

Lessons Learned from Pillar Point Tidepool Stewards

By Natalie Downe, Pillar Point Tidepool Stewards Program Coordinator, October 2022

The Pillar Point Tidepool Stewards program is an initiative started in February 2022 to address the harmful increase in unsustainable harvesting practices observed at the Pillar Point reef near Half Moon Bay, California. Pillar Point reef is a mixed-use area that is open to collecting (only protected by [Fish and Game Regulations](#)) on the south side of the reef. To the North are two California marine protected areas (MPAs), [Pillar Point State Marine Conservation Area](#) (SMCA) and above that further up the coast is [Montara State Marine Reserve](#) (SMR). The Pillar Point SMCA that covers part of Pillar Point Reef does allow for some recreational and commercial take but does not allow for any intertidal collection, while the Montara SMR does not allow for any take.



Image of Pillar Point Reef showing the adjacent Pillar Point SMCA, and nearby Montara SMR via Google Earth.

Due to the mixed-use nature of the reef it was important to make people aware of the MPA boundary to increase awareness of, and compliance with, MPA regulations. The program was funded by a grant to the [San Mateo MPA Collaborative](#), part of the MPA Collaborative Network, made through the Sustaining California's Ocean program of Resources Legacy Fund. The California Academy of Sciences served as the collaborative's fiscal sponsor.

Over the course of the year, 22 volunteers were recruited, trained and deployed to the reef during daytime low tides, to engage with visitors and educate them about sustainable harvesting practices and the ecological importance of the reef.

This document explains how the program was designed and implemented, and the lessons we learned that could be applied to future stewardship programs in other locations.

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Volunteer recruitment

We started by estimating the number of volunteers we would need to train for the program to run over the course of the year. We calculated the number of low tides occurring during daylight hours, and used that to estimate the number of volunteers we would need, assuming three shifts a year per volunteer.

See the section on shift calculations for more details:

<https://docs.google.com/document/d/1w2BDafpUaWORW3HaXBZ5f1U1GMAS9BlzzoXFMmAldp0/edit#bookmark=id.cze04c7y7tfz>

Our target was 28 volunteers. This was also influenced by a desire to keep the training sessions manageable. We recruited volunteers by putting up eye-catching posters in community centers, notice boards, cafes, shops and hubs of activity near the reef.

Poster: <https://drive.google.com/file/d/1L4vn4QqX33pE-ASfy1-Xnx0JCPdO-mML/view>

We also used social media to recruit volunteers from the Nextdoor app and local community groups on Facebook. Other networks we used to recruit volunteers included the San Mateo MPA Collaborative, California Academy of Sciences Pillar Point tidepool volunteer mailing list, and Beach Watch mailing lists.

We used this Google Form to collect the details of interested volunteers:

https://docs.google.com/forms/d/e/1FAIpQLSeNIQjY_0Ye_uDF8wrySbrzbw04jMV20H6leeOY-eOTz2QbBg/viewform



Save Pillar Point Reef Join the tide pool steward program!

The pandemic has brought thousands of new visitors to Pillar Point Reef and the increased harvesting is taking its toll on the ecology of the area.

The **San Mateo MPA Collaborative** and **California Academy of Sciences** is launching this new initiative to inspire curiosity and discourage unsustainable harvesting practices of marine life, to help the recovery of wildlife in the area and ensure a productive, biodiverse reef for generations to come.



We had over 70 applications. We accepted volunteers on a first-come-first-serve basis, based on when they provided proof of COVID vaccination to the program coordinator.

We did not have an interview process for accepting volunteers, due to our tight deadline in terms of training and scheduling. Interviewing candidates may have helped prioritize bilingual folks leading to a more diverse group, and help program managers get to know the personalities and physical limitations of the volunteers to help craft roles appropriate to each individual. Interviewing could also help program managers filter candidates for any future possibility of potentially confrontational attitudes that could cause issues when the volunteers talk to people on the reef; this has not been an issue to date.

This could also have helped set better expectations for the volunteers. We had two volunteers who dropped out after the first day of the training because

it did not match their expectations of what they would be doing.

While we did eventually create versions of the poster translated into Spanish and Simplified Chinese, by the time these were ready we had already filled our volunteer roster from the initial

English language recruitment effort. We had a limited number of people we could accept based on training limitations.

When recruiting for another round of volunteers we think it's really important to get the translations out at the same time, if not before, the English version to improve the diversity of the volunteer group. Partnering with Spanish and Chinese language community centers and groups would also be a good way to reach a more diverse group of volunteers.

We recognize, though, that if we advertise the program in multiple languages it would be good to be able to deliver the training in the languages advertised. We hope with continued investment and connections within the community, we will be able to recruit bilingual instructors and pay them for their time. Bilingual instructors who can work together with the main coordinator would improve our ability to recruit stewards who can communicate with a wider diversity of visitors to Pillar Point.

Training

Volunteer training took place across three sessions: one virtually on Zoom and two in-person. We added an optional third session on the reef for people who opted out of the initial reef session due to terrible weather.

Training logistics

21 of 25 volunteers joined us for the introductory Zoom session. The presenter covered topics such as why this Stewards program was started, expectations for volunteering, California MPAs, and rocky intertidal ecology; the audience asked thoughtful questions afterward.

COVID safety was a top priority in designing the training. As such, we chose to run the training entirely outside and required proof of vaccination from all volunteers in advance of the training.



