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## Capstone Papers

### **Title**

Does Participation in Fisheries Research Change Anglers' Opinions of California's Marine Protected Areas?

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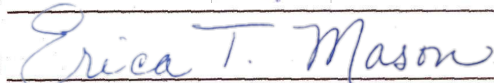
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**Does Participation in Fisheries Research Change Anglers'  
Opinions of California's Marine Protected Areas?**  
A survey of volunteer anglers with the California Collaborative Fisheries Research Program

Allison Kellum  
13 June 2018

Capstone Research Project  
Masters of Advanced Studies – Marine Biodiversity and Conservation  
Scripps Institution of Oceanography, UC San Diego

Capstone Advisory Committee:

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## **Abstract**

Recent marine spatial planning efforts, including the management and monitoring of marine protected areas (MPAs), have increasingly focused on the importance of stakeholder engagement. The California Collaborative Fisheries Research Program (CCFRP) provides a unique opportunity for members of the public to partner with researchers, the fishing industry, and resource managers to monitor California's network of MPAs. The program has shown considerable success in engaging volunteers since its inception in 2006. However, there has never been a formal study of the knowledge, attitudes, and perceptions of these volunteers regarding the program, marine conservation, and MPAs. This study surveyed CCFRP volunteers to: characterize them as a population; determine what their core motivations were for joining and staying in the program; assess their attitudes towards fisheries management; and evaluate if participation in the program influences their opinions of MPAs in California. It was found that volunteers represent a cross section of the general recreational angling community in some key ways, but are generally more conservation minded than their peers. Participation in science and giving back to fisheries resources are major motivating factors for volunteering. While most volunteers have a positive opinion of MPAs, and those who joined the program earlier are more likely to have gained a more positive opinion of MPAs. Through this research we now have a clearer view of who Central Coast CCFRP volunteers are as a group, and how participation in the program has shaped their perspectives.

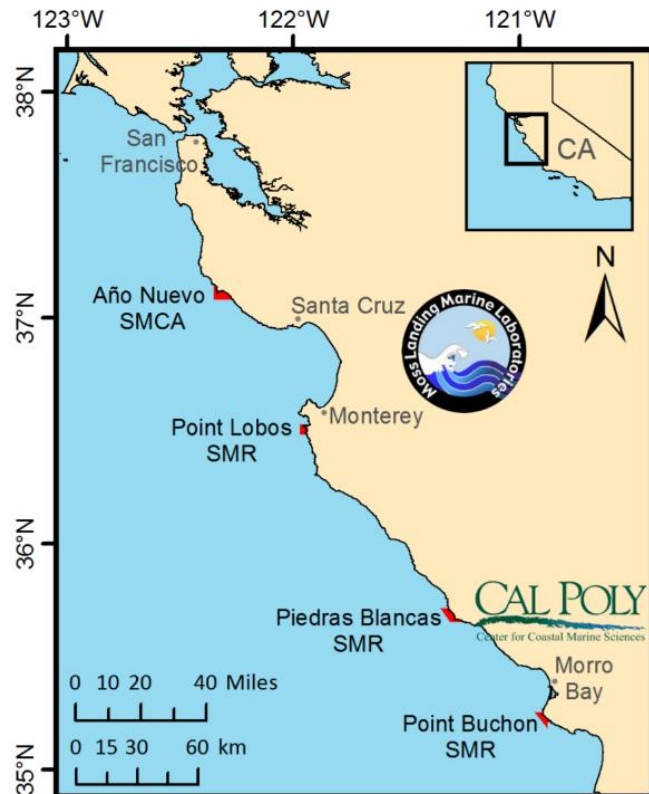
## Introduction

The Marine Life Protection Act (MLPA) was passed by the California legislature in 1999 in an effort to increase protection of the state's diverse marine habitats, wildlife, and cultural sites [1]. The law called for an assessment of the state's existing marine protected areas (MPAs), and a reimagining of these protections into a statewide network. The planning and implementation of this network of MPAs took over ten years and involved considerable effort to engage stakeholders [2]. Benefits of stakeholder engagement in marine spatial planning can include the incorporation of local knowledge into policy and the potential to create resource user buy-in [3]. Multiple assessments of the MLPA stakeholder process have been completed and many have found the process was effective in achieving its goals [4–6]. Since the planning and implementation of the MPA network was completed in 2012, new opportunities for public engagement have been created within the realm of MPA management, including the scientific monitoring of changing fish populations both in- and outside MPA boundaries.

One program that involves the public in MPA monitoring is the California Collaborative Fisheries Research Program (CCFRP). CCFRP is a partnership between commercial passenger fishing vessels (CPFVs), recreational anglers, academic scientists, and resource managers. They work together to monitor the species, abundance, and size of groundfish<sup>1</sup> in MPAs and nearby ecologically similar reference areas [7]. Between 2006 and 2016, CCFRP has annually surveyed four sets of MPAs and reference areas at: Año Nuevo State Marine Reserve, Point Lobos State Marine Reserve, Piedras Blancas State Marine Reserve, and Point Buchon State Marine Reserve (Figure 1).<sup>2</sup> These MPAs are all located within the Central Coast MLPA planning region, which extends from Pigeon Point to Point Conception, and were implemented in 2007.

Volunteer saltwater anglers are central to the program's standardized sampling protocol. Their job is to catch and safely land as many fish as possible for the

**Figure 1.** This map shows the four Central Coast MPA sites monitored by CCFRP between 2007 and 2016 with the locations of the coordinating institutions (credit: CCFRP webpage)



<sup>1</sup> Groundfish is a polyphyletic group that includes bottom-dwelling fish like rockfish, lingcod, cabezon, and flatfish.

<sup>2</sup> CCFRP added the Southeast Farallon Island State Marine Reserve as a Central Coast sampling site in 2017, in addition to projects based out of other MLPA planning regions in California. Information about these sites was not included in this study.

program's science crew to identify, measure, and release. Volunteering requires a commitment to early days with long hours, weathering rough seas, and providing near-constant fishing effort - all without the benefit of keeping the day's catch. Nevertheless, volunteering gives participants the unique opportunity to fish in MPAs designated as "no-take" zones.<sup>3</sup>

The goals of CCFRP extend past collecting data. They also include increasing communication and trust between stakeholder participants [7]. The coordinators of the program at California Polytechnic University, San Luis Obispo (CalPoly), and Moss Landing Marine Labs (MLML) focus a lot of energy on outreach and sharing results and trip highlights with volunteer participants and other partners [8]. While stakeholder engagement is a major component of the CCFRP mission, the motivations of volunteers to participate and the impact of program participation on volunteer knowledge, attitudes, and perceptions have never been formally measured [9].

This study used an online survey of current and former CCFRP volunteer anglers to investigate the human dimensions of volunteer participation in CCFRP. The objectives of this study were to:

- 1) describe the demographic characteristics of CCFRP volunteer anglers;
- 2) identify key motivations volunteers had for joining and continuing with the program; and
- 3) investigate the degree to which participation in the program may have influenced volunteer opinions of MPAs

Research on stakeholder attitudes has been slowly growing as managers and others have begun to understand the important role that human dimensions play in the success of MPAs [10–12]. However, research on public knowledge, attitudes, and perceptions of California's MPA is sparse, and studies that do exist vary widely across geographic region and composition of study population [11,13–16]. By characterizing this population and their opinions of marine resource management and MPAs in relation to their volunteer efforts, this study was able to evaluate the degree to which this program impacts human dimensions of marine conservation.

## **Methods**

### ***Survey***

To test these research questions, the researcher implemented an online survey of CCFRP volunteer anglers who participated in the Central Coast regional program between 2007 and the present. Volunteers are primarily recreational saltwater anglers who live in this region. The survey was distributed to 722 out of 901 former and current participants.<sup>4</sup> The survey questionnaire was developed and delivered via the online survey platform Qualtrics.<sup>5</sup> This was fielded via a series of outreach and follow-up e-mails delivered on April 19<sup>th</sup>, 26<sup>th</sup>, and May 1<sup>st</sup>,

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<sup>3</sup> All California State Marine Reserves are designated as "no-take" zones. State Marine Conservation Areas may allow some take, but Año Nuevo, studied by Central Coast CCFRP do not allow take of any fishes.

