SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

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August 18, 2023

Atlantic Coastal Cooperative Statistics Program
1050 N. Highland St. Ste. 200 A-N
Arlington, VA 22201

We are pleased to submit the proposal titled, "FY24: Expansion of the FISHstory Citizen Science Project." It is being submitted as a Year 1 Maintenance proposal. The FISHstory pilot project was developed through the SAFMC's Citizen Science Program. It uses historic photos from the 1940s-1970s to document for-hire catch and size composition for a time before recreational catch monitoring programs were established in the South Atlantic region. This proposal will build on the work done through the FY23 ACCSP grant. It will continue many of the same tasks - expanding the geographic and temporal scope of the project by compiling, archiving, and analyzing additional historic photos from multiple fleets, geographic regions, and from an expanded time range. Two new objectives are being incorporated into the FY24 proposal – to begin development of abundance indices from the historic images for King Mackerel and Red Snapper and to explore incorporation of the length determination protocol into the Zooniverse platform. The data collected through these efforts will provide additional catch, effort, and length data on the recreational for-hire sector during its nascent period which will offer researchers and managers an understanding of long-term changes in the fisheries and fish populations.

This proposal has been revised based on the reviewers' feedback. In the original proposal, reviewers asked that we remove any past highlighted text from the FY23 proposal before final submission. In this submission, the bold text indicates sections that help with the ranking process and green highlighted text indicates changes from our initial submission.

The FY24 FISHstory proposal would not benefit from receiving funding earlier than the usual disbursement in Spring 2024. We received the FY23 funding in July 2023. The FY24 proposal builds on the work done in the FY23 project, so we need to complete the FY23 project tasks before we can start on the FY24 proposal.

Please let us know if you have any questions or would like any additional information.

Best,

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Applicant Name: South Atlantic Fishery Management Council (SAFMC)

Project Title: FY24: Expansion of the FISHstory Citizen Science Project

Project Type: Maintenance – Year 1

Requested Award Amount: $123,068 (ACCSP Share: $86,815; Partner Share: $36,253)

Requested Award Period: One year upon receipt of funds

Submission Date: August 18, 2023

Principal Investigators: Julia Byrd, SAFMC and Jie Cao, North Carolina State University

Collaborators: Chip Collier and Allie Iberle, SAFMC
Ken Brennan and Kyle Shertzer, NOAA Southeast Fisheries Science Center

Photo from the Marianne in September 1965 archived through the FISHstory project. Credit: Rusty Hudson, Hudson, Stone & Timmons families.

OBJECTIVES:

- Expand geographical and temporal range of the FISHstory citizen science project in support of developing abundance indices for stock assessments of South Atlantic species
- Improve efficiency of data collection and photo processing
- Begin development of abundance indices for Red Snapper and King Mackerel
- Estimate length compositions for multiple species using the protocols developed during the pilot project with focus on Red Snapper and King Mackerel
- Explore incorporation of the length determination protocol into the Zooniverse platform
- Implement an outreach and engagement strategy to retain FISHstory's current volunteer base and recruit new users

NEED:

Stock assessments, which provide critical information to guide fishery management, rely on historical time-series information to make inferences about how fish stocks have responded to fishing activities and technological advancements. Relative abundance indices, e.g., catch per unit effort, and size and age compositions are two main types of data that are commonly used in fisheries stock assessments. However, these data are rarely available to describe the beginning of exploitation. Consequently, stock assessments often start from the year when these data are available and/or make assumptions about the status prior to that year. Such assumptions on historic stock abundance and size and age composition can have a significant influence on the inferences about fish population, e.g., productivity. Lack of historical information about abundance and size composition of exploited species can result in shifting baselines, against which modern populations are benchmarked. McClenachan et al. (2012) and Rosenberg et al. (2005) demonstrated that omission of relevant historical information typically led to overestimated abundance, underestimated recovery targets, and overestimated fisheries quotas. For instance, excluding the earliest 27 years of time series data in the Atlantic cod assessment resulted in reductions in estimates of maximum level of spawning stock biomass and long-term average biomass (McClenachan et al. 2012).

In the South Atlantic, few fishery-dependent surveys were in existence prior to the 1970s; those that existed were limited in scope and lacked comprehensiveness and continuity. Monitoring of the recreational headboat fishery began in the 1970s, and monitoring of private and charter boat fishing began in the early 1980s. However, there is indication that recreational fisheries were already operating in the region (Clark 1962; U.S. Department of the Interior et al. 1991). **Therefore, for most South Atlantic species (e.g., Red Snapper), traditional abundance indices and size and age composition data are not available for the years prior to 1970, when fisheries had already begun. In fact, for a species such as Red Snapper, the highest commercial landings on record occurred in the 1950s and 1960s. Lack of historical data**

may impair our ability to measure and understand long-term changes, to set meaningful targets for management and formulate stock rebuilding plans, and to better understand nonstationarity or regime shifts in stock productivity (Rosenberg et al. 2005, McClenachan et al. 2012).

Many stock assessments in the South Atlantic region start prior to the 1970s (e.g., SEDAR 73 South Atlantic Red Snapper, SEDAR 38 Update South Atlantic King Mackerel). To account for the lack of information prior to this time period, stock assessment scientists rely on species ratios and catch estimates from other sectors as proxies to estimate landings; alternatively modern landings trends are regressed back in time to recreate historical landings (SEDAR 2015). Historic photos have the potential to provide quantifiable species and length composition data at a point in time when fishery dependent surveys of the for-hire fleet did not exist (McClenachan 2009).

Using historic photos to improve recreational catch and size composition information is a 2021-2023 research priority for the SAFMC's Citizen Science Program. It addresses ACCSP recreational priorities #2 – 'Comprehensive for-hire data collection and monitoring' and #5 – 'Biological sampling for recreational fisheries separate from MRIP APAIS' by improving historic catch and effort and biological data from the for-hire sector prior to when fishery dependent catch programs were established in the South Atlantic region. This also matches research recommendations from recent stock assessments for important recreational species including Black Sea Bass, Cobia, Gray Triggerfish, and Red Snapper (SEDAR 2011, 2013, 2016, 2017, and 2023).

FISHstory, a pilot citizen science project, aiming to address this historic data gap, was completed in 2022. FISHstory was developed under the SAFMC's Citizen Science Program. This novel project successfully developed a standardized protocol for archiving and analyzing historic photos from the 1940s to 1970s from a for-hire fleet based in Florida to describe the beginnings of the South Atlantic for-hire fishery. The project had three primary components: digitizing and archiving historic fishing photos, analyzing historic photos to estimate for-hire catch composition and effort using crowdsourcing, and developing a method to estimate length distributions from historic photos. Through the pilot project, over 1,370 historical images from Daytona Beach, Florida were digitized and archived. The project established the FISHstory interface on Zooniverse, an online crowdsourcing platform, and developed an electronic data collection protocol using crowdsourcing to analyze historical catch images to determine historical species composition. This method is more cost-effective than traditional analysis techniques and allows for larger volumes of data to be collected in a more efficient manner. The protocol trained volunteers to identify and count the fish and people in the photos using online tutorials and training materials. Each photo was classified by multiple volunteers and when there was substantial disagreement among volunteers,

a Validation Team, composed of fishermen and scientists, verified species identifications and counts. Through the pilot, over 2,100 volunteers analyzed 1,000 photos which provided information from daily catches of a Florida fleet including species composition, total number by species or species group, and number of anglers per trip. The pilot also verified the feasibility of using an open-source image analysis software to determine historical length estimates. The method developed estimated fish length in the photos using the lumber in the leaderboards as a scalar. During the pilot project, all 1,374 photos were reviewed, King Mackerel were measured when present, and length compositions were produced.

