

Marine Protected Area knowledge across three interest groups in Monterey County CA, and suggestions for future education and outreach efforts

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Abstract

Monterey Bay is known for its abundant diversity of marine life, which is important ecologically and economically to the region. The Monterey Bay area is protected federally as a National Marine Sanctuary, in addition to state protection through the Marine Life Protection Act, which designated a network of marine protected areas (MPAs) with varying restrictions that were implemented in the Central Coast area in 2007. Because the Monterey Bay area houses different types of MPAs, and the state MPAs are a more recent addition, the goal of this study was to assess what people in the Monterey area know about MPAs in order to establish baseline information as well as to see how education and outreach efforts may be improved. We surveyed three groups of people within the Monterey area: sustainable seafood consumers that subscribe to Real Good Fish, a community supported fishery, SCUBA divers, and students from California State University, Monterey Bay. In addition to demographic data, we collected data pertaining to participants' knowledge of MPAs as well as group-specific questions pertaining to MPAs. 717 participants responded to the surveys. In general, survey participants reported feeling connected to the ocean and agreed that the ocean needs to be protected. Divers were more knowledgeable about MPAs than the other groups. For all groups, knowledge about MPAs was primarily received from either school or media. Within Real Good Fish subscribers, older participants reported having more knowledge than younger participants, suggesting that targeting younger audiences can potentially improve MPA awareness. CSUMB students that were science majors reported much higher levels of MPA knowledge than non-science majors, therefore MPA information should be incorporated in general education classes in order to increase MPA literacy. While it is encouraging that participants recognize the ocean needs to be protected, this study demonstrates that MPA outreach and education activities are still required to bolster MPA effectiveness and ocean stewardship in the Monterey area.

Introduction

Many management tools have been developed to ameliorate human impacts on marine environments. One of the more widely used tools are marine protected areas (MPAs): specific areas of the ocean that place limits on human interactions, similar to protected national parks on land (Edgar et al. 2007, Lester et al. 2009, Hoagland et al. 2010, Fox et al. 2013). MPAs have a wide variety of goals, which may include preservation of unique habitats or areas that have high species diversity, or socio-economic objectives, such as mitigating negative impacts of fisheries, preserving fish stocks, improving opportunities for recreation and education in the marine environment, or protecting cultural sites (Hilborn et al. 2004, Klein et al. 2008, Claudet 2012). Most studies of MPAs have reported an overall positive effect from MPAs via increases in species richness, size, biomass, and density, and these increases tend to be highest when MPAs

are no-take marine reserves that exclude all extractive activities in an area (Lester et al. 2009, Edgar et al. 2014).

Not all MPAs afford the same amount of protection, and MPAs come in many different types, which cover a multitude of environments and vary in sizes and goals. Within the United States, the federal government protects some areas as National Marine Sanctuaries. In total there are 13 National Marine Sanctuaries and they protect the environment by prohibiting offshore drilling, dumping, and seabed mining (NOAA 2015). One of the 13 national marine sanctuaries is the Monterey Bay National Marine Sanctuary (MBNMS), which was established in 1992. The MBNMS is one of the largest marine sanctuaries in the United States, extending from San Francisco Bay south to Cambria, California (NOAA 2015). While these Sanctuaries provide important protections to some marine habitats, some extractive activities, such as fishing, are still allowed within Sanctuary waters.

In 1999 California legislation passed the Marine Life Protection Act (MLPA), which mandated that the state design a network of MPAs along the coast of California to reduce anthropogenic disturbances to California marine habitats and safeguard California's marine resources (Gleason et al. 2010, Saarman et al. 2013). The state MPAs in the Central Coast region, including those in the Monterey Bay area within the MBNMS, were implemented in 2007. There are various types of state MPAs within California including State Marine Reserves (SMR), State Marine Conservation Areas (SMCA), State Marine Recreational Management Areas (SMRMA), and State Marine Parks (SMP). Each type has a different level of regulation. SMRs are no-take areas where some recreational activities are restricted. SMCAs have specific limitations of resources for commercial purposes. SMRMAs limit the unlawful removal of resources but make compromises with regard to recreational activity. SMPs prohibit the removal of marine resources, however public use and education is encouraged. These various MPAs may experience special, seasonal closures that limit access and activity for a given time period (CDFW 2014). The Monterey Bay area state MPAs include both no-take SMRs and SMCAs. The different types of MPAs and their regulations may be a source of confusion for local ocean users.

The goal of this study was to assess people's awareness and knowledge of MPAs within Monterey County, CA given the recent implementation of the MLPA MPAs. We were particularly interested in knowing how well information has been made available to the general public since the creation of the state MPAs. We focused on three diverse groups of people in the Monterey Bay area: sustainable seafood consumers that subscribe to the community supported fishery Real Good Fish, SCUBA divers, and California State University, Monterey Bay (CSUMB) students.

We wanted to evaluate these groups' local MPA knowledge because they all directly or indirectly interact with the Monterey Bay. Real Good Fish (RGF) is a company that provides locally caught sustainable seafood to their subscribers. By surveying RGF subscribers we can learn if consumers of locally caught sustainable seafood have an increased level of knowledge of MPAs in the Monterey Bay area. SCUBA diving has become a very popular marine activity over the years (Davis and Tisdell 1995). With an increase in human presence in the ocean, there is also a potential increase in degradation of the environment. Possible damage to the marine environment can occur from kicking, trampling and kneeling on the sediment, which can cause damage to the habitat and add stress to organisms (Davis and Tisdell 1995). It is important that with the increase of divers that they are aware of the regulations in place in protected areas. On the other hand, SCUBA divers can help promote conservation efforts as they have invested a lot

of time and money into the ocean and are often seen as stewards of the marine environment (de Groot and Bush 2010). Divers were chosen as a study group due to their direct contact with the ocean through recreational diving, scientific diving, spearfishing and snorkeling. By surveying divers we can see how their knowledge of MPAs correlates with the type of diving activities they participate in and whether or not they learned about MPAs in their certification classes. Lastly, we chose CSUMB students as a study group to assess knowledge of MPAs across a wide range of majors and backgrounds. Undergraduate students are an important group to consider because they have the potential to play a large role in the future of marine ecosystems and conservation. By assessing the extent of information available to CSUMB students about MPAs we can improve the way information is distributed, especially at a coastal campus adjacent to MPAs.

We created three similar but specialized surveys to determine what knowledge these three groups have about MPAs and their interactions with the ocean. By using demographic questions, such as age, MPA specific questions, such as level of knowledge of MPAs, as well as specific questions for each group we hoped to gain insight to how different groups learned about MPAs, and how information transfer may be increased. We hypothesized that individuals with a strong connection to the ocean would have a higher amount of MPA knowledge than those with less of a connection to the ocean, and that these individuals would be open to learning more information about MPAs.

