Nicholas Ta culling urchins with Franciscanus.
Photo by Kate Vylet Photography

CENTRAL CALIFORNIA URCHIN REMOVAL AND KELP RESTORATION

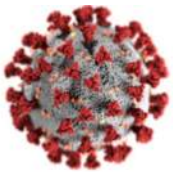
DIVE PLAN

RECREATIONAL DIVER URCHIN CULLING AND KELP RESTORATION IN MONTEREY CALIFORNIA

By Keith Rootsaert

GIANT GIANT KELP RESTORATION PROJECT

INCLUDES UPDATE FOR COVID-19 DIVING CONDITIONS



Petition Before the Fish and Game Commission

On February 21, 2019 Keith Rootsaert submitted Petition 2020-001 to the Fish and Game Commission along with maps showing locations of high urchin density and low kelp density at two sites in south Monterey Bay. The Petition seeks to increase recreational diver bag limits to 40 gallons per diver per day and allow the removal of purple and red urchins. On April 16, 2020 The Fish and Game Commission referred petition 2020-001 to the California Department of Fish and Wildlife for review and to come before the Commission at the June 24, 2020 meeting.

There are many different parties involved in the department review:

California Department of Fish and Wildlife, CDFW, will do their due diligence and review and verify data. They would then prepare a recommendation to the Commission of changes to sportfishing regulations.

Reef Check California, RCCA, will develop a scientific Monitoring Plan to evaluate the effects of urchin removal on these sites using Reef Check Certified divers.

Giant Giant Kelp Restoration, G2KR, has developed a Dive Plan, this document, and will direct the volunteer diver effort on the sites.

All three of these work products must be in agreement at the outset and cooperation between all the parties can continue as the project progresses.

Timeline

FGC Meeting, April 16 – Petition 2020-001 Granted for Consideration

G2KR Dive Plan submitted, May 14

CDFW site observations, review data, draft language.

