Next Steps:

Researching Citizen Science to Advance Fisheries Management

Rick Bonney and Jennifer Shirk

Cornell Lab of Ornithology

Citizen Science Association

Citizen Science and the a-b-c's of stock assessments

Abundance

Biological information

Catch rates

… and habitat use, environmental information (e.g., water temperature), socioeconomics, etc….

Diversity of approaches:

- Fisheries abundance and biological information
- Volunteer tagging programs
- Local fisheries knowledge
- Understanding impacts of environmental change on fisheries
- Categorical data informing models
- Biological data for stock assessments
- Recreational fishing apps

California Collaborative Fisheries Research Program

Engagement: determine sites, collect and measure fish

Data: 10+ years of MPA nearshore rockfish surveys

NOAA use: enhance stock assessments; explore long-term effects of MPAs

(Starr et al. 2015)

NOAA Fisheries Cooperative Shark Tagging Program

Engagement: tag and recover tagged sharks

Data: 50+ years, 290,000 fish tagged, 17,000 recovered (33 of 52 species): stock composition, movements, abundance, mortality, behavior…

NOAA use: best available information for some data-poor species

(e.g., American Littoral Society reports)

Reef Environmental Education Foundation (REEF) Fish Survey

Engagement: recreational divers provide categorical abundance estimates of fish species

Data: since 1993; reliable data for data-limited species population and growth rate estimates

NOAA use: site-structured demographic modeling; Multivariate auto-regressive state-space modeling; population assessment; habitat preferences

- assessing risk and recovery options for sensitive species

(e.g., Tolimieri et al. 2017)

Apps: iAngler

Engagement: recreational anglers share fish length, weight, location caught, photos

Data: discard data augmenting logbooks and interviews

Use: FL FWCC snook stock assessments

(e.g., Muller and Taylor, 2013; Jlorle et al. 2017)

Researching the Role of Program Infrastructure in Guiding Effective Development of a Scamp Discard Citizen Science Project

SAFMC Citizen Science Program: *Pilot Project*

Engagement: recruit and train fishermen volunteers as citizen scientists to provide supplementary data on scamp discards using a mobile app

Data: discard data (length, depth, images)

Use: consideration for use in 2019 stock assessment

PC: Greg McFall, GRNMS

Pilot Project:
Applicability for Citizen Science

Fishermen recognize the importance of understanding discards in stock assessments and have expressed interest in providing information that would reduce assessment uncertainty.

