



EVALUATING THE EFFECTIVENESS OF MARINE PROTECTED AREA (MPA) SIGNAGE IN CALIFORNIA

APRIL 2023 | PREPARED BY THE CALIFORNIA MARINE SANCTUARY FOUNDATION

This project, 'Advancing MPA Signage Needs in the State of California' was funded by the California Ocean Protection Council.



Since 1995, the California Marine Sanctuary Foundation (CMSF) has worked to protect California's coastal ecosystems while strengthening coastal resilience in the face of population growth, urban and industrial uses, climate change, and resource extraction. Working together with local communities, government agencies, tribal communities, harbors and marinas, and NGOs, we identify and then implement practical and effective solutions to lessen human impacts and increase stewardship of our state's coastal resources. CMSF serves a unique and important niche in California's conservation community by fostering strong public-private partnerships that result in greater impact than going it alone.

©California Marine Sanctuary Foundation, April 2023. All rights reserved, worldwide.

Suggested citation: Sprofera, Katelyn. California Marine Sanctuary Foundation, Evaluating the Effectiveness of Marine Protected Area (MPA) Signs, Report. 2023.

CONTENTS



06
INTRODUCTION

10
METHODS

14
FINDINGS

39
DISCUSSION

47
CONCLUSIONS

51
APPENDICES

EXECUTIVE SUMMARY

Signs are a popular communication strategy utilized to transmit messages to viewers, and a tool that can influence behavior change (Meis & Kashima 2017, Baltés & Hayward 1976, Reiter & Samuel 1980). Since the implementation of California's marine protected area (MPA) network, a variety of MPA signs have been developed to communicate MPA regulations to coastal visitors. However, because sign fabrication is a costly endeavor and audience specific content inspires more favorable responses (as demonstrated in the [MPA Outreach Evaluation Report](#)), this project sought to build an understanding of the signage elements that best communicate MPA regulations to increase signage effectiveness and cost efficiency into the future.

This study utilized mixed-methods to assess the effectiveness of five existing MPA sign types in increasing compliance with MPA regulations. Of nearly 3000 coastal visitors observed, just under 5% stopped to view signs upon arrival, suggesting that coastal visitors in general are not likely to view signs while visiting the coast. Despite this, each sign evaluated did have strengths, and when signs were read, they were, for the most part, successful in communicating the intended message. While the overall utility of each sign varied, the regulatory and the tidepool signs were most effective. Detailed results for each sign type, and recommendations to improve MPA signage in California are presented in this report.

When developing signage for California MPAs, it is imperative to consider sign goals from the start, acknowledge unique site and audience specific needs, and incorporate suggestions for design and placement. By taking into account the recommendations included in this report, MPA signage in California will become more impactful.

This is the second commissioned formal evaluation to assess the effectiveness of MPA outreach tools.

ACKNOWLEDGEMENTS

This evaluation would not have been possible without the contributions of partners throughout the state, in particular the MPA Collaborative Network staff and members, the California Ocean Protection Council and California Department of Fish & Wildlife, pilot study participants, coastal visitors that participated in the survey, and others. The insights provided by all project contributors have been crucial to the success of this project.





INTRODUCTION



PROJECT BACKGROUND



"SIGNAGE WAS THE MOST COMMONLY RECOMMENDED SOLUTION TO ADDRESS FACTORS CONTRIBUTING TO NONCOMPLIANCE"

Signs are an important device for communication, often utilized to 'transmit a message about what to do or not to do' as a means of inciting behavior change (Meis & Kashima 2017). As such, signage has become a popular communication strategy for increasing awareness of California's MPAs. Over the last decade, over 482 signs have been installed that are intended to influence coastal visitor awareness of and, ultimately, compliance with MPA regulations.

The MPA Collaborative Network (CN) held a series of Community Compliance Forums in 2019/20, bringing together local stakeholders from each coastal county to voice their MPA, ocean, and coastal compliance concerns and brainstorm ideas to address those concerns. Five hundred community members participated, resulting in over 2,200 compliance concerns and solutions mentioned during 40+ hours of engagement. Across coastal counties, signage was the most commonly recommended solution to address factors contributing to noncompliance. The compliance forums highlighted a general need for more, updated, or new informational signage with strategic messaging, signage translations, and strategic placement of signs (e.g., at boundaries and access points).

In 2020/21, CMSF staff conducted an evaluation of the effectiveness of select outreach tools (brochures, social media content, trainings) in increasing awareness of MPAs, and subsequently, compliance with regulations. Results showed that effective outreach requires a strategic, audience-specific approach. With signage identified as the number one recommended compliance solution, CMSF and the CN partnered to understand the effectiveness of existing MPA signs before developing new signage to address identified compliance concerns.

This study evaluated the effectiveness of five existing MPA sign types and their associated elements (maps, icons, text, etc.) in capturing attention, and encouraging and enhancing compliance with MPA regulations among coastal visitors. The evaluation results contained in this report inform the effectiveness of existing MPA signage and provide useful insight for the development of signs well into the future. **Findings will be used to design audience-appropriate signs that address area-specific compliance concerns.** By better understanding the overall impact of signage, the State can optimize the investment in MPA outreach and inform strategic decisions into the future.

OVERVIEW

This study utilized mixed-methods to assess the effectiveness of five types of MPA educational signs in influencing visitor awareness of and compliance with MPA regulations. Results and recommendations to improve MPA signage are presented in this report.

Harbor Sign



Interpretive Sign



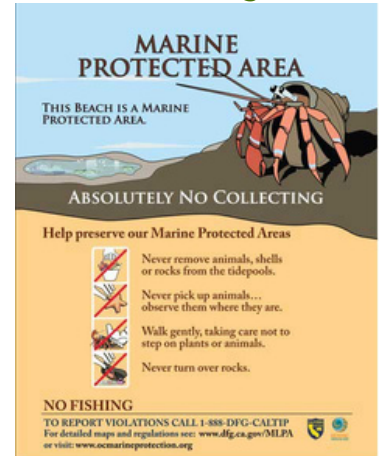
Regulatory Sign



You Are Here Sign



Good Tidepooler Rules Sign



GOALS & OBJECTIVES

Goal: To understand the effectiveness of existing MPA signs and their associated elements in conveying MPA regulatory information including activities that are/are not permitted.

Objectives

- Conduct an observational study to gain an understanding of sign effectiveness at capturing visitor attention.
- Administer surveys to gain an understanding of sign effectiveness at increasing awareness of MPAs and influencing compliance with regulations.
- Recommend modifications to improve existing MPA signs.
- Provide guidance for future MPA outreach strategy and content development.

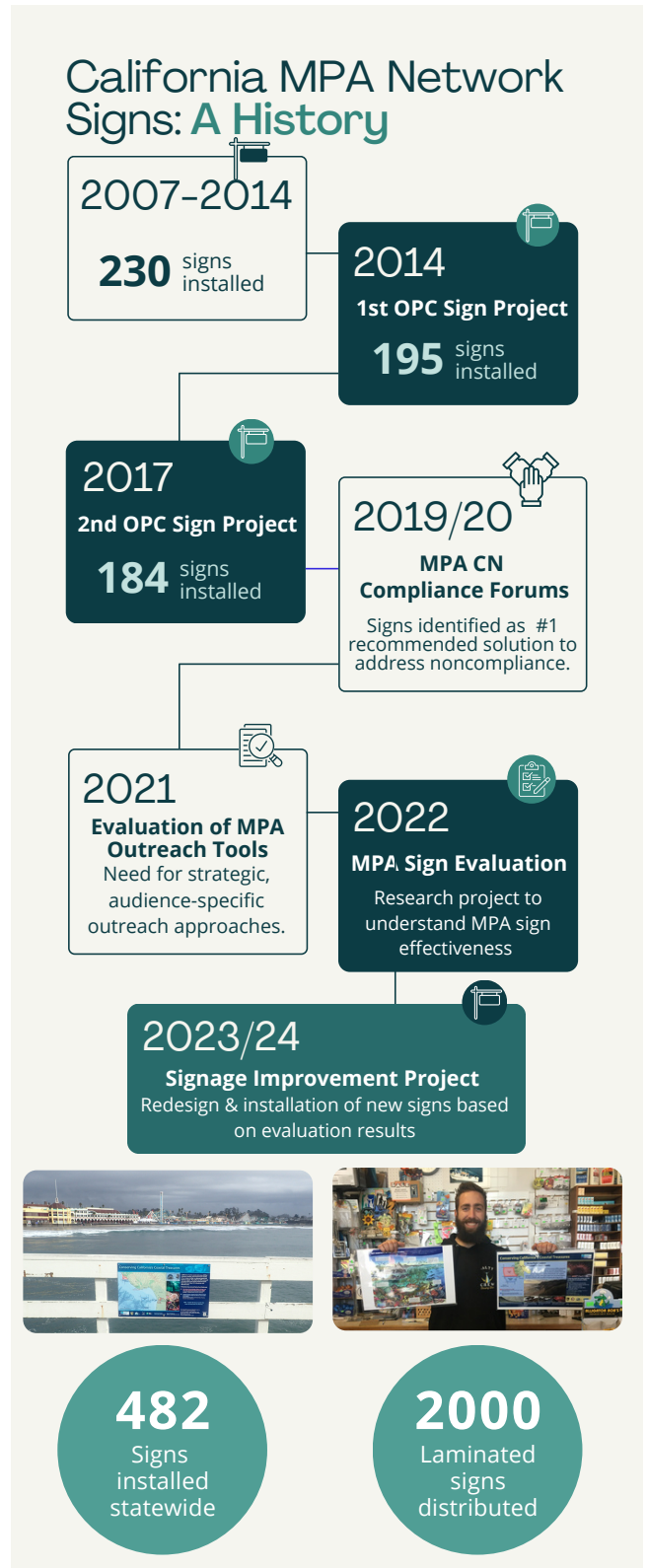
HISTORY

California MPA Network Signage

Starting in 2007, CMSF worked with Resources Legacy Fund and California Department of Fish and Wildlife to develop signage templates that could be modified for individual locations, giving a standardized look to MPA network signs. Various sign types were developed to address interpretive and regulatory needs, and priority locations for reaching consumptive and non-consumptive users were identified. After the initial round of harbor and interpretive signs were installed, OPC supported additional iterations of sign development installation in 2014 and 2017. To build off the efforts that went into designing the signs, laminated replicas were produced and distributed to ocean recreation businesses, museums and aquaria, and kids programs, and continue to be a success. Additionally, CMSF developed a statewide database of all MPA signage, including images of installation, GPS coordinates, and contact information to help track efforts.

In the years since the last big sign project, many partners have worked to update and replace MPA signage. **To date, there are nearly 500 signs installed in California to inform visitors about MPAs and MPA regulations. Additionally, over 2,000 laminated replicas of signs have been distributed.**

In 2019/20, signage was the top recommended solution to address factors contributing to noncompliance across coastal counties during the MPA Collaborative Network Community Compliance Forums. The 2021 CMSF evaluation of MPA outreach tools highlighted the need for strategic, audience-specific outreach approaches. Building off of previous studies evaluating sign effectiveness of marine conservation initiatives and acknowledging that improvements can be made to existing signage, CMSF and the MPA CN partnered to understand the effectiveness of MPA signs to inform the development of future signs to better address identified compliance concerns.