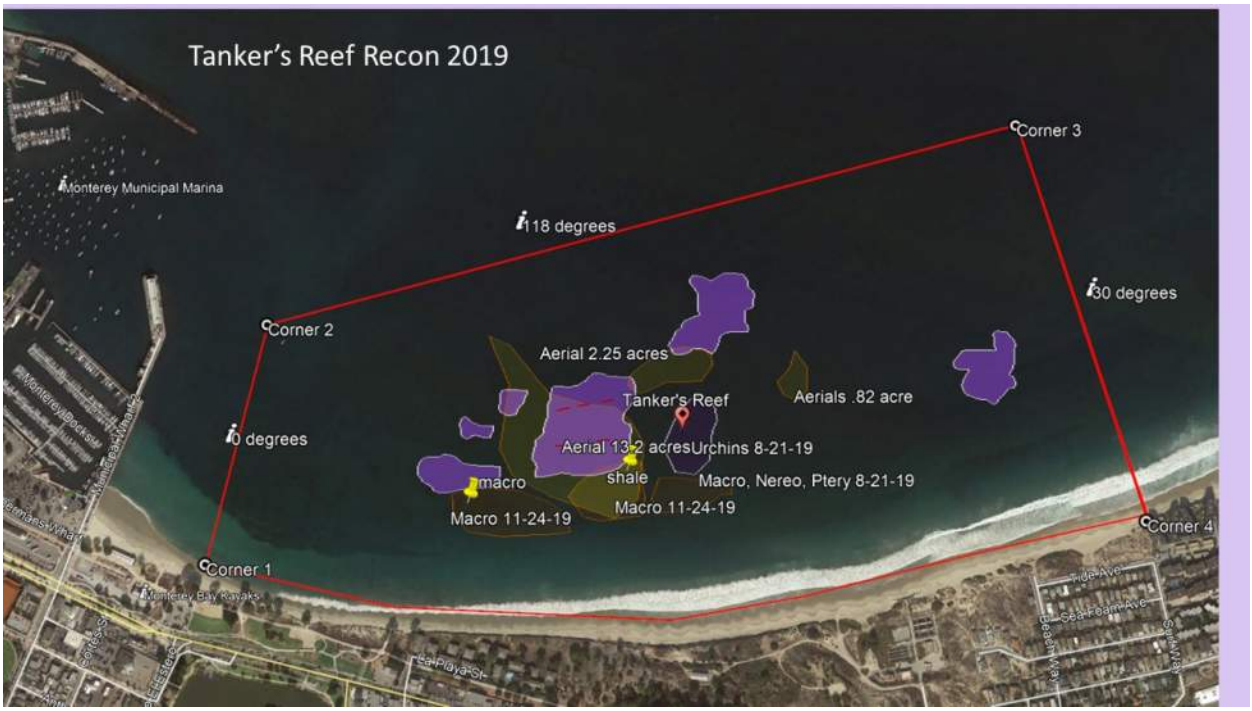
RCCA Scientific Monitoring Plan

Revised Dive Plan submitted, June 19

FGC Meeting, June 24

Site Selection

1. Tanker's Reef



Tanker's Reef has in past years been a giant kelp forest (*Macrocystis pyrifera)* of about 20 acres. The shifting sands of the south Monterey Bay expose and cover the shale reef closest to shore and bull kelp recruited there in the summer of 2017 and again in 2019. The substrate is marked by round holes dug into the shale by urchins and shale boring clams and these holes seem to promote the growth of bull kelp, giant kelp, and *Pterygophora sp.* on this reef at the close of 2019. There is no kelp canopy on the reef this spring.

Tanker's reef has the unique feature of not being in a Marine Protected Area, yet still having great access and parking for divers. The site is just offshore from a long wide sandy beach with no nearshore tidepools or protected areas that might be disturbed or trampled by increased use. It is immediately adjacent to the Monterey Municipal Marina at the south end of the bay that is normally in the wave shadow of Point Pinos and also behind the San Carlos Breakwater jetty. This area is diveable in all but the most severe conditions from boat or from shore, normally 50 weeks out of the year. The urchin barren is a shallow 30 to 40 feet-depth which makes it an easy, safe recreational dive. Because the reef is surrounded by sand, and urchins do not tend to traverse sand, the area, once cleared, should not be repopulated quickly by migrating urchins from the nearest adjacent reef over half a mile away.

While this site is well suited to urchin removal, the reef substrate is very different from any other sites in Monterey and may not inform removal and restoration elsewhere. Because there is not kelp on this site presently this is a lower priority than the next site.

2A Edward Rickett's State Marine Conservation Area

This site is the most popular dive site on the west coast of north America, thousands of scuba divers first learned at this beach and on weekends there are usually hundreds of divers here. There are two dive shops within a block and there is ample parking. There are two public restrooms serving this area, including showers. -Boats from the marina frequently begin their trip into the bay at the breakwater jetty. Emergency services and state lifeguards serve this area as well as the US Coast Guard stationed on the other side of the jetty. This area is diveable in all but the most severe conditions from boat or from shore, normally 50 weeks out of the year.

The substrate consists of a jetty made of quarried granite boulders and natural granite reef formations with an abundance of sand between granite outcroppings. Commissioner Murray asked at the April FGC meeting if urchin removal in the State Marine Conservation Area (SMCA) was going to delay approval of petition 2020-001, could we exclude it from this effort? My response was that the SMCA must be included because that is where the last remaining kelp is. Data shows that the kelp forest in the SMCA is in severe decline. There are high urchin densities in the urchin barrens just offshore and they are eating the remaining live kelp in a thin strip close to shore. Because this site has hard granite reefs, it is more typical of the majority of the Monterey Peninsula and Big Sur coastline, so lessons learned here could be attempted with more confidence of success on granite substrates.