Methods

We created three surveys using Google Forms. Each survey was composed of two parts (see full survey in Appendix A). Part one contained questions regarding background information and demographics, such as age and gender. Part two contained questions about MPAs such as ranking knowledge of MPAs from 1 (no knowledge) to 5 (know local locations and regulations) and some questions specific to the selected groups. Surveys were distributed in a variety of ways for each group, described below, and were kept open for different lengths of time due to logistical constraints.

Real Good Fish Subscribers

We created a survey with input from Alan Lovewell, the founder and CEO of RGF. Surveys were distributed through email to the subscribers of RGF and were open from November 18th to November 30th.

SCUBA divers

We had multiple methods for distributing the SCUBA diver survey. We selected three well-known and popular dive locations: Lover's Point, Monastery Beach, and Breakwater. We visited each location multiple times a week, including both weekdays and weekends and approached SCUBA divers to recruit them as participants. Surveys were either completed onsite, by filling in answers themselves on paper or a mobile device or verbally answering the questions, or they were given a link to the survey to participate at a later time. To increase participant numbers, we also sent out the survey to divers via social media (Facebook) and email, targeting known divers and requesting it be distributed amongst others. Current CSUMB students who were also divers were asked to only take the CSUMB student survey (see below). The SCUBA diver survey was open for five weeks from October 16th to November 17th.

CSUMB Students

Online links to the survey were sent to department chairs of all departments on the CSUMB campus with a request to distribute the survey to students in all available majors at CSUMB, with the goal of achieving responses across different majors. To increase distribution students were approached and given links to the survey during the Campus Sustainability Event hosted by Associated Students on October 21, 2015, in addition to outreach on social media using Facebook pages for the CSUMB Class of 2016, CSUMB Class of 2017, and personal Facebook accounts. The survey was also shared with students in individual classes as well as student-run clubs and/or organizations, such as the CSUMB Math and Psychology clubs. Surveys of CSUMB students were open for six weeks from October 7th to November 24th.

Data Analysis

All statistical analyses were performed using JMP (JMP[®], Version 11) and R (R Core Team, 2016).

Results

717 total people responded to the surveys across the three groups in this study. RGF subscribers had 226 respondents, SCUBA divers had 72 respondents, and the survey of CSUMB students had 419 respondents. Among all survey respondents the age distributions varied widely between the different groups. RGF subscribers were more evenly distributed in age, with a trend to 53 years and older. The median age of surveyed divers was 28 - 32 years with a maximum age of 69 years. The median age of surveyed CSUMB students was in the range of 18 - 22 years. (Figure 1). The survey of divers mostly captured scientific divers (56%), followed by recreational divers (44%). The majority of divers stated they dove quite frequently, with 40% diving monthly and 37% diving weekly. Among CSUMB student participants, respondents were skewed toward science students with 69% science majors and 31% non-science majors making up the participants.

A high percentage (68%) of all survey respondents claimed to have a strong connection to the ocean (4-5) on a scale of 1 (not at all connected) to 5 (extremely connected). Divers had the highest proportion of respondents ranking themselves as 5, extremely connected (Figure 2). There was no difference between connection to the ocean for CSUMB students and RGF subscribers (Figure 2). In addition to feeling connected to the ocean, 99% of all people surveyed believe that the ocean needs to be protected (Figure 3).

We found a difference between the percentage of people who knew where to find information on MPAs among the three groups ($n=717$, $df=2$, $\chi^2=29.9$, $\alpha=0.05$, $p<0.0001$). 47% of RGF subscribers and 52% of CSUMB students did not know where to find information about MPAs, while 82% of the surveyed divers indicated that they did know where to find information on MPAs (Figure 4).

There was a significant difference between groups in where the respondents first learned about MPAs (Chi-Square test for homogeneity, $n=717$, $df=10$, $\chi^2=190.79$, $\alpha=0.05$, $p<0.0001$; Figure 5). The divers and CSUMB students have a much higher proportion of responses that indicated they gained their knowledge from school (49%), compared to the RGF subscribers' responses (10%). RGF subscribers had a much higher proportion of responses (34%) that stated they gained their knowledge of MPAs from the media compared to divers or CSUMB students (6%). RGF subscribers and CSUMB students had a much higher proportion of responses (30%) of people that indicate they had no knowledge of MPAs compared to divers (5%).

Across the three surveyed groups there was a significant difference in the level of knowledge of MPAs participants claimed (Chi-Square test for homogeneity $n=717$, $df=8$, $\chi^2=72.54$, $\alpha=0.05$, $p<0.0001$; Figure 6). Overall, divers had the greatest knowledge of MPAs of all groups. 64% of divers rated themselves to have a knowledge level of 4 to 5, while only 17% of RGF subscribers and 33% of CSUMB students rated themselves in those categories. RGF subscribers had the greatest percentage of people reporting to have no knowledge of MPAs. There was also a significant but weak positive correlation between connection to the ocean and knowledge of MPAs across all respondents (Spearman's Correlation analysis $r_s(715)=0.47$, $p<0.0001$).

Amongst CSUMB students there was a significant difference in knowledge based on their type of major (science versus non-science, $n=419$, $df=4$, $\chi^2=43.34$, $\alpha=0.05$, $p<0.0001$; Figure 7). 72% of science majors ranked themselves to have a high level of knowledge (4-5) of MPAs, while 28% of science majors have little to no knowledge (1-3).

Within SCUBA diver participants scientific divers had higher levels of MPA knowledge than recreational divers ($n=72$, $df=4$, $\chi^2=2.526$, $\alpha=0.05$, $p<0.0001$; Figure 8). There was a significant effect of dive frequency on SCUBA diver knowledge of MPAs (Jonckheere-Terpstra test, $JT=1109$, $\alpha=0.05$, $p\text{-value}=0.0007396$). Divers who dove weekly had a much higher level of knowledge of local MPAs on average than divers who only dove yearly (post hoc Wilcoxon Ranked Sum test, $n=71$, $W=523$, $\alpha=0.0167$, $p\text{-value}=0.003558$).

