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Examining the Role of Community and Citizen Science in Marine Protected Area Implementation

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Examining the Role of Community and Citizen Science in Marine Protected Area Implementation

Ryan Meyer, Angela Korabik, Todd Harwell, Nicholas Petersen, and Heidi Ballard

About this report

This report was prepared for the California Department of Fish and Wildlife to inform the MPA Decadal Management Review. It is one of two projects at the Center for Community and Citizen Science aimed at supporting this important milestone for the MPA Network in California:

- Examining the Role of Community and Citizen Science in Marine Protected Area Implementation (this report); and
- Using MPA Watch Data to Analyze Human Activities Along the California Coast.

Each of these projects directly addresses goals of the Marine Life Protection Act and the four pillars of MPA Management: Research and Monitoring; Education and Outreach; Enforcement and Compliance; and Policy and Permitting. They also help to expand and develop a human dimensions research agenda for MPAs in California, and beyond.

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Photography

Front cover (clockwise from top left): Courtesy of LiMPETS, MPA Watch, Jellywatch, CCFRP, REEF, and Grunion Greeters
Back cover (left to right): Courtesy of LiMPETS, COASST, and LiMPETS

Design

Mark Briggs

Introduction & Highlights

Community and citizen science (CCS), which refers to the wide range of ways that nonscientists participate in science processes, has played a prominent role in MPA implementation and monitoring in the State of California for more than a decade. Led by a team of researchers at the Center for Community and Citizen Science at the University of California, Davis, this report highlights the breadth and depth of how CCS efforts have contributed to MPA program priorities and goals as well as participant contributions and outcomes.

Since 2007, the California Department of Fish and Wildlife (CFW), California Ocean Protection Council (OPC), and the California Fish and Game Commission have collaborated to manage California’s MPA Monitoring Program, which has included a wide-ranging portfolio of projects that received state funding to conduct both Baseline and Long-Term Monitoring. Some of these projects have leveraged CCS approaches to administer their monitoring and research activities.

We examined the CCS efforts of 10 MPA monitoring projects that received baseline and/or long-term funding from the State. They involved¹:



84,000
Participants



476,000
Volunteer
hours



528
Monitoring
sites



100
Partner organizations,
agencies, institutions
and groups

	Activity	Years Active	MPA Bioregion(s) ²	Number of Sites	Number of Participants (2010 to 2020)	Hours of Participant Effort (2010 to 2020)
Beach Watch^{a,b}	Trained volunteers survey live and dead species of birds and marine mammals along with human activities along the coast.	1993 to Present	North	41	418	71,407
Long-term Monitoring Program and Experiential Training for Students (LiMPETS)^{a,b}	Middle and high school students monitor Pacific mole crabs (sandy beach) and key invertebrate and algae species (rocky intertidal).	2002 to Present	North, Central, South	68	54,143	241,158

^a Received funding for Baseline Monitoring activities.

^b Received funding for Long-Term Monitoring activities.

¹ Based on data provided by project managers via publications, reports, databases, and/or responses to questions posed during in-depth conversations with our project team from Spring to Fall 2021.

² The years of activity within specific regions for projects active across multiple regions likely vary due to the multi-year monitoring plan implementation and funding and/or other factors contributing to expansion. For example CCFRP monitoring began in the Central region then expanded to North and South in 2017.

	Activity	Years Active	MPA Bioregion(s) ²	Number of Sites	Number of Participants (2010 to 2020)	Hours of Participant Effort (2010 to 2020)
Reef Check California^{a,b}	Experienced divers monitor rocky reef and kelp forest communities.	2006 to Present	North, Central, South	138	2,479	87,390
California Collaborative Fisheries Research Program (CCFRP)^{a,b}	Commercial passenger fishing vessel captains and recreational anglers conduct hook and line surveys of fish communities.	2007 to Present	North, Central, South	24	1,415	45,752
Surfperch Monitoring^a	Recreational anglers surveyed surf zone fishes.	2011 to 2012	North	4	49	353
Spiny Lobster Monitoring^a	Commercial lobster fishers and volunteers counted and tagged lobsters.	2011 to 2013	South	14	50	1,632
MPA Watch^b	Volunteer surveyors monitor the human uses of coastal and marine resources.	2011 ³ to Present	North, Central, South	205	1,918 ⁴	19,537
Rocky Reef Fish Monitoring^a	Vessel captains and recreational anglers conduct hook and line surveys of fish communities.	2014 to 2015	North	8	52	640
Seabird Monitoring^a	Volunteer birders monitored the abundance of seabirds nesting and roosting.	2014 to 2016	North	11	7	156
Snapshot Cal Coast^b	Volunteers attending bioblitz events share observations of biodiversity in sandy beach and rocky intertidal ecosystems.	2016 to Present	North, Central, South	Not applicable. Study area includes the entire state coastline.	20,322	8,390

^a Received funding for Baseline Monitoring activities.

^b Received funding for Long-Term Monitoring activities.

³ MPA Watch originated in 2008 as the Otter Project in Monterey County with the data protocol being standardized in 2011 when the program expanded statewide.

⁴ Note this is an underestimate of total participants as indicated by MPA Watch program leaders that were in the process of compiling updated participant data as this report was being drafted. See separate DMR submission: "MPA Watch: Community Science for Stewardship of Ocean Resources."

A Wider View of CCS on the California Coast

Beyond the 10 baseline and long-term monitoring projects, there are more than 60 additional CCS projects conducting research and monitoring along the California coast. Between 2010 and 2020⁵:

- 29 of those additional projects involved > 70,000 participants working with over 200 organizational partners.
- 21 projects collected data inside MPAs in California.
- 12 projects provided participants with information about MPAs.

Key Findings

How many people participated in community and citizen science for MPAs?

Since 2010, over 84,000 individuals have participated in the CCS efforts of 10 state-funded baseline and long-term monitoring programs/projects with a peak of participation in 2015.

