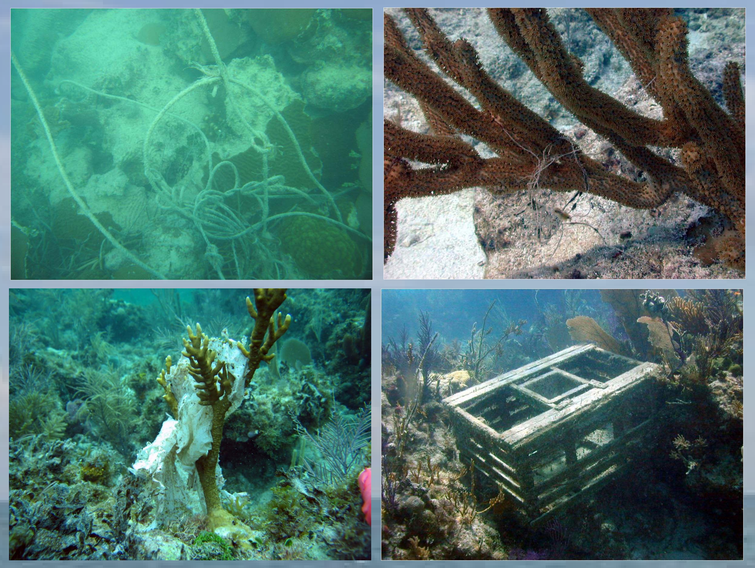
Large-scale Surveys of Lost Fishing Gear and Other Marine Debris in the Florida Keys

M. Chiappone, L.M. Rutten, S.L. Miller, D.W. Swanson

Background

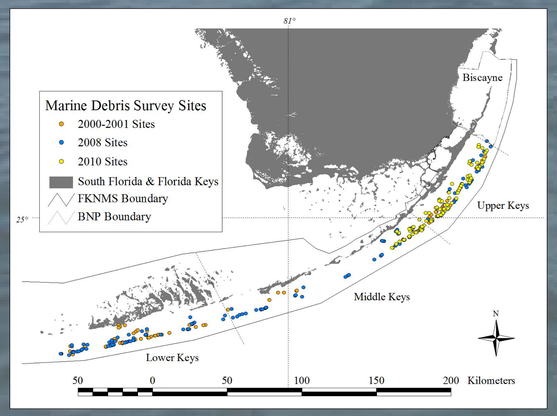
Marine debris, especially lost fishing gear, can destroy benthic organisms and entangle both benthic and mobile fauna. The loss and disposal of fishing gear is internationally recognized as a major environmental issue impacting coastal ecosystems.



Marine debris is pervasive in the Florida Keys

Study Objectives

- Determine the type, frequency, and amount (length, wet weight) of marine debris in the Florida Keys
- Assess the frequency of partial or complete mortality of benthic organisms from abrasion stress



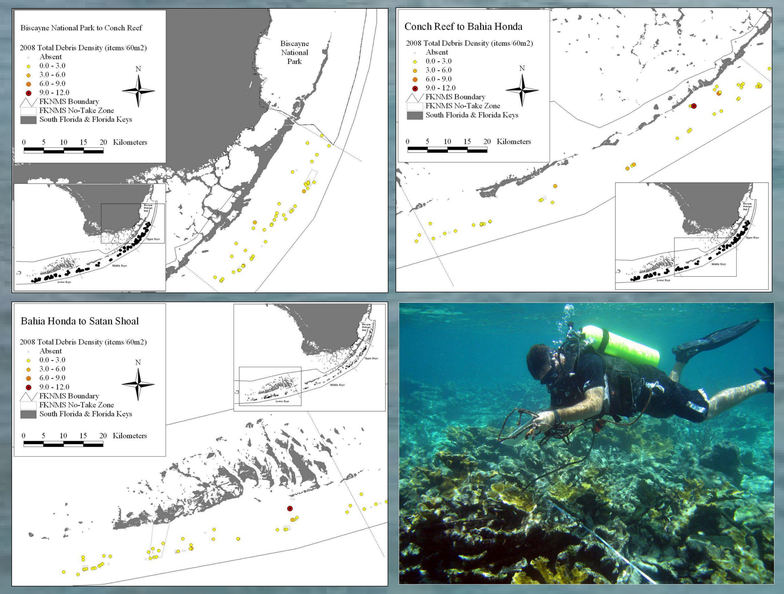
Marine debris survey locations in 2000, 2001 and 2008