Because RGF subscribers were supporters of sustainable fisheries we asked them additional questions related to trade-offs between fisheries management and marine protected areas. The majority of respondents (69%) believed that MPAs are still necessary even if fisheries are managed sustainably. 29 of respondents claimed that they did not know whether MPAs would still be necessary, 1% reported that they would probably agree that MPAs are necessary, and 1% of respondents did not agree that MPAs would still be necessary if fisheries are managed sustainably (Figure 10A). When asked if aerial coverage of local MPAs should be extended or decreased, the majority (53%) of RGF subscribers did not know whether aerial coverage should be extended or decreased (Figure 10B). However, a large percentage (43%) did think that aerial coverage should be extended, and none of the respondents thought that aerial coverage should be decreased. Finally, the majority of RGF respondents reported that they wanted to receive more information about MPAs in general (59%; Figure 10C).

Discussion

The goal of this study was to assess the knowledge of MPAs possessed by three groups in Monterey County, CA: RGF subscribers, SCUBA divers, and CSUMB students. With these responses we not only evaluated the level of knowledge in the groups, but also strived to determine the most effective ways to provide relevant MPA information to these groups.

Although all three study groups reported a connection to the ocean and felt it needs to be protected, there was a highly variable range of knowledge of MPAs reported within each group. We predicted that we would see a positive relationship between connection to the ocean and knowledge of MPAs, however, we only found a very weak association between the two variables. This shows that connection to the ocean is not an indicator of knowledge. However, the high overall connection to the ocean shared by respondents might indicate that participants within these groups would be receptive to MPA outreach and education efforts.

Out of the three respondent groups, divers had the highest knowledge level of MPAs. Divers may have this higher knowledge because they directly interact with the ocean more often

than the other two groups and are more likely to come into direct contact with the local MPAs and their regulations. Knowledge of MPAs increased among divers as dive frequency increased. This supports the idea that generally more interaction with the ocean means a higher knowledge level of MPAs. Within the diver group, a majority of responders were scientific divers (57%) and they had a higher knowledge level of MPAs than the recreational divers. The reports of higher knowledge by scientific divers can possibly be attributed to the advanced training required to receive and maintain the scientific diver title. Research diving often includes some kind of collection, which students or researchers would need to acquire permits for because many dive locations in the Monterey Bay are within no-take MPAs. About half of the diver group received their knowledge of MPAs from school, the other 45% of divers learned about MPAs from media, work, or family. This large portion of knowledge from school may be due to scientific divers typically being science majors in college. These findings suggest a lack of information is provided to recreational divers about MPAs, particularly those that dive infrequently. One way to increase knowledge among recreational divers may be to provide MPA information to dive shops, so they can be distributed to customers (see Appendix B for additional information about the transfer of MPA information from dive shops in the Monterey area).

Students in science majors reported the highest level of knowledge, while the non-science majors responded with significantly lower knowledge of MPAs. We were able to determine that students are exposed to more MPA information in class versus any other knowledge source including media or work. Considering that students receive the most information from their classes, and that science students report the highest knowledge of MPAs, we infer that most of the information on MPAs is coming from classes specific to science students. These findings suggest that there could be a lack of opportunity for non-science students to learn about MPAs through their university classes. If MPA information is incorporated into general education science classes required of all majors, more students will be exposed to information on MPAs.

The RGF subscriber group had a defining characteristic with the most uniform distribution of ages, ranging from 18 to 70+. Out of the three study groups, this group reported the overall lowest level of knowledge of MPA's. Even though they had the least amount of knowledge of MPAs, the majority of respondents believe that MPAs are necessary even if fisheries are managed sustainably. A large proportion of this group also believes that aerial coverage of MPAs should be extended, and none of them stated that aerial coverage should be decreased. These respondents may feel that multiple methods of ocean protection are better than one. Since RGF subscribers overall reported the lowest knowledge of MPA's, this suggests there is room for improvement in information distribution reaching all age groups and people without current links to formal education. Another unique characteristic of this group was that due to their subscription to RGF services, they receive periodic informational newsletters, which provides an opportunity for dissemination of outreach materials. Unlike divers and CSUMB students, RGF subscribers reported that the largest source of knowledge on MPAs was media sources, and the majority of this group responded that they do want additional information on MPAs. Incorporating MPA information into these newsletters is a solution that takes advantage of the respondents' affinity to media sources, as well as ensuring all subscribers at least have the opportunity to educate themselves on MPAs. A solution to target the younger respondent group would be similar to the solution for CSUMB students. Considering that this age range is reflective of college age students, incorporation of MPA knowledge into entry-level college courses, across several universities would increase the opportunity for students to be exposed to this information.

We encountered some limitations and constraints during this study, including small sample sizes, limited survey time due to logistical complications, and only focusing on three distinct groups. The CSUMB student survey was open for six weeks, the diver survey was open for five weeks, and the Real Good Fish survey was open for two weeks. Allowing the survey to be open for a longer period of time would yield a higher number of responses. Although the three focus groups provided interesting results, it would be beneficial to survey the general public and fishermen. These two groups of people would give more insight into two extremes, those who are interacting with the ocean every day and those who are not at all. These limitations should be taken into account when creating future studies.

Future studies are needed for a more complete analysis in determining where efforts for MPA awareness would be most useful. To increase the effectiveness of MPAs and their functions it is crucial to assess the public's knowledge of these areas, especially in locations that have a network of MPAs with varying regulations like Monterey Bay. Future studies can also be conducted to determine which method would be most successful in distributing MPA information to the public.

