

Identifying the American Alligators  
(*Alligator mississippiensis*) of Fripp Island, SC

May 1st - Aug. 26th

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## Introduction

The American alligator (*Alligator mississippiensis*) is one of 2 species in the genus *Alligator* under the order Crocodylia and is the only species endemic to the United States. It lives in the southeastern states ranging from Florida to east Texas and reaching its northernmost ranges in northeast Arkansas and coastal North Carolina (Powell et al. 2016). They are a predominantly freshwater species and, as a large, apex predator, will prey on fish, wading birds, deer, and other small mammals. The dorsal side of their neck, body, and tail are covered in subdermal bony plates referred to as scutes or osteoderms (meaning Bony-Skin). Alligators have increased growth rate from 0-6 years old and it declines dramatically after 6 years old. This was shown in South Carolina alligators to be 18.0–20.2 cm/yr. in 0-6 yr. olds, in females and males respectively, and 6.34–7.22 cm/yr. in ages 6 yr. to model asymptotic model (Wilkinson & Rhodes, 1997).

Previous work in 2021 on this long-term study by a prior intern, Brad Churches, showed that alligators can be identified by unique patterns of their scutes. The lateral scutes were used primarily due to general positioning of the alligators in the wild unless captured. This concept was brought on by a desire for alternative identification techniques besides tagging and tail-scute notching in the hope that it would be possible to identify local alligators without the stress of capture. This was confirmed as a possible strategy by a previous study on American crocodiles in Panama (Balaguera-Reina *et al.*, 2017). Out of 110 crocodiles they “obtained complete differentiation among individuals (i.e., no two individuals with the same pattern)”. This gave grounds to conduct a similar study on the alligators present on Fripp to give each alligator a unique “fingerprint.” After Churches’ research, it proved that this type of identification was a plausible strategy. The main factors that could affect the practicality of this technique is positioning of the individual alligator, distance to the alligator, and clarity of the images.

In 2022, the goal was to continue with this study by noting each individual observed and recording their scute pattern into a roster, preferably with a photo. This would give Fripp a database to use in positively identifying the local alligators if a tag or tail-notches were not visible or unable to interpret. A second goal in this was to get a general idea of individual ranges used by each alligator. This would occur as a side-effect of surveying and observing each alligator and its presence in different ponds or areas. Naturalists of the island have general locations where the larger specimens reside. However, having more detailed information about each alligator’s common ‘hang-out’ locations could help when answering questions or responding to a concerned resident/guest. In recent estimations, there are approximately 125-150 alligators on Fripp Island including juveniles and adults. Out of these, there are only 40 tagged individuals, so having an alternate strategy for identification can increase the number of known alligators and make it more accurate.

## Materials and Methods

In 2022, observational surveys were conducted on Fripp Island Resort’s Ocean Creek Golf Course and Ocean Point Golf Links (Fig. 1, Fig. 2). On each survey, both binoculars and a DSLR camera were used to spot and identify each alligator and to take photos of their Lateral Scute Pattern (LSP), if visible. Notes were taken at each observation (Fig. 3). At each sighting, an attempt would be made to identify the alligator by tag and then photograph or sketch the LSP and take note of any other identifiable characteristics. If there was no tag, an attempt was made to get a photo or sketch of the lateral pattern as the key identifier for that new individual which would be added to our roster

along with any key characteristics. For this project, only adults were recorded. In this study, an adult alligator was considered any individual >6 ft. in total length. This is due to juveniles' scutes not being fully developed and with having a higher growth rate scutes are liable to shift.



Figure 1: Ocean Creek Golf Course



Figure 2: Ocean Point Golf Links

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24 June 15: SC; Beaufort Co., Fripp Island.  
OP-A-1 | 1020 | 1023 |  
32.3233508N, -80.4561806  
Changed record style due.  
OP-N-1, 32.3268818N, -80.4825452.  
1102 Large <sup>UA</sup> alligator w/ orange neck tag. Could  
not get positive I.D. Based off estimated  
length, it could be any orange tag except for  
Arthur and Gwen and Mystery Gator.

Figure 3: Field notes example

Using Google Earth, maps of each course were outlined and marked with shorthand code for the courses, ponds, and each observation point where an alligator was observed (Fig. 1, Fig. 2). For example, Ocean Point Golf Links = OP; Pond A on Ocean Point = OP-A; and the point where individual Gr308 “Stumpy” was seen = OP-A-1; etc. A golf cart was used to visit each pond on the golf courses, especially during full course surveys. The only exceptions were observations at four ponds at Ocean Creek: OC-D, OC-F, OC-G, and OC-H. These ponds bordered Ocean Creek Blvd and were clearly visible from said road, so these were given more frequent, cursory surveys during daily commute which was not possible for the less accessible ponds. At each observation, general data was recorded: time of survey and observation, identifying characteristics of individual alligators (e.g. tag number, scute pattern, other unique phenotypical characteristics), position of the alligator (e.g. in the water/on land, parallel to the water/facing away, etc.). If the alligator was unidentifiable, one of three codes were recorded. UNKN = Unknown alligator that had not been previously marked (e.g. tags, tail scute notches); UA = Unidentifiable alligator that had been previously marked but could not confirm identity, usually due to illegible or submerged tag; N/A = Alligator that is not valid for this project due size/age.

