2012 Terrell Avian Grant Summary

Predator Management for Georgia's beach nesting birds.

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Introduction:

Predation has become a significant problem for Georgia's beach nesting birds and has led to complete loss of some seabird colonies in past years, and very low productivity for beach nesting shorebirds. The receipt of the Terrel Grant allowed us to purchase 3 separate sets of Electric Fences to surround seabird colonies, as well as purchase traps and hire a trapper to focus on areas with high numbers of breeding American Oystercatcher and Wilson's Plover (Wassaw Sound, St Catherines Island, Wolf NWR and Little Egg Island Bar).

Expenditures:

Trapper Salary	4,877.61
Boat Fuel /oil for trapper	3,343.53
Supplies (Fencing)	12,238.91
Other equipment	109.05
TOTAL	20,569.1

Electric Fence Summary:

We were able to purchase 3 complete electric fences. In conjunction with The Army corps in Savannah, and Cumberland Island National Seashore, this allowed 5 complete fencing sets for protecting seabirds on the Georgia coast (and Savannah River spoil site).

Little St Simons:

Early Least Tern colonies on Little St Simons were too small and prone to over wash to use the fence. A late Black skimmer colony on North Main Beach was established in a suitable place for electric fencing. Little St Simon's staff documented 105 Black Skimmer nests with eggs and 1 Gull-billed Tern nest. As the colony grew – the fence was expanded to enclose the majority of nests. At one point 93 Black Skimmer chicks were counted. The final count was at least 50 Black Skimmer chicks fledged. The fencing was very

effective at keeping predators out of the colony. There was no evidence of raccoon or coyote breaching the fence, and there was evidence of both predators outside the fence. As the chicks grew, they were able to move freely back and forth under the fence without adverse effect. The gap along the bottom of the fencing proved to be large enough for even fairly large skimmer chicks to fit underneath without any incidences of electrocution. Ghost crabs were an issue with both eggs and small chicks and LSSI staff had only minimal success with trapping for ghost crabs within the colony. Initially Laughing Gulls seemed to be an issue, but the adult skimmers fought them off, and one laughing gull was found dead at the edge of the colony, perhaps killed by the adult skimmers. Great Horned Owls depredated adult skimmers early in the nesting season, but were not a significant problem.

Sea Turtles are a significant concern with using electric fences on beaches in the southeast. Fortunately LSSI had no problems with adult or hatchling sea turtles. The fence was deployed late in the season when most nesting had already occurred, and in an area infrequently used by nesting turtles. One sea turtle nest was within the fenced area and hatchlings had no difficulty crossing the fence and making it to the ocean. A five foot alligator was caught in the fence and died. This was the only negative impact of the fence on Little St Simons this season.

Andrew's Island Summary: (From Gabrielle Robinson's Least Tern Season Summary)

There were three subdivisions of the Andrew's Island colony in 2012. Each subdivision occupied a different area of the island, although each was in very close proximity to one another, and each consisted of a slightly different habitat type. The "west side" colony was on the western edge of the island, the "southwest corner" colony was located on the road used by construction equipment in the southwest corner of Andrews Island, and the "disked" colony was located on the southern edge of the island (Fig. 1).

Figure 1. Andrew's Island colony subdivisions: west side, southwest corner, and disked.

The southwest corner (hereinafter "SW") colony was located in the same area that LETE have historically nested on Andrews Island. However, this year the nesting colony was located up on the construction road itself instead of on the lower flat adjacent to the road, which remained inundated with water for most of the 2012 season (rendering it unsuitable as LETE nesting habitat). Borrowing by the county from the SW site was already in progress when we began monitoring the site in late April, and we observed large construction vehicles driving back and forth through the area regularly. In addition, additional future borrowing from the SW area by GA Pacific was being scheduled. However, due to the history of occupancy at this site by breeding LETE, as well as the observations we made of LETE flying over and landing on the ground in that area early in the 2012 season, we were able to convince the USACE and GDOT to cease all borrowing activities at this site for the duration of the nesting season.

The disked colony established itself on a section of habitat that had been disked earlier in the season in order to attract breeding LETE. LETE decoys were also used here early in the season for this purpose. This particular area was thought to be ideal as a LETE colony site because it was on high ground and unlikely to flood, and because it was removed from construction/borrowing activities. Although LETE did begin nesting in the disked area, the site was eventually abandoned (by the end of May) while the other two colonies at Andrews grew. Even though the disked area had little vegetation due to disking, the substrate was extremely soft, with loose dirt, and therefore did not appear to be ideal for least tern nesting. Furthermore, large trees on the water's edge provided ideal roost sites for predatory

crows, and the disked colony experienced heavy predation by crows before it was abandoned in late May.

