CITIZEN SCIENCE PROGRAM

STANDARD OPERATING POLICIES & PROCEDURES

January 2021

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SAFMC Citizen Science Program Standard Operating Policies & Procedures

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Standard Operating Policies & Procedures

I. Program Goals

Vision Statement:
Advancing science and increasing trust, one project at a time

Mission Statement:
To build and maintain a program that improves information for fisheries management through collaborative science

Program Goals & Objectives:

GOAL 1: Design, implement, and sustain a program framework to guide the development of projects that support fishery management decision making.

Objective 1.1: Establish organizational infrastructure to provide program administration and oversight.
Objective 1.2: Develop program procedures, policies, and tools.
Objective 1.3: Create a funding strategy that is adaptable to changing circumstances and needs.

GOAL 2: Facilitate development of individual projects to address specific research priorities.

Objective 2.1: Publish and broadly disseminate the SAFMC's citizen science research priorities.
Objective 2.2: Implement the SAFMC's Citizen Science Project Endorsement Program.
Objective 2.3: Provide project support resources (best practices, templates, etc.) and project development guidance.
Objective 2.4: Encourage collaboration by diverse teams of stakeholders (scientists, fishermen, managers, etc.) to develop projects.

GOAL 3: Ensure that data collected by projects are accessible, robust, and fit for purpose.

Objective 3.1: Implement program guidelines that address data management, standards, quality, and accessibility.
Objective 3.2: Review project results to determine if data meet project and/or Program needs.
Objective 3.3: Document the contribution of citizen science projects and data to specific SAFMC research priorities and science and management decision making.

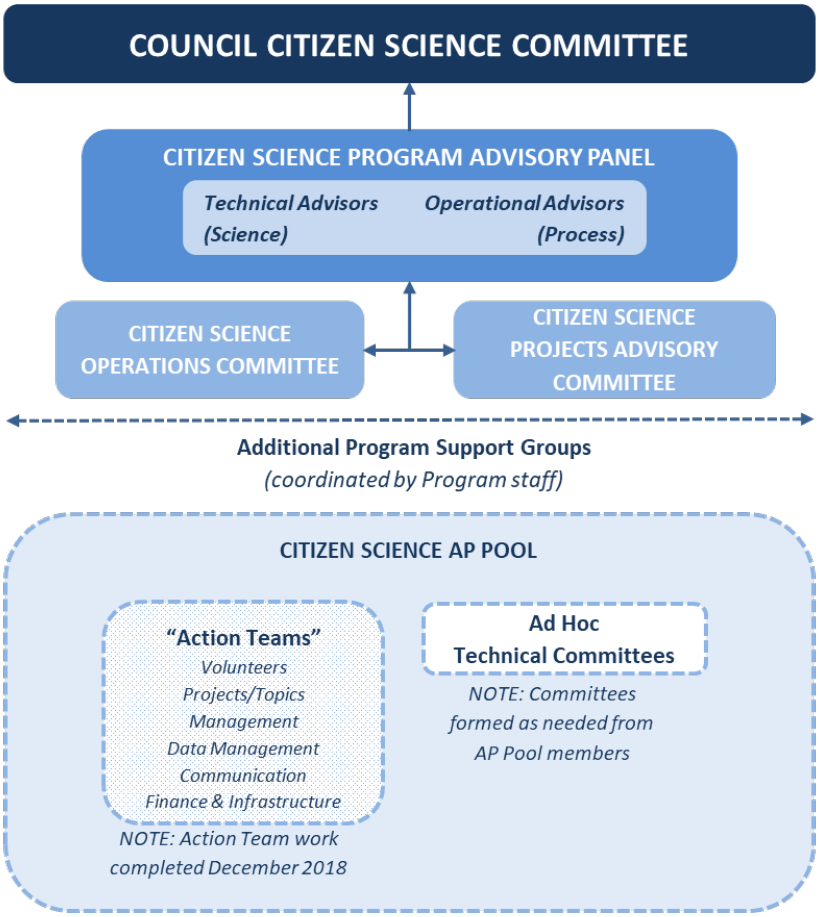
GOAL 4: Foster mutual learning, collaboration, and program engagement.

Objective 4.1: Promote opportunities for learning among diverse constituents.
Objective 4.2: Foster existing partnerships and develop new partnerships to support both program and project goals.
Objective 4.3: Strive to enhance trust among scientists, managers, and fishermen.
Objective 4.4: Engage new categories of stakeholders that are not typically involved in the Council process.
Objective 4.5: Develop Citizen Science Program volunteer engagement (recruitment, training,

retention) strategies, products, and activities using best practices outlined by the Citizen Science Action Teams.

II. Program Administration & Oversight

PROPOSED ORGANIZATIONAL INFRASTRUCTURE



a. Program Personnel/Staff -
The following is a general description of primary Citizen Science Program staff and responsibilities.

- Staff: The Program supports one FTE (Program Manager) that is supervised by the Deputy Director for Science & Statistics.

- Location: The staff position is housed at the Council office.

- Position Duties: The Program Manager position manages the overall operation of the Citizen Science Program to include supporting Program administrative groups,

partnership development (for Program support and project development), identifying and seeking funding for citizen science projects, and coordinating Program activities as they relate to Council priorities.

b. Council Citizen Science Committee -

- Purpose - The Citizen Science Committee was established as a Council-level committee in September 2016 to support the development and oversight of the Citizen Science Program.

- Roles & Responsibilities - The Committee serves as the liaison with the Council and the Program Advisory Panel to help provide guidance on programmatic level decision-making on the Program's activities, operation and adoption of the biennial Citizen Science Research Priorities (based on items in the Council's Research & Monitoring Plan). The Committee also coordinates approval of the Citizen Science Program budget in conjunction with the Council's Executive Finance Committee. As available, the Committee Chair/Vice Chair will attend webinars and in-person meetings of the other advisory committees and oversight board.

- Membership - The Citizen Science Committee is made up of Council members and is supported by the Citizen Science Program Manager as the staff lead.

- Meetings - The Committee meets as part of quarterly Council meetings, during at least two Council meetings per year.

c. Citizen Science Program Advisory Panel -

- Purpose – Advise on program policies related to scientific goals and integrity and operational processes.

- Structure – The Program Advisory Panel consists of two types of members – Technical Advisors and Operational Advisors – and operates as one panel. The Program Advisory Panel reports to the Council's Citizen Science Committee.

- Roles & Responsibilities - Technical advisors develop programmatic recommendations to ensure the Program maintains overall scientific integrity. Operational advisors develop programmatic recommendations related to fiscal support, legal issues, infrastructure, and governance. The Advisors review the SOPPs and the supporting materials and policies for carrying out the Program components as described in the SOPPs. The Program Advisory Panel is led by a Chair and Vice-Chair selected by the Panel from its members.

- Membership & Eligibility – Advisors (both Technical and Operational) may include representatives from: SEFSC or other Science Centers; NOAA Headquarters (chief scientist), Sea Grant (rotating), SAFMC (Council Citizen Science Committee Chair, Citizen Science Projects Advisory Committee Chair, and SSC Chair); conservation/environmental NGO; fishery stakeholders (private, for-hire, commercial fishermen or member of the public with an interest in fisheries and citizen science); ACCSP/ASMFC; State agency; legal

staff; citizen science expert; administrative executive.

- Appointments and Terms –
    - Council appointed: Fishery stakeholders (2); conservation/e-NGO (1); Sea Grant (1); Citizen Science expert (1); administrative executive (1)
    - Designees: SERO; SEFSC; NOAA Headquarters (S&T office); NOAA general counsel; ACCSP/ASMFC; Council Citizen Science Committee Chair ; Citizen Science Projects Advisory Committee Chair; SSC Chair
    - Named individuals may designate temporary or permanent proxies
    - Terms: 3-5 years, dependent on programmatic growth
    - Meetings: Single annual in-person meetings; additional meetings via conference call or webinar as needed.

- Coordination with other administrative groups of the Program – The Program Advisory Panel receives information from Program staff, the Operations Committee, and the Citizen Science Projects Advisory Committee and makes formal recommendations to the Council Citizen Science Committee.

d. Citizen Science Operations Committee -

- Purpose – Smaller group of advisors that develops program recommendations for the Program Advisory Panel to consider; specific tasks include reviewing policies, providing program direction/multi-partner support, and providing general advice.

- Roles & Responsibilities - Draft SOPPs and provide ongoing operational recommendations for Program Advisory Panel approval.

- Membership & Eligibility – Citizen Science Advisory Panel Pool members (5); member from SERO; member from SEFSC; member from the Council's SSC. Supported by Program staff.

- Appointments and Terms – Appointed by the Council's Citizen Science Committee; terms are 3-5 years, dependent on programmatic growth.

