

RED KNOT (*Calidris canutus rufa*) MONITORING AT  
CAPE LOOKOUT NATIONAL SEASHORE

2012 SUMMARY REPORT



USFWS Photo

NATIONAL PARK SERVICE  
CAPE LOOKOUT NATIONAL SEASHORE  
131 CHARLES STREET  
HARKERS ISLAND, NC 28531

## Introduction

Serious declines in the population of red knots (*Calidrus canutus rufa*) led to several petitions to the U.S. Fish and Wildlife Service for protection under the Endangered Species Act. In September 2006 the red knot was designated as a candidate for Endangered Species Act protection (Federal Register, 2006). Red knots use the Outer Banks of North Carolina as a stopover site in spring and fall migration. While not as important as some other coastal sites, the Outer Banks may still contribute to the survival of this species.

Previous monitoring of red knots at Cape Lookout National Seashore (CALO) was limited to surveys as part of a broader shorebird study in 1992 and 1993. North Core Banks had greater numbers of red knots than other areas in the Outer Banks (Dinsmore et al, 1998) but surveys in that study did not include any of the areas south of New Drum Inlet.

This report contains a summary of monitoring results for 2012 and comparisons to results from the earlier study and discussion of long-term monitoring of red knots at CALO.

## Methods

Surveys for red knots were made of the entire ocean beach and inlet areas on North Core Banks (NCB) and South Core Banks (SCB) beginning in mid-March. The area between Old Drum Inlet and Ophelia Inlet was not monitored in 2012.

Our survey frequency and timing followed the International Shorebird Census guidelines for spring and fall. Counts were done near the 5<sup>th</sup>, 15<sup>th</sup>, and 25<sup>th</sup> of the month from March 15<sup>th</sup> to June 5<sup>th</sup> and from July 15<sup>th</sup> to October 15<sup>th</sup>.

Surveys were conducted by the park biologist or biological science technicians with experience identifying shorebirds. Surveys were at different times of day, tides and weather conditions. Monitors recorded the number of red knots observed, the mile location, the latitude and longitude, the amount of human disturbance, tide level and the accuracy of the count (See Appendix 1).

## Results

Most of the red knots counted during our surveys were found on NCB with an average of 276 birds per count. SCB averaged 130 birds per count. NCB had the highest count of 1370 birds on April 25. SCB highest count of 684 birds was on May 25. The peak numbers for the core banks were during spring migration with 1611 birds counted on the April 25 census. The spring migration from 15 March to 5 June averaged 679 birds. There was also a small peak in late July and August when fall migrants moved back through (Figure 1). The fall migration from 15 July to 15 October averaged 182 birds. Additional counts outside of the methodology yielded 370 birds on February 17<sup>th</sup> and 39 birds on November 16<sup>th</sup> on NCB and 69 birds on the east Shackleford Banks on

November 14<sup>th</sup>. Red knots were distributed over the length of the seashore (Figure2). There were 52 banded birds re-sighted in the seashore, Appendix 2. The band re-sights were reported to [www.report.bandedbirds.org](http://www.report.bandedbirds.org)

## Discussion

Our monitoring confirmed the importance of the seashore as a stopover site for red knots, particularly during spring migration. The relative abundance of red knots on North Core Banks during peak spring migration was 46 birds/ kilometer compared to 34 birds/ kilometer in 1992-1993, Table 1 (Dinsmore et al, 1998). This comparison does take into account the changes in length of NCB due to inlet closures and inlet formation. The 1992-1993 study censused 34 km, were as North Core Banks length was 29.8 km in the spring of 2012 after the reopening of Old Drum Inlet in 2011. The length of NCB in kilometers for years 2006, 2007, and 2008 was corrected in Table 1 for this report and differs from previous reports. NCB averaged more birds overall and had the highest peak count. Although the Outer Banks may not be as important as some other sites in the region, the area still provides habitat that may be important for the recovery and long-term survival of red knots.

Table 1. Red knot relative abundance on North Core Banks, 1992-2012.

Year	Date	Peak Count	Kilometers	Relative Abundance
1992-1993			34	34
2006	5-May	618	30.3	20
2007	15-May	718	30.6	23
2008	15-Apr	1287	30.6	42
2009	25-May	525	36	14
2010	15-May	927	36	26
2011	15-May	1012	36	28
2012	25-April	1370	29.8	46

## Literature Cited

Dinsmore, S.J., J.A. Collazo, and J.R. Walters. 1998. Seasonal numbers and distribution of shorebirds on North Carolina's Outer Banks. *Wilson Bulletin* 110:171-182.

Figure 1. Number of Red Knots Counted at Cape Lookout National Seashore in 2012.

