



December 5, 2013

Lester B. Smith, Jr.
Principal - Environmental Sciences
Epsilon Associates, Inc.
3 Clock Tower Place, Suite 250
Maynard, MA 01754

RE: Methods - Underwater Video Reconnaissance Survey HDD Barge Locations, Vineyard Sound

Dear Mr. Smith,

On November 6, 2013, CR Environmental, Inc. (CR) performed a reconnaissance video survey at the proposed HDD barge locations from Falmouth to Martha's Vineyard in Vineyard Sound. A table showing dominant substrate and biota, and a plate with selected video screen captures are attached.

Vessel Support, Navigation, and Survey Design

Underwater video operations were conducted from CR's 25-foot fiberglass survey boat, *Charlotte Anne* with an enclosed pilothouse and bench for survey electronics, outside steering station, and 12 volt and 110 volt power supplies. The crew consisted of a Senior Hydrographer/Navigator and an environmental scientist /U.S. Coast Guard licensed Captain.

Navigation for the survey was accomplished using a Hemisphere RS-110 Differential Global Positioning System (DGPS) system capable of receiving U.S. Coast Guard (USCG) and Satellite Beacon corrections. The system provided real-time sub-meter horizontal position accuracy. The DGPS system was interfaced to a laptop computer running HYPACK 2013 hydrographic survey software. HYPACK recorded vessel position, water depth, and provided a steering display for the vessel captain.

Underwater Video Data Acquisition and Processing

Underwater video footage was obtained at twelve HDD anchor locations off Martha's Vineyard and one location off Falmouth to determine dominant bottom substrate and biota. Data were collected along a total of 32 video transects using a SeaViewer 950 color underwater video camera with LED lights, and interfaced to a Sea-DVR digital video recorder. The SeaViewer was configured with a stabilizing fin and suspended vertically. For scaling purposes a 3" x 3" dive weight was suspended directly beneath the camera, and the camera was maintained two feet off the bottom. At all the Martha's Vineyard anchor locations, the survey vessel was allowed to drift over the targeted point as video data were collected. On the Falmouth video transects, the camera was towed slowly toward shore to determine the boundary of the eel grass beds.

HYPACK navigation files were recorded during each video transect. Video data were transferred to a processing computer, viewed by a CR biologist and eight representative screen captures (frame images) showing different substrates and biota were extracted. Navigation data in GIS format and raw video data AVI files were provided to Epsilon.

General Observations

Video transect start times, water depths, transect location, dominant and secondary substrates, and dominant biota are provided in Table 1. The dominant bottom substrate observed at the majority of the video transects is flat sand and sand waves. At nine of the transects (Drifts 18, 19, 20, 23, 27, 28, 29, 30 and 32) the dominant substrate was a pebble or a cobble bottom. At many of the transects with sand as the dominant substrate, pebbles were observed to be the secondary substrate. At one location, Drift 22, cobbles and small boulders were observed in the troughs of the sand waves.

The dominant biota observed on the Martha's Vineyard video drifts was the Sulfur Sponge, (*Cliona celata*). It was observed in large patches growing directly on the sand and on pebble/cobble bottom. Large patches of the Invasive White Tunicate, (*Didendum vexillum*) were also observed along many of the transects. Other biota included Orange Encrusting Bryozoan, (*Schizoporella unicornis*), Carnation Worm, (*Hydroides dianthus*), Purple Spined Sea Urchin, (*Arbacia punctulata*), Common Sea Star, (*Asterias forbesi*), Branching Red Algae, (*Agardhiella tenera*), and Gulf Weed, (*Sargassum filpendula*).

On the Falmouth towed video transect, Common Slipper Shell (*Crepidula fornicata*) and sparse to moderate density Eelgrass (*Zostera marina*) were also observed.

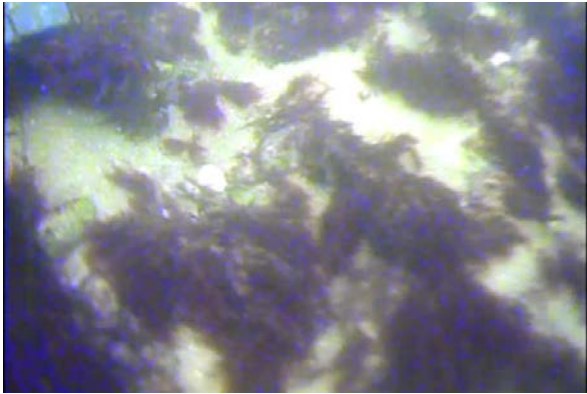
Representative video screen captures of bottom substrates and biota observed during the November survey are attached (Plate 1).

In general, the video quality during the November survey was relatively poor due to strong currents and large amount of particulates in the water column. The survey was conducted during an extremely strong tidal period, and video quality greatly improved during slack tide periods. In the future, underwater video surveys in Vineyard Sound should be scheduled around weaker monthly tides and slack tide periods whenever possible. Better quality video data could also be obtained with CR's video sled system that can be maintained closer to the bottom and has a wide angle video light system reducing the backscatter off particulates in front of the camera lens.