Acknowledgements

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Figures

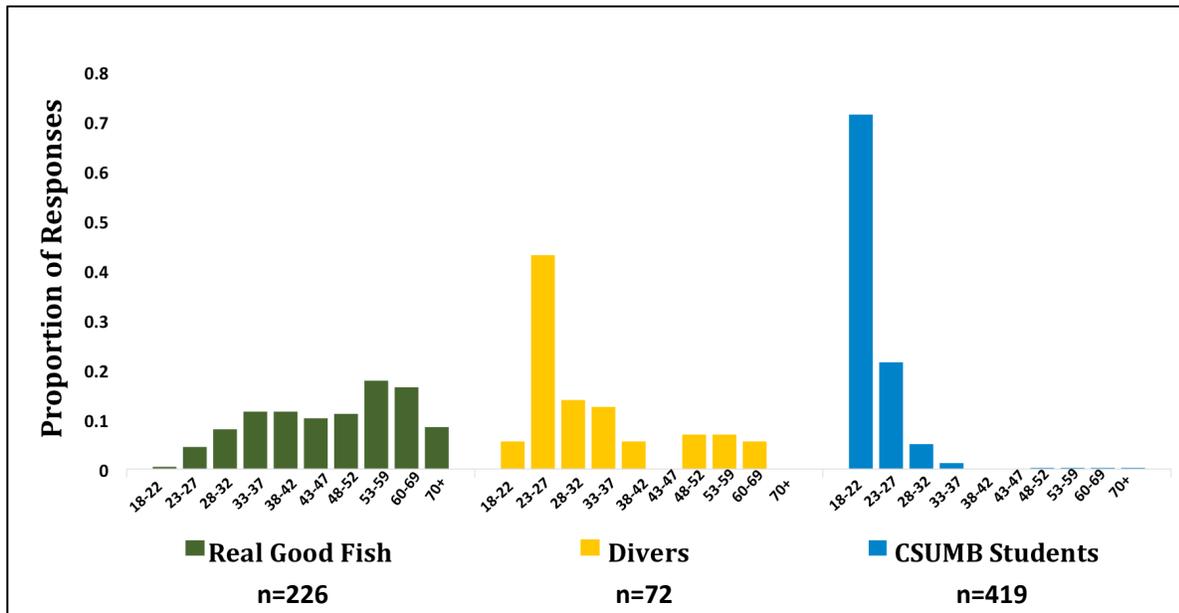


Figure 1. Age distribution of the three surveyed groups (Real Good Fish n=226, divers n=72, and CSUMB students n=419) binned into 5-year age brackets.

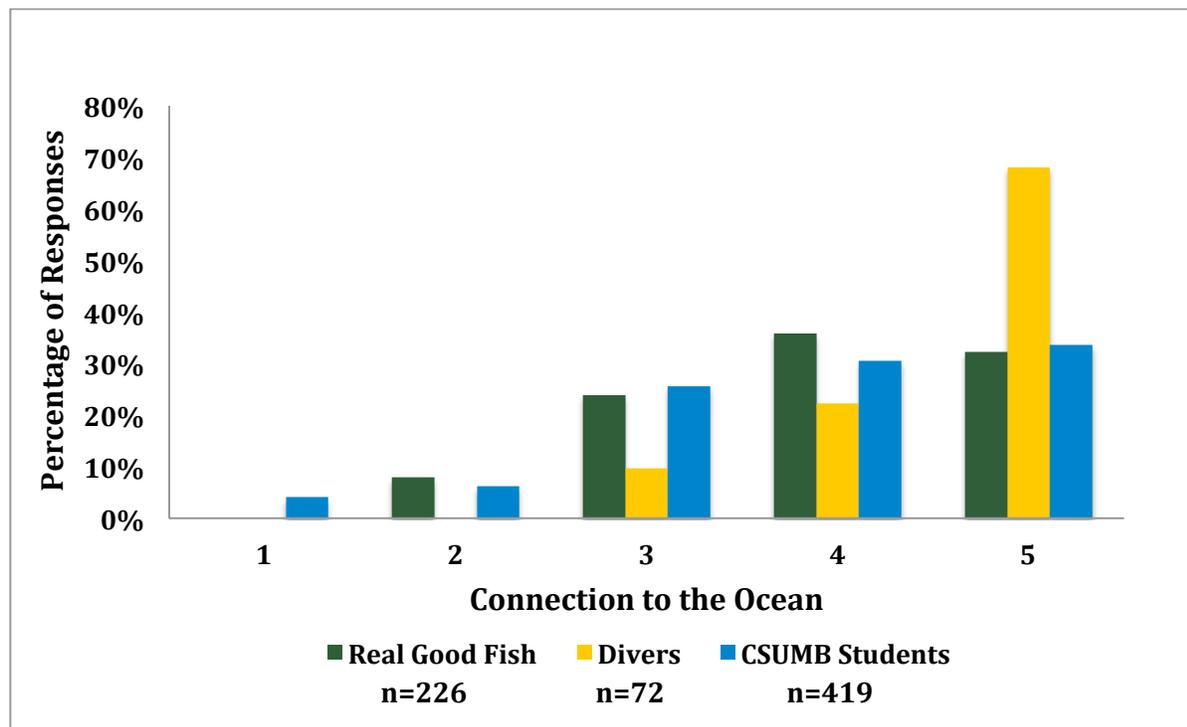


Figure 2: Self-ranked connection to the ocean on a scale of 1-Not at all connected to 5-Extremely connected for the three surveyed groups.

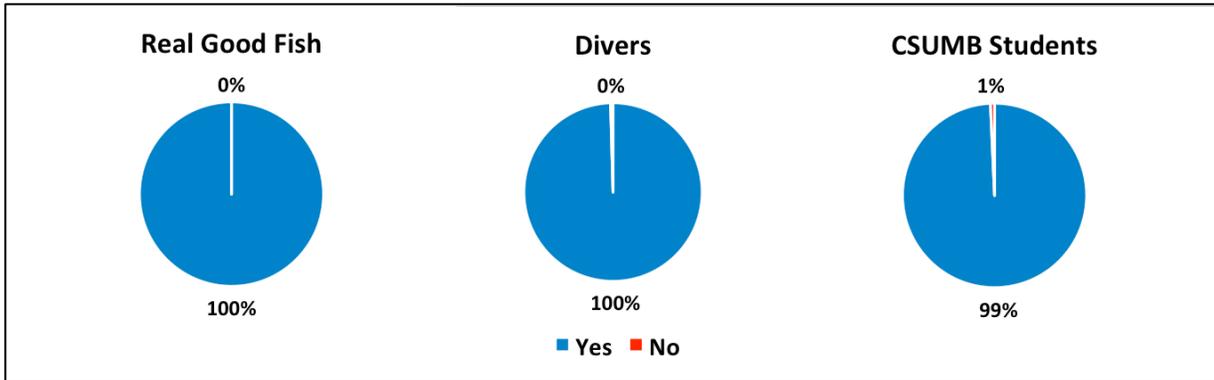


Figure 3: Percentage of respondents that think the ocean needs to be protected from the three surveyed groups.

