

**Deployments of Recycled Concrete & Steel Materials from Martin
County Landfill to Establish 4 Offshore Artificial Reefsites funded
by FFWCC & Martin County Commission
June /July 2007**



Grand Teton Reef on Ernst Artificial Reefsites, photo by Lee Harris, Ph. D., P.E.

Submitted to:

Kathy Fitzpatrick, P.E.
Coastal Engineer for Martin County

Submitted by:

Kerry L. Dillon
Sea-Rover Services, Inc.

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July 2007

Date: July 29, 2007

To: Kathy Fitzpatrick, P.E.

From: Kerry Dillon

Deployments Covered: 3 new artificial reefs @ Ernst Permitted Site and 1 new artificial reef deployed @ Sirotkin Site

Materials Utilized: Recycled concrete & Steel from Martin County Landfill & donated materials from several construction companies & the City of Vero Beach.

The following is a field report to document recent deployments of over 2000 tons of concrete and steel components to construct 4 offshore artificial reefs in Martin County, Florida. Many work groups and individuals were involved with this successful artificial reef construction project including: Martin County Board of County Commissioners, Florida Fish & Wildlife Conservation Commission, St. Lucie County Board of County Commissioners, George Denti, Project Manager for Florida Department of Transportation, Martin County Utilities Department, St. Lucie County Artificial Reef Program, Martin County Engineering Department.

Private companies directly involved with the acquisition, logistics for over land & sea transportation to the reefsites and proper placement of the materials on the seafloor are: McCulley Marine Services, & Sea Rover Services.

Companies & entities that provided additional materials to augment those that were retrieved from the Martin County Landfill include: Dickerson Construction Co., W. Jackson & Sons Co., Florida East Coast Railroad Co., City of Vero Beach Land Utilization Dept., and the many unknown companies that originally brought materials to the Martin County Landfill.

Newest artificial reefs built in Martin County - June/July 2007

Bargeload # & site	Suggested Name	Dates Deployed	Depths - ft. seafloor/top	Net Tons	Confirmed GPS Locations
First (Ernst)	West 400	6/15/07	62/46	400	27° 09.735 80° 03.856
Second (Ernst)	Mango's 700	6/15 & 26	61/48	440	27° 09.702 80° 03.702
Third (Ernst)	Grand Teton	6/26 & 30	62/34	728	27° 09.708 80° 03.535
Fourth (Sirotkin)	KD Select	7/9/07	124/113	537	27° 11.476 80° 01.474

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Below is a general timeframe of major project events.

<u>Dates</u>	<u>Events & Comments</u>
March 2006	Pre-construction survey dives completed to verify site chosen is acceptable for artificial reef construction. Report of findings by K. Dillon submitted to Martin County and included in FWC construction grant application.
June 2006	Conceptual approval of construction grant application by FFWCC.
April 2007	Martin County landfill personnel begin separating useable materials from large stockpile of concrete materials from the last 2 years for use as artificial reef materials.
May	Trucking contracts & logistics worked out prior to startup of transportation of materials to Ft. Pierce Harbour Pointe staging area.
Early June	St. Lucie County Board of County Commissioners grant approval for Martin County to stage materials at Harbor.
June 12	Martin County begins staging materials at Harbour Pointe in Port of Ft. Pierce and load onto McCulley Marine ABS barge. Notifications are given to agencies.
June 13	First semi-truck load of 57 loads from the landfill delivers materials to Harbour Pointe from Martin County landfill. Each load consists of 22 – 30 tons of concrete materials.
June 12 – 15	Barge is loaded with donated and landfill materials, (474 tons)
June 15	First of 3 deployments occurs at the Ernst permitted area In Martin County offshore waters
June 16 – 25	Materials delivered to Harbour Pointe and loaded for second deployment.
June 26	Second of 3 deployments occurs at the Ernst Site.

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Dates

Events & Comments

June 27 – 30	Materials delivered to Harbor Point and loaded for third deployment.
June 30	Third and last of 3 deployments occurs at the Ernst Site.
July 2 – 7	Materials delivered to Harbor Point and loaded for fourth deployment.
July 9, 2007	First & only deployment completed at the Sirotkin permitted reefsite
July 18	All 4 sites visited and GPS coordinates & profiles verified.
July 19 – Aug. 3	Closeout paperwork completed and submitted to govt. agencies.

Now that the construction phase is complete, post deployment dives will occur in August to photodocument each site as well as measure the overall footprint, and verify degree of stacking, and arrangement of the new reefsites. Starting next year a comprehensive annual monitoring will occur including fish species identification and census, reef components stability analysis, benthic species identification, mapping, and a complete digital photodocumentation survey. This will be conducted in the summer of 2008 as part of the annual monitoring requirement of the US Army Corps of Engineers permit for artificial reefsites.

Project Conclusions & Recommendations:

As this was the first effort for Martin County to utilize secondary use concrete materials recovered from the landfill to build offshore artificial reefs, there was a large learning curve. Some of the lessons learned were:

- The labor and time to separate the useable concrete from the unacceptable materials was much more difficult than expected.
- Controls should be established as to which materials are allowed to enter the dedicated landfill area for pre-staging of artificial reef materials.
- Contractors should be encouraged to trim off any steel rebar and wire; in return they could be given an incentive of either free disposal costs or reduced landfill fees.
- Pre-staging of acceptable materials should occur months in advance of the startup of the transportation phase to save time/effort/money to allow for the most efficient operation.
- Methodology should be established to determine volume of acceptable materials available for construction to allow better long range planning of construction capabilities. Options could be weigh trucks on the landfill scales as material is unloaded or provide monthly estimates based on observation.

Even with the difficulties it seems the process of utilizing obsolete steel & concrete landfill components to build artificial reefs seems to be a win/win situation for all parties involved including the marine environment, the fishers and divers. Martin County also benefits by

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reducing the amount of material is received at the Martin County transfer station and is ultimately transported to the Okeechobee landfill.

In the underwater realm, the future success of these and all new artificial reefs can be linked to the proper planning and execution of the deployments. When high relief reefs are designed, a contractual requirement for anchoring or mooring the barge on **each** deployment with constant rechecking of position is absolutely necessary. In past decades, some artificial reef projects have been haphazard attempts at deploying materials in a targeted area with limited success. These projects can result in a scattering of material across wide areas of ocean floor with very little profile and consequently may sink into the bottom sediments. This, of course would not apply where lower relief, more scattered reef patterns are desired. In the end the design and purpose of the reef construction must guide the construction practices.

Certification of findings

The undersigned certify that all of the above events as listed occurred as stated and findings are true as written and occurred between March 2006 – August 2007.

Kerry L. Dillon
Sea Rover Services, Inc.
Date – 8/1/07