



Kelp Restoration & Monitoring Project



K-Cove, fall 2009. Mark Corcoran, Starcrest Productions

2009 Annual Progress Report

Prepared by: Tom Ford, Brian Meux
December 2009

Acknowledgements

Special thanks to all the volunteer divers who gave their time to the Kelp Project, especially Yasumichi Kato for all the crucial work performed in the field and office. All the previously described successes of the Kelp Restoration and Monitoring Project would not be possible without important partnerships with the following organizations:



Santa Monica Baykeeper Kelp Project: 2009

Giant Kelp (*Macrocystis pyrifera*), a canopy forming brown algae (phylum *Phaeophyta*), provides food and habitat structure to over 800 species. Roughly one-fourth of California's marine life depends on giant kelp forest habitat during some part of their life history. The existence of productive, stable kelp forests contributes to California's economy through ecotourism, industrial goods, and both commercial and recreational fishing. Southern California has lost 80% of its giant kelp forests since the 1960's. Many areas in southern California that were formerly productive and diverse reefs have become barren areas dominated by sea urchins, commonly named 'urchin barrens'. In the absence of urchin predation historically by southern sea otters, spiny lobster, and California sheephead, urchin populations can expand dramatically. This often results in the consumption and elimination of vast quantities of giant kelp and other algae. The loss of habitat and *biogenic structure* provided by kelp impacts the species that depend on productive kelp forest habitat – and local economies.

In a response to the overall decline of kelp in southern California during the past few decades, Santa Monica Baykeeper created the Kelp Restoration and Monitoring Project in 1997. The Kelp Project is a community-based restoration project that uses professional staff and volunteer SCUBA divers to work year-round in the restoration and monitoring of kelp forests off both the Malibu and Palos Verdes coasts – two distinct biological regions in Los Angeles County. To date, the Kelp Project has restored over 3.5 acres off Escondido Beach, Malibu, and over 3 acres off Long Point, Palos Verdes (Map 1). At K-Cove, the new restoration area adjacent to Long Point, kelp has established in as little as 6 months in an area that was an extensive urchin barren in April 2009.

In 2009, the Kelp Project continued an experimental design that uses restoration, reference, and control sites. Each restoration *area* consists of three restoration *sites* (480 m² each), one reference *site* (480 m²), and one control *site* (480 m²). At the onset of work, restoration areas are considered urchin barrens, areas almost totally dominated by urchins that historically supported kelp forests. To better understand the ecological effects of work in the restoration sites, monitoring is conducted in control and reference sites for comparison, where no restoration work is performed. The reference site is a naturally occurring kelp forest nearby with similar characteristics to the restoration sites including, depth, exposure, and substrate type, and the control site is a nearby urchin barren that also shares these similar physical characteristics.

Kelp Project restoration work includes relocating urchins, primarily purple urchins (*Strongylocentrotus purpuratus*), and kelp seeding techniques. Urchin relocation involves hand and net collection of all species of urchins by SCUBA divers (Photo 1). Urchins are then floated to the surface with lift bags (Photo 2), hoisted onto the boat, counted, and dispersed over a large area to avoid damage to other local reefs. Once an area's urchin density is reduced to approximately 1 to 2 urchins per square meter the heavy grazing pressure is released and kelp can naturally recruit and develop. Urchin density is also reduced in areas surrounding each restoration site, creating a buffer to ensure sustainability of the restored kelp forest habitat. Kelp growth is also facilitated by seeding the restoration sites using sporophyll bags, bags collected from productive kelp forests containing reproductive kelp blades, or sporophylls. Sporophyll bags are floated one meter above the reef in order to disperse spores over the recently cleared reef.



Photo 1. Volunteer diver Hanae Spathias removes purple urchins from a restoration site at K-Cove (Long Point II), Palos Verdes in 2009. Photo taken by Dave Witting, NOAA.



Photo 2. Sea urchins are floated to the surface using a large lift bag and then hoisted onto the boat using a davit. Urchins are then counted and relocated over a wide area to avoid harm to nearby kelp forest habitats.

Escondido Beach, Malibu

Escondido Beach continues to thrive after 5 years. In 2004, giant kelp density in all restoration sites reached reference levels (approximately 1 plant every 10 square meters). In order to achieve these measures of success, Kelp Project staff and volunteer divers relocated a total of 32,428 urchins from the restoration areas at Escondido Beach (Fig. 1). Photo 3 shows the urchin barren before restoration work began, and demonstrates the relatively similar abundance of purple and red urchins that once dominated Escondido. Photo 4 shows the restored kelp forest in 2006, with diverse growth of substrate organisms. Considering the buffer areas outside the restoration sites where urchin density was also reduced, over three-and-a-half acres have been restored at this location.

All three restoration areas at Escondido Beach sustained kelp density levels greater than 1 plant per 10 square meters (Fig. 2) – the primary goal of the Kelp Project. Since the major recruitment event in 2006, the kelp forest ecosystems in all areas at Escondido Beach have undergone ecological change. From 2006 to 2008, kelp plant density generally decreased, while stipe density and stipes per plant (Fig. 3 and 4) in each site has remained relatively stable. Many of the kelp plants have become older and larger, thus potentially increasing habitat availability from holdfast to canopy, increasing resilience to storm events, and producing more sporophylls.

Escondido was monitored annually to assess the sustainability of the restoration efforts, and all sites except the control have consistently supported at least one kelp plant per 10 square meters since fall 2004 (Fig. 2). In 2008, the control site reached restored levels even though urchins were never removed from this site. Staff divers observed repeated instances where urchins encroached into the restoration site of closest proximity to the control site (approximately 115 meters distance between the control and westernmost edge of restoration site). It is likely that urchins moved from the control to the restoration site, perhaps attracted by new kelp growth and decreased competition. Urchin density has also been reduced in the area between the control and restoration sites. The recovery of kelp outside restoration sites increases the total acreage restored. Increasing the spatial extent of monitoring relative to restoration sites will aid in quantifying the affects of restoration efforts. Particular attention would be focused on relationships between invertebrate species abundance, (especially urchin densities) and density and diversity of fleshy macroalgae. Additionally, these data may contribute to the scientific understanding of the shifting ecological states between urchin barrens and kelp forests.

Annual Kelp Project monitoring has demonstrated stability and resilience of the Escondido restoration areas, and in anticipation of restoring more sites in the future, the CRANE methodology (Cooperative Resource Assessment of Nearshore Ecosystems, detailed below) will be used to monitor Escondido in January 2010 and in future years. The CRANE method is widely accepted, efficient, and effective at capturing the ecological state of rocky reef ecosystems and is standardized for comparison with other southern California kelp forest habitats.

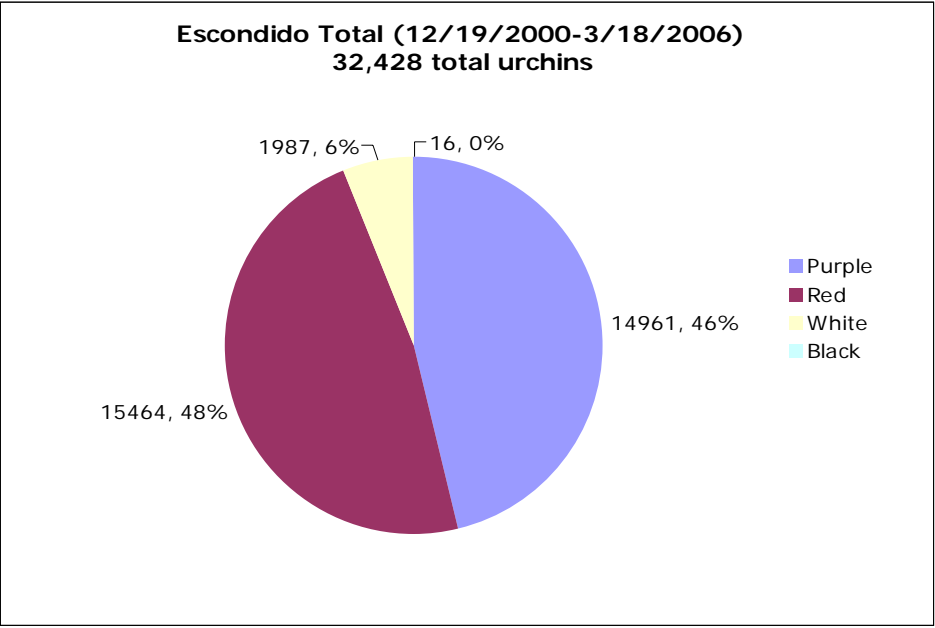


Figure 1. Escondido Beach urchin relocation totals of each species, showing the similar abundance of both red and purple urchin populations. Urchin relocation was conducted from 12/19/00 to 3/18/06.