The first in-person session was outdoors at the Half Moon Bay Kayak company, on folding tables and chairs borrowed from local residents.

We kept a spreadsheet of borrowed equipment, which came from 14 different households. This was a great way to build community support for the project, saved significant money and let us have an ad-hoc classroom wherever we needed it.

The weather in the first session was uncharacteristically cold and windy, which made the session uncomfortable for some volunteers.

The second half of the initial training day was out on the reef, but half of the volunteers were too cold to attend. We had to reschedule a reef session for a later date.

We moved the second day of training to a different location with better protection from the wind, in the Program Coordinator's backyard.



Holding this in a private home helped build even more of a community spirit than expected. Volunteers brought pastries and refreshments, and one of the chickens stole a slice of pizza.

All of the sessions were recorded and shared with volunteers.

Training content

Because we hadn't interviewed volunteers, we didn't know what their level of knowledge was. Some volunteers had PhDs in biology, some were residents who had never been out to the tidepools before.

We needed to get everyone to a basic level of knowledge about the specific reef they were going to be stewarding.

A big challenge for this program is that Pillar Point is a mixed-use reef that is not fully encompassed within the Pillar Point SMCA.

Volunteers need to be able to explain not just fishing regulations and the ecological impacts of ignoring them, but also provide information about the nearby MPAs and they need to be able to frame that in a positive interpretive way that inspires action. It was also really important to stress that we were not enforcing the rules, just helping educate.



First day

We started with a welcome and introductions to let people get to know each other. We deliberately had name tags that people could customize themselves with sea-life themed stickers and colored pens, because we wanted people to feel like they could express themselves and bring their full selves to the training - not staid and stuffy.

We did a bit of an icebreaker. Rebecca Johnson, San Mateo Collaborative Co-Chair and Alison Young, both Co-Directors of Biodiversity and Community Science at the California Academy of Sciences, provided an introduction to the area, to tide-pooling in general and to what makes Pillar Point special. We had an overview of ecology, biodiversity, keystone and foundation species, and some basic tide pool etiquette and safety.

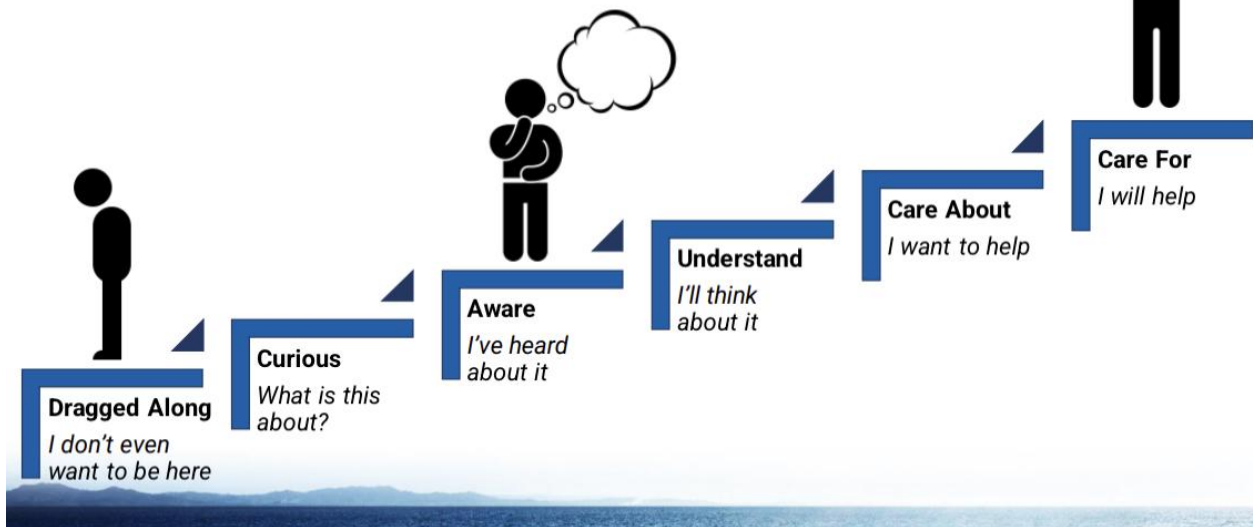
We wanted more of a focus on HOW to talk to people than what specifically to say to people. It was important that volunteers felt like they knew what they were talking about, but it was particularly important to provide good guidance on interpretation - meeting people where they were at, and being positive, curious and encouraging behavior change, not enforcing the regulations.

The Marine Mammal Center has a top-notch interpretive program, and we were lucky to have Laura Gill as a representative join us to talk about the art of interpretation and how to level people up the stewardship ladder.

The Public Continuum

Stewardship!

Steps to Stewardship - "One Step Better"



Slide from Laura Gill's presentation. Adapted for The Marine Mammal Center from NAI's Certified Interpretive Guide Training Workbook.

We split into two smaller groups in the afternoon for a visit to the reef. One group had a talk from Sara Worden and Environmental Scientist from the California Department of Fish and Wildlife (CDFW) on the legal catch limits, the ecological impacts of overfishing and the location of the boundary between the mixed-use reef and the MPA. They then shadowed California Fish and Wildlife Officer Gabrielle Stauffer on a patrol of the reef, observing her interacting with members of the public.

The other group had a guided tour of the reef with Rob Cala, San Mateo County Park Ranger and San Mateo Collaborative Co-Chair as well as Alison Young and Cricket Raspet from the California Academy of Sciences.