The pilot FISHstory project demonstrated an opportunity to provide information on historical catch, fishing effort, and length composition for years before dedicated fishery-dependent monitoring. The data collected through this proposal can be integrated into the fishery dependent database and used to develop abundance indices for years during which they are not available. The extended historic time-series of abundance indices can potentially improve the assessments of South Atlantic species. However, in order to develop reliable abundance indices and include them in the assessments, more photos need to be collected and analyzed and a protocol for standardizing catch and effort data needs to be developed. The existing data collected from the FISHstory project are not likely to produce representative abundance indices of South Atlantic fish stocks because the data were collected from one fleet in one area, i.e., Daytona Beach, Florida. Additionally, the photos collected in the pilot FISHstory project were from the 1940s to 1970s, which covered a time period when both King Mackerel and Red Snapper had decreasing spawning stock biomass and increasing fishing mortality rate (SEDAR 38 Update 2019, SEDAR 73 2021). To make the historical abundance indices more useful and informative in the assessment, the historical indices need to be calibrated to existing modern indices used in the assessments. This will result in a complete time-series abundance index, allow better estimation of the productivity of the stock, and provide better information on the range of exploitation and population levels. Monitoring of the recreational headboat fishery began in the 1970s, and the headboat index would be a good candidate modern index. To calibrate historical indices to the headboat index, photos from the 1980s that overlap in time with the headboat survey are needed.

Through FY23 funding, we will build on the FISHstory pilot project's success by expanding FISHstory's geographic and temporal range, improving the efficiency of data collection and photo processing using lessons learned through the pilot, and estimating length composition for multiple species. The FY23 project is anticipated to begin in July 2023 when funding is received. To expand the spatial and temporal coverage of the project, we will focus on collecting and archiving photos from across the South Atlantic region between the 1940s and 1980s. Through the pilot project, several fishermen across the South Atlantic have indicated they have historical photos they would be willing to share with the FISHstory project. To gather photos, we will hold five FISHstory scanning events

in conjunction with SAFMC related meetings. We will hold scanning events at the fall 2023 Snapper Grouper, Mackerel Cobia, and Dolphin Wahoo Advisory Panel meetings, as well as the September and December SAFMC 2023 meetings. We have already begun promoting these events with advisory panel members at their spring 2023 meetings. Additionally, we are working to identify other sources for historic photos, such as local history museums and libraries (e.g. NC History Center in Manteo, NC), NOAA Central Library, and Smithsonian archives.

This proposal will continue and expand on the work done through the FY23 funding. We will continue working to expand FISHstory's geographic and temporal range, improve the efficiency of data collection and photo processing, estimate length composition for multiple species, explore incorporation of the length determination protocol into Zooniverse, **and begin development of abundance indices for Red Snapper and King Mackerel.**

RESULTS and BENEFITS:
This proposal will build on the success of the FISHstory pilot project which was developed under the SAFMC's Citizen Science Program. The project used an innovative citizen science approach to gather data from historic photos that serve as an untapped source of biological data for years prior to dedicated catch monitoring programs. This proposal aims to build on the pilot and work completed through the FY23 funding. It will expand the geographical and temporal scope of the pilot project by continuing to collect, compile, archive, and analyze additional historic photos from multiple fleets, geographic regions, and from an expanded time range (1940s – 1980s). This proposal will also continue estimating length compositions for multiple species using the protocols developed during the pilot project with focus on Red Snapper and King Mackerel, two important recreational species. The pilot project developed a protocol to measure fish length in the historic photos and estimate length compositions using King Mackerel as a test species. Additional species may be added to the length component of the project, depending on the photos archived during the FY23 efforts. Additionally, this proposal will also begin to develop abundance indices for Red Snapper and King Mackerel.

This proposal will result in an extended database with more fishery and biological information on the recreational for-hire sector during its nascent period. These comprehensive historic data will offer researchers and managers an understanding of long-term changes in the fisheries and fish populations. Additionally, these historic data will allow us to develop long-term time series of abundance indices for South Atlantic species which can be directly used in the stock assessments. The inclusion of these long-term indices in the assessments will likely improve the estimates of historical population dynamics and potential stock productivity. The length compositions can also be used as corroborative information alongside the assessments, for example to compare with

predicted trends in mean size, or they could potentially be included in the assessments as data to be fitted. In either case, historical compositions could help inform changes in population structure, growth, natural mortality, and recruitment. Ultimately, the results from this project will lead to more informed management decisions, which will increase the likelihood of more sustainable fisheries in the South Atlantic.

This proposal is a unique opportunity to use a citizen science approach to expand time series of length data and potentially abundance trends back into history. Citizen science, as defined by the Crowdsourcing and Citizen Science Act of 2016, is a form of open collaboration in which individuals participate voluntarily in the scientific process. This project will use citizen scientists in a variety of ways (see APPROACH): data submission through photographs, data analysis with crowdsourcing, and data verification through a validation team made up of government and academic scientists along with fishermen as citizen scientists.

Citizen science is growing in the United States and other countries (McKinley et al. 2017) and has been used for research, management, policy, and public engagement (Poisson et al. 2020). A growing number of publications has shown that diverse citizen science projects can produce data on par with traditional scientific data when properly designed, implemented, and evaluated (McKinley et al. 2017, Kosmala et al. 2016, Freitag et al. 2016). The FISHstory pilot project developed protocols that helped ensure the data collection methods would minimize bias, be appropriate for use in management, and could be expanded if the pilot project was successful (Byrd et al. 2022). Additionally, citizen science projects can foster learning opportunities, increase scientific engagement and acceptance, and can help build positive relationships within the community (Fairclough et al. 2014). The FISHstory pilot project provided an opportunity for volunteers to learn about the beginnings of the South Atlantic for-hire fishery and hone their fish identification skills. It also provided an opportunity for scientists to gain more insight into the historic headboat fishery and the daily catches from vessels operating during this time period. Overall, there has been a very positive response to the project from stakeholders across the South Atlantic region and there has been overwhelming support to continue and expand the project.

This proposal addresses ACCSP FY24 Request for Proposal priorities 1a. *Catch, effort, and landing data* and 1b. *Biological data*, as well as ACCSP recreational priorities #2 – 'Comprehensive for-hire data collection and monitoring' and #5 – 'Biological sampling for recreational fisheries separate from MRIP APAIS' by improving historic catch and effort and biological data from the for-hire sector prior to when fishery dependent catch programs were established in the South Atlantic region.

The specific benefits to each data type and the rank of the target species within priority matrices included are addressed below.

Primary Program Priority: Catch and Effort: 50%

Historic photos provide the opportunity to collect trip level effort and landings data for the for-hire sector for a historic time period prior to when catch monitoring programs were in place. The for-hire catch composition component of the FISHstory project will provide species composition and catch rate information from this historic time period. The effort and landings data collected through this proposal will be used to develop abundance indices which can be included in the assessments.

