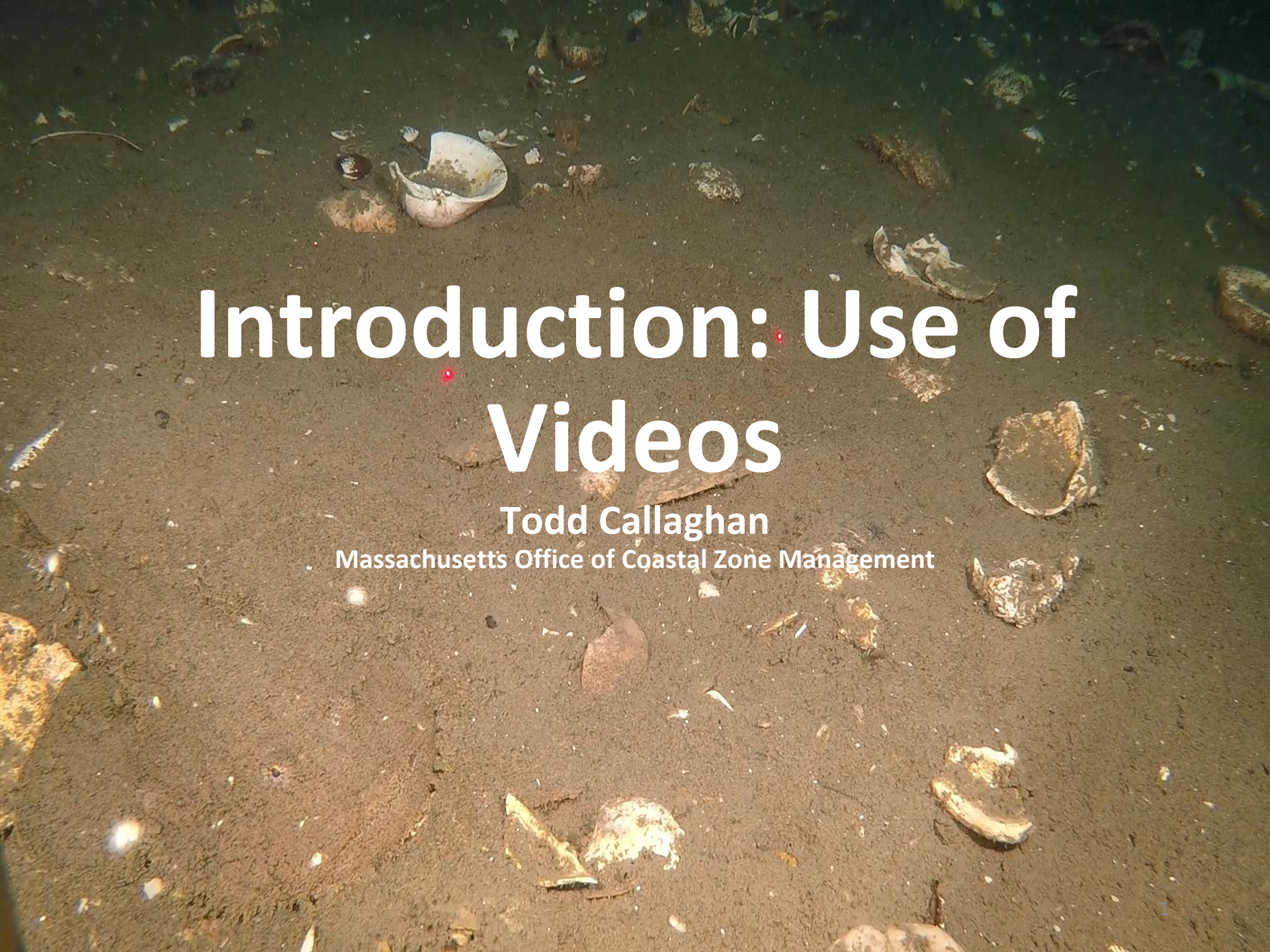


Introduction: Use of Videos

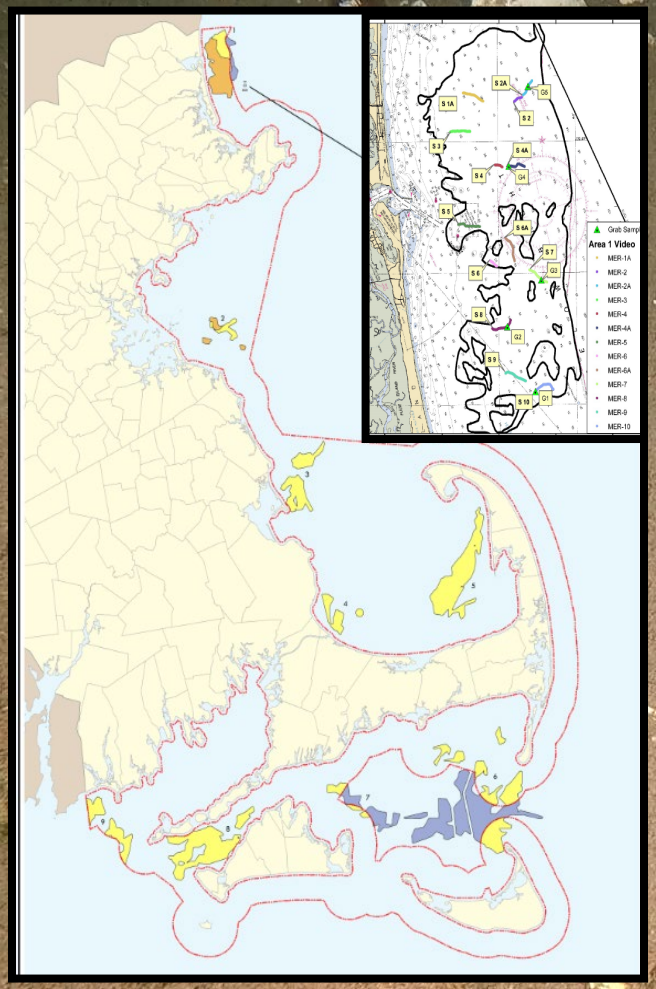
Todd Callaghan
Massachusetts Office of Coastal Zone Management

What….