For the training on the reef we made sure to have everyone's phone number to ensure we could get in touch with them if they got lost or needed help. We counted people back in at the end of the training and used a buddy system to make sure everyone got back safely.

It was important that everyone knew how to get to the reef, since some people had not visited it before. We provided a map and directions and encouraged people to car share if they needed to and were comfortable doing so.

- **9:00** Official "be there by" time, this will let people mingle a bit while we wait for stragglers
- **9:30 Welcome and introductions** (Alison Young and Rebecca Johnson from the California Academy of Sciences and Natalie Downe Program Coordinator for Pillar Point Tidepool Stewards)
- **9:45** 15 min break
- **10:00 Tidepool primer** (Rebecca Johnson / Alison Young)

- *10:50 10 min break*
- **11:00 Interpretation** (Laura Gill from The Marine Mammal Center)
- *12:00 Lunch & reef transport time*
- **1:00** Meet everyone by “pinch point” at the end of the path where it leaves the harbor before it becomes the beach / reef.
 - Explain the afternoon activity and break into two groups
- **1:05-2:35 Reef orientation and regulations sessions**

Second day

The second day of training aimed to go into more detail about specific expectations of the role as a Steward, as well as health and safety on the reef and how the ecology of California's coast is protected by a network of marine protected areas (MPAs).

We had a panel discussion covering tactics for interacting with people on the reef.

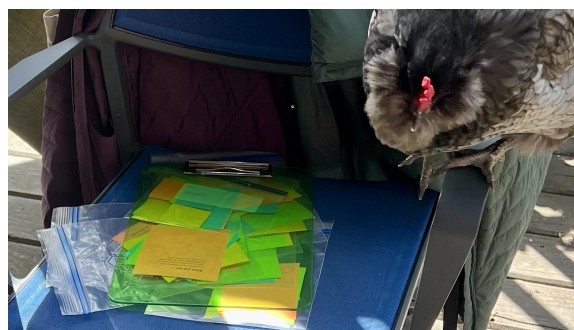
A role-player exercise was designed to help ease the volunteers into interacting on the reef, and to put into practice the lessons about interpretation from the first day of training.

- **9:00 arrive and settle in**
- **9:30-10:00 Introduction and recap from last week** (20-30 mins) (led by Alison Young and Rebecca Johnson from the California Academy of Sciences and Natalie Downe, Program Coordinator)
 - Go over the activities we had them do on the reef or share one surprising fact they learned from the last training
- **10:00-10:30 MPAs** (Sara Worden, CDFW Environmental Scientist)
- **10:30-11:00 Water safety, Harbor rules** (Cary Smith, Training Officer, Pillar Point Harbor Patrol)
- *11:00-11:10 ten min break*
- **11:15-12:00 Your role as a steward** (Natalie and Rebecca)
 - Health and safety and respect of the reef, what to wear etc
 - Learning from visitors & how to tell us stuff you learned
 - Tidepool etiquette refresher
 - Overall aim of this program and what's expected of Stewards, using walkie talkies
 - How to use the website to sign up for shifts
- *12:00-1:00 Lunch break*
- **1:00-1:30 Panel** to discuss tactics/stories of interacting with people on the reef (Sara Worden, Gaba Stauffer, Rebecca Johnson, Alison Young, Rob Cala, Dru Devlin, moderated by Natalie Downe)
- **1:30-3:00 ROLE PLAYING exercise** (led by Natalie)
- **3:00-3:30pm Future of pillar point and closing** (Rebecca, Alison and Natalie)
 - Climate change / ocean acidification / microplastics impact
 - Risks again of over harvesting (pointing to communication guidebook)
 - Reiterate again the importance of biodiversity and how they will be making a difference (but not enforcing the regulations)
 - Conclusion

Role Playing exercise

The roleplaying exercises were designed to have a scenario that could have multiple approach points depending on which the volunteer prioritized or felt most comfortable with. The volunteers were grouped into teams of three so that one person could just watch and two people could interact. The person role playing as the Steward only had the scenario of what they could see, the person role playing as the visitor also had information on where they were from, if they had a fishing license, how they found out about tidepooling, what tidepooling experience they had and what else they were interested in. These scenarios were based on real world experiences from the Program Coordinator.

Three people in a group are much more likely to stay on task than just two people where conversations can take over the activity. This dividing of roles also allowed each person to absorb the interaction as an observer which is great for different learning styles because they don't also feel the pressure of responding in the moment.



There were four scenarios that they could then rotate the practice of pretending to be the member of the public and the Pillar Point Steward. This exercise turned out to be a very popular one even amongst people who don't usually enjoy role playing, it was compared to "being a tidepool detective".

The role playing exercise was wrapped up with a popcorn style group discussion about what worked well, what approaches did not do so well or assumptions people had made from the provided clues and how it informed their interpretive interaction.

Scenario One

What you see: A young family mid way out on the rocks. They are all wearing brightly colored protective gear, there are two young children in life jackets. One is about 8 and enthusiastically harvesting his own mussels and the younger one who is about 5 looks bored but is sitting near a sea star and looks about to pick it up. They have a cart and multiple buckets.

How they found out about tidepooling: They have been coming here for many years, the parents used to come when they were kids too.

Where did they come from: Redwood City

Tidepooling experience: Lots of experience finding things to eat but they don't know much about the ecology or other creatures here.