Secondary Priority: Biological Sampling: 50%

The length component of the FISHstory project will estimate length compositions for multiple species using the protocols developed during the pilot project and improved through the FY23 work. Although estimating fish lengths in historic photos may not be the traditional view of biological sampling, it can provide the same information – lengths of fish if that sampling had been done. If pictures are obtained that overlap some of the traditional sampling programs, the two sources of biological samples – fish lengths – can be compared. Through the pilot project, King Mackerel length compositions were developed for the photos currently archived representing length measurements for over 1,100 fish (Figure 1). For this proposal, length analysts will continue to focus on producing and updating length compositions for Red Snapper King Mackerel with measurements from newly archived historic photos. Additionally, we will explore incorporation of the length determination protocol into the Zooniverse platform. Red Snapper is in the top 25% of the ACCSP biological sampling priority matrix and will be undergoing a SEDAR Research Track stock assessment starting in 2024. The PI's and project collaborators will be involved in this assessment, so there is a direct avenue to ensure these data are considered in this assessment. Additionally, a SEDAR South Atlantic King Mackerel operational stock assessment is scheduled to begin in 2025 and the FISHstory length data are included in the statement of work for consideration of use in the assessment. If time allows, additional species will be measured that are frequently found in the historic photo set. Species found in the current photo archive that are also in the top 25% of the ACCSP biological sampling matrix, include Red Grouper, Gag Grouper, Gray Triggerfish, and Black Sea Bass.

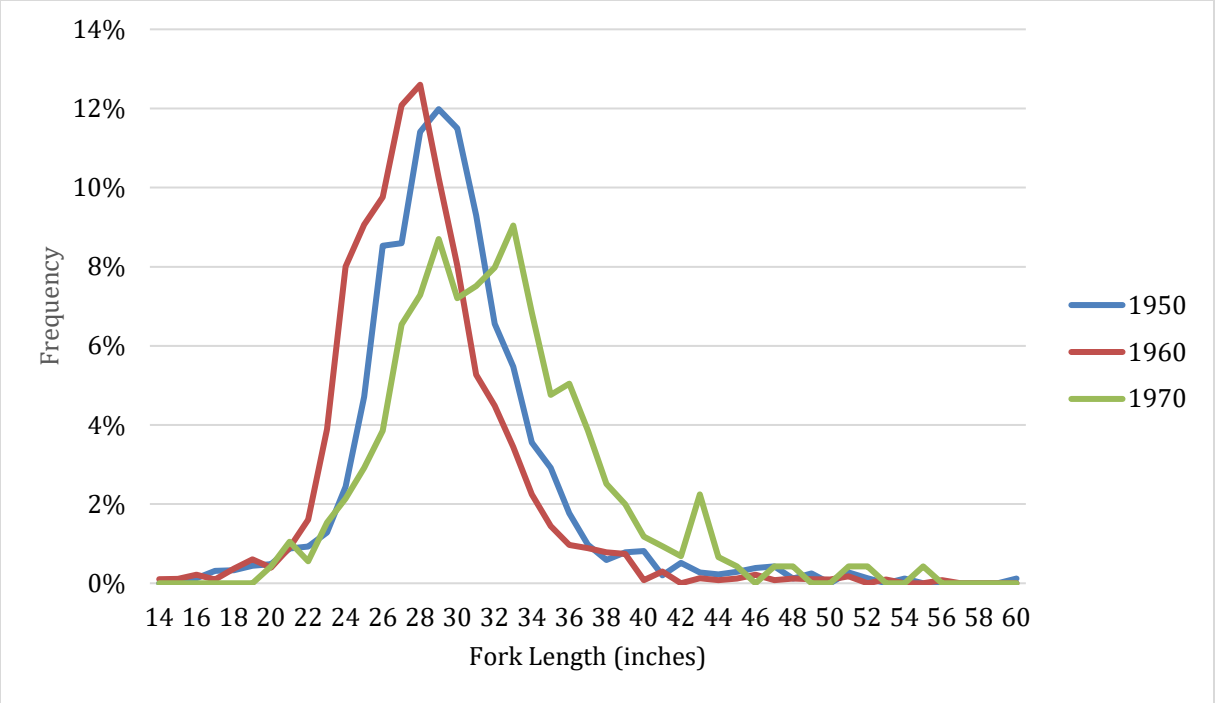

Figure 1. King Mackerel length compositions estimated through the FISHstory pilot project by 10-year time periods.

Stock Assessment and Management Benefits and Impact:

The positive impacts of this project to stock assessment and management could be substantial and are described in the following aspects:

Most stock assessments of South Atlantic species assume fish stocks were virtually unexploited through the 1950's when consistent monitoring of the commercial fishery began, and only lightly exploited through the 1970's when recreational monitoring began. There is very little information on overall catch or size composition to evaluate these assumptions. This proposal will provide fishery-dependent information from a time prior to catch monitoring. These data can help verify these assumptions made in assessments and potentially lead to more accurate assumptions. For example, the size compositions estimated from the photos for the early years can improve the assumptions on the size and therefore age composition of stocks in the initial years included in stock assessments.

Understanding how fishing activities and technological advancements affect fish stocks requires an estimate of what they are capable of producing when there is no fishing or little fishing. However, data rarely extend back to pre-exploitation or the beginning of exploitation. Therefore, stock assessments often start from the year when abundance index and/or size/age compositions are available and/or make assumptions about the status prior to that year. Lack of historic information on abundance and size/age composition can result

in biased estimates of productivity and therefore shifting baselines against which modern stocks are benchmarked. This proposal is designed to expand the FISHstory project in support of developing long-term abundance indices for stock assessments, as well as to estimate length compositions for the early years. The inclusion of these data in the assessments is likely to improve the estimates, e.g., productivity, size/age structure, and recruitment, and therefore increase the likelihood for managers to set meaningful targets for management and formulate stock rebuilding plans.

In addition to the benefits of an extended historic time series for existing assessment**s, length frequency and catch per unit effort information can be used in data limited modeling techniques to provide assessments for stocks which are now unassessed. Providing information from periods prior to heavy exploitation is particularly important in data limited frameworks.**

DATA DELIVERY PLAN:
Data collected through the for-hire catch and length composition components of the project will be made available to stock assessment scientists, fishery managers, and ACCSP partners as requested. Biological data collected through the length component of the project will be formatted for submission to the ACCSP biological database. Project PI's will coordinate with ACCSP staff on timing and submission of these data to ACCSP.

APPROACH:
Task 1: Compile, digitize and archive historic photos from different fleets, geographic regions, and from an expanded time range (1940s-1980s).

SAFMC

- Plan and implement historic photo scanning events at Council related meetings and other outreach events and/or coordinate visits to libraries or historic museums.
- Help identify and contact additional photo providers from the South Atlantic region and assist with photo compilation.

North Carolina State University (NCSU)

- Help identify and contact additional photo providers from the South Atlantic region and assist with photo compilation.
- Update photo archive spreadsheet.

SEFSC

- Help identify and contact additional photo providers from the South Atlantic region and assist with photo compilation.

Task 2: Collect for-hire species composition data via Zooniverse platform.

SAFMC

- Train NCSU graduate student on the Zooniverse processes developed during the FISHstory pilot project.
- Help identify and assist in implementing improvements to the existing workflows in the FISHstory Zooniverse project to improve data quality and data collection efficiency.
- Assist with Validation team recruitment and training.

NCSU

- Identify and implement improvements to the existing workflows in the FISHstory project in Zooniverse to improve data quality and data collection efficiency.
- Batch & add photos into the Zooniverse project.
- Assist with Validation Team recruitment and training
- Identify photos and coordinate Validation Team review.
- QA/QC & data analysis.

Task 3: Estimate length compositions for multiple species from photo archive focusing initially on Red Snapper and King Mackerel and explore incorporation of the length determination protocol into Zooniverse platform.

