

'Greening' oyster reef restoration in the Gulf:

Evaluating biodegradable alternatives to traditional plastic mesh bagging methods.



LESSONS LEARNED FROM EPA COOPERATIVE AGREEMENT # OOD86019

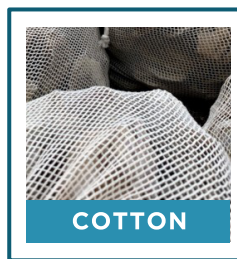
Opportunity

Providing substrate (like recycled oyster shells) is an effective restoration method. Small-scale restoration via community shell bagging events is beneficial; plastic mesh is often used to carry shell and provide vertical structure to restoration projects.

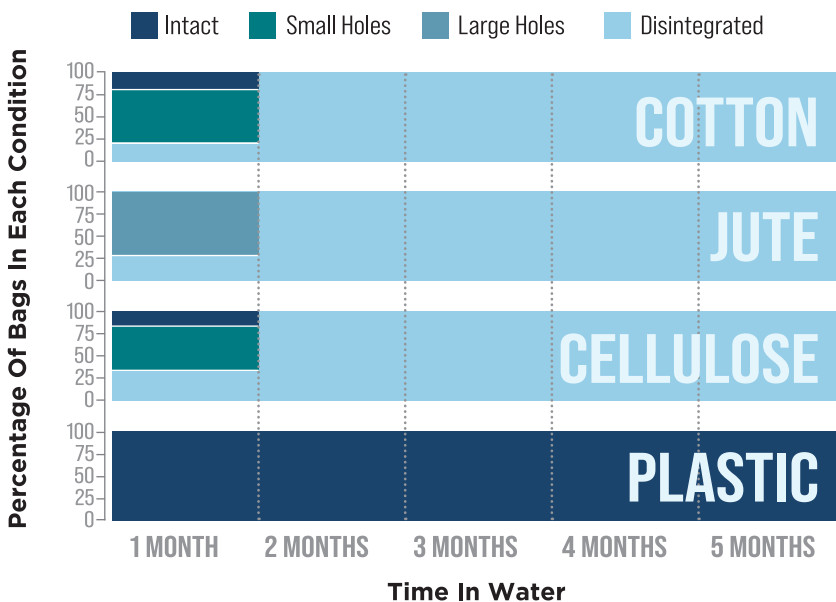
Environmental and public health concerns related to the introduction of plastics to marine systems have led to the search for alternative materials.



3 Biodegradable Bag Types were filled with recycled oyster shells and placed in a South Texas bay to assess their suitability as alternatives to plastic mesh bags for oyster restoration projects.



RESULTS: Bag Degradation



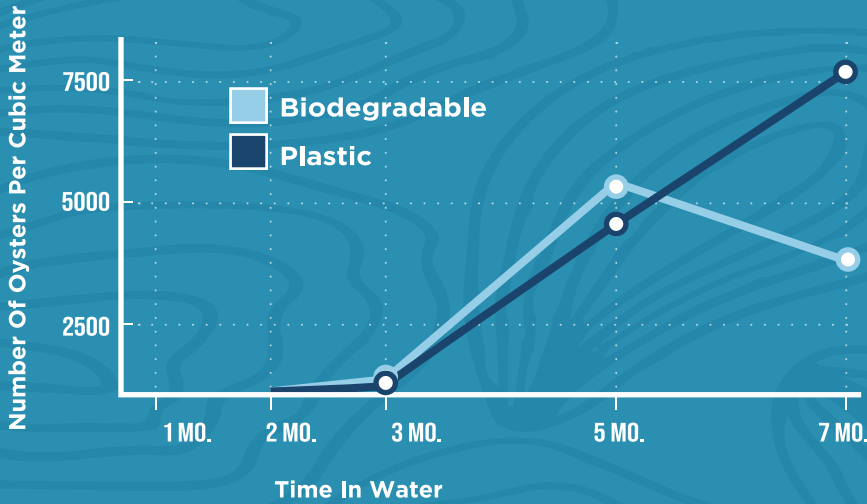
Conclusion

All biodegradable bag types disintegrated within 2 months of deployment.

Intact mesh bags provide structure for oysters to settle and grow, as well as refuge for fish, shrimp and crabs. Longer-lasting materials are needed.



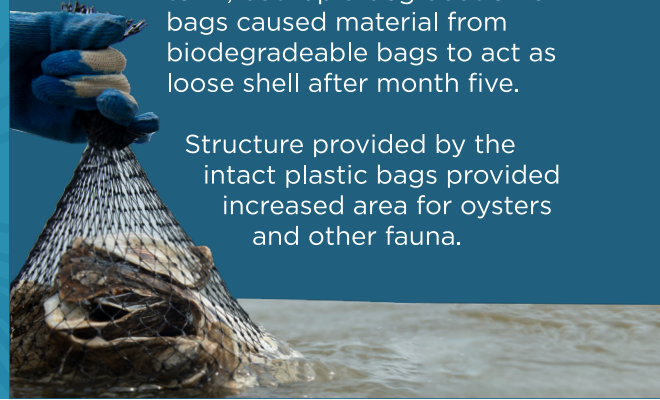
RESULTS: OYSTER ABUNDANCE



Conclusion

Biodegradable and plastic bags had similar benefits in the short term, but rapid degradation of bags caused material from biodegradable bags to act as loose shell after month five.

Structure provided by the intact plastic bags provided increased area for oysters and other fauna.



Comparing Material Benefits and Costs

Biodegradable options are relatively expensive, difficult to acquire, and do not hold up as well as plastic. HOWEVER, the environmental cost of introduction of plastics is difficult to quantify.

CELLULOSE	
COTTON	
JUTE	

BENEFIT/COST RATIOS

*Higher benefit/ cost ratios indicate better outcomes

	Oyster Abundance	Fauna Abundance	Cost/ 1000 Bags
CELLULOSE	2.41	20.19	\$5,399.27
COTTON	7.36	35.17	\$2,445.46
JUTE	5.62	34.88	\$3,382.64

FUTURE CONSIDERATIONS:

Continued evaluation of the actual cost of damages from plastic is needed.

Degradation of alternative materials is particularly fast in the sub-tropical environment of south Texas. Improving material longevity will increase ecological benefits.

Material cost and distribution concerns are other barriers to widespread use of biodegradable alternatives.

Better alternatives are needed. In the time since these experiments, promising options have become available. We will continue the search for and field-testing of biodegradable options.

RESTORATION RESEARCH ON THE HORIZON

This research is a first step in the critical transition to using biodegradable materials for oyster reef restoration via shell bagging. Biodegradable bags show great promise for their potential in oyster reef restoration. More research is needed to find an ideal material for use in South Texas bays.

