

Hanauma Bay User Study

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Abstract

The purpose of my study was to determine when the risk of reef damage at Hanauma Bay Nature Preserve was highest. Additionally, other observations of the bay and visitor inputs were collected to get an idea of the success and possible improvements of the UH Sea Grant Hanauma Bay education center.

The study was done by counting individual people at set times and days over a three month period, within specific boundaries of the beach and water. The daily weather and ocean conditions, as well as comments and suggestions from the bay's visitors were also recorded.

The results were that of the three time periods, the risk of reef damage was highest at 2:30 p.m., and decreased significantly until the 4:30 p.m. time period. The risk of reef damage was also higher in the earlier part of the day, before 2:30 p.m. Due to time constraints, I was unable to conclude if weather had an affect on the risk of reef damage.

Limitations

- Although significant, my results are limited:
1. The study was done in the months of September, October, and November 2008.
 2. The study was done from the hours of 2:30 to 4:30 pm.
 3. The study was done on the days of Monday, Wednesday, and Friday.
 4. The study was done by a single individual counter.
- The numbers and variables are currently and constantly changing, therefore this is an ongoing and continuing project.

Table 1. Human User Averages and Percentages At Hanauma Bay Nature Preserve From September to November 2008

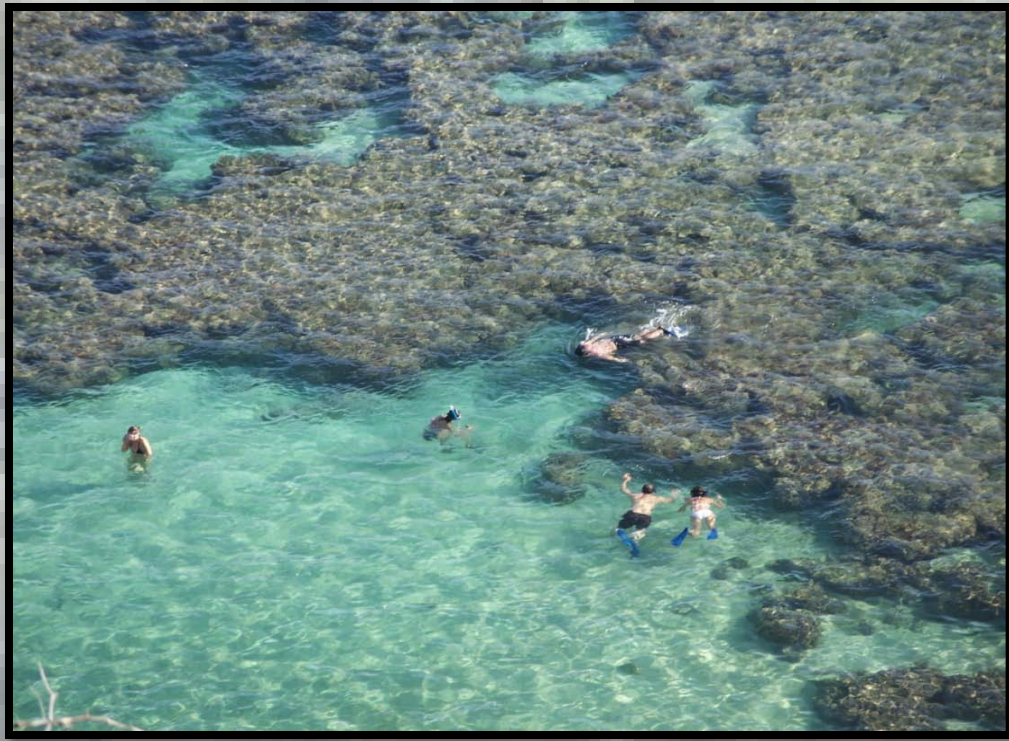
Time	2:30	3:30	4:30	Sum
Average Number of Individuals On the Beach	252	183	79	514
Average Number of Individuals In the Water	150	104	65	319
Percentage of Total Individuals In the Water	47.0%	32.7%	20.3%	100.0%

Results

I found that the time of day was directly related to the proportion of people on the beach and in the water—with an increase in time, there was a decrease in people in and out of the water. There were nearly two times as many people on the beach than in the water at any given time. On a daily basis, almost fifty percent of the total amount of people entering the water could be found doing so at 2:30 pm, while 3:30 pm makes up thirty-three percent of the total, and 4:30 pm accounts for only 20 percent (table 1.)

The total amount of people I recorded as being in the lower portion of the bay at any given time was only a fraction of the total amount of daily visitors, therefore it can also be assumed that the numbers of people in the water and on the beach were even higher at earlier points in the day (Hanauma Bay Daily Attendance Summary Sept-Oct 2008.)

Due to the time limitations, there was not enough variation in the weather data to reach any conclusion about the relationship between the weather conditions and the amount of people in the water.



Materials/Methods

This study was done from September to November 2008 with counts taken at 2:30 p.m., 3:30 p.m., and 4:30 p.m., on Monday, Wednesday, and Friday.

The materials used were a pen, clipboard, and self-produced worksheets for recording data; a counter (clicker) to keep accurate track of individuals; a watch to mark the time; a calculator to add up numbers and determine the average; a digital camera to take pictures of the bay and its users; visitor statistics from the Hanauma Bay volunteer staff; and Microsoft Excel 2007 to compile and analyze the collected data, as well as generate tables and graphs .

The **water** consisted of the ocean water within the limits of the bay, and was divided into two sections: the inner reef and the outer reef, to facilitate the counting of individuals (figure 1.) The **beach** consisted of the sand and dry land, and was divided into three sections, again to facilitate the counting of individuals (figure 1.)

