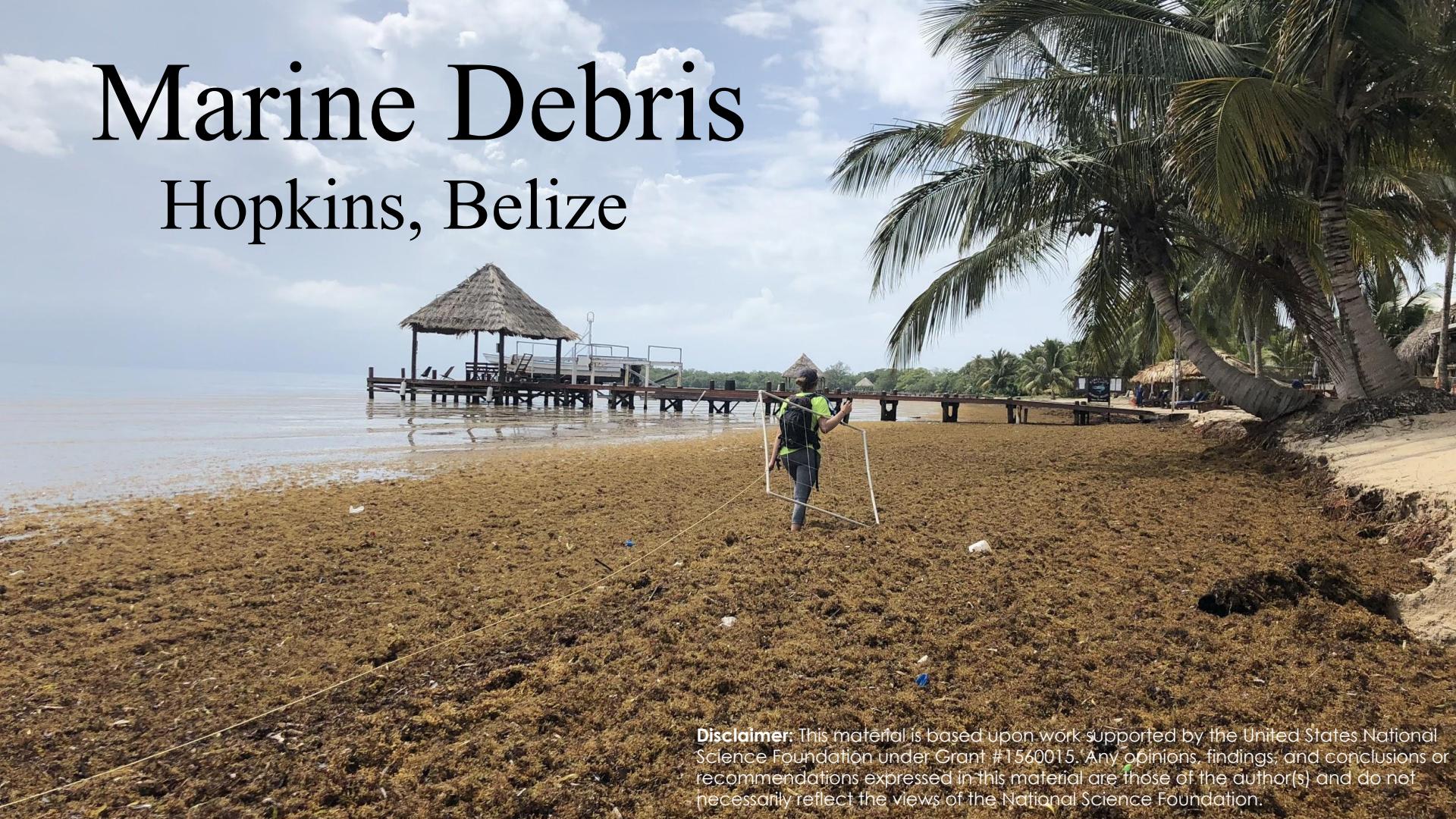


Marine Debris

Hopkins, Belize



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Track Members

Robert Darlington - Geography and Cartography/GIS

Elli Furukawa - Human Rights and Political Science

Sharon J. Huerta - Environmental Studies and Education

Amber Rutstein - Environmental Studies

Alexia Thompson - Natural Resource Management



Why Does This Research Matter?

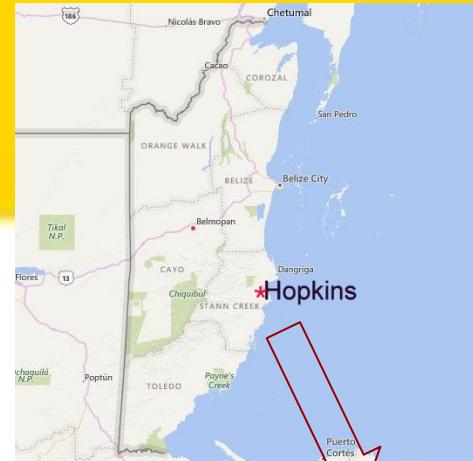


Research Questions

1. What is the difference in the amount and types of shoreline debris seen adjacent to different beachfront uses?
2. How do the methods for managing and disposing of marine debris differ across Hopkins beachfront properties? How does the community's perception of debris hotspots compare to observed hotspots?
3. Which beaches across Hopkins are being used, and how does that relate to the amount of plastic recorded? What is the relationship between frequency of beach use, and community perception of litter and natural debris?