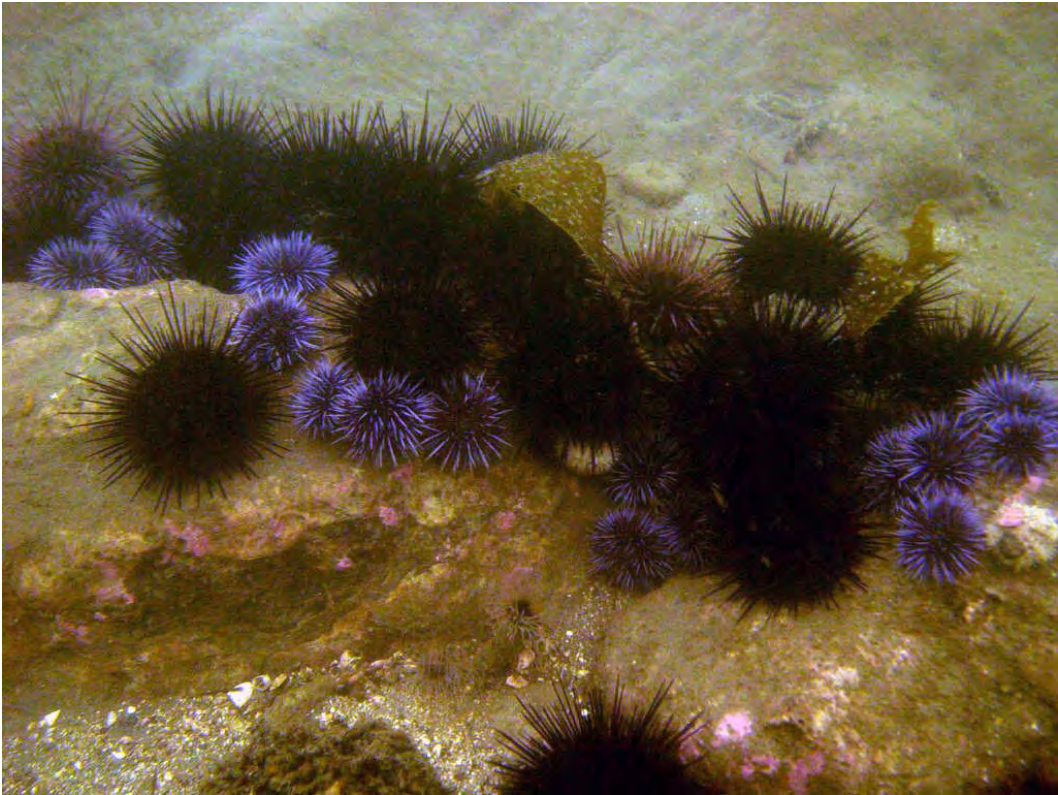


Photo 3. Red and purple urchins dominating the reef at Escondido Beach before restoration work began.

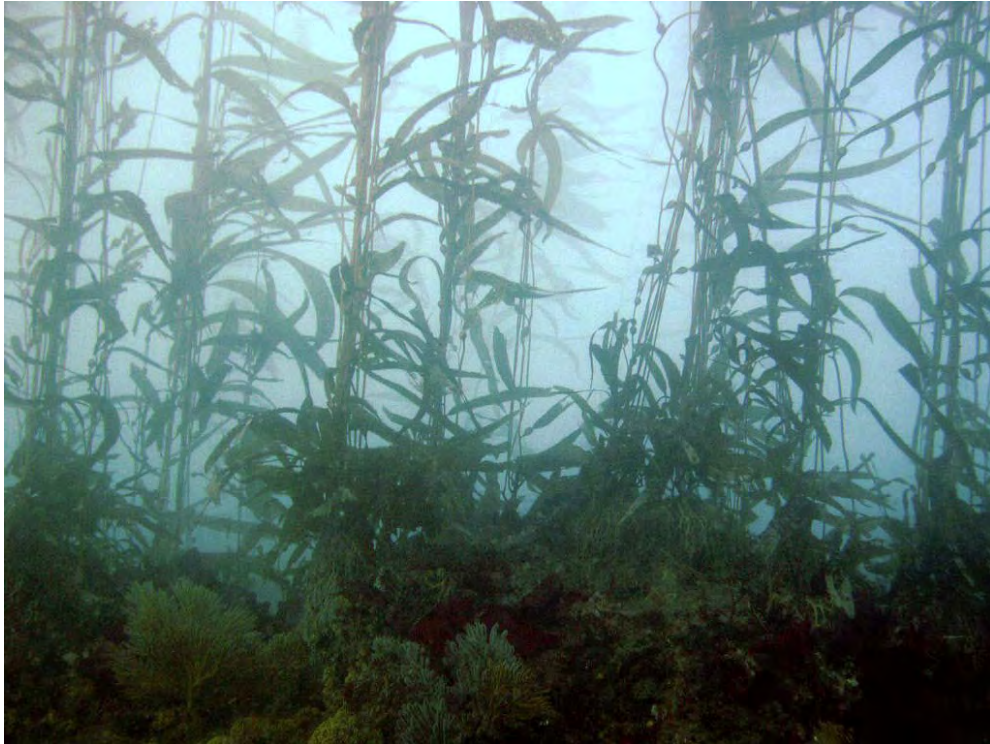


Photo 4. Escondido Beach restoration site in 2006 after being restored. Giant kelp and other species have continued to persist at Escondido Beach restoration areas.

Escondido Beach: *M. pyrifera* Density (plants > 1 meter)

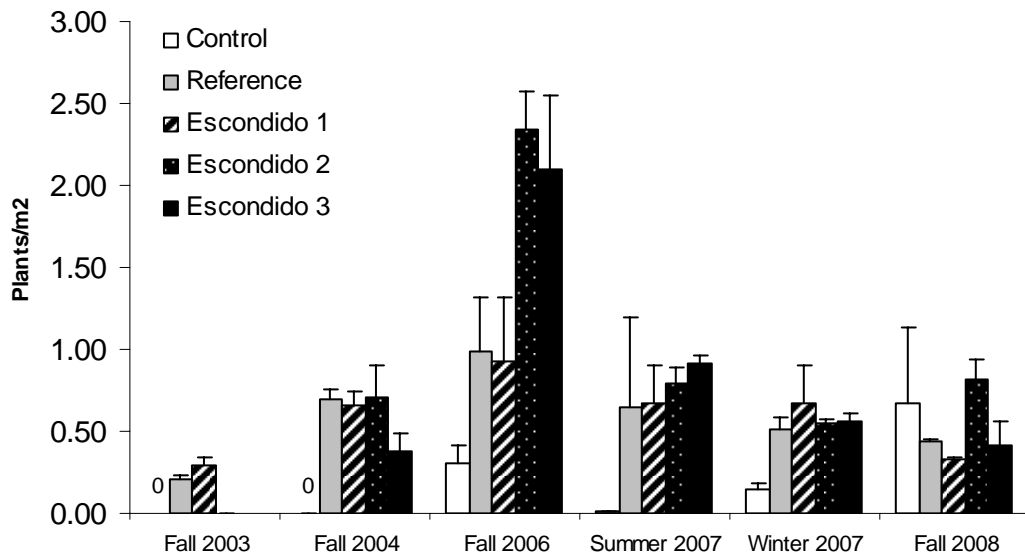


Figure 2. Mean (+SE) kelp (*Macrocystis pyrifera*) density at three Escondido Beach restoration areas, control and reference sites using band transects. Escondido 1 was the first restoration site followed by Escondido 2 and 3. Fall 2006 data show many kelp plants per square meter, a result of a large-scale recruitment of giant kelp followed from large storm events of winter 2005 and 2006.

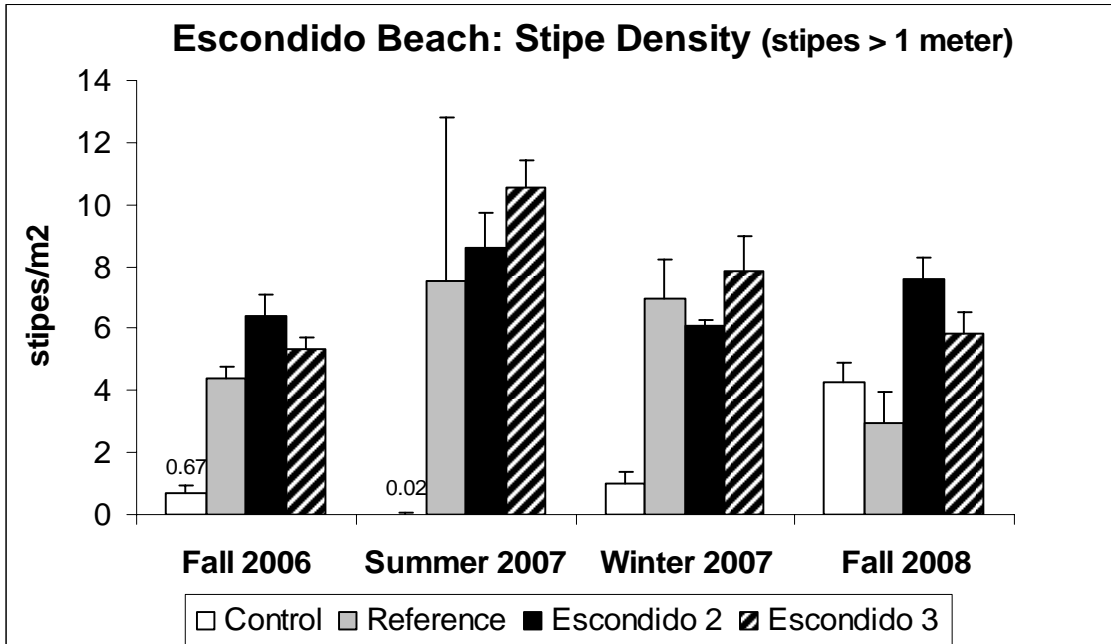


Figure 3. Mean (+SE) stipe (*Macrocystis pyrifera*) density at Escondido Beach reference, control and restoration sites (Escondido 2 and 3) using band transects. Stipe counts began at Escondido in 2006.