The west side colony at Andrew's was the largest and most concentrated area of LETE nesting that we monitored in 2012. It appeared that borrowing activities by the county over the past winter had helped shape the ideal habitat (flat, dense substrate, mostly void of vegetation) that existed in this area in the summer of 2012. This was the first time as far as we know, at least in recent history, that breeding LETE occupied this particular area of Andrew's Island.

We began monitoring Andrew's Island for nesting activity on April 21st, and the first Andrew's nests of the season were found on May 6th in the west side colony. We also observed many crows in the area of the colony on that day. We installed electric fencing around the colony on the following day. Electric fencing was used to protect all three colonies at Andrews from mammalian predators. The disked area fencing was eventually moved from the disked area to the SW colony after the disked site was abandoned by the LETE. Electric fences were run positive-negative to achieve the maximum possible voltage given the sandy soil, and very little vegetation was present to create resistance that would bring voltage down on the fences. Fences at all three sites at Andrews averaged ~9 kV, and ranged from 8kV-10kV. A fence voltage of 4kV is sufficient to deter most mammalian predators.

We observed crows on Andrews Island early in the season, and then erected crow effigies at both the disked area and the west side area. However, by May 7th crow predation had grown intense, and that morning we observed crow predation events approximately every 45 minutes from 7 am – 11 am, with 5-6 crows entering the west side colony at a time to prey on LETE nests. It became clear at this point that the crow effigies were not having the desired effect and that lethal measures of crow control were necessary. Proper permits and permission had already been attained earlier in the year, so crow removal was implemented right away, and on May 9th 8 crows were shot and removed from the west side colony area. More crows were removed on subsequent visits that occurred on May 9th, 12th, 20th, and 25th, until a total of 31 crows had been removed from Andrew's colonies, and crows were no longer observed in or near the LETE colonies for the remainder of the nesting season. The crows present at the Andrews LETE colonies were identified as mostly (or entirely) fish crows (*Corvus ossifragus*) based on vocalizations.

Tropical storm Beryl made landfall in Jacksonville, FL at the end of May, but despite high winds and heavy rain, the Andrews LETE colonies fared surprisingly well, with minimal loss or abandonment of nests. The electric fences at Andrew's only required very minor maintenance after the storm had passed, and the fences were still running with high voltages when tested immediately following the storm. Beryl appeared to have had very little negative impact on the Andrews LETE colonies. Later, at the end of June, tropical storm Debbie brought more heavy rain that this time led to standing water just beyond the perimeter of the west side colony, and in parts of the SW corner colony. GDNR and USACE acted quickly to manipulate the water levels at Andrews, and this inundation quickly disappeared before getting worse, and few LETE nests were lost. Again, minimal maintenance was required on the electric fences at Andrew's after tropical storm Debbie.

Hatching first occurred at Andrew's on June 11th in the west side colony, and hatching continued to increase into late June, with hatch success at all colonies near 100% during this period. Nesting peaked on June 22nd with a total of 268 active nests being present between the west side and SW colony sites. Then in late June, just after tropical storm Debbie had passed, large numbers of chicks began disappearing. On June 28th many chicks were found dead or moribund, and many more were completely missing. Dead chicks were found dismembered, some with breast tissue pulled out and removed.

Moribund chicks were usually very young and appeared to have grown very cold overnight in the absence of a brooding parent. We suspected a nocturnal predator was taking chicks, while also causing adults to abandon the colony overnight. On the night of June 28th I revisited the west side colony at 9 pm and clearly observed a great-horned owl (*Bubo virginianus*) perched on a *Tamarix* tree on the southwest corner of the west side colony. The owl flew away soon after my arrival. On June 30th we put out 17 wooden chick shelters (Fig. 2) in and around the perimeter of the west side and SW colonies. We hoped that these structures would provide shelter and cover to chicks overnight, and perhaps reduce owl predation. I continued to make daily evening visits (usually ~7pm-10 pm) to Andrews in hopes of observing and subsequently scaring off the owl. I was able to witness the owl only a couple more times in the week following the first sighting, and then I did not see it on any of my daily evening visits thereafter. I suspect that the owl continued to prey on the colony in days to follow, at night after I had left because it had become too dark for me to see. We continued to find dismembered chick carcasses, chicks in eggs that had died overnight while pipping (due to abandonment of colony at night by adults), and even several dismembered LETE adults, all indicating that owl predation continued to occur even after sightings of the owl in the evening had ceased.