Debris type	Frequency	Length (m)	Debris type	Frequency	Length (m)
Hook-and-line gear			*Other debris*		
Fishing rod	2	3.0	Anchor line + rope	1	8.2
Lead sinker	14	0.0	Bolt	1	0
Lure	1	0.0	Bottle cap	1	0
Monofilament	145	248.4	Brick	2	0.4
Monofilament + hook	36	63.4	Cable tie	2	0
Monofilament + leader	13	14.1	Cardboard	1	0
Monofilament + lure	2	3.8	Ceramic plate	1	0
Monofilament + sinker	17	16.4	Cloth	1	0
Monofilament + swivel	1	1.0	Coins	10	0
Wire cable	4	29.2	Computer cable	1	1.6
Wire leader	104	74.8	Cord/thin rope	3	5.2
Wire leader + hook	12	13.8	Filet knife	1	0
Wire leader + hook + sinker	1	0.7	Garden hose	1	0
Wire leader + lure	3	2.5	Glass bottle	17	0
Wire leader + sinker	8	6.5	Hex nut	1	0
Total hook-and-line gear	**363**	**477.6**	Mesh bag	1	0
			Mesh rope	2	1.1
Lobster/crab trap gear			Metal bracket/other metal	4	2.5
Cement block	40	0.0	Nylon cord	1	4.3
Cement block + grating	1	0.0	Plastic bag	7	0
Metal trap grating	7	0.0	Plastic band	3	7.7
Plastic pot opening	3	0.0	Plastic bottle	1	0
Rope	75	845.5	Plastic cord	2	3.4
Rope + grating	2	24.4	Plastic cup	2	0
Rope + trap	2	46.1	Plastic jug	2	0
Rope + wood	3	28.3	Ree-bar stake	1	0
Wood	106	0.0	Rope/string	5	12.6
Wood + cement	1	0.0	Sardine can	1	0
Wood + pot opening	1	0.0	Spear gun handle	1	0.5
Total trap gear	**241**	**944.3**	Spear gun shaft	1	0
			Spear gun tubing	1	0.7
Other debris			**Total other debris**	**82**	**48.3**
Aluminum can	2	0			
Anchor line + block	1	0	**Total debris**	**686**	**1,470.2**

Marine debris items encountered in 2008 from surveys of 145 sites representing 34,800 m² of benthic habitat

Methods

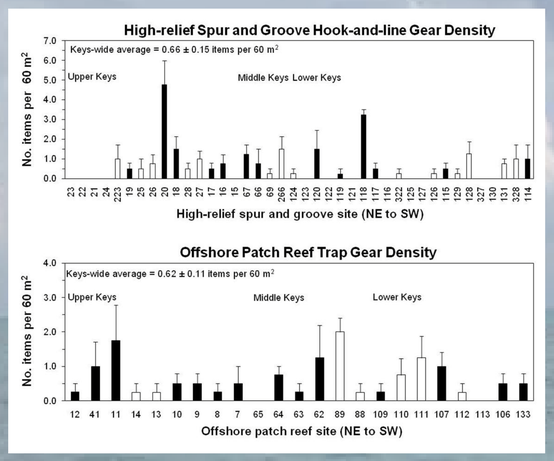
A stratified random sampling design was used to allocate effort according to habitat type and depth, along-shelf position, and management zone. Surveys were conducted at 131 sites Keys-wide in 2000-01, followed by 145 sites Keys-wide in 2008. Belt transects were used quantify the type of debris encountered. Lost angling gear and trap rope were additionally measured for total length. The 2008 surveys also collected data on debris wet weight.



Spatial distribution of total marine debris densities in 2008

Results

During 2008, a total of 686 pieces of debris were recovered from 34,800 m² of sampled benthic habitat, with ~443 kg removed. Most of the recovered debris was hook-and-line gear (53%, 0.5 km total length) and lobster/crab trap gear (35%, ~1 km total length). These debris types caused most (94%) of the 448 documented impacts to benthic organisms. Debris densities, including lost fishing gear, were usually not significantly different between fished and protected zones.



Comparisons of lost fishing gear in no-take zones (white bars) and reference areas (black bars) in 2008

Conclusions

Marine debris is spatially pervasive and a low-level chronic stressor in the Florida Keys. Spatial distribution reflects usage patterns. Impacts to organisms are dependent upon the type of debris and habitat structure. Monitoring marine debris can help to assess compliance with no-take zones

Acknowledgments

NOAA's CRCP and Aquarius Reef Base, Emerson Associates International, FKNMS, RSMAS-UM, Biscayne National Park, Dry Tortugas National Park, O. Rutten, J. Ault, S. Smith, B. Altmeier, M. O'Connor, D. Ward, B. Keller, and J. Delaney

References

Chiappone et al. (2004) Carib J Sci 40: 312-326

Reprints and quick look/data summary reports available at http://people.uncw.edu/millers