Fishing license: yes

Really interested in: finding fun things for dinner, the sense of satisfaction at having harvested food themselves and having a fun day out on the beach. The younger child is excitable when engaged but would quite like to take the starfish home.

Scenario Two

What you see: Two teenagers over by the mussel beds with their back to the ocean on a windy day, they are carrying a full dog poop bag and looking furtive, they don't have a dog with them. One is in trainers and the other is wearing a skirt and pale pink suede shoes.

How they found out about tidepooling: They are here on holiday at an airbnb with their dog nearby, they went out for a walk after lunch and they saw other people harvesting things and thought it looked fun. They have been collecting mussels and turban snails.

Where did they come from: Topeka, Kansas

Tidepooling experience: none, they buy shellfish and seafood from the market usually so they know how to cook it, but this is only their second time at the coast.

Fishing license: no, they have an idea they should have one but they thought they could get away with it.

Really interested in: Ideally they want to find urchins for Uni as they saw someone with some. They are picking up all the shellfish and already have over 50 turban snails.

Scenario Three

What you see: An older couple is heading over toward the mussel beds & MPA boundary, they have with them several buckets and an obvious bag of tools. They are wearing well used waders and are walking with intention.

How they found out about tidepooling: They are avid duck hunters who's friends told them about this place during the pandemic.

Where did they come from: San Jose

Tidepooling experience: They have been here once before with their friends, last time they found the best mussels over the MPA boundary which is where they are going.

Fishing license: no, they didn't know they needed one

Really interested in: They have a recipe in mind for mussels for a family dinner on Saturday. When they came with their friends during the pandemic, their friends didn't know they needed a license either because they read about this place on social media. Their friends showed them how to use tools to harvest the mussels.

Scenario Four

What you see: A couple over by the nudibranch pools, one of which is super excited about having found something bright yellow, the other person looks bored and is on their phone.

How they found out about tidepooling: The excitable one has been coming here for years, but hasn't been here since the pandemic. They have brought her new partner.

Where did they come from: San Francisco

Tidepooling experience: When the excitable one used to come a lot they saw all sorts of creatures and biodiversity, they stopped coming during the pandemic because the over harvesting made them sad but they wanted to show their new partner a place that was special to them. The partner has never been tidepooling before and doesn't know what to do and the excitable one is struggling to engage them.

Fishing license: no but they don't plan to harvest.

Really interested in: the excitable one wants to learn all the things but only has a basic knowledge of what's there, they don't know what the yellow thing is. The partner loves crabs and wildlife in general but was expecting creatures to be really obvious and doesn't know what they are supposed to do here.

Volunteer documents for the training

We had a code of conduct document that we shared with volunteers before the training. This did not have a signature sheet though, and we instead had to ask for verbal confirmation. A signature sheet would have been a good way to ensure that volunteers understood the expectations of them and a copy of the signed code of conduct kept on file also provides documentation and back-up later on if a volunteer is not meeting expectations and you want to let them go or adjust their behavior (even though this situation didn't occur). You can refer back to the code of conduct and have physical proof that they signed it if you end up needing to "part ways".

Code of Conduct:

https://docs.google.com/document/d/1gL_2Q0xk_9Km_x6g_Z2EzwJdglrbSw_Xs8BMit-nz64/edit

We asked people to sign a volunteer waiver prepared by the California Academy of Sciences legal team.

Waiver: [https://www.dropbox.com/s/glmon2moluodfd8/Academy Field Participant Release_2022 Pillar Pt.Intertidal Docent Program.doc?dl=0](https://www.dropbox.com/s/glmon2moluodfd8/Academy%20Field%20Participant%20Release%202022%20Pillar%20Pt.%20Intertidal%20Docent%20Program.doc?dl=0)

Lessons learned about interacting with the public on the reef

Over the course of 24 shifts (*From April 19th to September 30th*) our volunteers interacted with a wide variety of people on the reef.

Early in the design of the program we realized that a subtle shift in focus could have a profound impact on the outcome of the program. Pillar Point is a mixed-use reef, not only a marine protected area - so telling people not to harvest would not be appropriate or productive.

Instead, our focus was on **"encouraging sustainable harvesting techniques"**. This was a subtle shift in language, but it made a big difference in how people responded to our volunteers.



The key thing here was to encourage curiosity and help people understand the ecological impacts of over-harvesting and harmful harvesting practices and to know the legal catch limits and the boundary of the MPA. We wanted to inspire people to make better choices, not shame them for making bad ones and we are not there to enforce the regulations.

Going up to people in pairs helped a lot: it felt less like "chasing them down to tell them off" and allowed us to set the tone of an interaction better since it seemed more happenstance.

The best icebreaker/approach was something that is related to what they are doing. So "where did you come from today?" was treated with more confusion and hostility than **"oooooh what did you find?"** or **"have you found anything fun?"**.

At the beginning of the program we were worried that there would be a lot of conflict and tension

between volunteers and the public. We were pleasantly surprised to find that this was not the case. The vast majority of interactions were positive and friendly.

We were able to communicate with limited English speakers by using a combination of hand gestures, body language and pointing to things in the tidepools. Most people spoke enough English to understand the basics of what we were saying when approached with non-judgmental curiosity.

The volunteers said they would have liked to have had translated documents with legal limits, sustainable harvesting advice and other common issues such as toxic season for mussels that could have been given to people on the reef.