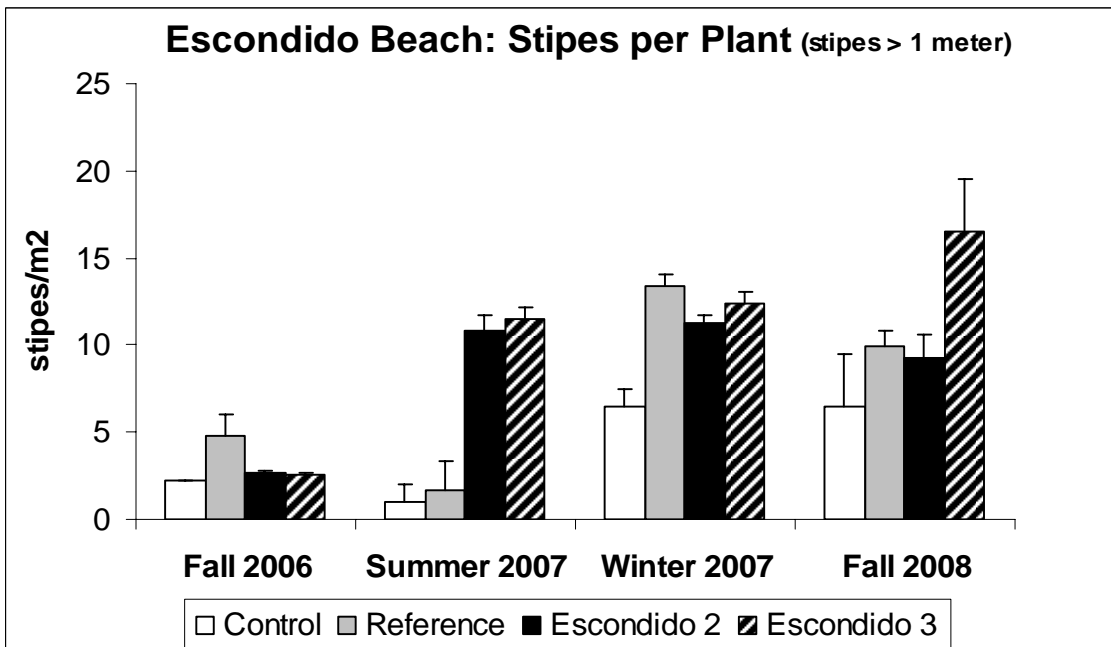


Figure 4. Mean (+SE) stipes per plant (*Macrocystis pyrifera*) at Escondido Beach reference, control and restoration sites (Escondido 2 and 3) using band transects. Fall 2006 data show few stipes per plant, a result of a large-scale recruitment of giant kelp followed from large storm events of winter 2005 and 2006.

Long Point, Palos Verdes

The kelp forest habitat off Long Point, Palos Verdes continues to flourish since kelp density was first restored in 2008 (Photo 6). The main method used to restore this site was urchin relocation; the total number relocated from fall 2005 to fall 2008 was 281,710 urchins (Fig. 5). In contrast to the nearly 50-50 split of red sea urchins and purple sea urchins, (*Strongylocentrotus franciscanus* and *Strongylocentrotus purpuratus* respectively) that inhabited the reef at Escondido (Fig. 1), the majority (91%) of urchins at Long Point were purple, (Fig. 5 and Photo 5). In addition to reducing urchin density, sporophyll bags were deployed in spring 2008 into areas where urchin density was reduced to reference levels. Considering the buffer areas outside the restoration sites where urchin density was also reduced, over three acres have been restored at this area.

Purple urchins in all restoration sites were reduced to reference levels by fall 2008, from 10.93 urchins/m² in 2005 to 0.46 urchins/m², resulting in restored kelp density (Figures 6, 7, and 8). Urchin density in Long Point's control site has dramatically decreased – with concurrent kelp density restored. Staff divers observed repeated instances where urchins encroached into the restoration site of closest proximity to the control site (approximately 140 meters distance between the control and easternmost edge of the restoration area). It is likely that urchins moved from the control to the nearest restoration site, perhaps attracted by new kelp growth and decreased competition. Further, red urchin (*Strongylocentrotus franciscanus*) density was similar to reference levels in fall 2005 (Fig. 7). As of fall 2009, the restoration site's red urchin density has increased, and the control site has decreased. Urchin density has also been reduced in the area between the control and restoration sites, with accompanying recovery of kelp and increasing the total acreage restored.

Long Point's kelp density (Fig. 8), stipe density (Fig. 9), and stipes per plant (Fig. 10) have developed considerably since work began in 2005 (Photo 6). Kelp density in the restoration area has increased from zero plants in fall 2005 to 1.17 plants per square meter in fall 2009, with restored levels achieved in winter 2007 (Fig 8). 2008 and 2009 were both good years for kelp recruitment and growth, as observed in the dramatic return of kelp density in the restoration area, which has exceeded reference levels both years.

Since the major kelp recruitment event in fall 2008 (Fig. 8), individual kelp plants have developed in all sites at Long Point. From 2008 to 2009, mean kelp density has decreased while mean stipe density (Fig. 9) and mean stipes per plant in each site has increased (Fig. 10). Many of the kelp plants have become older and larger, thus increasing habitat availability from holdfast to canopy, increasing resilience to storm events, and producing more sporophylls.

Baykeeper staff anticipates further development, production, and species diversity in Long Point's restoration area, and continued monitoring will describe these trends in the future. To ensure the long-term existence of this important kelp forest, urchin density must be reduced in the greater vicinity. The contiguous rocky reef east of the restoration area at Long Point still supports patchy urchin barrens, the largest of which the Kelp Project has already begun restoration work in 2009. This new site was deemed K-Cove, or Long Point 2, and was estimated to be an urchin barren over 1.5 acres in size (detailed in the next section).

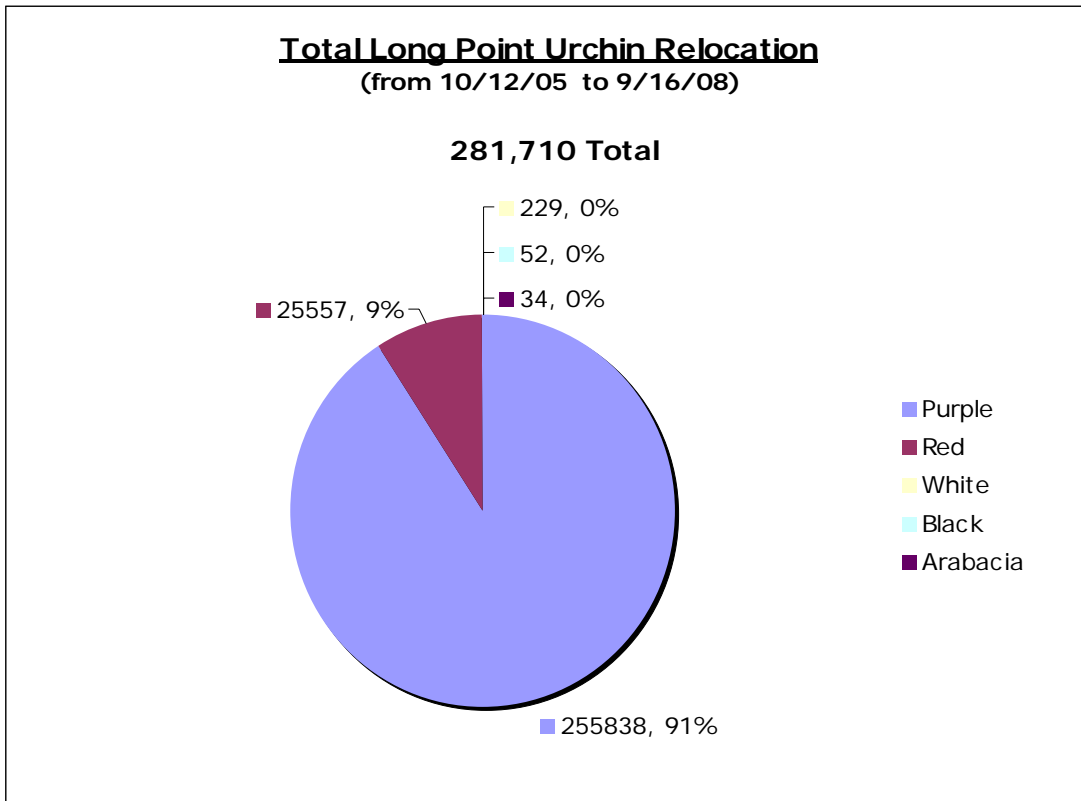


Figure 5. Total sea urchin relocation effort at Long Point, Palos Verdes from 10/12/05 to 9/16/08. The sum for Long Point is 281,710 urchins, clearing approximately 4,000 m² of reef. Purple urchins dominated the reef, comprising 91% of the urchins relocated.