- Coordination with other administrative groups of the Program – The Citizen Science Operations Committee will liaise with the Citizen Science Projects Advisory Committee to modify the SOPPs and program components, as needed.

e. Citizen Science Projects Advisory Committee –

- Purpose – Serve as advisors similar to the Council's Advisory Panels; Work in conjunction with the Citizen Science Operations Committee to develop recommendations for the Program Advisory Panel

- Roles & Responsibilities - Identify citizen science research and data needs across all the FMPs the Council manages; Assist with developing volunteer engagement strategies for recruiting, training, retaining, and communicating with volunteers; serve as outreach

ambassadors for the Program.

- Membership & Eligibility – Chair or designee of the Council's fishery Advisory Panels (Golden Crab, Shrimp/Deepwater Shrimp, Spiny Lobster, Mackerel Cobia, Snapper Grouper); Habitat & Ecosystem AP; and the Information & Education AP.

- Appointments and Terms – Determined by the existing Council's AP policies; terms are 2-3 years, rotating, dependent on term of the AP chair for each AP or as assigned designee. The Citizen Science Projects Advisory Committee would meet via webinar or conference call two times per year.

- Coordination with other administrative groups of the Program – The Citizen Science Projects Advisory Committee coordinates as needed with the Citizen Science Operations Committee to modify SOPPs and program components.

f. Additional Program Support Groups: *Citizen Science Advisory Panel Pool*

Citizen Science Advisory Panel Pool – The Citizen Science Advisory Panel Pool is modeled after the SEDAR Advisory Panel Pool and workshop panel approach. Appointments to the Citizen Science Advisory Panel Pool (CSAP) will be handled by the Citizen Science Committee. The Committee will also appoint members to Action Teams and any other *ad hoc* Technical Committees from the CSAP (consistent with appointments for specific SEDAR workshop panels).

i. Citizen Science Action Teams - Citizen Science Action Teams, as described in the Blueprint, were appointed to begin developing specific, program recommendations. A-Teams used Terms of Reference to guide the development of recommendations for the Program in five topical areas (Volunteers, Data Management, Projects/Topics Management, Communication/Outreach/Education, and Finance & Infrastructure). Functionally, the Action Teams were considered Advisory Panels and members were all appointed to the CSAP. Action Teams were not standing committees or standing APs, and only existed for the time it took to develop the Citizen Science Program as specified in the Blueprint.

Once the initial Terms of Reference for program development were addressed by each A-Team, the A-Teams were dissolved. Members are retained in the CSAP. Members of the CSAP may be called upon to serve on any additional Ad Hoc Technical Committees that may be needed for the Program. See Appendix A for additional details about the CSAP and Action Teams and the process by which they developed program recommendations in 2017-2018.

ii. *ad hoc* Citizen Science Technical Committees

- Purpose – To support areas of the program related to projects.

- Roles & Responsibilities - Members of technical committees will serve in a review capacity for process-oriented components of the Program. For example, once the

Project Endorsement Program is implemented, the Program will need an *ad hoc* Technical Committee to review applications for projects that are submitted for endorsement. Additional *ad hoc* Technical Committees may be needed for various types of Program activities that arise.

- Appointments and Terms – Members are appointed by the Council Citizen Science Committee from the CSAP. Terms are contingent on the nature of the technical committee, but are not to exceed one-year unless an alternative term is specifically designated at the time of appointment

III. Program Components

a. Citizen Science Program Research Prioritization Process -
(See Appendices B and C)
This process is a mechanism for establishing research priorities for the Program and determining how often they are reviewed and evaluated.

The three-step process involves:
Step 1: Reviewing and providing input on the Council's biennial Research & Monitoring Plan.
Mechanism – Program staff will review and provide feedback on the plan and identify items that could be addressed using the Citizen Science Program. In addition, the Plan will receive input from the Council's SSC, SEDAR process, AP discussions and the FMP development process.

Step 2: Developing a Citizen Science Program Research Priorities document.
Mechanism **-** Program staff will work with the Citizen Science Projects Advisory Committee, Operations Committee, and the Program Advisory Panel to develop a separate Citizen Science Program Research Priorities document that is informed by the Council's Research & Monitoring Plan. The draft document will be reviewed by the Council's APs and SSC.
Timing – The Citizen Science Research Priorities document will be reviewed biennially, in coordination withreviews of the Council's Research & Monitoring Plan;
Review & Adoption – Council reviews and adopts biennial research priorities.

Step 3: Citizen Science Project Idea Portal
Mechanism – Develop an online form hosted on the Council's Citizen Science webpage where stakeholders can submit citizen science project ideas that may be considered under the biennial Citizen Science Research Priorities. The online form will provide a series of questions focused on topics related to the Citizen Science Program Research Priorities. The portal will be monitored by staff, and include a feedback mechanism to provide comments within one month to the person submitting an idea and to help connect them with potential collaborators. Information received via the form will be compiled and considered during the next review of research priorities.
Timeframe – open year-round

b. Project Endorsement Program -

(See Appendix D)

In the absence of internal funding for projects, the Council's Citizen Science Program (Program) will encourage development of externally funded citizen science projects in partnership with stakeholders to support the goals of the Program. However, external projects pursued in partnership with the Council's Program need to have a mechanism in place that assures the project is designed appropriately and has the resources necessary for project success. To support development of robustly designed projects that produce data that can be considered for use in management by the Council, the Program will develop a project endorsement program that includes specific criteria that must be met, and an application and review process that must be followed, in order to receive endorsement.

Project Endorsement Criteria

Projects must meet the following criteria to be endorsed by the Council's Citizen Science Program:

- Meets the goals/objectives of the SAFMC Citizen Science Program
- Addresses one or more of the priority topics in the SAFMC Citizen Science Research Needs
- Outlines the Project Development Plan for the project
- Outlines the Data Management Plan for the project
- Outlines the Communication Plan for the project, including volunteer recruitment, sharing project results (approaches and products)
- Outlines the Volunteer Training Plan for the project
- Outlines methods for evaluating the project for the duration of the project

Application Process

Stakeholders interested in receiving endorsement for their citizen science project by the Program will engage in a two-step application process, 1) Pre-application and 2) Full application. Applications will be accepted (at any time) and reviewed quarterly.

Project Review Process

- Pre-application – Program staff will review the pre-application. All pre-applications will receive feedback on the extent to which they meet the project endorsement criteria. If minimum criteria are met, the applicant will be invited to submit a full application.
- Full application - Program staff will coordinate the review process for full applications by selecting a minimum of three reviewers per application. Reviewers will be selected from an established, semi-standing, *ad hoc* Technical Committee established for Project Review. Reviewers will use an online review form and the project review rating system to review project applications. The review process (review, comments, and response to applicant) will be completed in three weeks or less. Reviewers will be asked to complete their reviews within 2 weeks. Applicants will be informed of the results of the review and provided a summary of any recommendations for improvement that may be suggested by the reviewers.
- Full applications will be scored and provided review feedback.

Endorsed Projects – Benefits and Terms

Projects that are endorsed by the Program will receive a letter of endorsement, project promotion through the Program's outreach and promotion activities, and approval to use the Program's logo. Letters of endorsement will outline the terms of the endorsement and expectations for receiving endorsement to include, but not limited to, annual monitoring and progress reports on the project and notification if the scope of the project changes. Changes in project scope may warrant another review for continued endorsement.

c. Communication/Outreach/Branding -

Development of communication, outreach, and branding products and activities will primarily be the responsibility of Program staff. Products and activities will be informed by the best practices and policies outlined in the Communication and Training Plans developed by the Citizen Science Program Action Teams. Program staff will coordinate outreach and communication efforts related to citizen science activities with the Council's Outreach Team that is already in place.

The following types of communication and outreach products and activities will be considered for development by the Program and updated as needed as part of an annual Plan of Work:

- Routine Program Communication – newsletter/blog/reports
- Program Website
- Program Social Media Development
- Program Support Materials – brochures, fact sheets, etc.
- Annual report of accomplishments and volunteer recognition

d. Volunteer Engagement -

Developing volunteer engagement (recruitment, training, and retention) products and activities will be the responsibility of Program staff. Products and activities will be informed by the best practices and policies outlined in the Communication and Training Plans developed by the Citizen Science Program Action Teams and incorporated into an annual Plan of Work for the Program. Items to be considered for an annual Plan of Work for Program staff include:

- Developing a Volunteer Recognition Program through an *ad hoc* Technical Committee
- Developing a Participant Attitude Survey for volunteers participating in projects

e. Data Standards & QA/QC –

The Program requires that project teams address data standards, QA/QC, and other data management and analysis considerations for each specific project.

The Program expects project data to be useful for management, have a targeted user, and comply with sound scientific practices. meet? Comply with? a

The Program will facilitate discussions between project Principal Investigators (PIs) and data recipients to ensure data management standards and requirements are clearly identified, and that the project includes adequate provisions to ensure they are met.

