Background and Justification

Cruise tourism, a subdivision of coastal tourism\(^1\), began in the mid to late 19th century\(^2\)\(^3\)\(^4\)\(^5\) and has evolved into the fastest-growing sector of contemporary tourism\(^6\). Caribbean ports are the most popular cruise destinations worldwide\(^7\)\(^8\)\(^9\)\(^10\). Consequently, Caribbean islands have come to rely on the cruise industry more than any other location\(^10\). St. Thomas, the second-largest island in the USVI\(^1\), is one of the most popular destinations in the Caribbean\(^2\) with tourism accounting for over 70% of the territory’s gross domestic product\(^2\). Although important economically, this industry has the potential to increase pressure on the coastal environment\(^8\) by means of the release of solid waste\(^8\)\(^9\), contaminated ballast water\(^8\), anchor damage\(^10\), and moving hulls\(^10\). With 600 repeated and concentrated annual cruise ship visits to the two ports in St. Thomas, these environmental impacts can be magnified\(^8\), with the largest suspected impact to the coastal benthic environment coming from resuspended sediment. Sediment plumes have the potential to increase turbidity throughout the water column, resulting in faster light attenuation\(^10\) and limiting sunlight available to light-dependent organisms for growth, but it also eventually settles out of the water column to land on valuable habitat, such as coral reefs and seagrass\(^8\).

Objectives

1. To examine the turbidity, total suspended solids, and net sediment deposition of cruise ship induced plumes in Charlotte Amalie Harbor and West Gregorie Channel
2. To describe differences in plume characteristics between days with no cruise ships, one cruise ship, and two cruise ships
3. To determine if significant differences are present between the two ports

Results

Total Suspended Solids

- Total Suspended Solids after the passage of two cruise ships was significantly greater than before the passage in Charlotte Amalie Harbor (p-value = 0.0129) as well as in Crown Bay (p-value = 0.0012)
- Crown Bay also showed a significant increase in TSS after the passage of one cruise ship (p-value < 0.001)
- Total Suspended Solids after the one ship in both Charlotte Amalie Harbor and Crown Bay was significant (p-value < 0.001) however TSS after two ships between ports could not be distinguished significantly

Turbidity

- Turbidity increased significantly after the passage of one cruise ship in Charlotte Amalie Harbor (p-value = 0.0001) as well as for both one and two cruise ships in Crown Bay (p-values < 0.0001)

References


Acknowledgements

I would like to thank my co-authors and thesis committee members, Dr. Tyler Smith, Dr. Avram Primack, and Dr. Kristin Wilson, for their guidance and support in the planning of this project. I would also like to thank the faculty and staff of the CMC for Marine and Environmental Studies and everyone who assisted with field work and data collection.

I am especially grateful to the Luce Funds and the Virginia Islands Experimental Program to Stimulate Competitive Research (VIP-EPSCoR) for providing infrastructure and equipment support for this research as well as the Department of Planning and Natural Resources for funding. The United States Army Board for their continued support in diving activities.

*The results of this study do not represent the opinions of affiliated parties*

I would also like to extend special thanks to Michael Jetter, Jonathan Jetter, Rosina Elzeit, Madeline Amsden, Alexis Soben, Jon Byrne, and my parents, Scott and Donna Kisabeth.

Contact Information

jkkisabeth@coastal.edu