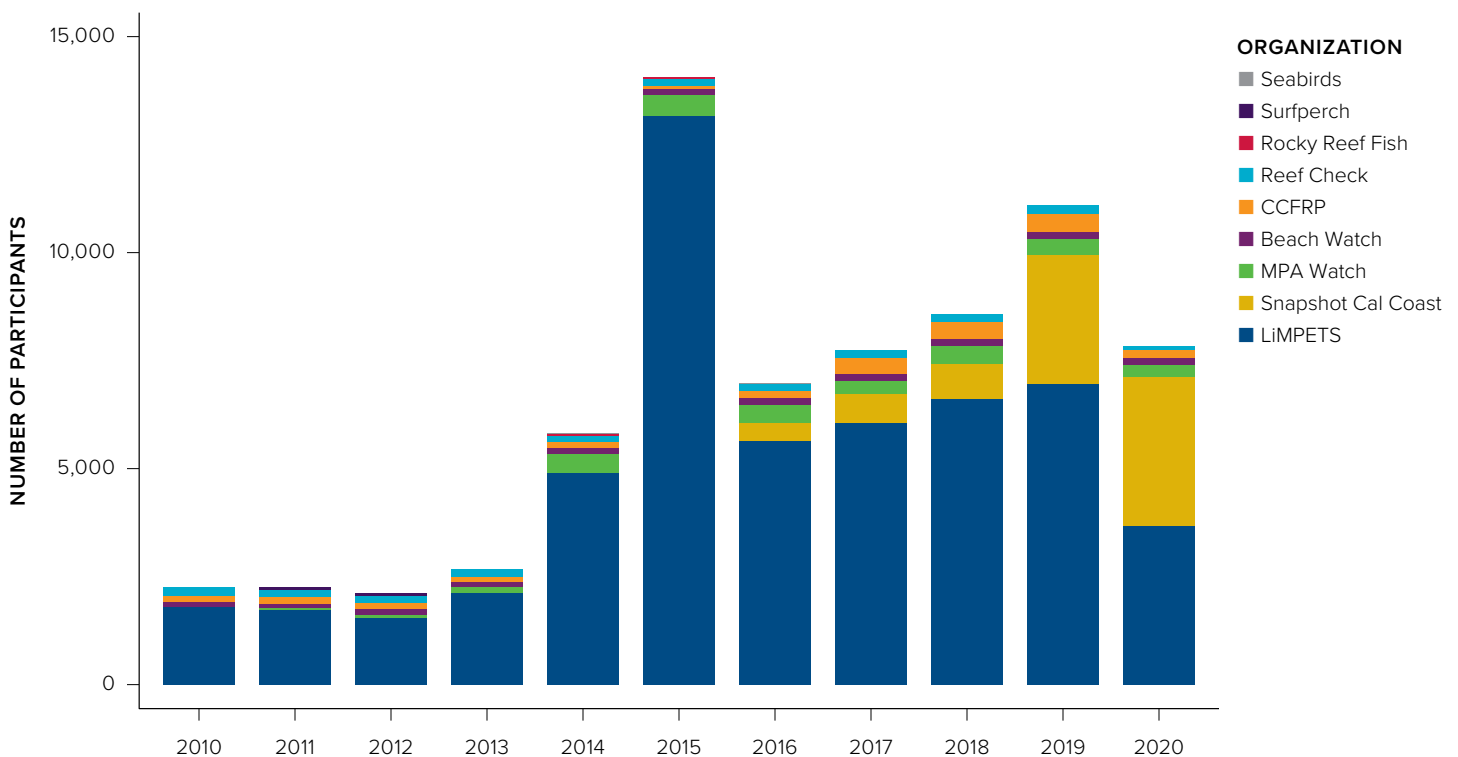


Figure 1. Number of participants for state-funded baseline and long-term monitoring community and citizen science projects (n=9) between 2010 and 2020. Participant data for the Spiny Lobster Monitoring project were not available.

⁵ Based on input and data provided by managers from 29 projects that responded to a brief survey that was shared with contacts from over 60 coastal/marine community and citizen science projects and programs identified by various contacts, networks, and results of a broad Internet search in Fall 2021.

Who participated in community and citizen science?

With over 84,000 individual participants engaging with the 10 baseline and long-term monitoring projects, CCS clearly represents an opportunity to involve a broad range of Californians, including underrepresented communities in MPAs and ocean resource management more broadly. There are still many questions about who is or is not participating, given that demographic data has not been formally collected or reported to date. However, some projects are making explicit efforts to engage underrepresented and underserved communities in their CCS efforts. For example:

- LA Waterkeeper, a participant in the MPA Watch network, runs a boat-based survey program that provides opportunities for at-risk students and formerly incarcerated youth to contribute to on-the-water science. While the data collection is the task at hand, being out on the ocean in a small boat is for most a first-time experience, and being a valued member of a community-based team can also be transformative.
- Reef Check California recently initiated “Dive Into Science,” a project working with young people of color. Participants are SCUBA-trained and learn to conduct Reef Check surveys.
- The LiMPETS program works with many Title I schools, engaging thousands of students in monitoring.
- Snapshot Cal Coast produces multilingual outreach materials about project events and activities in Filipino and Traditional Chinese, as well as English and Spanish, and distributes them throughout various communities in California.

The Role and Contributions of California Native American Tribes

As sovereign nations and the original and continued stewards of California’s coast and oceans, California Tribes are critical partners in the management and monitoring of the MPA network. Tribes have been collaborators and leaders of various MPA monitoring efforts, including baseline and long-term monitoring and CCS projects.

For example, **MPA Watch chapters in Del Norte County, Eagle Eyes of False Klamath Cove and Tolowa Dee-ni’ Nation, engage Tribal members in MPA Watch protocols to collect data on how humans are using marine resources both inside and outside MPAs.** These data provide vital information to understand how people are using MPAs and coastal areas and resources, and help inform Tribal and MPA management.

Where did community and citizen science happen in MPAs?