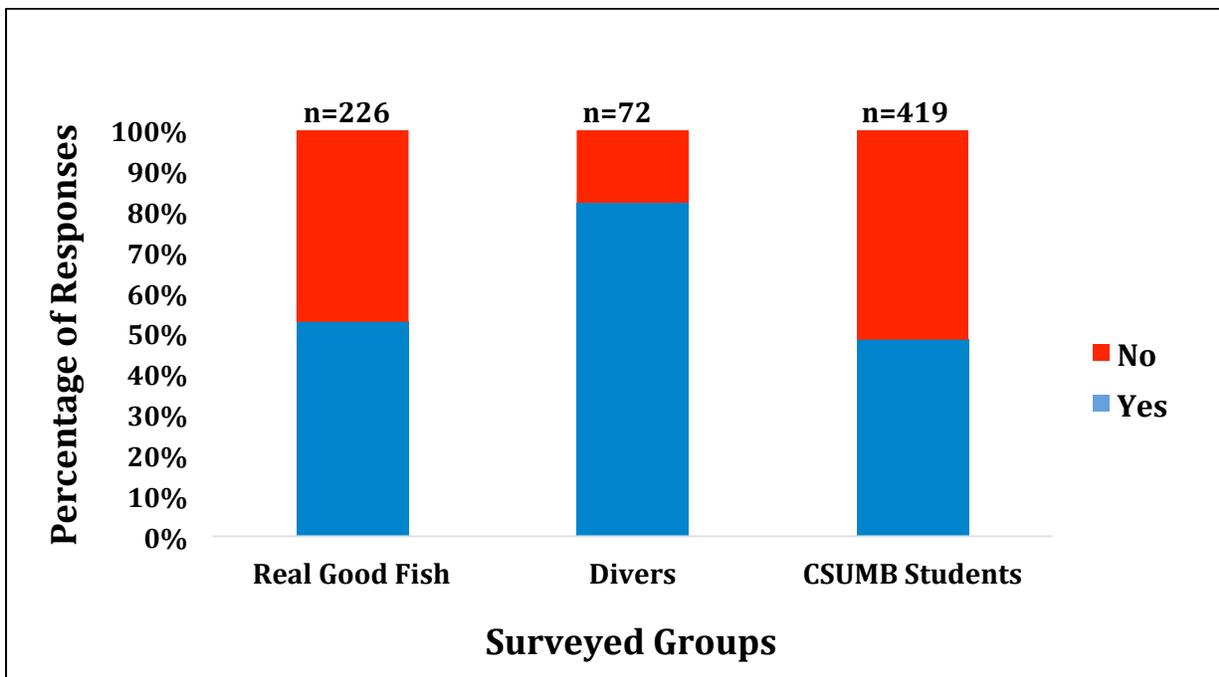


Figure 4: Percentage of survey respondents that know where to find information on MPAs for the three groups.

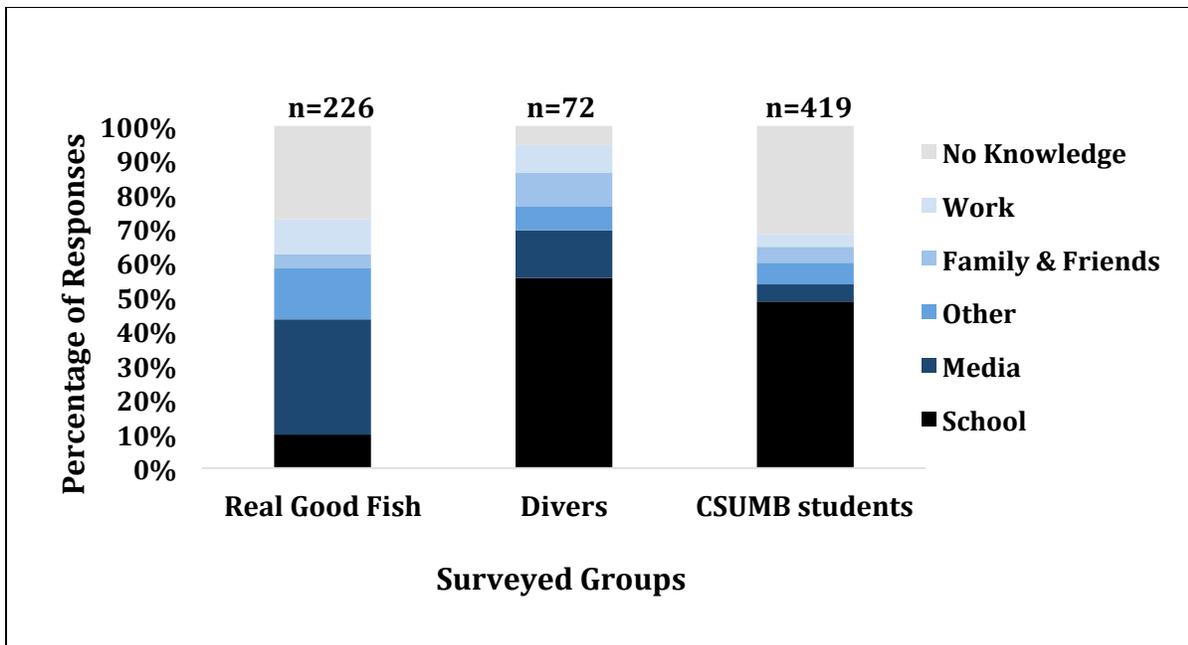


Figure 5: The percentage breakdown of sources where respondents first learned about MPAs separated by group.

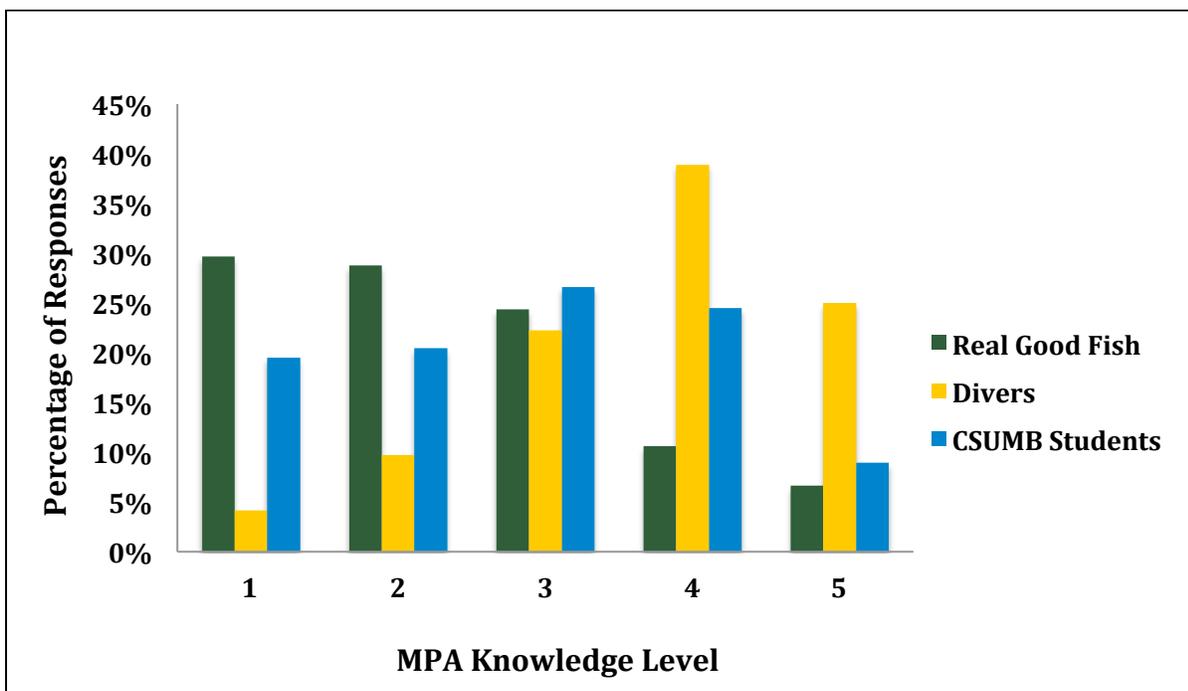


Figure 6: Self-ranked knowledge level of MPAs across the three surveyed groups, where 1 is “No knowledge” and 5 is “Know local locations and regulations”.