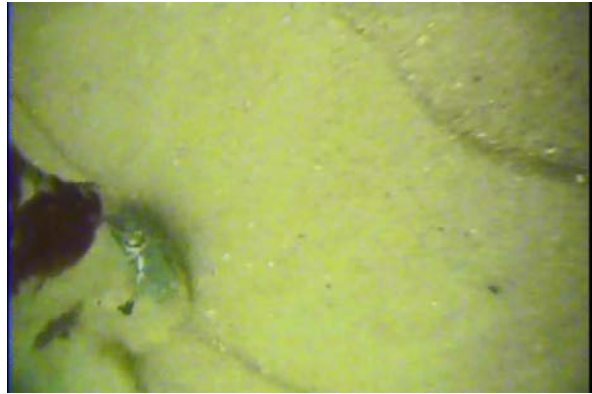
Sincerely,
CR Environmental, Inc.

for John H. Ryther Jr.
Manager of Oceanographic Operations

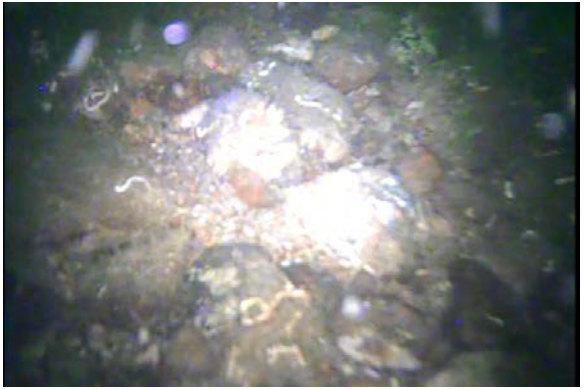
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Branching Red Algae on a Flat Sand Bottom



Sand Wave Bottom Substrate



Invasive White Tunicates on Cobble Bottom



Sulfur Sponge, White Invasive Tunicate



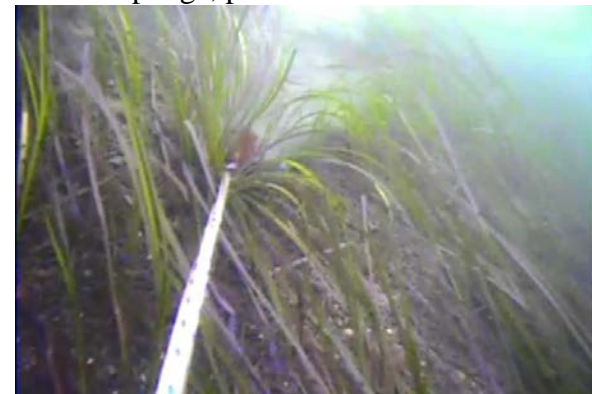
Sulfur Sponge, Orange Encrusting Bryozoan



Sulfur Sponge, possible cable



Pebble Bottom with Common Slipper Shells



Moderate Eelgrass on Flat Sand Bottom

Plate 1 Representative Bottom Substrates and Biota Observed on November Video Survey Vineyard Sound, Massachusetts