While CCS participant engagement for the 10 baseline and long-term monitoring projects by MPA bioregion has fluctuated over the past decade, **North Coast and Central Coast have consistently seen greater numbers of participants than in the South Coast**⁶.

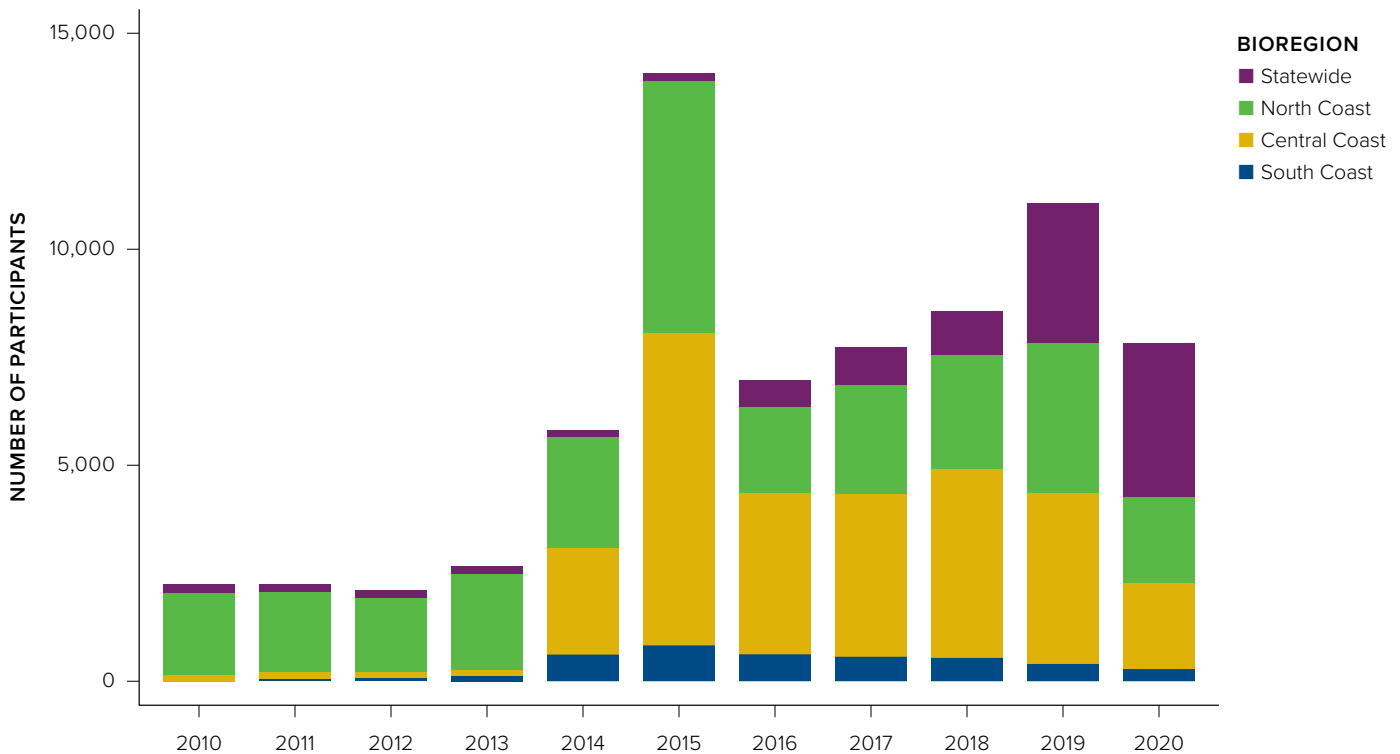


Figure 2. Number of active participants in MPA bioregions (or “Statewide” if not data cannot be parsed by region) for state-funded baseline and long-term monitoring community and citizen science projects (n=9) between 2010 and 2020. Participant data for the Spiny Lobster Monitoring project were not available.

Zooming in on CCS monitoring within MPA boundaries

Baseline and long-term monitoring has included CCS activities in 76 MPAs. We found that while it had fewer CCS participants overall, the **South Coast bioregion hosted a higher number of monitoring sites within MPAs** than the other two bioregions.

In some cases, multiple kinds of CCS are happening in the same MPA. For example, six different MPAs have sites from four different baseline and long-term monitoring CCS projects. The existence of multiple CCS opportunities in the same place may have implications for stewardship, local participation in management, education and outreach.

⁶ Note that some projects, including Reef Check and Snapshot Cal Coast, are active in all three bioregions but do not track or are unable to parse participant data by region.

What did participants in community and citizen science do?

For all 10 projects, participants aid in collecting samples and/or recording data. This can be as varied as fishing on a charter boat, SCUBA diving, a family photographing tidepool organisms, or a class field trip to the beach. **For many projects, volunteers play other important roles in the research process beyond data collection.**