The Program will work with the Technical Advisors of the Program Oversight Board to develop and maintain rigorous data standards and QA/QC processes.

f. Partnership Development -

(See Appendix E)

The Program will pursue partnership development using the best practices outlined in the Partnership Development Plan prepared by the Finance & Infrastructure Action Team. The Council Citizen Science Committee can provide input on potential partners and support staff in pursuing partnership development.

g. Project Support Guidelines

The Program may support projects that are pursued internally by the Program, as well as projects that are developed external to the program and endorsed as described above. The Program will support internal and endorsed projects in the following ways:

- Internal Projects – Program staff are responsible for all project coordination and
- management.
- External, Endorsed Projects – Projects that receive Project Endorsement through the Citizen Science Program will:
    - Develop a shared vision of how the project PI and the Program will communicate about the project;
    - Receive assistance with promotion of the project and communication of project results.

IV. Project Support & Best Practices

Projects falling under the umbrella of the Program should consider the best practices and templates developed by the Citizen Science Action teams during the development, implementation, and management of all aspects of a project. The following sections contain resources (information and links to the best practices and templates) for key components of a successful citizen science project.

a. Project Development Components

See Appendix F to review the Project Development Plan template to serve as a guide for helping projects develop using the Program's standards and suggested best practices.

b. Communication/Outreach/Branding

See Appendix G to review the Communication Plan Template that serves as a guide to help projects develop a dedicated communication plan and conduct outreach for the project using suggested best practices.

c. Data Management

See Appendices H, I, and J to review suggested best practices for a Data Management Plan for projects, including templates for Data Requirements, Data Standards, and QA/QC.

d. Volunteer Management

See Appendices K and L to review suggested best practices and the template for a Volunteer Training Plan. Additional resources related to volunteer training are also referenced in the Communication Plan template in Appendix G.

e. Resources

Below are links to a list of the inventories created by the Action Teams related to Data Management Resources and Funding Opportunities.

- Data Management Resources Inventory – will be periodically updated as needed
- Funding Opportunity Inventory – will be continually updated

Once the Program initiates projects, a Volunteer Database will be maintained. The database will collect basic contact information on volunteers and their interest and skill sets for participating in different types of projects.

- Volunteer Database (from the Volunteer Interest Form entries) – will be continually updated once the Volunteer Interest Form is made active.

V. Program Evaluation & Needs Assessment -

- Purpose
  - Evaluation of the program activities and status, and identification of any modifications needed to respond to emerging needs and opportunities.
  - Elements for an evaluation rubric:
    - Stakeholder collaboration and program resources
    - Goals and objectives
    - Methods: design and implementation of
    - Data management: entry, storage, analysis, and synthesis
    - Reporting and dissemination
    - Outcome evaluation and program review
- Timing
  - Annual summary – timing based on a calendar year and presented to the Council Citizen Science Committee in March annually.
  - 5-year programmatic review
- Product
  - Summary report that includes volunteer recognition

VI. Appendices

Program Component Resources

Appendix A: Overview of Citizen Science Advisory Panel Pool

Appendix B: Citizen Science Program Research Prioritization Process (from Projects/Topics A-Team)

Appendix C: Current Citizen Science Research Priorities – Adopted by SAFMC December 2019

Appendix D: Project Endorsement Program (from Projects/Topics A-Team)

Appendix E: Partnership Development Plan (from Finance & Infrastructure A-Team)

Project Support Resources

Appendix F: Project Development Plan Template (from Projects/Topics A-Team)

Appendix G: Communication Plan Template (from Communications A-Team)

Appendix H: Data Management/Requirements Template (from Data Management A-Team)

Appendix I: Data Standards Template (from Data Management A-Team)

Appendix J: Data Quality Management Recommendations (from Data Management A-Team)

Appendix K: Volunteer Training Basic Orientation Best Practices (from Volunteers A-Team)

Appendix L: Volunteer Training Basic Orientation Template (from Volunteers A-Team)

Citizen Science Advisory Panel Pool/Action Team Overview

Citizen Science Advisory Panel (Pool) – The Citizen Science Advisory Panel (Pool) is modeled after the SEDAR Advisory Panel (Pool) and workshop panel approach. Appointments to the Citizen Science Advisory Panel Pool (CSAP Pool) will be handled by the Citizen Science Committee. The Committee will also appoint members to Action Teams and any other ad hoc technical committees from the Citizen Science AP Pool (consistent with appointments for specific SEDAR workshop panels).

- Purpose: Provide a pool of individuals for appointment to specific Citizen Science Action Teams
- Membership: Attendees of the SAFMC Citizen Science Program Design Workshop; members of standing SAFMC APs, SSC, and agency representatives; other interested citizens with expertise in one of the five Action Team areas.
- Appointments: Members appointed by the AP Selection Committee and Council.
- Meetings: The CSAP Pool will not meet.
- Exceptions: CSAP Pool members are not subject to the 3-year AP term limit, and membership on the CSAP Pool will not count toward the rule suggesting individuals may only serve on one AP.
- Duration of Service: The intent is that CSAP Pool will be required while the A-Teams are in effect, which is expected to be 12-24 months (see below).
- Relation to Standing APs: As part of program development, the Citizen Science Committee and Council will need to consider Citizen Science Program Advisory Panel needs. This will include determining what additional APs are required. The CSAP Pool is in no way intended to serve as a standing AP.

Citizen Science Action Teams – Citizen Science Action Teams, as described in the Blueprint, were appointed to begin developing specific program recommendations. A-Teams will use Terms of Reference to guide the development of recommendations for the Program in five topical areas (see below). Functionally, the Action Teams will be considered Advisory Panels. Action Teams are not standing committees or standing APs, and will only exist for the time it takes to develop the Citizen Science Program as specified in the Blueprint.

- Purpose: Develop program policies and recommendations related to the focus area of their Action Team to be reviewed and adopted by the Citizen Science Committee and the Council.
- Membership & Eligibility: Members are appointed from the Citizen Science AP Pool (see above for details). Members of the Citizen Science AP Pool are appointed to one of five A-Teams based on interest and area of expertise – Volunteers, Data Management, Projects Topics Management, Finance & Infrastructure, and Communication/Outreach/Education.

- Appointments & Terms: A-Team members will be appointed by the Citizen Science Committee/Council, from the Citizen Science AP Pool. (Note that this is similar to the SEDAR panel appointment process); The intent is that A-teams will be able to address their respective program areas over approximately 12 months. They may be retained for another 3-6 months, or longer if needed, to address any concerns that may arise through Council review.
- Chair: A-Team co-chairs will be appointed by consensus of the A-Team members.
- Major Tasks: Each A-Team will be guided by a set of Terms of Reference to accomplish the following tasks
    - Volunteers - Develop policy recommendations for recruitment and retention; training; participation incentives; identifying projects and research needs; and expectation management of volunteers.
    - Data Management - Develop policy recommendations for an entity to manage data; data life cycle; standards and QA/QC; access; data validation; use and end-user citations; infrastructure; and presentation and marketing.
    - Projects/Topics Management - Develop policy recommendations for identifying and prioritizing project topics/research needs; developing an application process; approving/endorsing projects; project solicitation and selection; project management; training for citizen science methods; and project evaluation.
    - Finance & Infrastructure - Develop policy recommendations for short/long-term administrative funding and project funding; and creative funding partnerships.
    - Communication/Outreach/Education - Develop policy recommendations for appropriate approaches and tools to communicate project results; media plan; feedback-recognition plan; training plan; and communication platforms for the program and projects (visual, electronic, and print).
- Meetings: Each A-Team meets monthly via webinar with periodic “All-Hands” Action Team meetings bringing members of all the A-Teams together via webinar.
- Notification: Meetings are noticed in the FRN on a monthly basis.
- Administrative: Meetings are recorded and open to the public, consistent with standard AP meeting requirements.
- Transition Plan: Once the initial Terms of Reference for Program development have been addressed by each A-Team, the A-Teams will be dissolved and members return to the general Citizen Science Advisory Panel Pool. Members of the AP Pool may be called upon to serve on any additional technical committees that may be needed for the Program.

Appendix A

Process for Identifying SAFMC Citizen Science Program Research Priorities

This process serves as the mechanism for establishing research priorities for the Program and how often they are reviewed and evaluated.

The three-step process involves,
Step 1: Reviewing and providing input on the Council's Biannual Research & Monitoring Plan.
Mechanism – Program staff will review and provide feedback on the plan in addition to input from the Council's SSC, SEDAR process, AP discussions and other issues that arise during FMP development.

Step 2: Developing a Citizen Science Program Research Priorities document.
Mechanism **-** Program staff will work with administrative advisory groups to develop a separate Citizen Science Program Research Priorities document that is informed by the Council's Research & Monitoring Plan. The draft document will be reviewed review by the Council's AP's and the SSC.
Timeframe – The Citizen Science Research Priorities document will be reviewed biannually on the schedule of the Research & Monitoring Plan Review;
Review & Adoption – Council reviews and adopts biannual research priorities.

