



# **HEAL THE BAY'S MPA WATCH DATA ANALYSIS 2013**

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The 100+ MPA Watch volunteers and interns who have collected data  
and monitored MPAs along Los Angeles' beaches.

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## Overview

Heal the Bay is a non-profit environmental organization with over 15,000 members dedicated to making the Santa Monica Bay and Southern California coastal waters and watersheds safe, healthy, and clean for people and local ecosystems. Heal the Bay is committed to the successful implementation of Marine Protected Areas (MPAs) in Southern California through research, monitoring efforts, community collaboration, and education. Since 2008, Heal the Bay has played a critical role in advancing the goals of the Marine Life Protection Act (MLPA) in Southern California. Due in large part to its far-reaching public education campaigns, technical expertise, rapport with policymakers, and role in helping design the new MPAs as part of the South Coast Regional Stakeholder Group, Heal the Bay was instrumental in the recent adoption of science-based MPAs in Southern California. Heal the Bay developed Los Angeles' local MPA Watch program in early 2011.



**Heal the Bay has trained 130 volunteers and 24 interns who completed over 1,500 surveys since 2011.**

MPA Watch: Los Angeles is a citizen science monitoring program that trains volunteers to observe and collect data about coastal and marine resource use inside and outside marine protected areas (MPAs) using standardized protocols and categorizing observed human uses into a set of activities. Heal the Bay's MPA Watch volunteers collect data from both MPAs and outside MPAs, allowing for useful comparisons. Trained MPA Watch citizen scientists can produce accurate and reliable information to help better understand how the public uses coastal areas, and to inform management and monitoring of MPAs. In Los Angeles County, Heal the Bay manages MPA Watch volunteers that survey inside and outside MPAs in Malibu and Palos Verdes.

## Goals

1. To help determine how effective MPAs are at meeting their goal of enhancing recreational activities by tracking changes and trends over time.
2. To provide contextual information on human use for interpretation of biological monitoring data.
3. To inform MPA enforcement and management decisions regarding human activity inside MPAs.
4. To train MPA Watch volunteers as effective public educators regarding MPAs.

## Methods

MPA Watch volunteers walk along California's beaches and bluffs surveying and recording all offshore and onshore coastal activities within and directly outside Los Angeles area MPAs. Volunteers are trained to recognize different types of activities, using binoculars to view activities offshore, and to record what they see on data sheets. Examples of activities that volunteers record include consumptive activities such as commercial lobster fishing and shore fishing, and non-consumptive activities such as swimming, SCUBA diving, and wildlife watching. Volunteers are trained to use compasses to accurately begin and end their surveys, as well as to identify MPA boundaries. All data that is collected undergo rigorous quality assurance and quality control protocols by coordinating organizations before being accepted and shared.

## Study Area

Our study area includes beaches and offshore areas from Nicholas Canyon to Latigo Beach in Malibu, Leo Carrillo Beach, and north of Point Vicente to Portuguese Point in Palos Verdes. The study area includes four marine protected areas (MPAs): Point Dume SMCA, Point Dume SMR, Point Vicente SMCA, and Abalone Cove SMCA.



# MPA WATCH: Los Angeles

## In the Classroom...



The first part of MPA Watch training is in the classroom and includes information on the MLPA, MPA regulations and locations, and how to identify consumptive and non-consumptive activities.

## In the Field...

A new group of citizen scientists complete their field training at Point Dume, Malibu. During trainings, volunteers learn to identify about 30 consumptive and non-consumptive activities, both onshore and offshore.



One of the consumptive ocean uses MPA Watch citizen scientists record include commercial lobster fishing. This boat is in an area adjacent to Point Vicente State Marine Conservation Area in Palos Verdes.

Some of the consumptive and non-consumptive ocean uses prevalent along a survey on Westward Beach (within Point Dume State Marine Reserve) include shore-based rod/reel fishing, kayaking, swimming, wading, and beach recreation.



For more information about MPA Watch, please contact [mpawatch@healthebay.org](mailto:mpawatch@healthebay.org)

## Data Analysis Highlights

### Sample Size

- Total Surveys from March 2011 – August 2013 (Malibu and Palos Verdes): 1358
- Total Surveys after MPA implementation (Malibu and Palos Verdes): 1139
- Malibu Surveys: 916
- Malibu Surveys before MPA Implementation: 219
- Malibu Surveys after MPA implementation: 697
- Palos Verdes Surveys (all after MPA implementation): 442

### General Observations

- The most common coastal uses in both Malibu and Palos Verdes are non-consumptive.
- Total activity varies considerably over the year according to season.
- Noncompliance in the MPAs is quite low.

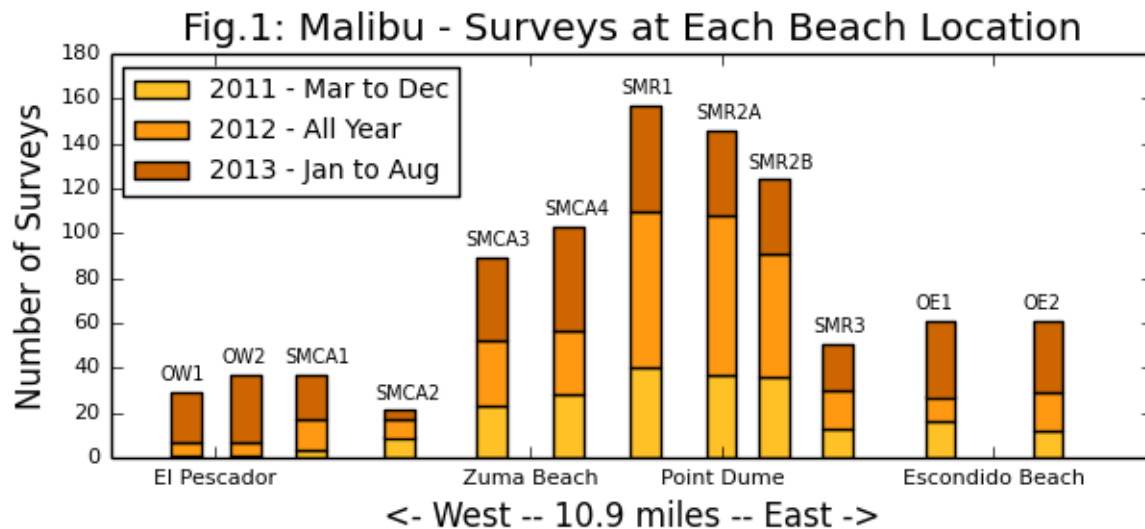
### Highlights of Malibu Data Analysis

- 99.0% of the Malibu coastal uses surveyed since MPA implementation are non-consumptive.
- The most popular coastal activity in Malibu is general beach recreation (69.1%). Walking (10.1%), swimming (7.0%) and surfing/boogie boarding (6.1%) are also extremely popular. Other common activities are associated with domesticated animals (1.7%), running (1.2%), media activities (1.0%) and stand up paddle-boarding (0.8%).
- Some noncompliant consumptive activities are present in the MPA, the majority of which are shore-based rod/reel fishing (51% of active noncompliant activity).
- Noncompliant shore-based rod/reel fishing decreased substantially after MPA implementation from survey observations in early 2012, averaging four individuals at any given time pre-MPAs (2011) to a value close to zero by August 2013.

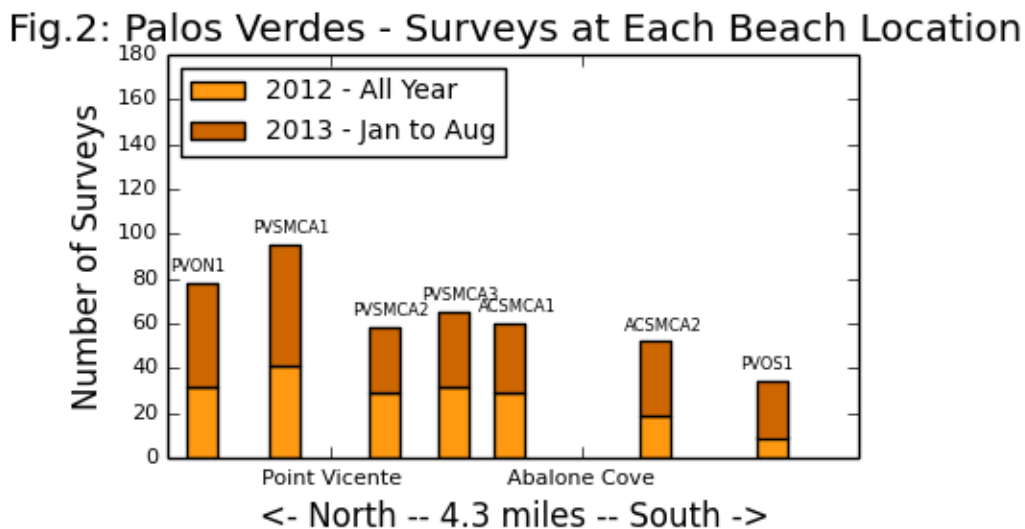
### Highlights of Palos Verdes Data Analysis

- 90.9% of the Palos Verdes coastal uses surveyed since MPA implementation are non-consumptive.
- The most popular coastal activities in Palos Verdes are general beach recreation (32.5%) and walking (21.6%). Other common activities are wildlife watching (9.1%), tidepooling (7.3%), sailing (4.9%), private power boating (4.1%), swimming/wading (3.5%) and shore-based rod/reel fishing (3.2%).
- Some active noncompliant consumptive activities are present in the MPA, the majority of which are shore-based rod/reel fishing (61%).
- Noncompliant shore-based rod/reel fishing has been declining over time from a starting value of two individuals at any given time in January 2012 to a value close to zero by the end of this study in August 2013, perhaps indicating that education and enforcement activity has been effective.

## Geographic Distribution of Surveys

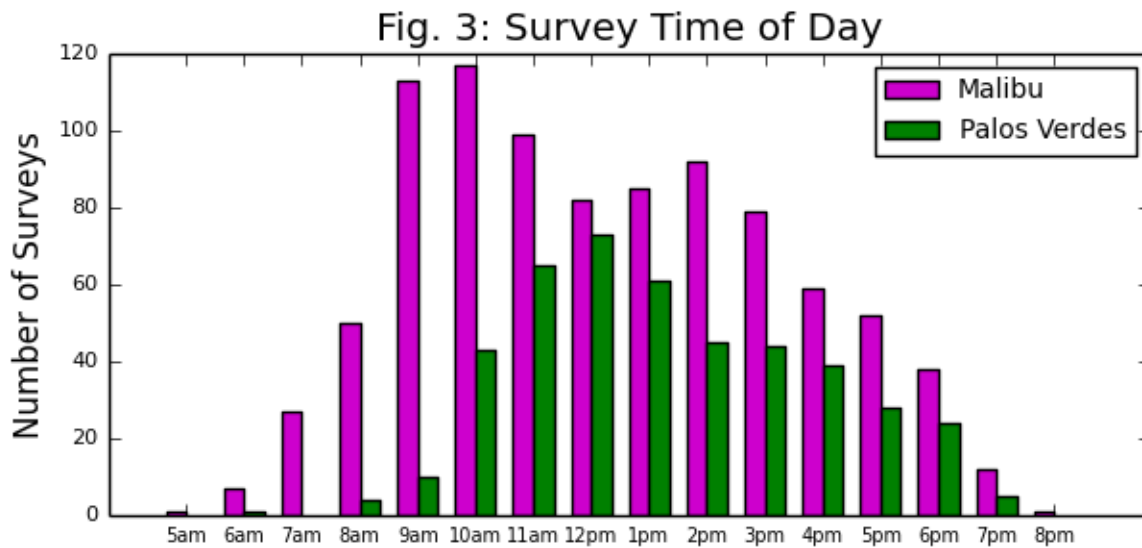


In Malibu, the survey locations cover 10.9 miles from Nicholas Canyon in the west to Latigo Beach in the east (Fig. 1). Point Dume SMCA includes the four survey segments: SMCA1, SMCA2, SMCA3 and SMCA4. Point Dume SMR includes the four survey segments: SMR1, SMR2A, SMR2B and SMR3. The survey segments OW1, OW2, OE1 and OE2 lie outside of the MPAs. Point Dume SMCA has 63 surveys completed before MPA implementation on January 1, 2012 and 187 surveys completed after. Point Dume SMR has approximately twice as many surveys with 126 surveys before and 352 surveys after.