Game cameras were also used at various points where alligators were commonly observed. This would help observe areas that could not be checked frequently or would observe individuals outside of surveying periods, mainly in the night. This information would also help identify which individuals used these locations most regularly compared to other individuals known to live in the immediate vicinity. All cameras were placed halfway through the data collecting season after prior observations dictated that these locations had the highest chance to record individuals out of the water. They were either strapped to trees or 1in. x 1in. wooden stakes if no trees or other suitable base was available based on location and angle to observation area.

## Results

Over the course of 15 weeks, 8 different confirmed individuals were observed with an estimated 19 unique individuals based on locales and sizes but could not confirm that the 11 were unique. Table 1 shows the individuals recorded and what category they fell under. There were 26 sightings (i.e. each time an alligator was observed) by visual surveys and 5 sightings using game cameras.

**Table 1:** Alligator Categories - Total Individuals and Sightings Recorded

Categories	ID Confirmed	UNKN	UA	N/A	Total
Individuals	4	4	4	7	19
Sightings	10	8	4	9	31
Sightings (In Water)	9	3	4	5	21
Sightings (On Land)	1	5	-	4	10
Scute Patterns	1	1	-	x*	2

\* Category not valid for scute pattern record

Under sightings, UNKN1 (added to the Fripp Island roster as “Stu”) falls under UNKN due to not being tagged; however, he was confirmed as a single individual across multiple surveys using his LSP (Fig. 4). Out of the 31 sightings, only two valid individuals were out on the pond banks to record their scute patterns: Gr308 (“Stumpy”) at OP-A-1 and UNKN1 (“Stu”) at OC-F-1 (Figs. 4, 5, 6).

The other three tagged individuals that were identified were Or222 (“Gwen”), Or223 (“Lance”), and Or231 (“Arthur”) and all three had their bodies submerged during observations. This means that of the previously tagged alligators on the island, only Gr308 had its lateral scute pattern added to its identifiers.



Figure 4: UNKN1 confirmed using Lateral Scute Pattern (LSP) on two different observations



Figure 5: Lateral Scute Pattern (LSP) of Gr308



Figure 6: Locations of Gr308 and UNKN1 sightings respectively, marked with red pin

Cam1 was placed on the north side of OC-F at 32.3136638°N, -80.4900528°W (Cam 1.1) facing OC-F/OC-F-1 as a test to see if game cameras were practical for this survey. After collecting the images, the data showed that the cameras would need to be closer to the focal point and have it centered to that point. This was shown in images that only had an alligator (UNKN1) in it if something else triggered the camera, generally humans watching the alligator. The alligator on the bank was too low to the ground to trigger the camera where it was angled. Cam1 was then moved to the east bank of OC-G at 32.3155798°N, -80.48871105°W (Cam 1.2) facing OC-G to photograph Or222 in a shallow spot of her home pond since she was always in the water during observations. This attempt produced zero results except for one N/A spotted towards the end of the collecting period. Cam2 was placed on the northwestern end of OC-H at 32.3159759°N, -80.4879752°W facing the end bank of OC-H. This area is a common place used by alligators to cross from OC-H to OC-G due to their proximity as seen in Figure 7. Cam3 was placed in between OP-I and OP-J at 32.3214953°N,

-80.462522°W facing the northeastern bank of OP-I. Alligators, including Fripp's largest Gr302 ("Sherman"), had been observed by citizens crossing between these two ponds and so it was determined a likely spot to record their lateral patterns as they traveled between ponds. This attempt also produced zero results. All camera locations are also in Figures 7 and 8 as shown below.