Figure 2. Wooden chick shelter

No predation other than owl predation was observed at any of the Andrew's colonies. However, fire ants were found preying on eggs on several occasions, but it is unclear whether fire ants were the cause of nest failure or if fire ants were scavenging on already-abandoned and addled eggs. We did observe canid tracks (mostly fox, but also a couple instances of coyote) on several occasions outside, but in very close proximity to, our electric-fenced colonies at all three Andrew's colony sites. It should also be noted that gulls of various species were observed flying over the Andrews colonies on several occasions throughout the summer, but the LETE did not react to them, indicating that gulls were not a major threat to LETE nests or chicks.

Despite heavy owl predation of adults and chicks, and loss of nests that died while pipping overnight, Andrew's Island did fledge young in 2012. There may have been a few fledges that occurred without documentation due to the difficult nature of the resighting chicks at these colonies (chicks often hunkered down in deep crevices out on the vast expanse of mudflats that surrounded both the SW and west side colony sites). Regardless, from a total of ~250 pairs of breeding LETE on Andrews (based on a peak active nest count of 268 nests in late June), 15-20 chicks fledged. This is certainly poor productivity, but it should also be considered that no LETE fledged, or even hatched, last year at Andrew's Island. Furthermore, while the daily nest survival rate was no more than a few days at Andrew's Island last year, hatch success was nearly 100% this year in the first half of the season (which is when the majority of viable nests will hatch). And while the great-horned owl had a devastating impact on the Andrew's colonies, it appeared to be the only predator of LETE nests or chicks after the crows were removed early in the season and electric fencing was installed to exclude mammalian predators.

Trapping Summary:

In 2012 Predator Control was applied to three main locations on the Georgia Coast. These included Wassaw Sound (Cabbage Island, Little Sister, Wilmington River North & South), St. Catherines Island ICW, Altamaha River (Wolf Island, Egg Island, & Egg Island Bar). (see Table for complete effort).

Beginning in March and ending early July a total of 372 hours (not including companion/volunteer hours) was applied to this project. These hours included travel time & boat maintenance as well as actual "working-predator time"

The following three techniques were applied:
1) Trapping with Havahart & Egg traps
2) Shooting at bait stations
3) Flushing & Hunting (day & nights hunts; with & without dog)

Total predators removed in this program were 29 Raccoons and 3 Minks

For Wassaw Sound a total of 159.25 hours were expended and 7 Raccoons removed.
For SCI at total of 92 hours were expended and 3 Raccoons and 2 Minks removed.
For the Egg Island & Bar complex a total of 137.25 hours were expended and 12 Raccoons and 1 Mink removed.
For Wolf Island a total of 142.75 hours were expended and 7 Raccoons removed.

Despite the significant effort and cost expended on trapping, there was no American Oystercatcher productivity in the mouth of the Altamaha in 2012. This was in large part due to a series of extreme high tide events that repeatedly flooded Wolf NWR and Little Egg Island Bar (See Table). This series of high tides flooded nests up and down the Georgia Coast and the only sites we had any successful American Oystercatchers in 2012 were on Little St Simons and St Catherines Islands. This was unfortunately as we were not able to assess the effectiveness of our trapping efforts on the Altamaha. Wolf NWR also proved a very difficult site to trap, and raccoons were never controlled there. In future years, more effort should be expended on Little Egg Island Bar, where there is a better chance to significantly reduce the raccoon population.

Trapping efforts on St Catherines Island did appear to help with their Oystercatcher production in 2012, particularly on shell rake sites, which in the past had suffered 100% predation. In 2012, 8 American Oystercatcher chicks fledged from the St Catherines Area in comparison to 3 chicks fledging in 2011 without predator control efforts in place. Based on the overall low productivity state-wide this year – this is a very significant number of chicks (State-wide only 16 Oystercatcher chicks fledged this year).

Summary of Flooding Tides during 2012

Date	Event	Impact
March 11	Spring tide	9.59‘ tide
April 7	Easter High Tides	10.2’ tide
May 7-8	Strong NE winds	10.35’ tide
May 8-9		1.79” rain
May 28-29	T.S. Beryl	2.99” rain
June 3-5	Spring tide	10.18’ tide
June 24-26	T.S. Debby	2.8” rain
July 3	Spring Tide	9.0’ tide

Summary:

The Predator Management project funded by GOS in 2012 proved partially successful. The use of electric fencing on both Andrews Island and Little St Simons Island proved completely effective at keeping mammalian predators away from the breeding birds. In both cases, birds fledged chicks in 2012 when they did not in 2011 (without the fences). The success at Andrews Island was hampered due to a Great-horned Owl that significantly reduced productivity by depredating both adults and chicks, and leading to adult nocturnal abandonment of the colony, which in turn led to exposure mortality of chicks.