<sup>4</sup> The majority of 179 volunteer anglers who were not included in the survey sample either no longer volunteered with CCFRP or had opted out of receiving communications about the program. Due to time and resource constraints, two other groups were also excluded from the study sample: individuals who did not have e-mail addresses and participants under the age of 18. Program coordinators at CalPoly and MLML identified these groups as comprising only a negligible portion of the volunteer population.

<sup>5</sup> Qualtrics is a survey design, distribution, and analysis platform hosted on the web.

2018. Each e-mail contained a description of the study, a letter of consent, and a link to the anonymous online questionnaire (see Appendices I and II). The questionnaire included one screening question and 29 research-related questions arranged in four sections on the topics of: CCFRP Volunteering; Fisheries Management and Health of California Groundfish Stocks; Marine Protected Areas; and Demographics and Miscellaneous Questions. Question types included yes/no, multiple-response, ordinal scale, and free-response. It was estimated that the survey would take respondents 15 minutes to complete.<sup>6</sup>

### *Data collection and analysis*

Once a questionnaire was completed and submitted by a respondent, answers were recorded automatically by Qualtrics and made available to the researcher. These answers were downloaded to a Statistical Package for the Social Sciences (SPSS) “.sav” file with all choice-answers numerically coded. Responses were processed and analyzed using SPSS (IBM SPSS Statistics, ver. 25, 64-bit). Numeric responses that had been recorded as text strings were converted into numeric data points before analysis.

### *Demographic and characteristic summaries*

Most of the demographic and characteristic summaries were synthesized directly from the responses, however, five additional variables were calculated from these responses. The first of these is angling avidity. Angling avidity is a relative measure of the enthusiasm an angler has for the sport. Respondents were categorized into three avidity levels – low, medium, or high – based on the number of saltwater angling trips they went on a year, outside of CCFRP surveys (Q26), with low being <4 days, medium 4-23 days, and high >23 days per year.<sup>7</sup>

Second, a series of questions asked respondents to identify if they had ever worked in marine resource management, the recreational fishing industry, or the commercial fishing industry (Q10, Q28, and Q29). Answers from these questions were used to bin respondents into six distinct categories. Three (3) categories were delineated for those who had worked in only one of these sectors, three (3) categories were defined for those who worked in a paired combination of two sectors, and the remaining groups were for those who participated in all three or none of the fields.

Third, another set of questions asked volunteers whether they had fished in any areas that are now MPAs and to identify which MPAs these areas corresponded to (Q13 and Q13A). Additionally, they were asked if they had visited MPAs on any CCFRP sampling trips and, if so, which ones (Q17 and Q17A). To determine which respondents had seen the sites before and after MPA implementation, answers from these questions were compared. Fourth, the number of respondents who had fished before and after MPA creation were counted for each site. And fifth, the number of respondents who visited *any* MPA site before and after its implementation was calculated using these same data.

### *Measures of volunteer participation*

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<sup>6</sup> Since this research involved human subjects, the methodology listed below, and the outreach materials used in this survey were submitted to the UC San Diego Institutional Review Board (IRB). The study was given exempt status, meaning that further or continuing review by the UC San Diego IRB office is not required with the protocols and materials submitted.

<sup>7</sup> These avidity ranges are based on the three West Coast Fishing Avidity categories published by NOAA in 2014 [19].

Three measures of volunteer participation were calculated from responses to five questions asking about volunteer participation with CCFRP. Length of time since a respondent began volunteering with the program was calculated by subtracting the year the respondent started (Q1) from the present year (2018). Number of Workshops attended was calculated by combining Q11 and Q11A. Responses for “No” they did not attend any Workshops for Q11 were recoded as “0” instead of “missing” for Q11A. For questions 2 and 3, respondents were asked how many years they volunteered with CCFRP and, what the average number of sampling trips they went on for each of these years was. The number of years a volunteer participated in CCFRP was multiplied by average number of trips they went on per year to approximate the total number of sampling trips the respondent went on throughout their time with CCFRP. These measures were then related with changes in volunteer opinions of MPA creation from before joining the program, to after participating with CCFRP.

#### *Measures of opinion change regarding the creation of MPAs*

Volunteers’ general opinion of MPA creation in California was measured in two questions, one asking about the respondent’s opinions before becoming a volunteer angler with CCFRP (Q14), and the other asking about respondent’s opinions of MPA creation in California after volunteering (Q18). Respondents answered on an ordinal scale. They could report that their opinion was either: “Positive,” “Somewhat positive,” “Somewhat negative,” “Negative,” or that they had “No opinion.” These answers were coded 1, 2, 3, 4, and 5 respectively. To create a single measure - change in opinion of creation of MPAs in California after volunteering with CCFRP - the answer code from Q18 was subtracted from the answer code for Q14. Results that were positive indicated a positive change in opinion of MPAs, results that were negative indicated a negative change in opinion of MPAs, and results that were “0” represented no change in opinion. These answer types were coded numerically into a single variable representing change in opinion, with positive change coded as “3”, no change coded as “2,” and negative change coded as “1.”

A multinomial logistic regression was conducted in SPSS to relate the three measures of participation with change in opinion of creation of MPAs. Survey responses were divided into three groups based on their change in opinion of creation of MPAs after volunteering with CCFRP. Demographics and characteristics of respondents were then compared between those who had a positive change in opinion, those who had no change in opinion, and those who had negative change in opinion.

## **Results**

Of the 722 current and former volunteer anglers contacted about the survey, 112 completed and submitted a survey, making the response rate 15%. Two respondents joined CCFRP within the last year, but had not yet gone on any sampling trips. Their answers were removed and only the 110 respondents who had gone on sampling trips were included in the analysis. Subjects took an average of 12 minutes to complete and submit the survey.

### *Demographics and Characteristics of Respondents*

As shown in Table 1, ages of respondents were strongly skewed towards older ranges, with nearly one third of respondents between 65 and 74 years of age, and the next largest age bracket being 55-64 year olds (17%). An overwhelming majority of respondents were male (86%), with 12% being female.<sup>8</sup> Respondents had medium to high avidity for saltwater angling, with 40% going on between 4 and 23 trips a year and 35% going on more than 23 trips a year. Most respondents did not participate in the MLPA planning process, with only 18% saying they did in any way. When these two characteristics were cross-analyzed, it was found that 23% of highly avid anglers participated in the MLPA, compared to 20% of anglers with medium avidity and only 7% of anglers with low avidity.

Seventy percent (70%) of volunteer anglers who responded to the survey considered themselves to be more conservation minded than their peers in the recreational community, and an additional 25% thought they were similarly conservation minded with their peers. Sixty-five percent (65%) of respondents did not have any experience in the marine resource management, recreational fishing, or commercial fishing industries. Of those that did, 24% had some kind of fishing related work experience, and overall 14% had some kind of marine resource management background with some overlaps between these groups. Forty-five percent (45%) of the respondents had fished in areas that have since become MPAs, with 33% having the chance to fish in those same MPAs again on CCFRP sampling trips. Seventy-four percent (74%) of respondents had the opportunity to fish in both MPAs and reference areas during their time as volunteers with CCFRP.

### *Opinions of Fisheries Health and Resource Management*

A slim majority of respondents (52%) believe California groundfish stocks are currently healthy, while a quarter think they are somewhat unhealthy or very unhealthy. Nearly four out of five respondents (79%) feel that California groundfish stocks are very well managed, well managed, or adequately managed, 14% believe they are poorly managed, and 2% think they are very poorly managed. Eighty-five percent (85%) of respondents thought seasonal closures and bag limits are effective fisheries management tools, while spatial closures and depth restrictions were not considered as effective, with only 65% and 48% of volunteers supporting them, respectively. Nearly one third of survey respondents said they were not sure if depth restrictions were effective for ensuring healthy groundfish stocks.

### *Motivations for volunteering with CCFRP*

A vast majority of respondents said they plan to continue volunteering with CCFRP (93%). Of those who plan to continue volunteering (N=102)<sup>9</sup>, the reasons why they joined the program remained similar to the reasons why they continue volunteering with the program (Figure 2). As shown in Figure 2, having the opportunity to participate in science was an important component for 75% of respondents who plan to continue volunteering.

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<sup>8</sup> Two percent of respondents chose the option "I prefer not to say."

<sup>9</sup> Some analyses were done on subgroups of the respondents. When a subgroup analysis results in percentages, the total number of people in that subgroup will be noted. Here, the number of people in the subgroup equals 102.