METHODS



STUDY DESIGN

This study sought to understand the relative effectiveness of existing signs designed to increase understanding of MPA rules and positively influence compliance with MPA regulations. Overall sign "effectiveness" was determined by evaluating a sign's ability to attract and keep visitor attention, increase awareness, and influence attitudes and behavioral intentions. Comparing these measures across sign types enabled the identification of sign elements that contributed to increased understanding of MPA rules and encouraged preferred behavior.

Coastal visitors were exposed to six sign types or treatments (the five pictured below, and a blank sign to serve as a control) at 18 sites across California during summer of 2022. Sign effectiveness was measured through behavioral observation of coastal visitors and a semi-structured survey questionnaire. A multi-day pilot study informed data collection methods, which allowed the protocol to be altered before official data collection began. Originally, the protocol called for surveying only people who observed the sign, but after two pilot days in the field with very few observations of sign observers, it became clear that meeting the required sample size would be difficult, if not impossible. In response, the protocol was revised and a separate survey was developed for visitors who did not observe the sign in order to capture their perceptions. Data collection occurred in three, three-hour sampling blocks per day, for 18 days, taking advantage of the increased summer coastal visitation.

SIGN TYPES EVALUATED (TREATMENTS)

HARBOR



Map & regulation focused. Large panel.

INTERPRETIVE



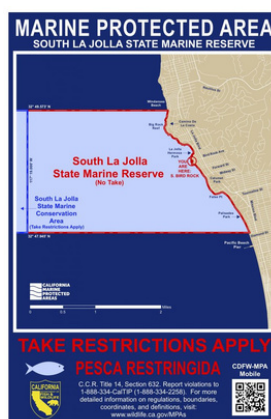
Interpretive text & photo focused. Large panel.

REGULATORY



Icons with regulatory language. Small panel.

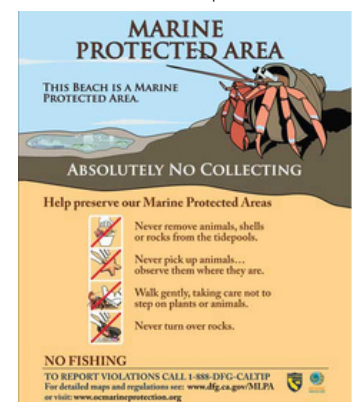
YOU ARE HERE



Map with location orientation information, regulatory language. Small panel.

GOOD TIDEPOOLER

aka Tidepool



Illustrated panel with tidepool etiquette focus; icons and regulations. Large panel.

STUDY SITES

Each sign (treatment) type was evaluated in each region (North, Central, South), except for the Good Tidepooler Rules sign, which only exists in the South Coast. Across the state, data collection occurred at a total of 18 study sites, selected based on the following criteria ([Appendix A](#)).

- A large number of visitors
- A bottleneck entry with limited access, so visitors are required to walk by the sign on their way in and out (i.e., can't easily leave through other access points).
- Must be in the immediate vicinity of an MPA with known compliance concerns (with the exception of Harbor signs, which are often installed at harbors that do not have regulations in waters adjacent to the sign).
- Existing sign must have 'ideal' placement, meaning it is the only sign in the immediate area (or there are less than three nearby) and it is visible upon accessing the MPA.



DATA COLLECTION

OBSERVATIONAL STUDY

The first component of data collection included an observational study to assess the behavior of coastal visitors as they approached the sign at the access point. Visitors were discreetly monitored by researchers who noted whether the visitor viewed the sign for at least one second, the length of time viewed, the number in the group, and characteristics to help identify the visitor for survey participation upon departure. To correlate observational study results with the questionnaire, a participant observation number was assigned to each visitor/group upon arrival.

SURVEY QUESTIONNAIRE

A survey was developed that included a series of multiple choice, Likert-scale (a rating scale that allows for collection of attitudes, perceptions and opinions), and open ended questions focused on understanding visitor awareness, attitudes, behavioral intentions, and demographics. The surveys were available to take on paper or on an iPad, utilizing Qualtrics survey platform. All visitors were given the opportunity to participate in the survey whether or not they observed the sign upon arrival. In larger groups, the visitor selected for the survey alternated between the two visitors closest to the researcher. The target audience for the surveys was English-speaking adults (18 years or older). Visitors who declined to participate were tracked as non-respondents.

Depending on whether the visitor viewed the sign upon arrival, respondents received slightly different surveys. While the questions were similar, non-observers were given a chance to review the sign before responding to some of the questions, while those that observed the sign had to complete the survey without viewing the sign again to test for retention of knowledge.

SAMPLE SIZE

Each year between 150 million and nearly 400 million visits are made to California beaches (Pendleton et al., 2006). At 95% Confidence Level with 5% margin of error, minimum sample size is 385. At the start of this study, we aimed for a sample size of 395 surveys (95% CI, 5% margin of error), but ended up with 868 survey responses, just short of the sample size required for a 95% CI, 3% margin of error (n=1068).

DATA ANALYSIS

Quantitative results were analyzed using descriptive statistics, providing simple summaries about the raw data collected to describe the study population, and inferential statistics were used to explore differences among variables, allowing for comparison among sign treatment groups and more. For statistical tests, the level of significance was set to $p=0.05$. Chi-square test was used to test the significance of the relationship between two categorical values. To test for the difference in means between two or more groups, an analysis of variance (ANOVA) was performed, and Tukey's HSD Test for multiple comparisons was used to test the significance of the difference.

Qualitative questions acquired descriptive information that otherwise cannot be captured by quantitative questions. Qualitative data were analyzed using a thematic analysis, a method for identifying, analyzing, and interpreting patterns discovered through survey responses (Creswell & Poth 2018). Using coding categories, meaningful patterns and trends in responses are identified and grouped.





FINDINGS

*Findings are presented in five sections with details on each sign type.
At the end, there are at-a-glance findings for each sign type.*



VISITOR CHARACTERISTICS

Visitors Observed

Visitor characteristics were collected during the observational study and survey administration, conducted during June-August 2022. Across the 18 data collection sites, 2,770 visitors were observed in 1,337 groups as they approached coastal access points along a MPA.



Of the observed visitors, just under 5% (136) stopped to view the sign.

Survey Responses

A total of 868 survey responses were collected, with over 100 per sign type as detailed in Table 1. More surveys (418) were acquired in the South Coast region (San Diego County-Santa Barbara County), than in the Central (293; San Luis Obispo- Marin) and North (157; Sonoma- Del Norte) coast regions.



In total, there were 299 visitors that refused to take the survey, for an average response rate of 61%. Non-english speaking visitors were disqualified from survey participation for consistency and not counted toward the response rate.

Table 1. Number of survey responses per sign type

	Harbor	Interpretive	Regulatory	Tidepool	You Are Here	Control
# Responses	157	146	152	155	151	107

User Group

Because signs attempt to influence compliance with MPA regulations, a question was asked to find the percentage of consumptive users (angling, tidepool harvest, etc.) in the sample. Of the survey respondents, 33.2% identified themselves as a consumptive user, while 66.8% indicated they never participate in consumptive activities while visiting the coast (Table 2).

Broken down by sign type, more consumptive users responded to the survey for the Harbor signs (44.8%). This is not surprising, as most harbor signs are installed at locations not in the immediate vicinity of a MPA, likely attracting more consumptive users when compared with other sign locations that have take restrictions.



33.2% of survey respondents were consumptive users.

Table 2. Percent Consumptive Users by Sign Type

	Harbor	Interpretive	Regulatory	Tidepool	You Are Here	Control
Percentage	44.8%	29.9%	37.8%	10.1%	29.2%	24.7%

ATTENTION

Observer Information: Survey Participants

Out of 2,770 visitors observed, just under 5% (136) stopped to view the sign. All visitors were given the opportunity to participate in the survey regardless of their sign observation status. **101 sign observers responded to the survey, while 755 surveys were acquired from non-observers.**

While a greater percentage of visitors stopped to view the Regulatory (16.4%) and You Are Here (14.6%) signs when compared with the other signs, there was no statistically significant relationship between sign type and whether the sign was observed ($\chi^2(5,855) = 7.65, p = .177$) (Table 3).

*More visitors stopped to view the **Regulatory and You Are Here** signs than other sign types.*

Table 3. Percentage of Sign Observers/Non-observers by Sign Type

	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Sign Observer	8.9%	10.5%	16.4%	11.6%	14.6%
Non-observer	91.1%	89.5%	83.6%	88.4%	85.4%

Length of Observation

Of the visitors who did stop, length of observation varied by sign type. Interpretive signs were viewed for an average of 19.2 seconds, Harbor signs 13.5 seconds, Tidepool signs 4.8 seconds, You Are Here signs 3.1 seconds, Regulatory signs for 2.5 seconds, and the Control/blank sign for 1.1 seconds on average. Table 4 shows the average length of observation and the observation length range of all sign observers.

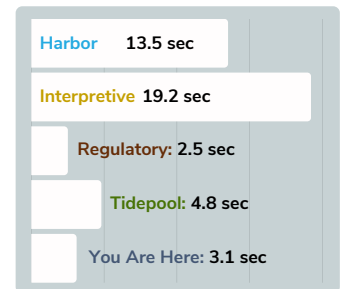


Table 4. Observation Length by Sign Type (seconds)

	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Avg. Observation Length	13.5	19.2	2.5	4.8	3.3
Observation Length Range	1-44	3-72	1-6	1-14	1-12

A ranked ANOVA, performed to compare the effect of sign type on length of the observation, revealed that there is a strong statistically significant difference in length of observation between at least two groups ($p < .00001$). Tukey's HSD Test for multiple comparisons found that the average length of observation was significantly different between 10 of the 15 groups, while there was no statistically significant difference between the length of observation for 5 of the groups (See [Appendix B](#) for ranked pairwise tests). The blank control sign performed as expected, with a strong statistically significant difference in observation length when compared to other sign types. Additionally, the Harbor and Interpretive signs, when compared with the other sign types, exhibited statistically significant differences, **with Harbor and Interpretive signs being viewed much longer on average than the Regulatory, You Are Here, and Tidepool signs.**

Frequency of Visit

Of the non-sign observers, 31% had never visited before, 24.4% visit annually, 37.6% visit weekly to monthly, and 7% visit daily. Sign observers were less likely to be frequent visitors of the location, with 57.4% never visiting before, 19% visiting annually, 21.3% visiting weekly to monthly, and 2.1% visiting daily. A Pearson's Chi-Square Test was performed to assess the relationship between observation and frequency of visit. There was a significant relationship between the two variables ($X^2(3,836) = 27.4, p < .00001$).

Sign observers were less likely to be frequent visitors of the location.

Reasons for the Viewing the Sign

Sign observers were asked to indicate if there was a reason they stopped to view the sign upon arrival. **The most common reasons for stopping to view the sign included first time visitor, the respondent enjoys reading signs, or a certain element caught their attention.**

To better understand if certain elements were responsible for catching observer attention, we asked if there was anything specific that caused them to stop and view the sign. Nearly 42% of respondents said something specific caught their eye, drawing them in to view the sign, while just over 58% indicated that there was nothing specific. For the Tidepool signs, the stand-out attention grabbing element identified was the hermit crab. For Harbor and You Are Here signs, the map was identified, for Interpretive signs, the pictures, and for Regulatory signs, the symbols were the elements that caught visitor attention. Additionally, across sign types, **placement of the sign was mentioned as an attention grabbing element.**

Elements Credited With Attracting Visitors

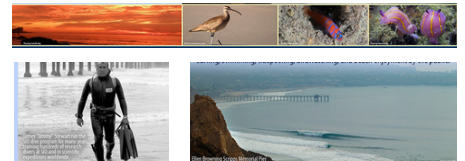
Harbor: Map



Regulatory: No-take symbols



Interpretive: Pictures



Tidepool: Hermit Crab



You Are Here: Map



Was the Sign Previously Viewed?