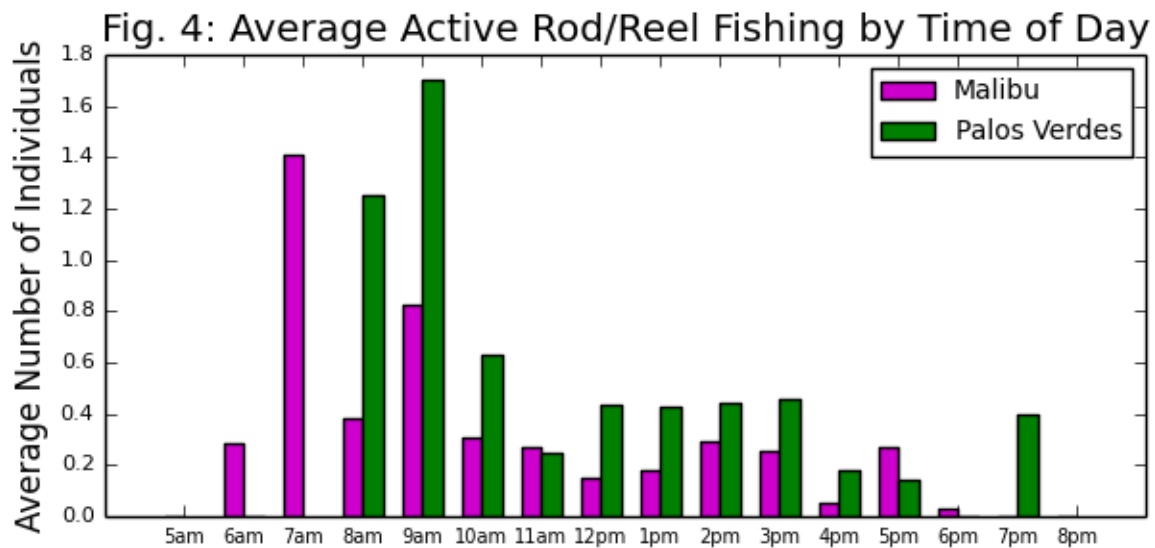
In Palos Verdes, the survey locations cover 4.3 miles from north of Point Vicente to Portuguese Point in the south (Fig. 2). Coverage is somewhat better in the northern beaches than in the southern beaches. Point Vicente SMCA includes the three survey segments: PVSMCA1, PVSMCA2 and PVSMCA3. Abalone Cove SMCA includes the two survey segments: ACSMCA1 and ACSMCA2. The survey segments PVON1 and PVOS1 lie outside of the MPAs. There are 218 surveys for Point Vicente SMCA and 112 surveys for Abalone Cove SMCA.

## Daily Distribution of Surveys



Most of the surveys have a start time between the hours of 8am to 5pm in Malibu and 10am to 4pm in Palos Verdes (Fig. 3). Surveys generally take less than an hour to complete.

Later discussion in this report shows that on-shore rod/reel fishing accounts for the majority of the noncompliant fishing activity occurring in both the Malibu and Palos Verdes MPA beaches. Figure 4 below shows the average number of individuals engaged in rod/reel fishing per survey as a function of the survey time of day. The graph includes all surveys from March 2011 to August 2013. There is significantly more fishing activity early in the morning when there are fewer surveys. Some effort should be made in future survey work to have more coverage of the early morning hours when shore-based rod/reel fishing may be more common. In Palos Verdes, there were no surveys done at the 7am hour and only one at 6am so the true shape of this distribution is not well defined from the surveys completed thus far.



## Total Number of Observed Individuals or Boats

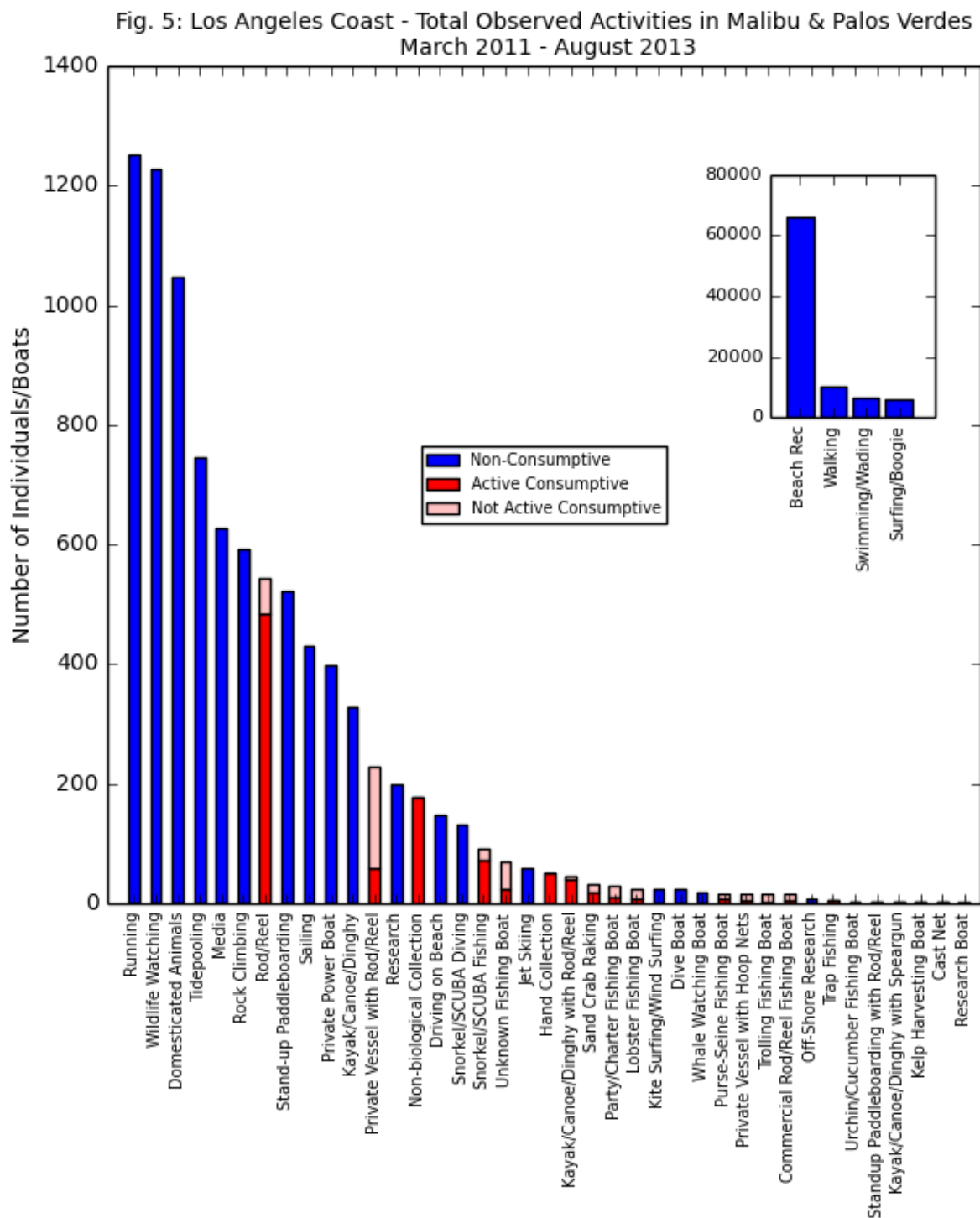


Figure 5 shows the raw observed activity data from all the surveys made for both the Malibu and Palos Verdes areas both within and outside of the MPAs, both pre and post MPA establishment. Later figures will show this data normalized to account for different areas having different numbers of surveys.

Of the 44 different types of activities monitored in the surveys, only one activity, stand up paddleboard fishing with a spear gun, had no observations.



## Malibu Coastal Activity

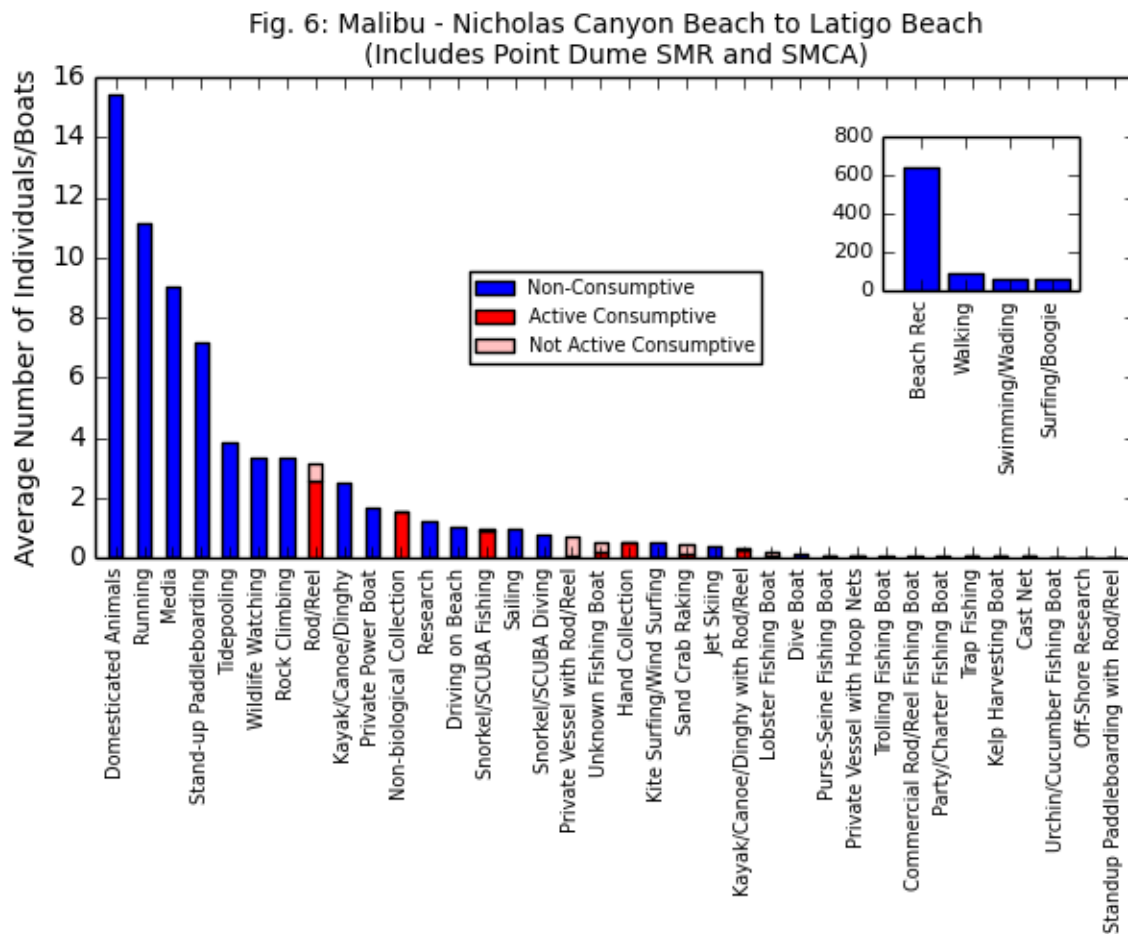
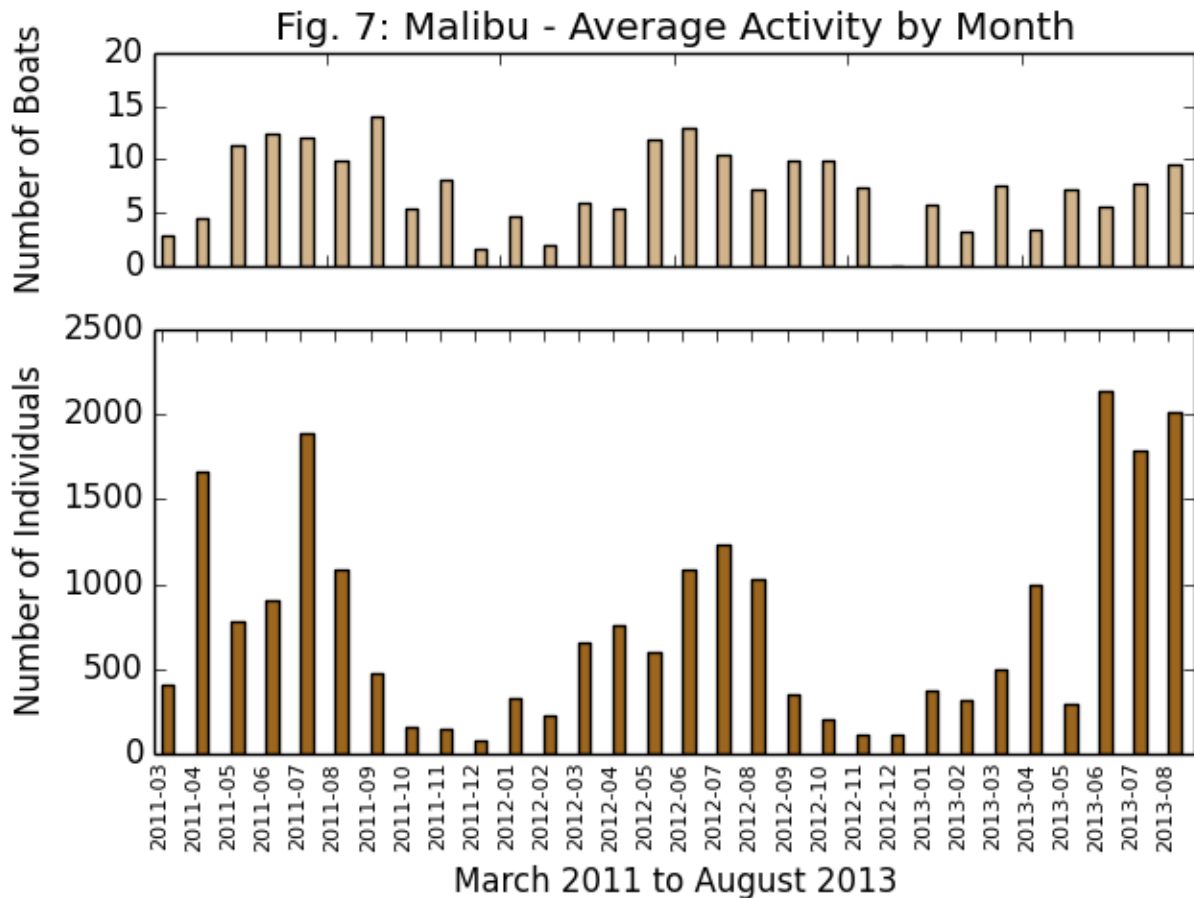