**Table 1: Demographics and Characteristics of Survey Respondents**

	<u>Category</u>	<u>Number of Respondents</u>	<u>Percent of Respondents</u>
<i>Age</i>	18-24	3	3%
	25-34	16	15%
	35-44	11	10%
	45-54	17	15%
	55-64	19	17%
	65-74	35	32%
	75+	9	8%
<i>Gender<sup>a</sup></i>	Male	95	86%
	Female	13	12%
<i>Angler avidity<sup>b</sup></i>	Low	27	25%
	Medium	44	40%
	High	38	35%
<i>Participated in the MLPA planning process</i>	Yes	20	18%
	No	90	82%
<i>Conservation Mindedness<sup>c</sup></i>	More	77	70%
	Similar	27	25%
	Less	1	1%
<i>Related work experience<sup>d</sup></i>	Recreational fishing only	12	11%
	Commercial fishing only	3	3%
	Marine resource management only	11	10%
	Management and Commercial	0	-
	Management and Recreational	2	2%
	Recreational and Commercial	7	6%
	All three	2	2%
	None	71	65%
<i>Fished and sampled at CCFRP sites before and after MPA creation</i>	Yes	36	33%
	No	74	67%
<i>Total</i>		110	100%

<sup>a</sup> The 2 respondents who selected the choice “I prefer not to say” were not included here.

<sup>b</sup> The 1 respondent who did not answer this question was not included here.

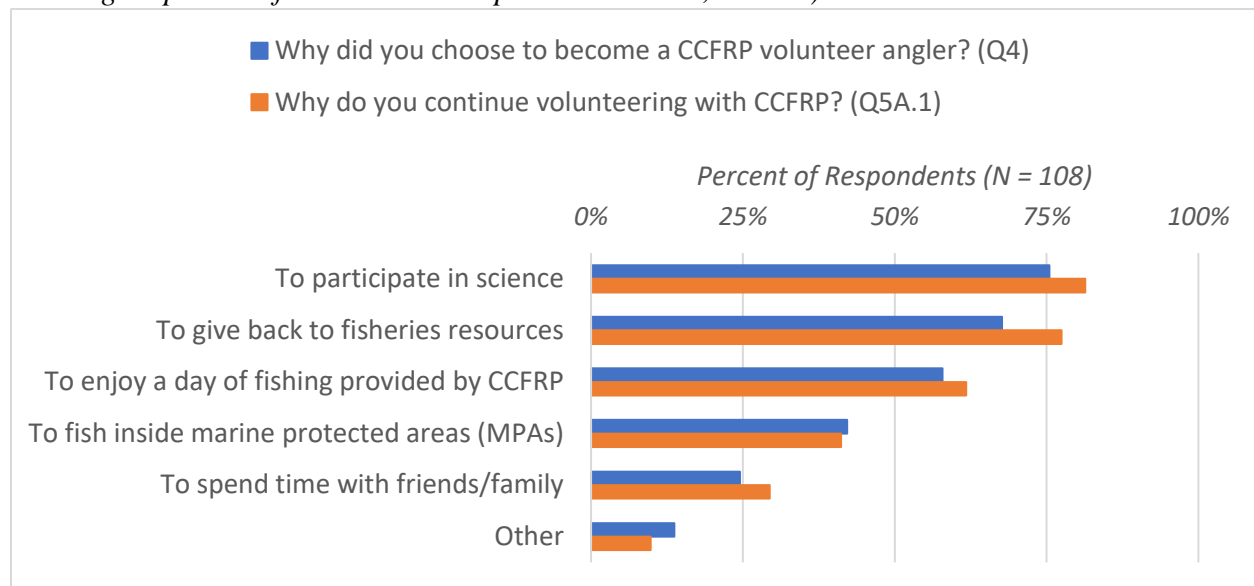
<sup>c</sup> The 5 respondents who did not answer this question were not included here.

<sup>d</sup> The 2 respondents who had incomplete answers for these questions were not included here.

Sixty-eight percent (68%) said “giving back to fisheries resources,” and 58% said “enjoying a day of fishing provided by CCFRP” were key reasons why they both joined the program and why they stay involved. A number of the respondents who responded “Other” described desires to help fisheries or help marine resource managers gather data to use in management. Three respondents replied that the opportunity to learn was important to why they joined the program, and an additional three respondents cited learning new information as reasons they continue to volunteer.

Only eight respondents said that they do not plan to continue volunteering with CCFRP. One cited lack of available volunteer spots on trips as a reason. Personal health and seasickness were mentioned by others and a few said that their experience volunteering had become boring or job-like.

**Figure 2.** Reasons why volunteers join CCFRP and why they continue with the program (only showing responses of volunteers who plan to continue, N=102).



**Measures of Participation**

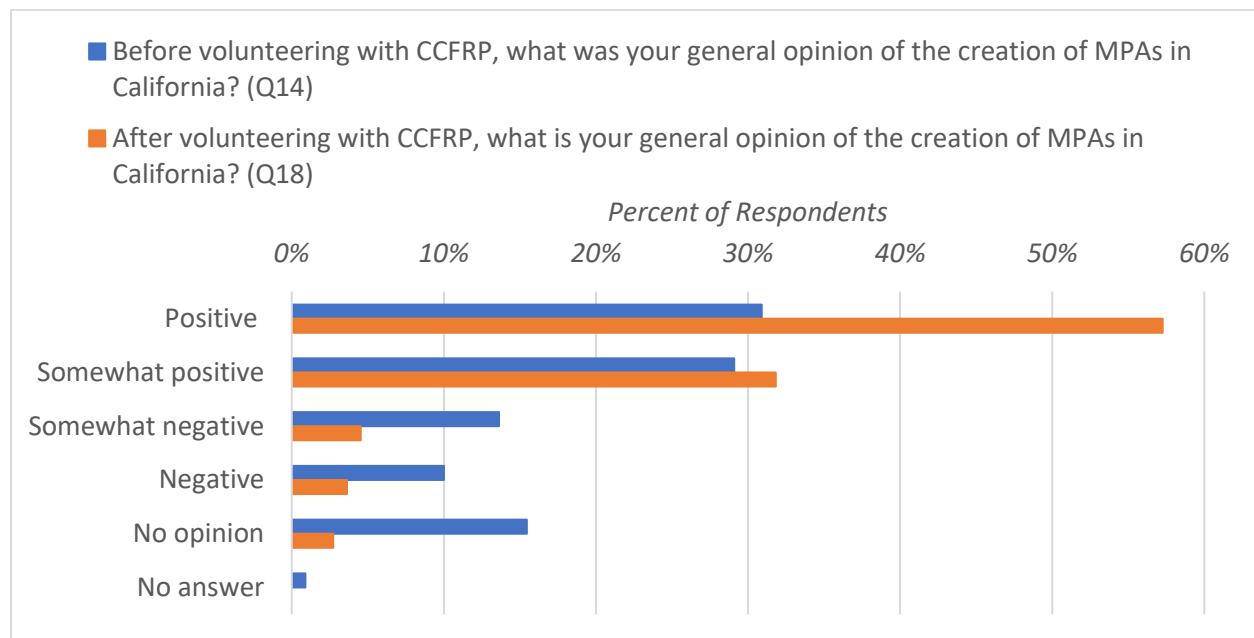
Levels of volunteer participation varied widely across respondents. Volunteers who have been with the program since 2007 were the largest group to respond, making up 15% of participants, with recently joined volunteers following behind at 12%. Only one individual who joined the program in 2011 responded, but otherwise participation in the survey was fairly evenly distributed across years since people joined. Fifty-four percent (54%) of volunteers surveyed have never attended an annual Volunteer Appreciation and Data Workshop with the program in the past eleven years. Of the 46% who have, most have only attended one to four Workshops. Only 6% of respondents had attended five or more workshops. The estimated number of CCFRP trips attended ranged widely amongst respondents. The minimum was one trip and the maximum was 154. The median number of trips was 8, the mean number 17. Seventeen percent of respondents (17%) had only attended one sampling trip.