Study Site

- Formerly known as Newtown Village
- Created and named Hopkins in 1942
- Culture capital of the Garifuna population
- Approximately 1,600 residents
- Northside (Baila) & Southside (False Sittee)
- Approx. 3.57 miles (5,750 m) of white sandy beach
 - Hawaii to Mangrove Forest



Coastal Land Use

Hopkins, Belize



Data Collected by Citizen Science GIS 2018 Research
Experience for Undergraduates students and community
members in Hopkins, Belize. Map created by Robert Darlington
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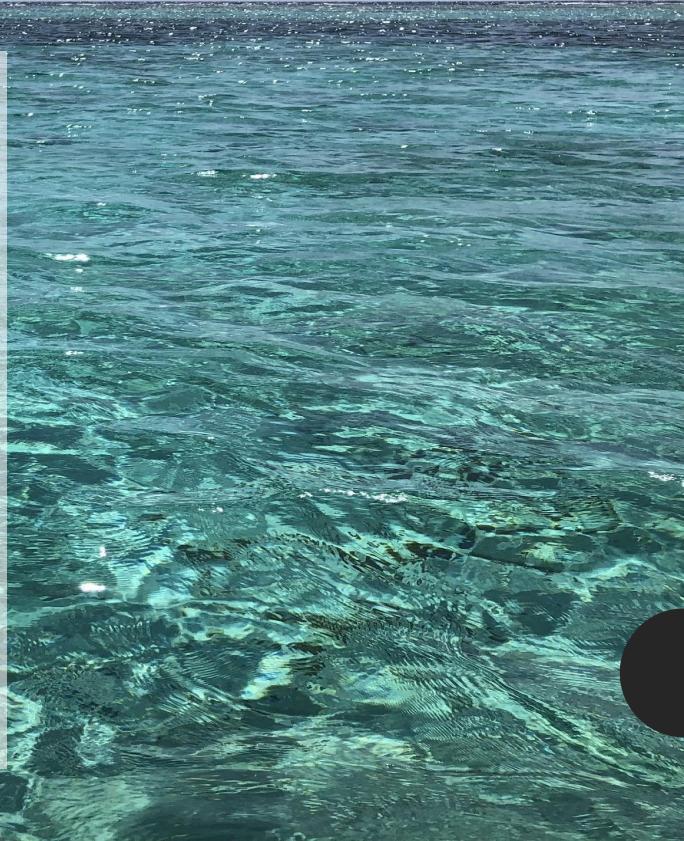
Methods on Quadrat and Hotspots

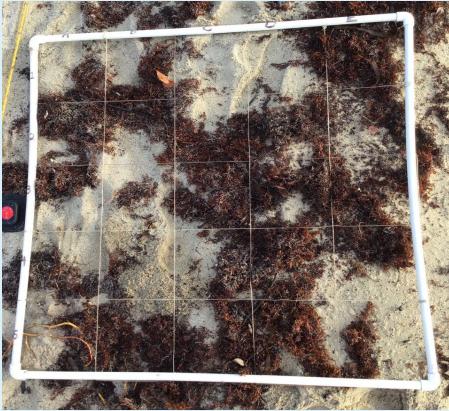
Quadrat Points

- Arc Collector
- GPS location, picture, weather, landuse
- 50 m distance: North to South
- Material counted by squares, length or pieces

Hotspots

- GPS location, picture
- Observed hotspots along public beach
- Primary, Secondary, Tertiary





Methods: Interviews and Sketch Mapping

Interviews

- Management & disposal
- More debris certain times of year
- Beach use & ranking system