Survey respondents were screened to see if they had observed the sign on a previous visit. Over 64% had never viewed the sign before, with nearly 25% saying they had seen it before.

Of the sign-observers, 74% had never seen the sign before, nearly 5% had seen the sign previously, and over 21% were unsure. Of the non-sign observers, nearly 63% had never seen the sign before, but over 27% had seen it previously. A Chi-Squared test revealed a statistically significant relationship between whether the sign was observed and whether the sign had been viewed previously, with **non-observers of the sign more likely to have viewed the sign previously** ($X^2(2,826) = 25.5, p < .00001$). **This indicates that coastal visitors are unlikely to read a sign more than once when visiting.**

Visitors who did not stop to look at the sign were more likely to have viewed it previously.

Viewed Previously | Sign Type

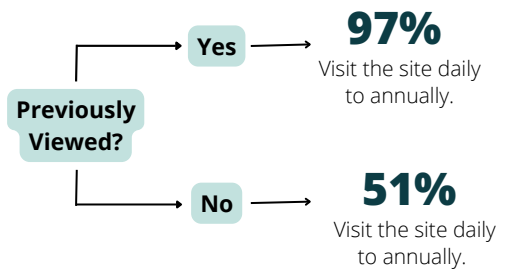
Differences among sign types were observed for whether the respondent had previously seen the sign before (Table 5). A Chi-Squared test revealed a strong statistically significant relationship between sign type and whether the sign had been viewed previously ($\chi^2(10,825) = 142, p < .00001$). **This may suggest certain signs, like the regulatory sign, are more effective at grabbing attention.**

Table 5. Percentage of Respondents that Previously Viewed Sign by Sign Type

Was the sign viewed on a previous visit?	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
No	44.1%	66.9%	41.6%	74.2%	70.3%
Yes	31%	27.7%	45%	21.9%	15.5%
Unsure	24.8%	5.4%	13.4%	4.0%	14.2%

Viewed Previously | Frequency of Visit

Of those that responded ‘no’ to seeing the sign before, over 48% said they never visit the location, while 29% visit annually, 20% visit weekly to monthly, and over 2% visit daily. This indicates that over 50% of visitors had been to the site before, but had not taken notice of the sign. Of those that responded ‘yes’ to seeing the sign before, over 20% indicated they visit the location daily, and over 76% visit the location weekly to monthly. A Chi-Squared test revealed a strong statistically significant relationship between frequency of visit and whether the sign had been viewed previously ($\chi^2(6,834) = 380, p < .00001$)



50% of visitors had been to the site before, but had not taken notice of the sign.

Viewed Previously | Frequency of Visit by Sign Type

Harbor: Of those that have not viewed the sign previously, 68.8% indicated they had never visited before, 29.7% visit infrequently, and 1.6% visit frequently. Of those that have seen the sign previously, 93.3% indicated they visit the location frequently.

Interpretive: Of those that have not viewed the sign previously, 69% indicated they had never visited before, 27.6% visit infrequently, and 3.4% visit frequently. Of those that have seen the sign previously, 100% indicated they visit the location frequently.

Regulatory: Of those that have not viewed the sign previously, 51% indicated they had never visited before, 41.9% visit infrequently, and 6.5% visit frequently. Of those that have seen the sign previously, 98.5% indicated they visit the location frequently.

Tidepool: Of those that have not viewed the sign previously, 72% indicated they had never visited before, 24% visit infrequently, and 4% visit frequently. Of those that have seen the sign previously, 90% indicated they visit frequently.

You Are Here: Of those that have not viewed the sign previously, 76.7% indicated they had never visited before, 20% visit infrequently, and 3.3% visit frequently. Of those that have seen the sign previously, 100% indicated they visit the location frequently.

AWARENESS

To better understand visitor awareness of local MPA regulations, visitors were asked a variety of questions to gauge their awareness about local MPAs.

Awareness of Regulations

Survey respondents were asked what kinds of activities are allowed at the location they visited. Answer options included: Fishing, kayak fishing, spear fishing, shore fishing, collecting from the shore/tidepools, collecting for subsistence reasons, tidepooling, surfing/paddling, kayaking/boating, beach sports, wildlife watching, and other. Responses were compared with site regulations to determine if the correct response was selected.

Across all sign types, sign observers were more likely to recall the rules for the nearby MPAs than non-observers. As a reminder, of the 2,770 coastal visitors observed, only 136 observed the sign upon arrival. This indicates that, while signs are effective at communicating rules when they are read, a majority of visitors do not take the time to view signs upon arrival.

The percentage of correct responses varied by sign type (Table 6). At 94.6%, the number of correct responses for the Regulatory sign was highest, followed by the Tidepool sign (82.7%), the You Are Here sign (74.5%), the Interpretive sign (67%), and the Harbor sign (54%). Consumptive users had a better understanding of the rules across all sign types when compared to non-consumptive users.

Consumptive users had a better understanding of the rules than non-consumptive users.

Table 6. Percentage of Respondents that Know MPA Rules by Sign Type

	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Non-Consumptive Users	54%	67.1%	94.6%	82.7%	74.5%
Consumptive Users	57%	84.3%	97.8%	84.6%	87.9%

Reporting Compliance Issues

Respondents were asked if they know what to do if they see someone participating in an activity that is not permitted. **Over 82% indicated that they do not know what to do, while nearly 18% said they do.** There was no significant relationship between sign type and awareness of how to report a compliance issue ($\chi^2(4,722) = 9.08, p = 0.0591$).

Those that indicated they knew what to do were asked to specify how to report a compliance issue. A thematic analysis identified that nearly 65% of respondents knew to notify CDFW or CalTIP of a violation. Additional ideas for who to notify included Lifeguards (24.1%), State Parks (16.3%), Harbor Patrol (5.7%), an 'Enforcement Official' (4.9%), and County Parks (2%).

With no significant difference between sign type, all signs could be improved if there is a goal to increase awareness of the mechanisms to report compliance issues among coastal visitors.

Sign Purpose: Main Topic Take-Away

Respondents were also asked if they could recall the main message the sign was trying to convey. Using thematic analysis, across sign types the most common response was ‘explain rules’ (55.7%), followed by ‘show map and rules’ (32.9%), ‘location orientation’ (8.7%), and ‘no fishing’ (5.4%), and ‘local information highlight’ (4.7%).

When broken down by sign type, responses differed. Those that viewed the Harbor sign listed ‘showing a map of protections’ and ‘explain rule and regulations’ as the topic. For the Interpretive sign, ‘highlight local information’. For both the Regulatory and Tidepool signs, the most common response was to ‘explain rules’. And for the You Are Here, ‘location orientation’.

Sign Type	Top Response(s)
Harbor	Show map of protections; Explain Rules
Interpretive	Highlight local area information
Regulatory	Explain rules
Tidepool	Explain rules
You Are Here	Location Orientation

Top Sign Elements Recalled

Respondents were also asked to recall up to 3 sign elements, or components of the sign. For Harbor signs, the most common elements recalled were the map and the written regulations. For the Interpretive signs, the pictures, maps and general area information were the most common elements recalled. For the Regulatory signs, the specific take restrictions were recalled, as well as the no take icons. For the Tidepool sign, the hermit crab illustration, the icons, and the specific take restrictions were most commonly recalled, and for the You Are Here sign, the take restrictions were recalled, as well as the map and QR code. Aesthetic information recalled was in reference to colors on the sign.

Sign Type	Top Responses
Harbor	Map; Written Regulations
Interpretive	Pictures; Maps; General Area Information
Regulatory	Specific Take Restriction Recalled; Icon/Symbol; Aesthetic Information
Tidepool	Hermit Crab Illustration; Specific Take Restriction Recalled; Symbols/Icons
You Are Here	Take Restriction Recalled; Map; QR Code; Aesthetic Information



ATTITUDES

To measure visitor attitudes toward MPA regulations, survey respondents were asked to rate their level of agreement with a series of statements about recreational opportunities and marine protected areas. In order to see if attitudes varied by sign type and user group, results were compared.

MPA Regulations: Attitudes Toward Activities Not Permitted

This is a good place for fishing

Respondents were asked to note their opinion of the statement ‘this is a good place for fishing’, with disagreement being a more favorable response (Table 7). Results from the Harbor sign, when compared with the other sign types, exhibited a statistically significant difference ($p < 0.00100$) for all pairwise tests. This is not surprising, as many Harbor signs show a large geographic area, all of which contain some areas that allow fishing. Due to their placement at a harbor, there are no restrictions in the immediate vicinity of the sign in most cases, skewing answers to statements like ‘This is a good place for fishing’.

Consumptive users were less likely to disagree with the statement than non-consumptive users for the Interpretive and Regulatory signs, but more likely to respond favorably (disagree that it is a good place for fishing) when exposed to the Tidepool and You Are Here signs. For both consumptive and non-consumptive users, the signs that elicited the most favorable responses were the **(1) Tidepool** and **(2) Regulatory signs**. Based on qualitative analysis of a survey question that enabled respondents to share additional information, **some consumptive users noted that they think MPAs are actually good places for fishing in terms of habitat type and species availability, but that doesn’t mean they would fish there.**

Table 7. Attitudes toward 'This is a good place for fishing'.

User Group	Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Consumptive Users	Agree	83.6%	18.5%	17.6%	6.1%	16.7%
	Disagree	0%	44.4%	47.1%	66.7%	41.7%
	Neither	16.4%	37.0%	35.3%	27.3%	41.7%
Non-consumptive Users	Agree	52.4%	3.6%	6.9%	1.9%	9.2%
	Disagree	1.0%	47.6%	49.1%	51.9%	32.1%
	Neither	46.6%	48.8%	44.0%	46.2%	58.7%

This is a good place for collecting from the tidepools

Respondents were asked to note their opinion of the statement ‘this is a good place for collecting from the tidepools’, with disagreement being a more favorable response (Table 8). Results from the Harbor sign, when compared with the other sign types, exhibited a statistically significant difference (p=0.00100*) for all pairwise tests. As noted above, this is expected as Harbor signs show a large geographic area that contain locations that allow certain kinds of take, influencing responses that different from signs located immediately adjacent to a MPA.

Across all sign types, **consumptive users were more likely to disagree with the statement** ‘this is a good place for collecting from the tidepools’ **than non-consumptive users**. For both consumptive and non-consumptive users, the signs that elicited the most responses in disagreement with the statement were the **(1) Tidepool** and **(2) Regulatory signs**.

Table 8. Attitudes toward 'This is a good place for collecting from the tidepools'.

User Group	Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Consumptive Users	Agree	30.2%	0.0%	0.0%	0.0%	0.0%
	Disagree	18.6%	55.6%	62.7%	72.7%	58.3%
	Neither	51.2%	44.4%	37.3%	27.3%	41.7%
Non-consumptive Users	Agree	18.4%	2.4%	3.4%	1.9%	0.9%
	Disagree	12.6%	48.2%	52.6%	59.2%	40.4%
	Neither	69.0%	49.4%	44.0%	38.8%	58.7%

MPA Regulations: Attitudes Toward MPAs

The rules are too strict here

Visitors were asked to rate their opinion of the statement ‘the rules are too strict here’, with disagreement being a more favorable response (Table 9). A higher proportion of respondents (from both user groups) who viewed the Harbor, Regulatory, and the Tidepool signs did not think the rules were too strict at the location, although there was no strong statistically significant relationship between sign type and opinion (p=0.155). When compared with other sign types, those that responded to the Harbor sign survey were most likely to disagree with the statement. This is likely due to the lack of restrictions in the immediate vicinity of the sign and the geographic scope of the map. Across all sign types, consumptive users were more likely than non-consumptive users to agree with the statement, which is likely a reflection of their interest in extractive activities.