"Fun facts" about species and the local habitat were another really useful tool for demonstrating enthusiasm and engaging people in conversation. We encouraged the volunteers to share these with each other. Together with the Fitzgerald Marine Reserve volunteers (Class

of 2020) the Program Coordinator compiled this fun fact spreadsheet which was distributed to the Pillar point volunteers.

Fun facts:

https://docs.google.com/spreadsheets/d/1V3FMj-R1fYQb_V_zg2OvFqEgUYLPxRScFkcSGC3KJo0/edit#gid=0

Advice that resulted in positive interactions

Giving advice to volunteers was crucial: it helped volunteers gain confidence in speaking to strangers, and it helped harvesters feel that the interactions with our volunteers were valuable and worthwhile.

Specific advice that worked well included:

- **Backing up the regulations with the reasons why** was really effective, especially relating it back to their interests. This worked particularly well for people harvesting mussels using tools - explaining that tools would harm the byssal threads connecting the mussel bed and result in less and smaller mussels for them to harvest in the future. This could be combined with or pivoted off from observations about how all the mussels are really tiny.
- **Noting the legal catch limits.** This was particularly effective when combined with a caution about the CDFW Officers: "I wouldn't want you to get in trouble: there might be Wildlife Officers checking buckets on the way back to your car." This made the public feel like we were on their side! We were very careful through the program to instill in the volunteers that we are not enforcing the rules, just providing education.
- As we are really close to the Pillar Point SMCA, a California marine protected area (MPA), it was really important to inform visitors **where they can and can't harvest** (the specific boundary of the MPA). A sign installed on the cliff face at the MPA boundary really helped to point people to, and this advice was best received when accompanied with targeted conversation around their specific needs. For example, "as you are looking for Urchins, I know some people have had a lot of luck over near the south edge of the reef so you could try over there, and by the way, the boundary to the marine protected area is over by that sign so you are not allowed to harvest at all past that point. A map and professionally surveyed MPA boundary image created by the MPA Collaborative Network was shared with the volunteers which was essential to their understanding of the layout of the reef and exact location of the boundary line. It would have been helpful to be able to share this with the public, and the boundary line at the intertidal level is also a straight line not taking geographical features into account, which is not how it's interpreted on the ground.
- **Warning people about the toxic mussel season** was a really easy way to get people to listen to us. "I wouldn't want you to get sick: there are a lot of toxic mussels out there right now." Many people had missed the signs about this and appreciated the warning.
- Some people had misinformation that you could cook the toxins out of the mussels, and appreciated being corrected about that!
- We gave advice on things they were allowed to collect instead of toxic mussels, for example non-filter-feeding shellfish.
- If we came across inexperienced harvesters we would sometimes **introduce them to other experienced harvesters** we had already spoken to who were clearly familiar with sustainable harvesting techniques, this led to conversations that we saw lasted all day.

- An easy first interaction for the volunteers while they were still getting used to talking to people was to talk to the picnickers by the cliff face and explain that they might want to move forwards a bit because of the **active erosion** of the cliff and to avoid getting hit by falling rocks. Interpretation aimed at people's personal safety is one of the easier interactions.
- We found that people collecting uni (urchins) would sometimes use their **tools** (which they were allowed to use for uni) to poke at other creatures such as sea anemones. Pointing out that this could hurt or kill other creatures on the reef was generally effective in getting them to stop, especially when coupled with pointing out some interesting creature or form of life on the reef and fun facts.
- Another useful piece of advice that helped change behaviour was letting harvesters know that the **parts of the uni you eat are actually it's gonads**, and since it takes them till they are about 4cm in diameter to become sexually mature, it's not worth eating them if they are smaller than that. Better to leave them till they get bigger so they can also make more urchins to try and repopulate the reef (our specific reef has been decimated of urchin unlike other areas in California which have the opposite problem).
- During **harbor seal breeding season** people would often get too close to the seals without realizing that this could startle or stress them at a time when they needed to conserve their energy to survive. We told people this and advised them that if the seal looks at them or behaves differently then they are too close and should back away. We would also inform them that marine mammals are protected by law and there are recommended guidelines for how far away you need to be.

The volunteers said they would have liked to have had translated documents with legal limits, sustainable harvesting advice and other common issues such as toxic season for mussels that could have been given to people on the reef.

Shift logistics

We used a group Slack channel to share tips on how best to interact with the public, and to share shift reports summarizing what happened during each shift. This also helped build community between the volunteers. A future improvement would be to have a structured form for volunteers to report how many people they saw / contacted, main issues noticed, photos, interpretative tips and things that worked, free form notes per shift

In terms of shift times: we found that an hour and a half before low tide was too early. Most harvesters didn't turn up till about 30 minutes before low tide because most harvesters didn't seem to know that they should come before low tide rather than at low tide, especially inexperienced harvesters. Another interesting anomaly we noticed was that if the actual time of the low tide was after 7 am (and more so after 8 am) then there was a dramatic step increase in people, e.g., a low tide of 6:49 am and a low tide of 7:03 am would have noticeably more people at the later low tide, especially if there were lower tides later or earlier that week.

It was useful to have someone - during the course of this grant funded project, it was the Program Coordinator - who was not out on the reef, be on call to answer questions from docents. Text message groups per shift worked really well for this, and also allowed the people

on shift to have each other's phone numbers to contact in an emergency. One added benefit of this was to provide a contextual shift pre-briefing, for example providing topical and timely information before the shift like slippery seasonal seaweed, Domoic Acid toxicity season in mussels, harbor seal breeding season and potential visitor communication strategies for these.