Sketch Mapping

- Arc collector
- High beach use
- Perceived high debris areas

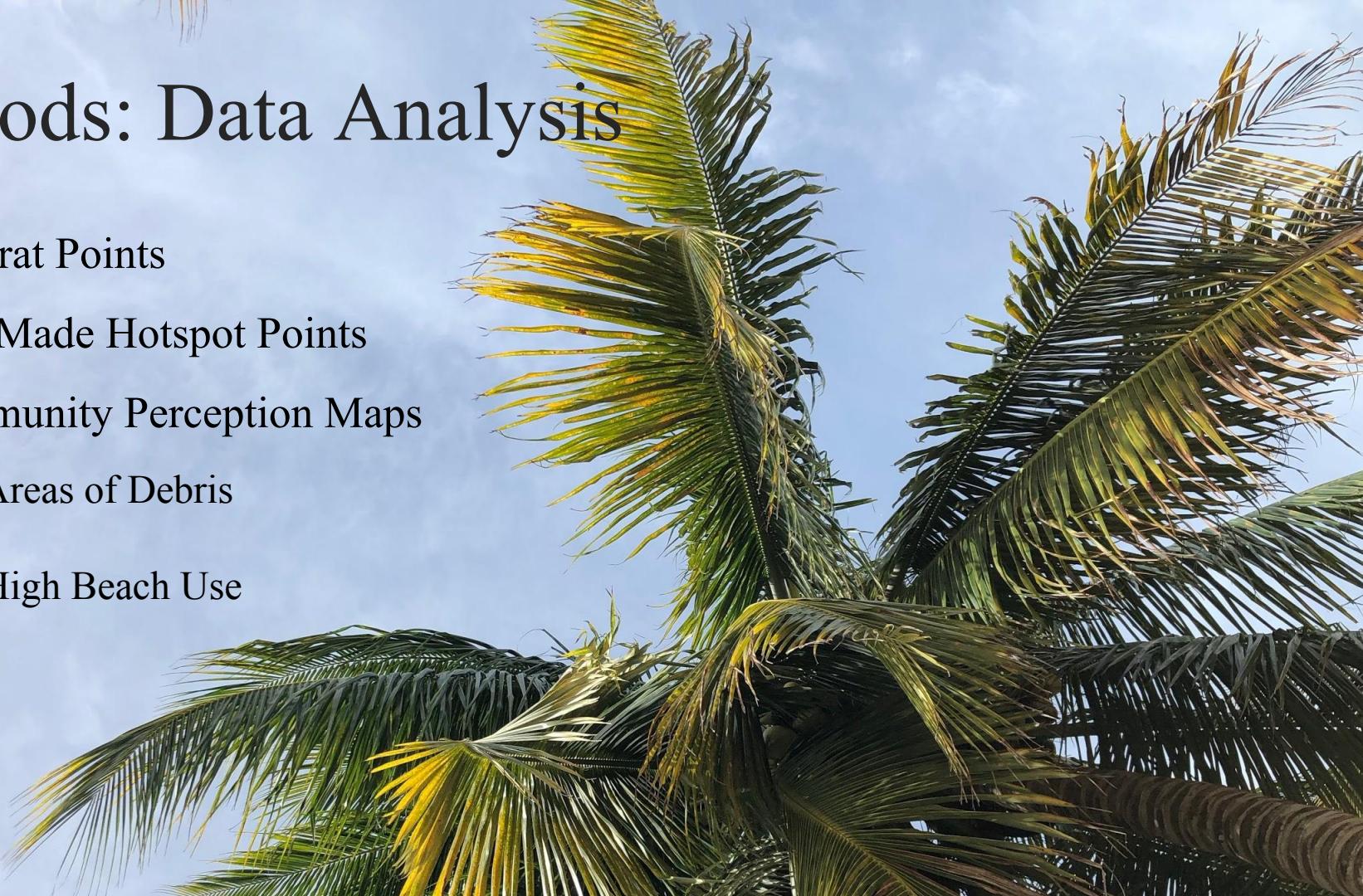


Team Accomplishments

- ★ 115 quadrat points taken along the beach
- ★ 73 observed hotspot piles recorded
- ★ 103 interviews with Hopkins community restaurants

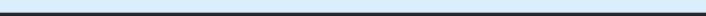
Methods: Data Analysis

- Quadrat Points
- Man Made Hotspot Points
- Community Perception Maps
 - Areas of Debris
 - High Beach Use



Research Question #1:

What is the difference in the amount and types of shoreline debris seen adjacent to different beachfront uses?



Research Question #1 Findings and Discussion

- Across all location types, most frequent type of natural debris:
 - Primary: *Sargassum*
 - Secondary: Seagrass
 - Tertiary: Plant material and Driftwood
- Across all location types, most frequent type of man-made debris:
 - Primary: Plastic
 - Secondary: Foam
 - Tertiary: Glass and Fabric