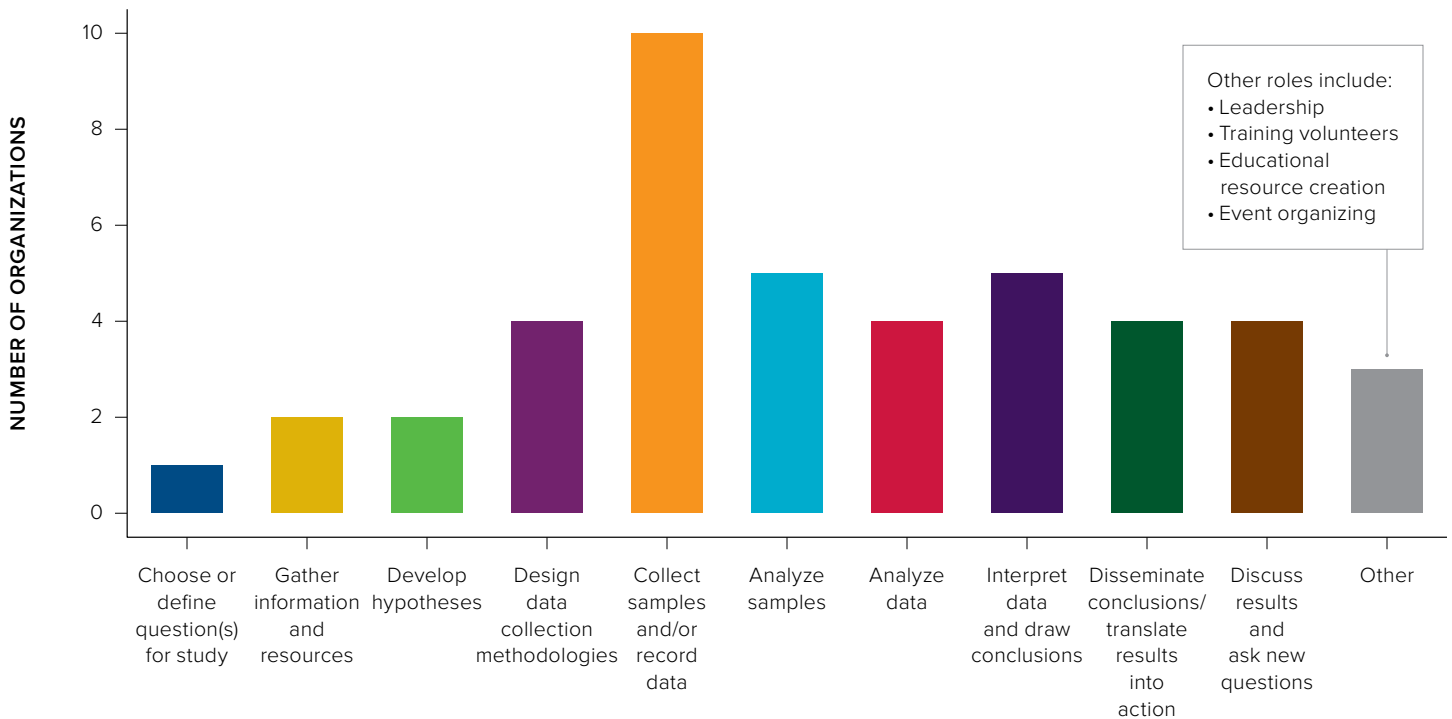


Figure 3. Number of state-funded baseline and long-term monitoring community and citizen science projects (n=10) self-reporting participant roles between 2010 and 2020.⁷

How much time did participants spend on community and citizen science for MPAs?

Although there is great variation in the methods by which projects track participant time and effort spent, across these 10 it is estimated that participants spent over 476,000 hours engaging in CCS activities in the past decade⁸. This overall total is likely an underestimate due to many project leaders using conservative methods or estimates to calculate participant number data. For example, Snapshot Cal Coast estimated three minutes of participant time to capture and submit each observation; however, that does not account for the total time each participant spent making observations that did not result in a data submission or the fact that uploading observations may take much longer than three minutes. LiMPETS also conservatively estimated the amount of time that students spent engaging in various activities related to their participation, including classroom curriculum, field activities including data collection, and classroom discussions and entering data with some teachers likely dedicating more classroom time before and after field activities.

⁷ Roles drawn from: Shirk, et al. 2012. "Public Participation in Scientific Research: A Framework for Deliberate Design." *Ecology and Society* 17 (2): 1–20.

⁸ Appendix A provides an overview of how volunteer effort was calculated for each project, along with descriptions of how or where other types of data were provided.

How does community and citizen science relate to MPA management?

Of course, all 10 of the state-funded projects generated research and monitoring data aimed directly at informing management of MPAs. But we found that **all four pillars of MPA management have some link to CCS**.

Importantly, all 10 projects communicate information about MPAs to their participants. This means that **more than 85,000 people were exposed to MPA education and outreach**. In some cases, CCS participants became involved in *delivering* MPA education and outreach, showing the multiplying power of these programs for this pillar of MPA management.

Of the four pillars of the MPA Management Program, all 10 baseline and long-term monitoring projects reported that most of their participants engaged in activities related to Research and Monitoring as well as Education and Outreach.