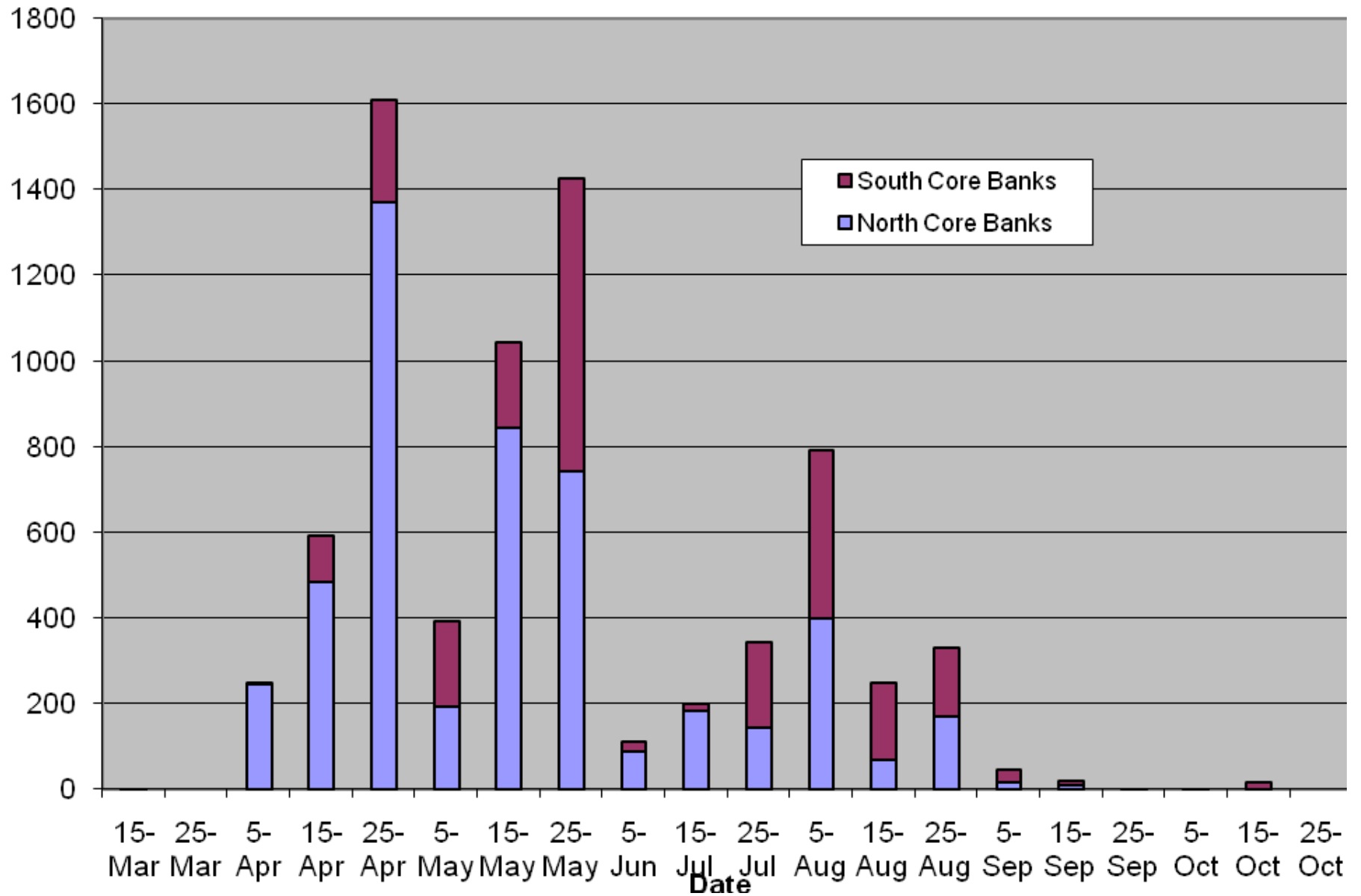
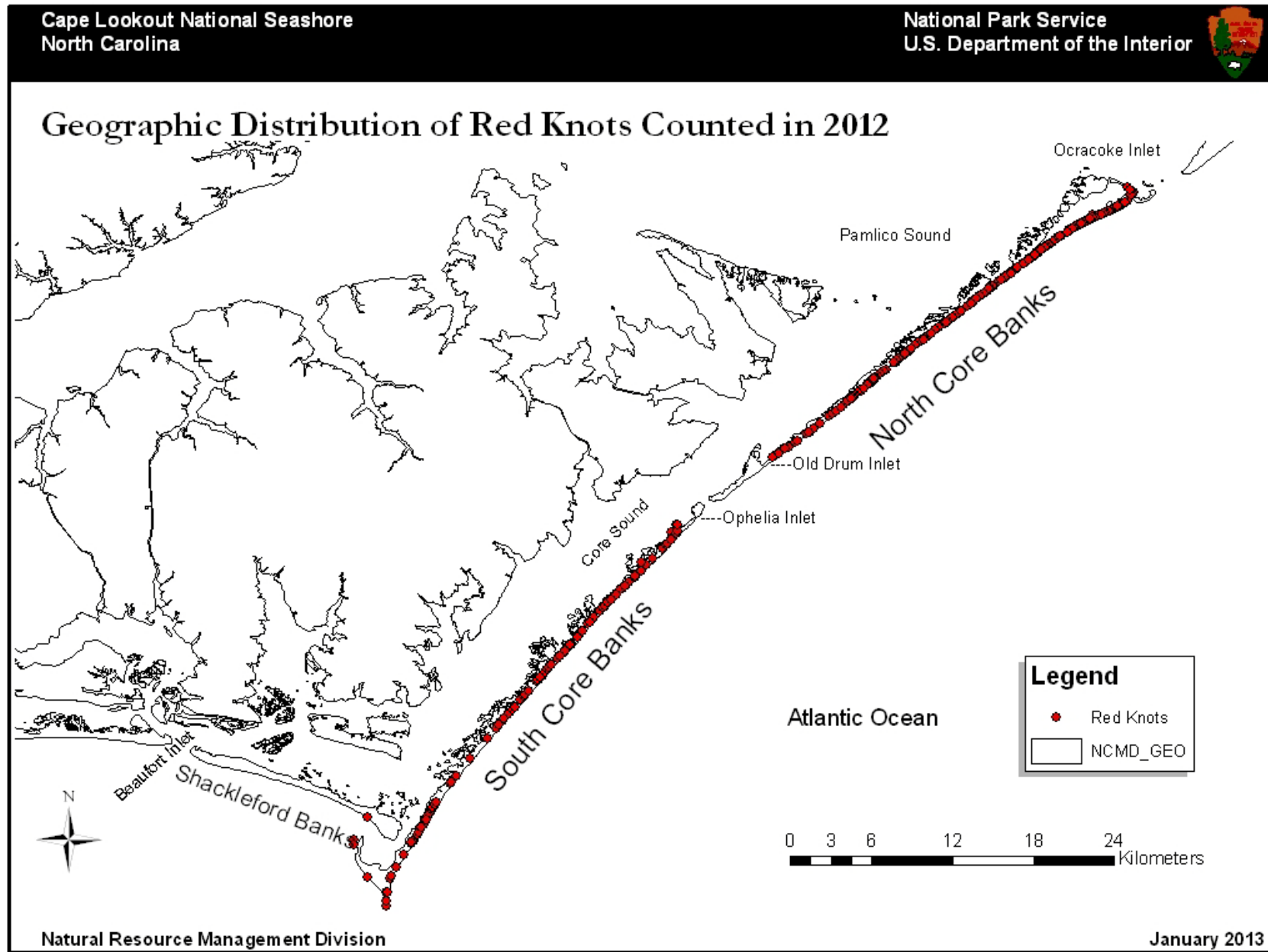


Figure 2. Geographic Distribution of Red Knots Counted at Cape Lookout National Seashore in 2012.



Appendix 1

RED KNOT (*Calidris canutus*) SURVEY DATA SHEET  
Cape Lookout National Seashore

Name of Observer: \_\_\_\_\_

Date \_\_\_\_\_ Island \_\_\_\_\_ Start Time \_\_\_\_\_ End Time \_\_\_\_\_

# of REKN	Mile	Latitude (decimal degrees)	Longitude (decimal degrees)	Human Disturbance	Tide	Accuracy

Human disturbance: During this census, shorebirds were:  
A=undisturbed, B=disturbed 1-2 times, C=3-4 times, D=5-10 times, E=>10 times, X= unknown

TIDE (coastal sites): 1=high, 2=near high/RISING, 3=near high/ FALLING, 4=half/RISING,5=half/FALLING, 6=near low/RISING, 7=near low/FALLING, 8=LOW, 9=unknown.