### *Change in opinions of MPAs*

As shown in Figure 3, 60% of volunteer anglers surveyed said that they had positive or somewhat positive opinions of MPAs before they began volunteering, and 28% said they had somewhat negative or negative opinions of MPA creation in California before volunteering. Fifteen percent (15%) of respondents said they did not have any opinion of MPAs before joining the program. When volunteers were asked about their opinions now, after volunteering with CCFRP, 89% said they had a positive or somewhat positive opinion of MPAs. This 50% increase in positive opinion was matched by a decrease in somewhat negative and negative opinions, as well as an even greater decrease in those who held no opinion of MPAs from before volunteering with CCFRP to after.

In addition to general trends, change was measured on an individual scale. It was found that 48% of respondents had no opinion change from before volunteering to after and 46% reported a positive change in opinion about MPA creation. Only 5% of respondents reported a negative change in opinion of MPAs after volunteering with CCFRP.

**Figure 3.** *Volunteer opinions of the creation of MPAs in California before and after volunteering with CCFRP.*



### *Results of Multinomial Logistic Regression Analysis*

One hundred and four (104) of the respondents answered all of the questions related to opinion change and the three calculated measures of participation (length of time since joining the program, number of Workshops attended, and total number of trips attended). A multinomial logistic regression of change in opinion (positive, negative, or no change) relative to the three covariate measures of participation found that there was a significant relationship between length of time since joining CCFRP and change in opinion of MPAs. No significant relationships were

found between the number of Workshops a volunteer attended or the number of trips they attended and change of opinion of MPAs.

As shown in Table 2: Likelihood Ratio Estimates, for “no change of opinion” relative to “positive change in opinion,” the Wald test statistic for the predictor “length of time since joining CCFRP” is 9.663 with an associated p-value of 0.002. With an alpha level of 0.05, we are able to reject the null hypothesis and conclude that, for no change in opinion of MPAs relative to positive change in opinion of MPAs, the regression coefficient for length of time since joining CCFRP has been found to be statistically different from zero given number of volunteer appreciation and data workshops attended and total number of trips attended are in the model.

As shown in Table 3: Parameter Estimates, given a one year increase in length of time spent in CCFRP, the relative risk of being in the “no change of opinion” group is 0.798 times less likely when the other variables in the model are held constant. These results can also be stated as: if a subject were to spend more years in the program, we would expect them to be more likely to have a positive change in opinion than no opinion.

**Table 2. Likelihood Ratio Tests for Multinomial Logistic Regression of Change in Opinion of MPAs relative to measures of participation in CCFRP**

Predictors	Likelihood Ratio Tests		
	Chi-Square	df	Sig.
Intercept	15.942	2	0.000
Number of Volunteer Appreciation and Data Workshops attended	1.468	2	0.480
Length of time since joining CCFRP	10.653	2	0.005
Total number of sampling trips with CCFRP	1.887	2	0.389

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

**Table 3. Parameter Estimates for Multinomial Logistic Regression of Change in Opinion of MPAs relative to measures of participation in CCFRP**

Change in opinion of the creation of MPAs in California		Exp(B)	Sig.
Negative Opinion Change	Intercept		0.271
	Number of Volunteer Appreciation and Data Workshops attended	1.338	0.518
	Length of time since joining CCFRP	0.916	0.581
	Total number of sampling trips with CCFRP	0.915	0.354
No Opinion Change	Intercept		0.003
	Number of Volunteer Appreciation and Data Workshops attended	1.132	0.271
	Length of time since joining CCFRP	0.798	0.002
	Total number of sampling trips with CCFRP	0.995	0.667

a. The reference category is: Positive Opinion Change.

### *Demographics and Characteristics compared across opinion change categories*

Many characteristics of volunteers were similar across opinion change categories, including gender, angler avidity, and conservation mindedness. Respondents who expressed no opinion change of MPAs did tend to be younger than those who had a positive change in opinion of MPAs. As shown in Table 4, there were almost two times the number of respondents aged 45-54, and half the number of respondents aged 65-74 in the no change group relative to the group who expressed a positive opinion of MPAs. Those respondents who had previously worked in marine resource management were split between having no change in opinion and having a positive change in opinion of MPAs.

The sample size for those who expressed a negative change of opinion towards MPAs was small, with only 5 respondents. Of these respondents, none participated in the MLPA planning process or worked previously in marine resource management. Three had fished in both MPAs and reference sites with CCFRP, but none had visited the same MPA sites with CCFRP that they had fished in before the implementation of MPAs in 2007.

## **Discussion**

The overwhelming majority of respondents said they plan to continue volunteering. MLML reported that 140-150 volunteer anglers participated in the 2017 sampling season between the two programs [17], so it is likely that the 110 responses represent an accurate sample of those who plan to continue with the program. Due to a lack of sample size, no conclusions can be drawn across the entirety of the volunteer angler population or for former volunteers.

### *Demographics and Characteristics of Respondents*

The split in genders of respondents is representative of fresh and saltwater anglers in California, but volunteer angler respondents are older than members of the larger angling community. A 2011 report entitled “Fishing, Hunting, and Wildlife-Associated Recreation in California” found that angler ages are fairly evenly spread out across age groups. That report found that forty-nine percent (49%) were between 18 and 44 years old and less than 4% were 65 or older [18]. In contrast, 18 to 44-year-olds make up less than a third of CCFRP’s volunteers, and 40% are over the age of 65. For CCFRP, older adults may be more likely to attend sampling trips scheduled during the work week. While current volunteership represents a cross-section of ages in the recreational angling community, this survey shows that younger volunteers as a constituency are underrepresented in CCFRP.

CCFRP volunteer anglers tend to be slightly more enthusiastic about, or show increased avidity for, fishing than others on the West Coast. Angler avidity in this region has been shown to positively correlate with perceived importance of ensuring “that the opinions of all recreational fisheries stakeholders are considered in policy-making” [19]. While the questionnaire for this study did not ask volunteers to report their opinions on the importance of stakeholder input in policy making, more avid CCFRP volunteer anglers were found to be more likely to have participated in the MLPA process.

**Table 4: Demographics and Characteristics of Respondents within each Opinion Change Subgroup**

<u>Category</u>	<u>Positive change</u> (N=51)	<u>No change</u> (N=53)	<u>Negative change</u> (N=5)
<i>Age</i>			
18-24	-	6%	-
25-34	14%	15%	20%
35-44	6%	11%	20%
45-54	12%	21%	-
55-64	18%	19%	-
65-74	41%	23%	40%
75+	10%	6%	20%
<i>Gender<sup>a</sup></i>			
Male	88%	85%	80%
Female	10%	13%	20%
<i>Angler avidity<sup>b</sup></i>			
Low	24%	26%	20%
Medium	41%	36%	60%
High	35%	38%	20%
<i>Participated in the MLPA planning process</i>			
Yes	18%	21%	-
No	82%	79%	100%
<i>Conservation Mindedness<sup>c</sup></i>			
More	63%	77%	60%
Similar	29%	21%	20%
Less	2%	-	-
<i>Related work experience<sup>d</sup></i>			
Recreational fishing only	6%	15%	20%
Commercial fishing only	6%	-	-
Marine resource management only	14%	8%	-
Management and Commercial	-	-	-
Management and Recreational	-	4%	-
Recreational and Commercial	12%	2%	-
All three	-	4%	-
None	63%	66%	60%
<i>Fished and sampled at CCFRP sites before and after MPA creation</i>			
Yes	35%	34%	-
No	65%	66%	100%

<sup>a</sup> The 2 respondents who selected the choice “I prefer not to say” were not included here.

<sup>b</sup> The 1 respondent who did not answer this question was not included here.

<sup>c</sup> The 5 respondents who did not answer this question were not included here.

<sup>d</sup> The 2 respondents who had incomplete answers for these questions were not included here.

Levels of public participation in the California MLPA planning process were very high, with over 4,000 members of the public attending planning-related events and over 70,000 public comments submitted during the process and environmental review [4]. While these numbers are high for stakeholder engagement of any kind, public participation came from a small portion of California's over 39 million residents [20]. One in five CCFRP survey respondents participated in the MLPA in some form, making them more engaged than the average resident. As expected, about one third of respondents who participated in the MLPA were marine resource managers, however not all of those who had worked in marine resource management participated in the MLPA.

Anglers have an inherent interest in preserving fisheries resources. While catching is not the only aspect of a day on the water, more fish generally provides greater fishing opportunities. Nevertheless, attitudes towards conservation and management measures can vary amongst anglers. Most CCFRP volunteer anglers perceived themselves to be more conservation minded than their peers in the recreational angling community. Those who identified as more conservation minded felt that California groundfish stocks were less healthy than those who felt similarly conservation minded as their peers. Individuals who perceive that groundfish stocks are unhealthy, and therefore in need of conservation, may be more likely to self-select to volunteer with CCFRP.