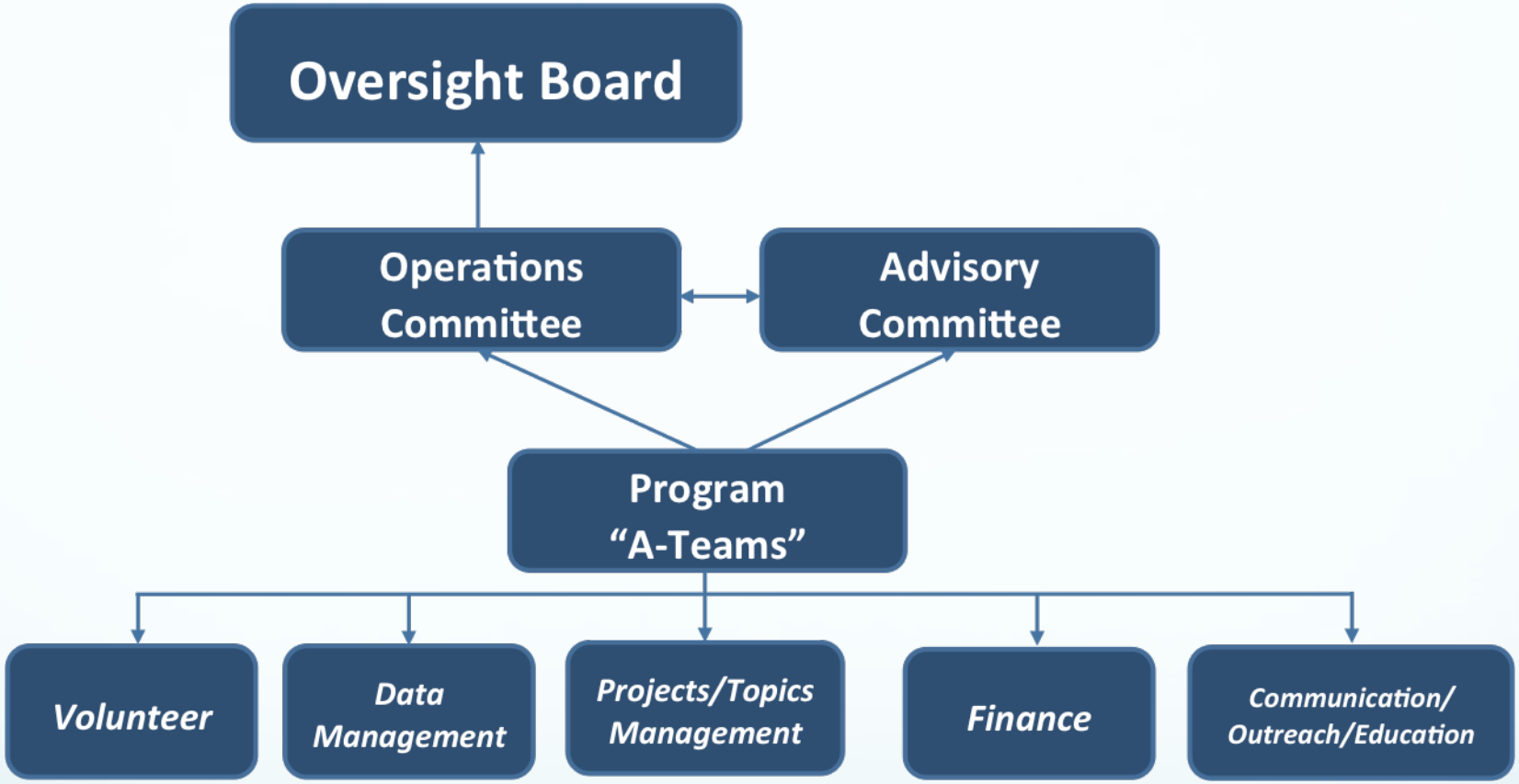
- Addresses a need identified by fishermen and scientists
- Fills a known data gap for difficult or expensive to access information
- Data desired are relatively simple to collect
- Data do not require costly equipment or specialized skills to collect
- Project is scalable -
  - Take place over a wide geographic area
  - Include fishermen from all sectors
  - Provide useful information within a short period of time with minimal start-up lag

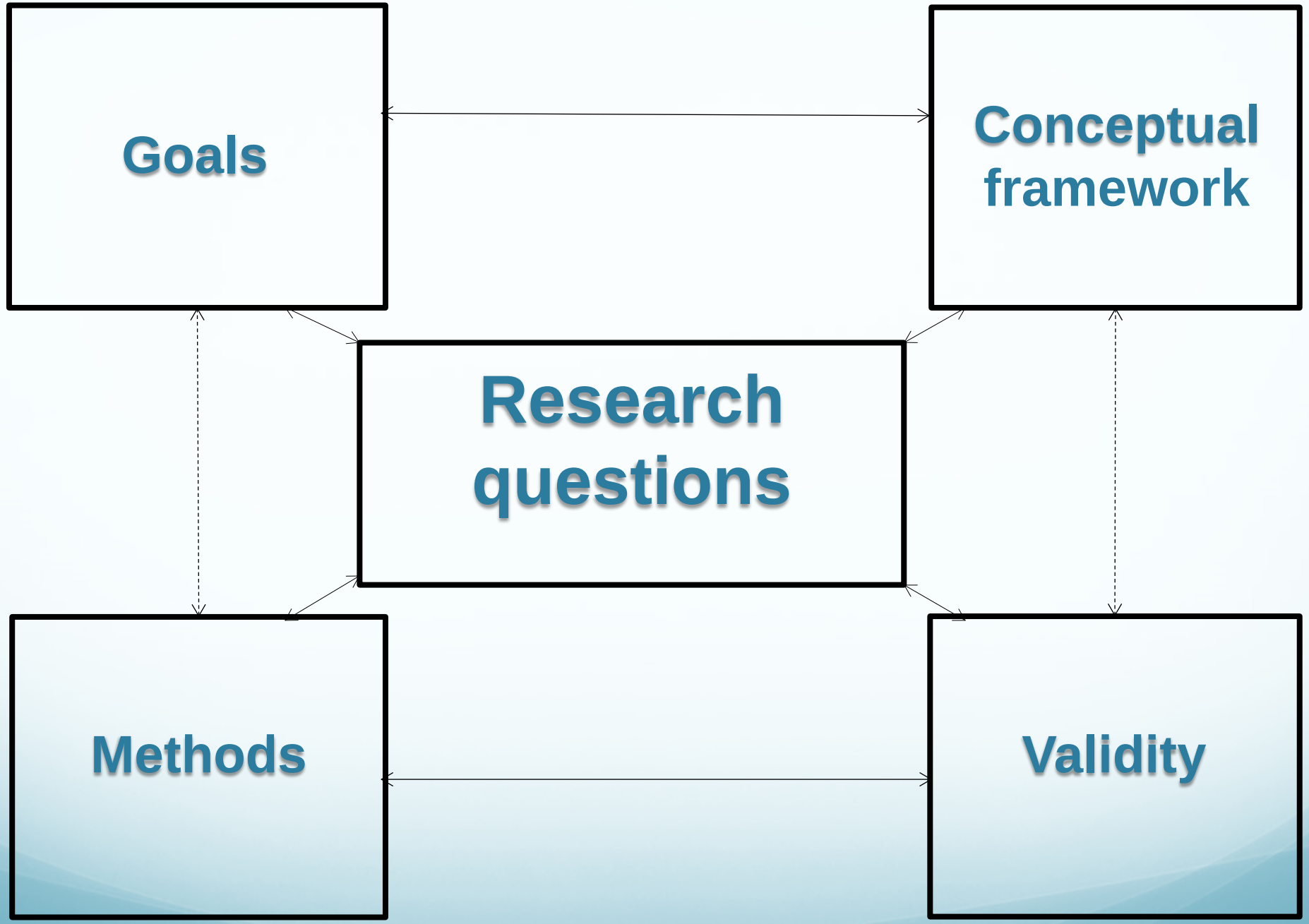
Pilot Project:
Characterizing Scamp Discards