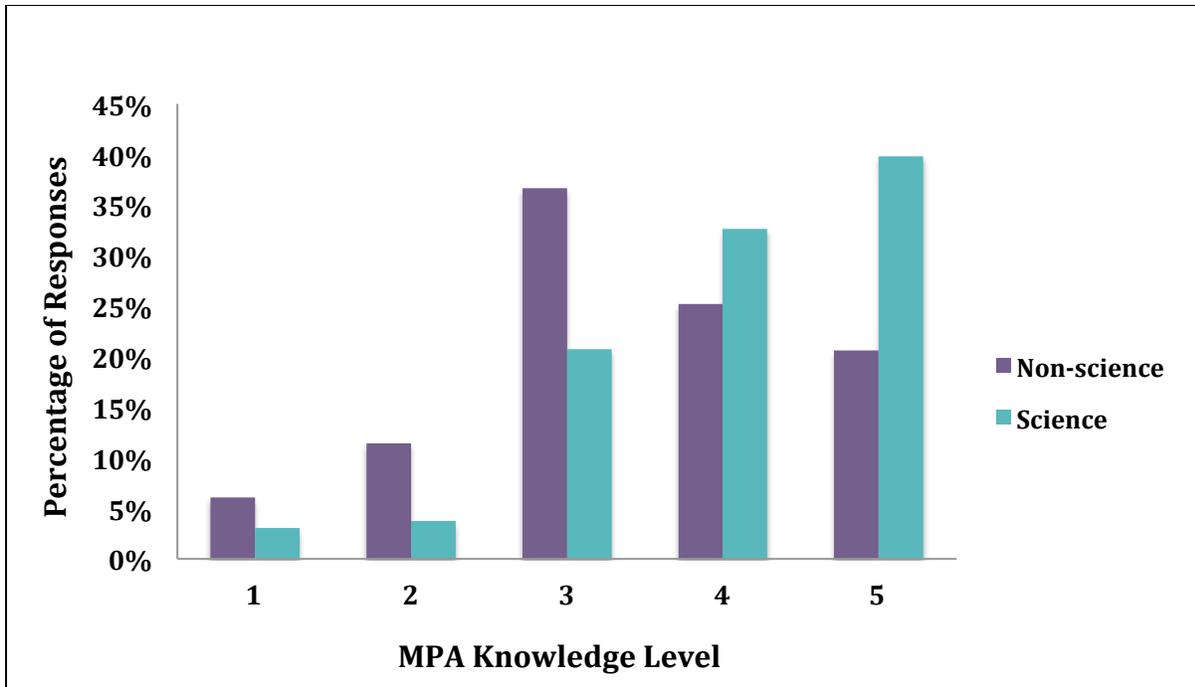


Figure 7: Knowledge level of MPAs between science majors and non-science majors at CSUMB, where 1 is “No knowledge” and 5 is “Know local locations and regulations”.

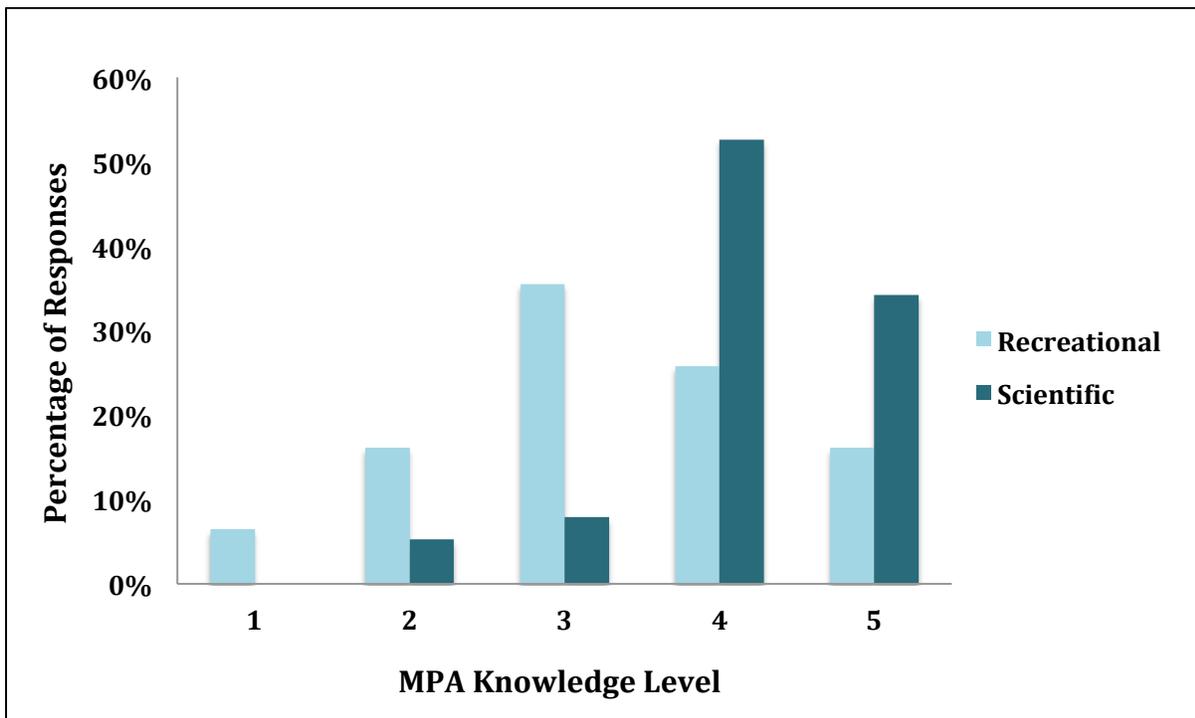


Figure 8: Knowledge level of MPAs based on dive certification level reported from the diver survey, where 1 is “No knowledge” and 5 is “Know local locations and regulations”. Recreational divers included free divers, spear fishermen, recreational SCUBA divers, and snorkelers.