One challenge was ensuring volunteers who didn't know each other could meet up prior to heading out to the reef. We had hoped that our branded blue hats would help here but on crowded days it was still hard for volunteers to find each other. Having a set meeting point sometimes didn't work as volunteers occasionally arrived at different times from each other. Ensuring people had each other's phone numbers was the most helpful.

Materials and equipment



We wanted to make sure people were identifiable on the reef, so we provided volunteers with custom branded hats purchased from Customink.com. These, along with the name tag lanyards added a level of authenticity to our interactions with the public and were also intended to help volunteers and the public recognize us on the reef. In the future we would like to get a number of vests that may work better as identifying uniforms.

Cary Smith, Training Officer from Pillar Point Harbor and his team have been really very helpful and accommodating. They provided and installed a picnic table that we can use to have an information booth at the entrance to the reef. They also installed a secure box that the Program Coordinator can stock with reference materials and tidepooling equipment for the volunteers.



Printed materials provided to the volunteers for use and reference with the public

- A printed version of CDFW's illustrated "red/green poster" "**Northern and Central California Intertidal Collecting Regulations**" - a translated version of this would have been invaluable!
- MPA Collaborative Network's Good Tidepooler Rules (aka Harry the Crab) Sign image/poster on **tidepooling responsibly**
- Various **guide books and identification cards**

Printed materials provided to the volunteers for personal reference

- Printouts of the **detailed professionally surveyed MPA boundary image of the nearby MPA** that intersects at the north of the reef, created by the MPA Collaborative Network and approved for sharing with volunteers by CDFW. This was made clear it was for personal reference use of the volunteers only, although having a public facing version of where exactly the boundary is would have been really helpful. As it was, the boundary of the MPA on the reef is a straight line and does not match the topography of the area and is not as the boundary is interpreted by anyone on the ground.
- **Name tag lanyards with emergency contact details** and useful contact agencies to every volunteer.
- Printouts of the **California Ocean Sport Fishing regulations 2022-2023**.
- CDFW printouts of **Montara State Marine Reserve Boundary and Pillar Point State Marine Conservation Boundary and regulations** from the California Code of Regulations, title 15, Section 632.
- **Map of local area** and walking directions to the reef (Open Street map annotated by Program Coordinator).
- San Mateo MPA Collaborative brochure on **Marine Protected Areas in San Mateo County**.
- CDFW folded poster of "**The California Network of Marine Protected Areas**".
- California Academy of Sciences & iNaturalist booklet on "**Help us track the health of California's Marine Mammals**" and Marine Mammal identification guide.
- **Fitzgerald Marine Reserve** trifold leaflet by the San Mateo County Parks.
- **Fitzgerald Marine Reserve self guided tour** leaflet.
- CDFW brochure on **California Marine Protected Areas on "Central California: Pigeon Point to Point Conception"**.
- Marine Life Studies "**Marine Mammals of California**, a waterproof ocean users' guide" 6th edition.
- Information pamphlet by the San Mateo County Harbor District on **Pillar Point Harbor**.
- **Photos of beach / ocean wave hazards** provided by Cary Smith from the Harbor and Rob Calla from San Mateo County parks.

Digital materials shared with volunteers included but not limited to:

- **Reference guide to fun facts of local species** that the program coordinator developed alongside Fitzgerald Marine Reserve volunteers (class of 2022)

https://docs.google.com/spreadsheets/d/1V3FMj-R1fYQb_V_zg2OvFqEgUYLPxRScFkcSGC3KJo0/edit#gid=0

- Link to the full version of the **Ocean Sport Fishing regulations** from CDFW
<https://wildlife.ca.gov/Fishing/Ocean/Regulations/Sport-Fishing>
- iNaturalist project reference of nearby species.
<https://www.inaturalist.org/projects/intertidal-biodiversity-survey-at-pillar-point>
- Understanding the local mechanics of Mavericks waves
https://www.surflife.com/surf-news/mechanics-of-mavericks_62313/
- Surf guide for Pillar Point / Mavericks
http://www.stormsurfing.com/cgi/display2.cgi?a=t20;b=mavs_1
- Magic Seaweed surf predictions
<https://magicseaweed.com/Mavericks-Half-Moon-Bay-Surf-Report/162/>
- Local wind predictions <https://www.windguru.cz/210886>
- Local weather predictions
<https://www.wunderground.com/calendar/us/ca/moss-beach/KHAF>
- Videos of all the training sessions provided by the program
- Jim Covell, retired Director of Training & Interpretation from the Monterey Bay Aquarium, shared his expert techniques for staying positive and effective while interpreting wildlife viewing etiquette for visitors to California's coast. From the Wildlife Disturbance Symposium put on by Respect Wildlife.
<https://www.youtube.com/watch?v=TTzKDyQojTo&list=PLe1gJc8Y5DkVWKX-HXPjOLzaYoYsL9X6B&index=14>
- Translations of a few key phrases by the San Mateo MPA Collaborative
<https://www.mpacollaborative.org/documents/MPA-key-phrases-translation-CitationBook-FINAL-press.pdf>
- Building Pathways to Justice, Equity, Diversity, and Inclusion for California's Coast and Ocean Workshop Series by the MPA Collaborative Network and Just Communities.
<https://www.mpacollaborative.org/project/pathways-workshop-series/>
- Melissa Loebel, from the Bolsa Chica Ecological Reserve, talks about how successful collaboration between groups improves education and reduces wildlife disturbance at Bolsa Chica Ecological Reserve. From the Wildlife Disturbance Symposium put on by Respect Wildlife.
<https://www.youtube.com/watch?v=Da58W3lt9m8&list=PLe1gJc8Y5DkVWKX-HXPjOLzaYoYsL9X6B&index=9>
- Homepage of the San Mateo MPA Collaborative <https://www.mpacollaborative.org/sanmateo/>
- CalTIP (888) 334-2258 <https://wildlife.ca.gov/Enforcement/CalTIP>
- How to buy a fishing license <https://wildlife.ca.gov/Licensing/Fishing>