Project Components

Volunteers	Project/Topics Management	Data Management	Finance/ Funding	Communication/ Outreach
• Fishermen to collect data • Assessment of skills - existing/ needed • Expectations for project • Motivations to participate	• Oversight of fishermen volunteers • Managing project planning • Working with partners • Data standards/ policies	• Database needs • QA.QC • Data sharing • Data access • Analysis	• Support for mobile app development • Support for fishermen training • Support for database development	• Training materials for fishermen • Sharing project updates/results • Evaluation • How data are used by Council


Participant engagement
Identify goals
Science
Policy/action
Participants
Establish capacity
Staff
Volunteers
Partners
Design/ refine
Question/protocol
Training
Infrastructure
Manage
Participation
Data
Expectations
Apply & adapt
Research/action
Determine effectiveness
Transparency
Sustainability/accountability


Oversight Board
Operations Committee
Advisory Committee
Program "A-Teams"
Volunteer
Data Management
Projects/Topics Management
Finance
Communication/ Outreach/Education


Goals
Conceptual framework
Research questions
Methods
Validity

Research Questions

- ***What can we learn from the roll-out of the SAFMC Citizen Science Program that can inform the development of citizen science across Councils and management settings?***
- What happens when framework recommendations are enacted as a **program** for citizen science project development?
- How does the program-first approach lend itself to a successful **project**?

Goals

- Inform theory and practice of citizen science program development
- “Ground reference” utility of framework components
- Provide evidence to inform program development by other organizations
- Support program refinement
- Support project evaluation

