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Nathan M. Bacheler, Zebulon H. Schobernd, Bradford Z. Teer, Erin P. Pickett, Kevan C. Gregalis, Zachary D. Gillum, Christina M. Schobernd

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
101 Pivers Island Road
Beaufort, NC 28516 USA

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Southeast Fisheries Science Center, Beaufort Laboratory
101 Pivers Island Road
Beaufort, NC 28516

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Rick Spinrad, Under Secretary for Oceans and Atmosphere

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Janet Coit, Assistant Administrator for Fisheries

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Authors and affiliations:

Nathan M. Bacheler, Zebulon H. Schobernd, Kevan C. Gregalis, Christina M. Schobernd, National Marine Fisheries Service, Southeast Fisheries Science Center, Beaufort, NC

Bradford Z. Teer, Erin P. Pickett, Zachary D. Gillum, TechGlobal, Inc., 5850 Crabbs Branch Way, Suite 380, Rockville, MD; under contract to National Marine Fisheries Service, Southeast Fisheries Science Center, Beaufort, NC . https://doi.org/10.25923/pejz-qn59

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Questions, comments, or feedback on this report? Please contact:

Nathan Bacheler
nate.bacheler@noaa.gov
NOAA Southeast Fisheries Science Center
Beaufort Laboratory
101 Pivers Island Road
Beaufort, North Carolina 28516
PDF version available at www.sefsc.noaa.gov

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Introduction

Since 2010, SERFS videos are read using the MeanCount approach described by Schobernd et al. (2014). MeanCount is used to index the relative abundance of approximately 100 priority species that are high priorities for management. Beginning in 2015, an additional component was added to video reading, which was noting the presence or absence of nearly all fish taxa over the entire 20-minute interval of time within which MeanCount occurs. This additional presence-absence video reading component has been extremely useful and has resulted in new knowledge of reef fish in the region (e.g., Bacheler 2019, 2022). However, SERFS typically records much more bottom footage than is currently read.

Early in the COVID-19 pandemic, after all videos had been read using the typical SERFS video reading protocol, there was additional time for video readers to read videos. The decision was made to read the ***full length of videos*** (hereafter "full reads") for a suite of rare but important taxa that we thought could benefit from full reads:

- All sharks
- All species in the family Mobulidae (manta rays and devilfishes)
- All species in the family Pristidae (sawfishes)
- All species in the family Acipenseridae (sturgeon)
- Goliath grouper, Nassau grouper, Warsaw grouper, and speckled hind
- Sheepshead
- Cobia
- Spiny lobster
- All sea turtles in the family Cheloniidae

Any taxon that we were not able to identify to the species level was identified at the lowest possible taxonomic classification, and hereafter we call all of these "focal taxa". Here, we quantify the additional information we acquired for these focal taxa from full reads and discuss whether we believe the effort expended was worth the information gain.

Methods

SERFS video data collection and video reading protocols are discussed in Bacheler et al. (2020). For these analyses, we compared the presence-absence data for focal taxa during the typical 20-minute interval of time, beginning 10 minutes after traps land on the bottom, to full video reads where focal taxa were recorded as present or absent over the entire available length of video. Videos typical record for 45–70 minutes, so full reads involved viewing approximately 2–3 times more bottom footage than the typical 20-minute reads.

Videos from 2018 and 2019 were selected for full video reads. Most videos from 2019 were read using full reads (N = 1,383), while a smaller portion was read in 2018 (N = 592). Only videos that had valid full reads and valid typical 20-min reads were included in our direct comparison of presence-absence of focal taxa. For our analyses, we compared the frequency of occurrence (number of videos in which a focal taxon was observed on video) and percent occurrence (percent of videos in which a focal taxon was observed on video) by video reading approach (20-min vs full read). We also then calculated the percent increase of frequency of occurrence for each focal taxon on full reads compared to 20-min reads.

Results

A total of 26 focal taxa were recorded during full reads of 1,975 videos (Table 1). These taxa included 20 taxa identified to the species level, two taxa identified to the genus level, 3 taxa identified to the family level, and an "unidentified shark" taxa where video readers could identify individuals as sharks but not to the family level. Of the 20 taxa identified to the species level, 12 were sharks, 1 was a sawfish, 4 were bony fishes, 2 were turtles, and 1 was a lobster (Table 1). The most commonly observed taxa during full reads were sheepshead (12.61% of videos), Atlantic sharpnose sharks (11.39%), unidentified sharks (9.77%), cobia (5.92%), and spiny lobster (4.81%). Twelve of the twenty-six taxa were observed on five or fewer videos during full reads. Generally, the same ordering of taxa was observed during 20-min reads as full reads with only a few small exceptions. Four taxa observed (rarely) on full reads were absent on 20-min reads: great white shark, Mobulidae (manta ray family), great hammerhead shark, and smalltooth sawfish.