SAFMC

- Train graduate student on the length protocol developed during the FISHstory pilot project.
- Help identify and assist with implementing improvements to the length data collection process.
- Assist with length analyst recruitment and training.
- Assist with length measurements, as needed.
- Assist in developing length protocol workflow and corresponding training materials in Zooniverse for one species.
- Assist in beta testing length protocol workflow with Zooniverse 'Gold Star' volunteers for a sub-set of photos. Work would include QA/QC and analysis of beta test data.

NCSU

- Identify and implement improvements to the length data collection process.
- Assist with length analyst recruitment and training.
- Coordinate fish measurements among length analysts.
- QA/QC & data analysis.

- Format data for submission to ACCSP.
- Develop length protocol workflow and corresponding training materials in Zooniverse for one species.
- Assist in beta testing length protocol workflow with Zooniverse 'Gold Star' volunteers for a sub-set of photos. Work would include QA/QC and analysis of beta test data.

SEFSC

- Assist with fish length measurements.

Task 4: Design and implement an outreach and engagement strategy.

SAFMC

- Update and refine FISHstory communication and volunteer engagement plan from the pilot project.
- Develop and distribute promotional materials to spread awareness, provide progress updates, and recruit new volunteers for the project using SAFMC communication platforms, collaborations with existing partners, and through the formation of new partnerships.
- Provide monthly newsletters and outreach materials summarizing project findings to active volunteers.
- Monitor talk boards in the FISHstory Zooniverse project.

NCSU

- Help monitor talk boards in the FISHstory Zooniverse project.
- Assist SAFMC with other outreach and volunteer engagement initiatives, as needed.

Task 5: Begin development of abundance indices for Red Snapper and King Mackerel

NCSU

- Develop a protocol for a photo-based index development process
- Develop a model-based index standardization method
- Explore ways to calibrate historical photo-based index to existing modern indices used in the assessments

GEOGRAPHIC LOCATION:

The FISHstory project will digitize, archive, and analyze historic fishing photos throughout the South Atlantic region (North Carolina through the East Coast of Florida to the Florida Keys). The catch and biological data collected through the program will be available to all other partners for use in assessment and management. Although the geographic scope of

the project focuses on the South Atlantic region, the FISHstory image analysis methods have a high likelihood of scalability and transferability to other ACCSP partners throughout the Atlantic coast who have similar historic photos.

FUNDING TRANSITION PLAN:
The FY24 funding for the FISHstory project will focus on continuing to compile and archive additional photos, collecting additional catch and effort data through the FISHstory project in Zooniverse, estimating length composition for multiple species, and beginning to develop abundance indices. Additional funding will be needed to continue the above work and to complete the development of abundance indices. Project PIs are developing proposals to submit through other funding opportunities to help support an additional year of this project.

MILESTONE SCHEDULE:

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Digitize & archive additional photos	x	x	x	x	x	x	x					
Identify and implement improvements to existing workflows and training materials in Zooniverse	x	x	x									
Re-launch project & collect data in Zooniverse				x	x	x	x	x	x			
Validation Team photo review						x	x	x	x			
For-hire catch composition analysis								x	x	x		
Identify and implement improvements to existing length protocol and training materials	x	x										

Length measurements & analysis			x	x	x	x						
Develop length protocol workflow and training materials in Zooniverse and beta test with 'Gold Star' volunteers	x	x	x		x	x						
Index development							x	x	x	x	x	x
Volunteer outreach & communication	x	x	x	x	x	x	x	x	x	x	x	x
Data sharing preparation & report writing										x	x	x

PROJECT ACCOMPLISHMENTS MEASUREMENTS:

Component	Deliverables
Photo archiving	Four photo scanning events and/or trips to libraries or historic museums are planned and implemented. Target of 400 additional photos digitized and archived.
For-Hire Catch Composition	Workflows and training materials refined; FISHstory project relaunched in Zooniverse; target of 500 photos analyzed and validated for species composition, as needed.
Length Composition	Length processes and training materials refined; target for any photos added to the archive through this project to be analyzed for Red Snapper and King Mackerel lengths and length composition analysis to be updated; length protocol workflow and training materials developed in Zooniverse and beta test complete.
Index Development	A protocol for the index development process will be developed. A model-based index standardization method will be developed. Evaluate methods to calibrate the historical indices to the modern headboat indices.

Volunteer Outreach & Engagement	Staff will work to retain current and recruit new FISHstory volunteers for the Zooniverse project, Validation team, and length analysts. Validation team members and length analysts will receive virtual training sessions. Active volunteers will receive monthly project updates via electronic/print/social media outlets and an end of the year progress report for the project. Data visualizations will be provided on trends in species/length composition and how the data may be used.
Data Sharing Preparation & Report Writing	Data will be compiled and formatted for transfer to ACCSP, SEDAR and others for use in assessments and management. Final project report is completed outlining the project findings, successes, and lessons learned.

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FY24 BUDGET:

Item	ACCSP Share	Partner Share	Total
PERSONNEL COSTS			
SAFMC Personnel Julia Byrd, Citizen Science Program Manager (2 months; salary and fringe) Allie Iberle, Fishery Scientist (0.5 months; salary and fringe)		$26,436 $4,817	
SEFSC Personnel Ken Brennan, Kyle Shertzer, and headboat port agents		$5,000	
CONTRACT			
A. Zooniverse Project Builder platform support	$5,000		
B. North Carolina State University (NCSU)			
1) Personnel Graduate student stipend PI summer salary (0.5 months)	 $28,000 $5,072		
2) Fringe Graduate student fringe PI fringe	 $5,211 $1,635		
3) Tuition NCSU (Year 1)	 $10,405		
4) Travel	$1,359		

5) Indirect at 27.6%	$11,393		
TOTAL NCSU Contract	$63,075		
TRAVEL			
Support for SAFMC staff to compile and digitize photos via scanning nights at Council related meetings and other outreach events or visits to libraries or historic museums	$7,639		
SUPPLIES			
Photo negative scanner	$300		
Software design packages	$870		
Outreach, promotional, and training materials	$5,500		
Indirect costs - 10% of $44,309 (total costs only including $25,000 of the NC State contract)	$4,431		
TOTAL	**$86,815**	**$36,253**	**$123,068**
Percentage	**71%**	**29%**	

BUDGET NARRATIVE:

Contractual ($68,075**):**

A) Zooniverse ($5,000): Funding will help support the Zooniverse platform and provide Zooniverse staff time to consult and help incorporate new tools for the FISHstory project.

B) North Carolina State University ($63,075)

Personnel ($33,072 total)

- Jie Cao, Ph.D., Principal Investigator (0.5 calendar month) will be responsible for supervising the graduate student, $5,072
- Graduate student (12 calendar months), $28,000

Fringe Benefits ($6,846 total)

- Jie Cao, Ph.D., Principal Investigator, $1,635
- Graduate student, $5,211

Fringe benefits are requested for personnel on this project at the following rates:

	Fringe Benefits (% of salary)	Health Insurance per FTE
Faculty/Staff	32.24%	$7,397
Faculty (summer months)	32.24%	N/A
Postdoctoral Associates	8.05%	$4,962
Graduate Students	8.05%	$2,957
Hourly Workers	8.05%	N/A

Travel ($1,359 total)

Funds are requested for travel as follows:

Purpose of Travel	Location	Item	Rate	Cost
Council visits	South Carolina	Mileage	$0.585/mile * 600 miles * 2 trips	$702

		Hotel	$120/person * 1 person * 2 nights * 2 trips	$480
		Per Diem (meals)	$44.3/day * 1 person * 4 days	$177.2

Note: NCSU travel rate estimates are based on NC state reimbursement and per diem rates.