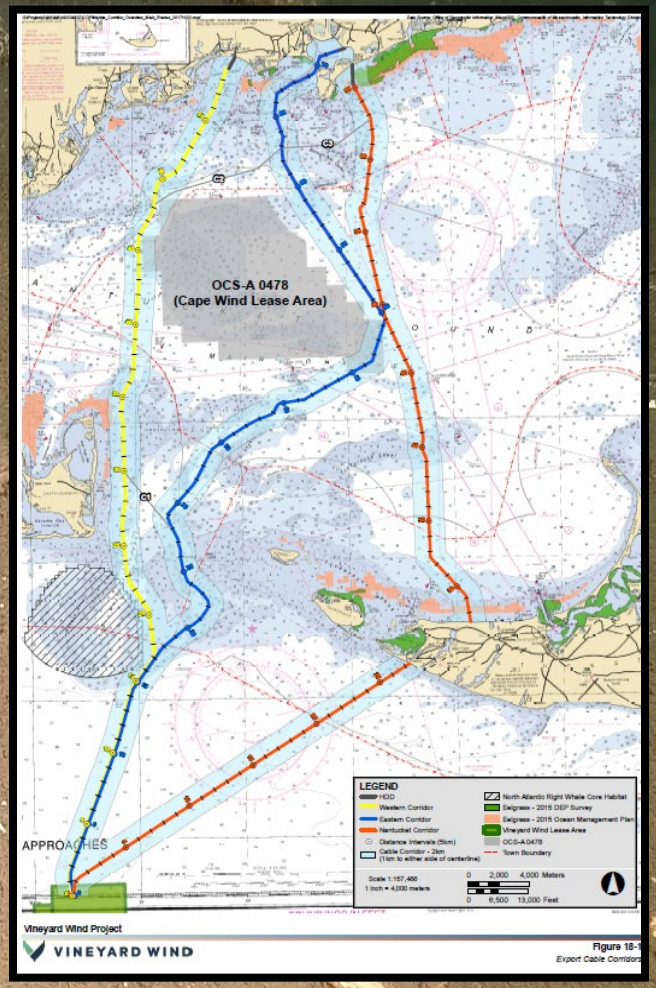
- Videos towed from behind a survey vessel
  - Offshore wind companies
  - CZM-funded survey to characterize offshore sand

CR Environmental

Where ….