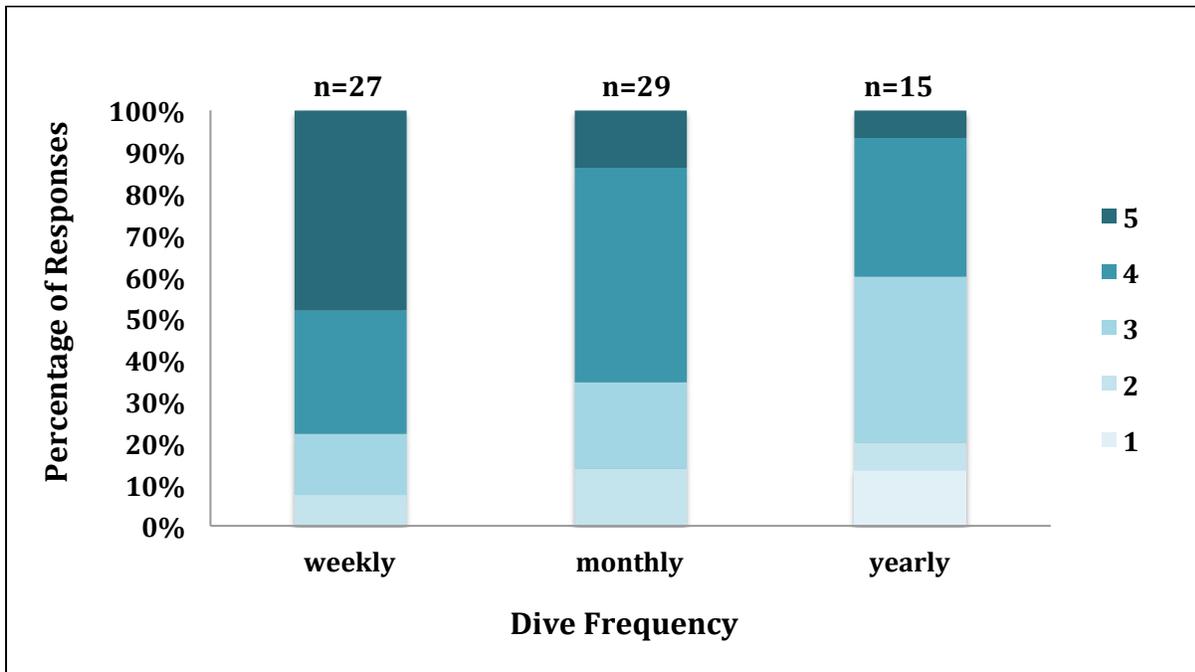


Figure 9: MPA knowledge for divers based on their dive frequency, where 1 is “No knowledge” and 5 is “Know local locations and regulations”.

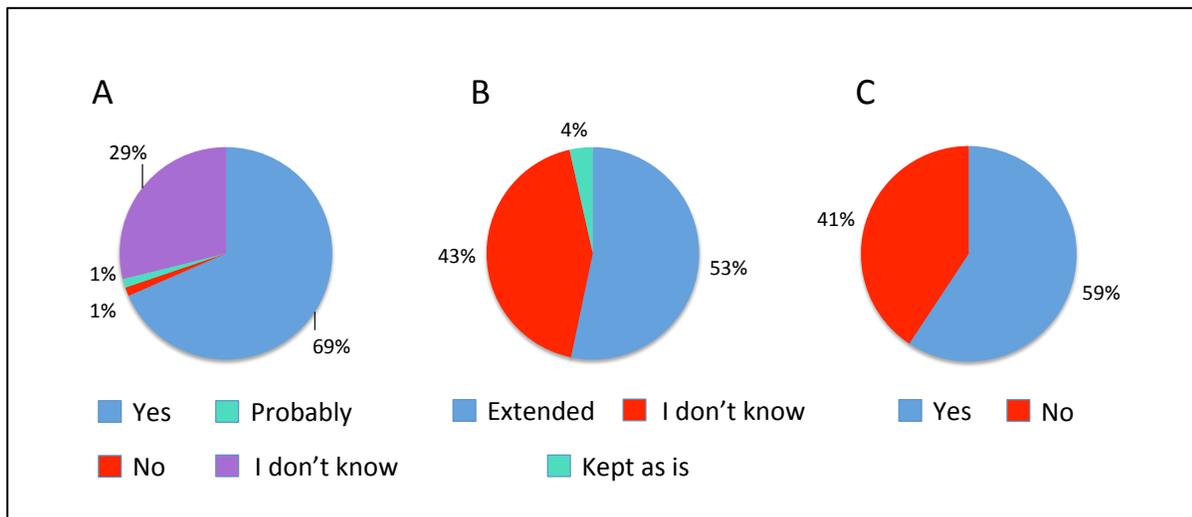


Figure 10: (A) Percentage of Real Good Fish subscribers that think MPAs are still necessary when fisheries are managed sustainably (n = 226). (B) The percentage of Real Good Fish subscribers that think aerial coverage should be extended, decreased, or kept as is (zero people responded that areal coverage should be decreased) (n = 226). (C) Percentage of Real Good Fish subscribers that would like to receive additional information or maps of local MPAs (n = 226).

Appendix A: Surveys

General survey

The general survey questions were included in the Real Good Fish, SCUBA diver, and CSUMB student surveys.

What is your age?

Gender

- Female
- Male
- Prefer not to respond
- Other:

What is your ethnicity?

- African American/Black
- Alaskan Native or American Indian
- Asian
- Caucasian/White
- Hispanic/Latino/Chicano
- Pacific Islander or Native Hawaiian
- Biracial/Multiracial
- Prefer not to respond
- Other:

Education level attained or currently enrolled in

- High school/GED
- Community college (2 years)
- University (4+ years)
- Graduate school
- None
- Prefer not to respond

Occupation Status, Check all that apply

- Work full time
- Work part time
- Student full time
- Student part time
- Retired
- Temporarily unemployed
- Prefer not to respond

Current zip code

How close do you live to the ocean?

- Less than 10 miles
- 10-50 miles

- More than 50 miles
- Prefer not to respond

On a scale of 1-5, how connected do you feel to the ocean?

	1	2	3	4	5	
Not at all						Extremely connected

How frequently do you visit the ocean?

