

# State of The Beach

By: Anabell Martinez

## Introduction

- Testing of USA beaches has been necessary since the discovery of many health and ecological problems related to beach water pollution and contamination.
- Tests are done on fecal/bacterial contamination, toxicity and dumping underwater and on coastlines. The main objective in collecting this information is to improve water quality to reduce health risks and environmental problems.
- One of the most widely recognized causes of beach water pollution is fecal contamination. Fecal is mostly abundant after rainfall. Excessive rainwater overwhelms sewage systems, which cause sewage overflow.
- The runoff water contains feces which harbor all kinds of pathogens, especially bacteria and viruses.

## Introduction continued

- In 2003, about 18,284 beaches were close because of pollutants found in the water- 46% of those closings were relate to sewage runoff.
- Another major problem concerning beaches both in the United States and worldwide is coastal dumping and material pollution. Litter from the streets gets washed away after rainfall and then ends up the beaches.
- Rainwater washes litter away into nearby beaches and other water sources and causes notable disruptions in the environment. Many animals confuse debris for food and end up swallowing harmful plastics and other substances.
- Nitrate chemicals found in some beaches are known to cause harm to babies, the elderly, and people with compromised immune systems.

## Introduction continued

- Extensive fertilization, manure, sewage systems, septic tanks and decaying plants are factors that lead to increased nitrate levels in our nation's beaches.
- Though high levels of nitrates are harmful to human and marine life, only a few states actually test for such chemicals.

## Hypothesis

- I think NYC beaches have relatively high levels of nitrates in the water. Also, I think the same litter problems we've had in the past are still with us today.

## Materials

- 15 plastic water bottles
- 6 test tubes
- rubber gloves
- Safety goggles
- Nitrate test kit
- Stop watch
- Pen and paper

## Methods

### First Study: Water Quality

#### Day 1

- For my study I visited 5 NYC beaches: Rockaway Beach, Coney Island Beach, South Beach, Howard Beach and Manhattan Island Beach. I collected individual water samples from each beach in plastic water bottles. I made sure to fill each bottle with enough water samples for my experiment. About half-way should do.
- Next I bought a nitrate test kit from PetLand Discounts (\$9.99 per kit) to test the nitrate levels in the water samples.

## Methods Continued

- To test for nitrates in samples these procedures must be followed very carefully:
- First label the test tubes C, H, M, S, R, W
- Fill each test tube with 5ml of the individual water samples.
- Set aside a test tube for the control: tap water
- Pour 10 drops of the 1<sup>st</sup> Nitrate Solution...

## Methods continued

- into each test tube (use a lot of caution nitrate is coercive!)
- Cover test tube and shake several times.
- Next shake Nitrate Solution #2 bottle for at least 30 seconds. Use stop watch.
- Pour 10 drops of the 2<sup>nd</sup> Solution into individual test tubes. Shake for 1min
- Wait 5 minutes for color change
- Use nitrate strips to record color change if any.
- Repeat these steps about 5 times to get an average

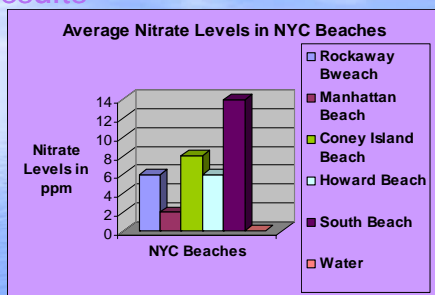
## Methods 2

### Second Study: Litter Count

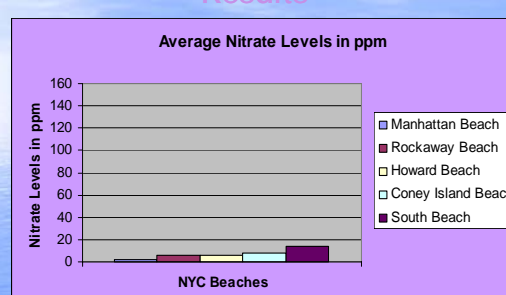
#### Day 2

- I went to the 5 NYC beaches aforementioned and literally counted garbage and recorded data
- For each beach I counted I took down the name of the most common sort of litter The top 5 items are listed in my results

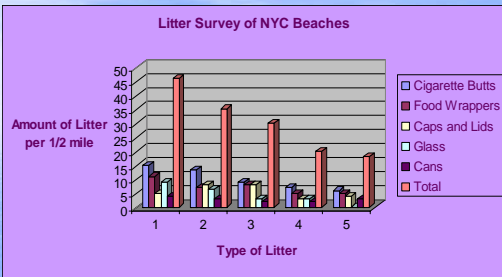
## Results



## Results



## Results continued



## Conclusion

- From this study I was able to find which NYC beach was the cleanest. I had originally hypothesized that there would be relatively high levels of nitrates in NYC beach waters but as of this study, was proven incorrect. In general, nitrate levels in our beaches are very low. However, more studies should be conducted before any lasting conclusion can stand.
- My second hypothesis was correct. Litter is still an issue of concern. The same garbage items found on the beach ten years ago (cigarette butts, food wrappers, cans etc.) are still causing problems today. It will take stronger enforcement of anti-litter laws and developments of more equip storm drain systems to control the amount of debris found on the beach.

## Future Studies

- My results and conclusions were based on findings from this one study, other studies like this one should be performed in order to come up with a general conclusion.  
Some possible studies are:
- Conduct this study but in the summer months, when beachgoer traffic is at its height
- Conduct this experiment on days of rainfall and days without to compare the results
- After rainfall, test samples of beach water for the presence of fecal matter. Then do follow-up studies on the presence of bacteria

## Future Studies cont.

- Test beach water for phosphates, which can present the same problems nitrates cause.
- Conduct further studies on the different waterways in NYC (i.e. rivers, lakes, streams)
- Study the effects of the NY law banning smoking in public places on beaches. Though a good law, has it increased the possibility of more cigarette butts winding up NYC beaches?
- Do comparative studies on NYC beaches and beaches in the rest of the state or even perhaps the rest nation.