The Pillar Point Stewards website

A crucial tool we built for this program was the <https://www.pillarpointstewards.com/> website. This website was not aimed at the general public: instead, it was a tool for our volunteers. The site's primary purpose was to allow volunteers to sign up for shifts.

This saved an enormous amount of administrative time for the Program Coordinator, who would otherwise have to manually calculate tide times and schedule volunteers. It also helped identify shifts that were missing volunteers with enough time to fill them.

Volunteers could see which shifts still needed help, and the Program Coordinator could then create ad-hoc text groups per shift for reminders and to answer questions when volunteers were out on the reef.

The site also included emergency contact details, including for the Pillar Point Harbor Patrol, local CDFW Officers and other key contacts. Volunteers also had a Lanyard with this information that they had on them during shifts (lanyards were quick release for safety).

We released the source code for the site under an Apache 2 open source license, to allow other organizations to adapt it to run their own volunteer programs. The program leads are actively seeking additional funding for the coordinator to help other tidepool programs in the state implement similar tools.

Source code: <https://github.com/natbat/pillarpointstewards>

We compiled this document with screenshots for our volunteers explaining how to use the site: <https://www.dropbox.com/s/llo315cxpapfnak/web-instructions.pdf?dl=0>

Create an account & Login

1

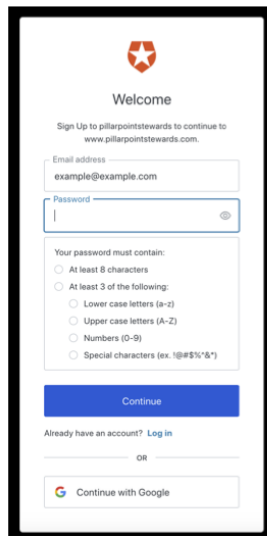
Visit <https://bit.ly/pillarpoint-steward-signup>
This starts you through the create account process.

2

You'll see a login prompt. If you have Gmail you can click **"Continue with Google"** and follow the prompts (*If you do this, you won't need to use a password in future*).

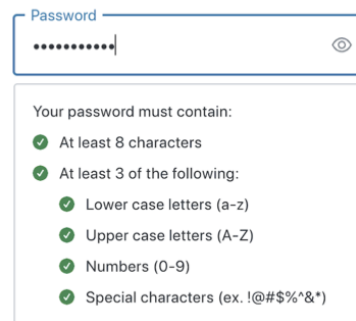


If you want to sign up with a username and password, click **"Sign up"**.

A screenshot of the Pillar Point Stewards login/signup page. It features a "Welcome" header, a login prompt, and input fields for "Email address" and "Password". There is a "Forgot password?" link, a blue "Continue" button, and a "Don't have an account? Sign up" link. Below these is an "OR" separator and a "Continue with Google" button. An orange arrow points from the "Continue with Google" button in the text to the corresponding button in the form.A screenshot of the Pillar Point Stewards sign-up form. It features a "Welcome" header, a "Sign Up" prompt, and input fields for "Email address" and "Password". Below the password field is a section titled "Your password must contain:" with radio button options: "At least 8 characters", "At least 3 of the following:" (which includes "Lower case letters (a-z)", "Upper case letters (A-Z)", "Numbers (0-9)", and "Special characters (ex. !@#\$%^&*")"), and "Continue". There is also a "Log in" link for existing accounts and a "Continue with Google" button. An orange arrow points from the "Continue" button in the text to the corresponding button in the form.

Enter your email address and choose a secure password.

When the little circles near the password requirements all turn green you can click **"Continue"**.

A screenshot of the password requirements section. It shows a "Password" input field with a masked password ".....". Below it is a list of requirements, each with a green checkmark: "At least 8 characters", "At least 3 of the following:" (which includes "Lower case letters (a-z)", "Upper case letters (A-Z)", "Numbers (0-9)", and "Special characters (ex. !@#\$%^&*")"). An orange arrow points from the "Continue" button in the previous form to this section.

3

You will now be redirected back to the website www.pillarpointstewards.com and you will be logged in. Go to your email account to verify your email address.

4



To log in or out in the future, click the little login link.

Sign up for your shifts

Shifts are usually about 3 hours long (*but may be shorter due to daylight*). We would really like it if you could do about four or five shifts a year.

1

Log into www.pillarpointstewards.com

(see step 4 of the previous page)

You should see a calendar once you log in. If you don't then your account may need to be activated, email natbat@gmail.com with details of what you see on the page.