CCFRP straddles two modes of public engagement in science: collaborative fisheries research (CFR) and citizen science. The program draws from a long history of collaborative and cooperative fisheries research where scientists partner with members of the fishing industry to study fish populations or develop management tools (Hartley and Robertson, 2009; Gleason et al., 2017). Citizen science – also called community-based or participatory science – involves members of the public who are not scientists [22], and it differs from CFR in that these people are not necessarily part of the fishing industry. The California Ocean Science Trust recently published guidelines for citizen science and ocean resource management with a focus on programs in the Central Coast, including CCFRP [23]. The partnership between CCFRP and CPFVs follows a more traditional CFR model, but the program is a leader in successfully integrating citizen science into the collaborative fisheries research model by creating a role for recreational anglers in the public.

The purpose of asking volunteers to select their related work experience was to get a cross-section of which of these various experience categories - citizen scientist, manager, fishing industry worker - participants fall under. The program has successfully engaged members of the general public, as two thirds of volunteers had no work experience in management, recreational fishing, or commercial fishing sectors. Considering the general audience targeted for volunteer angler recruitment was recreational anglers [7], it is surprising that almost a fifth of respondents had worked in marine resource management. These respondents are distributed across age groups, suggesting that perhaps a number of these volunteers still work in resource management. While the role of “volunteer angler” was meant to engage members of the public more than other stakeholder groups, the experience of fishing side-by-side with people from different professional backgrounds may aid in the relationship-building that is an important cornerstone of the program.

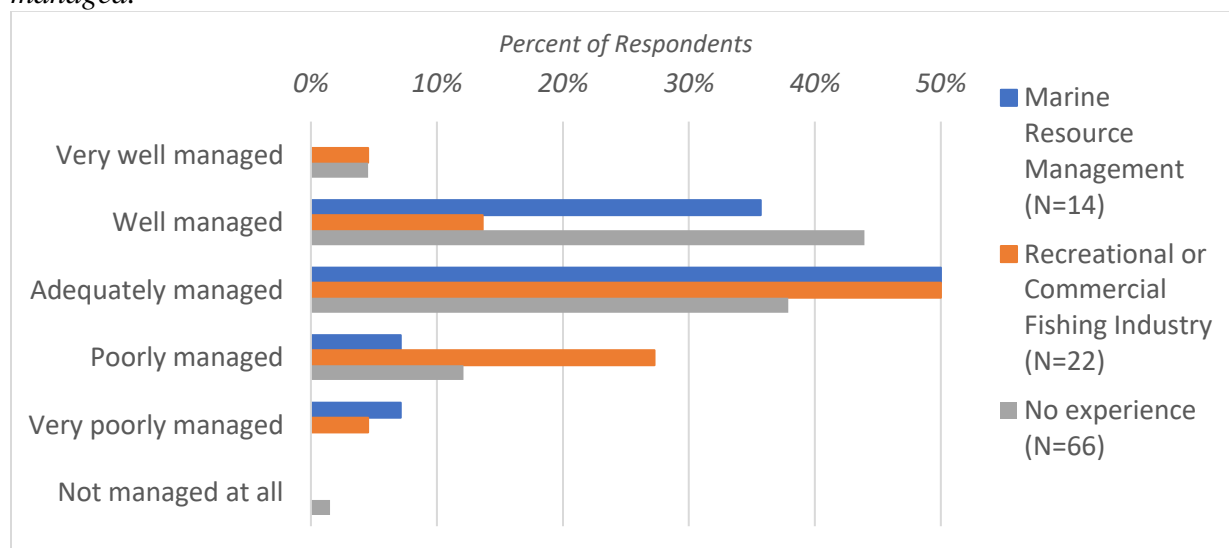
### *Opinions on Marine Resource Management*

The vast majority of survey respondents from all ocean-related work experience types (here divided into marine resource management, commercial or recreational fishing experience, and no experience), believe groundfish stocks in California are adequately managed. As shown in Figure 4, those who have related work experience in the recreational and commercial fishing sectors are more likely to think that groundfish are poorly managed than either those who have worked in management or those who have no related work experience. Managers and volunteers without industry work experience are also much more likely to view the fishery as well managed. When it comes to specific recreational fisheries management strategies, all three groups generally agreed on the effectiveness of minimum size limits, seasonal closures, spatial limits, and catch limits. However, respondents with no experience in these fields and fishermen responded nearly half as favorably to depth restrictions as did managers. Depth restrictions also garnered the greatest amount of uncertainty across groups, including those who had been marine resource managers.

### *Motivations for volunteering with CCFRP*

The three most cited reasons that the majority of volunteers joined the program were: to participate in science, to give back to fisheries resources, and to enjoy a day of fishing provided by CCFRP. These same reasons remained important to why volunteers continue with the program. Learning was a powerful driver for volunteer participation. The scientific aspect of CCFRP sets it apart from other angling opportunities and strong interest in this aspect of the program shows interest by participants to be involved in research for research's sake, not just the novelty of fishing inside MPAs. Three volunteers answered that learning was a motivator for why they joined, either for themselves or the students they brought with them.<sup>10</sup> Three more listed learning as a motivator for why they stayed. Across marine and coastal citizen science projects, increasing knowledge is often a frequent motivation [24].

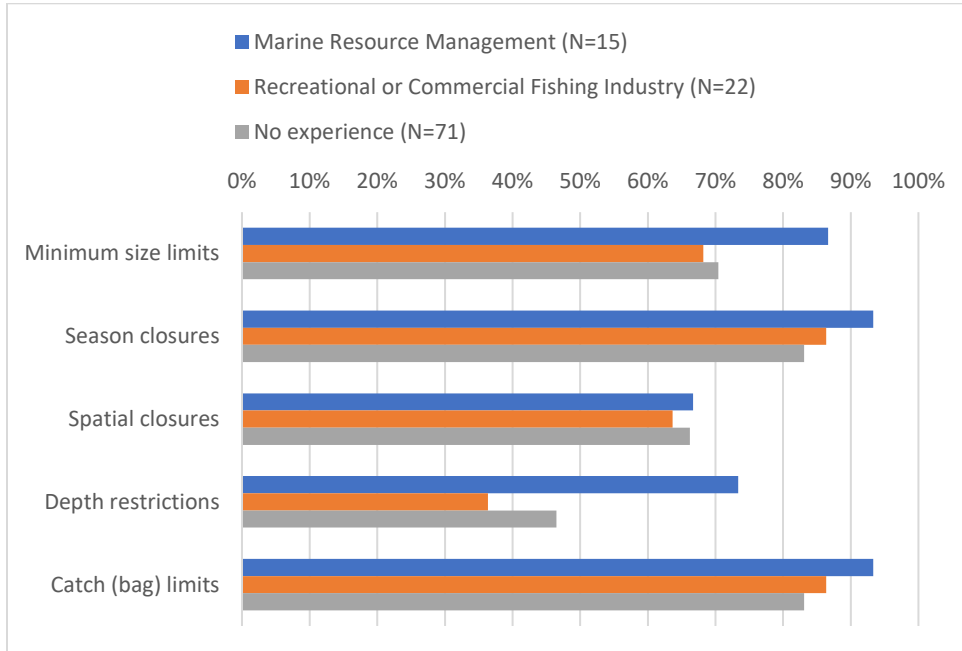
**Figure 4.** Percent of respondents from each of three work experience categories (management, fishing, no experience) and their opinions of the degree to which California groundfish are managed.