Step 3: Citizen Science Project Idea Portal
Mechanism – Develop an online form hosted on the Council's Citizen Science webpage where stakeholders can submit citizen science project ideas. The online form would be set up with a series of questions that are focused on topics related to the Citizen Science Program Research Priorities. The portal is monitored by staff with a feedback mechanism built in to provide comments to the person submitting an idea and to help connect them with potential collaborators. Information received via the form would be compiled and considered during the next review of research priorities.
Timeframe – open year-round
Additional Information – The online form would be set up with logic to walk the stakeholder through a series of questions or a checklist of items:

- Initial questions to tell us about their project idea.
- Does the project idea fit under one or more of the items in the Council's Research & Monitoring Plan and/or the annual Call for Citizen Science Needs?
    - If so, check which item it addresses.
    - If not, why should this be considered (i.e., how could the idea inform assessments and/or management)?
    - If not, would you like to be matched with a researcher/scientist that can help you with your idea?
- Have you spoken with a researcher or scientist about your idea?
    - If so, who?
    - If not, would you like to be matched with a researcher/scientist that can help you with your idea?
- Have you spoken with other fishermen about the project that would be willing to volunteer?
    - If so, how many? Willing to share name or contact information?

- Would the project require payment to fishermen?
    - If so, it doesn't fit the program's criteria
    - If not, proceed.
- How much time do you think the project would take to complete?
- How much do you think the project would cost?
- How many people are involved in this project idea – what is your man power?
- Who will manage the project on behalf of the group and how?
- What kind of resources do you have in place?

Appendix C

ADOPTED BY SAFMC: Dec 2021

SAFMC Citizen Science Program

Citizen Science Research Priorities

Age Sampling^:

a. Target volunteers: Recreational
b. Data needed: otolith collection
c. Target species: Cobia, Greater Amberjack, Scamp, Snowy Grouper, Gag, Knobbed Porgy, Porgy complex, Almaco Jack, Dolphin, Wahoo, Lane Snapper, Hogfish (GA-NC stock), Red Grouper, Vermilion Snapper, Blueline tilefish
d. Anticipated outcome: characterize the age of catches
e. Potential cost: $$

Maturity Data^:

a. Target volunteers: Recreational and commercial; tournaments
b. Data needed: gonad collection (either actual biological samples or pictures)
c. Target species: Cobia, Red Porgy, Snowy Grouper, Spiny Lobster, Gag, Red Grouper, Black Grouper, Scamp, Black Seabass, Greater Amberjack, Wahoo, Mutton Snapper
d. Anticipated outcome: improved reproductive information
e. Potential cost: $$

Discard Information:

a. Target volunteers: Recreational and commercial
b. Data needed: length of fish; depth caught/released; number of fish; reason for discard; devices used
c. Target species: all SAFMC managed species in particular, Scamp, Red Snapper, deepwater groupers, Red Porgy, Greater Amberjack, Cobia, King Mackerel (sub-legal releases), and Gray Triggerfish
d. Anticipated outcome: improved discard removals estimates, ability to characterize size composition of discards
e. Potential cost: $-$$

Genetic Sampling^:

a. Target volunteers: Recreational and commercial; bait and tackle shops; tournaments
b. Data needed: fin clips
c. Target species: Cobia, Hogfish (both stocks), Red Grouper, White Grunt, Spanish Mackerel, Dolphin
d. Anticipated outcome: stock identification
e. Potential cost: $-$$

Fishing Infrastructure:

a. Target volunteers: Recreational, commercial, and community members/citizens
b. Data needed: GPS location of existing and previously existing/closed fishing-related infrastructure (commercial fishing facilities, marinas, bait/tackle shops, ice house, fuel docks, boat ramps, piers, roadside seafood stands, retail markets, etc.)

^Projects under these priorities would likely require a high level of involvement or collaboration between multiple organizations.

c. Anticipated outcome: Baseline for fishing-related infrastructure to help document potential impacts from regulations
d. Potential cost: $

Historical Fishing Photos:

a. Target volunteers: Recreational and for-hire
b. Data needed: digitized images (will need to scan print photos into digital format)
c. Target species: commonly caught charter/headboat species
d. Anticipated outcome: length comps for certain species; improved historical information
e. Potential cost: $-$$

Fishery Oral Histories^:

a. Target volunteers: For-hire and commercial captains
b. Data needed: interviews with fishermen to learn about the history and current state of a fishery; possibly pair interviews with topic #6 (Historical Fishing Photos)
c. Anticipated outcome: documentation of how fisheries operated over time (catchability changes over time with improvements in technology; markets; clients; species distribution; size of fish; weather; etc.) and other observational data
d. Potential cost: $

Oceanographic/Environmental/Weather Conditions:

a. Target volunteers: Recreational and commercial
b. Data needed: Bottom temperature; weather impacts to fishing; presence/absence of sargassum and size of area; movement of forage fish (bait) and shifts in patterns of a fishery (i.e., mackerel)
c. Anticipated outcome: building database on climate and conditions; distribution of sargassum; how forage fish impacts patterns in a fishery
d. Potential cost: $-$$

Rare or Data Limited Species Observations:

a. Target volunteers: Recreational and commercial
b. Data needed: Point observations of data limited or unusual or rarely encountered species
c. Anticipated outcome: baseline for species shift; increasing information available for data limited species
d. Potential cost: $-$$

Historic Personal Fishing Logbooks/Diaries:

a. Target volunteers: For-hire and commercial
b. Data needed: translate fishermen's historic logbooks into electronic data/database
c. Anticipated outcome: develop relative indices of abundance
d. Potential cost: $-$$

Observations in Managed Areas^:

a. Target volunteers: Recreational and commercial, divers
b. Data needed: species, length, depth, videos/photos
c. Target species: snapper and grouper

^Projects under these priorities would likely require a high level of involvement or collaboration between multiple organizations.

d. Anticipated outcome: species composition, changes in fish abundance over time
e. Potential cost: $$

Movement and Migration:

a. Target volunteers: Recreational and commercial, focus on supporting and working with existing tagging programs
b. Data needed: species, location, length, tag details
c. Target species: Dolphin and Wahoo
d. Anticipated outcome: movement and migratory patterns
e. Potential cost: $-$$

Shark Predation:

a. Target volunteers: Recreational and commercial
b. Data needed: observations of shark depredation, location, species
c. Anticipated outcome: document shark depredation observations
d. Potential cost: $-$$

^Projects under these priorities would likely require a high level of involvement or collaboration between multiple organizations.

SAFMC Citizen Science Project Endorsement Program

Purpose of the Project Endorsement Program

In the absence of internal funding for projects, the Council's Citizen Science Program (Program) should encourage development of externally-funded citizen science projects in partnership with stakeholders to support the goals of the Program. However, external projects pursued in partnership with the Council's Program need to have a mechanism in place that assures the project is designed appropriately and have the resources necessary for project success. To support development of robustly-designed projects that produce data that could be considered for use in management by the Council, the Council should develop a project endorsement program that includes specific criteria that must be met in order to receive endorsement by the Program.

Project Endorsement Criteria

Projects must meet the following criteria to be endorsed by the Council's Citizen Science Program:

- Meets the goals/objectives of the SAFMC Citizen Science Program
- Addresses one or more of the priority topics in the SAFMC Citizen Science Research Needs
- Outlines the Project Development Plan for the project
- Outlines the Data Management Plan for the project
- Outlines the Communication Plan for the project, including volunteer recruitment, sharing project results (approaches and products).
- Outlines the Volunteer Training Plan for the project
- Outlines methods for evaluating the project for the duration of the project

What is the Benefit of Project Endorsement?

Projects that pursue endorsement by the Program will,

- Be able to engage with Program staff to help develop a citizen science project
- Be able to vet project ideas with points of contacts identified in the Citizen Science Research Needs document
- Have access to the Council's network of fishery stakeholders for developing projects and partnerships

Projects that receive endorsement by the Program will,

- Have met the endorsement criteria outlined by the Program,
- Have been vetted by a review committee for approval, and
- Have met the project design requirements that allows for the data collected by the project to be considered for use in the science and decision-making process of the Council's management.
- Use of Program logo, if needed
- Letter of endorsement

What is the Process for Pursuing Project Endorsement?

Stakeholders interested in receiving endorsement for their citizen science project by the Council's Program will engage in a two-step application process, 1) Pre-application and 2) Full application.

Review Process and Review Team

- Program staff will coordinate the review process.
- Pre-applications will be reviewed by Program staff.

For review of full applications,

- The Program will establish a pool of reviewers from existing APs, SSC and other experts in the field identified to have subject matter expertise that match up to an application.
- A minimum of three reviewers will be solicited to review a full application and will make of the Project Endorsement Review Team (Review Team).
- The Review Team will use the established criterion and rating system to review full applications.
- Additionally, reviewers will provide a brief summary of review comments.