The percent increase of focal taxa on full reads compared to 20-min reads ranged from 0 to infinity (the latter for species not observed at all during 20-min reads); the mean percent increase (after excluding infinities) across all taxa was 110% (Table 1). For instance, sheepshead were observed 47% more often on full reads ($N = 249$) compared to 20-min reads ($N = 169$). The bony fish species with the highest percent increase on full read ($N = 117$) compared to 20-min videos ($N = 53$) was cobia (121%). Excluding taxa observed rarely ($N < 5$) on full reads and never on 20-min videos, the shark species with the highest percent increase on full reads ($N = 55$) compared to 20-min reads ($N = 20$) was tiger shark (175%), but note that all sharks were observed substantially more often on full reads, with the possible exception of sand tiger sharks (only a 40% increase). Loggerhead sea turtles were also seen much more often on full reads (145%), while green sea turtles were not (0%, but note $N = 1$ for each protocol). Spiny lobster were also seen more frequently on full reads (53%).

Some notable focal species not observed on full reads (or corresponding 20-min videos) were Warsaw grouper, Nassau grouper, sturgeon, and a variety of shark species (those not listed in Table 1).

Videos were collected in 2018 and 2019, but note that these videos were not evenly spread throughout the sampling area (Figure 1). Videos included in these analyses were also collected from April to September when combined across years, but were not necessarily available throughout the sampling area during each month (Figure 2).

Conclusion

Reading complete (full) instead of partial videos increased the frequency of occurrence for a number of taxa with management importance such as various shark and bony fish species, sea turtles, and spiny lobster. A number of these taxa could only be identified to the genus or family levels and others had extremely low sample sizes, meaning full read data would not be particularly useful for estimating species-specific relative abundance and therefore not very useful for management. For other species, full reads would likely be beneficial for management. For example, indices of abundance could likely be developed for species such as sheepshead, Atlantic sharpnose sharks, cobia, and perhaps spiny lobster and nurse sharks; full read data would likely result in significantly reduced uncertainty given much higher sample sizes from full read videos.

The drawback of reading full videos was the time and effort expended. It took 5 video readers approximately 7 months to complete full reads of the 1,975 videos included in this study. Note that video readers are already unable to read all videos collected each year using typical video reading protocols (e.g., only 1,374 of 2,025 videos or 68% were read from 2021) given insufficient video readers for the number of videos collected each year by SERFS. If more money were to become available for video reading, the first priority should be to hire more staff to read all videos using the typical SERFS video reading protocol. If that were to happen and then *additional* money were to become available to hire new staff to assist with video reading, full video reads for some or all videos each year might be possible, which would provide useful additional information for some focal species.

References

Bacheler et al. 2019. https://doi.org/10.1007/s12526-019-00981-9
Bacheler et al. 2020. https://doi.org/10.1002/mcf2.10118
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Table 1. Presence-absence of various taxa observed on 1,975 videos read by the Southeast Reef Fish Survey between North Carolina and Florida in 2018 and 2019. Frequency of occurrence and percent occurrence of various taxa were quantified using the standard 20-minute interval and compared to frequency of occurrence and percent occurrence from full video reads, where the entire video was read from the time it landed on the bottom to the end of the video or trap retrieval. Percent increase is the percent increase in frequency of occurrence from 20-min reads to full video reads for each taxa. Taxa were listed in descending order based on the percent occurrence on full reads.

Taxa	20-minute read		Full video read		Percent increase
	Frequency of occurrence	Percent occurrence	Frequency of occurrence	Percent occurrence	
Sheepshead	169	8.56	249	12.61	47
Atlantic sharpnose shark	127	6.43	225	11.39	77
Shark (unidentified to species)	94	4.76	193	9.77	105
Cobia	53	2.68	117	5.92	121
Spiny lobster	62	3.14	95	4.81	53
Nurse shark	37	1.87	84	4.25	127
Tiger shark	20	1.01	55	2.78	175
Sandbar shark	24	1.22	45	2.28	88
Carcharhinus species	9	0.46	30	1.52	233
Loggerhead sea turtle	11	0.56	27	1.37	145
Sphyrna species	9	0.46	21	1.06	133
Requiem shark family	3	0.15	15	0.76	400
Goliath grouper	11	0.56	15	0.76	36
Sand tiger shark	5	0.25	7	0.35	40
Scalloped hammerhead shark	2	0.10	5	0.25	150
Blacktip shark	2	0.10	4	0.20	100
Great white shark	0	0.00	3	0.15	Inf
Sea turtle family	1	0.05	3	0.15	200
Spinner shark	1	0.05	2	0.10	100
Bull shark	1	0.05	2	0.10	100
Manta ray family	0	0.00	2	0.10	Inf
Great hammerhead shark	0	0.00	2	0.10	Inf
Common thresher shark	1	0.05	1	0.05	0
Green sea turtle	1	0.05	1	0.05	0
Speckled hind	1	0.05	1	0.05	0
Smalltooth sawfish	0	0.00	1	0.05	Inf