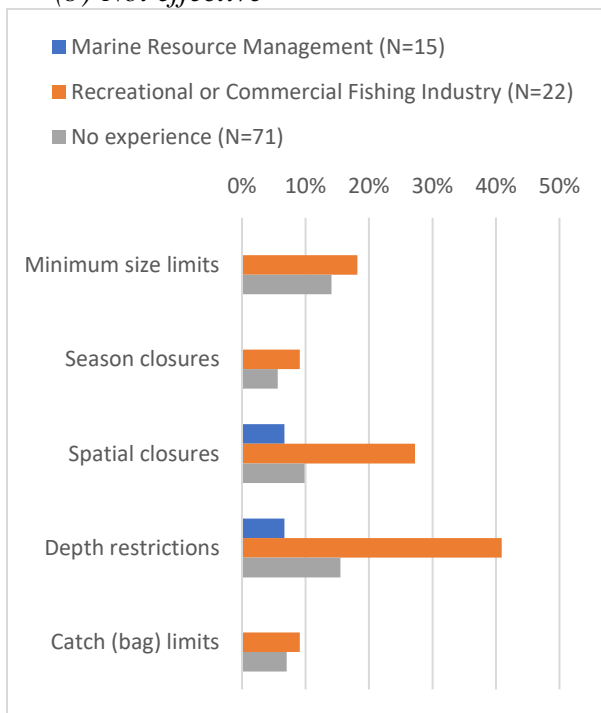
<sup>10</sup> A handful of high school teachers have brought their students on CCFRP trips to give them field experience.

**Figure 5.** Percent of respondents in each of three work experience categories who believe various fisheries management strategies are effective. Response options for each category were (a) “Effective,” (b) “Not effective,” (c) “Not sure.”

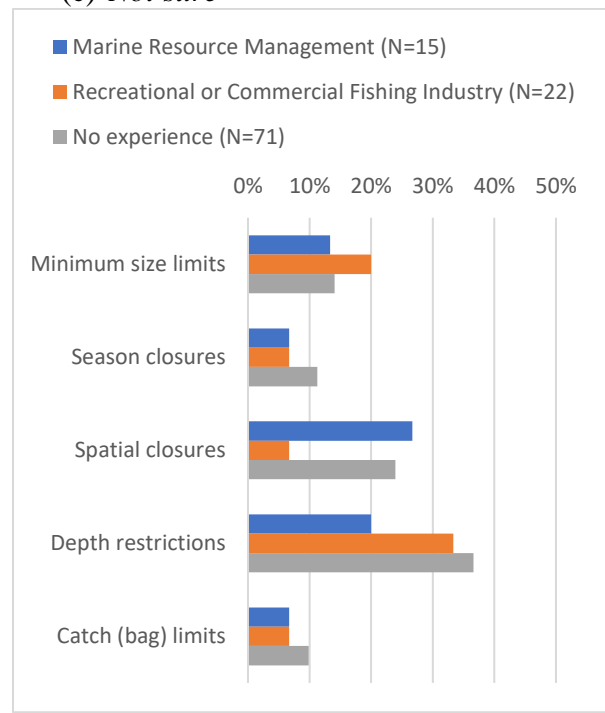
(a) *Effective*



(b) *Not effective*



(c) *Not sure*



### *Change in opinions of MPAs*

The majority of CCFRP volunteers entered the program with positive opinions towards the creation of MPAs in California. Many who held positive opinions maintained their attitudes after volunteering. The major change trend that this survey found was that many of those who had negative opinions of MPAs, or no opinion at all, gained a positive opinion of them after volunteering with CCFRP. It was found that volunteers who have been with the program longer were more likely to have reported a positive change in opinion than no change at all.

These trends follow with those for Californians generally. Polling data from across the history of the MLPA process in California indicate general support for MPA creation. According to a 2003 Public Policy Institute of California (PPCI) survey, three out of four Californians supported the creation of marine reserves off the coast [14]. A 2007 survey sponsored by the American Sportfishing Association (ASA)<sup>11</sup> found that, of the 32% of Californians who had heard of the MLPA, a large majority thought it was a good thing [13]. A recent Public Policy Institute of California poll found that 77% of adults say it is very important that California have marine protected areas and 18% say it is somewhat important (Baldassare, et al., 2017). The survey areas and methodologies do not match up completely, but there appears to be both an increase in awareness of MPAs and an increase in support for them across the state in the last ten years.

The ASA survey was one of the only surveys to date with sampling specifically directed at recreational anglers across California. The survey administrators found that anglers had greater awareness of the MLPA, but that only one third of all survey respondents had a positive opinion of it. Volunteers who began the program in 2007 align more closely to these attitudes than volunteers who started later, but not to any great degree. One third of early CCFRP participants had no opinion of MPA creation before joining the program, and nearly half had a positive opinion. Across the board of participation, two thirds of CCFRP anglers had a positive opinion of MPA creation before they even began volunteering. This could suggest that volunteers may be more conservation minded than their peers, possibly even before volunteering.

### *Results of Multinomial Logistic Regression Analysis*

The only significant correlation between change in opinion and any one measure of participation was found with the total number of years since a volunteer angler joined CCFRP. The literature supports relationship building as being important for stakeholder engagement (Gleason et al., 2017; Vann-sander et al., 2016). More years of volunteership would also theoretically correspond with more years of exposure to CCFRP communications, including e-mails, e-newsletters, and posts on social media.

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<sup>11</sup> The ASA was part of a coalition of recreational fishing interest groups called the Partnership for Sustainable Oceans (PSO) that lobbied for more support of angling perspectives in the MLPA process. At the time, their stance was generally negative towards MPAs, especially those that limited recreational fishing opportunities for their members.

### *Demographics and Characteristics compared across opinion change categories*

CCFRP has collected data from MPAs and the related reference sites, compiling and synthesizing it over time. The program regularly shares this data with volunteers, but often our lived experiences are more salient and have more impact on our knowledge, attitudes, and perceptions. The questions regarding experience fishing in MPAs gauge the amount of experience volunteers had gotten with fisheries resources across the parameters of time and space. Of the respondents who visited sites before and after they became MPAs, the vast majority visited at least one of these same sites while volunteering as an angler with CCFRP. This group of anglers are likely to have the best frame of reference for changes in the MPAs because of their unique experience seeing them before and after MPA implementation.

### **Conclusion**

Through this research we now have a clearer view of who Central Coast CCFRP volunteers are as a group, and how participation in the program has shaped their perspectives. CCFRP volunteers share many of the same characteristics, amongst each other and the broader recreational angling community in California. They represent a heterogeneous group in terms of experience with related industry sectors and opinions of fisheries management. Overall, these volunteers have positive view of the MPAs they help to monitor, and volunteers who have been with the program longer are more likely to have changed their views to positive than to have no change in opinion of MPAs. Next steps for this research could be to interview CCFRP participating CPFV captains or crew, or other CCFRP partners, including science crew who are mostly undergraduate and graduate students. More information could also be gathered about the degree to which trust and relationships have been built as a result of this program's engagement of multiple stakeholders. Since there is no survey data on recreational angler opinions of MPAs specifically from the central coast, it would also be interesting to interview non-citizen scientists in the region to couch these findings into a region-specific context.

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## **Appendix I: Example Outreach Cover Letter for Distribution E-mails**

### **SUBJECT: You're invited to participate in a CCFRP Volunteer Angler Survey**

Dear CCFRP volunteer angler,

The California Collaborative Fisheries Research Program (CCFRP) has been running for 11 years and counting in central California. With the help of volunteers like you, the program has collected data on fish populations throughout the Central Coast region. Now we're interested in learning from the program's current and former volunteers about how volunteer perceptions of MPAs and MPA performance may have changed over time.

My name is Allison Kellum, and I'm a master's student at Scripps Institution of Oceanography at the University of California, San Diego (UCSD). I am conducting a research study investigating the degree to which volunteer angler attitudes and thoughts about fisheries management, MPAs, and MPA performance have changed over time after participation with CCFRP. I am conducting this research for my Capstone Project (similar to a thesis). In addition to collecting information that will be presented in a report and presentation for the Capstone Project, the results of this study will be presented to CCFRP, and, with my advisors, I may seek publication of the results in a scientific journal.

If you choose to participate in the study, click on the "Begin CCFRP Volunteer Angler Survey" link below. You will be shown a Letter of Consent (a copy of which is attached to this e-mail) followed by a series of questions about your experience with CCFRP, your opinions of fisheries health and management, your opinions of MPAs, and some demographic/miscellaneous questions. The entire survey should take 15 minutes to complete.

Participation in this study is completely voluntary and any answers you provide will be kept anonymous. Participation in this survey, or the answers you provide, will in no way impact your standing as a volunteer angler with CCFRP. The survey collection period ends two weeks from today, so please complete and submit the survey as soon as you are able.

### ***Begin CCFRP Volunteer Angler Survey***

Please contact me at [akellum@ucsd.edu](mailto:akellum@ucsd.edu), or leave me a voicemail at (703)300-1427 with any questions or concerns you may have regarding the study.