While hard to say if these signs are directly influencing attitudes about the strictness of rules, the **Harbor, Regulatory and Tidepool signs were correlated with more positive perceptions about the local rules**.

Table 9. Attitudes toward 'The rules are too strict here'.

User Group	Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Consumptive Users	Agree	10.9%	29.6%	47.1%	39.4%	30.6%
	Disagree	63.6%	22.2%	47.1%	42.4%	33.3%
	Neither	25.5%	48.1%	5.9%	18.2%	36.1%
Non-consumptive Users	Agree	5.0%	9.0%	20.4%	15.7%	11.1%
	Disagree	49%	35.9%	38.1%	42.2%	30.6%
	Neither	46.0%	55.1%	41.6%	42.2%	58.3%

The MPA is not working

Respondents were asked to note their opinion of the statement ‘the MPA is not working’, with disagreement being a more favorable response (Table 10). There was no strong statistically significant relationship between sign type and opinion of whether the MPA was working (p=0.379). Consumptive users were more likely to disagree with the statement for all sign types except the Interpretive sign, where a majority of non-consumptive users chose ‘neither agree nor disagree’. **This indicates that consumptive users have formed stronger perceptions about the effectiveness of existing MPAs, while non-consumptive users did not have an opinion on the statement.**

For **consumptive users, the Regulatory and Tidepool** signs elicited more responses that agree with the statement that the MPA is working. For **non-consumptive users, the Tidepool and Harbor** sign.

Table 10. Attitudes toward 'The MPA is not working'.

User Group	Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Consumptive Users	Agree	24.5%	22.2%	24.5%	32.3%	22.2%
	Disagree	18.2%	25.9%	51.0%	41.9%	36.1%
	Neither	57.3%	51.9%	24.5%	25.8%	41.7%
Non-consumptive Users	Agree	11.6%	6.5%	10.6%	11.5%	8.6%
	Disagree	37.1%	35.1%	33.6%	39.6%	29.5%
	Neither	51.3%	58.4%	55.8%	49.0%	61.9%

Attitudes: Sign Impact

Communicating Rules

Visitors were asked their opinion of the signs' ability to communicate the local rules (Table 11). A signs' perceived ability to help visitors understand local MPA rules varied significantly by sign type ($X^2(10,838 = 577, p < .00001)$). Across user groups, **Regulatory and Tidepool signs were the most effective at helping visitors understand rules.**

Table 11. Attitudes toward 'Does the sign help you understand the local MPA rules'.

User Group	Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Consumptive Users	No	12.5%	18.4%	0%	0%	12.5%
	Yes	83.9%	71.1%	100%	97.5%	87.5%
	Unsure	3.6%	10.5%	0%	2.5%	0%
Non-consumptive Users	No	9.5%	6.7%	0%	0%	23.0%
	Yes	85.7%	84.4%	100%	98.0%	75.4%
	Unsure	4.8%	8.9%	0%	2.0%	1.6%

Influencing Behavior

Visitors were asked if the sign influences their behavior while visiting (Table 12). A signs' perceived influence on behavior varied significantly by sign type ($X^2(10,820 = 508, p < .00001)$). Across user groups, **Regulatory and Tidepool signs were perceived to be the most effective at influencing visitor behavior.**

Table 12. Attitudes toward 'Does this sign influence your behavior when visiting this location'.

User Group	Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Consumptive Users	No	12.5%	23.7%	2.0%	5.0%	27.5%
	Yes	58.3%	60.5%	98.0%	87.5%	61.0%
	Unsure	29.2%	15.8%	0%	7.5%	11.5%
Non-consumptive Users	No	11.8%	15.6%	2.8%	4.0%	31.1%
	Yes	61.8%	57.8%	97.2%	92%	55.7%
	Unsure	26.5%	26.7%	0%	4.0%	13.1%

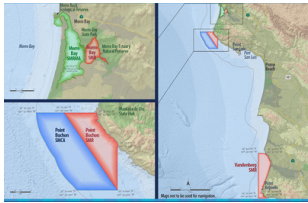
Attitudes: Sign Design

Visitors were asked which sign elements best convey the MPA rules, and whether anything could be added to increase understanding of MPA regulations. A thematic analysis was employed to identify common patterns among respondents from open-ended responses.

HARBOR

SIGN ELEMENTS THAT BEST CONVEY MPA REGULATIONS

Map



Entire Sign



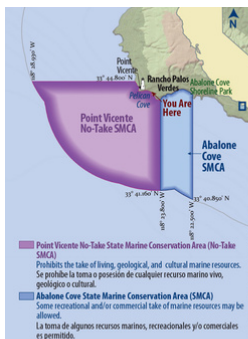
SUGGESTIONS TO INCREASE UNDERSTANDING OF REGULATIONS

- **Detailed MPA regulations.** Many noted the need for specific regulation information specifically for the State Marine Conservation Areas (SMCAs), which tend to have vague, summary regulations that require further research to understand the nuanced rules.
- **Clear, detailed definition for 'finfish'.** Currently, certain harbor signs include reference to 'finfish' in the regulation section, and include an asterisk saying 'as defined by California Department of Fish and Wildlife state regulations', but omit specifics.
- **Allowed activity icons on map.** Many suggested the addition of symbols or icons on the map to show activities that are/are not allowed so that they would stand out at a glance
- **On-the-go information:** Many requests were made for a mechanism to take the information on the harbor sign 'on-the-go' to read at leisure and reference later. Respondents mentioned **QR codes and even brochures**, which may be a better solution for areas without service.
- **Location orientation information.** Respondents suggested adding a marker on the map to help orient their location.
- **Stand Out Rules.** While less specific, many noted that the rules should stand out more. Many requests were made to **reduce the sign content** to assist with this.

INTERPRETIVE

SIGN ELEMENTS THAT BEST CONVEY MPA REGULATIONS

Map & Regulation Text



SUGGESTIONS TO INCREASE UNDERSTANDING OF REGULATIONS

- **Detailed MPA regulations.** Respondents expressed a need for specific regulation information as the interpretive signs currently have summary regulations that lack the detailed, nuanced rules of individual MPAs.
- **Allowed activity icons on map.** Many suggested the addition of symbols or icons on the map to show activities that are/are not allowed that would allow for at-a-glance understanding of rules.
- **Boundary identifiers.** Respondents requested boundary identifiers, specifically pictures of landmarks and on-the-water markers to help identify boundaries without GPS.
- **Stand out rules.** Many noted that the sign was busy, taking away emphasis of the regulations. Requests were made to **reduce the content** if the goal is to educate about the rules.
- **Compile agency rules:** Many noted the need to compile all agency rules on one sign to reduce the amount of signs with regulatory information.

REGULATORY

SIGN ELEMENTS THAT BEST CONVEY MPA REGULATIONS

No-Take Symbols



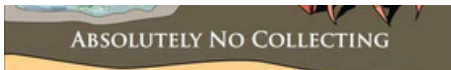
SUGGESTIONS TO INCREASE UNDERSTANDING OF REGULATIONS

- **Map with boundary identifiers.** Respondents requested the addition of a map with boundary identifiers to aid in location orientation without GPS.
- **Additional MPA information.** Respondents expressed interest in seeing general MPA information and information about why the area is protected added to the sign.
- **Alternative locations.** Respondents requested the addition of information on alternative locations for activities not allowed at a MPA. For instance, if fishing is not allowed at the MPA, list the closest location(s) someone could go to partake in that activity.
- **Compile agency rules.** Many noted the need to compile all agency rules on one sign to reduce the amount of signs with regulatory information.

TIDEPOOL

SIGN ELEMENTS THAT BEST CONVEY MPA REGULATIONS

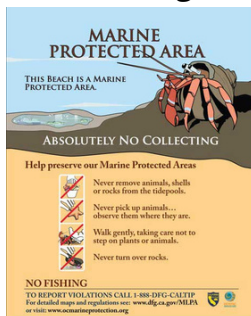
Regulation Text



Icons



Entire Sign



SUGGESTIONS TO INCREASE UNDERSTANDING OF REGULATIONS

- **Map.** Respondents suggest adding a map of the MPAs.
- **Additional MPA information.** Respondents expressed interest in seeing general MPA information added to the sign including information about why the area is protected.
- **Fishing information.** Respondents requested to see information about fishing added to the sign.
- **Alternative locations.** Respondents requested the addition of information on alternative locations for activities not allowed at a MPA. For instance, if fishing is not allowed at the MPA, list some alternative nearby locations someone could go to partake in that activity.
- **Compile agency rules.** Many noted the need to compile all agency rules on one sign to reduce the amount of signs with regulatory information.

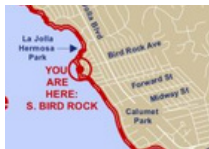
YOU ARE HERE

SIGN ELEMENTS THAT BEST CONVEY MPA REGULATIONS

Map



Location Marker



Regulation Text



SUGGESTIONS TO INCREASE UNDERSTANDING OF REGULATIONS

- Detailed MPA regulations.** Respondents requested detailed regulation information for each MPA shown on the map. In particular, many noted the vague regulation text that accompanies SMCAs, stating 'take restrictions apply' without detailed information.
 - Many noted the presence of a QR code, but in 2 of the 3 survey locations, the QR code did not work due to lack of cellular service.
- Boundary identifiers.** Respondents requested the addition of boundary identifiers like street names or images of landmarks to aid in location orientation without GPS.
- Allowed activity icons on map.** Many suggested the addition of symbols or icons on the map to show activities that are/are not allowed that would allow for at-a-glance understanding of rules.
- Alternative locations.** Respondents requested the addition of information on alternative locations for activities not allowed at a MPA. For instance, if fishing is not allowed at the MPA, list some alternative nearby locations someone could go to partake in that activity.



BEHAVIORAL INTENT

Respondents were asked to rate the chances they would participate in certain recreational activities at the sign site, demonstrating behavioral intent while visiting a MPA. Ideally, after exposure to the sign, visitors would reflect behavioral intent in line with MPA regulations. Consumptive activities are highlighted to provide insight into visitor intent to participate in activities not allowed.

All Survey Respondents

I will fish here

There is a strong statistically significant relationship between sign type and noted intent to fish at the sign location ($p < 0.00001$). Results from the Harbor sign, when compared with the other sign types, exhibited a statistically significant difference ($p < 0.00100$) for all pairwise tests. This is not surprising, as many harbor signs show a large geographic area, all of which contain areas that allow fishing. Due to their placement at a harbor, there are no restrictions in the immediate vicinity of the sign in most cases, skewing answers to statements like 'I will fish here'. With the Harbor sign removed from the analysis, there was no significant difference between sign type and intent to fish.

I will collect from the shore and/or tidepools here.

There is a strong statistically significant relationship between sign type and noted intent to collect from the shore and/or tidepools at the location ($p < 0.00001$). Similar to above, results from the harbor sign, when compared with the other sign types, exhibited a statistically significant difference ($p = 0.00100$) for all pairwise tests due to the nature of the sign placement away from a MPA and the geography represented on the sign.