- Daily
- Weekly
- Monthly
- Yearly
- Rarely/never
- Prefer not to respond

What of the following do you take from the ocean? Check all that apply

- Fish, shellfish, etc.
- Beach-combing: (shells, algae, rocks, sea glass)
- Only pictures
- Trash/Debris
- Nothing
- Prefer not to respond

Do you think the ocean needs to be protected?

- Yes
- No
- Prefer not to respond

What is your knowledge of Marine Protected Areas (MPAs) on a scale of 1 to 5?

	1	2	3	4	5	
No knowledge						Know local locations and regulations

Do you know the difference between State and Federal MPAs?

- Yes
- No
- Prefer not to respond

Do you know where to find information about MPAs?

- Yes
- No
- Prefer not to respond

What are the goals of MPAs? Check all that apply

- Protect wildlife/biodiversity
- Protect habitats
- Allow fish populations to thrive
- Prevent overfishing
- Cultural and heritage protection
- I don't know
- Prefer not to respond

What do you think are the three most important aspects of MPAs? Select your top 3 choices

- I don't believe MPAs are important
- Prevents the loss of biodiversity
- Prevents the loss of habitat
- Prevents local extinctions
- Protects feeding grounds
- Protects vulnerable species
- Limits overfishing
- Sustains genetic diversity
- Sustains the natural beauty of the ocean
- Prefer not to respond

How much of the ocean is protected by MPAs?

- More than 50%
- About 35%
- About 10%
- About 3%
- I don't know
- Prefer not to respond

Where did you first learn about MPAs?

- Media
- School
- Family/friends
- Work
- I have never learned about MPAs
- Prefer not to respond
- Other:

Supplemental questions in the Real Good Fish survey

Would you like to receive additional information or maps of local MPAs? *

- Yes, maps of local MPAs
- Yes, additional information of MPAs
- Yes, both
- No information

Do you know the difference between State and Federal MPAs? *

- Yes
- No
- Prefer not to respond

Do you think areal coverage of local MPAs should be: *

- Extended
- Decreased
- Kept as is
- I don't know

What do you think the benefits of California's network of state MPAs are?

- Please explain:

What do you think the trade-offs of California's network of state MPAs are?

- Please explain:

If fisheries are managed sustainably do you think MPAs are still necessary?

- Yes
- No
- I don't know
- Other:

Supplemental questions in the SCUBA diver survey

Did you learn about MPAs in your Scuba Certification class?

- Yes
- No
- Prefer not to respond

What are your diving interactions with the ocean? Check all that apply

- Recreational
- Scientific
- Freediving
- Spearfishing
- Snorkeling
- Prefer not to respond
- Other:

How often do you dive?

- Daily
- Weekly
- Monthly
- Yearly
- Every couple of years
- Prefer not to respond

Do you feel your diving activities are restricted by MPAs?

- Yes
- No
- Sometimes
- I don't know
- Prefer not to respond

Do you feel like you have easy access to MPA information?

- Yes
- No
- Sometimes
- I don't know
- Prefer not to respond

Supplemental questions in the CSUMB student survey

Degree working toward?

- Undergraduate
- Graduate

Are you an: Check all that apply

- In-State Student
- Out-of-State Student
- International Student
- Full-Time Student
- Part-Time Student

How many years have you attended CSUMB?

- 1
- 2
- 3
- 4
- 5 and above

What is your major?

Where did you first learn about MPAs?

- Media
- School
- Friends/Family
- Work
- I have never learned about MPAs
- Prefer not to respond
- Other:

Have you learned about MPAs through any CSUMB classes?

- Yes
- No

If so, which class(es)? (ex: MSCI 475, Marine Conservation Biology or None)

Results

The responses from the dive shops varied (see Table B1 for specific answers). When asked “Do you inform employees about MPAs”, Aquarius said they did, Glenn’s Aquarius II said they didn’t, Bamboo Reef said they did sometimes, and Dive to Survive Scuba said they weren’t sure. When asked if they inform customers about MPAs, all four shops said they do, but the information and frequency of that information varies. All four dive shops said they have easy access to information on MPAs. Bamboo Reef and Glenn’s Aquarius II said they would be interested in supplemental information of some kind to provide customers, however, Aquarius Dive Shop and Dive to Survive were not interested. All four dive shops think it is important to inform scuba divers of local MPAs, based on the definition of MPAs we provided. Additionally, most of the dive shops offered suggestions they thought could improve future outreach efforts.

Discussion

Surveying local dive shop owners and managers offered another point of view in understanding what the dive community knows about MPAs since their implementation 9 years ago. Owners each knew about MPAs and felt they were beneficial and while they do not make MPA awareness part of their training, they do sometimes offer some information to employees and customers. Multiple dive shop owners reported that they do not include information regarding MPAs in certification classes because their lessons are developed by larger organizations (such as PADI, NAUI, SSI, etc.) and are focused on the mechanics of SCUBA diving rather than ocean stewardship. They also felt information was easily accessible and therefore they could potentially direct the inquiring public to find more detailed information if requested.

Each dive shop offered suggestions they felt could potentially help with increasing MPA outreach efforts. The suggestions included having simple brochures/pamphlets available, posters that could easily be placed in the window or by a check-out counter, increasing signage in general and creating an easy-to-recognize MPA symbol similar to that of a dive logo. Some dive shops also said they would be supportive of this effort by having it available in their location. This information will be used by the Monterey MPA collaborative for improving the distribution of MPA information.

Table B1: Dive shop survey responses.

	Aquarius Dive Shop	Bamboo Reef	Glen's Aquarius II	Dive to Survive Scuba
Do you have easy access to MPA information?	Yes	Yes	Yes	Not sure
Do you inform employees about MPAs?	Yes	Sometimes	No	Not MPAs specifically but they know bay is protected in general, Not formally taught
Do you inform customers about MPAs?	Yes	Sometimes	Sometimes	Generally teaches about respecting marine life and that the bay is protected but not MPA's specifically. Most customers got their cert with at Dive to Survive and talk about it in the course.
Are you interested in any of the following?	None	Brochures or fact sheets for customers. Maps and regulations of local MPAs for customers.	Brochures or fact sheets that could be handed out to customers	None
Based on the definition of MPAs provided, do you think it is important to inform local divers about MPAs?	Yes	Not sure	Yes	Yes
Do you have any suggestions on how to make divers more aware of MPAs?	Visit California Department of Fish and Wildlife website for most recent maps.	Poster that could be posted near the rental checkout or in the window of the shop. Could help spark interest and prompt questions.	None	Posted signs (at beaches): similar to "Danger" sign at Monastery Beach Current signs are too wordy Stickers or logo (like scuba symbol) that people can associate with to indicate an MPA