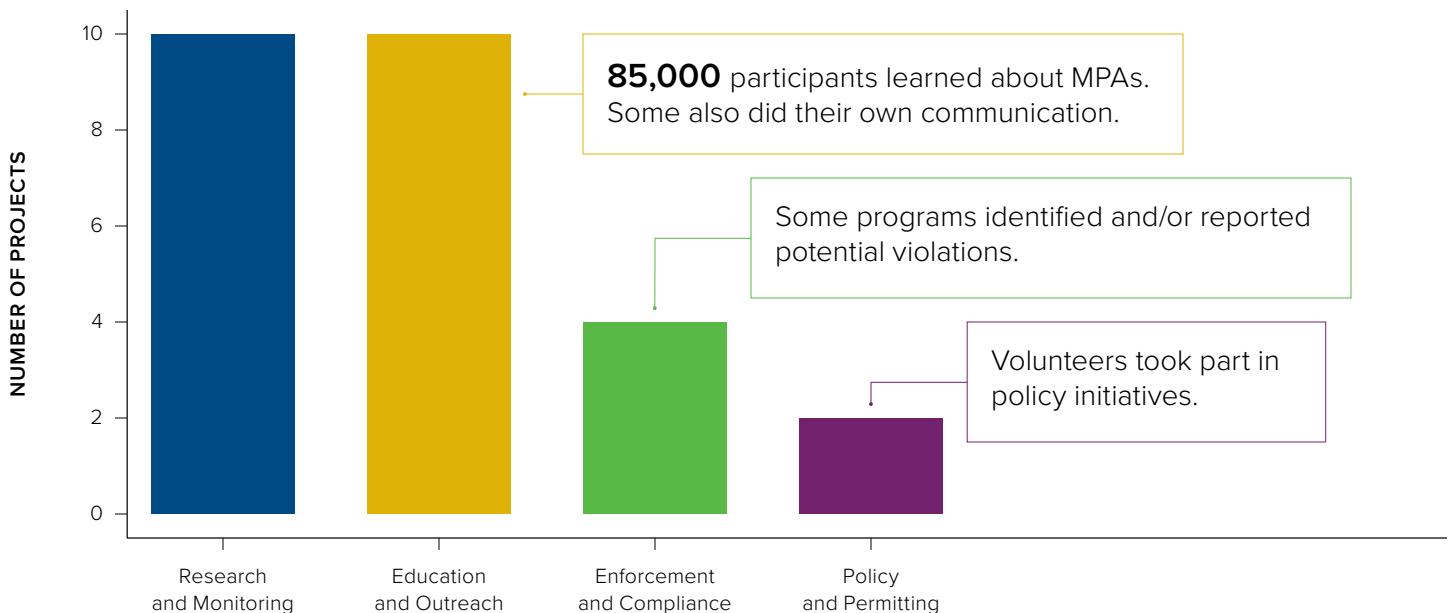


Figure 4. Number of state-funded baseline and long-term monitoring community and citizen science projects (n=10) self-reporting activity related to each MPA Management program pillar between 2010 and 2020.

What other kinds of ocean and coastal community and citizen science efforts are happening in California?

Beyond the projects that have received MPA-related state support, there are more than 60 other ocean and coastal CCS efforts underway in California.⁹ Responses to a brief survey give us some useful insights into 29 of those projects.¹⁰ The tables and figures below describe the history, scope, and reach of CCS participants, projects, and partners, hinting at opportunities for the next decade of CCS in MPA monitoring.¹¹

⁹ Appendix B includes a broader list of coastal/marine community and citizen science efforts in California.

¹⁰ Appendix C includes additional survey response data beyond the highlighted findings below.

¹¹ Based on input and data provided by managers from 29 projects that responded to a brief survey that was shared with contacts from over 60 coastal/marine community and citizen science projects and programs identified by various contacts, networks, and results of a broad Internet search in Fall 2021.

- These 29 community and citizen science projects are distributed across all three MPA bioregions (Figure 5).
- Of these 29 community and citizen science projects, which engaged over 70,000 individual participants, 21 include data collection activities occurring within MPA boundaries.
- Participants from 24 projects engage in MPA education and outreach activities.
- All 29 projects were active in 2021, and some have been operating for decades. One project began in the 1980s, and six began in the 1990s.
- These 29 projects involve more than 200 organizational partners (Figure 6), and operate across a variety of geographic scopes (Figure 7).



Figure 5. Number of surveyed community and citizen science projects (n = 29) operating in each MPA bioregion.

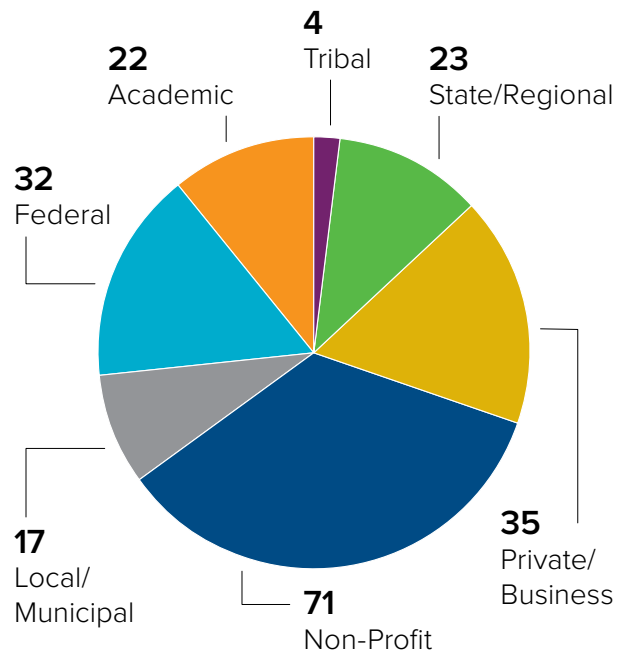


Figure 6. Number of partner types for surveyed community and citizen science projects (n = 29).

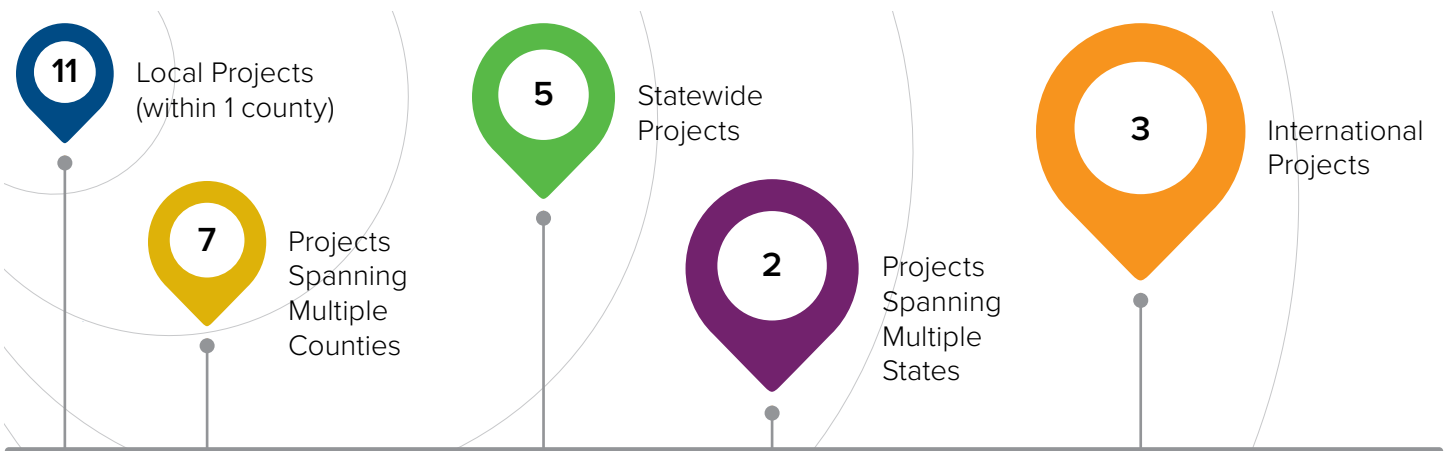


Figure 7. Number of surveyed community and citizen science projects (n = 29) by geographic scope.