Takeaways:

- **The Harbor sign is less effective at influencing behavior than the other signs.** This is likely attributed to the placement of the sign within a harbor, and not immediately adjacent to a MPA. While there was a strong statistically significant relationship between sign type and response for each of the above statements, when data from Harbor signs was pulled out of the analysis, there was no significant difference among groups for both 'I will fish here' ($p = 2.03$) and 'I will collect from the shore and/or tidepools here' ($p = 0.093$).
- Although there was no statistically significant difference in the impact of the different signs (with exception of the harbor sign), there are still notable differences in the overall impact each sign had on different user groups. For more insight into the impact by sign type, see the following pages.

Consumptive Users

Because consumptive users are more likely to participate in extractive activities, their responses were considered independently of non-consumptive users. The tables below highlight responses from those that partake in consumptive activities only for each sign type.

While all sign types had a high number of respondents indicating they would not fish at the sign location, **the Regulatory sign returned the most favorable responses, followed by the Tidepool sign.** Additionally, the interpretive sign (and the harbor sign, as anticipated) was the only sign to elicit a negative response, while across all other sign types none of the respondents indicated they would fish.

FINDINGS: BEHAVIORAL INTENT

Likewise, all sign types had a high number of respondents from the consumptive user group indicating they would not collect from the shore or tidepool, but **the Interpretive and the Regulatory signs returned the most favorable responses.**

Table 13. Consumptive user responses to 'I will fish at this location' by sign type.

Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Will	85.7%	6.1%	0%	0%	0%
Will Not	14.3%	93.9%	98.0%	96.9%	91.2%
Might	0%	0%	2.0%	3.1%	8.8%

Table 14. Consumptive user responses to 'I will collect from the shore and/or tidepools here. by sign type.

Response	Harbor	Interpretive	Regulatory	Tidepool	You Are Here
Will	21.4%	3.0%	0%	0%	0%
Will Not	75.0%	96.0%	98.0%	97.1%	94.3%
Might	3.6%	1.0%	2.0%	2.9%	5.7%

BY SIGN TYPE

Harbor Sign

I will fish here

- **Overall: 65.5%** definitely (15.5%) or probably (50%) **will not fish** here, 0.7% said they might or might not, and 34% definitely (31.3%) or probably (2.7%) will fish at the sign location
- **Consumptive Users: 14.3%** definitely (5.4%) or probably (8.9%) **will not fish** at the sign location, and 85.7% definitely (82.1%) or probably (3.6%) will fish at the sign location.
- **Non-consumptive Users: 58.8%** definitely (12.3%) or probably (46.5%) **will not fish** at the sign location, 0.9% said they might or might not, and 40.3% definitely (36.8%) or probably (3.5%) will fish at the sign location.

I will collect from the shore and/or tidepools here.

- **Overall: 90.5%** definitely (19.6%) or probably (70.9%) **will not collect** from the shore or tidepools, 1.4% said they might or might not, and 8.1% definitely (5.4%) or probably (2.7%) will collect from the shore or tidepools.
- **Consumptive Users: 75%** definitely (16.1%) or probably (58.9%) **will not collect** from the shore or tidepools, 3.6% said they might or might not, and 21.4% definitely (14.3%) or probably (7.1%) will collect from the shore or tidepools.
- **Non-Consumptive Users: 87.2%** definitely (16.1%) or probably (71.1%) **will not collect** from the shore or tidepools, 1.8% said they might or might not, and 10.5% definitely (7%) or probably (3.5%) will collect from the shore or tidepools.

Takeaways- Harbor Sign

- When compared with non-consumptive users, **consumptive users were more likely to express a less favorable response to both statements**, with 40.3% indicating the intent to fish, and 21.4% indicating the intent to collect from the shore and/or tidepool.
- Results from the Harbor sign, when compared with the other sign types, exhibited a statistically significant difference ($p < 0.001$) for all pairwise tests. This is not surprising, as the harbor signs show a map that spans a large geographic area that contains areas that allow fishing and collecting from the shore and tidepools. Due to their placement at a harbor, there are no restrictions in the immediate vicinity of the sign in most cases, making it harder to understand their intent to participate in certain behaviors within the geographic area displayed on the map.

Interpretive Sign

I will fish here

- **Overall: 94.8%** definitely (69.8%) or probably (25.0%) **will not fish** here, 3.4% said they might or might not, and 1.7% indicated they would probably fish at the sign location.
- **Consumptive Users: 93.9%** definitely (69.7%) or probably (24.2%) **will not fish** at the sign location, and 6.1% indicated they would probably fish at the sign location.
- **Non-consumptive Users: 84.8%** definitely (70.8%) or probably (14.0%) **will not fish** at the sign location, 3.1% said they might or might not, and 2.1% probably will fish at the sign location.

I will collect from the shore and/or tidepools here.

- **Overall: 92.3%** definitely (66.4%) or probably (25.9%) **will not collect** from the shore or tidepools, 5.2% said they might or might not, and 2.6 % definitely (0.9%) or probably (1.7%) will collect from the shore or tidepools.
- **Consumptive Users: 100%** definitely (75.8%) or probably (24.2%) **will not collect** from the shore or tidepools.
- **Non-consumptive Users: 92.7%** definitely (66.7%) or probably (26%) **will not collect** from the shore or tidepools, 4.2% said they might or might not, and 3.1% definitely (1%) or probably (2.1%) will collect from the shore or tidepools.

Takeaways- Interpretive Sign

- When compared with non-consumptive users, consumptive users were more likely to express a favorable response to both statements, with nearly 94% indicating they have no intent to fish at the location and 100% indicating they have no intent to collect from the shore and/or tidepool. **This may indicate that extractive users know and abide by the regulations at these locations, while non-consumptive users may have less regard for the local area regulations.**

Regulatory Sign

I will fish here

- **Overall: 93.9%** definitely (80.5%) or probably (13.4%) **will not fish** at the sign location and 6.0% said they might or might not fish at the sign location.
- **Consumptive Users: 98%** definitely (84.3%) or probably (13.7%) **will not fish** at the sign location, and 2.0% said they might or might not fish at the sign location.
- **Non-consumptive Users: 94%** definitely (79.3%) or probably (14.7%) **will not fish** at the sign location, and 6.0% said they might or might not fish at the sign location.

I will collect from the shore and/or tidepools here

- **Overall: 87.2%** definitely (69.1%) or probably (18.1%) **will not collect** from the shore or tidepools, 12.8% said they might or might not collect from the shore or tidepools.
- **Consumptive Users: 98%** definitely (88.2%) or probably (9.8%) **will not collect** from the shore or tidepools, and 2.0% said they might or might not collect from the shore or tidepools.
- **Non-consumptive Users: 85.4%** definitely (69%) or probably (16.4%) **will not collect** from the shore or tidepools, 14.7% said they might or might not collect from the shore or tidepools.

Takeaways- Regulatory Sign

- When compared with non-consumptive users, **consumptive users were more likely to disagree with both statements (a more favorable response)**, with nearly 98% indicating they have no intent to fish at the location and 98% indicating they have no intent to collect from the shore and/or tidepool.

Tidepool Sign

I will fish here

- **Overall: 92.7%** definitely (74.8%) or probably (17.9%) **will not fish** at the sign location, and 7.3% said they might or might not.
- **Consumptive Users: 96.9% definitely will not fish** at the sign location, and only 3.1% said they might or might not fish at the sign location.
- **Non-consumptive Users: 93.5%** definitely (77.8%) or probably (15.7%) **will not fish** at the sign location, and 6.5% said they might or might not fish at the sign location.

I will collect from the shore and/or tidepools here

- **Overall: 92.5%** definitely (72%) or probably (20.5%) **will not collect** from the shore or tidepools, 7.6% said they might or might not.
- **Consumptive Users: 97.2%** definitely (94.3%) or probably (2.9%) **will not collect** from the shore or tidepools, and 2.8% said they might or might not collect from the shore or tidepools.
- **Non-consumptive Users: 92.3%** definitely (74.8%) or probably (18.3%) **will not collect** from the shore or tidepools, 7.7% said they might or might not collect from the shore or tidepools.

Takeaways- Tidepool Sign

- When compared with non-consumptive users, **consumptive users were slightly more likely to disagree with both statements (a more favorable response)**, with 96.7% indicating they have no intent to fish at the location and 97.2% indicating they have no intent to collect from the shore and/or tidepool.

You Are Here Sign

I will fish here

- **Overall: 93.9%** definitely (80.5%) or probably (13.4%) **will not fish** at the sign location and 6.0% said they might or might not.
- **Consumptive Users: 91.1%** definitely (67.6%) or probably (23.5%) **will not fish** at the sign location, 8.8% said they might or might not.
- **Non-consumptive Users: 94.5%** definitely (54.5%) or probably (40%) **will not fish** here, 5.5% said they might or might not fish at the sign location.

I will collect from the shore and/or tidepools here

- **Overall: 91.6%** definitely (48.3%) or probably (43.3%) **will not collect** from the shore or tidepools, and 8.3% said they might or might not collect from the shore or tidepools.
- **Consumptive Users: 94.3%** definitely (68.6%) or probably (25.7%) **will not collect** from the shore or tidepools, 5.7% said they might or might not collect from the shore or tidepools.
- **Non-consumptive Users: 92.8%** definitely (48.2%) or probably (44.6%) **will not collect** from the shore or tidepools, and 7.1% said they might or might not collect.

Takeaways- You Are Here Sign

- When compared to non-consumptive users (94.5%), a smaller proportion of consumptive users (91.1%) expressed that they would not fish at the location.
- A greater proportion of consumptive users (94.3%) disagreed with the statement 'I will collect from the shore and/or tidepools at this location' than when compared to non-consumptive users (92.8%).





KEY FINDINGS & RECOMMENDATIONS

The following pages showcase high level findings and recommendations organized by sign type.



HARBOR SIGN

ATTENTION

Of the coastal visitors observed:



Sign Element of Attraction

The Map



Length of Observation

13.5 Seconds (avg)

AWARENESS

% of Respondents who knew MPA rules:



Main Purpose of Sign

(Most Commonly Recalled)

1. Show map of protections
2. Explain rules

ATTITUDES

'The sign location is a good place for fishing'

% Respondents in **disagreement**:



'The sign location is a good place for collecting from tidepools'

% Respondents in **disagreement**:



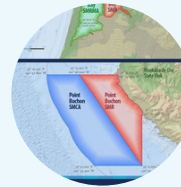
Perceived Impact: Communicating Rules

% Respondents that **agree** the sign helps them understand MPA rules.



Harbor signs show a large geographic area, all of which contain some areas that allow fishing. Due to their placement at a harbor, there are no restrictions in the immediate vicinity of the sign in most cases, skewing answers to these statements when compared to other signs evaluated.

Top Sign Elements Recalled



Map



Regulatory Text

INTENT

Respondents were asked to rate the likelihood they would participate in extractive activities at the sign site.

'I will fish here' % Respondents in **disagreement**:



'I will collect from the shore/tidepool here'

% Respondents in **disagreement**:



Sign Elements That Best Convey Regulations

Map



Regulatory Text



Recommendations For Improvement

- Detailed MPA regulations
- A detailed definition for 'finfish'
- Allowed/not allowed activity icons on map
- On-the-go information
- Location orientation information
- Reduce sign content to make rules stand out

INTERPRETIVE SIGN

ATTENTION

Of the coastal visitors observed:

10.5%
Sign
observers



89.5%
Non-
observers

Sign Element of Attraction

Pictures



Length of Observation

19.2 Seconds (avg)

AWARENESS

% of Respondents who knew MPA rules:



84.3%
Consumptive
users



67.1%
Non-consumptive users

Main Purpose of Sign

(Most Commonly Recalled)

Highlight local area information

ATTITUDES

'The sign location is a good place for fishing'

% Respondents in **disagreement**:



44.4%
Consumptive
users



47.6%
Non-consumptive users

'The sign location is a good place for collecting from tidepools'

% Respondents in **disagreement**:



55.6%
Consumptive
users



48.2%
Non-consumptive users

Perceived Impact: Communicating Rules

% Respondents that **agree** the sign helps them understand MPA rules.