The weather conditions were observed and recorded on each sample day. First, from the top of the road heading down into the bay; the number of individuals in each of the two sections of the water were counted and recorded, then added up for the total *water* count. Next, the numbers of individuals in each section of the beach were counted and recorded, then added up for the total *beach* count. In order to produce an accurate estimate of the number of individuals in the water and on the beach, three counts were taken and averaged. Lastly, observations of human activities and events were recorded. Questions to visitors about Hanauma Bay helped to clarify some observations and their responses were recorded.

Introduction

Hanauma Bay was established as the state's first marine life conservation district in 1967. In 2002, the newly designed education center opened to the public; spreading awareness to visitors about the importance of protecting and respecting all of the life within the ocean, especially at Hanauma Bay.

Thousands of visitors come each year to discover the underwater beauty of the bay. But exploring Hanauma's fragile reef environment can be harmful to the reef itself—when people don't respect and preserve its habitat. It is common knowledge that there is a steady annual flow of visitors into and out of the bay—however only a portion of those enjoying Hanauma are entering the reef environment at a given time, and seemingly at particular times of day.

My study explored both the overall human population trend at Hanauma Bay and the proportion of visitors on the beach and in the water, over a period of three months. These numbers were recorded at set time periods and days. The purpose of this study was to determine when the risk of reef damage was highest, and to find out if weather had an effect on human use of the bay. Other observations of the bay were gathered along with input from visitors, which helped in determining the effectiveness of the education center and in developing possible improvements to protect the bay more efficiently.

Discussion/Conclusion

In general, most people come to Hanauma Bay to explore the marine life. At least one-third to one-half of the total amount of visitors in the lower park are in the water at any given time, potentially putting the reef in danger.

The amount of people in the water is highest in the earlier part of the day; therefore the risk of reef damage is higher in these earlier hours. Within my study, the risk of reef damage was highest at 2:30 pm, and lowest at 4:30 pm. The total amount of visitors in the lower park decrease as the day progresses, which in turn lessens the endangerment of the reef environment.

Continuation of this study is vital to Hanauma Bay. By constantly monitoring the fluctuations in the amounts of people entering the reef environment, we can assess the changing conditions and potential risk of harm to the reef and the life it contains. With a longer time frame involved, there could be a possibility that the weather conditions, as well as the different months, could have an effect on the amount of people within the water. Also, a more in-depth study could be done (as in Dr. Richard Brock's Hanauma Bay Carrying Capacity Study 2000)—like determining the water quality, turbidity, species richness, and species diversity. These tests and assessments would provide hard evidence as to the actual damage caused by increased human use of Hanauma Bay's waters, and may bring about possible ways to alleviate the extra stress put on the reef during the peak hours of snorkeling and swimming.

Continuation of the UH Sea Grant Hanauma Bay education program is also extremely important to the bay. It is the key to perpetuating the life within the fragile reef environment, as well as the interest and respect shown by all its visitors.

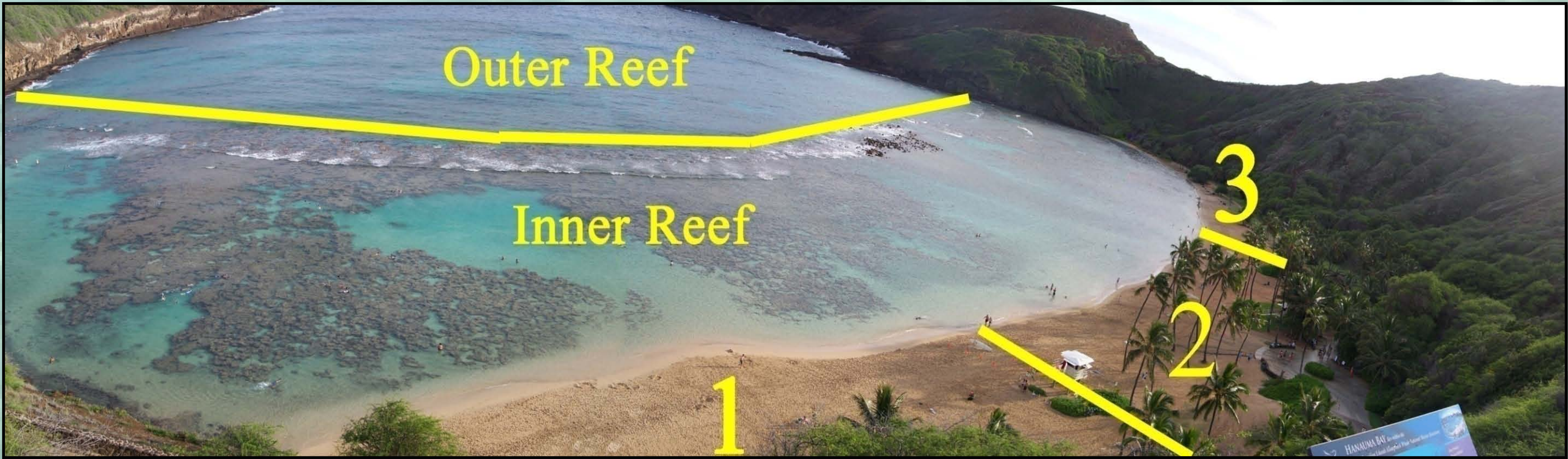


Figure 1. Individuals were counted in two separate divisions of the ocean—the inner reef and outer reef, while the method for counting individuals on the beach consisted of dividing the beach up into three sections.

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