Challenges and Knowledge Gaps

The data presented here are helpful in understanding the scale and nature of CCS activities. But learning more about who the participants were, as well as the motivations, benefits, and outcomes stemming from their participation, would greatly deepen our understanding of the benefits and challenges of the past decade, and opportunities for the future. We encountered some data gaps and lack of consistent data collection across projects in the following areas:

- **Participant demographics:** None of the 10 state-funded projects track this information, such as age, sex, race/ethnicity, or education level, and only a few of the other programs do.
- **Learning outcomes and other participant benefits:** Some projects gain such insights through surveys, quick feedback forms at the end of trainings, or other informal communications with participants, but there is no cross-program consistency in metrics or questions that would allow for broader analysis.
- **Participant motivations and engagement patterns:** Especially when combined with information above, learning about why, when, and for how long people participate in CCS could help with program design and retention, and potentially with bolstering MPA stewardship and broader engagement that builds on the monitoring work of participants.

In the course of our work we heard a variety of anecdotes that point to **challenges faced by CCS programs**. These came from conversations, public comments at community meetings, and other communications. More research is needed to determine how broadly held these opinions are, but we offer a few of these challenges as a starting point:

- The process and criteria for tapping into state support for MPA monitoring is unclear or opaque, especially for CCS projects.
- It is not clear why some CCS projects funded during baseline MPA monitoring did not receive ongoing support for long-term MPA monitoring.
- Sustainability and uncertainty of future funds is an ongoing challenge, especially with partnership-intensive work.
- Some community members wish to know more about the full breadth of CCS volunteer opportunities available related to MPA monitoring, but lack a central repository or site for this information.
- CCS project leaders desire more formal coordination and consistent guidance among monitoring projects regarding opportunities for the public to get involved.
- Some wish to see more concrete – and more frequent – evidence that CCS data are being used for MPA management and other decision making.

Recommendations & Conclusions

Our project is moving into a second, more in-depth research phase that will aid in developing targeted recommendations for CCS programs, funders, and state agencies. We offer here some preliminary recommendations that will become more detailed in the coming months.

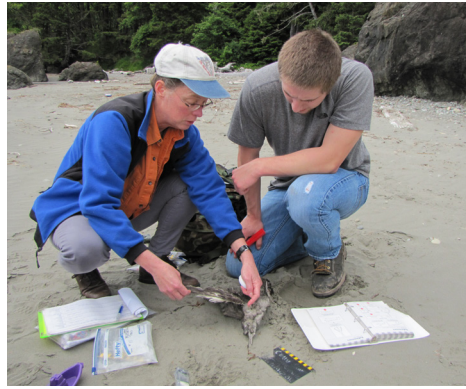
- A standard reporting structure and protocol for state-funded projects, if not overly onerous, could be very useful in addressing the data gaps discussed above. It would be helpful to identify core metrics of interest to MPA managers and ensure consistency across efforts, allowing for larger-scale analysis of CCS reach and impacts on MPA and coastal management.
- Regular dialog between CCS projects and MPA managers would help to address topics such as the utility of CCS-generated data, and the kinds of support that are particularly important for sustaining CCS projects.
- Assessments of MPA outreach and education initiatives should include CCS activities.
- As we learn more about the impacts of CCS for participants and communities, we should use that information to collaboratively develop formal strategies related to education and outreach, and diversity, equity and inclusion.
- The State should examine opportunities to collaborate more widely with existing CCS projects that collect data, and conduct other activities relevant to MPA implementation.

As the MPA Management Program seeks to increase its understanding of the human dimensions of MPA implementation, CCS programs offer a compelling and significant opportunity to reach tens of thousands of Californians and visitors; provide robust data about MPAs and coastal ecosystems to state managers; and to help the state meet its goals of increasing the diversity of stakeholders engaged in coastal management. Through their training programs and reach into schools, communities, and a wide range of organizations, CCS programs advance MPA education and outreach. This increased awareness of MPAs can also support compliance and public engagement with MPA management.

The power of CCS lies in its potential to work actively across multiple domains of the Socio-Ecological Framework that guides the State in managing and evaluating the MPA network.¹² CCS programs generate knowledge about the MPA system, while also actively impacting the human systems that relate to MPAs.

Our report has focused on 10 state-funded projects, and a subset of the more than 60 other coastal and ocean CCS projects operating in California. On one hand the organizational effort required to support CCS at this scale is impressive. On the other hand, so much more could be done to coordinate, leverage, assess and sustain the efforts of these organizations. Our analysis also hints at the scale of the public's desire to participate in science on the California Coast. But this leaves us wondering what untapped interest and capacity remain, particularly in underrepresented communities. The opportunity for the next ten years is to honor, foster and meet that desire, and leverage it for the benefit of marine ecosystems and all Californians.

¹² Hall-Arber, M., Murray, S., Aylesworth, L., Carr, M., Field, J., Grorud-Colvert, K., Martone, R., Nickols, K., Saarman, E., Wertz, S. *Scientific Guidance for Evaluating California's Marine Protected Area Network: A Report by the Ocean Protection Council Science Advisory Team Working Group and California Ocean Science Trust*, June 2021. <https://www.oceansciencetrust.org/wp-content/uploads/2021/06/Evaluating-California%E2%80%99s-Marine-Protected-Area-Network-2021.pdf>



About the Center for Community and Citizen Science

The Center for Community and Citizen Science, based at the UC Davis School of Education, helps scientists, communities, and citizens collaborate on science to address environmental problems as a part of civic life. The Center was founded in 2016 and engages a wide array of on and off-campus partners to advance research, practice, and dialog on community and citizen science.