ACCURACY: Please indicate in each block whether your count is:  
\* a true count, \*\* an extrapolated estimate, or circle a "guestimate"

Appendix 2a. 2012 Red Knot Survey Data North Core Banks

Month	Day	Observer	Island	#REKN	Mile	Latitude	Longitude	Disturb.	Tide	Ac.	Comments (Bands)
2	17	Jon Altman	NCB	370	5	35.01788	-76.10335	B	6	**	GF (205, 2XY,X3E-Yellow band, 320, 089, 225, UE5, 147, 7CC, 102-geolocator, 169-geolocator, HN3-green band, C9V, 22X, C9E, 2XY)
3	15	Erin Lamm	NCB	2	8.73	34.98151	-76.15128	A	8	*	
4	5	Moody & Griffith	NCB	5	13.96	34.92881	-76.21769	B	7	*	UL: light green flag (1YB), LR: metal
4	5	Moody & Griffith	NCB	60	13.5	34.93293	-76.21315	B	7	**	
4	5	Moody & Griffith	NCB	46	11.34	34.95533	-76.18583	A	8	*	
4	5	Moody & Griffith	NCB	101	8.07	34.98804	-76.14291	A	6	*	
4	5	Moody & Griffith	NCB	6	6.72	35.00143	-76.12543	B	6	*	
4	5	Moody & Griffith	NCB	27	1.22	35.05307	-76.04279	A	6	*	
4	15	Aubrie Russell	NCB	73	13.57	34.93301	-76.21304	C	7	*	
4	15	Aubrie Russell	NCB	227	13.19	34.93694	-76.20831	C	7	*	
4	15	Aubrie Russell	NCB	44	11.56	34.95350	-76.18789	A	7	*	UL: light green flag (20T), LR: metal
4	15	Aubrie Russell	NCB	18	11.27	34.95647	-76.18428	A	7	*	
4	15	Aubrie Russell	NCB	85	8.7	34.98174	-76.15096	A	7	*	UL: light green flag (169), UR: yellow geolocator, LR: metal; UL: light green flag (295), UR: yellow geolocator, LR: metal
4	15	Aubrie Russell	NCB	37	7.09	34.99775	-76.13030	A	8	*	UL: light green flag (175), UR: yellow geolocator, LR: metal
4	25	Kara Moody	NCB	4	16.67	34.90119	-76.25156	B	4	*	
4	25	Kara Moody	NCB	3	14.5	34.92319	-76.22412	A	4	*	
4	25	Kara Moody	NCB	73	13.96	34.92864	-76.21743	A	4	*	UL: light green flag (7CA), LR: metal
4	25	Kara Moody	NCB	45	13.48	34.93371	-76.21160	B	2	*	
4	25	Kara Moody	NCB	6	13.38	34.93457	-76.21019	B	2	*	
4	25	Kara Moody	NCB	122	13.32	34.93518	-76.20948	B	2	*	UR: light green flag (K4K), LR: metal
4	25	Kara Moody	NCB	25	12.58	34.94292	-76.20027	A	1	*	
4	25	Kara Moody	NCB	77	12.08	34.94795	-76.19404	A	1	*	UL: light green flag (?02), UR: yellow/blue geolocator, LR: metal
4	25	Kara Moody	NCB	14	11.49	34.95395	-76.18660	B	1	*	
4	25	Kara Moody	NCB	7	11.4	34.95491	-76.18550	A	1	*	

4	25	Kara Moody	NCB	53	10.02	34.96879	-76.16810	C	1	*	UL: white?, UR: dark green flag, LL: metal
4	25	Kara Moody	NCB	22	8.75	34.98119	-76.15135	B	3	*	UL: light green flag (E10), LR: metal
4	25	Kara Moody	NCB	127	7.33	34.99535	-76.13318	A	3	*	UL: light green flag (288), UR: yellow/blue geolocator, LR: metal
4	25	Kara Moody	NCB	109	6.42	35.00435	-76.12148	B	3	*	
4	25	Kara Moody	NCB	12	6.29	35.00552	-76.11971	A	3	*	
4	25	Kara Moody	NCB	16	6.23	35.00616	-76.11899	A	3	*	UL: light green flag (014), UR: yellow/blue geolocator, LR: metal
4	25	Kara Moody	NCB	164	6	35.00864	-76.11632	B	5	*	
4	25	Kara Moody	NCB	25	5.89	35.00938	-76.11454	B	5	*	
4	25	Kara Moody	NCB	120	5.77	35.01057	-76.11305	B	7	**	
4	25	Kara Moody	NCB	96	4.94	35.01869	-76.10215	B	7	*	UL: light green flag (049), LR: metal; UL: light green flag (169), UR: yellow/blue geolocator, LR: metal; UL: light green flag (7EL), unk on metal; UL: light green flag (# unk), UR: light green band, LR: metal
4	25	Kara Moody	NCB	250	4.04	35.02733	-76.09024	A	7	**	U(not sure right or left): light green flag (8YN)
5	5	Aubrie Russell	NCB	6	9.37	34.97511	-76.15944	B	6	*	
5	5	Aubrie Russell	NCB	120	11.63	34.95286	-76.18869	C	6	**	
5	5	Aubrie Russell	NCB	60	11.85	34.95065	-76.19151	B	6	*	
5	5	Aubrie Russell	NCB	6	13.29	34.93592	-76.20950	A	6	*	
5	15	Aaron Griffith	NCB	129	0.16	35.06084	-76.03607	A	8	*	
5	15	Aaron Griffith	NCB	36	1	35.05289	-76.04262	B	8	*	
5	15	Aaron Griffith	NCB	59	1.1	35.05162	-76.04514	A	8	*	
5	15	Aaron Griffith	NCB	42	1.22	35.04984	-76.04897	A	8	*	
5	15	Aaron Griffith	NCB	63	2	35.04659	-76.05637	A	6	*	
5	15	Aaron Griffith	NCB	12	2.17	35.04567	-76.06326	A	6	*	
5	15	Aaron Griffith	NCB	3	2.47	35.04119	-76.06835	A	6	*	
5	15	Aaron Griffith	NCB	68	3	35.03868	-76.07321	A	6	*	
5	15	Aaron Griffith	NCB	20	3.08	35.03694	-76.07619	A	6	*	
5	15	Aaron Griffith	NCB	17	3.19	35.03538	-76.07867	A	6	*	
5	15	Aaron Griffith	NCB	68	3.58	35.03178	-76.08427	A	6	*	
5	15	Aaron Griffith	NCB	81	4	35.02776	-76.09002	A	6	*	