2B Lovers Point State Marine Reserve

The Lovers Cove SMR is proposed as an alternate to the Edward Ricketts SMCA site due to MLPA rules that does not specifically allow for kelp restoration in a SMCA. We believe that adaptive management of the MPAs is required by the MLPA goals and should be allowed. However, the Department is considering that work in the SMCA is not allowed due to California Code PRC § 36710 (c). However, PRC § 36710 (a) expressly allows restoration activities in a SMR.

> In a **state marine reserve**, it is unlawful to injure, damage, take, or possess any living, geological, or cultural marine resource, except under a permit or specific authorization from the managing agency for research, restoration, or monitoring purposes. While, to the extent feasible, the area shall be open to the public for managed enjoyment and study, the area shall be maintained to the extent practicable in an undisturbed and unpolluted state. Access and use for activities including, but not limited to, walking, swimming, boating, and diving may be restricted to protect marine resources. Research, restoration, and monitoring may be permitted by the managing agency. Educational activities and other forms of non-consumptive human use may be permitted by the designating entity or managing agency in a manner consistent with the protection of all marine resources PRC §36710(a).

Lovers Cove has historically been a lot of things: a bath house, a tea garden, Hopkins Marine Station, and the city dump. Presently it is a beautiful beach, park, and tourist attraction. In 2017 the thick kelp canopy in the cove disappeared and an urchin barren is now found through the entire cove. There is only one remaining kelp stand remaining near the entrance to the cove. The plan is to restore the kelp on the west side of this SMR that was added in 2007 to the Hopkins Marine Reserve that has long term data sets on the east side of this site. The lone remaining kelp hopefully can re-seed the cove.

State Marine Conservation Area Issue

We recognize that removing invertebrates in a SMCA is prohibited by Marine Protected Area rules. But the rules also allow for restoration activities and the areas are intended to be adaptively managed. The diverse kelp forest ecosystems of 2013 are today denuded of species due to an explosive overpopulation of urchins. Monterey's last giant kelp forests, critical habitat for the Southern sea otter, is under attack and immediate intervention is required. CDFW has denied work in MPAs for years and has allowed little human interference in these sites, despite an abundance of long-term data showing the precipitous decline of kelp. While the fishing regulations remain unchanged, the nearshore fishery is declining because there is not kelp for fish recruitment. The urchin barrens expand because the crustose coralline algae is a settlement cue for even more urchins. The inconvenient truth is that the last remaining kelp is under threat and the only way proposed to defend it is by this immediate intervention.

There are three Reef Check survey sites within the SMCA boundary and despite the huge effort of citizen scientists to survey and monitor this habitat and share this information with CDFW, the demise of this marine habitat garners no attention and the same 10 rockfish fishing rule applies every year. In the opinion of many hard-working volunteer divers, our work and timely warnings are ignored.

Southern Sea Otter Issue

There was some concern by Commissioners that the Southern Sea Otter is within this range and a California Environmental Quality Act (CEQA) review would be needed for the exception. Sea otters and divers have cohabitated in this area without incident for decades. Studies clearly show otters do not eat urchins in the urchin barrens and this project to remove urchins and restore kelp will only be of benefit to the threatened sea otter and improve their foraging success in a healthy kelp forest.

Dive and Monitoring Planning

Urchin Barren Assessment

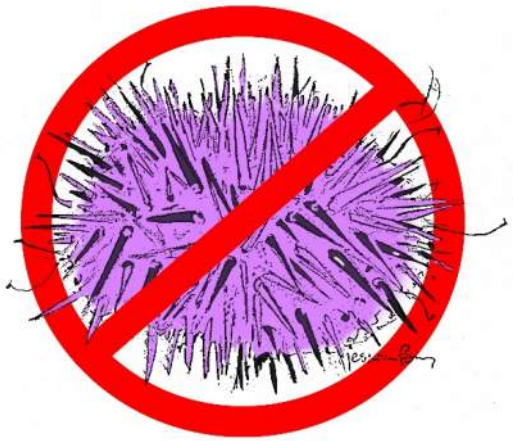
Scheduled for May 15, a PVC quadrat suspended by fishing line to a GoPro Hero4 and dropped by fishing pole to the bottom at GPS recorded locations. These videos will be captured and reviewed to count urchins, substrate type, algae, and holes in the shale. The location and density data will be used by a computer program to make a heat map of urchin and kelp density and substrate types and features. The heat map will be available at the start of urchin removal activities.