1) <u>Pre-application</u>

The pre-application is the opportunity for projects to vet their project idea with the Program's staff by providing a simple summary of the project idea to include,

- Project Summary:
  - Purpose of the Project
  - What research question or data gap is being addressed by the project? (Identify which of the identified Citizen Science Research Needs would be addressed.)
  - Methods - How will the project be carried out?
  - What is the anticipated outcome of the project and how might the data be used by the Council?
- What types of project partners are needed for the project and what is their role in the project?
- What is the timeline for completion of the project? (Is the project appropriate in terms of the timeliness and availability of the data for use in management?)
- What is the total estimated cost of the project? (Is the project cost feasible for the work proposed?)

<u>Review of Pre-Applications</u> –

Pre-applications will be reviewed and in order to be considered for a full application, must be able to meet the following basic criteria:

- Meets the goals/objectives of the SAFMC Citizen Science Program
- Addresses one or more of the priority topics in the SAFMC Citizen Science Research Needs
- Completion of the components in the pre-application

<u>Review Process</u> – Program staff review the project pre-application and determine if the basic criteria have or have not been met for the pre-application.

- If a project meets the basic criteria, the project would be invited to submit a full application.
- If the project does not meet the criteria, staff will provide assistance in further developing the project to meet the criteria. (Staff can assist in providing points of contact for a specific research need/topic.)

- If the project does not meet the criteria and is not a research need priority for the Program, the project idea will be archived ("project parking lot") for review/consideration during the annual review of the Citizen Science Research Needs document.

2) <u>Full application</u>

Once a project has passed the pre-application step, the project would submit a full application to include the elements in the pre-application in addition to the following:

- Who are the project partners?
  - Partners should be identified by main point of contact, affiliation and their role in the partnership
- Who will serve on the project team?
  - The project team should be made up of representatives that will be involved in the design and development of the project for the duration of the project. This will be dependent on the project but ideally the project team would include a researcher, fishermen, local scientist, outreach, technology expert, Council staff (as needed).
- Who is the end user of the project data?
- Project Methods
- What resources have been gathered to complete the project?
  - Using a matrix table, the project should briefly identify the project lead, partners and their role in the project, volunteer training needed, data management needed, volunteer engagement needed, communication needed,
- What is the Data Management Plan (entry, storage, access, use)? (Separate template document)
- What is the Volunteer Training Plan? (Separate template document)
- What is the Communication Plan? (Separate template document)
- What is the budget for the project?
  - Project staff, as needed
  - Equipment
  - Materials
  - Development of training materials
  - Database management/storage
  - Technology development
  - Travel – general project and for training
  - Software costs
  - Potential match:
    - Estimate of volunteer time contribution
    - Project staff
    - Corporate sponsors

<u>Review of Full Applications:</u>

Program staff will coordinate the review process for full applications by selecting a minimum of three reviewers per application and providing them the following review process and rating system instructions. Reviewers will use an online review form to submit their scores and comments.

Review Process & Rating System –

Full applications will be evaluated under the following criterion and rating system:

1) Relevance to program goals
2) Addresses a research priority
3) Technical merit/methodology
4) Availability of expertize and its application to the problem addressed
5) Participant/volunteer qualifications and/or ability to train volunteers
6) Recruitment of and outreach to volunteers
7) Value to NOAA NMFS, SA Council, Industry

Each category above, will be rated using the following scoring:

1- Do not recommend
2- Poor
3- Fair
4- Good
5- Excellent

Each criterion will receive a score and then will be tallied and averaged across the 7 criteria. Based on averages of all scores, a final average score between 4 and 5 would receive an endorsement.

If the full application doesn't meet the minimum criteria scoring for endorsement then the application is not endorsed. Each reviewer will provide a paragraph summary of why the proposal is endorsed or not to give some feedback to the applicant.

Timeline – Full applications are reviewed on a quarterly basis

- Timeline for review and endorsement decisions should be two weeks or less
- If consensus not met during 2-week time frame, have a special call/meeting to discuss after and notify application of delay (maximum 1 week)
- If project deemed worthy of endorsement, notify applicant
- If project falls short of review committee's decision to endorse, provide feedback to the application and encourage continued submission and/or resubmission of project with changes from the feedback
    - This project idea would also go in the **"project parking lot".**

Partnership Development Plan: *Best Practices for Developing Partnerships for the Citizen Science Program*

1) Identify the type of partnership model being pursued.

The type of partnership model could be a fiscal partnership or project partnership. See Tables 1 and 2 below.

2) Review goals/objectives of potential partner and identify where they align with the Citizen Science Program goals and research priorities.

3) Prepare a partnership prospectus outlining the roles, expectations, and scope of both parties.

4) Develop an informal MOU with the partner that includes the scope of the partnership, expectations and duration of MOU.

TABLE 1: Funding Model Options for the SAFMC Citizen Science Program

Matrix Criteria	**Public-Private Partnership with 501(c)3**	**Crowdfunding**	**Academic Institution Partnership**	**Foundations**	**Government Partnership**
Accept grant $ for program	✓		✓	✓	✓
Serve as PI on grants			✓	✓	✓
Accept solicited donations for program	✓	✓		✓	Possibly
Fundraise for program	✓	✓		Possibly	Not typical
MOU	✓		Possibly	✓	✓
Charge administrative fee for fiscal agent services	✓(Rate dependent on agreement)		✓	✓(Rate dependent on agreement)	✓(Rate dependent on agreement)
Overlapping mission/program goals	Strongly suggested	Typically	Typically	Strongly suggested	✓
Coordinated by third party administrator		✓			
Assist with program or project promotion/outreach	* Dependent on agreement	Campaign serves as promotion/ outreach	* Dependent on agreement	* Dependent on agreement	* Dependent on agreement
Established contract process		✓	✓		✓
Audit process			✓	✓	✓

Examples	Tall Timbers; The Nature Conservancy	NC Artificial Reef GoFundMe	Duke University; College of Charleston; Sea Grant	National Marine Sanctuary Foundation; Friends of the Sanctuary	Atlantic States Marine Fisheries Commission

TABLE 2: Funding Source Options for the SAFMC Citizen Science Program

	NGO/foundation grants	Crowdfunding	Academic grants	State, fed, regional gov't RFPs	Approps/federal budgets	Corporate
Type of funds available: project, program, both	Both	Both	Both	Both	Both	Both
Fundraising opportunity						
Eligibility (Council, partner, both)	Partner	Partner	Partner	Both	Council	Partner
Funding mechanism: RFP, funder-led solicitation, recipient-led solicitation, contract, research grant, gift	All mechanisms	Recipient-led solicitation	RFP, funder-led solicitation, contract, research grant	RFP, contract (?), research grant (?)	TBD (both funder- and recipient-led solicitation IMO but maybe we don't want to go here now)	All mechanisms
Timing: rolling, deadline, both						
Additional parameter?			`			

Project Development Plan Template

Projects should demonstrate how the project will be developed to include:

- Who are the project partners?
    - Partners should be identified by main point of contact, affiliation and their role in the partnership
- Who will serve on the project team?
    - The project team is made up of representatives that will be involved in the design and development of the project for the duration of the project. This will be dependent on the project but ideally the project team would include a researcher, fishermen, local scientist, outreach, technology expert, Council staff (as needed).
- Who is the end user of the project data?
- Provide a project summary:
    - What is the purpose of the project?
    - What research question is being addressed? (Does this meet one of the Council's Cit Sci research needs?)
    - What are the methods for the project?
    - What is the anticipated outcome and how could the results be used? (Is the project feasible in terms of the timeliness of results, methods, and costs?)
- What resources have been gathered to complete the project?
    - Using a matrix table, the project should briefly identify the project lead, partners and their role in the project, volunteer training needed, data management needed, volunteer engagement needed, communication needed,
- What is the Data Management Plan (entry, storage, access, use)? (Separate document)
- What is the Volunteer Training Plan? (Separate document)
- What is the Communication Plan? (Separate document)
- What is the budget for the project?
    - Project staff, as needed
    - Equipment
    - Materials
    - Development of training materials
    - Database management/storage
    - Technology development
    - Travel – general project and for training
    - Software costs
    - Potential match:
        - Estimate of volunteer time contribution
        - Project staff
        - Corporate sponsors

SAFMC Communications Plan Template (Citizen Science Program)

- Project background - describe the project (purpose, objectives, anticipated outcomes, who is involved and how the information will be used)

- Communication objectives
    - -both external (what you hope to accomplish with your target audience) and internal (what you hope to accomplish internally within the organization and with communication staff)

- Target audiences

- Key messaging for each of your audiences
    - important to be mindful of your "brand"…ie make sure you messages align with identity/purpose of your program

- Implementation Plan and Timeline
    - What methods/tools should you use (social media, website, infographics, brochures, press release etc)
        - Use your key messaging to help develop this content
    - Map out the timeline for each of the core activities of the communication plan -
        - who is responsible for the activities and when;
        - the frequency of the activities (special occasions, ongoing, quarterly, etc.)