5	15	Aaron Griffith	NCB	7	4.24	35.02542	-76.09303	A	6	*	
5	15	Aaron Griffith	NCB	9	4.56	35.02233	-76.09784	A	6	*	
5	15	Aaron Griffith	NCB	17	4.78	35.02026	-76.10017	B	6	*	
5	15	Aaron Griffith	NCB	18	4.96	35.01858	-76.10250	A	6	*	
5	15	Aaron Griffith	NCB	4	6.35	35.00499	-76.12048	A	6	*	
5	15	Aaron Griffith	NCB	8	6.48	35.00367	-76.12233	A	6	*	
5	15	Aaron Griffith	NCB	3	7.01	34.99853	-76.12920	A	6	*	
5	15	Aaron Griffith	NCB	50	8.12	34.98748	-76.14340	A	6	*	
5	15	Aaron Griffith	NCB	4	8.78	34.98089	-76.15176	A	6	*	
5	15	Aaron Griffith	NCB	6	9.18	34.97696	-76.15695	A	6	*	
5	15	Aaron Griffith	NCB	10	9.56	34.97323	-76.16199	B	6	*	
5	15	Aaron Griffith	NCB	7	10.01	34.96889	-76.16780	A	6	*	
5	15	Aaron Griffith	NCB	3	10.62	34.96284	-76.17598	A	6	*	
5	15	Aaron Griffith	NCB	17	11.3	34.95615	-76.18462	A	6	*	
5	15	Aaron Griffith	NCB	4	11.48	34.95434	-76.18684	A	6	*	
5	15	Aaron Griffith	NCB	3	11.95	34.94953	-76.19275	A	6	*	
5	15	Aaron Griffith	NCB	4	12.17	34.94725	-76.19551	A	6	*	
5	15	Aaron Griffith	NCB	6	12.74	34.94146	-76.20251	B	6	*	
5	15	Aaron Griffith	NCB	5	13.38	34.93483	-76.21055	A	6	*	
5	15	Aaron Griffith	NCB	26	13.6	34.93264	-76.21333	A	6	*	
5	15	Aaron Griffith	NCB	9	14.88	34.91922	-76.22890	B	6	*	
5	15	Aaron Griffith	NCB	4	16.12	34.90650	-76.24441	A	6	*	
5	15	Aaron Griffith	NCB	16	16.81	34.89992	-76.25351	A	6	*	
5	15	Aaron Griffith	NCB	1	17.84	34.89008	-76.26918	A	6	*	
5	15	Aaron Griffith	NCB	6	18.33	34.88551	-76.27364	A	6	*	
5	25	Kara Moody	NCB	1	0.19	35.06034	-76.03615	A	3	*	
5	25	Kara Moody	NCB	7	1.3	35.04934	-76.05051	A	3	*	
5	25	Kara Moody	NCB	16	1.8	35.04579	-76.05836	A	3	*	UL: light green flag (175), UR: geolocator
5	25	Kara Moody	NCB	5	2.16	35.04373	-76.06300	B	3	*	
5	25	Kara Moody	NCB	22	2.28	35.04275	-76.06550	A	3	*	
5	25	Kara Moody	NCB	1	2.73	35.03926	-76.07238	B	3	*	
5	25	Kara Moody	NCB	1	2.85	35.03828	-76.07409	A	3	*	
5	25	Kara Moody	NCB	4	3.09	35.03648	-76.07715	A	3	*	
5	25	Kara Moody	NCB	2	4.21	35.02592	-76.09267	A	3	*	

5	25	Kara Moody	NCB	21	4.58	35.02224	-76.09760	B	3	*	
5	25	Kara Moody	NCB	17	5.17	35.01667	-76.10532	A	3	*	
5	25	Kara Moody	NCB	76	5.39	35.01439	-76.10819	A	4	*	
5	25	Kara Moody	NCB	3	5.85	35.01002	-76.11423	A	4	*	
5	25	Kara Moody	NCB	1	7.05	34.99815	-76.12982	A	4	*	
5	25	Kara Moody	NCB	3	7.19	34.99683	-76.13171	A	4	*	
5	25	Kara Moody	NCB	5	7.75	34.99129	-76.13882	A	4	*	
5	25	Kara Moody	NCB	13	8.03	34.98848	-76.14240	A	4	*	
5	25	Kara Moody	NCB	16	8.95	34.97926	-76.15417	A	5	*	
5	25	Kara Moody	NCB	4	9.14	34.97741	-76.15652	B	5	*	
5	25	Kara Moody	NCB	6	9.41	34.97482	-76.16019	A	5	*	
5	25	Kara Moody	NCB	9	9.51	34.97376	-76.16151	A	5	*	
5	25	Kara Moody	NCB	41	9.81	34.97088	-76.16537	A	5	*	
5	25	Kara Moody	NCB	3	10.02	34.96878	-76.16799	B	5	*	
5	25	Kara Moody	NCB	6	10.23	34.96673	-76.17082	A	5	*	
5	25	Kara Moody	NCB	3	10.5	34.96414	-76.17426	B	5	*	
5	25	Kara Moody	NCB	17	10.67	34.96246	-76.17660	A	5	*	UL: orange flag (E3L), LL: metal, UR: red band
5	25	Kara Moody	NCB	29	10.77	34.96151	-76.17787	A	5	*	
5	25	Kara Moody	NCB	49	10.88	34.96045	-76.17934	B	7	*	
5	25	Kara Moody	NCB	40	11.03	34.95897	-76.18130	A	7	*	
5	25	Kara Moody	NCB	72	11.25	34.95673	-76.18413	A	7	*	
5	25	Kara Moody	NCB	2	11.72	34.95190	-76.18995	B	7	*	
5	25	Kara Moody	NCB	9	11.89	34.95014	-76.19198	A	7	*	
5	25	Kara Moody	NCB	2	12.02	34.94884	-76.19366	A	7	*	
5	25	Kara Moody	NCB	12	12.16	34.94747	-76.19547	A	7	*	
5	25	Kara Moody	NCB	30	12.72	34.94165	-76.20244	A	7	*	
5	25	Kara Moody	NCB	18	12.89	34.93996	-76.20461	A	7	*	
5	25	Kara Moody	NCB	3	13.05	34.93836	-76.20657	B	7	*	
5	25	Kara Moody	NCB	5	13.16	34.93724	-76.20788	B	7	*	
5	25	Kara Moody	NCB	5	13.31	34.93563	-76.20978	A	7	*	
5	25	Kara Moody	NCB	14	13.59	34.93280	-76.21326	B	7	*	
5	25	Kara Moody	NCB	15	13.81	34.93043	-76.21580	A	7	*	
5	25	Kara Moody	NCB	15	14.11	34.92720	-76.21945	A	7	*	
5	25	Kara Moody	NCB	6	14.24	34.92592	-76.22105	B	7	*	