Thank you for all of your time and effort volunteering with CCFRP!

Sincerely,  
Allison Kellum  
Candidate, Master of Advanced Studies - Marine Biodiversity and Conservation  
Scripps Institution of Oceanography  
University of California, San Diego

## *Frequently Asked Questions*

### **Why am I receiving this e-mail?**

You have been a volunteer angler with CCFRP at some point within the last 11 years. The researcher is interested in surveying both current and former CCFRP volunteers for this study.

### **Will participation in this survey affect my standing as a volunteer angler with CCFRP?**

No, your choice to participate in this survey will have no bearing on your status as a CCFRP angler. The survey is completely anonymous, and neither the researcher nor the program coordinators will know who has responded (or not responded) to the survey, or what your personal responses were. Filling out the survey is completely voluntary and will not result in any preferential treatment.

### **Is my e-mail address or other personal information being shared?**

No! CCFRP has not given researchers at Scripps access to your e-mail or other personal information, nor is your information shared with any other outside organizations. You have given Moss Landing Marine Labs (MLML) and/or CalPoly permission to contact you via this e-mail address about CCFRP opportunities, and the programs are merely sharing this opportunity to participate in this study of CCFRP volunteers. If you no longer wish to receive emails from MLML or Cal Poly about CCFRP-related matters, please notify the MLML or CalPoly CCFRP office and they will immediately remove you from future communications.

### **What is Qualtrics?**

Qualtrics is the online survey platform being used to distribute this survey. Researchers can build surveys, distribute surveys, collect responses, and analyze responses using Qualtrics. The University of California, San Diego, provides a subscription to Qualtrics for its staff and students for survey and research purposes.

**Appendix II: Survey Questionnaire (with Letter of Consent embedded)**  
**CCFRP Volunteer Angler Survey**

*[Screening question]*

CCFRP welcomes individuals who are 16 years of age and older to become volunteer anglers. For the purposes of this survey we are only accepting responses from volunteer anglers aged 18 and up.

Are you over 18 years old?

- Yes
- No

*[IF “YES,” continue to Letter of Consent, IF “NO” display “Unfortunately we are unable to collect your response for this study. Thank you for your interest in participating and your volunteer service to CCFRP” then end survey]*

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**CCFRP Volunteer Angler Survey**

**Letter of Consent**

Allison Kellum, who is a master’s student at Scripps Institution of Oceanography at the University of California, San Diego (UCSD), is conducting a research study to find out more about volunteer experiences with the Central Coast California Collaborative Fisheries Research Program (CCFRP). She is conducting this research for her Capstone Project (similar to a thesis).

**Background:**

The marine protected areas (MPAs) in the Central Coast of California were established in 2007. After 11 years of CCFRP, the program has information about the biological changes in MPAs. The researcher and program coordinators are also interested in knowing the degree to which angler perceptions about MPAs and MPA performance have changed over time. The information collected in this survey will be used in a report and presentation for Allison Kellum’s Capstone Project at UCSD. Also, the results of this survey will be presented to CCFRP leaders, and Allison Kellum and her advisors may seek publication of the results in a scientific journal.

**Objective:**

The objective of this study is to investigate the degree to which volunteer angler attitudes and thoughts about fisheries management, MPAs, and MPA performance have changed over time after participation with CCFRP. To address this objective, survey participants will be asked about their perceptions of fisheries issues and some background questions regarding angler participation with CCFRP.

If you agree to be in this study, you will be asked to:

- 1) Open the link to the survey provided in the outreach e-mail
- 2) Provide answers to the online survey questions (via the Qualtrics online survey platform).

The survey should take approximately 15 minutes to complete. Please complete the survey in one sitting; incomplete surveys *cannot* be saved prior to submission to return to at a later date. Once you click “Submit” on the last page of the survey, your survey answers will be recorded and made available to the researcher via the Qualtrics system.

Research records will be kept confidential to the extent allowed by law. The survey will be conducted anonymously as your name, e-mail, or IP address will *not* be recorded with your responses. Respondent data will be collected and analyzed by Allison and her advisors at Scripps and will not be made available to others in its raw form. Data from this study will be reported in aggregate so that no individual respondent’s answers can be used to figure out that person’s identity. Data from this survey will also be encrypted to add further security and it will be stored for up to five years (June, 2023).

While numerous safeguards are in place, there is no way to guarantee absolute confidentiality over the internet. Participation in this research is entirely voluntary. You may refuse to participate or withdraw at any time without penalty or loss of benefits to which you are entitled. Your identity to CCFRP staff will be completely anonymous and your participation and answers in this survey will not influence your standing as a volunteer angler with CCFRP. To withdraw, simply close the internet browser tab prior to clicking “Submit” on the final page.

If you want additional information about this study or need help resolving survey-related questions, you may reach Allison Kellum at (703) 300-1427 or via e-mail at [akellum@ucsd.edu](mailto:akellum@ucsd.edu).

If you consent to participate and wish to begin the survey click the button "I consent to participate in this survey" below.

*["I consent to participate in this survey" button displayed, must be clicked to move to next page of survey]*

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## CCFRP Volunteer Angler Survey

This survey consists of a series of questions arranged in four sections:

- I. CCFRP Volunteering
- II. Fisheries Management and Health of CA Groundfish Stocks
- III. (A,B, and C) Marine Protected Areas (MPAs)
- IV. Demographics and Miscellaneous Questions

*Since CCFRP was expanded statewide in 2017, for the purpose of this survey please respond about your involvement between 2007 and 2016. Your answers will be kept anonymous.*

Please complete this survey in one sitting. Your response will only be recorded if you click “Submit” at the end of the survey. This survey should take 15 minutes to complete.

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### Section I. CCFRP Volunteering

The following questions ask about your experiences as a volunteer angler with CCFRP *between 2007 and 2016*:

- 1) What year did you start volunteering with CCFRP?  
\_\_\_\_\_
- 2) How many years did you volunteer with CCFRP?  
\_\_\_\_\_
- 3) On average, how many CCFRP trip(s) did you go on per year? (*give your best guess*)  
\_\_\_\_\_
- 4) Why did you choose to become a volunteer angler? (*select all that apply*)
  - To give back to fisheries resources
  - To participate in science
  - To fish inside marine protected areas (MPAs)
  - To spend time with friends/family
  - To enjoy a day of fishing provided by CCFRP
  - Other:\_\_\_\_\_
- 5) Do you plan to continue volunteering with CCFRP?
  - Yes
  - No

*[IF “YES,” continue QUESTION 5A.1, IF “NO,” skip to QUESTION 5A.2]*

**5A.1)** Why do you continue volunteering with CCFRP? (*select all that apply*)

- To give back to fisheries resources
- To participate in science
- To fish inside marine protected areas (MPAs)
- To spend time with friends/family
- To enjoy a day of fishing provided by CCFRP
- Other: \_\_\_\_\_

*[CONTINUE TO Question 6]*

**5A.2)** Why did you stop volunteering with CCFRP? (*select all that apply*)

- I moved away
- I no longer had the time
- The trips I could go on were already full
- Personal reasons (health, family, etc.)
- I had issues with other volunteers and/or staff
- I had issues with the science being conducted (protocol, sampling, etc.)
- I did not realize I could continue volunteering
- Other: \_\_\_\_\_ *[CONTINUE TO Question 6]*

**6)** Have you attended a CCFRP “Volunteer Appreciation and Data Workshop” event?

- Yes
- No

*[IF “YES,” continue to QUESTION 6A) IF “NO,” skip to SECTION II, QUESTION 7]*

**6A)** How many Volunteer Appreciation and Data Workshop events have you attended?

\_\_\_\_\_

**6B)** Why did you attend the Volunteer Appreciation and Data Workshop event(s)? (*select all that apply*)

- To learn if there are effects of MPA creation on fish populations
- To see data from the program
- To learn about fisheries resources
- To participate in community events
- To see friends/family
- To talk to CCFRP staff
- To enjoy food and/or raffle prizes provided by CCFRP
- To see videos/pictures of trips
- Other: \_\_\_\_\_

*[CONTINUE TO SECTION II]*

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**Section II. Fisheries Management and Health of CA Groundfish Stocks**

The following questions ask about any experience you may have had in fisheries management prior to volunteering with CCFRP, as well as your current opinions of the health and management of groundfish in California.