Courtesy of Daniel A. McCarthy



Courtesy of National Public Radio

Land-Use and Natural Debris Chart

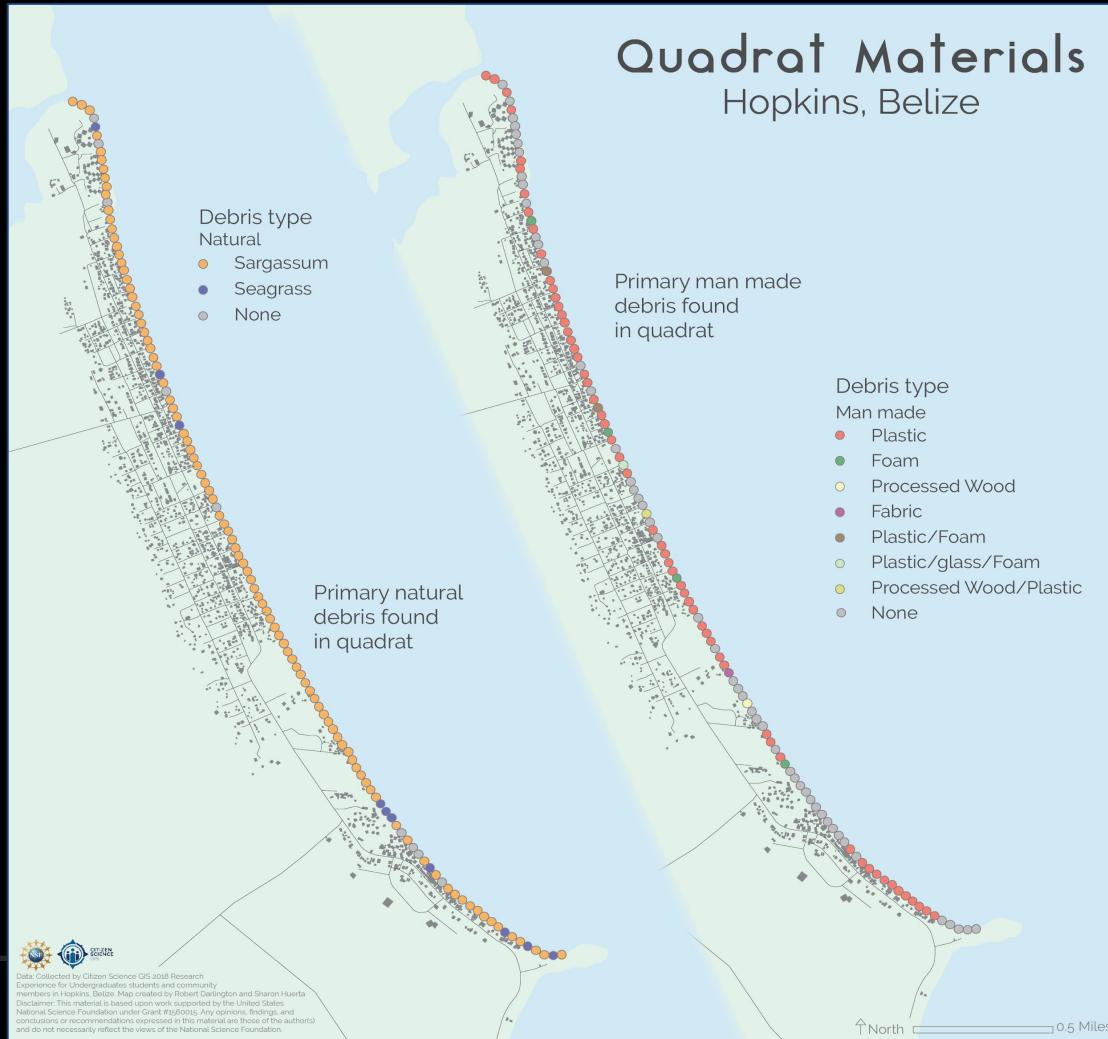
Land-Use Type	# of Quadrat Points	Primary Natural Debris	Secondary Natural Debris	Tertiary Natural Debris
Residential	(42 points)	<i>Sargassum</i>	Seagrass	Driftwood
Undeveloped	(25 points)	<i>Sargassum</i>	Seagrass	Plant
Resort	(21 points)	<i>Sargassum</i>	Seagrass	Plant
Hotel	(15 points)	<i>Sargassum</i>	Seagrass	None
Restaurant	(6 points)	<i>Sargassum</i>	Seagrass	Plant
Public Space	(3 points)	<i>Sargassum</i>	Seagrass	Driftwood
Restaurant/ Residential	(2 points)	<i>Sargassum</i>	Seagrass	Driftwood
Church	(1 point)	<i>Sargassum</i>	Seagrass	None

Land-Use and Man-Made Debris Chart

Land-Use Type	# of Quadrat Points	Primary Man-Made Debris	Secondary Man-Made Debris	Tertiary Man-Made Debris
Residential	(42 points)	Plastic: 206 pieces	Foam: 11 pieces	Glass: 7 pieces
Undeveloped	(25 points)	Plastic: 46 pieces	Foam: 3 pieces	Fabric: 1 piece
Resort	(21 points)	Plastic: 81 pieces	None	None
Hotel	(15 points)	Plastic: 33 pieces	Foam: 7 pieces	None
Restaurant	(6 points)	Plastic: 6 pieces	Foam: 2 pieces	None
Public Space	(3 points)	Plastic: 2 pieces	Foam: 1 piece	None
Restaurant/ Residential	(2 points)	None	None	None
Church	(1 point)	Plastic: 1 piece	None	None