Other Direct Costs ($10,405 total)

Tuition

- The estimated graduate student's tuition rate at NCSU in 2024-2025 is $10,405 based on a 10% increase over 2023-2024 rates.

Indirect Costs ($11,393 total)

- Indirect costs are applied at the off-site research rate of 27.60% of Modified Total Direct Costs. Indirect costs are calculated on the total NCSU contract minus tuition costs. North Carolina State University's indirect cost rate agreements and other information can be found here: https://research.ncsu.edu/sparcs/budgeting-guidelines/budgeting-f-and-a/

Total Contractor Costs ($63,075 total)

Travel ($7,639): Support will be used for staff to travel throughout the South Atlantic region to compile and digitize historic photos via scanning nights at Council related meetings and other outreach events or visits to libraries or historic museums and to distribute promotional materials. Funds are requested to support travel for two staff members on four trips approximately 3-4 days each. Costs are estimated for a total of 18 hotel nights (9 per staff member at $195/night), 28 days per diem (14 per staff member at $79/day), ~1400 miles for four trips (at $0.655/mile) and two airplane fares at ~$500/ticket. Note: Council travel rate estimates are based on federal reimbursement and per diem rates.

Supplies ($6,670): Funding will be used to purchase a portable photo negative scanner (estimated at $300) to use at photo scanning events. Design software annual subscriptions will be purchased (Adobe Creative Cloud and Canva Pro estimated at $870 for annual subscriptions) to assist with photo manipulation and help design outreach, promotional, and training materials. Promotional, outreach, and training materials (estimated at $5500) will be purchased and distributed to raise awareness about the project, help with volunteer recruitment and retention, and share project updates and results. Cost for print materials range from wallet cards (~$0.05 each) to flyers (~$1.50 each). Using an average cost of $0.78 per item $2,000 will allow us to print 2,564 items for distribution. Funds will also be used to purchase small promotional items

(e.g. notebooks, stickers, etc.) to help increase recruitment and retention of participants. Cost for promotional items range between stickers (~$1.50 each) to notebooks (~$4.00 each). Using an average cost of $2.75 per item, $3,500 will allow us to distribute ~1,272 items to participants. Materials would potentially be distributed through industry business and organizations (e.g. tackle shops, trade shows), educators (e.g. marine educator organizations, fisheries graduate and undergraduate programs, and K-12 classrooms), citizen science organizations (e.g. SciStarter) and fisheries organizations.

Indirect charges of 10% are applied to $44,309 (total costs including only $25,000 of the NC State contract) for a total of $4,431. $44,309 is used to calculate indirect costs because only the first $25,000 of the NC State contract can be included in indirect calculations, based on communications from NOAA Fisheries.

FY23 BUDGET:

Item	ACCSP Share	Partner Share	Total
PERSONNEL COSTS			
SAFMC Personnel Julia Byrd, Citizen Science Program Manager (2 months; salary and fringe) Allie Iberle, Fishery Scientist (0.5 months; salary and fringe)		$24,066 $4,441	
SEFSC Personnel Ken Brennan, Kyle Shertzer, and headboat port agents		$5,000	
CONTRACT			
C. Consultant and photo curator Processes, scans and catalogs ~ 400 photos (Smitherman and Freeman photos)	$3,500		
D. North Carolina State University (NCSU)			
6) Personnel Graduate student stipend PI summer salary (0.5 months)	 $28,000 $4,675		
7) Fringe Graduate student fringe PI fringe	 $5,235 $1,437		
8) Tuition NCSU (Year 1)	 $10,005		
9) Travel	$2,039		

10) Indirect at 27.6%	$11,422		
TOTAL NCSU Contract	$62,813		
TRAVEL			
Support for SAFMC staff to compile and digitize photos via scanning nights at Council related meetings and other outreach events	$6,325		
SUPPLIES			
Portable photo scanner	$600		
Software design packages	$870		
Outreach, promotional, and training materials	$5,500		
Indirect costs - 10% of total costs	$7,961		
TOTAL	**$87,569**	**$33,507**	**$121,076**
Percentage	**72%**	**28%**	**100%**

BUDGET NARRATIVE:

Contractual ($66,313):

C) Rusty Hudson ($3,500): Hudson will be a project consultant and photo curator. He will process, scan, and catalog ~400 photos compiled by retired Captains Billy Smitherman (FL) and Robert Freeman (NC).

D) North Carolina State University ($62,813)

Personnel ($32,675 total)

- Jie Cao, Ph.D., Principal Investigator (0.5 calendar month) will be responsible for supervising the graduate student, $4,675
- Graduate student (12 calendar months), $28,000

Fringe Benefits ($6,672 total)

- Jie Cao, Ph.D., Principal Investigator, $1,437
- Graduate student, $5,235

Fringe benefits are requested for personnel on this project at the following rates:

	Fringe Benefits (% of salary)	Health Insurance per FTE
Faculty/Staff	30.73%	$6,512
Faculty (summer months)	30.73%	N/A
Postdoctoral Associates	9.05%	$4,336
Graduate Students	9.05%	$2,701
Hourly Workers	9.05%	N/A

Travel ($2,038.8 total)

Funds are requested for travel as follows:

Purpose of Travel	Location	Item	Rate	Cost
Council visits	South Carolina	Mileage	$0.585/mile * 600 miles * 3 trips	$1053

		Hotel	$120/person * 1 person * 2 nights * 3 trips	$720
		Per Diem (meals)	$44.3/day * 1 person * 6 days	$265.8

Note: NCSU travel rate estimates are based on NC state reimbursement and per diem rates.

Other Direct Costs ($10,005 total)

Tuition

- The estimated graduate student's tuition rate at NCSU in 2023-2024 is $10,005 based on a 10% increase over 2022-2023 rates.

Indirect Costs ($11,422 total)

- Indirect costs are applied at the off-site research rate of 27.60% of Modified Total Direct Costs. Indirect costs are calculated on the total NCSU contract minus tuition costs. North Carolina State University's indirect cost rate agreements and other information can be found here: https://research.ncsu.edu/sparcs/budgeting-guidelines/budgeting-f-and-a/

Total Contractor Costs ($62,812.8 total)

Travel ($6,325): Support will be used for staff to travel throughout the South Atlantic region to compile and digitize historic photos via scanning nights at Council related meetings and other outreach events and to distribute promotional materials. Funds are requested to support travel for two staff members on five trips approximately 2-3 days each. Costs are estimated for a total of 20 hotel nights (10 per staff member at $120/night), 30 days per diem (15 per staff member at $75/day), ~1400 miles for four trips (at $0.625/mile) and two airplane fares at ~$400/ticket. Note: Council travel rate estimates are based on federal reimbursement and per diem rates.

Supplies ($6,970): Funding will be used to purchase a portable photo scanner (estimated at $600) to use at photo scanning events. Design software annual subscriptions will be purchased (Adobe Creative Cloud and Canva Pro estimated at $870 for annual subscriptions) to assist with photo manipulation and help design outreach, promotional, and training materials. Promotional, outreach, and training materials (estimated at $5500) will be purchased and distributed to raise awareness about the project, help with volunteer recruitment and retention, and share project updates and results. Cost for print materials range from wallet cards (~$0.05 each) to flyers (~$1.50 each). Using an average cost of $0.78 per item $2,000 will allow us to print 2,564 items for distribution. Funds will also be used to purchase small promotional items (e.g. notebooks, stickers, etc.) to help increase recruitment and retention of participants. Cost for promotional

items range between stickers (~$1.50 each) to notebooks (~$4.00 each). Using an average cost of $2.75 per item, $3,500 will allow us to distribute ~1,272 items to participants. Materials would potentially be distributed through industry business and organizations (e.g. tackle shops, trade shows), educators (e.g. marine educator organizations, fisheries graduate and undergraduate programs, and K-12 classrooms), citizen science organizations (e.g. SciStarter) and fisheries organizations.