- Evaluation efforts
    - How do you know if your objectives have be met? How will you measure success?
        - (externally and internally)
- Branding
    - What types of branding products/graphics would need to be developed for the project

	Commercial	Charter	Headboat	Private Rec Angler	Scientists	Funder	Partners	Media
Objectives								
Background info								
Key Messages								
Frequency								
Vehicle/Tool/ Approach								
Project Resources Available								
Timeline								
Evaluation of effectiveness of communication								
Additional Notes:								

SAFMC Citizen Science Program
DRAFT Data Requirements Document

Version 1.0

1. Introduction

    1.1 Purpose –

    1.2 Scope – This document will provide:

        2. Overview
        3. Functional Requirements
            3.1. General Requirements
            3.2. Specific Requirements
        4. Support and Training
        5. Project Timeline
        6. Figures and Appendices

    1.3 Personnel

        1.3.1 Project PI and Data Collectors

        1.3.2 Additional Collaborators

2. Project Overview

3. Functional Requirements

    3.1 General Requirements - This section contains plain-English, high-level description of the project "needs" and "wants". The Project PIs will be needed to help to refine this section, and define their vision of what the application will accomplish.

    3.2 Specific Requirements - This section should contain the more technical description on how to meet each of the plain-English requirements detailed above in section 3.1. Input from the Project Planning Team will be important for this section – in order to describe their understanding/ interpretation of the requirements, and how those needs are expected to be met using the intended available resources.

4. Support and Training – This section should outline how and who will provide project support and training of volunteers for the project.

5. Project Timeline – This section should map out the anticipated timeline of major project activities and milestones.

6. Figures and Appendices

A1. Data elements and formats.

Citizen Science Data Standards Template

Compiled and Reviewed by Data Management Action Team
March, 2018

Purpose: The purpose of this document is to outline the Data Standards sections recommended by the Data Management Action Team (DMAT) that a citizen science project needs to address during the development phase. Data Standards provided by the Atlantic Coastal Cooperative Statistics Program (ACCSP), the Southeast Area Monitoring and Assessment Program (SEAMAP), and the Southeast Coastal Ocean Observing Regional Association (SECOORA) were reviewed to develop these recommendations. The purpose is not to define those standards for citizen science projects because research needs and data types may change over time, and the DMAT cannot expect to anticipate all data needs. This document should be used to guide the design phase of a project and to allow project sponsors to evaluate the potential success and use of data collected.

Data Standards Sections DMAT Recommends to be Developed for SAFMC "Certified" Citizen Science Projects

Mission/Purpose Statement

- Identify what the project is, what research need it addresses, briefly describe methods to be employed, expected partners, and expected results or data uses

Roles and Responsibilities Overview

- List identified partners or primary investigators and responsibilities
- If participants are yet to be identified, list as such and what their responsibilities will be

Data Collection Methods

- Survey Design
- Mechanism for collecting (paper, electronic, phone)
- Who are your volunteers, how were they selected?

Project Timeline(s)

- Identify deliverables or milestones that will be addressed each year
- Identify expected length of project

Data Workflow

- Provide a description or schematic of expected data to be collected and structure

Data Module(s)

- Describe your data type(s) and data structure
- Intended uses and limitations of data
- Describe data storage system

Data Elements for Each Module

- Names, definitions, formats
- Example. Commercial Trip Level Data

DATA ELEMENT	DESCRIPTION/CRITERIA	COLLECTED
Form type, version	Version identification number	Preprinted
Trip Start Date	Date the trip started	Collected from dealer and fishermen
Vessel identifier	Unique vessel identifier such as US Coast Guard documentation or state registration number	Collected from dealer and fishermen
Dealer identifier	Unique identifier for the dealer at the point of transaction	Collected from dealer and fishermen
Species	Genus and species landed, sold, released, or discated	Collected from dealer and fishermen
Trip End Date	Date the trip ended	Collected from dealer and fishermen

Example. Fishing Effort Data

DATA ELEMENT	DESCRIPTION/CRITERIA
Registration Source Name	- Code assigned by NOAA Fisheries Service - 2 letter state abbreviation or organization acronym
Customer Identification	- Code or identification used by the source organization to identify its customers, licensees, or registrants
Registration Issue Date	- Format: YYYYMMDD
Phone Number	- Do not include punctuation (dashes, parentheses, spaces)

QA/QC Process

- Responsibilities/personnel (exs. Spot checks, identification of outliers)
- Method for corrections and acceptable timeline

- Chain of custody
- Describe and prioritize sources of uncertainty
- Describe data entry program validation checks used to prevent errors (exs. phone follow-ups; collector reviews)

Units, Methods for Measurements, and Structures/Tissues

- Provide a description of the units, measurements and measurement methods, and structures or tissues that will be collected.
- Examples of commonly accepted methods and structures can be found in ACCSP's data standards http://www.accsp.org/sites/default/files/ACCSP_StandardsandAppendices2012_Final05082012.pdf

Metadata

- Identify the types of metadata to be produced by the program
- Identify how metadata will be provided to users and stored
- Identify how data should best used or analyzed or combined with other data sets

Continuity of Time Series ("Benchmarking)

- If a project is multi-year or a continuation of a previous project, describe methods to be employed to ensure continuity (ex. Calibration study)

Accessibility/Ownership/Confidentiality

- Identify whom you anticipate accessing the data
    - Volunteer rights to access data
    - PI rights to access data
    - Others' right to access data
- Describe expected mechanisms to access data
- Identify approaches to secure personal or proprietary information
- Identify correct citation for the use of the data, plus a statement saying data can be used if cited properly
- Describe appropriate or suggested data usages

Data Quality Management Plan
Recommendations for Quality Assurance and Quality Control

1. Introduction

Background

For many years the South Atlantic Fishery Management Council (SAFMC) has grappled with the challenge of ensuring adequate and timely science to support management despite limited resources, a multitude of species to manage, and a complex and highly diverse ecosystem. Discussions of data shortcomings and the resulting scientific uncertainties often lead to offers from fishermen to provide their vessels as research platforms, collect samples and record their own observations to help increase scientific knowledge and 'fill the gaps'. The SAFMC recognizes the desire of constituents to get involved and the need to have a well-designed program and accompanying sampling protocols to ensure that information collected through such efforts is useful. To meet this growing need, the SAFMC has initiated a Citizen Science Advisory Panel to coordinate, develop, and assist citizen science (CS) projects in the South Atlantic.

Purpose

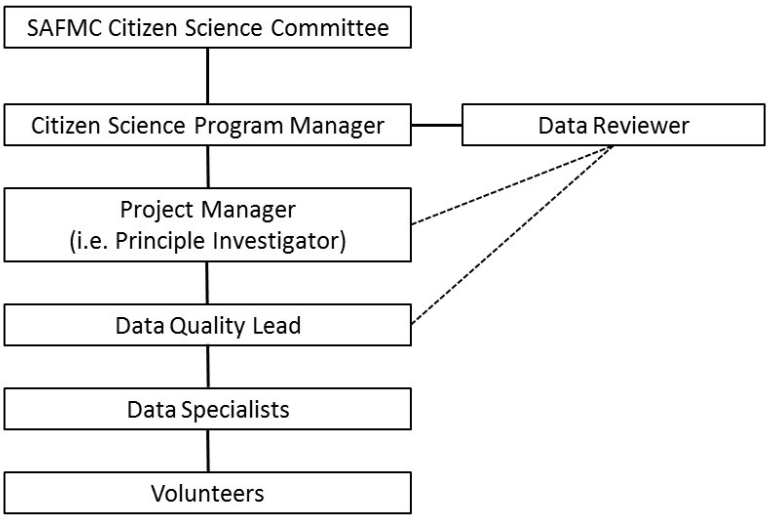
This document describes the recommended sections and content of Data Quality Management Plans (DQMP) to be developed by each CS project conducted in conjunction with the CS program at SAFMC. CS projects requiring a DQMP can be conducted by the SAFMC CS program or external entities. The DQMPs are recognized by the Data Management Action Team as the backbone to ensuring high quality data is collected by CS projects and the quality of the data is maintained over time. Recommendations provided in this document are based on similar documents utilized by the Environmental Protection Agency (EPA 2001), the Atlantic Coastal Cooperative Statistics Program (ACCSP 2012), and the DataONE CS workgroup (Wiggins et al. 2013).