Photo 5. Purple urchins dominated the reef off Long Point in 2005, before restoration work began. Acres of urchin barren have since been restored to productive kelp forests.



Photo 6. Restored kelp forest at Long Point in fall 2009, showing 2 years of growth and development. Many fish, invertebrate, and algae species have returned to what was once a vast urchin barren.

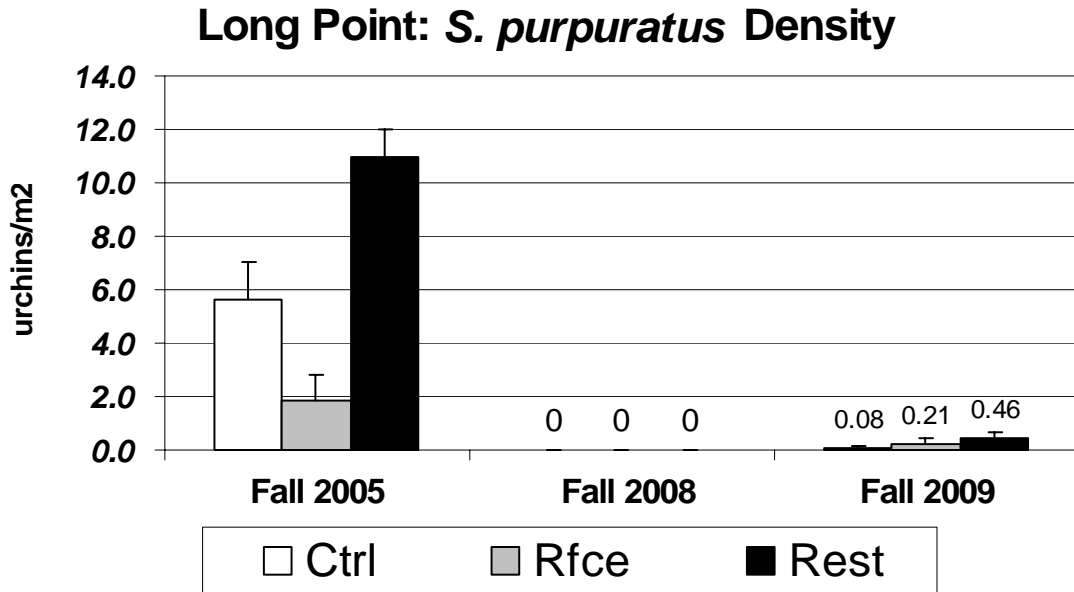


Figure 6. Long Point mean (+SE) purple urchin (*Strongylocentrotus purpuratus*) density in the control, reference and restoration sites using quadrats. Urchins in all restoration sites have been reduced from 10.93 urchins/m² to 0.46 urchins/m² by fall 2009. No quadrat data exists for 2006 or 2007, instead efforts were focused on urchin relocation. Urchins were observed moving into the restoration sites from the direction of the control site. The control site's close proximity to the restoration sites may have allowed urchins to move into the restoration sites, where they were relocated. As a result, the control site was also restored, increasing acreage restored.

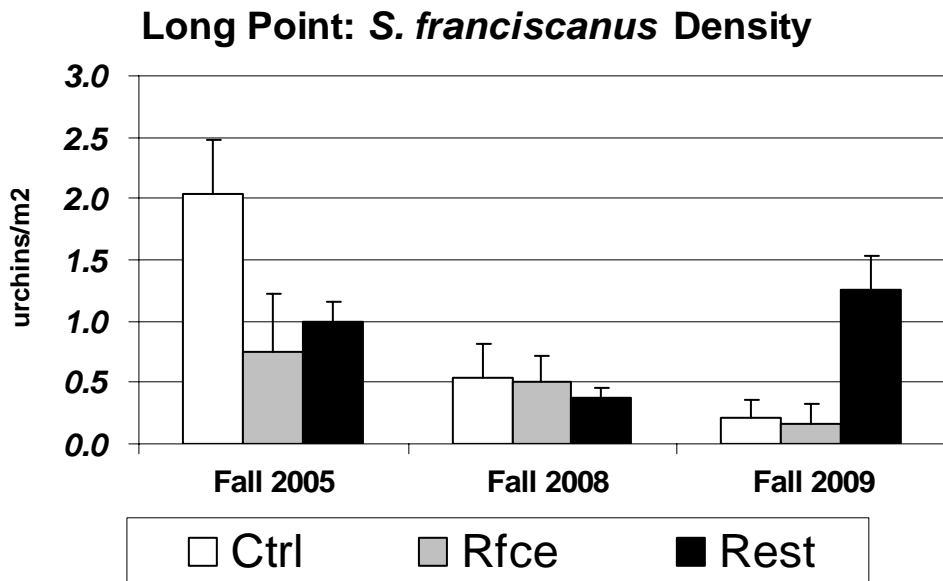


Figure 7. Long Point mean (+SE) red urchin (*Strongylocentrotus franciscanus*) density in the control, reference and restoration sites using quadrats. Red urchin density was similar to reference levels in fall 2005 and 2008, when urchin relocation ceased. No quadrat data exists for 2006 and 2007, instead efforts were focused on urchin relocation. In fall 2009, the restoration site's density increased, and the control site decreased. In 2008, urchins were observed moving into the restoration sites from the direction of the control site. The control site's close proximity to the restoration sites may have allowed red urchins to move into the restoration sites.

Long Point: *M. pyrifera* Density (Plants > 1 meter)

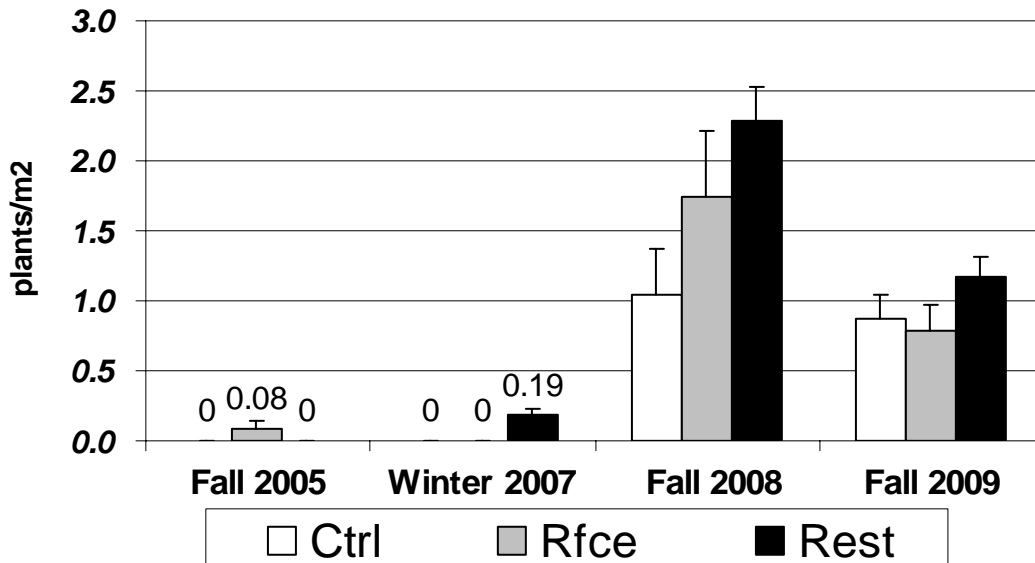


Figure 8. Mean (+SE) kelp (*Macrocystis pyrifera*) density in the control, reference and restoration sites at Long Point, Palos Verdes. Kelp density was restored in 2007, followed by a major recruitment event in all sites by fall 2008. The restored kelp density levels in the control site by fall 2008 is likely due to an observed decrease of urchins in the control and urchin movement from the control to the restoration site. Urchin density has also been reduced in the area in between the control and restoration sites, with accompanying recovery of kelp. Band transect data is shown for winter 2007 to help show general pattern of kelp recovery. No quadrat data is available for 2006 and 2007 because efforts were focused on restoration, specifically urchin relocation.