Figure 7: Locations of Cam 1.1, 1.2 & 2 as marked by purple pins

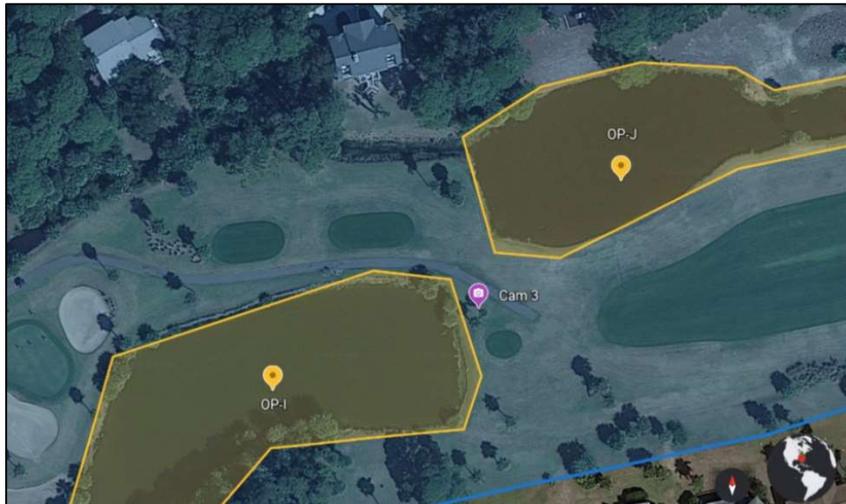


Figure 8: Location of Cam 3 as marked by purple pin

## Discussion

This project was the first initiative to give Lateral Scute Pattern IDs to the alligators on the island. Out of the estimated 19 unique individuals observed, two received an LSP ID. With one being a previously tagged and the other being an UNKN, this was great progress although small. It proved that this form of identification can be used for increasing the identification accuracy of tagged individuals, and it can be used to identify non-tagged individuals without capture or causing stress.

For Gr308, this means there will now be an alternate way to identify him if the tag is illegible or not visible. For UNKN1, it can now be added to Fripp's roster of known alligators. Being able to recognize and know the local alligators is important, especially when behavioral tests are conducted or if a naturalist must respond to a call.

The idea behind this "fingerprinting" is practical but it has limitations. As shown in the data on Table 1, it was difficult finding alligators out of the water or where their LSPs were visible. This is due to multiple variables. Weather and temperature were not considered in this data; however, with this survey occurring in the summer months, it was often most likely too hot for the alligators. They were scarcely observed out of the water if at all during the day. Most observations of them basking or resting on land was during early mornings or on cloudy/rainy days. This drop-off in alligator presence was especially noticed by first-hand experience. During the spring before the survey project began, alligators were seen much more often during daily commutes than during the summer. Most of the largest alligators, both previously tagged and UA, were generally either visible just by their head or only partially out of the water. This made it difficult to record the LSP. With their natural aversion to humans, it was difficult to approach the alligator enough to document their pattern but not startle it into the water. There was also the matter of identifying the tagged alligators which was challenging due to either the tag being submerged or covered in algae making it illegible.

Based on this survey, using game cameras is not reliable for this type of ID. If there is an area where alligators regularly bask during the day, then one or two cameras could be set up monitoring the spot. Most of the ponds have multiple locations where they bask or come on land and cross between ponds that it makes it difficult to observe each area without more cameras than feasible. Cam 1.2 only recorded Or222 at night when adult alligators generally migrate between ponds. Due to the nature of the night vision mode, the LSP was not distinguishable enough to use for ID. Or222 was only identified in the images by tag position, tail scute notches, size, and location.

## **Future Considerations**

Moving forward with this project, there are many alterations that can be made based off this year's surveys. Surveying should be conducted year-round or at least during the spring and fall months when the temperatures are more favorable for alligators to bask or rest on land. The temperatures are not as extreme as during the summer, and, especially with spring, American alligators are coming out of cold months and brumation and therefore basking more often. This could also be a basis for continued research into what weather conditions are most preferred by alligators and when they are most likely to be out on the banks. If regular surveying is not possible, try to record or photograph large alligators (>6 ft.), when they are seen in passing. If surveying during the summer, observations should be made during the early mornings or late evenings, approximately around sunrise/sunset.

Game cameras could be used again during the above-mentioned alternative seasons and potentially produce positive results. The researcher should follow the methods used in this project or similar to it to make sure the camera triggers. With increased basking, these could be a useful, passive form of observation.

Continued use of Google Earth for mapping is recommended. Especially if there is potential to add ArcGIS or similar GIS mapping, having multiple ways of mapping and laying it out would help with looking at ranges and what each area offers to the alligators. Why do they prefer certain ponds over others? This there more overhanging vegetation? All of this could help with identifying where alligators would be located and why they prefer those areas over others.

Future research could be conducted on whether there is a different scute areas that would be more practical when identifying semi-aquatic species without capture. The limitations of using the Lateral Scute Pattern are the need for the individual to be completely or >50% out of the water and be at the correct angle to record the pattern. These limitations were also noted by Churches in his previous work on this project. Image quality is also paramount since some of the scutes are subtle depending on the angle the photo was taken at.

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## **References**

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