Figure 6 shows the normalized beach activity in the Malibu area from the beginning of MPA implementation in January 2012 to August 2013. The data were normalized by taking the average of each individual activity count for each beach location and then summing those averages over all the beach locations to calculate an average for each activity over the entire Malibu area. The vertical scale on Figure 6 therefore represents the expected activity that might be observed at any given time looking at the beach stretching from Nicholas Canyon Beach in the west to Latigo Beach in the east. For example, at any given time you would expect over 600 people to be engaged in the category beach recreation, around 100 people to be out walking, perhaps 11 to be running on the beach and three people fishing using a rod/reel. For activities having an average of less than one, you would only observe people engaging in those activities occasionally. Jet skiing has a value of 0.4 and so you might see someone engaged in this activity two out of every five surveys of the Malibu beaches.

The most common coastal activities in the Malibu study area are beach recreation, walking, swimming/wading and surfing/boogie boarding. Rod/reel fishing from shore is the most common consumptive activity and is 12<sup>th</sup> in overall frequency of non-consumptive and consumptive activities combined.

There was no observed activity for whale watching boats, stand up paddleboard fishing with a spear gun, kayak/canoe/dinghy fishing with a spear gun or research boats.

## Malibu Activity over Time

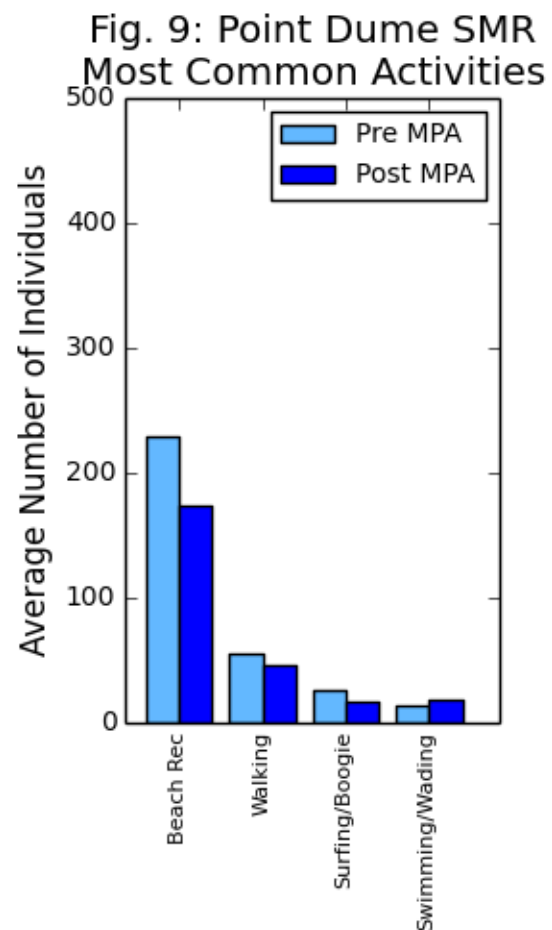
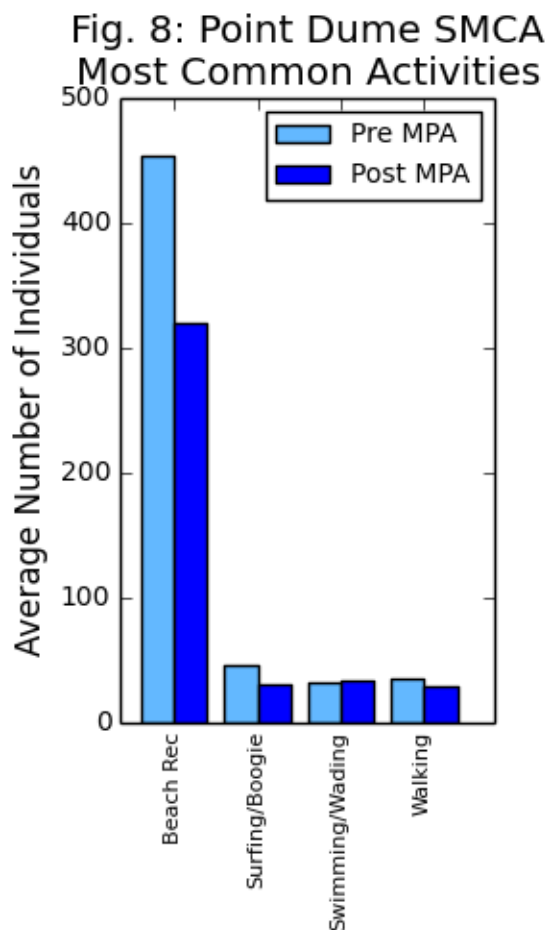


The total amount of beach activity varies considerably over time, with seasonal shifts from high activity during the summer months to low activity during the winter months. Figure 7 shows the variation for both boating activity and individuals for the 30 months of data collection in Malibu. As in Figure 6, the vertical scale shows the expected activity that might be observed at any given time.

Figure 6 on the preceding page shows that general beach recreation dominates the individual activity counts; therefore the lower part of Figure 7 showing the number of individuals observed on the beach or in the water is primarily showing the fluctuation in this one activity. While the average number of people engaged in beach recreation is over 600, looking at the graph on this page would lead you to expect 1000 to 2000 people to be on the Malibu beaches during the summer months and only 100 to 200 people during the winter months.

The number of boats observed near the shore is quite small compared to the number of individuals on the beach and doesn't fluctuate as much, with the numbers ranging from a high of 14 in September 2011 to a low of zero in December 2012 (Fig. 7).

## Comparing Activities Before and After MPA Implementation – Most Common



Comparing the activity within the Point Dume MPA beaches before and after MPA implementation, it looks like the relative proportion of activity types stayed relatively constant but the absolute value decreased substantially. This could be an artifact of not including two months of winter data in the pre-MPA data as survey collection did not begin in 2011 until March. As discussed with Figure 7, there is tremendous variation in the activity level during different seasons. The pre-MPA data includes only a partial year, March through December 2011. The post MPA data includes a full year plus a partial year spanning January through August 2013. Another possibility is that there were significantly different weather patterns during the peak summer season but this possibility isn't explored in the current report. Better summer conditions could lead to higher beach activity in general.

The Point Dume SMCA beaches have higher numbers of people engaging in beach recreation than the Point Dume SMR beaches (Figures 8 and 9). Some of this increase is simply due to the longer beach length in the SMCA area, 3.84 miles vs. the 3.21 miles of Point Dume SMR beaches; however, this difference in size isn't large enough to change the overall conclusion that the SMCA beaches are more popular for beach recreation than the SMR beaches. This is probably due to the easier beach access to the SMCA beaches and the prevalence of parking in the Zuma Beach area. While the top four activities remain the same in both areas, the order is slightly different with walking being more popular on the SMR beaches than on the SMCA beaches.

## Comparing Activities Before and After MPA Implementation – Non-Consumptive

Fig. 10: Point Dume SMCA  
Other Common Activities

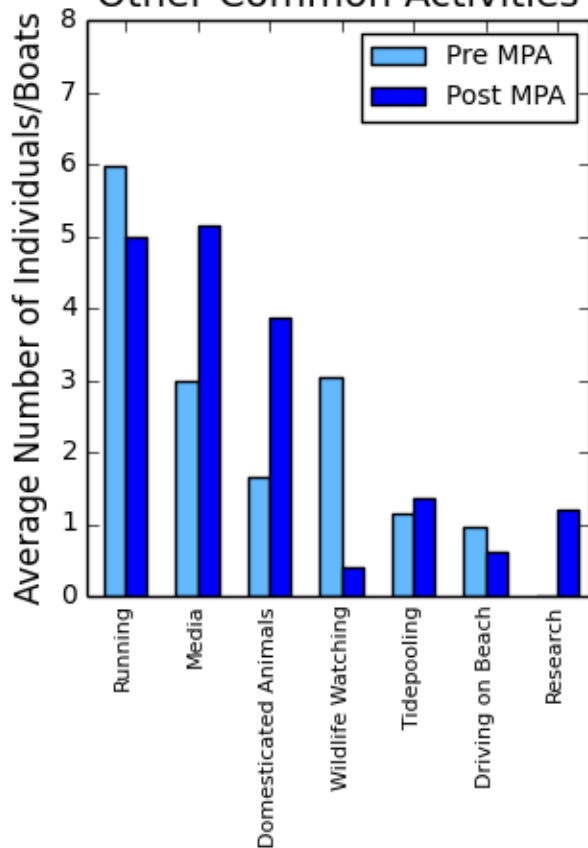
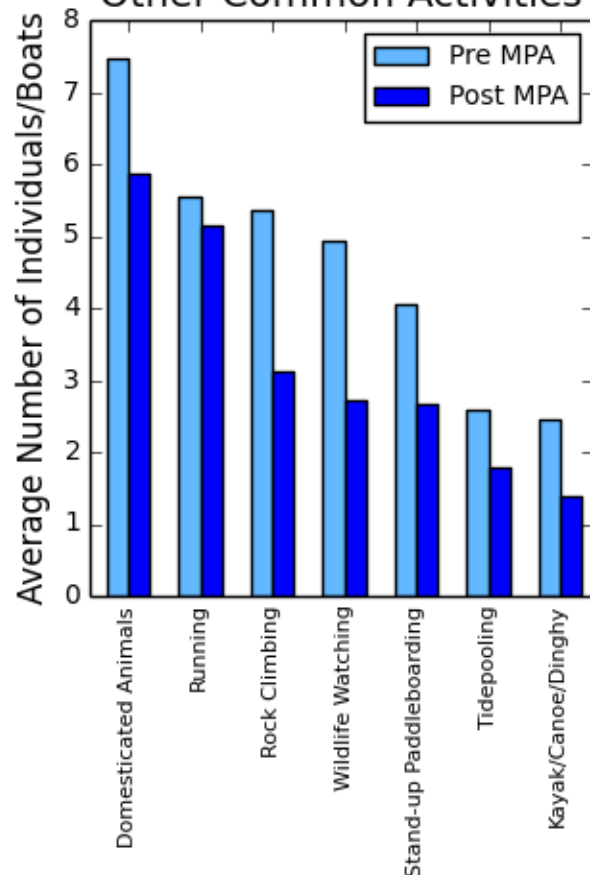