Indirect charges of 10% are applied to the total cost of the grant for a total of $7,961.

FISHstory Project History

Fiscal Year	Title	Cost	Results
FY23	Expansion of the FISHstory Citizen Science Project	Total = $121,076 ACCSP share = $87,569 Partner share = $33,507	This project will expand the geographical and temporal range of the FISHstory project in support of developing abundance indices for stock assessments of South Atlantic species; improve efficiency of data collection and photo processing; estimate length compositions for multiple species with focus on King Mackerel and Red Snapper; and implement an outreach and engagement strategy to retain FISHstory's volunteer base and recruit new users. Funding for this project was received in mid-July 2023. Work to date has included: ● NCSU graduate student for FY23 has been identified and SAFMC staff conducted initial project onboarding June 7-9, 2023. ● SAFMC staff have begun planning for FISHstory scanning events for fall 2023 in conjunction with SAFMC related meetings. Scanning events will be held at the fall 2023 Snapper Grouper, Mackerel Cobia, and Dolphin Wahoo Advisory Panel meetings, as well as the September and December SAFMC 2023 meetings. Information on the scanning events was shared with advisory panel members at their spring 2023 meetings. Key messages and flyers have been developed to promote the scanning events and promotion of the scanning event at the September 2023 Council meeting is underway.

			● The contract with photo curator/consultant, Rusty Hudson, is finalized and Hudson has started scanning Captain Smitherman's (FL) and Captain Freeman's (NC) photos. Target is to have these photos scanned and archived by mid- September 2023. ● SAFMC staff have begun working to identify other sources for historic photos, such as local history museums and libraries (e.g. NC History Center), NOAA Central Library, and Smithsonian archives. ● Staff held a call with Zooniverse personnel in July 2023 to discuss the process for making changes to existing workflows and incorporation of new features into the project before re-launching. ● FISHstory Design Team members have been identified and will hold their initial meeting in early September 2023. The Design Team is a group of stakeholders with diverse expertise that will provide guidance on the expansion of the FISHstory project.

Summary of Proposal for Ranking

Proposal Type: Maintenance Year 1

Primary Program Priority: Catch and Effort - 50%
This proposal addresses ACCSP recreational priority #2 – 'Comprehensive for-hire data collection and monitoring' by improving historic catch and effort data prior to when fishery dependent catch programs were established in the South Atlantic. Historic photos provide the opportunity to collect trip level effort and landings data for the for-hire sector for a historic time period prior to when catch monitoring programs were in place in the South Atlantic. The for-hire catch composition component of the FISHstory project will provide species composition and catch rate information from this historic time period. The effort and landings data collected through this proposal will be used to develop abundance indices which can be included in stock assessments.

Data Delivery Plan:
Data collected through the for-hire catch and length composition components of the project will be made available to stock assessment scientists, fishery managers, and ACCSP partners as requested. Biological data collected through the length component of the project will be formatted for submission to the ACCSP biological database. Project PI's will coordinate with ACCSP staff on timing and submission of these data to ACCSP.

Project Quality Factors:

- **Multi-partner/Regional impact including broad applications:**
  Partners in this proposal include the SAFMC, NOAA Fisheries SEFSC, and NC State University. The FISHstory project will digitize, archive, and analyze historic fishing photos throughout the South Atlantic region (North Carolina through the East Coast of Florida to the Florida Keys). The catch and biological data collected through the program will be available to all other partners for use in assessment and management. Although the geographic scope of the project focuses on the South Atlantic region, the FISHstory image analysis methods have a high likelihood of scalability and transferability to other ACCSP partners throughout the Atlantic coast who have similar historic photos.

- **Contains funding transition plan:**
  The initial year of funding for the FISHstory project will focus on compiling and archiving additional photos, collecting additional catch and effort data through the FISHstory project in Zooniverse, and estimating length composition for multiple species. An additional year of funding will be needed to develop indices of abundance using the data collected through the project. Project PI's are already

developing proposals to submit through other funding opportunities to help support an additional year of this project.

- **In-kind contribution: 29%**

- **Improvement in data quality/quantity/timeliness**
  - **This proposal will build on the success of the FISHstory pilot project which uses an innovative citizen science approach to gather data from historic photos to provide for-hire catch and effort and biological information before fishery dependent monitoring programs were in place in the South Atlantic region.**
  - **By expanding the geographic and temporal scope of FISHstory, this proposal will collect more representative historic data for the South Atlantic region which will broaden the use of the data for both stock assessment and management.**
  - **These historic data will provide researchers and managers a better understanding of the long-term changes in the fisheries and fish populations.**

- **Potential secondary module as a by-product: Biological - 50%.**

This proposal addresses ACCSP recreational priority #5 – 'Biological sampling for recreational fisheries separate from MRIP APAIS' by improving historic biological data prior to when fishery dependent catch programs were established in the South Atlantic. Although estimating fish lengths in historic photos may not be the traditional view of biological sampling, it can provide the same information. The length component of this proposal will continue to focus on producing and updating length compositions for Red Snapper and King Mackerel with measurements from newly archived historic photos. Red Snapper is in the top 25% of the ACCSP biological sampling priority matrix and will be undergoing a SEDAR Research Track stock assessment starting in 2024. The PI's and project collaborators will be involved in this assessment, so there is a direct avenue to ensure these data are considered in this assessment. Additionally, a SEDAR South Atlantic King Mackerel operational stock assessment is scheduled to begin in 2025 and the FISHstory length data are included in the statement of work for consideration of use in the assessment. If time allows, additional species will be measured that are frequently found in the historic photo set. Species found in the current photo archive that are also in the top 25% of the ACCSP biological sampling matrix, include Red Grouper, Gag Grouper, Gray Triggerfish, and Black Sea Bass.

- **Impact on stock assessment**

  Stock assessment impacts from this proposal are significant.

- **Most stock assessments of South Atlantic species assume fish stocks were virtually unexploited through the 1950's when consistent monitoring of the commercial fishery began, and only lightly exploited through the 1970's when recreational monitoring began. There is very little information on overall catch or size composition to evaluate these assumptions. This proposal will provide fishery-dependent information from a time prior to catch monitoring. These data can help verify these assumptions made in assessments and potentially lead to more accurate assumptions.**
- **Lack of historic information on abundance and size/age composition can result in biased estimates of productivity and therefore shifting baselines against which modern stocks are benchmarked. This proposal is designed to expand the FISHstory project in support of developing long-term abundance indices for stock assessments, as well as to estimate length compositions for the early years. The inclusion of these data in the assessments is likely to improve the estimates, e.g., productivity, size/age structure, and recruitment, and therefore increase the likelihood for managers to set meaningful targets for management and formulate stock rebuilding plans.**
- **Length frequency and catch per unit information can be used in data limited modeling techniques to provide assessments for stock which are now unassessed. Providing information from periods prior to heavy exploitation is particularly important in data limited frameworks.**

Other Factors:

- **Innovative**
  Historic photos serve as an untapped source of catch, effort, and biological information for years prior to dedicated catch monitoring programs. This proposal uses an innovative citizen science approach to gather data from historic photos. The methodology developed is more cost-effective than traditional analysis techniques and allows for larger volumes of data to be collected in a more efficient manner using the power of the crowd.
- **Properly prepared**
  This proposal follows the guidelines under the ACCSP Funding Decision Process Document.
- **Merit**
  This proposal builds on a successful pilot project that demonstrated historic photos have the potential to provide quantifiable species and length composition data at a point in time when fishery dependent surveys of the for-hire fleets didn't exist in the South Atlantic. This proposal will provide catch and effort and biological data for a time period where data are very limited for the recreational sector. These data will

satisfy several species specific research recommendations. Additionally the biological data collected include species from the top 25% of the FY24 ACCSP Biological matrix.