5	25	Kara Moody	NCB	17	14.33	34.92503	-76.22217	A	7	*	
5	25	Kara Moody	NCB	8	14.4	34.92432	-76.22312	B	7	*	
5	25	Kara Moody	NCB	19	14.54	34.92289	-76.22482	A	7	*	
5	25	Kara Moody	NCB	3	14.75	34.92059	-76.22736	B	7	*	
5	25	Kara Moody	NCB	4	15	34.91789	-76.23036	B	7	*	
5	25	Kara Moody	NCB	16	16.43	34.90350	-76.24846	A	7	*	
5	25	Kara Moody	NCB	8	17.43	34.89388	-76.26168	B	7	*	
5	25	Kara Moody	NCB	2	17.71	34.89125	-76.26538	B	7	*	
5	25	Kara Moody	NCB	4	17.88	34.88977	-76.26770	A	7	*	
5	25	Kara Moody	NCB	3	18.18	34.88688	-76.27178	A	7	*	
5	25	Kara Moody	NCB	30	18.5	34.88404	-76.27617	A	7	*	
6	5	Aaron Griffith	NCB	12	1.09	35.05151	-76.04545	A	1	*	
6	5	Aaron Griffith	NCB	12	2	35.04748	-76.05444	A	1	*	
6	5	Aaron Griffith	NCB	6	2.05	35.04666	-76.05634	A	1	*	
6	5	Aaron Griffith	NCB	17	2.16	35.04377	-76.06322	B	1	*	
6	5	Aaron Griffith	NCB	30	3.2	35.03535	-76.07897	A	1	*	
6	5	Aaron Griffith	NCB	4	10.41	34.96498	-76.17323	B	3	*	
6	5	Aaron Griffith	NCB	6	13.19	34.93690	-76.20823	A	3	*	
7	15	Aubrie Russell	NCB	1	2.8	35.03854	-76.07329	B	2	*	
7	15	Aubrie Russell	NCB	42	2.59	35.04031	-76.07015	A	2	*	
7	15	Aubrie Russell	NCB	5	2.14	35.04402	-76.06212	B	2	*	
7	15	Aubrie Russell	NCB	87	1.8	35.04549	-76.05913	A	2	*	
7	15	Aubrie Russell	NCB	44	1.49	35.04790	-76.05345	B	1	*	UL: light green flag (604), LR: metal; UL: light green flag (708), LR: metal
7	15	Aubrie Russell	NCB	4	1.15	35.05043	-76.04790	A	1	*	
7	25	Moody & Griffith	NCB	33	0.13	35.06282	-76.03814	B	4	*	
7	25	Moody & Griffith	NCB	19	1.26	35.04951	-76.04966	B	4	*	
7	25	Moody & Griffith	NCB	3	1.47	35.04800	-76.05306	B	4	*	
7	25	Moody & Griffith	NCB	13	1.56	35.04745	-76.05447	B	4	*	UL: light green flag (284), UR: geolocator, LR: metal
7	25	Moody & Griffith	NCB	2	1.89	35.04524	-76.05975	B	4	*	
7	25	Moody & Griffith	NCB	2	2.32	35.04243	-76.06618	A	2	*	
7	25	Moody & Griffith	NCB	3	2.54	35.04079	-76.06950	A	2	*	
7	25	Moody & Griffith	NCB	21	2.81	35.03895	-76.07351	A	2	*	
7	25	Moody & Griffith	NCB	1	3.04	35.03664	-76.07684	A	2	*	

7	25	Moody & Griffith	NCB	18	3.22	35.03514	-76.07915	A	2	*	UL: geolocator, UR: light green flag (1MK), LR: metal
7	25	Moody & Griffith	NCB	14	3.73	35.03041	-76.08618	B	2	*	
7	25	Moody & Griffith	NCB	2	3.88	35.02906	-76.08825	A	2	*	
7	25	Moody & Griffith	NCB	2	4.33	35.02480	-76.09436	B	2	*	
7	25	Moody & Griffith	NCB	2	4.78	35.02047	-76.10032	A	2	*	
7	25	Moody & Griffith	NCB	9	5.54	35.01302	-76.11023	A	2	*	
8	5	Aubrie Russell	NCB	8	15.65	34.91135	-76.23855	B	2	*	
8	5	Aubrie Russell	NCB	5	15.46	34.91338	-76.23628	B	2	*	
8	5	Aubrie Russell	NCB	1	15.26	34.91527	-76.23363	A	2	*	
8	5	Aubrie Russell	NCB	2	15.01	34.91790	-76.23053	A	2	*	
8	5	Aubrie Russell	NCB	6	13.27	34.93606	-76.20924	B	2	*	UL: light green flag (SLV), LR: metal
8	5	Aubrie Russell	NCB	7	11.57	34.95350	-76.18801	A	2	*	
8	5	Aubrie Russell	NCB	5	10.62	34.96295	-76.17597	A	2	*	
8	5	Aubrie Russell	NCB	5	9.46	34.97425	-76.16082	A	2	*	
8	5	Aubrie Russell	NCB	13	8.39	34.98478	-76.14683	B	1	*	UL: light green flag (4XJ), LR: metal; UL: light green flag (28(?)4), UR: geolocator, LR: metal
8	5	Aubrie Russell	NCB	5	8.15	34.98732	-76.14392	A	1	*	
8	5	Aubrie Russell	NCB	5	7.71	34.99164	-76.13819	B	1	*	
8	5	Aubrie Russell	NCB	11	6.47	35.00377	-76.12221	A	1	*	
8	5	Aubrie Russell	NCB	21	5.79	35.01043	-76.11339	A	1	*	
8	5	Aubrie Russell	NCB	20	5.48	35.01354	-76.10939	A	1	*	
8	5	Aubrie Russell	NCB	1	4.8	35.02013	-76.10042	A	1	*	
8	5	Aubrie Russell	NCB	7	4.7	35.02108	-76.09905	B	1	*	
8	5	Aubrie Russell	NCB	1	4.58	35.02233	-76.09756	A	1	*	
8	5	Aubrie Russell	NCB	16	3.67	35.03086	-76.08537	A	1	*	
8	5	Aubrie Russell	NCB	3	3.16	35.03567	-76.07818	A	1	*	
8	5	Aubrie Russell	NCB	106	2.82	35.03848	-76.07370	A	1	*	UL: light green flag (169), UR: geolocator, LR: metal
8	5	Aubrie Russell	NCB	6	2.41	35.04167	-76.06741	A	1	*	
8	5	Aubrie Russell	NCB	4	2.26	35.04280	-76.06499	A	1	*	
8	5	Aubrie Russell	NCB	2	2.18	35.04352	-76.06326	A	1	*	
8	5	Aubrie Russell	NCB	3	2.14	35.04401	-76.06217	A	1	*	
8	5	Aubrie Russell	NCB	14	1.95	35.04476	-76.06062	A	1	*	UL: light green flag (2P5), LR: metal
8	5	Aubrie Russell	NCB	19	1.77	35.04597	-76.05772	A	1	*	