71.1%
Consumptive
users

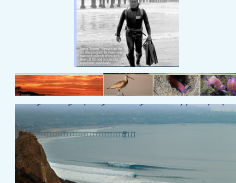


84.4%
Non-consumptive users

Top Sign Elements Recalled



Map



Pictures



General Area
Information

INTENT

Respondents were asked to rate the likelihood they would participate in extractive activities at the sign site.

'I will fish here' % Respondents in **disagreement**:



93.9%
Consumptive
users



84.4%
Non-consumptive users

'I will collect from the shore/tidepool here' % Respondents in **disagreement**:



92.7%
Non-consumptive users



100%
Consumptive
users

Sign Elements That Best Convey Regulations

Map



Regulation Text

Point Vicente No-Take State Marine Conservation Area (No-Take SMCA)
Prohibits the take of living, geological, and cultural marine resources.
Se prohíbe la toma o posesión de cualquier recurso marino vivo, geológico o cultural.

Abalone Cove State Marine Conservation Area (SMCA)
Some recreational and/or commercial take of marine resources may be allowed.
La toma de algunos recursos marinos, recreacionales y/o comerciales es permitida.

Recommendations For Improvement

- Detailed MPA regulations
- Allowed/not allowed activity icons on map
- Boundary identifiers
- Reduce sign content to make rules stand out
- Compile all agency rules on one sign

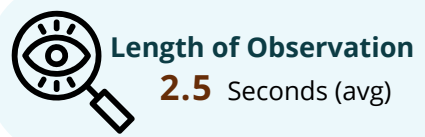
REGULATORY SIGN

ATTENTION

Of the coastal visitors observed:

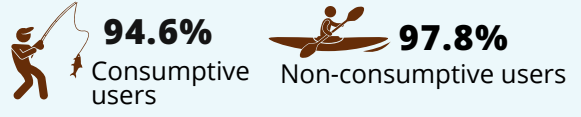


Sign Element of Attraction
No-take Symbols



AWARENESS

% of Respondents who knew MPA rules:



Main Purpose of Sign
(Most Commonly Recalled)

Explain MPA Rules

Top Sign Elements Recalled



Take Restriction Recalled



Icon/Symbol



Aesthetic Information

ATTITUDES

'The sign location is a good place for fishing'
% Respondents in **disagreement:**



'The sign location is a good place for collecting from tidepools'
% Respondents in **disagreement:**



Perceived Impact: Communicating Rules
% Respondents that **agree** the sign helps them understand MPA rules.



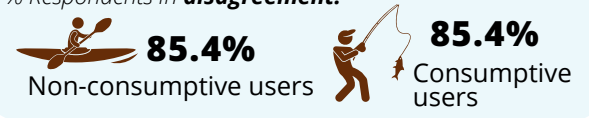
INTENT

Respondents were asked to rate the likelihood they would participate in extractive activities at the sign site.

'I will fish here' % Respondents in **disagreement:**



'I will collect from the shore/tidepool here'
% Respondents in **disagreement:**



Sign Elements That Best Convey Regulations

No-take Icons/Symbols



Recommendations For Improvement

- Map with boundary identifiers
- Additional MPA information
- Alternative locations for activities not allowed
- Compile all agency rules on one sign

TIDEPOOL SIGN

ATTENTION

Of the coastal visitors observed:

11.6%
Sign observers



88.4%
Non-observers

Sign Element of Attraction
Hermit Crab



Length of Observation
4.8 Seconds (avg)

AWARENESS

% of Respondents who knew MPA rules:



84.6%
Consumptive users



82.7%
Non-consumptive users

Main Purpose of Sign

(Most Commonly Recalled)

Explain MPA Rules

Top Sign Elements Recalled



Hermit Crab



Specific Take Restriction Recalled



Symbols

ATTITUDES

'The sign location is a good place for fishing'

% Respondents in **disagreement:**



66.7%
Consumptive users



51.9%
Non-consumptive users

'The sign location is a good place for collecting from tidepools'

% Respondents in **disagreement:**



72.7%
Consumptive users



59.2%
Non-consumptive users

Perceived Impact: Communicating Rules

% Respondents that **agree** the sign helps them understand MPA rules.



97.5%
Consumptive users



98%
Non-consumptive users

INTENT

Respondents were asked to rate the likelihood they would participate in extractive activities at the sign site.

'I will fish here' % Respondents in **disagreement:**



96.6%
Consumptive users



93.5%
Non-consumptive users

'I will collect from the shore/tidepool here'

% Respondents in **disagreement:**



92.3%
Non-consumptive users



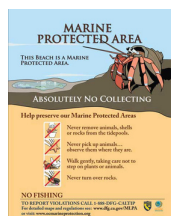
97.2%
Consumptive users

Sign Elements That Best Convey Regulations

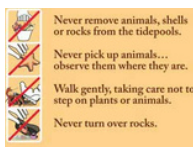
Regulation Text

NO FISHING

Entire Sign



Icons



Recommendations For Improvement

- Map
- Additional MPA information
- Fishing information
- Alternative locations for activities not allowed
- Compile agency rules on one sign

YOU ARE HERE SIGN

ATTENTION

Of the coastal visitors observed:

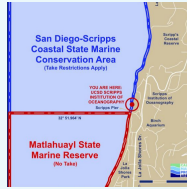
14.6%
Sign
observers



85.4
Non-
observers

Sign Element of Attraction

Map



Length of Observation
3.1 Seconds (avg)

AWARENESS

% of Respondents who knew MPA rules:



87.9%
Consumptive
users



74.5%
Non-consumptive users

Main Purpose of Sign

(Most Commonly Recalled) *Location Orientation*

Top Sign Elements Recalled



Map



Specific Take
Restriction Recalled



QR Code

ATTITUDES

'The sign location is a good place for fishing'

% Respondents in **disagreement**:



41.7%
Consumptive
users



32.1%
Non-consumptive users

'The sign location is a good place for collecting from tidepools'

% Respondents in **disagreement**:



58.3%
Consumptive
users



40.4%
Non-consumptive users

Perceived Impact: Communicating Rules

% Respondents that **agree** the sign helps them understand MPA rules.



87.5%
Consumptive
users



75.4%
Non-consumptive users

INTENT

Respondents were asked to rate the likelihood they would participate in extractive activities at the sign site.

'I will fish here' % Respondents in **disagreement**:



91.1%
Consumptive
users



94.5%
Non-consumptive users

'I will collect from the shore/tidepool here' % Respondents in **disagreement**:



92.8%
Non-consumptive users



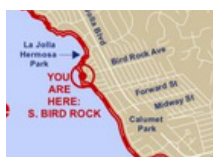
94.3%
Consumptive
users

Sign Elements That Best Convey Regulations

Map



Location Marker



Regulation Text



Recommendations For Improvement

- Detailed MPA regulations, especially for SMCAs
- Boundary identifiers
- Allowed activity icons on map
- Alternative locations for activities not allowed



DISCUSSION



SIGNS WORK.... WHEN VIEWED

Of the nearly 3,000 coastal visitors observed, only 136 observed the sign upon arrival. With just under 5% of observed visitors stopping to view the sign upon arrival, this suggests that coastal visitors in general are not likely to view signs while visiting the coast. Of those who did not stop to view the sign, nearly half had visited before and not seen the sign previously, while 23% had. While not every visitor may look at signs, they are a helpful resource for the subset of the population that does tend to view signs. Across all sign types, sign observers were more likely to recall the correct rules for the nearby MPAs. In order to increase the chances of the sign being viewed, placement must be considered.

**COASTAL VISITORS
ARE NOT LIKELY TO
VIEW SIGNS...
BUT
...SIGN OBSERVERS
ARE MORE LIKELY TO
RECALL THE CORRECT
MPA RULES**

EXISTING SIGN EFFECTIVENESS

This study resulted in intriguing results that inform the effectiveness of existing California MPA Network signs in increasing understanding of MPA regulations, and consequently compliance. By reviewing the different measures used to understand sign effectiveness, we can understand the impact of each sign on visitor attention, awareness, attitudes and intent to participate in extractive activities. The following pages outline high-level findings by measure considered in this study, and highlights effectiveness by sign type.

Attention

A sign's ability to capture and hold attention was the first indicator considered, as in order to obtain the messaging from the sign, it first needed to be viewed. The **Regulatory** and **You Are Here** signs were the most effective at capturing attention, while the **Interpretive** and **Harbor** signs were able to hold visitor attention for a longer duration than the other sign types.

Awareness

Awareness of conservation topics can lead to compliance with conservation regulations (Cornelisse & Duane 2013, Leisher et al. 2012, George & Crooks 2006). The **Regulatory**, **Tidepool** and **You Are Here** signs performed the best at improving awareness of MPA regulations among coastal visitors, as a majority of respondents were able to recall the specific MPA rules, and also noted regulations/take restrictions as the top recalled sign elements.

Attitudes

Attitudes were assessed in order to understand if signs were positively correlated to attitudes in agreement with MPA regulations. The **Tidepool** and **Regulatory** signs were associated with attitudes most likely to lead to favorable compliance outcomes, specifically in relation to whether the MPA is a good place for fishing and collecting from the tidepool. Additionally, the **Regulatory** and **Tidepool** signs elicited the most pro-compliance responses to questions about the signs perceived ability to help visitors understand local MPA rules and influence behavior while visiting the location. There were no significant differences between sign type in terms of perception of the MPA working and the strictness of rules.

Intent

Intent to participate in certain extractive activities was assessed in order to understand if signs were correlated to behavioral intentions in line with MPA regulations. The **Regulatory** and **Tidepool** signs returned the most favorable responses (no intent to participate) from respondents who were asked to specify the chances they would participate in extractive activities at the sign site.

HIGH LEVEL FINDINGS

Attention

Capturing Attention: Number of observations	Keeping Attention: Length of observation
<ol style="list-style-type: none"> 1. Regulatory 2. You Are Here 3. Tidepool 4. Interpretive 5. Harbor 	<ol style="list-style-type: none"> 1. Interpretive 2. Harbor 3. Tidepool 4. You Are Here 5. Regulatory

Signs are ranked in order of effectiveness, with the most effective listed first.

*No significant difference between sign types found
 ** Harbor signs are not installed at a MPA, but rather in the vicinity, and show a greater geographic scale. This resulted in expected differences when compared to other sign types, that are installed in the immediate vicinity of an MPA and have a focused geography.

