

Est. 2012-13

This pond has a small frog population each year. There are also infrequent visits from hawks. Raccoons are near nightly visitors.

Upper Woodland Pond

Est. 2017-18

Backfield Ponds

Est. 2016-17

This pond system has traditionally been our best habitat for Leopard Frogs. This year is no different. Raccoons are regular visitors at night.

Chapel Meadow

Est. 2013-14

(east view)

TRINITY EPISCOPAL SCHOOL

EXCELLENCE UNITY FAMILY

Chapel Meadow (west view)

Garden Center Meadow

Est. 2016-17

Trinity Outdoor Chapel

Est. 2016

Garden Center Meadows

Est. 2015

Spirit Field Meadow

East Side

Est. 2016-17

Spirit Field Meadow

West Side

Est. 2016-17

Fellowship Hall Meadow

Est. 2015

Trinity Garden Center

Est. 2017