Fig. 11: Point Dume SMR  
Other Common Activities



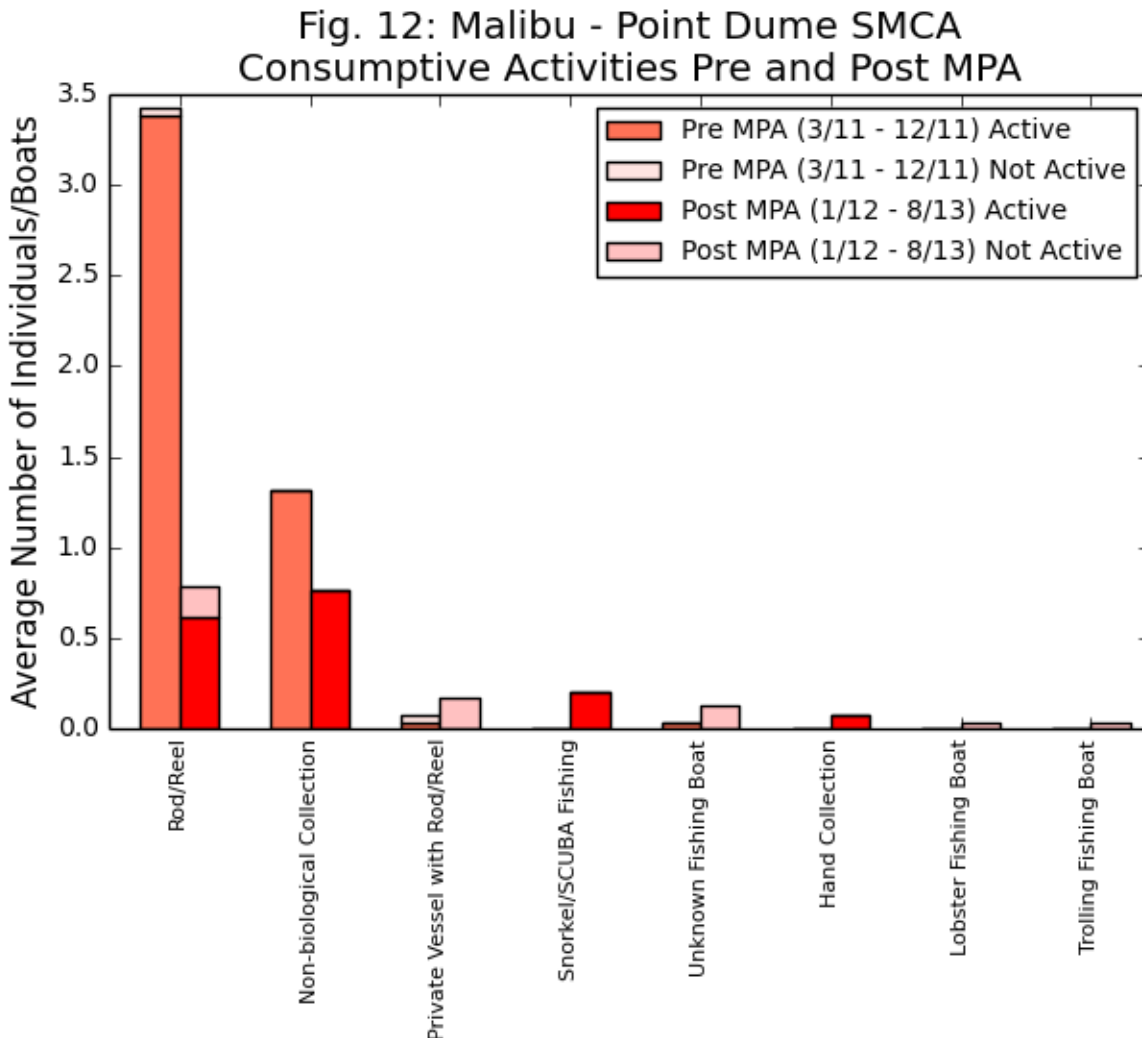
Only relatively popular non-consumptive activities are shown in Figures 10 and 11. The most popular activities (top four) are discussed on the preceding page (Figures 8 and 9).

Consumptive activities are discussed on the following page (Figures 12 and 13). Point Dume SMCA has 63 surveys completed before MPA implementation on January 1, 2012 and 187 surveys completed after. Point Dume SMR has approximately twice as many surveys with 126 surveys before and 352 surveys after.

Driving on the beach and participating in research activities are more common on the SMCA beaches while rock climbing, wildlife watching, stand up paddleboarding and using a kayak/canoe/dinghy are more common on the SMR beaches. There seems to be a significant rise in media use, activities with domesticated animals and research in the SMCA beaches post-MPA implementation while there is a drop in wildlife watching activity.



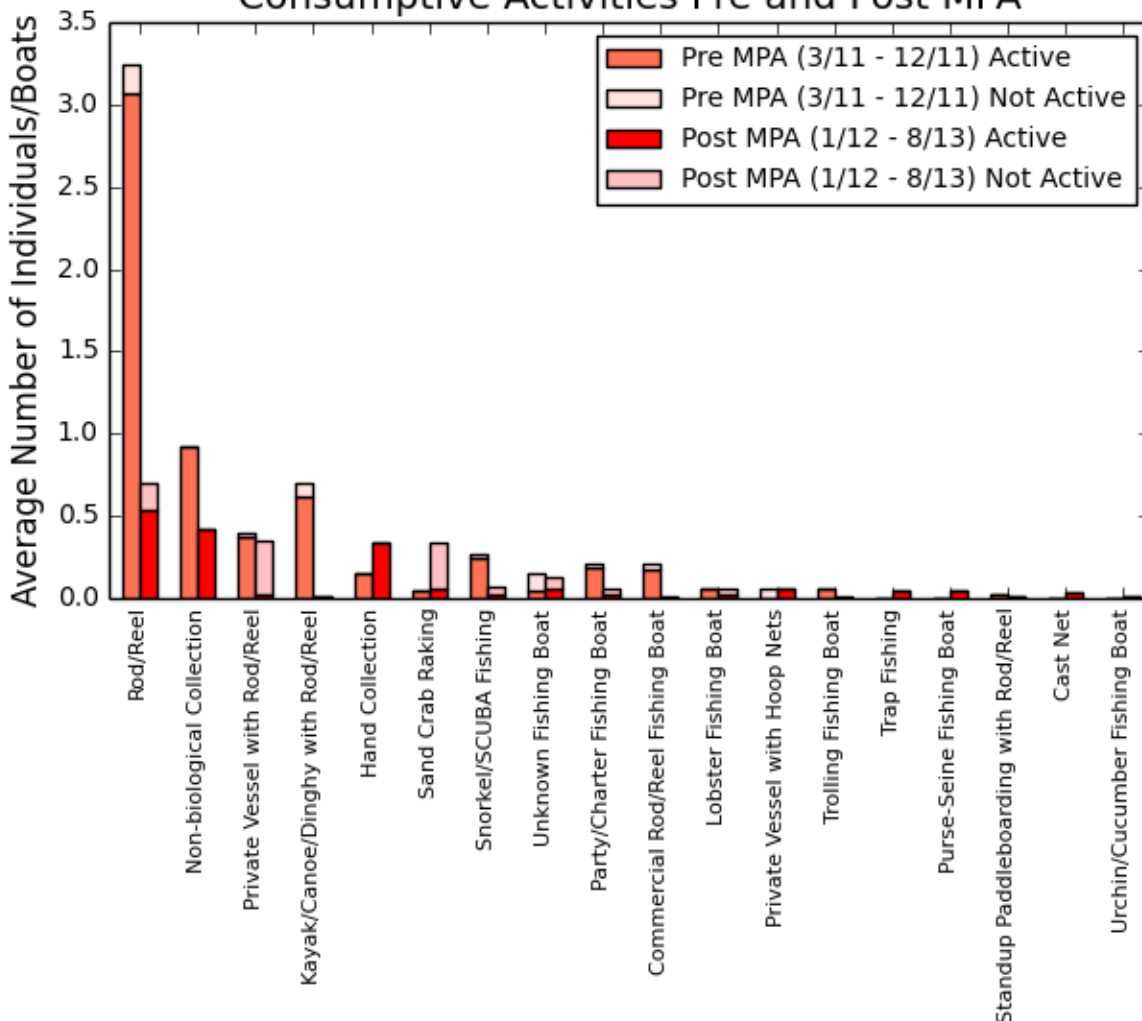
## Comparing Activities Before and After MPA Implementation – Consumptive



All of the observed consumptive activities in the Point Dume SMCA beaches, both active and not active, are compared for the time before MPA implementation and after in Figure 12. The majority of these consumptive activities became illegal after MPA implementation in 2012. While there is still observed noncompliance with the shore-based rod/reel fishing, the numbers are much smaller than in 2011. In the 20 months of data collection post-MPA, on average an observer would only see one active rod/reel fisherman every other day throughout the entire Point Dume State Marine Conservation Area beaches. One limitation of this data, however, is that most of the surveys have been completed between the hours of 8am and 5pm, so fishing activity done earlier or later in the day might not be reflected in these numbers.

## Comparing Activities Before and After MPA Implementation – Consumptive

Fig. 13: Malibu - Point Dume SMR  
Consumptive Activities Pre and Post MPA



All of the observed consumptive activities in the Point Dume SMR beaches, both active and not active, are compared for the time before MPA implementation and after in Figure 13. These consumptive activities became illegal after MPA implementation with the exception of the non-biological collection such as shell collecting. While there is still observed noncompliance with the shore-based rod/reel fishing, the numbers are much smaller than in 2011. In the 20 months of data collection post-MPA, on average an observer would only see one rod/reel fisherman every other day throughout the entire Point Dume State Marine Reserve beach. One concern, with this data, however, is that most of the surveys have been done between the hours of 8am and 5pm, so fishing activity from earlier in the day might not be reflected with these numbers.

The amount of hand collection activity, such as taking species from tide pools, has increased post MPA implementation and points to the need for increased education or enforcement.