Long Point: Stipe Density (stipes > 1 meter)

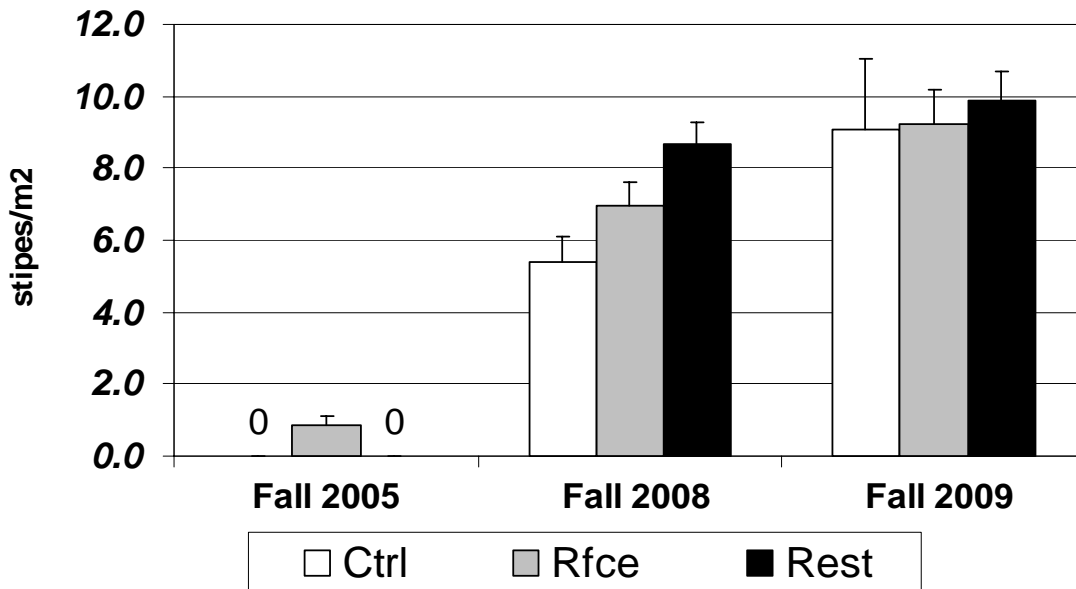


Figure 9. Mean (+SE) stipe density (*Macrocystis pyrifera*) at Long Point control, reference and restoration sites. Large increases in stipes per square meter were observed by fall 2008.

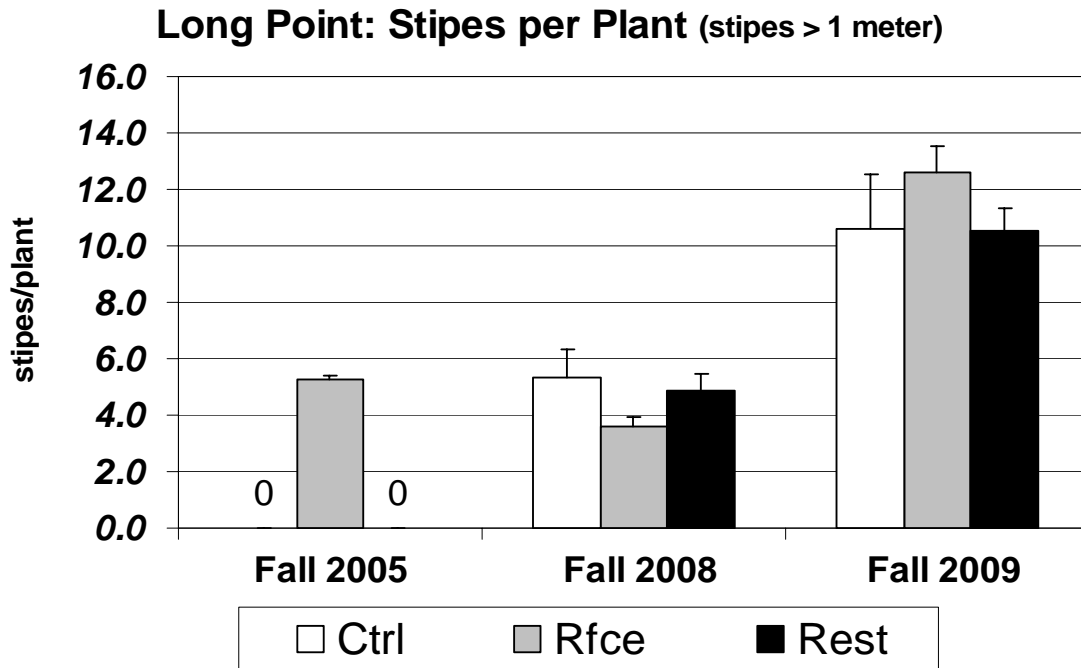


Figure 10. Mean (+SE) stipes per plant (*Macrocyctis pyrifera*) at Long Point control, reference and restoration sites. Mean stipes per plant exceeded reference levels in the control and restoration sites by fall 2008.

K-Cove, Palos Verdes (Long Point 2)

The K-Cove restoration site is adjacent to Long Point's original restoration area. A structurally complex reef, it is composed of high and low relief bedrock, and patchy sand habitat across a depth range of 25 to 35 feet. In April 2009, when baseline monitoring was conducted, the area was dominated by purple urchins (Photo 7). Accelerated recovery of kelp density was expected in K-Cove restoration sites due to the close proximity to Long Point, where sporophylls are now abundant. Photo 8 shows the new kelp forest in November 2009.

Urchin relocation work began in April 2009, and by early December 2009, the project staff and volunteers relocated 118,092 sea urchins (Fig. 11). As a result, purple urchin density has been reduced from 21.35 urchins/m² to reference levels by fall 2009, where 1.76 urchins/m² were described using 1-meter quadrats (Photo 9 and Fig. 12). Red urchins were less abundant at the onset of restoration work, being reduced from 1.57 urchins/m² to 0.36 urchins/m² (Fig. 13).

Once urchin density was reduced to reference levels, kelp returned quickly in the restoration sites. To increase precision, quadrats were used as the primary method to measure success at K-Cove. Surprisingly, in just six months kelp density was restored to 2.6 plants/m² (Fig. 14), and stipe density was recorded at 21.4 stipes/m² (Fig. 15). By November 2009, the new kelp plants averaged 3.6 stipes per plant (Fig. 16). This quick recovery may be due to a high quantity of kelp spores available from previous restoration efforts at Long Point, when in 2009 plants averaged over 10 stipes per plant at Long Point. It can also be presumed that Kelp Project restoration, reference, and control sites have benefited from favorable kelp growth conditions in 2008 and 2009.

Urchin relocation work in 2009 has reduced the urchin density in the restoration sites and kelp has recovered. In order to ensure the long-term sustainability of the entire K-Cove restoration area, staff and volunteer divers performed urchin relocation work from the areas immediately surrounding each restoration site, creating substantial buffer zones. The objective for the first quarter of 2010 is to complete restoration work in the buffer zones and allow the restored kelp forest community to further develop.



Photo 7. Volunteer Oren Skoog collects urchins at K-Cove, Palos Verdes. Purple urchins dominated the restoration sites in April 2009. Photo taken by Mark Corcoran, Starcrest Productions.



Photo 8. K-Cove, Palos Verdes restoration site in November 2009, six months after urchin relocation began. Overpopulated by purple urchins in April 2009, this site experienced rapid kelp recruitment and growth once urchin density was reduced to reference levels.

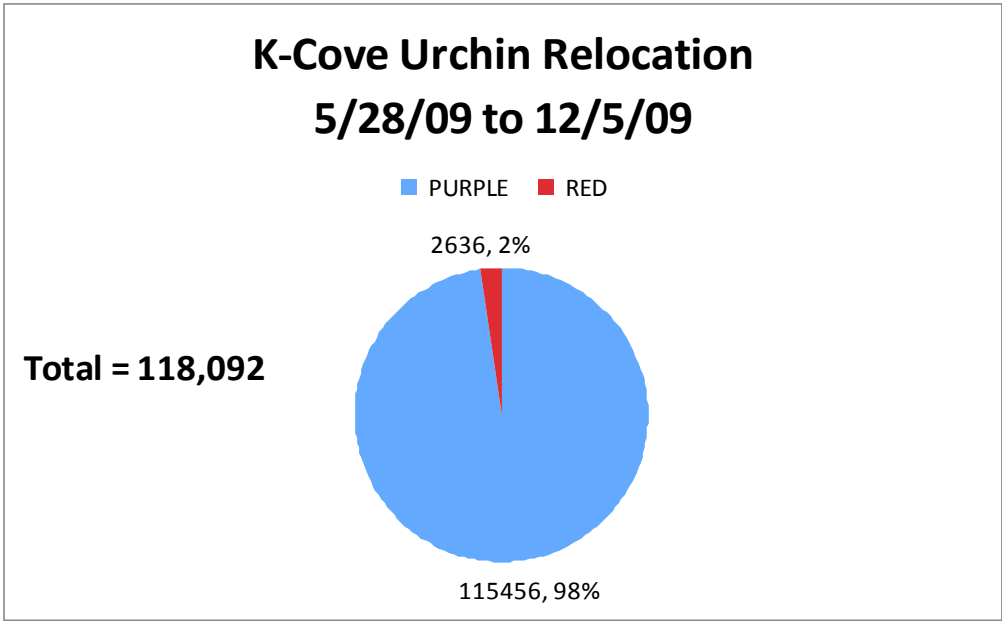


Figure 11. Total urchins relocated from the restoration site at K-Cove, Palos Verdes in 2009. 118,092 total urchins were relocated, the most relocated in one year. The restoration sites were comprised mostly of purple urchins (98%), red urchins made up only 2% of the entire take.



Photo 9. Kelp Project intern Yasumichi Kato counts species in a quadrat at K-Cove in 2009. Quadrats were utilized to determine precise kelp and urchin density at K-Cove in 2009.