Quadrat Materials

Hopkins, Belize



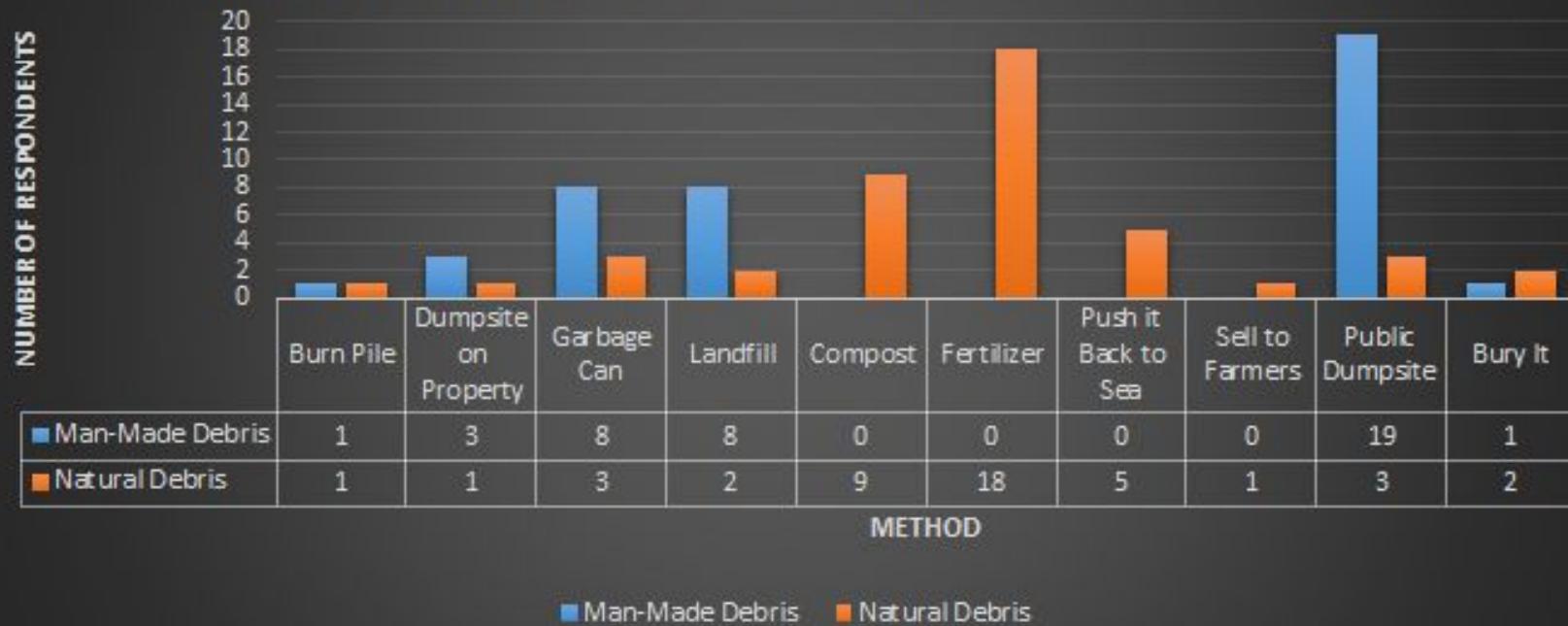
Research Questions #2:

How do the methods for managing and disposing of marine debris differ across Hopkins beachfront properties?

How does the community's perception of debris hotspots compare to observed hotspots?