Summary of Proposal for Ranking - Abridged

- **Achieved Goals**
- **The 'Expansion of the FISHstory Citizen Science Project' was a new project in FY23. Funding for this project was received mid-July 2023, so limited work has been completed at the submission of this proposal. Work to date has included:**
    - **NCSU graduate student for FY23 has been identified and SAFMC staff conducted initial project onboarding June 7-9, 2023;**
    - **SAFMC staff have begun planning for FISHstory scanning events for fall 2023 in conjunction with SAFMC related meetings. Scanning events will be held at the fall 2023 Snapper Grouper, Mackerel Cobia, and Dolphin Wahoo Advisory Panel meetings, as well as the September and December SAFMC 2023 meetings; and SAFMC staff have begun working to identify other sources for historic photos, such as local history museums and libraries (e.g. NC History Center), NOAA Central Library, and Smithsonian archives. Key messages and flyers have been developed to promote the scanning events and promotion of the scanning event at the September 2023 Council meeting is underway.**
    - **The contract with photo curator/consultant, Rusty Hudson, is finalized and Hudson has started scanning Captain Smitherman's (FL) and Captain Freeman's (NC) photos.**
    - **Staff held a call with Zooniverse personnel in July 2023 to discuss the process for making changes to existing workflows and incorporation of new features into the project before re-launching.**
    - **FISHstory Design Team members have been identified and will hold their initial meeting in early September 2023. The Design Team is a group of stakeholders with diverse expertise that will provide guidance on the expansion of the FISHstory project.**

- **Data Delivery Plan**
  Data collected through the for-hire catch and length composition components of the project will be made available to stock assessment scientists, fishery managers, and ACCSP partners as requested. Biological data collected through the length component of the project will be formatted for submission to the ACCSP biological database. Project PI's will coordinate with ACCSP staff on timing and submission of these data to ACCSP.

- **Level of Funding**
  Funding for this project will initially be received in FY23 and the total cost of the project will be $121,076 (ACCSP share = $87,569; Partner share = $33,507).

The FY24 proposal cost is $123,068 (ACCSP Share: $86,815; Partner Share: $36,253).

- **Properly Prepared**
  This proposal follows the guidelines under the ACCSP Funding Decision Process Document.

- **Merit**
  This proposal builds on a successful pilot project that demonstrated historic photos have the potential to provide quantifiable species and length composition data at a point in time when fishery dependent surveys of the for-hire fleets didn't exist in the South Atlantic. This proposal will provide catch and effort and biological data for a time period where data are very limited for the recreational sector. These data will satisfy several species specific research recommendations. Additionally the biological data collected include species from the top 25% of the FY24 ACCSP Biological matrix.

JIE CAO

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Education

Ph.D.	Marine Biology	2015 University of Maine
M.S.	Marine Fisheries Resources	2010 Shanghai Ocean University
B.S.	Marine Fisheries Sciences	2007 Shanghai Ocean University

Professional Experience

2018 – present	Assistant Professor, NCSU, Morehead City, NC
2017 – 2018	Post-doctoral Associate, UW&NOAA, Seattle, WA
2015 – 2017	Post-doctoral Associate, UM, Orono, ME

Advisory Board

2020 – present	SSC, South Atlantic Fishery Management Council
2019 – present	Vice-chair of SC, North Pacific Fisheries Commission
2019 – present	Vice-chair of WP billfish, Indian Ocean Tuna Commission

Selected publications

Cao J, Thorson J, Punt A, and Szubanski C, A novel spatiotemporal stock assessment framework to better address fine-scale species distributions: development and simulation testing. Fish and Fisheries, 2019. DOI:10.1111/faf.12433

Cao J, Thorson J, Richards A, Chen Y. Spatio-temporal index standardization improves the stock assessment of northern shrimp in the Gulf of Maine. *Canadian Journal of Fisheries and Aquatic Sciences*, 2017.

Cao J, Chen Y, Richards A. Improving assessment of *Pandalus* stocks using a seasonal, size-structured assessment model with environmental variables: Part I: Model description and application. *Canadian Journal of Fisheries and Aquatic Sciences*, 2017, 74(3): 349-362.

Cao J, Chen Y, Richards A. Improving assessment of *Pandalus* stocks using a seasonal, size-structured assessment model with environmental variables: Part II: Model evaluation and simulation. *Canadian Journal of Fisheries and Aquatic Sciences*, 2017, 74(3) 363-376.

Cao J, Guan WJ, Treusdell S, et al. An individual-based probabilistic model for simulating fisheries population dynamics. *Aquaculture and Fisheries*, 2016, 1:34-40.

Cao J, Chen XJ, Tian SQ. Bayesian hierarchical DeLury model for stock assessment of west winter-spring cohort of neon flying squid (*Ommastrephes bartramii*) in northwest Pacific Ocean. *Bulletin of Marine Science*, 2014, 91(1): 1-13.

Cao J, Truesdell S, Chen Y. Impacts of seasonal stock mixing on the assessment of Atlantic cod in the Gulf of Maine. *ICES Journal of Marine Science*, 2014, 71(6): 1443-1457.

Guan WJ, **Cao J**, Chen Y, et al. Impacts of population and fishery spatial structures on fishery stock assessment. *Canadian Journal of Fisheries and Aquatic Sciences*, 2013, 70 (8): 1178-1189.

Cao J, Chen XJ, Chen Y. Influence of surface oceanographic variability on abundance of the western winter-spring stock of neon flying squid (*Ommastrephes bartramii*) in the northwest Pacific Ocean. *Marine Ecology Progress Series*, 2009, 381: 119-127.

Funded Research Projects

Estimating seasonal growth and size-dependent mortality of North Carolina blue crab in support of improving its stock assessment and management. North Carolina Sea Grant. **J. Cao**, L. Yan, D. Eggleston, J. Buckel, L. Lee, A. Rocco. $59,692 US Dollars, 2022-2023.

Spatiotemporal distribution and habitat use of major Snapper-Grouper species in the Atlantic Ocean off the southeastern U.S. NOAA/CISESS. **J. Cao**. $39,384 US Dollars, 2021-2022

Development and Application of an International Stock Assessment and Management Strategy Evaluation Tool for Common Dolphinfish (*Coryphaena Hippurus*) in the Atlantic Ocean and the Caribbean Sea (Matthew Damiano, 2020 NMFS-Sea Grant Population Fellowship). North Carolina State University Sea Grant Program. **J. Cao,** K. Shertzer, M. Damiano. $118,817 US Dollas, 2020-2023.

Evaluating the Impacts of Environmental Stress and Bioactive Chemicals on North Carolina Blue Crab Population: An Individual-Based Model. North Carolina Sea Grant. **J. Cao**, L. Yan, L. Lee. $56,786 US Dollars, 2020-2021.