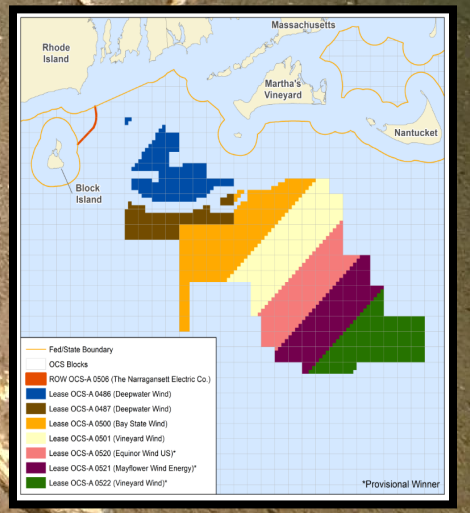
Offshore Sand Resource Areas
Aug-Nov 2017



Vineyard Wind Cable Route
2017, 2018

Why ….

- MA Ocean Plan: Offshore sand
- Offshore Wind: COP, EIS
- CZM's Seafloor Mapping Program: h/c seafloor

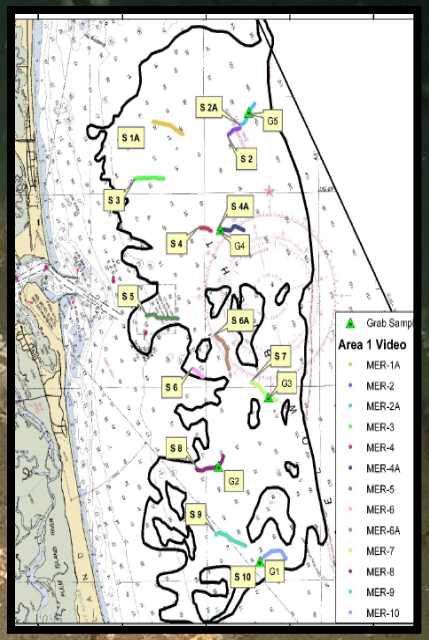


Offshore Wind Leases

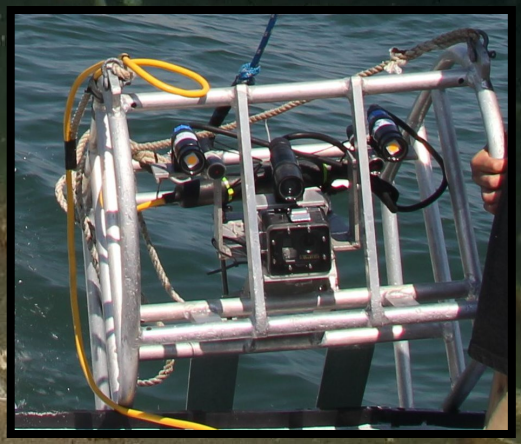
Sampling Design and Execution

Preparation

- Videos of opportunity
- Offshore Sand
  - 10 lines within each of the 5 areas of interest
  - Transition zones (sand→cobble)
  - 40-130’ depth
  - 1000 m length
- Offshore Wind
  - From site to shore every 1 km
  - Video transects perpendicular to cable pathway
  - 15-115’
  - 1000 m length