Awareness

MPA Regulations: Consumptive Users	MPA Regulations: Non- Consumptive Users	Reporting Compliance Issues *	Main Topic Take-Away	
<ol style="list-style-type: none"> 1. Regulatory 2. You Are Here 3. Tidepool 4. Interpretive 5. Harbor 	<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 3. You Are Here 4. Interpretive 5. Harbor 	82.4% do not know how to report compliance issues, while 17.7% said they do. 65% of respondents that indicated they know what to do, knew to notify CDFW or CalTIP.	<ul style="list-style-type: none"> • Harbor: Explain regulations; show map of protections • Interpretive: Highlight local information • Regulatory: Explain regulations • Tidepool: Explain regulations • You Are Here: Location orientation 	
Top Sign Elements Recalled				
Harbor	Interpretive	Regulatory	Tidepool	You Are Here
<ol style="list-style-type: none"> 1. Map 2. Written regulations 	<ol style="list-style-type: none"> 1. Pictures 2. Maps 3. Area information 	<ol style="list-style-type: none"> 1. Take restrictions 2. No Take Icons 	<ul style="list-style-type: none"> • Hermit Crab illustration • Specific take restrictions 	<ul style="list-style-type: none"> • Specific take restrictions • Map • QR code

Attitudes

Signs listed in order of those that elicited the most positive responses (in favor with MPA regulations and concepts)

'This is a good place for fishing'	'This is a good place for collecting from the tidepools'	'The rules are too strict here' *	'The MPA is not working' *	
			Consumptive Users	Non- Consumptive Users
<ol style="list-style-type: none"> 1. Tidepool 2. Regulatory 3. You Are Here 4. Interpretive 5. Harbor** 	<ol style="list-style-type: none"> 1. Tidepool 2. Regulatory 3. You Are Here 4. Interpretive 5. Harbor** 	<ol style="list-style-type: none"> 1. Harbor** 2. Regulatory 3. Tidepool 4. You Are Here 5. Interpretive 	<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 	<ol style="list-style-type: none"> 1. Tidepool 2. Harbor**

Attitudes

Communicating Rules		Influencing Behavior		Best Elements for Communicating Rules
Consumptive	Non- Consumptive	Consumptive	Non- Consumptive	
<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 3. You Are Here 4. Harbor 5. Interpretive 	<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 3. Harbor 4. Interpretive 5. You Are Here 	<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 3. You Are Here 4. Interpretive 5. Harbor 	<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 3. Harbor 4. Interpretive 5. You Are Here 	<p>Harbor: Map and the 'entire sign'.</p> <p>Interpretive: Combination of map and rules and the regulation text.</p> <p>Regulatory: No take symbols.</p> <p>Tidepool: Regulation text, icons and the 'entire sign'.</p> <p>You Are Here: Map, location marker and regulation text.</p>

Intent Signs listed in order of those that elicited the **most positive responses** (in favor with MPA regulations and concepts)

Intent to Fish at the MPA	Intent to Collect from Shore/ Tidepools
<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 3. You Are Here 4. Interpretive 5. Harbor 	<ol style="list-style-type: none"> 1. Regulatory 2. Tidepool 3. Interpretive 4. You Are Here 5. Harbor

WHICH SIGN IS MOST EFFECTIVE?

Each sign had strengths and weaknesses, but the regulatory sign was the most effective when comparing across measures, followed by the tidepool sign.



Regulatory Sign: The Regulatory sign was the most impactful for many of the measures considered for attention, knowledge, attitudes and intent. A greater proportion of coastal visitors stopped to view the Regulatory sign than any other sign type, yet it had the shortest average length of observation (2.5 seconds). Despite the short length of observation, a majority of survey respondents were able to recall MPA rules as a result of this sign treatment. This sign also had the best results in terms of influencing favorable attitudes and behavioral intent. In comparison to other sign types, the Regulatory sign includes the least amount of information, but was the most effective at conveying attention.



Tidepool sign: The Tidepool sign also was at the top of the ranks for many of the measures considered. The Tidepool sign was the second most viewed sign, with an average view time of 4.8 seconds. Similar to the Regulatory sign, a greater proportion of respondents were able to recall the local regulations and important sign elements than the other sign types.

RECOMMENDATIONS

Improving Existing Signs

While the **Regulatory** and **Tidepool** signs were deemed the most effective at influencing compliance with MPA regulations, there are overarching recommendations for improving the MPA signs evaluated, which are presented below. These suggested recommendations are presented to inform modifications to existing materials, as well as the development of new materials, to improve communications with coastal visitors.

RECOMMENDATIONS BY SIGN TYPE

HARBOR

- Detailed MPA regulations
- A detailed definition for 'finfish'
- Allowed/not allowed activity icons on map
- On-the-go information
- Location orientation information
- Reduce sign content to make rules stand out

INTERPRETIVE

- Detailed MPA regulations
- Allowed/not allowed activity icons on map
- Boundary identifiers
- Reduce sign content to make rules stand out
- Compile agency rules

REGULATORY

- Map with boundary identifiers
- Additional MPA information
- Alternative locations
- Compile agency rules

TIDEPOOL

- Map
- Additional MPA information
- Fishing information
- Alternative locations
- Compile agency rules

YOU ARE HERE

- Detailed MPA regulations
- Boundary identifiers
- Allowed activity icons on map
- Alternative locations

Similarities Among Suggestions

Across sign types, there were many similarities among suggestions to help increase understanding of MPA regulations.

One of the most common includes the **addition of detailed regulations**. Many respondents expressed frustration with the lack of detail when it came to the SMCA regulations, noting that the listed regulations were vague. While some of the signs have ways to acquire regulation information like the QR code, others do not. And in some instances, signs are located in areas where there is no service to allow for further research into regulations. By adding specific regulation information, it will take the mystery out of it for coastal visitors. Originally, official CDFW summary regulations were used in case slight regulation changes were made, enabling the signs to still be accurate.

Icons for allowed/not-allowed uses were also requested on the signs that have maps. Qualitative analysis showed that many respondents noted that an icon - similar to those used on the regulatory signs - would enable them to see and understand the rules at a slight glance. Icons are a unique mode of communication, enabling for those that view them to understand the meaning much 'quicker than their word equivalents, and provide for communication across different languages (Mcdougall et al. 1999).

Another common suggestion was to **include all of the rules, across agencies, on one sign**. Locals were quick to note that the signs were not comprehensive of the area rules. While these signs are specific to MPAs, requiring a visitor to read multiple signs to understand area rules is an ineffective means of communication as so few visitors tend to read signs as it is. By reducing competition for messaging and concentrating cross-agency efforts, the impact of such signs may be improved.

Similarities Among Suggestions

Another common recommendation was to **include information on alternative locations to do activities not allowed at that MPA**, so for example, providing information on locations where fishing is permitted, like in the [Los Angeles MPA Collaborative fishing poster](#), and [Orange County Marine Protected Area Collaborative signs](#) that include a QR code leading to information on dog-friendly beaches.

Boundary identifiers were also requested so that visitors could have an way to check MPA boundaries without a GPS unit. The LA [fishing poster](#) and [brochure](#) both offer great examples of how to display boundaries.

It is important to note that the signs with less general MPA information (Regulatory and Tidepool) returned requests for more general MPA information, whereas the content-heavy Interpretive sign received conflicting recommendations for reducing the amount of text to make the MPA regulations stand out. Respondents often requested the opposite of what they were shown.

A NEW KIND OF SIGN

While the existing MPA sign templates can be improved based on the aforementioned recommendations, with overlapping recommendations across sign type it is worth considering the development of a new sign template that pulls together the most effective communication elements from different signs to address area-specific needs. A few examples of what this could look like are listed below, but there are many possibilities. Working with local community partners will be imperative to identifying the appropriate elements needed to create effective audience and area specific signs.

- **Sites with Known Compliance Issues:** For sites with known compliance issues, we recommend developing a new sign to address site specific needs by combining certain elements of existing signs. For instance, an emphasis on shore fishing or harvesting from the tidepools if that is an identified compliance concern. These signs, designed on a site by site basis but following a common template, could include the no-take icon(s), a map with location orientation information, specific regulations, and a QR code to enable the visitor to take information on-the-go. Special attention should be given to areas without good cellular service if the sign requires visitors to find more information on their own. For areas with known fishing compliance issues, information on alternative locations to do activities not allowed at that MPA could be provided. For areas like tidepools that experience disproportionately high visitation at times, signs could include etiquette for interacting with the marine environment.
- **Sites with High Visitation, Low Impact to Resource:** For sites with many visitors, but that don't experience a high risk to marine resources due to human impacts, signs can still be a useful tool to communicate to those who don't tend to interact with the environment in a harmful way. A sign could be developed to include the elements deemed most effective (icon, map with location information, specific rules), as well as general MPA information, a request from the existing signs that have little content.
- **High Visitation, No Access Sites:** Certain locations are also excellent candidates for content-heavy interpretive signs, such as interpretive centers and aquaria. These signs could include maps with location orientation information, icon symbols on the maps, a QR code to scan for mobile information, and site-specific MPA information including recreation opportunities, tribal stories, ocean etiquette, and more.

While signs are not viewed by a majority of coastal visitors, they do prove effective for those that read them. By improving the value of the content included on the signs by crafting it to fit site-specific and user-specific needs, and emphasizing elements that prove better at capturing attention, sign viewership and effectiveness will improve.



OVERARCHING RECOMMENDATIONS: IMPROVING SIGN EFFECTIVENESS

Beyond the signage recommendations to improve compliance with MPA regulations outlined in the preceding pages, recommendations for selecting sign type and strategic installation are detailed in this section.

Signs Designed with Goals in Mind

Signs types should be selected and designed with goals in mind. Is the goal to increase compliance with rules? Increase awareness of MPAs in general? Location orientation relative to an MPA? Because different locations and audiences have vastly different needs, we recommend choosing sign type and developing sign content on a case by case basis. For instance, an MPA that is easily accessible is a good candidate for a Regulatory sign, where an area with no access (e.g., on a bluff above the MPA) but high visibility may be a better contender for an Interpretive sign. If the goal is to increase compliance with MPAs, at a glance symbols should be used to communicate rules to the small proportion who do stop to read, and those that walk by with a glance. Updates should be made to existing signage templates to incorporate recommendations from the evaluation. **New sign templates should be considered, that allow for the incorporation of multiple sign elements to address both site-specific compliance needs and audience-specific needs.**



Sign Placement

Sign placement is an important factor that can influence the chance of the sign being viewed. Each sign evaluated was chosen based on its ideal placement, but unfortunately, many signs in California have been installed in locations that are not conducive to attracting visitors. This includes signs installed below waist level, hidden behind bushes, and in places where the sign would only be visible upon exiting the beach. Additionally, proximity to MPA should be considered, as signs are more effective when they are located within proximity to the location where the behavior is desired, and when that behavior is convenient (Meis & Kashima 2017, Geller et al. 1973, Kurz et al. 2005, Craig & Leland 1983).

Sign ‘litter’ is also of concern. When a sign is installed at a location with many other signs in the immediate vicinity, it lessens the chance of it being viewed as the signs are all in competition for visitor attention. While signs already have a low chance of being viewed upon arrival, this impacts the chances even more.



THE FUTURE OF MPA NETWORK SIGNAGE IN CALIFORNIA

California is currently in the process of reviewing the MPA Network for the first time since implementation. Despite these findings that most do not look at MPA signs upon arrival, they do play an important role in MPA management. The presence of MPA signs with regulatory information makes California MPAs enforceable, similar to how no parking signs are placed on red curbs. Beyond this, their impact will grow by implementing recommendations from this research to improve efficacy.

Now more than ever, there is a better understanding of MPA compliance issues. *A new round of MPA signage is on the horizon, offering a unique opportunity to address known compliance concerns through improved signage, designed to address site and audience specific needs.* Over the next couple years, sign templates will be redesigned and priority locations will be identified for new or updated signage to address site-specific compliance concerns.

