Wrightsville Beach Smoking Ban Preliminary Results

Sara Melick, Bonnie Monteleone, and Brooks Avery, PhD.
University of North Carolina Wilmington Department of Chemistry and Biochemistry

Abstract and Introduction

Cigarette filters are consistently the number one manmade debris discarded in the environment(1) and have negative consequences, especially on beaches. A 2006 laboratory study found that cigarette filters were acutely toxic to cladocerans, a freshwater organism, as well as marine bacteria (microtox) and the main cause of toxicity was attributed to nicotine and ethyl phenol in the leachates from cigarette filters.(2) There are documented cases of small children hospitalized from ingesting cigarette filters and cigarette filters found in dissected birds and fish.(3) Furthermore, these filters are composed of cellulose acetate, a form of plastic, and can persist in the environment indefinitely.(4)

A study was conducted by UNCW undergraduate students to look at the amounts of manmade debris found on Wrightsville Beach, NC, a smoke-free beach. Over the course of 4 years, 45 undergraduate students gained field research experience collecting over 500 samples partially focusing on discarded cigarette filters and were able to determine significant outcomes due the smoking ban and make recommendations for better debris management.

Marine life are known to ingested cigarette filters

Methods

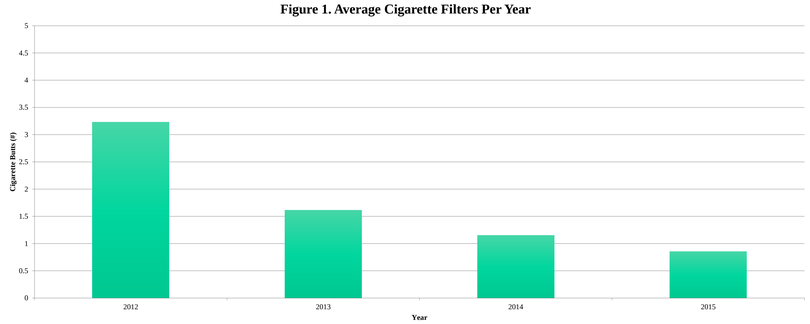
Each student was assigned 10 accesses to collect from per week for 3 months. They collected 1 to 3 samples each visit in sets of 2 either from the wrack line or the berm. The sample sites were randomly selected with the caveat that 1 would visually have a high concentrations of manmade debris and the other would have little to no evidence of manmade debris. This was to normalize each collection site to avoid only highly concentrated samples being collected. Sample sites were measured out a meter squared removing the top 5 cm of sand and debris. The samples were dried at 20° c., weighed, and sorted in the lab, separating the natural debris from the manmade debris, and then each weighed. The manmade debris was sorted by type: paper, glass, metal, cigarette filters, and plastic. The plastics were sorted again by preproduction pellet, film, filament, fragment, or foam. The data was then recorded on a master spreadsheet along with date, location, time, weather conditions, tide, coordinates, and quantities by number and by weight for each sample set.

Results and Discussion

Three questions were formulated from the data that the study was able to answer. By year the number of cigarette filters went down (fig.1) and were able to back these finding with another concurrent study on the same beach (fig 2). The findings also highlighted the pier accesses as having the highest concentration. (fig.3)

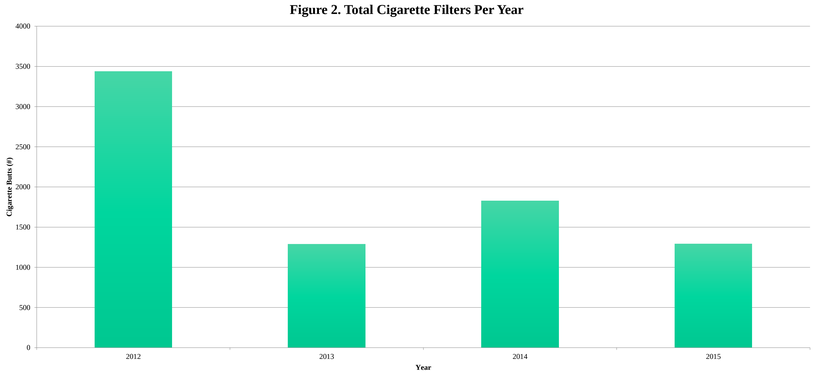
How did the number of cigarette filters change during the study?

Figure 1. Average Cigarette Filters Per Year



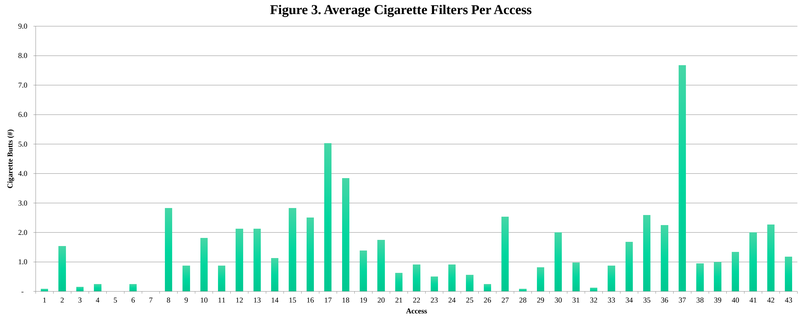
How does this data compare with other studies that have been conducted?

Figure 2. Total Cigarette Filters Per Year



How is this data distributed among the different accesses?

Figure 3. Average Cigarette Filters Per Access



Recommendations

- Monitor and keep up with signage at all of the accesses, especially those at and adjacent to the piers. This will help with better awareness of the ban.
- Have larger cigarette filter receptacles put in, especially in high traffic areas.
- Enlist groups to "Adopt a Pier." They would be responsible for cleaning up the area not only for cigarette filters, but also for picking up other debris.
- Enlist beach ambassadors by having local nonprofits collaborate with the town of WB to give unpaid internship positions. It would engage the local community regarding litter and give intern opportunities to students who can increase awareness regarding the ban and why it is important.

Conclusion

While cigarette filters continue to be the number one item found on this beach, the smoking ban has been effective in reducing the amount. The data also revealed the piers are the hot spot areas where more education and signage could significantly reduce discarded cigarette filters. Without the data collected through UNCW, along with Wrightsville Beach Keep it Clean, it would be difficult to recognize the ban was working.

References

1. 30 Year Anniversary International Coastal Cleanup Annual Report 2015. http://www.oceanconservancy.org/our-work/marine-debris/2016-data-release/2016-data-release-1.pdf
2. Micevska, T.; Warne, M.; Pablo, F.; Patra, R. Variation in, and causes of, toxicity of cigarette butts to a cladoceran and microtox. Arch. Environ. Contam. Toxicol. 2006, 50, 205-212.
3. Tobacco Free Kids. Special Reports: Justice Department Civil Lawsuit (updated 17 November 2006). http://www.tobaccofreekids.org/reports/doj/ (accessed November 8, 2008).
4. Clean Virginia Waterways. Are Cigarette butts bio-degradable? http://www.longwood.edu/CLEANVA/cigbuttbiodegradable.htm (accessed December 15, 2006).

Acknowledgements

45 UNCW undergraduate research students
Ethan Lawson – UNCW Chemistry Undergraduate
Ginger Taylor – Wrightsville Beach Keep it Clean
UNCW's Experiencing Transformative Education through Applied Learning (ETEAL)