Learn more about the Center for Community and Citizen Science by visiting education.ucdavis.edu/ccs



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Appendix A: Data Sources

For all 10 programs/projects, data pertaining to **participant roles** were obtained from responses by project leaders to a survey question shared via email while data regarding the **alignment of participant activities with the four pillars of the MPA Management program** were based on responses by program/project leaders to a question about participant activities that align with the four pillars shared during conversation(s).

	Participant Numbers	Participant Effort	Site Numbers	Taxa/Organisms
<u>Beach Watch</u>	Provided by Kirsten Lindquist.	Calculated by summing participant preparation hours, driving hours, and hours spent surveying dead species for 2010 to 2020.	Obtained from Beach Watch website.	No # organisms available; estimate of # taxa provided by Kirsten Lindquist.
<u>Long-term Monitoring Program and Experiential Training for Students (LIMPETS)</u>	Provided by Jaclyn Schneider.	Calculated by multiplying 56,399 total participants (for years 2009 to 2020) by an estimated 4.25 hours of participant effort (including classroom and field activities) summed with 209 teachers participating in required workshops multiplied by 7 hours per workshop.	Obtained from LIMPETS online databases.	Obtained from LIMPETS online databases.
<u>Reef Check California</u>	Provided by Dan Abbott.	Calculated by multiplying 9,710 participant days by 9 hours of participant effort per day.	Provided by Dan Abbott.	Species list provided by Dan Abbott and included in the RCCA manual; # organisms unavailable.
<u>California Collaborative Fisheries Research Program (CCFRP)</u>	Provided by Rachel Brooks.	Calculated by multiplying 4,816 participant days (for years 2010 to 2020) by 9.5 hours of participant effort per day.	Obtained from CCFRP Website and provided by Rachel Brooks.	Obtained from CCFRP Website and provided by Rachel Brooks.

<u>Surfperch Monitoring</u>	From page 93 of Baseline Characterization of Sandy Beach Ecosystems in California's North-Central Coast Region Final Report.	Sum of fishing effort hours from Table 9 (Summary of all surfperch trips 2011-2012) of Baseline Characterization of Sandy Beach Ecosystems in California's North-Central Coast Region Final Report.	From page 92 of Baseline Characterization of Sandy Beach Ecosystems in California's North-Central Coast Region Final Report.	# taxa from Figure 35 and # organisms from From Table 9 of Baseline Characterization of Sandy Beach Ecosystems in California's North-Central Coast Region Final Report.
<u>Spiny Lobster Monitoring</u>	Provided by Kevin Hovel.	Calculated by multiplying 68 trapping days with 4 participants each day by 6 hours of participant effort per trapping day.	From Table 3 of Baseline characterization of California spiny lobster (<i>Panulirus interruptus</i>) in South Coast marine protected areas Final Report.	Only one taxa studied in this project; Total number organisms obtained from page 21 of Baseline characterization of California spiny lobster (<i>Panulirus interruptus</i>) in South Coast marine protected areas Final Report.
<u>MPA Watch</u>	Calculated by the project team from raw survey data.	Sum of the self-reported participant hours as recorded in the MPA Watch database based on survey duration times.	Calculated by the project team from raw data.	Data not provided.
<u>Rocky Reef Fish Monitoring</u>	Total number obtained from page 12 of Baseline Characterization Of Fish Communities Associated With Nearshore Rocky Reefs In The Northern California Marine Protected Area Study Regions; Breakdown by site and year provided by Jay Staton.	Calculated by multiplying 80 total participant days (from page 12 of report) by 8 boat hours of participant effort per day.	From Table 1 of Baseline Characterization Of Fish Communities Associated With Nearshore Rocky Reefs In The Northern California Marine Protected Area Study Regions.	From Tables 3 and 5 of Baseline Characterization Of Fish Communities Associated With Nearshore Rocky Reefs In The Northern California Marine Protected Area Study Regions.
<u>Seabird Monitoring</u>	From page 105 of Comprehensive Seabird Monitoring For The Characterization And Future Evaluation Of Marine Protected Areas In	Calculated by multiplying 39 total surveys by 4 hours of participant effort per survey.	From page 106 (under Results and Discussion) of Comprehensive Seabird Monitoring For The Characterization And Future Evaluation	From Table 14 of Comprehensive Seabird Monitoring For The Characterization And Future Evaluation Of Marine Protected Areas In California's North Coast Study Region; confirmed with Daniel

	California's North Coast Study Region; confirmed with Daniel C. Barton in a conversation.		Of Marine Protected Areas In California's North Coast Study Region; confirmed with Daniel C. Barton in a conversation.	C. Barton in a conversation.
Snapshot Cal Coast	Obtained from SSCC iNaturalist project sites; repeat names across observers and identifiers were accounted for by the project team.	Calculated by multiplying 107,802 observations (for 2016 to 2019 and December 2020) by an estimated 3 minutes of participant effort per observation in addition summed with 40 partner events per year multiplied by 15 hours per event.	Data unavailable as the range of sites includes the entire state coastline.	Obtained from SSCC iNaturalist project sites.