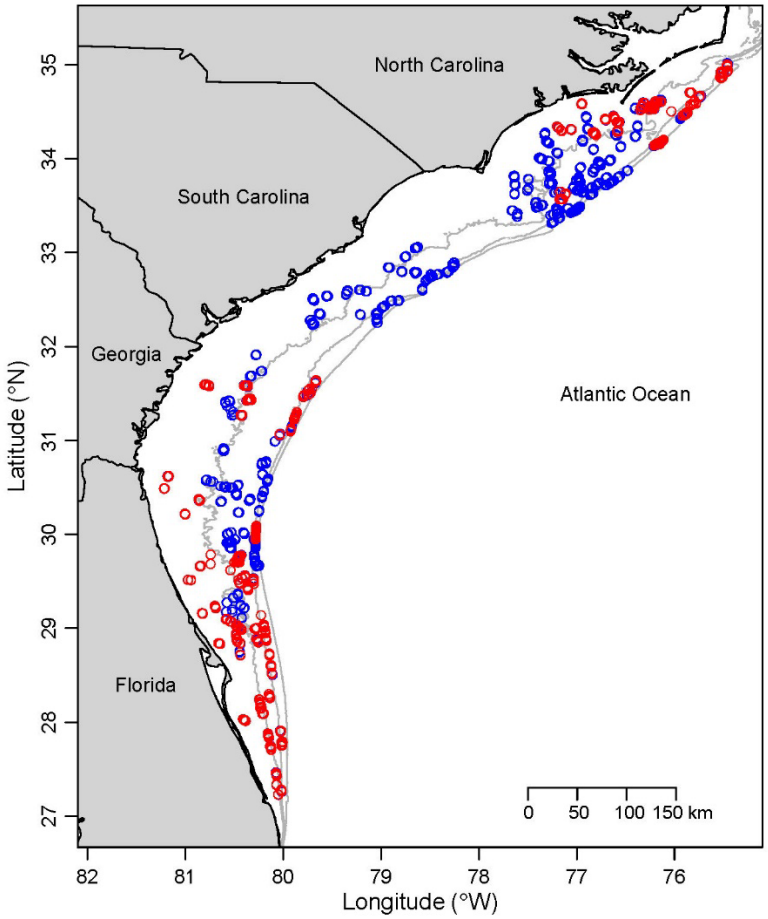

Figure 1. Spatial distribution of samples included in the video read time analyses. Red points are videos read from 2018 (N = 592) and blue points are videos read from 2019 (N = 1,383); note symbols overlap.

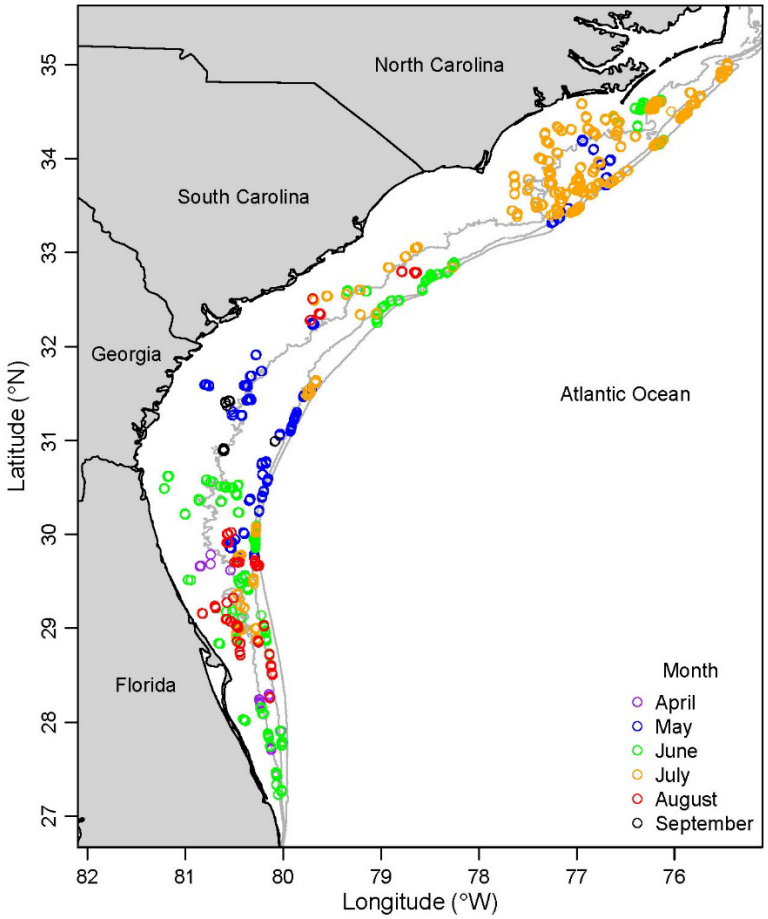

Figure 2. Temporal distribution of video samples included in the full read analyses, with points color coded by month. Note these samples occurred in both 2018 and 2019. Ideally, these samples would be spread out over the entire sampling area in each month of sampling.