**Malibu Fishing Activity Locations Pre and Post MPA: Fig. 14**

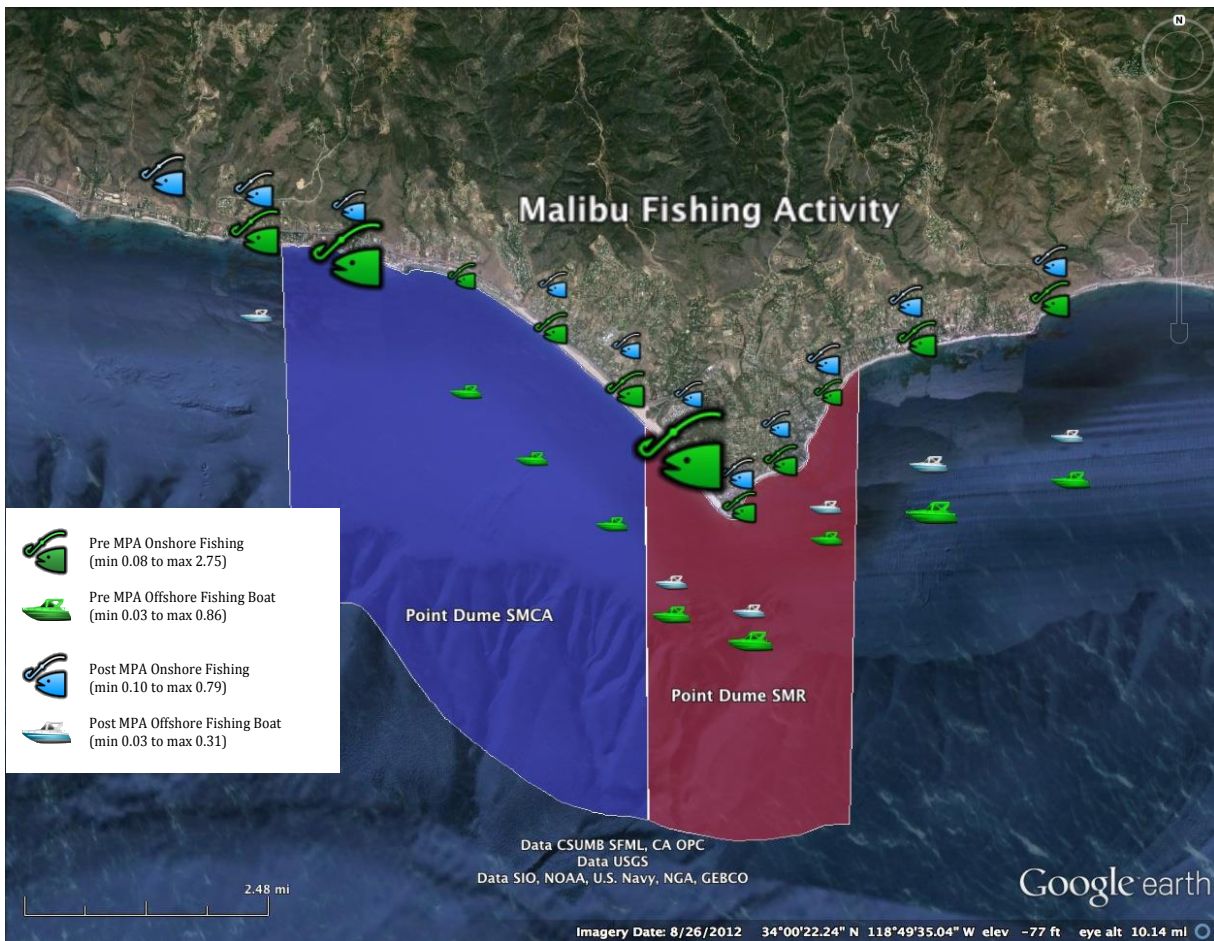


Figure 14 shows the active fishing at the different Malibu survey sites both pre and post MPA implementation. On-shore activity includes active rod/reel fishing, trap fishing, cast net fishing, sand crab raking, biological hand collection, snorkel/SCUBA fishing and standup paddle board fishing with a rod/reel. Offshore activity includes fishing from a kayak/canoe/dinghy with a rod/reel, private boats fishing with either rod/reel or hoop nets, party/charter, trolling, lobster, purse-seine or other commercial fishing boats, urchin/cucumber dive boats and boats engaged in kelp harvesting or collecting for research purposes.

Most on-shore pre-MPA fishing activity occurred at the Point Dume headlands in the Point Dume SMR (2.75)<sup>1</sup> and at El Matador beach on the western end of the Point Dume SMCA (2.0). These values decrease substantially post-MPA (Point Dume headlands is 0.1 and El Matador is 0.4). There is no observed offshore fishing in the Point Dume SMCA post-MPA implementation. The maximum onshore post-MPA fishing occurs outside of the MPA at El Pescador State Beach with a rate of 0.8 individuals engaged in this activity at any given time. The maximum offshore post-MPA fishing occurs outside of the MPA off the coast between Paradise Cove and Escondido Beach (0.3).

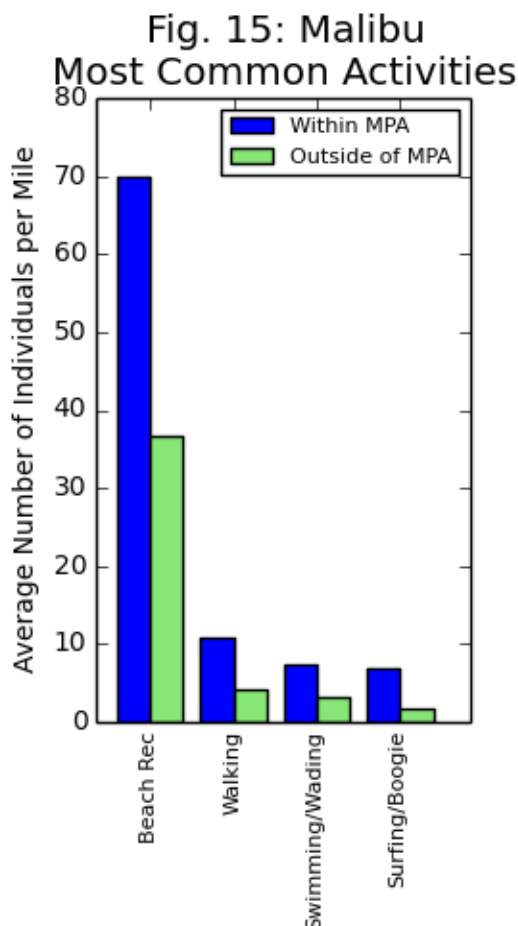
<sup>1</sup>All numbers presented in parenthesis in this section are the expected average number of individuals or boats participating in a coastal activity in the Malibu or Palos Verdes beaches observed at any given time.

## Comparing Activities Inside and Outside Malibu MPA Areas – Most Common

Figure 15 shows the most common post-MPA activities on the Malibu MPA beaches (both the point Dume SMCA and the Point Dume SMR) compared to the beaches located outside of the MPAs. In order to compare average beach activity between two locations having different beach lengths, the average beach activity for the entire region was divided by the region beach length to get an average activity per mile. For example, in the figure to the right, you would expect to see on average 70 people engaged in some type of beach recreation on a mile of beach within the MPAs, while you would only expect to see around 36 people engaged in beach recreation on a mile of beach on one of the surveyed beaches located outside of the MPAs.

The MPA beaches stretch from El Matador in the west to Little Dume – Paradise Cove in the east. The beaches outside of the MPA include El Pescador State Beach to La Piedra in the west and Paradise Cove to Latigo Beach in the east. Only Post-MPA surveys are included in this analysis (January 2012 to August 2013).

While the density of activity is much higher in the MPA beaches than those outside of the MPAs, the same four activities are the most common: beach recreation, walking, swimming/wading and surfing/boogie boarding. Non-consumptive activities dominate in both regions with the top eleven being non-consumptive. Other popular non-consumptive activities are compared in Figure 16. All consumptive activities are compared in Figure 17 where the highest value shown is 0.37 individuals per mile for on-shore rod/reel fishing.





## Comparing Activities Inside and Outside Malibu MPA Areas – Non-Consumptive

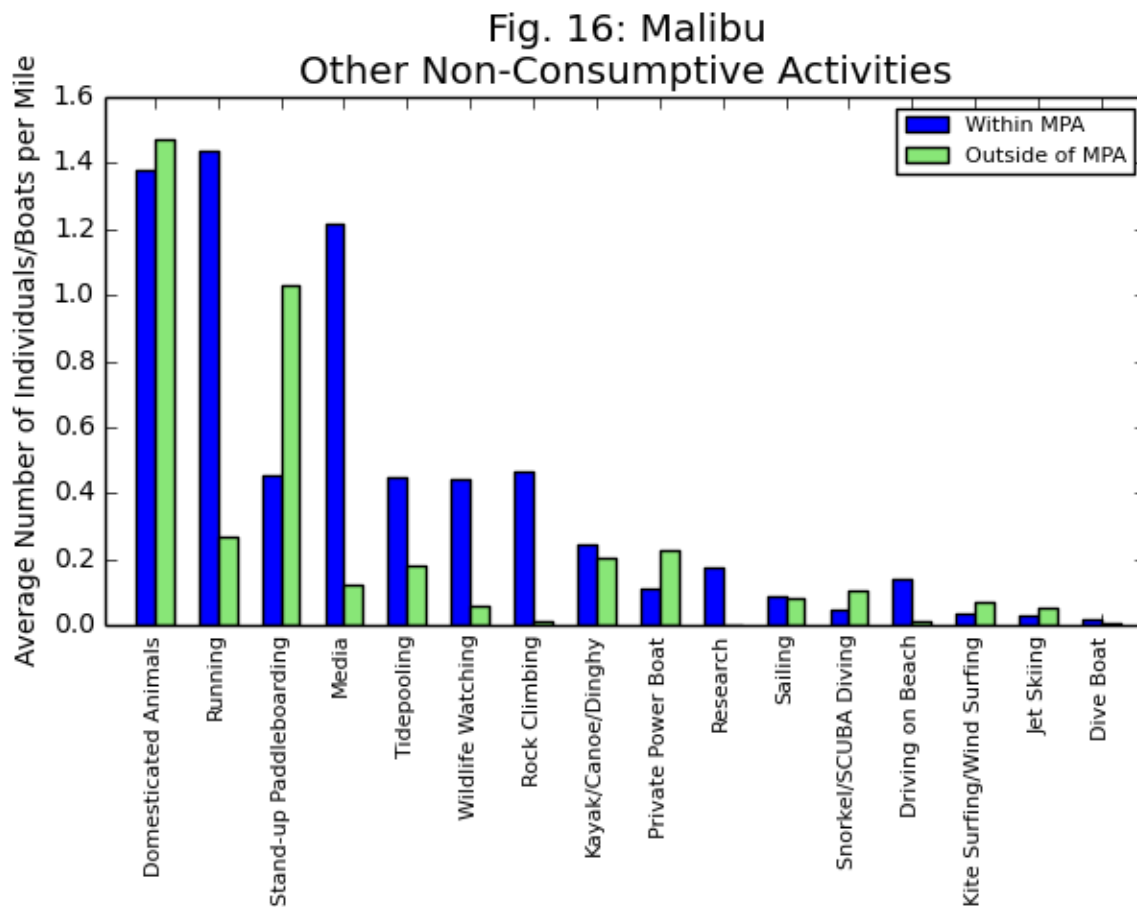


Figure 16 compares less-common non-consumptive activities between the MPA region and outside of the MPAs. Spending time with domesticated animals is equally common in both regions while running and media work are much more popular within the MPAs. Stand-up paddle boarding is more common on the beaches outside of MPAs.