2. Management and Organization

DQMPs should include information pertaining to overall scope, applicability, and management responsibilities for the project and specific to data quality. DQMPs should, when applicable, document:

- Standard operating procedures, including volunteer training
- Generation of measurement data
- Verification and reproducibility of data
- Known quality of data (accuracy, precision, completeness, etc.)
- Research and analyses, chains-of-custody (where appropriate), derivations of analytic approaches and results
- Software used
- Resources used
- Mechanism by which data errors identified through assessment, audit, or other means are corrected
- DQMPs can be based on quality documents required by other programs such as the ACCSP Data Requirements documents or the EPA Quality Assurance Project and Quality Management Plans

Recommended Personnel Involved in Data Quality



- Citizen Science Program Manager: SAFMC staff member that facilitates CS projects conducted in conjunction with the mission of SAFMC. Provides advice for development of DMQP.
- Project Manager (i.e. Principle Investigator): overall management of the project. Oversees collaboration with CS Coordinator. Develops DMQP and other project documents.
- Data Quality Lead: overall data management for the project. Oversees adherence to DMQP, data collection and entry training, data checks or audits. Coordinates data corrections, archiving, and delivery to users.
- Data Specialists: project personnel involved in any data management aspect.
- Data Reviewer: CS Program Manager may assign a data reviewer to conduct data audits as needed or on advice of the CS Committee. Evaluates collection, accuracy, precision, and validity of data, adherence to the DMQP, and proper archiving of data.
- ***Note:*** one person may serve multiple roles, depending on the type and scope of a project.

3. DQMP Documentation, Reviews, and Revisions

Each project must develop specific quality procedures, training, and documentation systems in their DQMP. All project participants are responsible for knowing and understanding the quality system for a given project and other supplemental project documentation. DQMPs should be developed prior to a CS project enlisting volunteers and beginning data collection. As part of the documentation and archiving process, the CS Program Manager will maintain both archived and updated versions the DQMP, the records of deliberations and decisions on all subsequent updates and revisions, and copies of change control memoranda (i.e. changes to the DQMP). The Project Manager, in collaboration with the Data Quality Lead, is responsible for overseeing the implementation of changes, documentation of changes, maintaining and numbering new DQMP versions, and distributing copies of updated DQMPs to the CS Program Manager and project personnel.

4. Personnel Qualification and Training

CS projects are required to implement data entry training as part of their overall volunteer training efforts. In addition, volunteers or others collecting data, should be trained in species identification and measuring protocols, as appropriate. Project-specific data management personnel (Quality Lead and Specialists) should be trained in procedures outlined in the DQMP. In addition, Project Managers in conjunction with the Quality Officer must ensure that data management personnel and volunteers are adhering to the project's DQMP. Methods to determine adherence can be developed to best fit a project, but must be outlined in the DQMP. One example is a quarterly data audit. Adherence checks should be documented in a project's progress and final reports.

5. Documents and Records

SAFMC CS projects are required to provide electronic documentation of the project's objectives, methods, and results throughout the project's life span. This documentation should be done in adherence with funding sources, such as progress and final reports, but also can and should include detailed procedural documentation for data collections, management, and analysis. Electronic copies of all reports and procedural documents will be submitted to the CS Program Manager and stored at the SAFMC headquarters.

6. Electronic Equipment and Software

DQMPs must identify all electronic equipment and software used for data collection, management, and analysis. Details to consider may include:

- accuracy and precision of instruments used,
- training procedures for using instruments, and
- calibration or servicing of instruments.

DQMPs also should include methods by which electronic data collected by a project (including volunteer data) is secured and remains private as appropriate. For projects that are developing new software, the DQMP must include user requirements and the methods employed to test/troubleshoot the new software. For electronically captured data, DQMPs must include verification and validation procedures. Without compromising the integrity or security of software or web applications, software code used to capture, manage, or analyze data should be included the supplemental documentation submitted to the CS Program Manager.

7. Generation, Acquisition, and Use of Data

DQMPs should consider including details on the accuracy and precision of collected data. This section should address:

- How the intended measurement is appropriate for achieving project objectives. Whether the project involves the application of known methods or the development of new methods.
- How the quality control procedures are sufficient for obtaining data of known and adequate quality.
- To what degree data will be defensible if challenged technically or legally.
- Limits to the use of data.

Measurement and Data Acquisition

Each project's DQMP must address the design and implementation of measurement systems to ensure that appropriate methods for collection, handling, and analysis is done.

- Sampling process design (experimental design)
- Sampling methods requirements

- Sample handling and custody requirements
- Quality control requirements
- Data acquisition requirements (non-direct measurements)
- Data management

Data Quality Steps

Projects should outline the process by which they assure data quality. These processes can be general and apply to a range of projects or be specific to each project, tailored as appropriate to the data types to be collected. ACCSP (2012) provides detailed steps that projects submitting data to them should follow; we provide a summary of these steps here to assist projects for developing their own processes.

- Data are collected on paper should be reviewed for legibility, completeness, reasonable values, and accuracy prior to electronic entry.
- All data should be available electronically and data entry protocols to minimize errors or identify errors should be in place.
    - Exs. Spot checks, outlier checks, double entry.
- Computer audits are highly recommended to automate data checks for errors less easy to identify.
    - Exs. Species' length and weight ranges, license numbers, dates, blanks.
- Data review at any of the steps above should occur in a reasonably short time frame after collection provide the greatest chance that errors can be corrected by contacting the person who recorded the data.
- Consistent errors should be addressed with data recorders to prevent future errors.

Assessment, Validation, and Usability

Each project's DQMP must address the methods by which data correctness (and therefore usefulness) is ascertained. DQMPs should detail:

- How are data assessed and response actions for corrections
- How are data corrections tracked
- How are data validated and verified
- Degree of precision (measure of agreement among repeated measurements)
- Required accuracy (measure of overall agreement to a known value)
- Degree of completeness (amount of data obtained in comparison to amount expected to be collected)
- Representativeness (degree to which the data represent the population from which they are drawn)
- Comparability (confidence with which data set can be compared to another)

References

ACCSP. 2012. Atlantic Coast Fisheries Data Collection Standards.

EPA. 2001. Guidance for Quality Assurance Project Plans. EPA QA/G-5.

Wiggins, A., R. Bonney, E. Graham, S. Henderson, S. Kelling, G. LeBuhn, R. Littauer, K. Lotts, W. Michener, G. Newman, E. Russell, R. Stevenson & J. Weltzin. 2013. Data Management Guide for Public Participation in Scientific Research.

Citizen Science Volunteer Training: Basic Orientation

- All training materials should contain:
  - **Mission statement to develop direction and expectations for project**

    Program Vision: "more collaboration + more data + more trust = better management"
    Program Mission: Improve fisheries management through collaborative science

    - The SAFMC aims to improve the efficiency and quality of fisheries management as well as inform the fishing community through the implementation of citizen science projects.
  - **Background science, in advance, to illustrate importance of citizen science project**
    - This can be done in a general sense. Funds are almost always limited, and as a result, many fisheries fall by the wayside when it comes to data collection. This is where citizen science comes in: while the data may not always be the cleanest, we live in a world of "best available science," so there can be potential there.
    - Basic orientation - Maybe add overview of existing data collection programs (state/federal; all sectors) and how it feeds into the management process here?
    - Project Specific orientation - discuss in this section the specific data gaps/research needs that are trying to be addressed with the project and any fishery related background information (life history, concerns about stock, etc.)
  - **Description of sampling design and compilation of results**
    - Not applicable to "Basic Orientation" component of Volunteer Training
    - May be more specific to projects?
    - Maybe combine this section with the next section below?
    - Need to be sure to discuss about the importance of "zeros" and how this is a data point as well.; minimizing bias
  - **Explanation of how data will be used to help manage expectations of participants (including scientists)**—explain both benefits and caveats; for example, data sets can take multiple years to become valuable/usable.
    - This can be done in a general sense. If possible, there should be an introductory message on the difference between statistically designed surveys and volunteer, "opt-in" projects. It will only hurt the success of these projects if we avoid the discussion about what sort of analysis these datasets will go through before being used in a stock assessment or by management agencies. Scientists can be very wary of programs without rigorously designed data collection procedures, but many citizen science projects are only possible with less structured designs. This may not be a problem, as most of these types of projects arise precisely because there is not a lot of information being produced by conventional surveys. In these situations, managers have the potential to be more forgiving, as they are balancing the science with the needs of their communities, and the trade-off of "sampling design vs. sample size" may come into play.
    - Multiple ways to collect data
    - Projects will go through a rigorous review process when proposed to ensure design meets the criteria for Cit Sci Program endorsement

- The way the project is designed is how to accommodate/address potential bias. Explaining potential bias and validation of data is also important to include in explanation (before or after the project). (Sample size, spatial distribution, etc.)

Additional Items to address from our 3/29 Discussion:

Who is the Council?

Why is the Council pursuing cit sci?