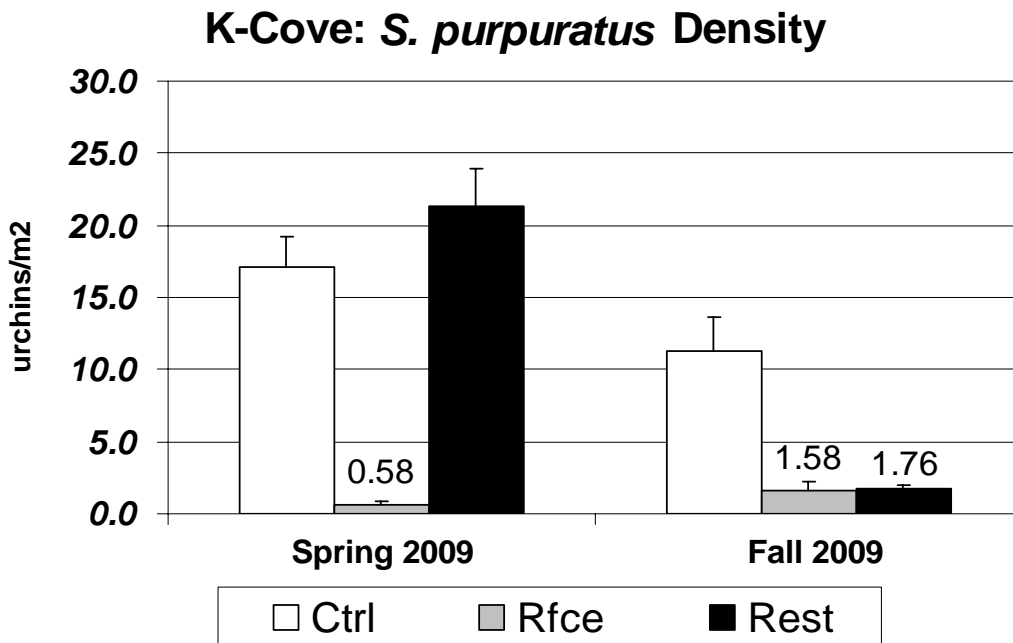


Figure 12. K-Cove mean (+SE) purple urchin (*Strongylocentrotus purpuratus*) density in the control, reference and restoration sites using quadrats. Urchins in all restoration sites were reduced from 21.35 urchins/m² to reference levels by fall 2009, where 1.76 urchins/m² were found in quadrats.

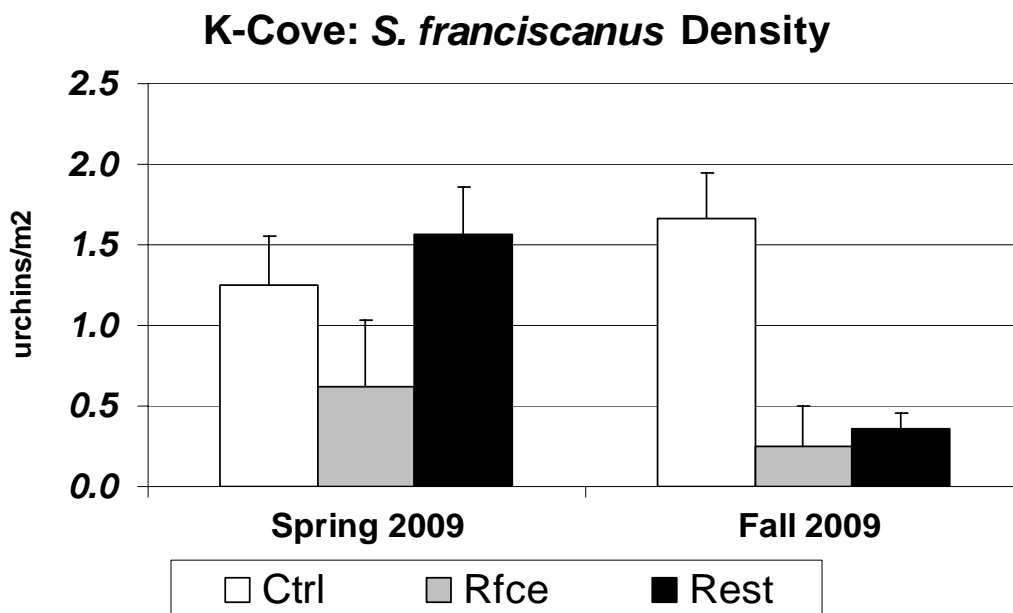


Figure 13. K-Cove mean (+SE) red urchin (*Strongylocentrotus franciscanus*) density in the control, reference and restoration sites using quadrats. Urchins in all restoration sites were reduced to 0.36 urchins/m² by fall 2009.

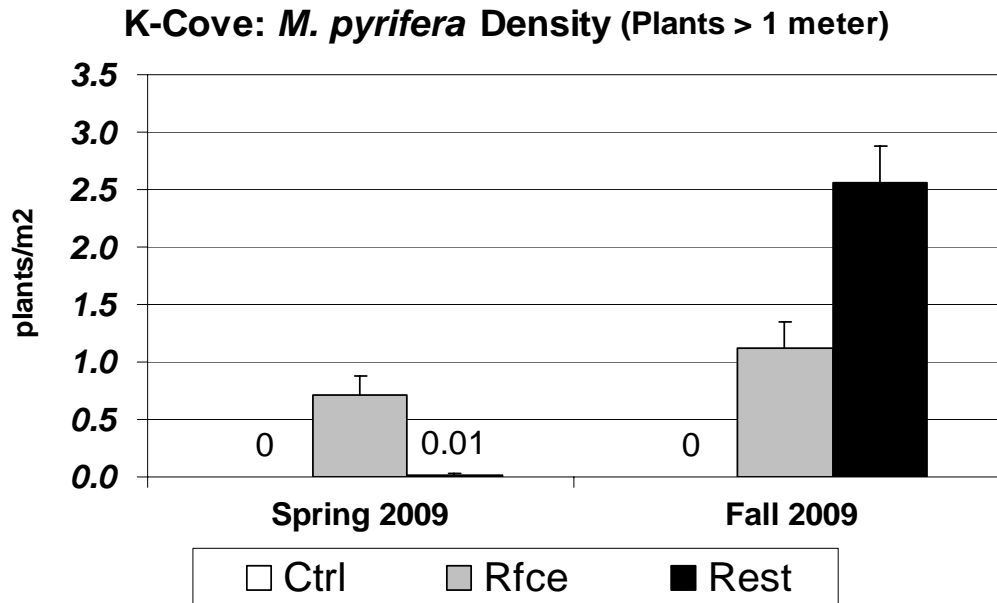


Figure 14. Mean (+SE) kelp (*Macrocystis. pyrifera*) density in the control, reference and restoration sites at K-Cove, Palos Verdes. Once released from urchin grazing pressure, kelp density was restored to 2.6 plants/m² in six months.

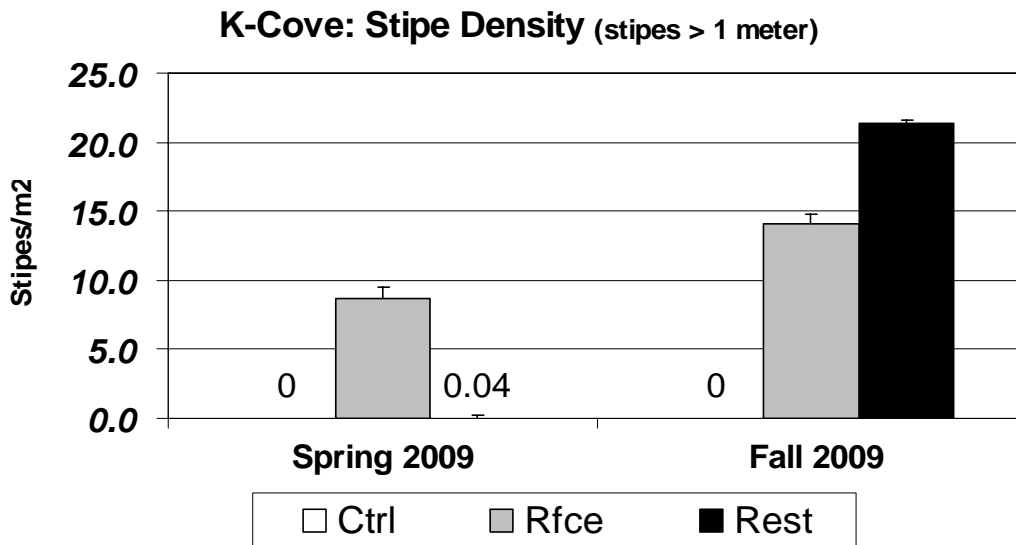


Figure 15. Mean (+SE) kelp stipe (*Macrocystis. pyrifera*) density in the control, reference and restoration sites at K-Cove, Palos Verdes. Stipe Density attained an average of 21.4 stipes/m² in six months.