Development and application of a management strategy evaluation tool: tradeoffs between the management objective of recreational and commercial fisheries. Marine Fisheries Initiative (MARFIN) Program, NOAA. **J. Cao**, K. Shertzer. $121,756 US Dollars, 2019-2021.

Promoting China-US collaborative research on assessment and management of Chinese fisheries. Packard Foundation. R. Hilborn, C. Szuwalski, A. Punt, **J. Cao**. $222,628 US Dollars, **Cao's subaward**: 31,850 US Dollars, 2019-2020.

Incorporating environmental variables to improve assessment and predictive capacity for American lobster in a changing Gulf of Maine and southern New England. The Fisheries and the Environment (FATE) Program, NOAA. B. Shank, Y. Chen, **J. Cao**, K. Tanaka. $182,633 US Dollars. 2017-2019.

Incorporating environmental and ecological variables to improve the assessment of northern shrimp in the Gulf of Maine. The Fisheries and the Environment (FATE) Program, NOAA. A. Richards, Y. Chen, **J. Cao**, K. Drew. $106,104 US Dollars. 2015-2017.

Evaluate performance of length-structured models for the assessment of northern shrimp and Atlantic herring in the Gulf of Maine. Maine Sea grant Program. Y. Chen, **J. Cao**. $143,778 US Dollars. 2014-2016.

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EDUCATION: UNIVERSITY OF CHARLESTON, SC, Charleston, SC
-**Masters of Environmental Studies**, December 2004

WAKE FOREST UNIVERSITY, Winston-Salem, NC
-**Bachelor of Science** in **Biology**, Minor in **Environmental Studies**, May 2000

WORK EXPERIENCE:

Citizen Science Program Manager, South Atlantic Fishery Management Council **(SAFMC)**
Charleston, SC, March 2019 – present

Adjunct faculty at the College of Charleston
Charleston, SC, 2020 to present

Southeast Data Assessment and Review (SEDAR) Coordinator, SAFMC
Charleston, SC, August 2012 – February 2019

Wildlife Biologist III, Office of Fisheries Management, South Carolina Department of Natural Resources
Charleston, SC, August 2005 – August 2012

MARMAP hourly, South Carolina Department of Natural Resources
Charleston, SC, April 2005 – August 2005

Intern, In-Water Sea Turtle Abundance Study, South Carolina Department of Natural Resources
Charleston, SC, May 2003 – August 2003 and May 2004 – September 2004

Education Coordinator, Conservation International
Washington, DC, January 2002 – July 2002

SELECT GRANT PROPOSALS FUNDED as PI or co-PI:

FY2023. Expansion of the FISHstory Citizen Science Project. Julia Byrd (SAFMC) and Dr. Jie Caio (NC State University). Atlantic Coastal Cooperative Statistics Program. $121,076.

FY2022. SAFIS Expansion of the SciFish Customizable Fisheries Citizen Science Data Collection Application. Julia Byrd (SAFMC) and Dr. Andrew Cathey (NC Division of Marine Fisheries). Atlantic Coastal Cooperative Statistics Program. $116,182.

FY2021. SAFIS Expansion of Customizable Fisheries Citizen Science Data Collection Application. Julia Byrd (SAFMC). Atlantic Coastal Cooperative Statistics Program. $114,792.

FY2020. SAFIS Expansion of "*SAFMC Release*" and "*NC DMF Catch U Later*" Discard Reporting Applications. Atlantic Coastal Cooperative Statistics Program. $118,500.

FY2019. The FISHstory Project - Documenting historical catch and length estimates from historic photos in the for-hire sector using electronic data collection and imagery analysis platforms and crowdsourcing approaches. Julia Byrd (SAFMC) and Amber VonHarten (SAFMC). NOAA-Fisheries Information Systems. $75,000.

SELECTED PUBLICATIONS:

- Byrd, J. W.R. Collier, and A. Iberle. 2022. Designing the FISHstory project to support fisheries management. Fisheries: 44 (11): 492-498.
- Oremland, L., A. Furnish, J. Byrd, and R. Cody. 2022. How fishery managers can harness the power of the crowd: Using citizen science and non-traditional data sources in fisheries management. Fisheries: 44 (11): 459-462.
- Bonney, R., J. Byrd, J. T. Carmichael, L. Cunningham, L. Oremland, J. Shirk, and A. Von Harten. 2021. Sea Change: Using Citizen Science to Inform Fisheries Management. BioScience: 71(5): 519-530.
- Brown, S.K., M. Shivani, R. Koeneke, D. Agnew, J. Byrd, M. Cryer, C. Dichmont, D. Die, W. Michaels, J. Rive, H. Sparholt, and J. Weiberg. 2020. Patterns and practices in fisheries assessment peer review systems. Marine Policy: 117,103880.
- SEDAR. 2015. SEDAR Procedural Workshop 7: Data Best Practices. SEDAR, North Charleston, SC. 151pp. (editor).

SELECTED PROFESSIONAL PRESENTATIONS:

- Byrd, J. C. Collier, and A. Iberle. 2022. FISHstory, using citizen science to describe historic catches. SAFMC Seminar Series. (Oral presentation).
- Byrd, J. A. Iberle, C. Collier, D. Cathey, J. Simpson, F. Karp, B. Spain, K. Knowlton, and M. Bucko. 2021. Development of the SciFish Application, a customizable citizen science project builder. American Fisheries Society Annual Meeting. (Oral presentation).
- Byrd, J. C. Collier, and A. Iberle. 2020. The SAFMC's Citizen Science Program: Designing a program to support fisheries science and management decision making. American Fisheries Society Annual Meeting (held virtually). (Oral presentation).
- Byrd, J., J. Carmichael, and J. Neer. 2017. The Importance of Peer Review in SEDAR Stock Assessments. American Fisheries Society Annual Meeting, Tampa, FL. (Oral presentation).
- Carmichael, J., A. VonHarten, and J. Byrd. 2016. Efforts to Develop a South Atlantic Fishery Management Council Citizen Science Program. NOAA Fisheries Quantitative Ecology and Socioeconomics Training Program Webinar Series. (Webinar presentation).
- VonHarten, A. and J. Byrd. 2016. Building a Fishery Citizen Science Program in the U.S. South Atlantic to Improve Management and Policy. 4th International Marine Conservation Congress. (Oral presentation and helped facilitate focus group).

SELECTED HONORS:

- National Conservation Leadership Institute, Cohort 7 (2012-2013)
- FY07 Nominee for SC Department of Natural Resources – Marine Resources Division Employee of the Year
- Emerging Wildlife Conservation Leaders, Pilot Class (2005-2007)

SELECTED TRAINING:

- Management Assistance Team (MAT) Leader as Communicator Training
- Smithsonian's Communication & Facilitation Skills for Conservation Managers Course
- Technology of Participation (TOP) Facilitation Methods
- NOAA Coastal Service Center Planning and Facilitating Collaborative Meetings
- Well's National Estuarine Research Reserve Coastal Training Program Collaborative Learning Workshop
- NOAA Coastal Service Center Project Design and Evaluation Workshop
- NOAA Coastal Service Center Public Issues and Conflict Management Workshop
- University of Maryland's Communicating Science Effectively Workshop
- Atlantic States Marine Fisheries Commission Basic Stock Assessment Workshop
- Atlantic States Marine Fisheries Commission Maximum Likelihood Modeling Workshop

PROFESSIONAL MEMBERSHIPS:

- Citizen Science Association
- American Fisheries Society
- SC Chapter of the American Fisheries Society
- ACCSP Operations Committee (2015-present)