## Comparing Activities Inside and Outside Malibu MPA Areas – All Consumptive

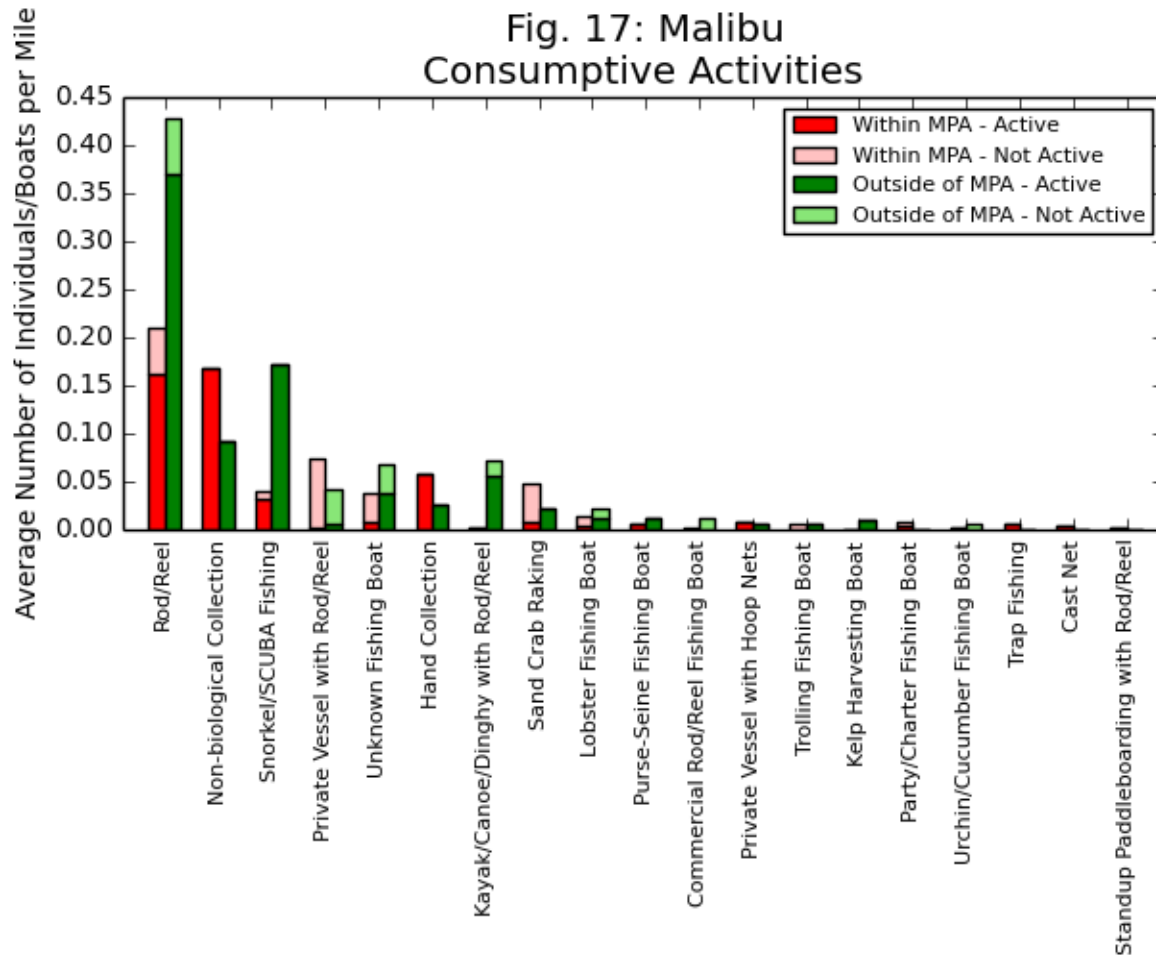
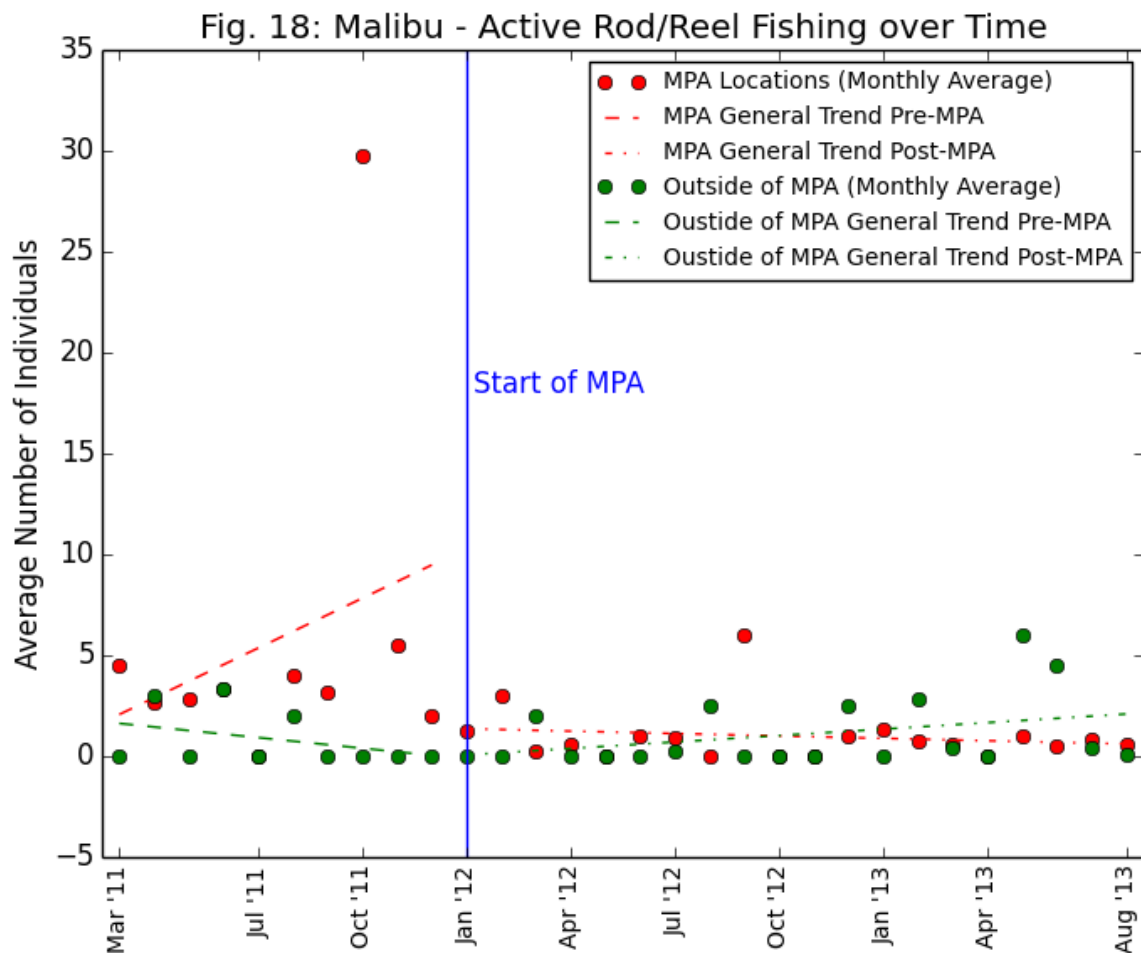


Figure 17 shows that consumptive activities in all the Malibu beaches or coastal waters are not very common. Rod/reel fishing is more common where it is legal outside of the MPA. This figure only shows data gathered since the start of MPA implementation in January 2012, so active consumptive fishing activities shown within the MPA are potential noncompliance. Of these noncompliant activities, on-shore rod/reel fishing dominates with on average 0.15 individuals engaged in this activity per mile of MPA beach. This equates to finding one person a week if you took a look once each day. Non-biological collection is equally common.

Where activities are shown as not active, equipment necessary for those activities might have been observed near an individual but the person was not actively using it. For example, the observer may have seen a crab rake near an individual however they did not observe the person actually using the rake during the survey time.

## Malibu On-Shore Rod/Reel Fishing Activity Over Time Inside and Outside of MPA



The active rod/reel fishing from the beach is plotted over time in order to show the effect of the MPA implementation (Fig. 18). After January 1, 2012, it is illegal to fish from the Point Dume beaches. You can see in the Figure 18 that at any given time, there were on average four people engaged in this activity before MPA implementation and only around one person after that time. The spike to 30 people for October 2011 is due to a couple of surveys done at 7:00am (SMCA4) and 7:30am (SMR1) on October 9<sup>th</sup>. Most of the surveys made were between the hours of 8am and 5pm (see graph earlier in the report) so it is not clear if the October 2011 data point is showing unusual activity for that month in particular, or just showing that more fishing was taking place earlier in the day.

The vertical scale shows the average number of individuals engaged in this activity in the entire beach region indicated. So the 'MPA Locations' include both the Point Dume State Marine Conservation beaches and the Point Dume State Marine Reserve beaches while the 'Outside of MPA' area includes the beaches bordering those two areas: El Pescador State Beach to La Piedra in the west and Paradise Cove to Latigo Beach in the east. The numbers are not normalized per beach mile and so the value shown for the MPA Location cannot be compared directly to the value shown for Outside of MPA. Dividing by the respective beach lengths would allow for that type of comparison.

## Palos Verdes Coastal Activity

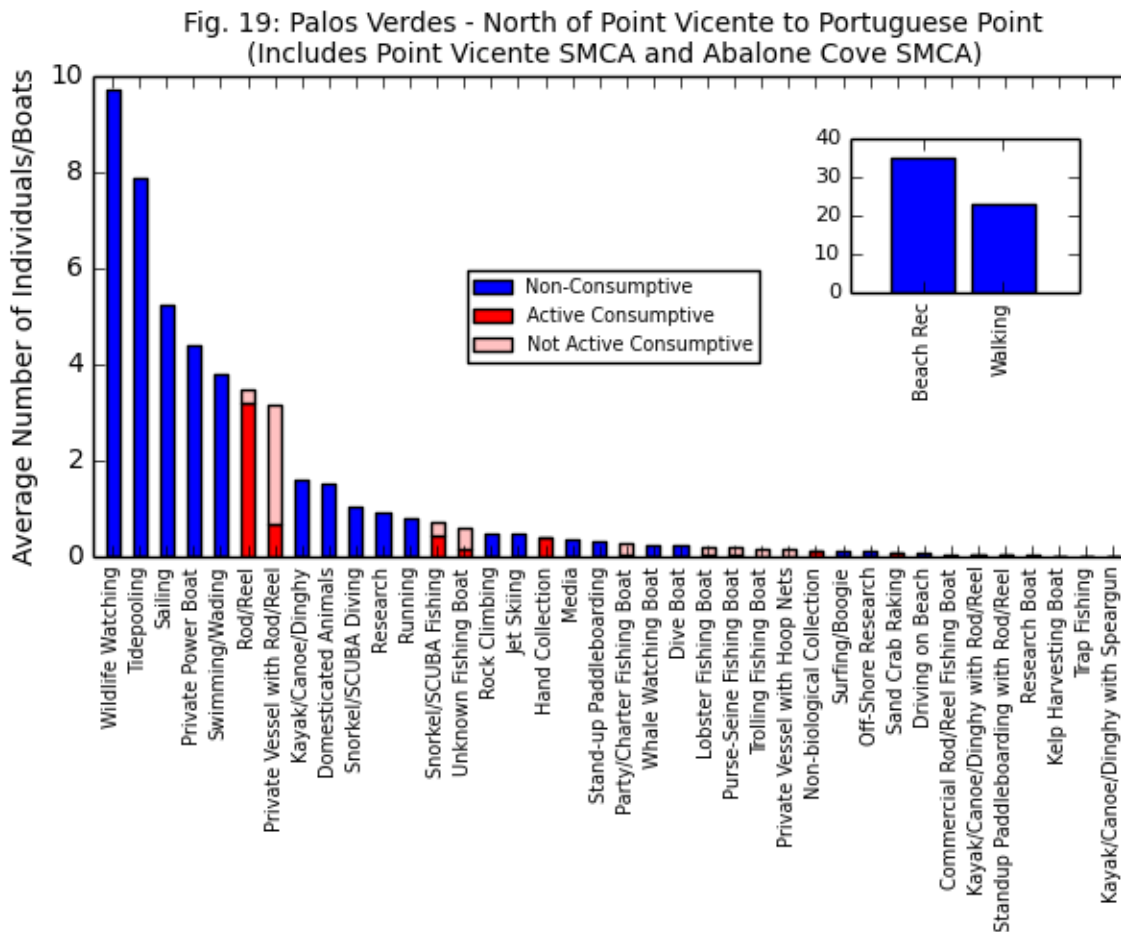


Figure 19 shows the normalized beach activity in the Palos Verdes area from the beginning of MPA implementation in January 2012 to August 2013. The data were normalized by taking the average of each individual activity count for each beach location and then summing those averages over all the beach locations to calculate an average for each activity over the entire Palos Verdes region. The vertical scale on the graph above therefore represents the expected activity that might be observed at any given time looking at the beach stretching from north of Point Vicente to south of Abalone Cove. For example, at any given time you would expect around 35 people to be engaged in the category beach recreation, around 23 people to be out walking, perhaps ten to be wildlife watching and three people fishing using a rod/reel. For activities having an average of less than one, you would only observe people engaging in those activities occasionally. Hand collection of biological material has a value of 0.4 and so you might see someone engaged in this activity two out of every five times that the Palos Verdes beaches were surveyed.