8	5	Aubrie Russell	NCB	3	1.56	35.04736	-76.05447	B	1	*	
8	5	Aubrie Russell	NCB	7	1.48	35.04793	-76.05316	A	1	*	
8	5	Aubrie Russell	NCB	21	1.34	35.04885	-76.05090	A	1	*	
8	5	Aubrie Russell	NCB	25	1.25	35.04958	-76.04946	A	1	*	
8	5	Aubrie Russell	NCB	5	1.18	35.05011	-76.04833	A	1	*	
8	5	Aubrie Russell	NCB	1	1.12	35.05070	-76.04711	A	1	*	
8	5	Aubrie Russell	NCB	11	1.09	35.05124	-76.04603	A	1	*	
8	5	Aubrie Russell	NCB	28	0.61	35.05453	-76.04023	A	1	*	
8	5	Aubrie Russell	NCB	1	0.12	35.06393	-76.04007	A	3	*	
8	15	Aaron Griffith	NCB	7	0.29	35.05910	-76.03714	B	7	*	
8	15	Aaron Griffith	NCB	2	2.23	35.04297	-76.06423	A	7	*	
8	15	Aaron Griffith	NCB	14	3.68	35.03077	-76.08536	B	7	*	
8	15	Aaron Griffith	NCB	3	4.36	35.02431	-76.09468	A	7	*	
8	15	Aaron Griffith	NCB	16	4.58	35.02230	-76.09751	A	7	*	
8	15	Aaron Griffith	NCB	4	5.03	35.01788	-76.10341	A	7	*	
8	15	Aaron Griffith	NCB	18	6.46	35.00385	-76.12196	A	7	*	
8	15	Aaron Griffith	NCB	2	7.7	34.99160	-76.13810	A	7	*	
8	15	Aaron Griffith	NCB	3	10.62	34.96284	-76.17586	A	7	*	
8	25	Aubrie Russell	NCB	11	0.14	35.06272	-76.03817	A	6	*	
8	25	Aubrie Russell	NCB	7	1.08	35.05140	-76.04579	A	6	*	
8	25	Aubrie Russell	NCB	4	1.12	35.05062	-76.04719	A	6	*	
8	25	Aubrie Russell	NCB	4	1.2	35.04993	-76.04872	A	6	*	
8	25	Aubrie Russell	NCB	2	1.38	35.04860	-76.05152	A	6	*	
8	25	Aubrie Russell	NCB	3	1.42	35.04831	-76.05227	A	6	*	
8	25	Aubrie Russell	NCB	2	1.61	35.04706	-76.05527	A	6	*	
8	25	Aubrie Russell	NCB	1	1.65	35.04673	-76.05597	A	6	*	
8	25	Aubrie Russell	NCB	11	1.75	35.04614	-76.05746	A	6	*	UL: light green flag (appeared to be blank), UR: light green band, LR: metal
8	25	Aubrie Russell	NCB	7	2.13	35.04434	-76.06152	A	6	*	UL: light green flag (169), UR: geolocator, LR: metal
8	25	Aubrie Russell	NCB	2	2.16	35.04377	-76.06280	A	6	*	
8	25	Aubrie Russell	NCB	27	2.25	35.04303	-76.06482	A	6	*	
8	25	Aubrie Russell	NCB	7	2.63	35.04002	-76.07080	A	6	*	
8	25	Aubrie Russell	NCB	1	2.96	35.03724	-76.07568	A	6	*	

8	25	Aubrie Russell	NCB	12	3.08	35.03678	-76.07648	A	6	*	
8	25	Aubrie Russell	NCB	14	3.29	35.03444	-76.08014	A	6	*	
8	25	Aubrie Russell	NCB	2	3.62	35.03124	-76.08465	A	6	*	
8	25	Aubrie Russell	NCB	1	5.22	35.01615	-76.10593	B	4	*	
8	25	Aubrie Russell	NCB	4	6.1	35.00755	-76.11739	A	4	*	
8	25	Aubrie Russell	NCB	1	6.33	35.00517	-76.12040	A	4	*	
8	25	Aubrie Russell	NCB	3	6.59	35.00268	-76.12366	A	4	*	
8	25	Aubrie Russell	NCB	3	7.25	34.99627	-76.13232	A	4	*	
8	25	Aubrie Russell	NCB	1	7.51	34.99359	-76.13568	B	4	*	
8	25	Aubrie Russell	NCB	5	7.7	34.99181	-76.13813	B	4	*	
8	25	Aubrie Russell	NCB	5	7.92	34.98968	-76.14098	A	4	*	
8	25	Aubrie Russell	NCB	12	8.34	34.98535	-76.14642	A	4	*	
8	25	Aubrie Russell	NCB	3	8.69	34.98182	-76.15070	A	4	*	
8	25	Aubrie Russell	NCB	4	10.24	34.96669	-76.17100	B	4	*	
8	25	Aubrie Russell	NCB	10	14.6	34.92241	-76.22569	A	4	*	
9	5	Aaron Griffith	NCB	11	1.1	35.05087	-76.04694	A	1	*	
9	5	Aaron Griffith	NCB	2	8.18	34.98698	-76.14428	B	1	*	
9	5	Aaron Griffith	NCB	2	16.71	34.90092	-76.25213	A	1	*	
9	15	Aubrie Russell	NCB	1	0.7	35.05371	-76.04162	A	5	*	
9	15	Aubrie Russell	NCB	4	1.08	35.05120	-76.04631	A	5	*	
9	15	Aubrie Russell	NCB	2	14.66	34.92157	-76.22621	B	5	*	
9	15	Aubrie Russell	NCB	3	17.27	34.89545	-76.25949	A	5	*	
9	25	Jon Altman	NCB	2	14.5	34.92313	-76.22419	B	8	*	
9	25	Jon Altman	NCB	3	13.23	34.93640	-76.20858	B	8	*	
10	17	Jon Altman	NCB	0					8	*	
10	24	Jon Altman	NCB	0					8	*	
11	16	Jon Altman	NCB	19		35.01926	-76.10150	A		*	GF 3CV
11	16	Jon Altman	NCB	20		35.00703	-76.11768	A		*	GF E0A