2

Choose a shift from the calendar

Check which days you are free and click on the calendar entry for the shift you would like to volunteer on.

MAY						
Mon	Tue	Wed	Thu	Fri	Sat	Sun
25	26	27	28	29	30	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17 6:30am-9:00am	18	19 6:45am-9:45am	20 7:45am-10:45am	21 8:45am-11:45am	22 9:45am-12:45pm
23	24	25	26	27	28	29
30	31	1	2	3	4	5

Key

Your shift

volunteers needed

partly full shift

fully staffed shift

3

Assign yourself to the shift

The next step is to assign yourself to the shift using the button on the shift page.

Once you are assigned to a shift there is a button on the page that lets you remove yourself from your shift

The homepage shows a list of your upcoming and past shifts.

PILLAR POINT
Tidepool Stewards

Shift on 2nd April 2022

You are not scheduled on this shift
Shift time: from 7:00am to 9:00am
Lowest tide: -1.055ft at 7:30am
Dawn: 6:02am
Dusk: 8:16pm

Volunteers on this shift (0/2)
It looks like no-one has signed up for this shift yet

[Add me to this shift](#)

[Back to homepage](#)
Conditions

Shift calculations

The Program Coordinator of the project saved a lot of time in calculating shifts programmatically rather than by hand using a tide table. In order to know how many people to recruit we needed to work out roughly how many shifts there would be per year and what our expectations of volunteers would be.

We made a prototype shift calculator based on some initial variables, assumptions and expectations: <https://observablehq.com/@natbat/tidepool-shift-calculator-v2>

Feel free to fork and use this code for your own use. All the code for this project is released under the Apache 2.0 license <https://github.com/natbat/pillarpointstewards/blob/main/LICENSE>

The initial assumptions of this calculator

- Appropriate low tides for shifts are counted as **-1ft on a week day and 0ft on a weekend**
- **2 volunteers per shift**
- **3 shifts per volunteer per year**
- **3hr** shifts with the center of the shift being aligned to the lowest tide
- **Civil dusk** seemed the right time to end the shift, because where we are in our latitude dusk is always at a reasonable time. This calculator wouldn't work as well for latitudes where dusk is past a reasonable hour or if the sun doesn't set in summer etc.
- Shifts start at **civil dawn**.
- Initial **shortest shift length was 30 minutes**. This would happen on the extreme early/late shifts when the lowest part of the tide was either before the earliest start time (civil dawn) or after the latest shift time (civil dusk)
- That there would **only ever be one shift per day**. We live in an area where we have Mixed Semi Diurnal tides (we have two low tides a day but one is lower than the other) This calculator would not currently work in areas where there are two equal low tides (Semi diurnal) each day, it is possible that it may work for diurnal (one low tide a day) tidal areas.
- The **minimum and maximum tides** for our area are hardcoded in the prototype in feet above (8) / below (-2) average lowest tide. The average low tide (0 is the mean of the lower low water level, in California 0.0 is currently about 3.3ft above sea level) is constantly re-calculated for us at Crissy field in San Francisco based on each low tide, our low tides are calculated as being exactly 50 mins before the station in SF. This doesn't take into account our local geography so we are as limited in our shift calculation as the prediction is. Anyone re-using this code needs to consider at what point their reef is exposed.

Changes we made during the program to the shift calculation

- Observations during shifts were that there were a lot **less people before the low tide than after**, additionally **3hrs of a shift was a really long time** especially in inclement weather. We shortened the shifts to 45 mins before the low tide and 1.5hrs after.
- Civil dawn seemed too early to start a shift and the volunteers were less keen to start then (*shifts with a dawn start were not filling up*), we moved to a **1hr past civil dawn start time** and that was much more acceptable and volunteers more readily signed up to these.
- The shortest shift length being 30 mins didn't work for people to catch just the beginning or end of the low tide, especially as this usually meant the next day or previous day was a better low tide, in turn meaning that any harvesters looking at the tide times would be more likely to come on the better day. Some of our volunteers were traveling a fair distance too (furthest away was Vacaville: 64 miles) so coming out for a 30 min shift was a waste of resources. We increased the **shortest shift length to be 90 mins**.

Potential shift calculation improvements for the future

- Including public holidays in the calculations. For example, a public holiday on a Monday would have shifts starting at a low tide of 1ft and lower rather than the regular weekday shifts starting at a low tide of 0 and lower.
- Assigning **more people to shifts that are at extreme low tides** (eg -1.5ft on a weekday, -1ft on a weekend)
- Assigning **more people to weekend and public holiday shifts**
- Working out the variables needed for this to function for any low tide globally
- The tide has to be 0.3 or lower in order to cross the main channel at Pillar point, so it might be worth adjusting the low tide on a weekend to be 0.3 rather than 0.

Advantages of this method of calculation

- Observable notebooks <https://observablehq.com/> are a really fast prototyping mechanism that allowed us to very quickly use the NOAA API to work out the shift times we needed.
- A lot of our calculations had previously been done for the Program Coordinator's personal project <https://www.rockybeaches.com/> so we were able to pull data from there. Currently the calculations are done in Observable notebooks and the shift data copy and pasted to the primary system <https://www.pillarpointstewards.com/> - In future we want to integrate this calculator to the primary system to reduce dependencies.
- Calculating shifts by hand would have taken a considerable amount of time longer and would have been more error prone and harder to change once we observed we needed to adjust shift lengths etc during the project.