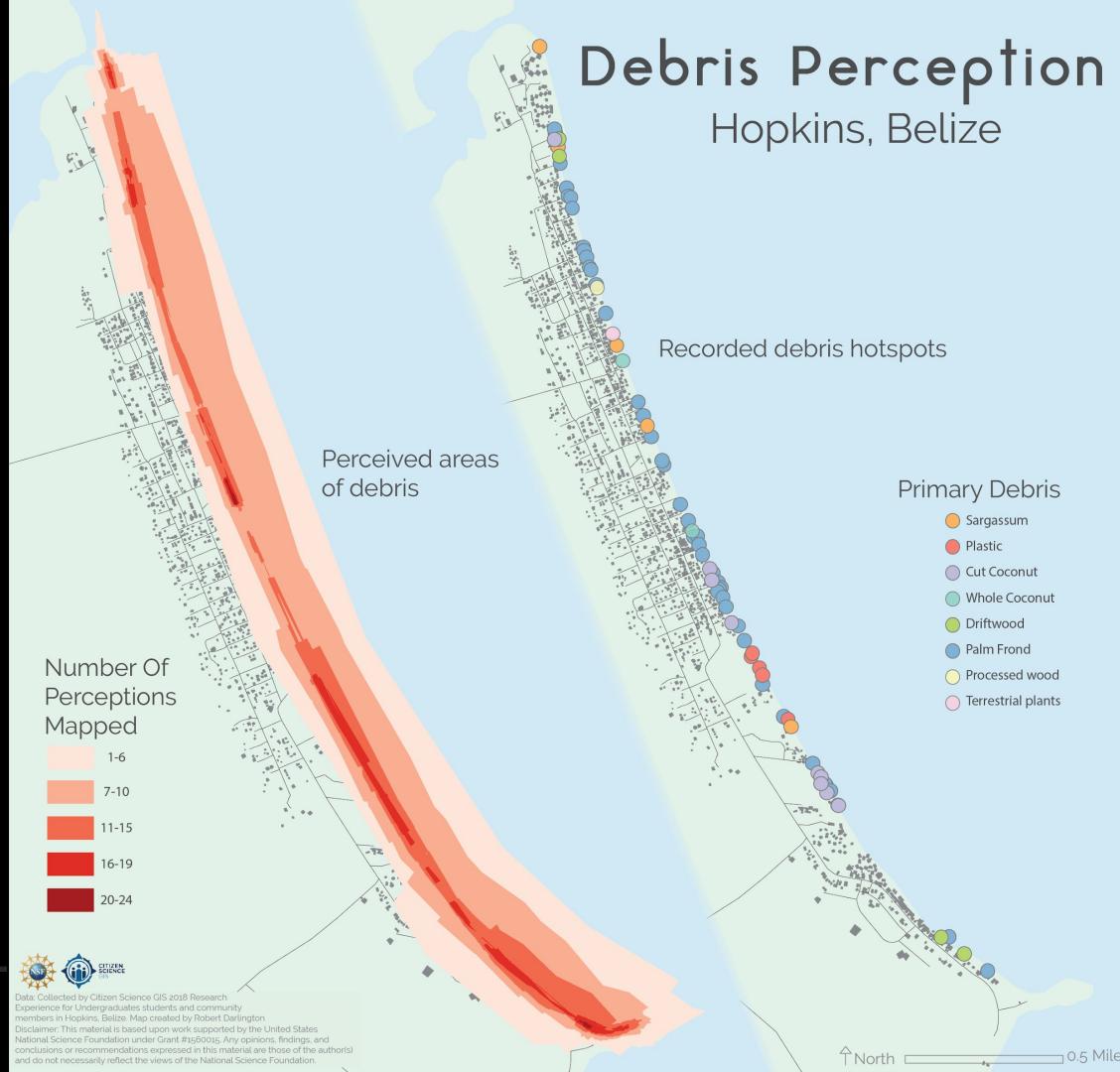
Research Question #2 Findings and Discussion

Method of Marine Debris Disposal



Debris Perception

Hopkins, Belize



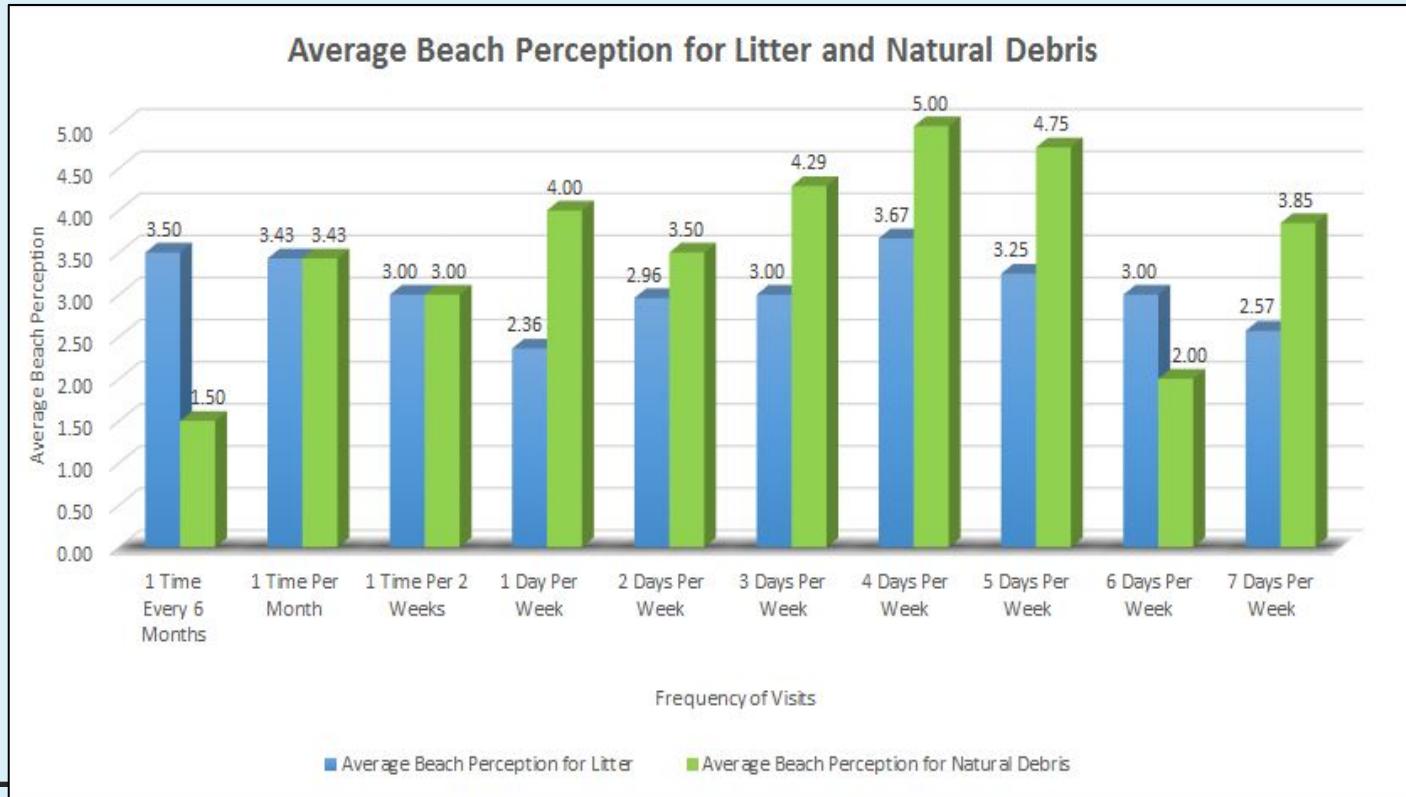
Data Collected by Citizen Science GIS 2018 Research
Experience for Undergraduates at Cornell University
mentored by Dr. Robert Darlington
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Research Questions #3:

Which beaches across Hopkins are being used, and how does that relate to the amount of plastic recorded?

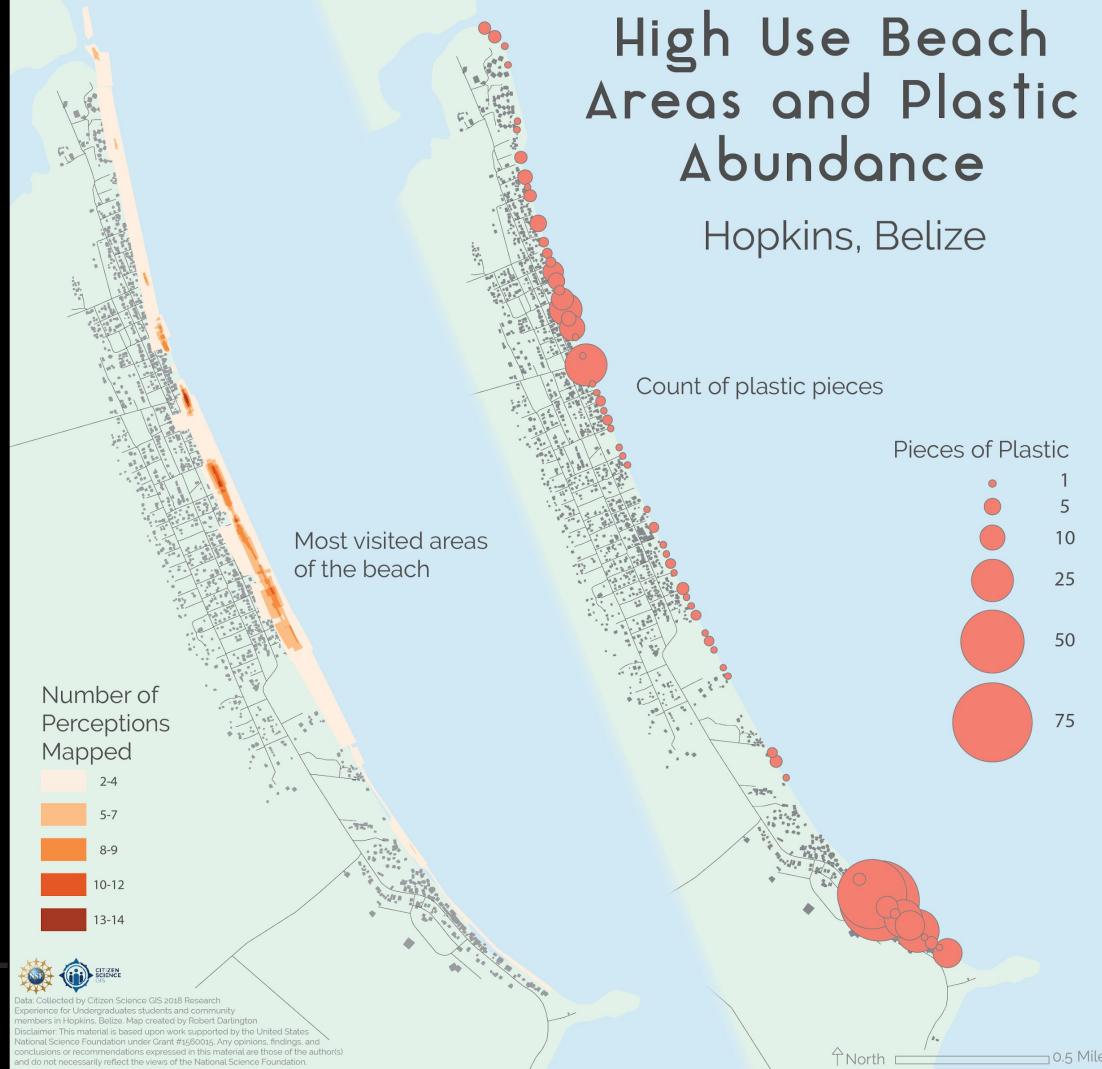
What is the relationship between frequency of beach use, and community perception of litter and natural debris?