Two other sites used electric fences in 2012 for Least Tern colonies, but they were funded by other sources. The Least Tern colonies on the Savannah River spoil islands fared extremely well this year due to electric fencing. The fence was shown to dissuade both feral hogs and coyotes at this site, with the exception of one coyote that got in on one occasion. This site had 150 nests and fledged 50 chicks. Cumberland Island Long Point had a small Least Tern colony and the fence was deployed to protect it. The use of a fence at this site was problematic due to extreme overwash events and a sea turtle that was entangled (it survived with possible injuries to one flipper).

Due to the extreme tides throughout the nesting season in 2012, it was impossible to determine the effectiveness of trapping on the Altamaha, though we did determine that Wolf NWR is not worth trapping in the future, and all efforts should be focused on Little Egg Island Bar. Trapping in the St Catherines area proved more effective, and a number of American Oystercatcher chicks survived to fledging (some have already been re-sighted in Cedar Key FL) thanks to our trapping efforts.

Thanks to this grant we will be able to deploy up to 3 electric fences in the future. Little St Simons will maintain one set and DNR will maintain 2. We will also be able to fine tune our future trapping efforts. DNR and our partners greatly appreciate the funding.

DATE	WASSAW SOUND	SCI	EGG (S)	WOLF	RACOONS	MINK	HUNTING	TRAPPING	DOG	LOCATION
3-Mar-12			3				X			
6-Mar-12			3	5.5	1		X	X		WOLF
7-Mar-12	5		3	3.5			X	X		
8-Mar-12			3	5.5			X	X		
9-Mar-12			5	4.5			X	X		
10-Mar-12		5.25				1	X	X		N. RAKES
11-Mar-12	7.5						X			
12-Mar-12	6.25						X			
14-Mar-12			4.5	3			X	X		
15-Mar-12			5	4	1		X	X		WOLF
16-Mar-12				4.5			X	X		
17-Mar-12				6			X	X		
20-Mar-12			5		5	1	X	X		EGG BAR
21-Mar-12			4	3.5			X	X		
22-Mar-12			3	3			X	X		
23-Mar-12										BOAT MAINTANEN
26-Mar-12	8						X	X		
27-Mar-12	4	4					X	X		
28-Mar-12	9						X			
29-Mar-12			4	4.5	2		X	X		WOLF
13-Apr-12	11						X	X		
16-Apr-12	6						X	X		
17-Apr-12			3	2.5	2		X	X		WOLF
18-Apr-12			5	5			X	X		
19-Apr-12	3.5						X	X		
20-Apr-12	5.5									RAINED OUT
21-Apr-12			3	3.5			X	X		
23-Apr-12			4	3.5			X	X		
26-Apr-12			3	4	3					EGG BAR
27-Apr-12	6		4	4	1		X	X		EGG BAR
28-Apr-12	5.5						X			
1-May-12		4.5	3	2	1	1	X	X	X	SCI
2-May-12		4	2.5	2.5			X	X		
3-May-12			3.5	3.5			X	X		
7-May-12	5		2	3	1		X	X	X	WASSAW
8-May-12			6	6.5	1		X			EGG BAR
9-May-12	6				1		X		X	WASSAW
11-May-12			4	3			X	X		
15-May-12			4.75	5			X	X		
16-May-12	7.5						X	X		
17-May-12	11.5				2		X	X		WASSAW
18-May-12	3		3	3.5	2		X	X		WASSAW
20-May-12	4						X	X	X	WASSAW
21-May-12	4		3	3.5			X	X		
22-May-12			4	4.5			X	X		
23-May-12			3	3			X	X		
24-May-12	5		3	3.5			X	X		
26-May-12	5		4	3			X	X		
27-May-12		6					X	X	X	
11-Jun-12	7.25				1		X		X	WASSAW
12-Jun-12	8.75						X	X		
14-Jun-12			6	6.75	2		X	X		EGG
15-Jun-12		8.25			1		X	X	X	SCI
16-Jun-12	4						X			
17-Jun-12			3.5	4			X	X		
18-Jun-12			2.5	3	1		X	X		WOLF
19-Jun-12			5	5.5			X	X		
20-Jun-12	5	5.5					X	X	X	
25-Jun-12		10			1		X	X	X	SCI
26-Jun-12		10					X	X	X	
27-Jun-12		10					X	X	X	
28-Jun-12		10					X	X	X	
3-Jul-12			5	4			X	X		
5-Jul-12	6	7.5					X	X	X	
6-Jul-12		4	3	3			X	X	X	
10-Jul-12		3	2				X	X		COLLECT TRAPS
TOTALS	159.25	92	137.25	142.75	29	3				