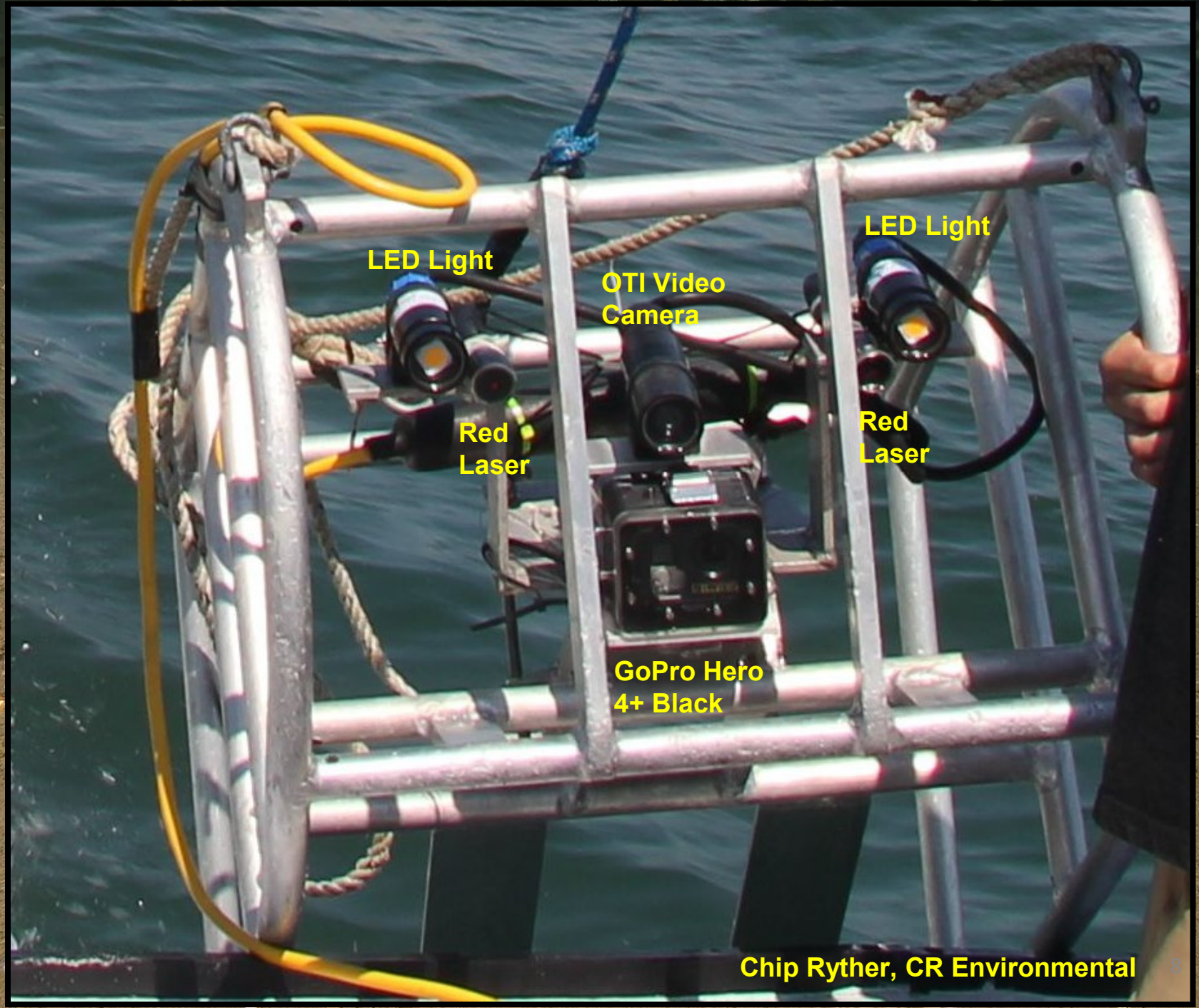
Execution



- Data Gathering
  - Towed, vessel adrift at 0.5 to 2 knots
  - Red lasers 25 cm (9.8” apart) on sled frame
  - Outland Technologies (OTI) hi res, low light, color camera
  - 2 UWL-401 LED lights w/ variable output
  - OTI-960 video recorder and topside monitor

  Also,
  - Hi def GoPro Hero 4+ Black in a Nimar deepwater housing
  - Mounted below OTI housing
  - Recording HD video at 1080P resolution, 30 fps
  - AND 12 Megapixel stills every 5-10 secs