Scientific Monitoring Plan

Reef Check California and G2KR will coordinate activities so that pre-removal monitoring of the site can be performed and areas for urchins to be removed and areas of control are identified. Together they will deploy navigational buoys for the project. RCCA will obtain permission from the Monterey Bay National Maine Sanctuary which has authority over the submerged lands of the project. Several passes may be necessary to reduce urchin density to prescribed numbers. When the sites are cleared of excess urchins and kelp is restored Reef Check will continue annual monitoring. We are meeting with the scientific and educational stakeholders separately to develop collaborative experiments. Proposed projects include passive netting, urchinomics, and portable giant kelp seeding.

Diver Qualifications and Training

Recreational scuba divers routinely dive at these sites. Removal activities are in shallow water and are accessible to the lowest diver certification level. There is some task loading that divers encounter when they work underwater and count urchins and there are new skills to learn. We may require an Advanced Open Water Certification or require a certain number of logged dives to ensure diver safety. We are developing a PADI and SSI diver certification so that dive shops that are struggling to reopen after the recent economic downturn will be able to train and be guides for recreational divers. The training materials are under development but includes: Safety, navigation, noninvasive culling techniques, counting, & reporting. Additional training will be available to current Reef Check certified divers.



This work will require a California Sportfishing license and all divers in the program will be required to process an annual or day license and their GO number will recorded in our database. We have raised $1330 and we will raise more to pay for fishing licenses for students and military, a large local constituency.

The plan is to direct diving activity through the G2kr.com website and local dive shops. While it is possible for divers to exercise their fishing license legally within the project area, we will reach out to those individuals as we encounter them and seek to train and coordinate their efforts with the group.

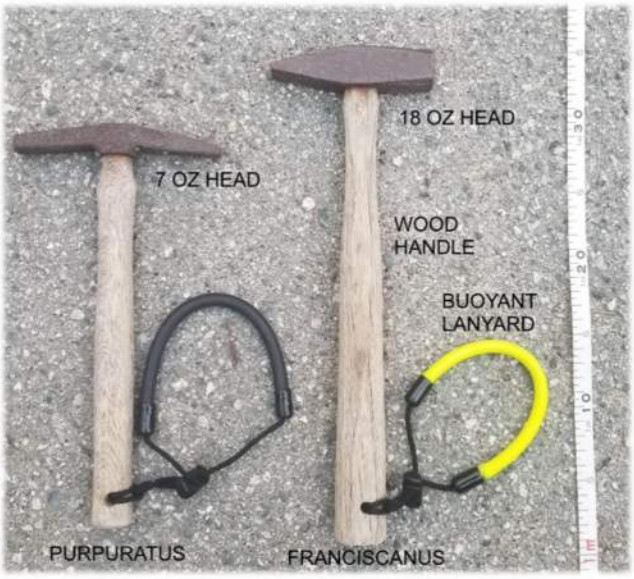
Dive Effort Organization

Divers will register with the G2KR.com website and verify their California Sportfishing license. Registered divers will attend training by dive shop instructors and dive masters to learn the method of removal. They will reserve time slots on an online calendar to go with their two or three person buddy team to the urchin barren navigation buoy and cull along a compass bearing. As they go along hammering urchins they will record how many of each species they culled. At the conclusion of their dive they will exit the water. By this method the divers will not aggregate on the beach or at the surface. Divers will follow the guidance of the RCCA DCB Covid 19 dive procedures. When funding becomes available underwater acoustical positioning devices, underwater drones, aerial drones, and high resolution mapping will be developed.