The most common coastal activities in the Palos Verdes study area are beach recreation and walking. Wildlife watching and tidepooling are also very popular. Rod/reel fishing from shore is the most common consumptive activity and is 8<sup>th</sup> in overall frequency of non-consumptive and consumptive activities combined.

There was no observed activity for kite surfing/wind surfing, cast net fishing, stand up paddleboarding with a spear gun or urchin/cucumber fishing.



## Palos Verdes Activity over Time

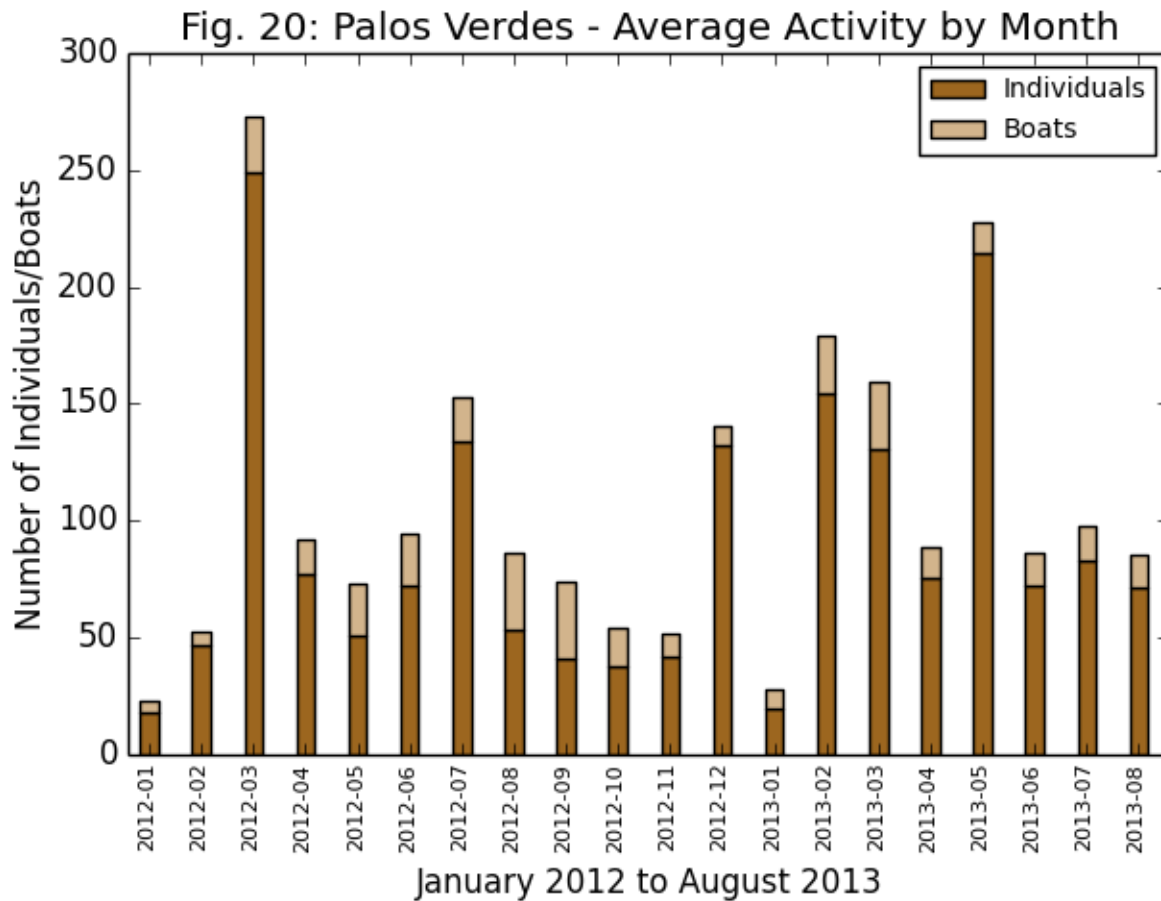


Figure 20 shows the variation for both boating activity and individuals for the 20 months of data collection in Palos Verdes. As in the preceding figure, the vertical scale shows the expected activity that might be observed at any given time. The total amount of beach activity varies considerably over time, but the variability is not closely associated with the season. The two highest months of activity were in March of 2012 and May of 2013. The lowest two months were in January of 2012 and January of 2013. While the average number of people engaged in beach recreation is 35, the graph on this page suggests more of an expected range of 20 to 250.

The number of boats observed near shore makes up a significant portion of the total coastal activity. Their number also fluctuates with the numbers ranging from a high of 33 in August and September of 2012 to a low of five in January 2012.

## Palos Verdes Fishing Activity: Fig. 21



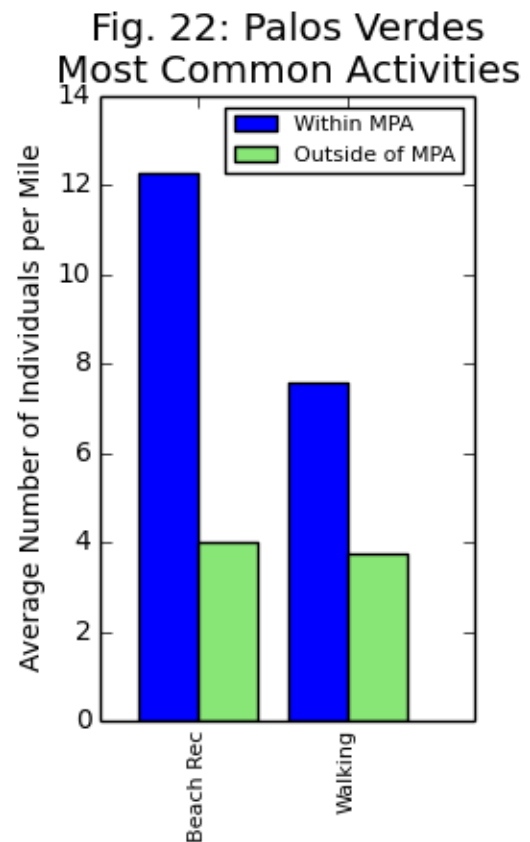
Figure 21 shows the active fishing at the different Palos Verdes survey sites post MPA implementation. On-shore activity includes active rod/reel fishing, trap fishing, cast net fishing, sand crab raking, biological hand collection, snorkel/SCUBA fishing and standup paddleboard fishing with a rod/reel. Off shore activity includes fishing from a kayak/canoe/dinghy with either rod/reel or spear gun, private boats fishing with either rod/reel or hoop nets, party/charter, trolling, lobster, purse-seine or other commercial fishing boats, urchin/cucumber dive boats and boats engaged in kelp harvesting or collecting for research purposes.

Most of the on-shore fishing activity occurred around the Portuguese Point Trail just south of the Abalone Cove SMCA (legal) and Abalone Cove where it is illegal. The smallest icons represent positive values less than 0.25 while the largest icon size shows values from 1.0 to 1.25. The highest value of 1.2 was just south and outside of Abalone Cove SMCA and represents on average finding one person fishing there at any given time. Places with no observed fishing activity do not have an icon.

## Comparing Activities Inside and Outside Palos Verdes MPA Areas – Most Common

Figure 22 shows the most common post-MPA activities on the Palos Verdes MPA beaches (both the Point Vicente SMCA and the Abalone Cove SMCA) compared to the beaches located outside of the MPA areas. In order to compare average beach activity between two locations having different beach lengths, the average beach activity for the entire region was divided by the region beach length to get an average activity per mile. For example, in the figure to the right, you would expect to see on average 12 people engaged in some type of beach recreation on a mile of beach within the MPA, while you would only expect to see around four people engaged in beach recreation on a mile of beach on one of the surveyed beaches located outside of the MPAs.

The MPA beaches stretch from Point Vicente in the North to Abalone Cove in the South. Only Post-MPA surveys are included in this analysis (January 2012 to August 2013).



While the density of activity is much higher in the MPA beaches than those outside of the MPAs, the same two activities are the most common: beach recreation and walking. Non-consumptive activities are more prevalent in both regions with the top five being non-consumptive (Figures 22 and 23). Consumptive activities are shown in Figure 24 where the highest value shown is around 1.4 individuals per mile for active on-shore rod/reel fishing.

## Comparing Activities Inside and Outside Palos Verdes MPA Areas – Non-Consumptive

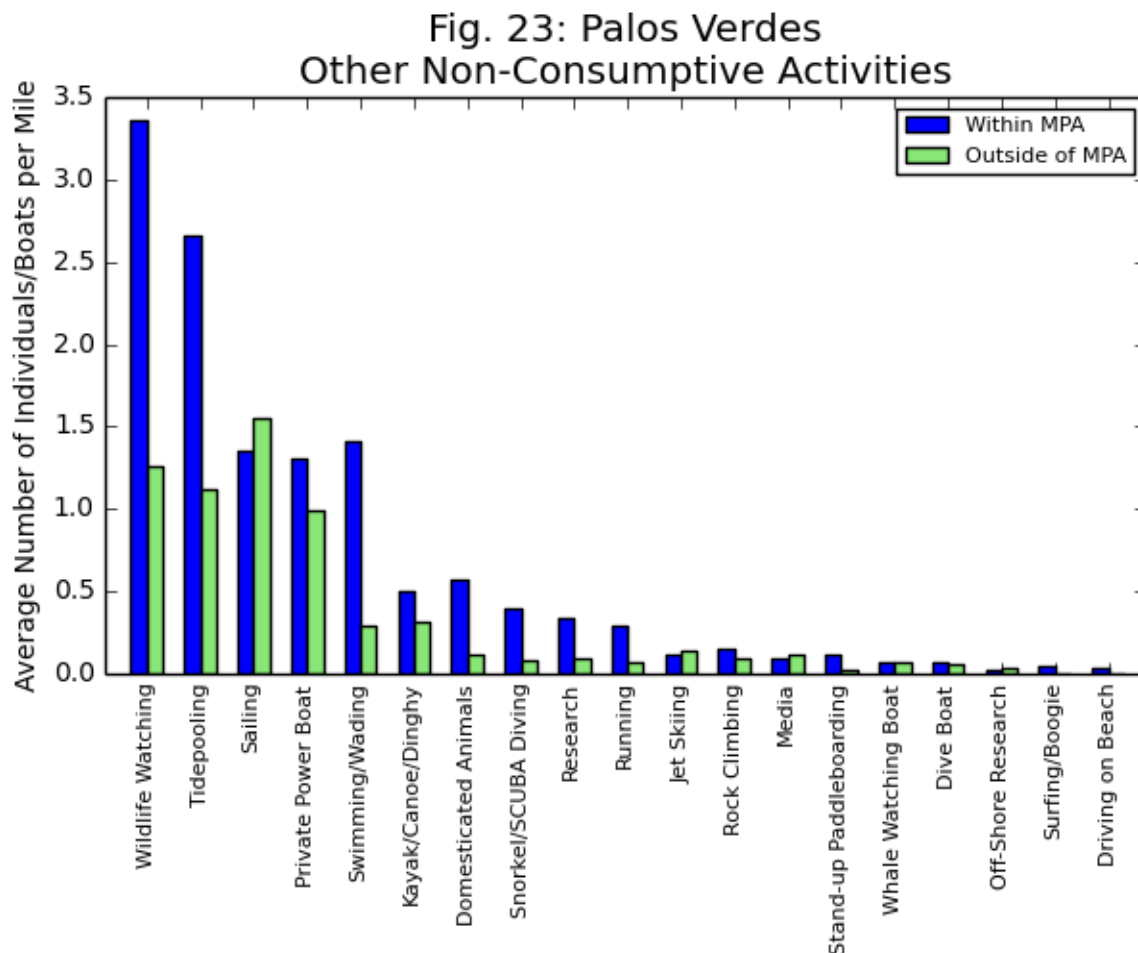
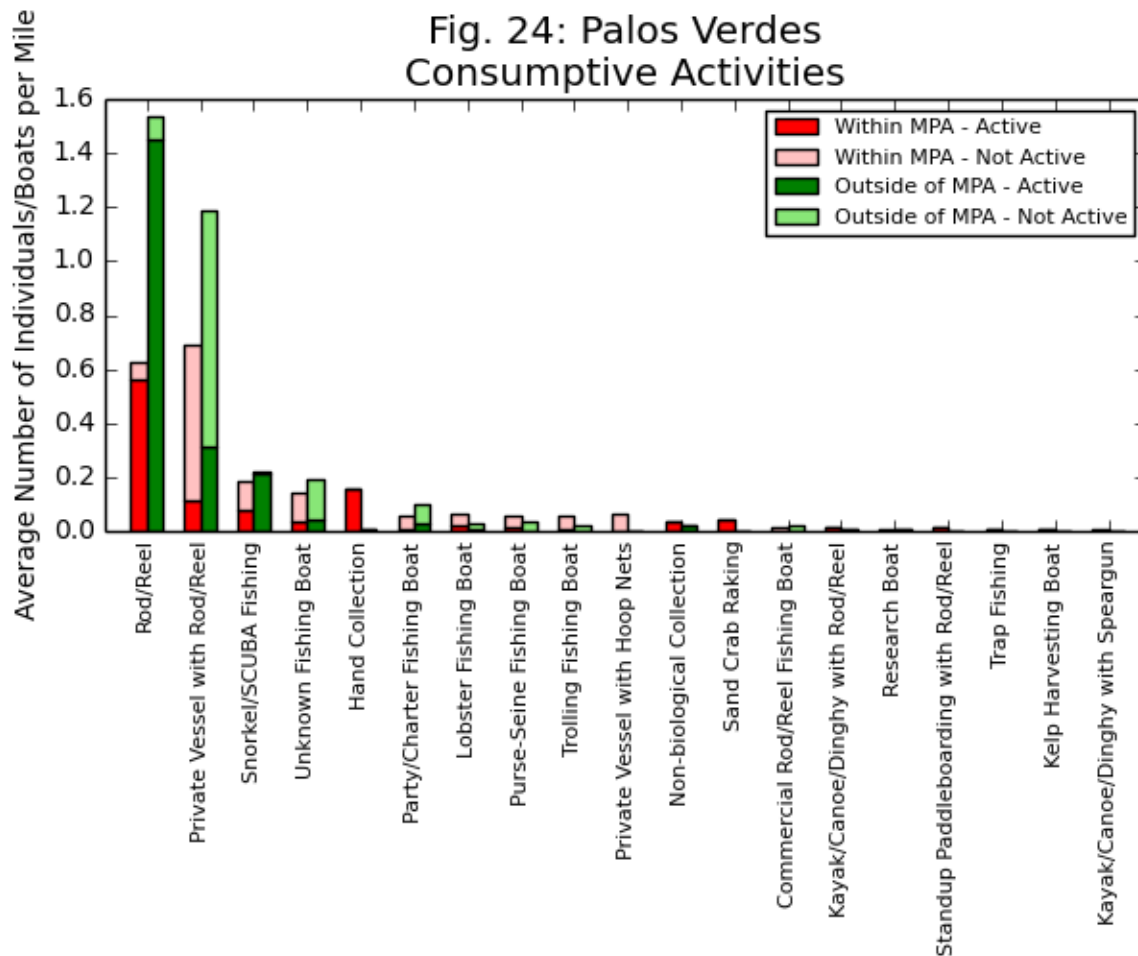