Research Question #3: Findings and Discussion



High Use Beach Areas and Plastic Abundance

Hopkins, Belize



Data Collected by Citizen Science GIS 2018 Research
Experience for Undergraduates students and community
members in Hopkins, Belize. Map created by Robert Darlington
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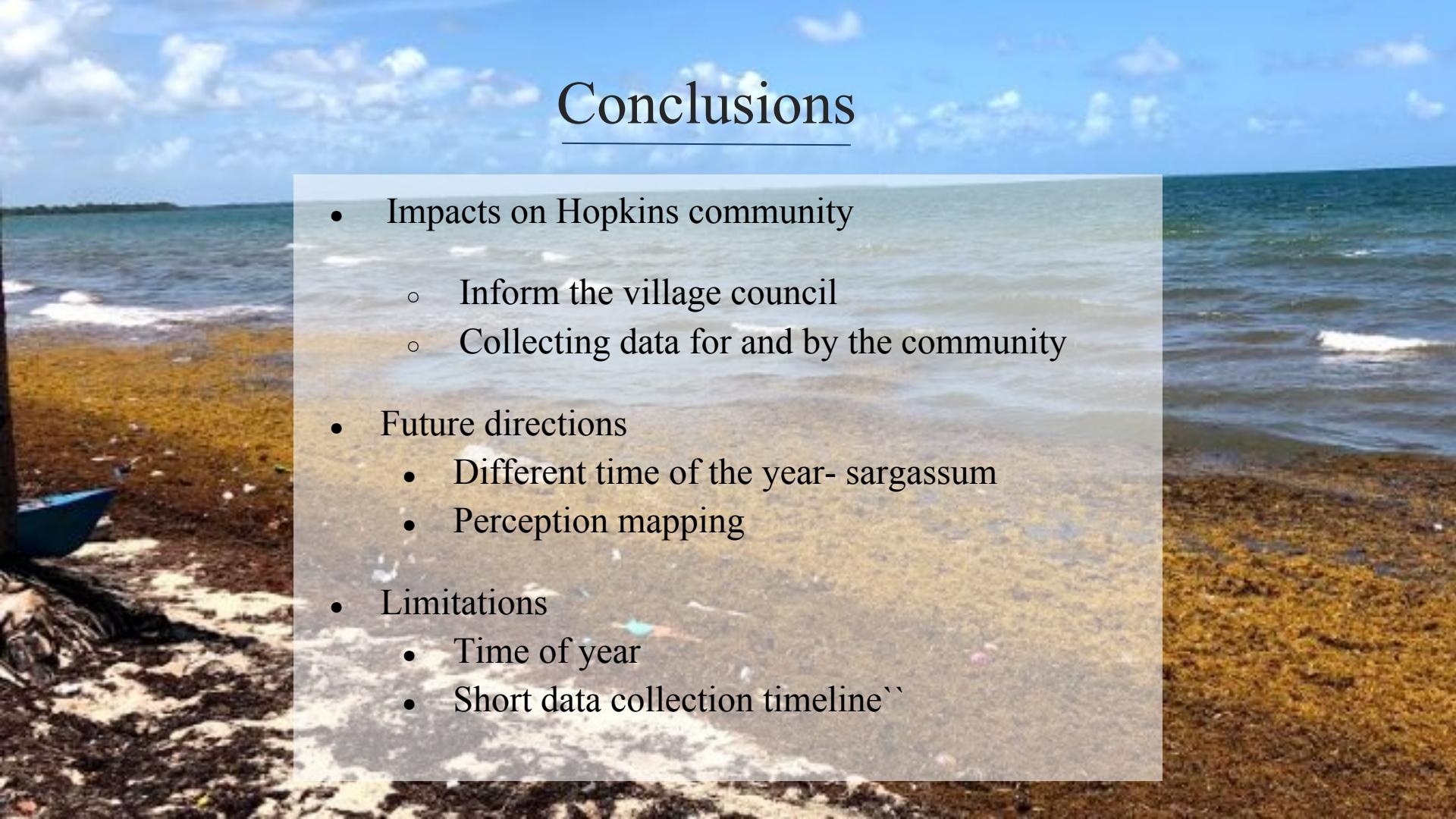
Recommendations

	low-use	high-use
high plastic	high-priority	high-priority
low plastic	low-priority	low-priority



Conclusions

- Impacts on Hopkins community
 - Inform the village council
 - Collecting data for and by the community
- Future directions
 - Different time of the year- sargassum
 - Perception mapping
- Limitations
 - Time of year
 - Short data collection timeline``



Acknowledgments



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ADVENTURE & DIVE RESORT, BELIZE