Appendix 2b. 2012 Red Knot Survey Data South Core Banks

Month	Day	Observer	Island	#REKN	Mile	Latitude	Longitude	Disturb.	Tide	Ac.	Comments (Bands)
3	14	Lamm & Stephenson	SCB	3	23.64	34.83393	-76.34409	A	6	*	
4	5	Lamm & Moore	SCB	1	28.13	34.78212	-76.39154	B	6	*	
4	15	Erin Lamm	SCB	14	40.87	34.62883	-76.51569	A	6	*	
4	15	Erin Lamm	SCB	2	40.30	34.63585	-76.51118	B	6	*	
4	15	Erin Lamm	SCB	2	39.50	34.64661	-76.50502	A	6	*	
4	15	Erin Lamm	SCB	2	38.97	34.65359	-76.50096	A	6	*	
4	15	Erin Lamm	SCB	44	37.70	34.66924	-76.48937	A	6	*	
4	15	Erin Lamm	SCB	44	37.45	34.67223	-76.48690	A	6	*	
4	15	Erin Lamm	SCB	1	32.00	34.73656	-76.43171	A	6	*	
4	25	Carolyn Moore	SCB	7	25.96	34.80616	-76.36678	A	7	*	
4	25	Carolyn Moore	SCB	44	26.58	34.79942	-76.37412	B	7	*	
4	25	Carolyn Moore	SCB	161	27.89	34.78477	-76.38888	A	7	*	
4	25	Carolyn Moore	SCB	7	29.45	34.76644	-76.40499	A	8	*	
4	25	Carolyn Moore	SCB	13	31.53	34.74237	-76.42692	A	8	*	
4	25	Carolyn Moore	SCB	9	32.18	34.73482	-76.43363	B	8	*	
5	5	Erin Lamm	SCB	15	40.89	34.62845	-76.51572	A	7	*	
5	5	Erin Lamm	SCB	116	39.32	34.64899	-76.50369	B	7	*	
5	5	Erin Lamm	SCB	36	39.10	34.65183	-76.50208	A	7	*	
5	5	Erin Lamm	SCB	2	33.60	34.71799	-76.44805	A	7	*	
5	5	Erin Lamm	SCB	7	25.98	34.80572	-76.36710	A	7	*	
5	5	Erin Lamm	SCB	26	25.66	34.80945	-76.36337	B	7	*	
5	15	Carolyn Moore	SCB	7	47.18	34.62954	-76.55547	B	6	*	
5	15	Carolyn Moore	SCB	4	41.04	34.62673	-76.51714	B	6	*	
5	15	Carolyn Moore	SCB	3	34.82	34.70368	-76.46074	A	6	*	
5	15	Carolyn Moore	SCB	11	34.38	34.70892	-76.45621	A	6	*	
5	15	Carolyn Moore	SCB	14	33.90	34.71448	-76.45127	A	6	*	
5	15	Carolyn Moore	SCB	11	33.18	34.72309	-76.44421	B	6	*	
5	15	Carolyn Moore	SCB	6	32.05	34.73628	-76.43234	A	6	*	
5	15	Carolyn Moore	SCB	10	31.82	34.73896	-76.42984	A	6	*	

5	15	Carolyn Moore	SCB	3	30.30	34.75657	-76.41353	A	6	*	
5	15	Carolyn Moore	SCB	2	29.95	34.76057	-76.40998	B	6	*	
5	15	Carolyn Moore	SCB	41	28.86	34.77359	-76.39925	B	6	*	
5	15	Carolyn Moore	SCB	7	28.66	34.77602	-76.39714	B	6	*	
5	15	Carolyn Moore	SCB	9	28.56	34.77709	-76.39602	B	6	*	
5	15	Carolyn Moore	SCB	1	27.90	34.78464	-76.38888	A	6	*	
5	15	Carolyn Moore	SCB	2	27.15	34.79309	-76.38060	B	6	*	
5	15	Carolyn Moore	SCB	19	26.80	34.79694	-76.37653	B	6	*	
5	15	Carolyn Moore	SCB	8	26.05	34.80516	-76.36797	B	6	*	
5	15	Carolyn Moore	SCB	4	25.36	34.81290	-76.36017	B	6	*	
5	15	Carolyn Moore	SCB	10	24.40	34.82378	-76.34958	B	6	*	
5	15	Carolyn Moore	SCB	6	24.19	34.82629	-76.34741	B	6	*	
5	15	Carolyn Moore	SCB	8	23.86	34.82981	-76.34348	B	6	*	
5	15	Carolyn Moore	SCB	12	23.55	34.83350	-76.34015	B	6	*	
5	25	Erin Lamm	SCB	3	45.37	34.60477	-76.54623	A	3	*	
5	25	Erin Lamm	SCB	5	43.47	34.59421	-76.53342	A	3	*	
5	25	Erin Lamm	SCB	4	43.19	34.60353	-76.53091	B	3	*	
5	25	Erin Lamm	SCB	8	42.67	34.60556	-76.53010	B	3	*	
5	25	Erin Lamm	SCB	4	41.63	34.61919	-76.52223	A	3	*	
5	25	Erin Lamm	SCB	28	40.98	34.62747	-76.51687	A	3	*	
5	25	Erin Lamm	SCB	2	40.57	34.63269	-76.51321	B	3	*	
5	25	Erin Lamm	SCB	14	39.94	34.64080	-76.50819	A	3	*	
5	25	Erin Lamm	SCB	19	39.72	34.64383	-76.50665	A	3	*	
5	25	Erin Lamm	SCB	28	39.40	34.64803	-76.50447	B	3	*	
5	25	Erin Lamm	SCB	58	39.12	34.65129	-76.50275	A	3	*	
5	25	Erin Lamm	SCB	49	38.90	34.65453	-76.50064	B	3	*	
5	25	Erin Lamm	SCB	20	37.89	34.66707	-76.49141	B	3	*	UL- Orange flag, LL- White band
5	25	Erin Lamm	SCB	54	36.54	34.68328	-76.47800	A	3	*	UR- White band (only band)
5	25	Erin Lamm	SCB	19	35.37	34.69730	-76.46653	A	3	*	
5	25	Erin Lamm	SCB	22	34.07	34.71255	-76.45315	A	3	*	
5	25	Erin Lamm	SCB	19	33.60	34.71813	-76.44825	B	3	*	
5	25	Erin Lamm	SCB	75	32.97	34.72557	-76.44209	B	5	*	
5	25	Erin Lamm	SCB	22	32.18	34.73491	-76.43378	A	5	*	
5	25	Erin Lamm	SCB	20	31.78	34.73949	-76.42942	A	5	*	
5	25	Erin Lamm	SCB	15	31.37	34.74416	-76.42506	A	5	*	