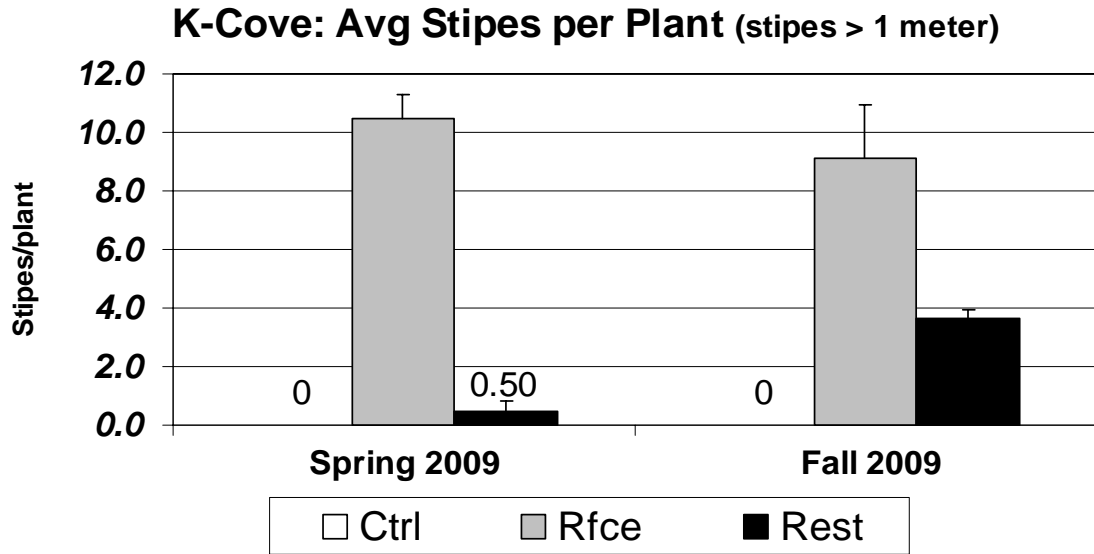


Figure 16. Mean (+SE) kelp stipes per plant (*Macrocystis. pyrifera*) in the control, reference and restoration sites at K-Cove, Palos Verdes. On average, kelp plants grew to 3.6 stipes per plant throughout restoration sites by the time monitoring was conducted in November 2009.

In Summary

This year has been successful for growth, both for kelp and community involvement. Kelp density at all K-Cove sites reached restored levels as of fall 2009. Volunteer divers are a key component to a successful kelp restoration program, and the Kelp Project benefited from increased volunteer participation and field work in 2009 (Photo 10). In addition to two Kelp Project staff divers, a total of 41 volunteer divers participated in the dives, which helped produce a record number of urchins relocated this year. There were a total of 46 dive trips and 455 dives: 140 staff dives, 315 volunteer dives. The total underwater time was 395 hours: 120 staff hours, 225 volunteer hours.

The Kelp Project will continue to develop in 2009, bringing more field work and data analysis, including a formal assessment of fish, invertebrate, and algae species. Total collected urchin biomass, in addition to urchin gonad indices were measured in 2009 at K-Cove, and results will be available in 2010 upon completion of urchin relocation work. It is anticipated that restoration work will continue at a new site in 2010 after site setup and baseline surveys of substrate, fish, algae, and invertebrates are completed.

In addition to Kelp Project monitoring, dives were also devoted to CRANE monitoring (Cooperative Resource Assessment of Nearshore Ecosystems) of local kelp forests to serve as baseline data for the Marine Life Protection Act Initiative as well as general ecological assessment. CRANE includes a comprehensive survey of fish, invertebrate, algal, and substrate surveys to gain knowledge of the overall status and dynamics of rocky reef natural resources. Since 2007, Kelp Project staff have been involved in rocky reef surveys that will contribute to the formation and study of the upcoming network of marine protected areas (MPAs) in southern California. In 2009, field training in combination with CDs were used to improve the species identification skills of those Kelp Project volunteers looking to achieve a higher level of monitoring rigor. Map 2 shows the locations of sites that have been surveyed to date. CRANE data was generated near our restoration sites, which can also be compared to the long-term restoration data set we have acquired to more comprehensively understand the restoration process in this complex system.

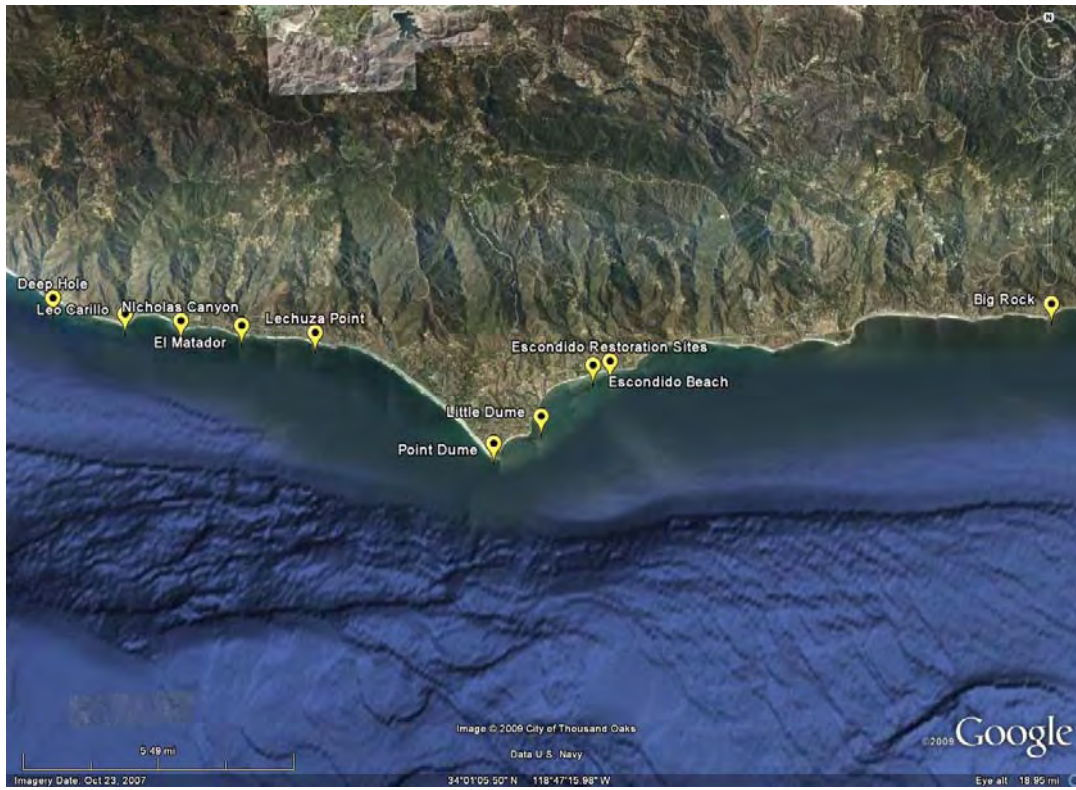
Teaching the importance of the kelp forest is a central part of the Kelp Project (see appendix for detailed outreach list). Kelp Project staff, with the help of volunteers, gave 18 educational presentations and 18 tabling events to universities, colleges, local schools, dive clubs and community groups in 2009. Community organizing and public comment of staff and volunteers was also performed at over a dozen meetings regarding all units and stages of the MLPA Initiative to support increased protections for important marine life and habitats. In addition, Kelp Project and MLPA information was dispersed to over 30 LA County dive shops. Photo 11 shows one of the many outreach events where SMBK staff and volunteers were able to educate the public on the importance of California's kelp beds and the need for restoration.

Utilizing an opportunity for extensive internet outreach, Baykeeper partnered with Starcrest Productions and rising film star Oren Skoog to produce a video highlighting the importance of kelp forests and the Kelp Project. This video was posted online in December 2009 and has received over ten thousand views to date. The Kelp Project has also been well received online by our volunteers and the greater community, receiving postings at popular networking sites such as Facebook.com, YouTube.com, and Scubaboard.com. Numerous divers and other SMBK