Figure 23 compares less-common non-consumptive activities between the MPA region and outside of the MPAs. All of these non-consumptive activities are more common within the MPAs region except for sailing, jet skiing, media activity and offshore research. Wildlife watching, tidepooling and swimming/wading are much more common within the MPAs.

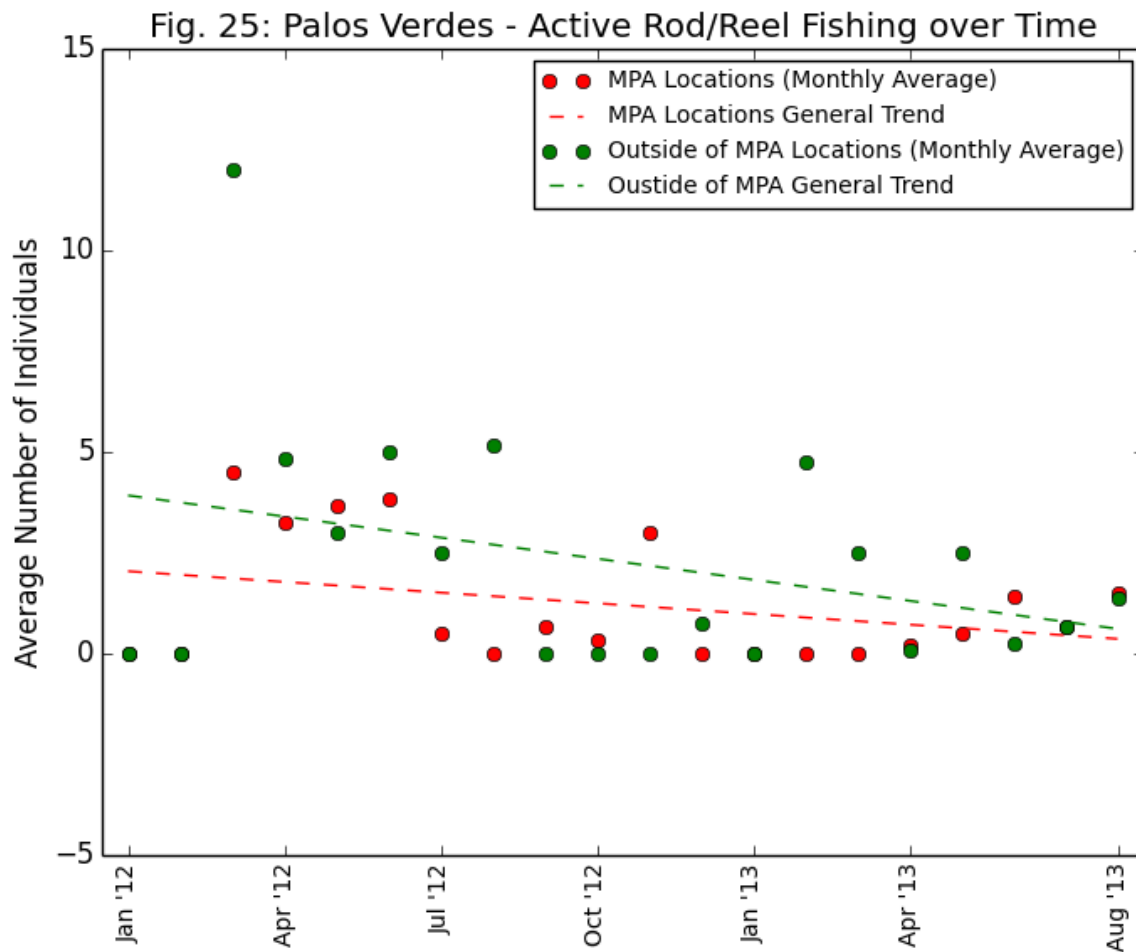


## Comparing Activities Inside and Outside Palos Verdes MPA Areas – All Consumptive



Active consumptive activities in all the Palos Verdes beaches or coastal waters are generally less common inside the MPAs than outside. Figure 24 only shows data gathered since the start of MPA implementation in January 2012, so all of the active consumptive fishing activities are potential noncompliance. Of the active noncompliant activities, on-shore rod/reel fishing dominates with close to 0.6 individuals engaged in this activity per mile of MPA beach. This equates to finding one person fishing on a mile of beach slightly more than every other day if you took a look once each day.

## Palos Verdes On-Shore Rod/Reel Fishing Activity Over Time Inside and Outside of MPAs



Active rod/reel fishing from the beach is plotted over time in order to show the effect of the MPA implementation (Fig. 25). Rod/reel fishing is decreasing over time both within the MPAs and outside, however, more surveys need to be done early in the morning to confirm this trend.

The vertical scale shows the average number of individuals engaged in this activity in the entire beach region indicated. So the 'MPA Locations' include both the Point Vicente State Marine Conservation Area beaches and the Abalone Cove State Marine Conservation Area beaches. The 'Outside of MPA' area includes the two beach areas on either side of the MPAs. The numbers are not normalized per beach mile and so the value shown for the MPA Location cannot be compared directly to the value shown for Outside of MPA. Dividing by the respective beach lengths would allow for that type of comparison.

## Palos Verdes Wildlife Viewing and Tidepooling Activity Over Time

Fig. 26: Palos Verdes Wildlife Viewing over Time

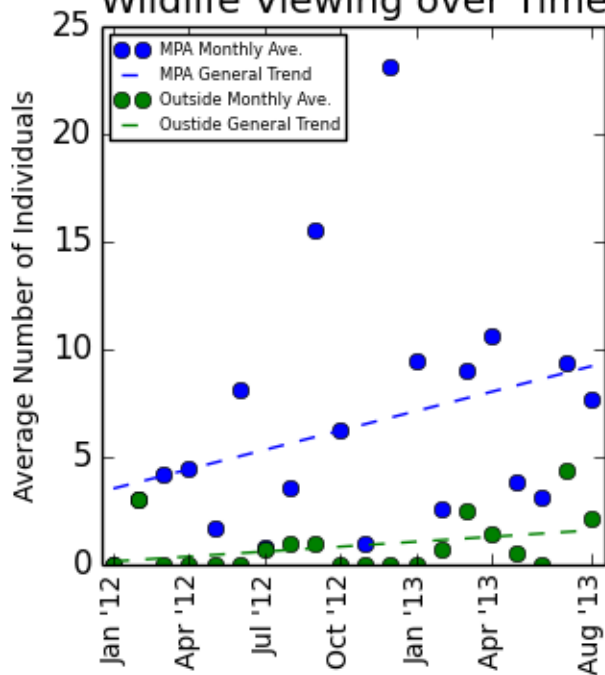
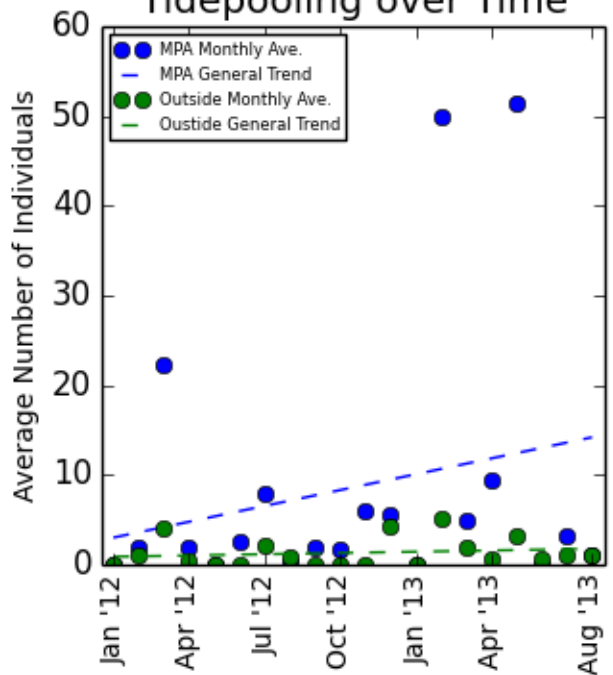


Fig. 27: Palos Verdes Tidepooling over Time



Figures 26 and 27 show how the average number of people engaged in wildlife viewing and tidepooling in Palos Verdes changed over the 20 month duration of this study in both the MPAs and outside of the MPAs. Participation in both activities increased notably within the MPAs but remained relatively flat outside of the MPAs. The average number of people engaged in viewing wildlife in the MPAs more than doubled from four to almost ten. The average number of people observed tidepooling in the MPAs increased from two to 14. The number of people observed tidepooling tended to be quite small (median was 0) except for a few large groups: one group of 90, one group of 49, one group of 32 and eight groups in the 10 to 25 person range.