Method of Removal

The method of removal is to cull the urchins with a pointy hammer. The original petition calls for removing urchins, putting them in kayaks, taking them to shore and throwing them in the dump but that was before they allowed culling urchins at Caspar Cove. In speaking with Josh Russo of Waterman's Alliance, it is much safer and efficient to cull the urchins then to haul them out of the water and the logistics are much simpler too. With Covid 19 making social distancing a necessity plans had to change to adapt to this new circumstance. We have culled over 21,000 urchins on the Reef Check Urchin Experiment and we have some experience with this.

Divers will cull urchins with 12” long wooden hammers. The 7oz hammer (Purpuratus) and the 18oz (Franciscanus) feature an elastic colored lanyard. The lanyard will help prevent divers from losing them and if they are lost the lanyard will stick out of the sand and aid in recovery. The hammers will be sold through local dive shops and the G2KR.com store.



Invertebrate Species to Remove

The Petition makes the distinction of seeking the removal of both purple and red urchins. Other species of urchins are not commonly found at the proposed sites. Divers will be instructed to cull only the purple and red species. Special care will be taken to not impact other species or the substrate they reside in. If divers find urchins on brittle invertebrates such as colonial sand tube worms or bryozoans the urchins will be removed and smashed on bare rock or sand. We will instruct divers to not remove urchins from cracks because they are consuming drift and not exhibiting kelp-destroying behaviors. The length of the hammer will also restrict scraping deep in cracks and potentially hurting other inverts. The reason we are removing red urchins in addition to purple urchins is because on the RCCA Urchin Experiment red urchins were found to triple their density when purples were culled.

Diver Data Recording

Divers will record how many of each species they cull. Divers will be trained to use an underwater slate to tally the total number of both red and purple urchins. Divers will be advised to stop culling if they were to reach any limit imposed by CDFW. The petition calls for 40 gallons per diver per day. The number of individual urchins would not be attainable by even the most efficient diver by this method. Divers will report back to the G2KR.com website how many red and purple urchins they culled and their dive time so we can record work rates and award fabulous prizes. CDFW is welcome to collect data and all data collected by G2KR.com and RCCA will be shared with CDFW.

Objectives and Measurement of Success

The plan is to clear the reef of urchins to a density proven to allow kelp to recruit and thrive on the reef. This is a continuation of the Reef Check threshold density experiment at Lovers Point. Instead of having small reefs of graduated densities to see which ones can sustain kelp, this project clears the barren and then checks the density of urchins in the places where kelp subsequently recruited and the density of places where kelp was not successful. The two approaches to threshold density should yield a better understanding of kelp dynamics and determine the most effective ways to be successful at restoring kelp.

We consider success where we have reduced the average density to less than 1 urchin per meter 2 and kelp is recruiting and increasing in stipe density year to year. If this experimental project is not successful at restoring kelp, we will be the first to tell CDFW and FGC can change the rules back.

Scientific Studies in Progress

We are pursuing other science contributions from new and ongoing studies at UCSC, the University of Oregon, CSUMB, and Moss Landing Marine Labs. We will deploy drones above and below the water and further the advancement of those technologies. Our volunteer science educator will make the project data available to educators and create lessons aligned with California's Next Generation Science Standards.

Scalability and Next Projects.

With lessons learned from this project we aspire to preserve additional threatened kelp forests. There are several sites under consideration, all within Marine Protected Areas of varying types. If this project is successful, we will ask for permission from the CDFW and the FGC to replicate this project at various locations in Monterey, Northern California and the Northern Channel Islands.

Site Selection:

1. Tanker's Reef – Not in an MPA

2A. Edward F. Ricketts State Marine Conservation Area

2B. Lovers Cove State Marine Reserve