*For this survey, “groundfish” is defined as all species of rockfish, lingcod, cabezon, and flatfish.*

7) In your opinion, what is the current overall health of California groundfish stocks?

I believe California groundfish stocks to be...

- Very healthy
- Somewhat healthy
- Neutral
- Somewhat unhealthy
- Very unhealthy
- I don’t know

8) In your opinion, how well are California groundfish stocks managed?

I believe California groundfish stocks are...

- Very well managed
- Well managed
- Adequately managed
- Poorly managed
- Very poorly managed
- I don’t believe they are managed at all
- I don’t know

9) In your opinion, are the following recreational fisheries management strategies effective, or ineffective, for ensuring healthy groundfish stocks?

<b>Management strategy</b>	<b>Effective</b>	<b>Not Effective</b>	<b>Not sure</b>
Minimum size limits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Season closures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spatial closures (e.g. rockfish conservation areas, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depth restrictions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Catch (bag) limits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**10)** Have you ever worked in marine resource management at the local, state, or federal level? (for example, at CA Department of Fish and Wildlife or NOAA)

- Yes
- No

**11)** Before volunteering with CCFRP, did you have an opinion of the quality of data used in fisheries management decisions?

- Yes
- No

[IF "YES," continue to QUESTION 11A, IF "NO," skip to SECTION III, QUESTION 12]

**11A)** Has volunteering with CCFRP changed your opinion of the quality of these data?

- Yes
- No

[IF "YES," continue to QUESTION 11B, IF "NO," skip to SECTION III, QUESTION 12]

**11B)** In what way did volunteering with CCFRP change your opinion of the quality of these data?

My opinion changed to be...

- More positive
- Positive from negative
- Negative from positive
- More negative

[CONTINUE to SECTION III.]

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**Section III.A. Marine Protected Areas (MPAs)**

*The Marine Life Protection Act (MLPA) was passed in 1999, requiring “the state to redesign its previously existing system of...marine protected areas (MPAs)...to increase its coherence and effectiveness at protecting the state’s marine life, habitats, and ecosystems.”\**

*\*California Department of Fish and Wildlife. 2016. “2016 Master Plan for Marine Protected Areas- Appendix E.”*

The following questions ask about your experiences with marine protected areas (MPAs) in California.

**12)** Did you participate in the Marine Life Protection Act (MLPA) planning process at any time between 1999 and 2012? *(for example, by attending a meeting, being part of the Regional Stakeholder Group, submitting a public comment, etc.)*

- Yes
- No

**13)** Did you ever fish in areas that are now MPAs?

- Yes
- No
- I don’t know

*[IF “YES,” continue to QUESTION 13A, IF “NO,” skip to QUESTION 14]*

**13A)** In which areas that are now Central Coast MPAs did you previously fish?

- Año Nuevo State Marine Reserve
  - Point Lobos State Marine Reserve
  - Piedras Blancas State Marine Reserve
  - Point Buchon State Marine Reserve
  - Other(s): \_\_\_\_\_
  - I don’t know
- 
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### Section III.B. Marine Protected Areas (MPAs) continued

The following questions ask about your opinions of marine protected areas (MPAs) in California *BEFORE* volunteering with CCFRP.

*For this survey, “groundfish” is defined as all species of rockfish, lingcod, cabezon, and flatfish.*

**14)** Before volunteering with CCFRP, what was your general opinion of the creation of MPAs in California?

My general opinion of MPA creation was...

- Positive
- Somewhat positive
- Somewhat negative
- Negative
- No opinion

**15)** Before volunteering with CCFRP, did you believe the creation of MPAs would affect the abundance of groundfish inside MPAs?

- Yes
- No
- I don’t know

*[IF “YES,” continue to QUESTION 15A, IF “NO,” skip to QUESTION 16]*

**15A)** What effect did you believe MPA creation would have on groundfish abundance?

I believed there would be a...

- Large increase
- Small increase
- Small decrease
- Large decrease

**16)** Before volunteering with CCFRP, did you believe the creation of MPAs would affect the size of groundfish caught inside MPAs?

- Yes
- No
- I don’t know

*[IF “YES,” continue to QUESTION 16A, IF “NO,” skip to SECTION IIIC, QUESTION 17]*

**16A)** What effect did you believe MPA creation would have on groundfish size?

I believed there would be a...

- Large increase
- Small increase
- Small decrease
- Large decrease

### Section III.C. Marine Protected Areas (MPAs) continued

The following questions ask about your opinions of marine protected areas (MPAs) in California *AFTER* volunteering with CCFRP.

*For this survey, “groundfish” is defined as all species of rockfish, lingcod, cabezon, and flatfish.*

**17)** Which type(s) of sampling sites did you visit with CCFRP trips? (“Reference” sites are CCFRP sampling sites with habitats similar to corresponding MPA sampling sites.)

- MPA
- Reference
- Both
- I don’t know

*[IF “MPA, or Both” continue to QUESTION 17A, IF “Reference” or “I don’t know” skip to QUESTION 18]*

**17A)** Which Central Coast MPA site(s) did you visit with CCFRP between 2007 and 2016? (*select all that apply*)

- Año Nuevo State Marine Reserve
- Point Lobos State Marine Reserve
- Piedras Blancas State Marine Reserve
- Point Buchon State Marine Reserve
- I don’t know

**18)** After volunteering with CCFRP, what is your general opinion of the creation of MPAs in California?

My general opinion of MPA creation is...

- Positive
- Somewhat positive
- Somewhat negative
- Negative
- No opinion

**19)** After volunteering with CCFRP, do you believe the creation of MPAs affects the abundance of groundfish inside MPAs?

- Yes
- No
- I don’t know

*[IF “YES,” continue to QUESTION 19A, IF “NO,” skip to QUESTION 20]*

**19A)** What effect do you believe MPA creation has on groundfish abundance?

I believe there is a...

- Large increase
- Small increase
- Small decrease
- Large decrease

**20)** After volunteering with CCFRP, do you believe the creation of MPAs affects the size of groundfish caught inside MPAs?

- Yes
- No
- I don't know

*[IF "YES," continue to QUESTION 20A, IF "NO," skip to QUESTION 21]*

**20A)** What effect do you believe MPA creation has on groundfish size?

I believe there is a...

- Large increase
- Small increase
- Small decrease
- Large decrease

**21)** If you believe that California MPA creation has affected groundfish abundance and/or size, were these effects faster or slower than you anticipated?

- Faster
- Slower
- As expected
- I don't know
- N/A, I do not believe there is an effect

**22)** If you believe that California MPA creation affected groundfish abundance and/or size, what aspect(s) of MPAs do you believe caused these effect(s)? *(select all that apply)*

- Location of MPAs
- Size of MPAs
- Enforcement of MPA restrictions
- Planning of MPAs as a network
- MPA protection of a portion of fish populations
- Voluntary compliance with restrictions
- Other: \_\_\_\_\_
- N/A, I do not believe there is an effect

*[CONTINUE to SECTION IV.]*

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#### Section IV. Demographics and Miscellaneous Questions

The following demographic questions ask for some general information about you.

23) What is your age?

- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55-64 years old
- 65-74 years old
- 75 years or older

24) What is your gender?

- Female
- Male
- Other
- I prefer not to say

25) At what age did you start salt-water angling?

\_\_\_\_\_

26) On average how many recreational angling trips do you go on per year? (*do not include CCFRP trips*)

\_\_\_\_\_

27) In general, would you say that you are more conservation minded or less conservation minded than others in the recreational angling community?

Compared to the rest of the recreational angling community, I am...

- More conservation minded
- Similarly conservation minded
- Less conservation minded
- I don't know

28) Have you ever worked in the *recreational* fishing industry? (*for example, as a captain, boat crew, bait or tackle salesperson, etc.*)

- Yes
- No

29) Have you ever worked in the *commercial* fishing industry? (*for example, as a fisherman, captain, boat crew, buyer, etc.*)

- Yes
- No

***You have reached the end of the survey!***  
***If you are finished, click "Submit" to record your answers.***

*[If done, click “Submit” to submit survey]*

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***Your response has been submitted and your answers recorded.  
Thank you for taking the time to fill out this survey and for all of your help as a volunteer with  
CCFRP!***

*[End of Survey]*