- Describe the SAFMC Snapper Grouper Visioning Project and how cit sci was discussed as an opportunity for expanding data collection and engaging fishermen
- Mention Crowdsourcing and Citizen Science Act of 2017 – directed federal agencies to pursue this approach for research (use example of ACCSP; explore rarely encountered species)
- Another way for fishermen to engage in the management process in a different way – make this a more empowering way to get involved on the science/data collection aspect of management because they have a hand in the data that is being collected; help to build trust

Additional ideas to address:

- Maybe provide an example of how cit sci or other data collected by fishermen has been used in the past to supplement management decisions? Talk about successes and also discuss what makes a randomized well-designed survey different from a less structured project; adds to some scientific uncertainty (address the challenges that may arise)
- Sampling design and standardized data collection- needs to be explained early on and how that fits into the model; need to show the pieces of the puzzle (fishery dependent; fishery independent; how this data gets incorporated into the Council process)
- Need to be consistent in how we communicate to the managers as well
- Need to consider the audience for this material – not just fishermen but also scientists/researchers/managers; may need to include information about the concerns over the validity of cit sci collected data and how the Council's intent is to ensure the design of projects
- Also be sure to give some of the hard truths – help to manage expectations up front with this information to be sure participants understand what can and can't be done with the data collected by a project
- Basic Orientation modules - Maybe break up the basic orientation into modules and create a certification process for participants to complete each module to participate in a project.

Basic Orientation for Volunteers
Citizen Science Program
South Atlantic Fishery Management Council

Who is the Council?
The South Atlantic Fishery Management Council, headquartered in Charleston, S.C., is responsible for the conservation and management of fish stocks in federal waters spanning from 3-miles to 200-miles off the Atlantic coasts of North Carolina, South Carolina, Georgia and east Florida to Key West. The role of the councils is to develop fishery management plans needed to manage fishery resources within federal waters.

Citizens from each of the southeastern states (NC, SC, GA and the east coast of FL) who are knowledgeable of some aspects of the fisheries are eligible to become Council members. Members serve three-year terms and are appointed by the Secretary of Commerce from lists of nominees submitted by the governors of the states. The Council consists of 17 total members made up of 13 voting members and four non-voting members to include:

- The Southeast Regional Administrator of the National Marine Fisheries Service.
- The directors or designees of the four South Atlantic state marine resource management agencies.
- Eight citizens (two per state) of the southeastern states.
- Non-voting members include representatives of the U.S. Fish and Wildlife Service, U.S. Coast Guard, State Department, and Atlantic States Marine Fisheries Commission.

Citizen Science Program
Program Vision: "more collaboration + more data + more trust = better management"
Program Mission: Improve fisheries management through collaborative science

Describe the SAFMC Snapper Grouper Visioning Project and how cit sci was discussed as an opportunity for expanding data collection and engaging fishermen

Utility of Citizen Science for Fisheries Management
The Council, like many fisheries agencies across the country, is tasked with managing many fisheries, and every fishery can only be properly managed with sufficient data. However, funds can be limited for smaller or rarely encountered fisheries, and managers are forced to make decisions with limited data. This is where citizen science has the potential to supplement current data collection efforts, and there are examples of it already being used in both stock assessments and management decisions.

- In the management arena, citizen science data was recently used to help set season and vessel limits for recreational cobia fishing in Virginia. In 2018, the Virginia Marine Resources Commission received an endorsement from the Atlantic States Marine

Fisheries Commission to utilize its carcass donation program data to estimate the average weight for cobia while predicting harvest and setting 2018 regulations.

- The Angler Logbook program, Logbooks have been distributed to guides, recreational anglers, and shore-based anglers on both coasts. Since 2002, nearly 200 participants have recorded trip data for over 9,000 directed snook fishing trips (successful or not) where snook is the primary target and have provided lengths of over 30,000 snook. Anglers record date, county fished, number of anglers, hours fished, numbers of snook caught, kept, and released, and the total lengths (to the nearest ¼") of as many snook as possible. These data are used to calculate fishery-dependent indexes of catch, effort, and release rates as tuning indices for the stock assessment. Most importantly, the size composition of the snook fishery (the exact lengths of snook caught) is directly included stock assessment models.
- Between 2014-2016, charter boat captains and 100 volunteer anglers collected 100 rare rockfish in the Northwest's Puget Sound region. Three species had been listed as threatened or endangered, and NOAA looked to local ecological knowledge for the scientific sampling required for recovery. Genetic analyses from these fishing trips provided new information and contributed, in 2017, to the delisting of Canary Rockfish and expanded protective boundaries for Yelloweye Rockfish. Copied from: http://noaa.maps.arcgis.com/apps/Cascade/index.html?appid=de0010822e1c41569c03aecdadf32aca
- In the Gulf of Mexico, closed seasons and size limits require many fish to be returned to the water after being caught. Recreational anglers are often concerned with uncertainty surrounding discard mortality estimates used in stock assessments. Gulf recreational anglers approached scientists to create a project that would better quantify survival of discarded fish. These recreational anglers provided boat trips and caught all of the fish that were tagged with acoustic transmitters, which allowed fish to be monitored for weeks to months after release. With help from the fishing community, scientists are able to better quantify actual discard mortality after recreational catch and release. Acoustic tagging of Gag grouper after catch and release is helping to better define recreational discard mortality on the West Florida Shelf
- The recovery of the Goliath grouper population in the US is a success story for Florida. Cooperative research with the diving and angling community continues to provide data on this fish's behavior, distribution and abundance. A fin clip program is in place at FWC to assist genetic research and permitted anglers are able to provide data that assist with stock assessment. An annual Great Goliath Grouper Count takes place each June and gives divers a chance to contribute data regarding Goliath grouper abundance at their favorite dive sites – these data are also incorporated into stock assessments. Stakeholders are able to contribute data online to the Gulf Council through the Goliath Grouper Web Reporting Module: http://noaa.maps.arcgis.com/apps/MapJournal/index.html?appid=121fc5a8c5284c079d3c1e3af5ab618c

Further, there has been an increased interest in developing and utilizing citizen science data. In 2016, Congress passed the Crowdsourcing and Citizen Science Act, to encourage and increase the use of crowdsourcing and citizen science methods within the Federal Government to advance and accelerate scientific research, literacy, and diplomacy The Act recognizes that

crowdsourcing and citizen science are a cost effective means to accelerate scientific research, address societal needs, and facilitate broader public participation in Federal science agency missions. (maybe have a sidebar here with definitions of "citizen science" and "crowdsourcing"). This could be a good segue into a brief description of how stock assessment data goes to SSC/SEDAR, then Council, then to NOAA where it becomes regulation in Federal Register…(or a diagram)

Understanding the Scope of Citizen Science

Although there are examples of citizen science being used successfully in fisheries management, there are concerns and limitations regarding such programs. Surveys that are designed and conducted by professional researchers generally have rigorous statistical designs that are tailored for usage in analyses like stock assessments. Citizen science projects, on the other hand, may have designs that are driven more by the ability to gather interest and participation from the citizens themselves. Because of this, researchers need to take extra caution to ensure these datasets have an acceptably low level of bias.

For example, in some catch reporting programs in the past, recreational anglers and captains have only reported trips resulting in the targeted fish being caught, but not those where the fish was not caught. Leaving out these "zero-catch" trips can introduce bias into catch rates and limit the dataset's appropriateness to serve as an index of that fish's abundance over time. Other projects have been limited by drop-offs in participation, where data submission by citizens is high at the beginning, but falls off in later years. However, datasets may only become useful if they have consecutive years of comparable data collection procedures and high levels of participation. It is very important that these data streams are maintained, for it really takes at least 5 years of data collection to become statistically significant. Finally, many citizen science programs collect data without undergoing formal validation studies, where a team of researchers compares the dataset to another, similar program. Because many such initiatives have lacked the rigorous design of more formal surveys, managers desire that they be tested against traditional survey methods. However, the Council's program hopes to overcome some of these challenges by involving scientists, managers, and fishermen in the entire process of project development (design, data collection, and results) to ensure the project is designed and conducted in a way that can stand up to the standards that need to be met for use in management.

Where Citizen Science Fits into Fisheries Management

Citizen Science can be described as a form data collection, but data used for fisheries management is generally further classified into two categories. The first is fisheries-independent sources, where samples are collected directly by researchers or fisheries professionals through a specific design. The second is fisheries-dependent, where the samples come specifically from either commercial or recreational fishing trips. While these may still be collected or measured by researchers, they are defined by the fact that they come from fishing trips, where users do not go out and "collect fish" based on a statistically designed protocol. .

One benefit that citizen science projects often have is a relatively large sample size, at least compared to the small or rarely sampled fisheries they're created to supplement. However, having a large number of samples is only one half of the equation when it comes to providing high-quality data. The other half is ensuring these data are representative of the study population in question, and this is why project design is very important. . The Council is trying to support projects that involve both fishermen and researchers in the project design phase so that the

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