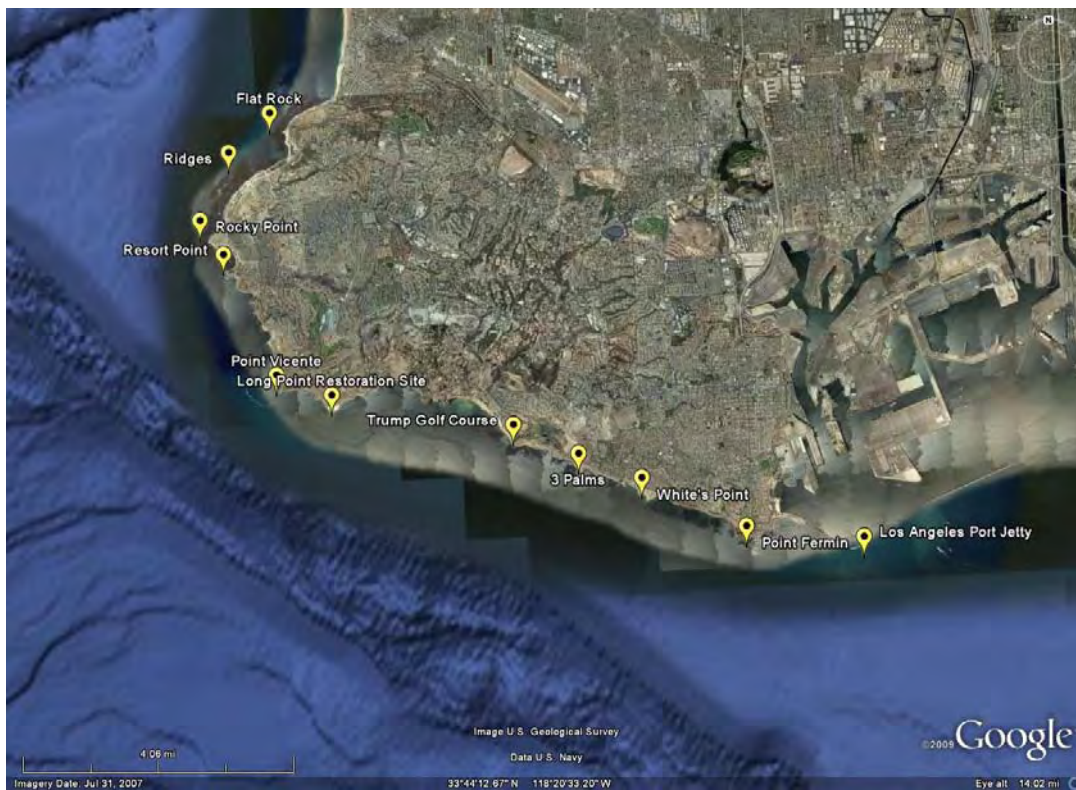
volunteers and members posted blogs, including Kelp Project pictures and video taken by volunteers in the field.

All that we have accomplished this year on the Kelp Project could not exist without funding. Special thanks to the California Coastal Conservancy, Santa Monica Bay Restoration Commission, NEP/CRP (National Estuary Programs/National Oceanic and Atmospheric Administration) partnership funding, and private foundations, who all continued to provide support for the Kelp Project.

a)



b)



Map 2. CRANE sites surveyed since 2007 along the a) Malibu and b) Palos Verdes coastlines. The few island sites surveyed were not included.



Photo 10. Kelp Project divers on board Baykeeper's research vessel after a day of diving on the Kelp Project. *From left to right:* Kate Salvo, Brian Meux, Ben Barnes, Yasumichi Kato, Chris Gonzalez.



Photo 11. Baykeeper staff and volunteers educate the public about the importance of kelp forests at the Abbot-Kinney Festival in Venice. *From left to right:* Whitney Graves, Tom Ford, Brian Meux.

Appendix
2009
Outreach, Education, and Community Organizing

Date	Event	Note
1/22/09	Willows Elementary and Middle Private School. ~50 2 nd grade students.	Stacie Fejtek, kelp presentation.
2/9/09	Loyola Marymount undergraduate sustainability class. ~30 students attendance.	Tom Ford, kelp/MLPA presentation.
2/11/09	Point Vicente Interpretive Center, Palos Verdes.	Brian Meux, kelp and local habitat presentation to MLPA staff and RSG members
3/3/09	MLPA RSG meeting, Hilton, Long Beach.	Tom Ford, external proposal presentation to RSG.
3/3/09	American Cetacean Society, whale watch naturalists, Cabrillo Aquarium. ~50 naturalists.	Brian Meux, kelp/MLPA presentation.
3/4/09	UCLA Oceanography class. ~20 students	Stacie Fejtek, kelp/MLPA presentation.
3/10/09	Malibu Surfing Association monthly meeting. ~20 people	Stacie Fejtek, kelp/MLPA pres.
3/29/09	Diver's Day at the Aquarium of the Pacific, Long Beach. Tabling to couple hundred divers.	Brian Meux, Stacie Fejtek, kelp project volunteers, kelp/MLPA info.
4/7/09	Southern California Dive Club of the Inland Empire. ~75 divers.	Brian Meux, kelp project/MLPA pres.
4/14/09	Point Vicente Interpretive Center meeting. ~20 naturalists	Brian Meux, kelp/MLPA pres.
4/17/09	Willows Elementary School, Los Angeles. ~ 50 students.	Stacie Fejtek, kelp pres.
4/28/09	Dan Pondella's Marine Biology class, Occidental College. ~30 students	Tom Ford, kelp/MLPA pres.
5/5/09	S.E.A. Divers dive club (in partnership with Lia Protopapadakis, SMBRC staff, MLPA RSG member). ~25 divers	Brian Meux, MLPA/kelp pres.
5/30 & 5/31/09	SCUBA Show 2009, Long Beach Convention Center. Hundreds of divers in attendance.	Brian Meux, Stacie Fejtek, kelp project volunteers, kelp/MLPA info.
6/10/09	Pacific Explorers Dive Club, Canoga Park. ~ 30 divers.	Brian Meux kelp/MLPA pres.
7/15/09	Dive n' Surf Dive Team, King Harbor, Redondo Beach. ~ 30 divers.	Brian Meux kelp/MLPA presentation
7/22/09	Outreach and SCMI student divers conduct urchin relocation. K-Cove, Palos Verdes	Brian Meux, kelp talk and urchin relocation.
8/10/09	Sole Searchers Dive Club, Pasadena. ~40 divers.	Brian Meux kelp/MLPA presentation
8/17/09	AAAS meeting: Sustainability in an Evolving World. ~50 academics.	Brian Meux kelp/MLPA poster session
8/26/09	Eco Dive Club Bonfire/MLPA tabling. ~ 100 divers.	Brian Meux, Dockweiler Beach, kelp/MLPA tabling info
8/31/09	Pasadena City College, Marine Biology Class / Bower. ~30 students	Volunteer Billy Arcila, outreach talk, pamphlets
9/3/09	Rusty's Surf Ranch, Green Drinks meet & greet,	Brian Meux, Stacie Fejtek,

	tabling kelp/MLPA. ~ 200 environmentalists.	SMBK volunteers, kelp/MLPA info.
9/4/09	Fullerton College, Marine Biology / Carolyn Heath. ~ 30 students.	Volunteer Billy Arcila, outreach talk, pamphlets
9/8/09	Sharkbait Dive Club, Anaheim. ~20 divers.	Brian Meux kelp/MLPA presentation
9/8/09	Cypress College, Oceanography (Flynn, R.) / Environmental Science (Gill, D.)	Volunteer Billy Arcila, outreach talk, handed pamphlets
9/9/09	MLPA Short speech scientific guidelines, ReefCheck divers (3 boat trips and 1 shore dive)	Volunteer Yasumichi Kato, support letters, handouts
9/10/09	Intro Marine Biology class, Long Beach State. ~ 120 students.	Volunteer Yasumichi Kato, support letters, handouts
9/14/09	Antelope Valley Desert Divers, Palmdale. ~25 divers.	Brian Meux kelp/MLPA presentation
9/17/09	Cypress College, Dr. Gwen Goodmanlowe Science Lecture.	Volunteer Billy Arcila, petition table, pamphlets
9/19/09	Coastal Cleanup Day, King Harbor, Redondo Beach. ~200 public	Brian Meux, Tatiana Gaur kelp/MLPA info.
9/26/09	Fullerton College	Volunteer Billy Arcila, petition table, pamphlets
9/27/09	Abbot-Kinney Festival, kelp MLPA tabling. Hundreds of members of public attended.	Brian Meux, Tom Ford, Tatiana Gaur. Kelp/MLPA info, petitions.
10/4/09	UCLA "Peaceable Kingdom", 1-5pm	Volunteer Billy Arcila, outreach, petition, pamphlets
10/5/09	5 min presentation, signed MLPA support letters, handouts to students taking Marine community (15) Conservation Biology (37) in CSULB	Volunteer Yasumichi Kato, support letters, handouts
10/7/09	Sierra Club Pasadena Chapter	Volunteer Billy Arcila, outreach talk, pamphlets
11/09	Kelp Project video: "Oren Skoog and the Santa Monica Baykeeper, by Starcrest Productions. See it at: http://www.youtube.com/watch?v=GQ-lfK-cN0g	Outreach, education with Oren Skoog, and Starcrest Productions
11/12/09	CSULB campus – signed MLPA support letters, petitions	Volunteer Yasumichi Kato, support letters, handouts
11/16-11/20/09	Handouts and support letters at: Cabrillo Marine Aquarium, Marine Biology chair in CSULB and MBSA president, Aquarium of the Pacific education department and volunteer day captains	Volunteer Yasumichi Kato, support letters, handouts
11/19/09	Brawerman School, Los Angeles - 4 th grade assembly. ~ 60 students	Brian Meux, kelp presentation
Ongoing	Community organizing and public comment of staff and volunteers at over a dozen meetings regarding all units of the MLPA Initiative.	SMBK staff and volunteers
Ongoing	<u>Online Community Forums:</u> Facebook.com, Scubaboard.com, Dive Matrix.com, Scubapost.net, Divetrippers.com, U.T.D.	SMBK staff and volunteers - Kelp/MLPA posts, blogs, communications