5	25	Erin Lamm	SCB	4	30.48	34.75449	-76.41563	A	5	*	
5	25	Erin Lamm	SCB	12	30.05	34.75974	-76.41081	A	5	*	
5	25	Erin Lamm	SCB	50	29.31	34.76814	-76.40347	A	5	*	
5	25	Erin Lamm	SCB	22	28.52	34.77755	-76.39569	A	5	*	
5	25	Erin Lamm	SCB	15	27.27	34.79182	-76.38190	A	5	*	
5	25	Erin Lamm	SCB	29	26.09	34.80470	-76.36826	A	5	*	
5	25	Erin Lamm	SCB	11	25.72	34.80874	-76.36408	A	5	*	
5	25	Erin Lamm	SCB	11	25.21	34.81456	-76.36385	A	5	*	
5	25	Erin Lamm	SCB	13	25.00	34.81660	-76.35640	A	5	*	
5	25	Erin Lamm	SCB	7	24.13	34.82687	-76.34668	A	5	*	
5	25	Erin Lamm	SCB	22	23.88	34.82951	-76.34384	A	5	*	
6	5	Carolyn Moore	SCB	1	46.98	34.62650	-76.55499	B	7	*	
6	5	Carolyn Moore	SCB	23	27.89	34.78477	-76.38872	B	8	*	LL- Red flag LHK, RL- Silver band
7	15	Erin Lamm	SCB	18	39.00	34.65313	-76.50153	B	7	*	
7	25	Carolyn Moore	SCB	48	43.43	34.59473	-76.53318	B	5	*	
7	25	Carolyn Moore	SCB	57	42.24	34.61127	-76.52688	C	5	*	
7	25	Carolyn Moore	SCB	35	40.40	34.63485	-76.51189	C	5	*	
7	25	Carolyn Moore	SCB	58	40.05	34.63944	-76.50902	B	5	*	
8	5	Erin Lamm	SCB	2	44.20	34.58504	-76.53349	A	5	*	
8	5	Erin Lamm	SCB	3	40.18	34.63769	-76.50998	B	5	*	
8	5	Erin Lamm	SCB	7	39.80	34.64262	-76.50793	B	5	*	
8	5	Erin Lamm	SCB	3	39.55	34.64592	-76.50543	B	5	*	
8	5	Erin Lamm	SCB	97	39.09	34.65433	-76.50060	B	5	*	
8	5	Erin Lamm	SCB	10	34.08	34.71234	-76.45300	B	5	*	
8	5	Erin Lamm	SCB	11	33.92	34.72603	-76.44142	A	5	*	
8	5	Erin Lamm	SCB	18	32.70	34.72866	-76.43902	B	7	*	
8	5	Erin Lamm	SCB	40	30.39	34.75554	-76.41441	B	7	*	
8	5	Erin Lamm	SCB	19	30.08	34.75920	-76.41135	A	7	*	
8	5	Erin Lamm	SCB	3	27.81	34.78555	-76.38769	B	7	*	
8	5	Erin Lamm	SCB	52	27.46	34.78960	-76.38402	B	7	*	
8	5	Erin Lamm	SCB	117	27.10	34.79583	-76.37778	A	7	*	
8	5	Erin Lamm	SCB	13	26.41	34.80109	-76.37197	A	7	*	
8	15	Carolyn Moore	SCB	8	43.83	34.58909	-76.53396	B	8	*	
8	15	Carolyn Moore	SCB	4	39.63	34.64489	-76.50597	B	8	*	
8	15	Carolyn Moore	SCB	3	34.50	34.70742	-76.45749	B	8	*	

8	15	Carolyn Moore	SCB	27	32.07	34.73593	-76.43246	B	8	*	
8	15	Carolyn Moore	SCB	6	30.86	34.75010	-76.41955	B	8	*	
8	15	Carolyn Moore	SCB	18	30.08	34.75921	-76.41134	B	8	*	
8	15	Carolyn Moore	SCB	6	29.25	34.76874	-76.40287	B	8	*	
8	15	Carolyn Moore	SCB	34	28.76	34.77476	-76.39813	B	8	*	
8	15	Carolyn Moore	SCB	54	27.93	34.78421	-76.38917	C	8	*	
8	15	Carolyn Moore	SCB	19	26.89	34.79600	-76.37754	B	8	*	
8	25	Erin Lamm	SCB	16	23.26	34.83913	-76.34065	A	7	*	
8	25	Erin Lamm	SCB	20	25.76	34.85981	-76.28123	A	7	*	
8	25	Erin Lamm	SCB	3	26.65	34.79858	-76.37479	A	7	*	
8	25	Erin Lamm	SCB	2	27.16	34.79295	-76.38061	A	7	*	
8	25	Erin Lamm	SCB	24	27.82	34.78548	-76.38791	A	7	*	
8	25	Erin Lamm	SCB	6	29.62	34.76438	-76.40649	B	7	*	
8	25	Erin Lamm	SCB	3	30.70	34.75193	-76.41795	A	7	*	UL- Red flag ECL
8	25	Erin Lamm	SCB	22	31.94	34.73748	-76.43116	A	8	*	
8	25	Erin Lamm	SCB	10	34.26	34.71029	-76.45506	B	8	*	
8	25	Erin Lamm	SCB	13	34.60	34.70626	-76.45861	B	8	*	
8	25	Erin Lamm	SCB	42	37.83	34.66771	-76.49067	B	6	*	
9	5	Carolyn Moore	SCB	22	27.62	34.78777	-76.38586	B	3	*	
9	5	Carolyn Moore	SCB	10	23.45	34.83483	-76.33959	B	3	*	
9	13	Carolyn Moore	SCB	4	31.21	34.74608	-76.42348	A	2	*	
9	13	Carolyn Moore	SCB	5	27.45	34.78962	-76.38387	B	2	*	
9	25	Jon Altman	SCB	0					8	*	
10	5	Erin Lamm	SCB	2	23.21	34.83923	-76.33982	A	7	*	
10	14	Erin Lamm	SCB	5	23.22	34.83912	-76.34000	A	1	*	
10	14	Erin Lamm	SCB	5	26.05	34.80506	-76.36769	A	1	*	
10	14	Erin Lamm	SCB	5	39.79	34.64299	-76.50739	B	3	*	
10	25	Jon Altman	SCB	0					8	*	
11	14	Jon Altman	SB	69	48	34.64452	-76.54638	B		*	