TABLE 1
SUMMARY DATA FOR VIDEO SURVEY TRANSECTS
VINEYARD SOUND HDD ANCHOR LOCATIONS VINEYARD SOUND
NOVEMBER 6, 2013

Transect	SOL Time	Water Depth (ft)	Video File	Target Feature	Dominant Substrate	Secondary Substrate	Dominant Biota	Other Substrate / Species Observations
Drift 1	902	23	131105 2200	Mud Barge-SE	S	PE	SuS	AL(rb),AL(gw)
Drift 2	912	21	131105 2210	Mud Barge-SE	S	PE	SuS	AL (rb), AL(gw)
Drift 3	921		131105 2219	Mud Barge-SE	S	PE	SuS	Al (rb), AL (gw)
Drift 4	926		131105 2225	Mud Barge-SE	S	PE	SuS	CW, AL (rb), AL(gw)
Drift 5	935		131105 2233	Mud Barge-SW	SW	SR	None	
Drift 6	941		131105 2239	Mud Barge-SW	SW	SR	None	
Drift 7	949		131105 2247	Mud Barge-SW	SW	SR	None	
Drift 8	959	72	131105 2257	Steel Barge-SW	S	PE	SuS	WT,OB
Drift 9	1013	77	131105 2312	Steel Barge-SW	S	PE	SuS	WT,OB
Drift 10	1021	78	131105 2319	Steel Barge-SW	S	PE	SuS	WT,OB
Drift 11	1026	81	131105 2324	Steel Barge-SW	S	PE	SuS	WT
Drift 12	1035	75	131105 2333	Steel Barge-NW	S	None	SuS	WT,OB
Drift 13	1042	72	131105 2340	Steel Barge-NW	S	None	SuS	WT,OB
Drift 14	1047	74	131105 2345	Steel Barge-NW	S	PE	SuS	AL(rb),BH
Drift 15	1054	78	131105 2352	Steel Barge NE	S	PE	SuS	OB, WT
Drift 16	1101	79	131105 2359	Steel Barge NE	S	PE	SuS	WT,AL(rb)
Drift 17	1111	79	131106 0009	Steel Barge NE	S	PE/CO	SuS	WT,OB
Drift 18	1200	65	131106 0058	Co Steel Barge NE	PE/CO	S	SuS	WT,OB,SF
Drift 19	1210	65	131106 0108	Co Steel Barge NE	PE/CO	S	SuS	WT,OB
Drift 20	1218		131106 0116	Co Steel Barge NE	PE/CO	None	SuS	AL(rb),WT
Drift 21	1227	86	131106 0125	20T Anchor	SW	CO	SuS	AL(br),BH
Drift 22	1242	83	131106 0140	20T Anchor (200ft S)	SW	CO/BO	SuS	WT,OB
Drift 23	1251	80	131106 0149	20T Anchor(400ft S)	CO	PE	SuS	WT,BH
Drift 24	1302	76	131106 0200	Alt Stern Steel Barge SW	S	PE/CO	SuS	WT
Drift 25	1313	78	131106 0211	Alt Stern Steel Barge SW	S	PE/CO	SuS	WT,BH
Drift 26	1323		131106 0221	Alt Stern Steel Barge SE	S	PE/CO	WT	SuS,SU,AL(rb)
Drift 27	1327		131106 0225	Alt Stern Steel Barge SE	PE	CO	SuS	WT,OB
Drift 28	1335	72	131106 0233	Mud Barge NE	PE/CO	S	SuS	WT
Drift 29	1347	76	131106 0245	Mud Barge NE	PE/CO	S	SuS	WT,OB, AL(rb)
Drift 30	1353	76	131106 0251	Mud Barge NE	PE/CO	S	SuS	WT,AL(rb)
Drift 31	1359	76	131106 0257	Mud Barge NE	S	CO	SuS	WT
Drift 32	1427		131106 0325	Falmouth HDD Eelgrass	PE	S	EG(o)-EG(c)	HS,AL(rb),AL(gw)

TABLE 1
SUMMARY DATA FOR VIDEO SURVEY TRANSECTS
VINEYARD SOUND HDD ANCHOR LOCATIONS VINEYARD SOUND
NOVEMBER 6, 2013

ABBREVIATION CONVENTION:

SOL - start of line

Habitat-substrate class

S Flat sand
SR Sand Ripples
SW Sand Waves
PE Pebbles
CO Cobbles
BO Boulder
AL (gf) Green Fleece
AL (gw) Gulf Weed
AL (hc) Hollow Green Algae
AL (re) Encrusting Red Algae
AL (rb) Branching Red Algae
AL (ur) Unidentified Branching Red Algae
EG(a) Eelgras Abundant
EG(c) Eelgras Common
EG(o) Eelgras Occasional
DE Debris

Fauna

BA Common Barnacle
BH Branched Hydroid
CW Carnation Worm
FL Summer Flounder
HS Horn Shells
HC Hermit Crabs
MC Mud Snail
MS Moon Snail
MU Blue Mussel
OB Orange Bryozoan
PaW Parchment Worm
PIW Plume Worm
SaS Sand Sponge
SB Black Sea Bass
SC Star Coral
SCI Atlantic Surf Clam
SCP Bay Scallop
SF Common Sea Star
SRO Sea Robin
SU Sea Urchin
SuS Sulfur Sponge
WH Channeled Whelk
WT Invasive White Tunicate



Drift 1, Screen Capture.



Drift 2, Screen Capture.



Drift 3, Screen Capture.



Drift 4, Screen Capture.



Drift 5, Screen Capture.



Drift 6, Screen Capture.



Drift 7, Screen Capture.



Drift 8, Screen Capture.



Drift 9, Screen Capture.



Drift 10, Screen Capture.



Drift 11, Screen Capture.



Drift 12, Screen Capture.



Drift 13, Screen Capture.



Drift 14, Screen Capture.



Drift 15, Screen Capture.



Drift 16, Screen Capture.



Drift 17, Screen Capture.



Drift 18, Screen Capture.



Drift 19, Screen Capture.



Drift 20, Screen Capture.



Drift 21, Screen Capture.



Drift 22, Screen Capture.



Drift 23, Screen Capture.



Drift 24, Screen Capture.



Drift 25, Screen Capture.



Drift 26, Screen Capture.



Drift 27, Screen Capture.



Drift 28, Screen Capture.



Drift 29, Screen Capture.



Drift 30, Screen Capture.



Drift 31, Screen Capture.



Drift 32, Screen Capture.