Methods

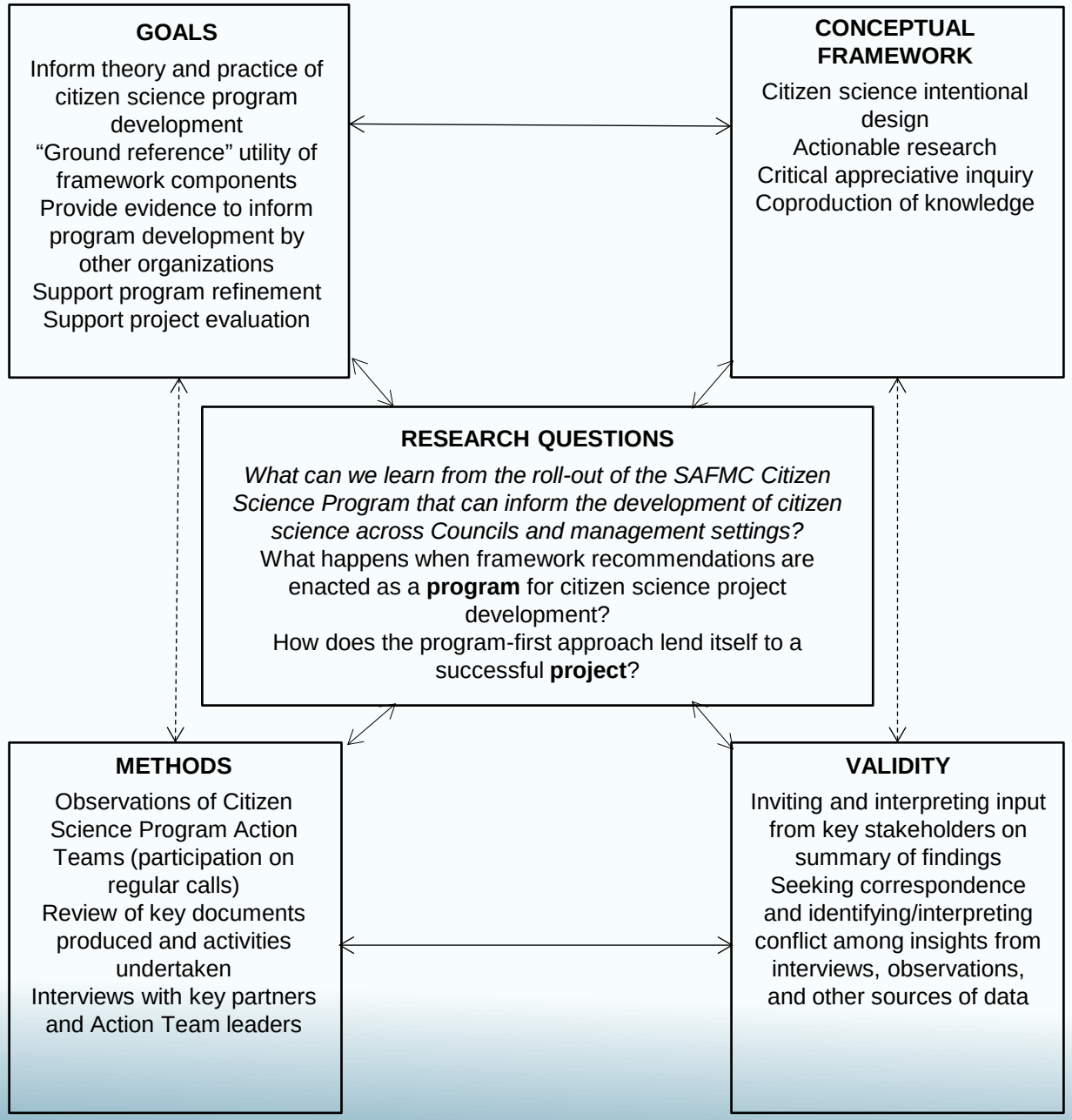
- Observations of Citizen Science Program Action Teams (participation on regular calls)
- Review of key documents produced and activities undertaken
- Interviews with key partners and Action Team leaders

Conceptual Framework

- Citizen science intentional design
- Actionable research
- Critical appreciative inquiry
- Coproduction of knowledge

Validity

- Inviting and interpreting input from key stakeholders on summary of findings
- Seeking correspondence and identifying/interpreting conflict among insights from interviews, observations, and other sources of data


GOALS
Inform theory and practice of citizen science program development
"Ground reference" utility of framework components
Provide evidence to inform program development by other organizations
Support program refinement
Support project evaluation
CONCEPTUAL FRAMEWORK
Citizen science intentional design
Actionable research
Critical appreciative inquiry
Coproduction of knowledge
RESEARCH QUESTIONS
What can we learn from the roll-out of the SAFMC Citizen Science Program that can inform the development of citizen science across Councils and management settings?
What happens when framework recommendations are enacted as a program for citizen science project development?
How does the program-first approach lend itself to a successful project?
METHODS
Observations of Citizen Science Program Action Teams (participation on regular calls)
Review of key documents produced and activities undertaken
Interviews with key partners and Action Team leaders
VALIDITY
Inviting and interpreting input from key stakeholders on summary of findings
Seeking correspondence and identifying/interpreting conflict among insights from interviews, observations, and other sources of data