Appendix B: Broader List of Coastal/Marine Community and Citizen Science Efforts in California

Project	Organization
Gray Whale Census and Behavior Project - LA Chapter	American Cetacean Society
Community Science Programs	Aquarium of the Pacific
The Heron and Egret Project	Audubon Canyon Ranch
Tomales Bay Shorebird Monitoring	Audubon Canyon Ranch
Tomales Bay Waterbird Monitoring	Audubon Canyon Ranch
Natural Resources Monitoring Volunteers	Cabrillo National Monument
Tidepool Protection Education and Restoration Program (TPERP)	Cabrillo National Monument
California King Tides Project	California Coastal Commission
Marine Biotoxin Monitoring Program	California Department of Public Health
Phytoplankton Monitoring Program	California Department of Public Health
First Flush	California Marine Sanctuary Foundation
Humpback and Blue Whale Photo IDs	Cascadia Research Collective
La Jolla Fishes	Center for Marine Biodiversity & Conservation
Citizen Kelp	CitSci.org
Beached Bird Surveys	COASST (Coastal Observation and Seabird Survey Team)
Volunteer Monitoring and Surveying	Crystal Cove Conservancy
Return of the Natives	CSU - Monterey Bay
Volunteer Monitoring and Research	Elkhorn Slough National Estuarine Research Reserve
Central California Urchin Removal and Kelp Restoration	Giant Kelp Restoration Project
Beach Cleanups and Snowy Plover Monitoring	Golden Gate Audubon

Gray Whales Count	Gray Whales Count
Bolinas Lagoon Restoration - Green Crab Removal	Greater Farallones Association
Bolinas Lagoon Restoration - Kent Island Restoration	Greater Farallones Association
Marine Debris Program	Greater Farallones Association
White Shark Stewardship Monitoring Program	Greater Farallones National Marine Sanctuary
Adopt-A-Beach	Heal the Bay
Snowy Plover and Least Tern Program	Los Angeles Audubon Society
Community Water Watch	Los Angeles Waterkeeper
Creeks 2 Coast Cleanup Challenge	Los Angeles Waterkeeper
Seastar Wasting Project	MARINe
Whale Monitoring Program	Marine Life Studies
Save Our Shorebirds Surveying	Mendocino Coast Audubon Society
Field Studies and Citizen Science	MERITO Foundation
Share Our Shores Monitoring	Monterey Audubon Society
CrowdHydrology	Morro Bay National Estuary Program
Record the Rain	Morro Bay National Estuary Program
Trash Tracker	Morro Bay National Estuary Program
Christmas Bird Counts	Morro Coast Audubon Society
Shorebird Count Surveying	Morro Coast Audubon Society
BeachCOMBERS (Coastal Ocean Mammal and Bird Education and Research Surveys)	Moss Landing Marine Laboratories
National Phytoplankton Monitoring Network	National Centers for Coastal Ocean Science
Taking it to the Streets: Urban Neighborhood Trash Monitoring and Education	National Oceanic and Atmospheric Administration

Help the Kelp Bull Kelp Recovery Program	Noyo Center
Cleanswell App	Ocean Conservancy
International Coastal Cleanup	Ocean Conservancy
Project AWARE Underwater cleanups	Ocean Conservancy
Sevengill Shark Identification	Ocean Sanctuaries
Sharks of California	Ocean Sanctuaries
Tide Pool Project	Ocean Sanctuaries
Yukon Marine Life Survey	Ocean Sanctuaries
Cleanup OC	Orange County Coast Keeper
California Central Coast Black Oystercatcher Monitoring Project	Pacific Grove Museum of Natural History
Grunion Greeters	Pepperdine University
Migratory Shorebird Project	Point Blue Conservation Science
Pacific Flyway Shorebird Survey	Point Blue Conservation Science
Snowy Plover Mud Stomp	Point Blue Conservation Science
Soundscapes to Landscapes	Point Blue Conservation Science
Whale Alert-West Coast	Point Blue Conservation Science
STRAW (Students and Teachers Restoring a Watershed)	Point Blue Conservation Science
Annual Subtidal Monitoring in MBNMS	Reef Environmental Education Foundation (REEF)
Invertebrate and Algae Monitoring Programs	Reef Environmental Education Foundation (REEF)

Least Tern and Snowy Plover Volunteer Program	San Diego Audubon Society
Snowy Plover Docent Program	Santa Barbara Audubon Society
Trash Clean Ups	Santa Barbara Channel Keeper
Watershed Brigade	Santa Barbara Channel Keeper
Sanctuary Stewards	Save Our Shores
Least Tern and Snowy Plover Monitoring Project	Sea and Sage Audubon Society
Environmental Monitoring Program	Southern California Marine Institute (CSULB)
Seabird and Pinniped Monitoring	Stewards of the Coast and Redwoods
Blue Water Task Force	Surfrider Foundation
Beach Cleanups	Surfrider Foundation
Volunteer Monitoring	The Marine Mammal Center
Marin County Coastal Clean Up Day	West Marin Environmental Action Committee

Appendix C: Additional Survey Results of Coastal/Marine Community and Citizen Science Efforts in California

Range of Total Participants			
1 - 49	50 - 499	500 - 4,999	5,000+
9	13	4	3

Estimated total number of participants		
69,940		*5 out of 29 do not track

Collect Demographics?	
Yes	No
4	25

Participant Roles	# Projects
Choose/define questions	3
Gather info/resources	17
Develop hypotheses	3
Design data collection methodologies	5
Collect samples and/or record data	29
Analyze samples	6
Analyze data	5
Interpret data and draw conclusions	9
Disseminate conclusions/translate results	8
Discuss results and ask new questions	10
Other	Support regulation changes

Participant Requirements	# Projects
Complete training	18
Commit to level or participation	14
Obtain certification	1
Provide own equipment	3
Membership	1
Age restrictions	6
Fees	1
Other	Skills/abilities (snorkel or SCUBA); Read protocols and online guides; Curriculum for students; Complete a federal volunteer service agreement; Knowledge and bird ID abilities; Ability to ID sea star species; Interest in and knowledge of heterobranch regional fauna

MPA Regions Projects Operate In		
North	Central	South
16	22	15

Data Collected within MPAs		
Yes	No	Not Sure
21	4	4

MPA Information Provided to Participants	
Yes	No
12	17

Education/Outreach Activities Conducted by Participants	
Yes	No
24	5

Education and Learning Outcomes for Participants are Measured

Yes	No
7	22

Geographic Range/Scale of Project Activities	# Projects
Single County	11
Multiple Counties	7
Statewide	5
Multiple States	2
National	0
International	3
Other: Morro Bay Watershed	1

Active Projects by Decade			
1980 - 1989	1990 - 1999	2000 - 2009	2010 - Present
1	6	14	29