IMPORTANCE OF UNDERSTANDING AREA & AUDIENCE-SPECIFIC NEEDS

Engaging with coastal visitors to understand the diversity of needs contributes to more effective outreach and communications in the long term (Leisher et al. 2012). An increase in awareness of conservation topics can lead to compliance with conservation regulations, therefore it is imperative that the education and outreach materials contain appropriate information in a style, format, and language they respond to (Cornelisse & Duane 2013, Leisher et al. 2012, George & Crooks 2006).

Previous research into compliance and behavior change highlight the critical importance of understanding audience-specific needs and our findings confirm this. Results from this research highlight select differences in how different user groups responded to the sign treatments.

Despite audience type, we found that the existing signs could use modifications to become more effective at increasing compliance with MPA regulations. By incorporating these recommendations based on site-specific compliance concerns, signage can be better suited to communicate the intended messaging.





CONCLUSION





California’s MPA Network has been in place for over a decade, with extensive investment in MPA education and outreach by public and private entities. With new evaluation of MPA education and outreach tools, it has become clear that certain outreach mechanisms are more impactful than others, and all require investment in continued monitoring and evaluation to improve communication tools.

While MPA signs are impactful to a certain degree, this research has demonstrated that **signs are not a stand alone solution for addressing MPA compliance issues**. While they have the potential to be impactful and convey the intended messages, most visitors do not read signs upon arrival to these coastal places, even if it is their first time visiting. Despite this, signage has an important place in MPA education and outreach, and sign impact can be bolstered by utilizing on-site educators, docents, and volunteers to help direct people to signage while sharing information, allowing for multiple levels of communication.

This report contains a cadre of recommendations that will be taken into consideration to improve efficacy into the future. By considering goals for the sign from the start, acknowledging unique site and audience specific needs, and incorporating suggestions for sign installation, MPA signage in California will become more impactful.

**BY ACKNOWLEDGING
UNIQUE SITE- AND
AUDIENCE- SPECIFIC NEEDS,
CALIFORNIA MPA SIGNS
WILL BECOME MORE
IMPACTFUL.**

This study highlights the importance of continually assessing MPA outreach tools among unique target audiences to allocate limited state resources efficiently and successfully. Before evaluating MPA network signs for their impact on coastal visitors, over 500 signs had been installed. **Because different audiences and different sites along the California coast have vastly different needs, MPA education and outreach cannot be undertaken with a one-size-fits-all approach.** Awareness, understanding, and perceptions are imperative to the success of conservation initiatives; therefore, it is crucial to understand audience and area specific needs before updating existing education and outreach materials or developing new materials.



QUESTIONS?

CONTACT:

Katelyn Sprofera, Project Lead
Katelyn@CaliforniaMSF.org
Program Manager & Evaluation Specialist
California Marine Sanctuary Foundation



REFERENCES

Baltes MM, Hayward SC. Application and evaluation of strategies to reduce pollution: Behavioral control of littering in a football stadium. *Journal of Applied Psychology*. 1976;61(4):501–6.

Cornelisse, T. M., & Duane, T. P. (2013). Effects of Knowledge of an Endangered Species on Recreationists' Attitudes and Stated Behaviors and the Significance of Management Compliance for Ohlone Tiger Beetle Conservation. *Conservation Biology*, 27(6), 1449–1457. <https://doi.org/10.1111/cobi.12117>

Craig HB, Leland LS. Improving cafeteria patrons' waste disposal. *Journal of Organizational Behavior Management*. 1983;5(2):79–88.

Creswell, J. W., & Poth, C. N. (2007). *Qualitative inquiry and research design: choosing among five approaches* (4th ed.). Sage.

Geller ES, Farris JC, Post DS. Prompting a consumer behavior for pollution control. *Journal of Applied Behavior Analysis*. 1973;6(3):367–76. pmid:16795418

George, S. L., & Crooks, K. R. (2006). Education and Conservation on the Urban-Wildland Interface : Testing the Efficacy of Informational Brochures. *Southwestern Association of Naturalists*, 51(2), 240–250.

Kurz T, Donaghue N, Walker I. Utilizing a social-ecological framework to promote water and energy conservation: A field experiment. *Journal of Applied Social Psychology*. 2005;35(6):1281–300.

Leisher, C., Mangubhai, S., Hess, S., Widodo, H., Soekirman, T., Tjoe, S., Wawiyai, S., Neil Larsen, S., Rumetna, L., Halim, A., & Sanjayan, M. (2012). Measuring the benefits and costs of community education and outreach in marine protected areas. *Marine Policy*, 36(5), 1005–1011. <https://doi.org/10.1016/j.marpol.2012.02.022>

Mcdougall, S.J, Curry, M.B., deBruijn, O. Measuring symbol and icon characteristics: Norms for concreteness, complexity, meaningfulness, familiarity, and semantic distance for 239 symbols. *Behavior Research Methods, Instruments, & Computers* 31, 487–519 (1999). <https://doi.org/10.3758/BF03200730>

Meis, J., & Kashima, Y. (2017). Signage as a tool for behavior change: Direct and indirect routes to understanding the meaning of a sign. *PLoS ONE* 12(8): e0182975. <https://doi.org/10.1371/journal.pone.0182975>

Mellish, S., Pearson, E. L., McLeod, E. M., Tuckey, M. R., & Ryan, J. C. (2019). What goes up must come down: an evaluation of a zoo conservation-education program for balloon litter on visitor understanding, attitudes, and behaviour. *Journal of Sustainable Tourism*, 27(9), 1393–1415. <https://doi.org/10.1080/09669582.2019.1625908>

Reiter SM, Samuel W. Littering as a function of prior litter and the presence or absence of prohibitive signs. *Journal of Applied Social Psychology*. 1980;10(1):45–55.

Thaler, A. D., Zelnio, K. A., Freitag, A., MacPherson, R., Shiffman, D., Bik, H., Goldstein, M. C., & McClain, C. (2012). Digital environmentalism: Tools and strategies for the evolving online ecosystem. *Environmental Leadership: A Reference Handbook*, 364–372. <https://doi.org/10.4135/9781452218601.n39>



APPENDICES

A. Study Sites

B. Length Of Observation: Pairwise Test

C. Respondent Demographics

STUDY SITES

Sign Type	Region	County	Site
Harbor	North	Del Norte	Crescent City Harbor
	Central	Monterey	Monterey Harbor
	South	Los Angeles	Avalon: Green Pier
Regulatory	North	Mendocino	Point Cabrillo
	Central	San Luis Obispo	Lampton St. Park
	South	San Diego	PB Point
Interpretive	North	Sonoma	Bodega Head
	Central	Santa Cruz	Natural Bridges
	South	San Diego	Scripps Pier
Tidepool	South	Orange County	Crescent Bay
	South	San Diego	Wynmar St.
	South	San Diego	Bird Rock North
You Are Here	North	Sonoma	Bodega Head
	Central	San Luis Obispo	Elephant Seal Viewpoint
	South	San Diego	Bird Rock South
Control	North	Humboldt	Table Bluff Park
	Central	San Mateo	Moss Beach
	South	San Diego	Loring St.

LENGTH OF OBSERVATION: PAIRWISE TEST

Tukey's HSD Test for multiple comparisons found that the average length of observation was significantly different between 10 of the 15 groups, while there was no statistically significant difference between the length of observation for 5 of the groups

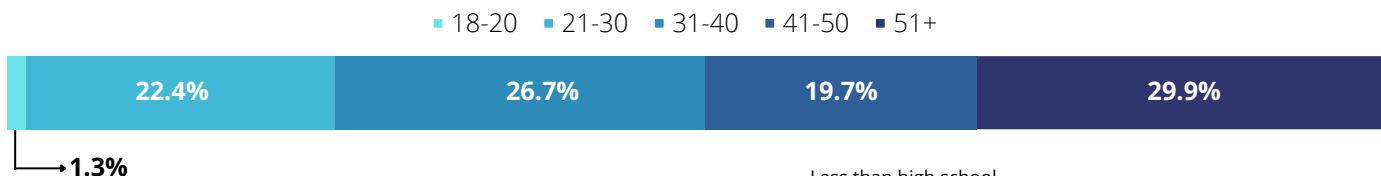
Ranked Pairwise Test Results: Length of Observation by Sign Type

Group 1	Group 2	P-Value
Control	Regulatory	0.0010*
Control	You Are Here	0.0111*
Control	Harbor	0.0112*
Control	Interpretive	0.0164*
Harbor	Regulatory	0.0200*
Interpretive	Regulatory	0.0241*
Harbor	You Are Here	0.0277*
Control	Tidepool	0.0282*
Interpretive	You Are Here	0.0298*
Interpretive	Tidepool	0.0461*
Harbor	Tidepool	0.0547
Regulatory	Tidepool	0.324
Tidepool	You Are Here	0.772
Regulatory	You Are Here	0.787
Harbor	Interpretive	0.900

RESPONDENT DEMOGRAPHICS

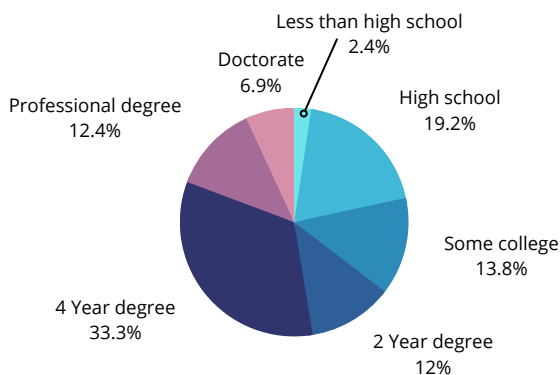
Age

The average age of respondents was 43 years old, with a minimum of 18 and a maximum of 78. The chart below shows the percent of survey respondents in each age bracket.



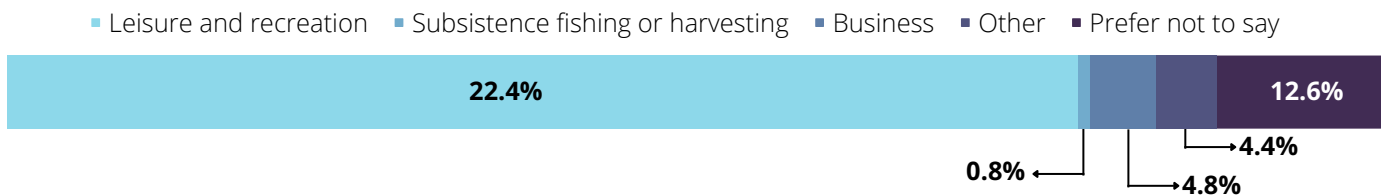
Education

Respondents were asked to note the highest level of education completed. The most common response was a 4 year degree (33.3%), followed by high school (19.2%).



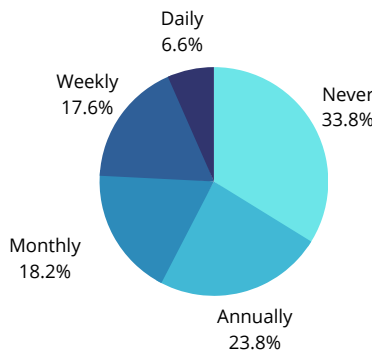
Purpose of Visit

Survey respondents were asked the purpose of their visit. A large majority were visiting for leisure and recreation, indicating MPAs are indeed, places to play!



Frequency of Visit

Information on respondent frequency of visit to the location was collected. A majority of survey respondents were first time visitors to the area (33.8%). Daily visitors accounted for 6.6% of survey responses, and weekly visitors, 17.6%.





CMSF

CALIFORNIA
MARINE
SANCTUARY
FOUNDATION