  - Both cameras synched to each other and navigation computer

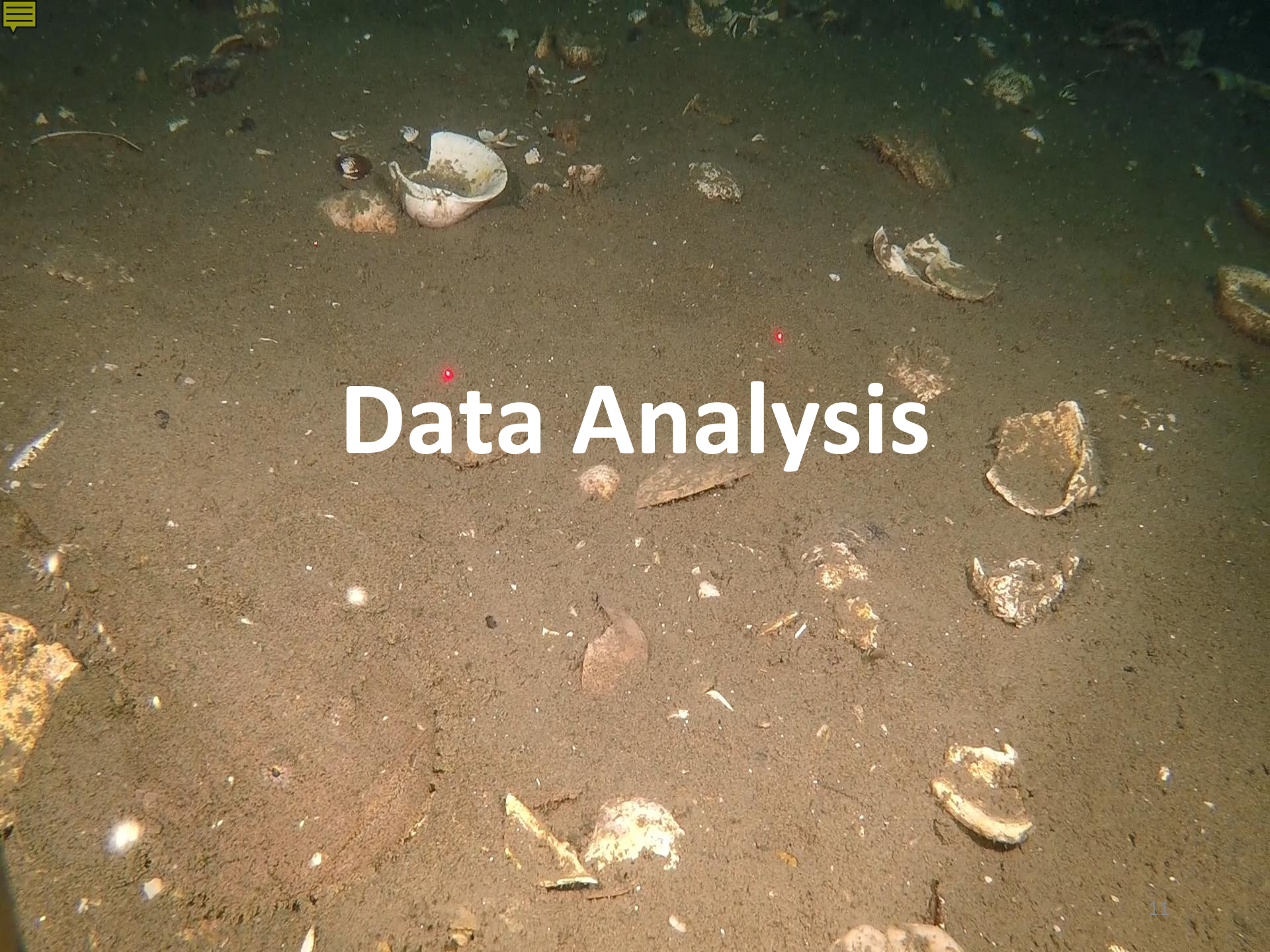

LED Light
LED Light
OTI Video Camera
Red Laser
Red Laser
GoPro Hero 4+ Black
Chip Ryther, CR Environmental

Data Management

- Simply use the file names provided by collector
- Data on hard drives (external and shared CZM server)
- 350 GB for offshore sand videos
- 1 TB for Vineyard Wind videos
- Use Excel for analyzed photos data

What worked well, and what didn't …

- Need to do tows in Cape Cod Bay Jan 1-April 30 to avoid lobster gear
- Transect "lines" are actually nonlinear b/c of drift & avoidance
- GoPro is a good backup when OTI fails


Data Analysis

Approach

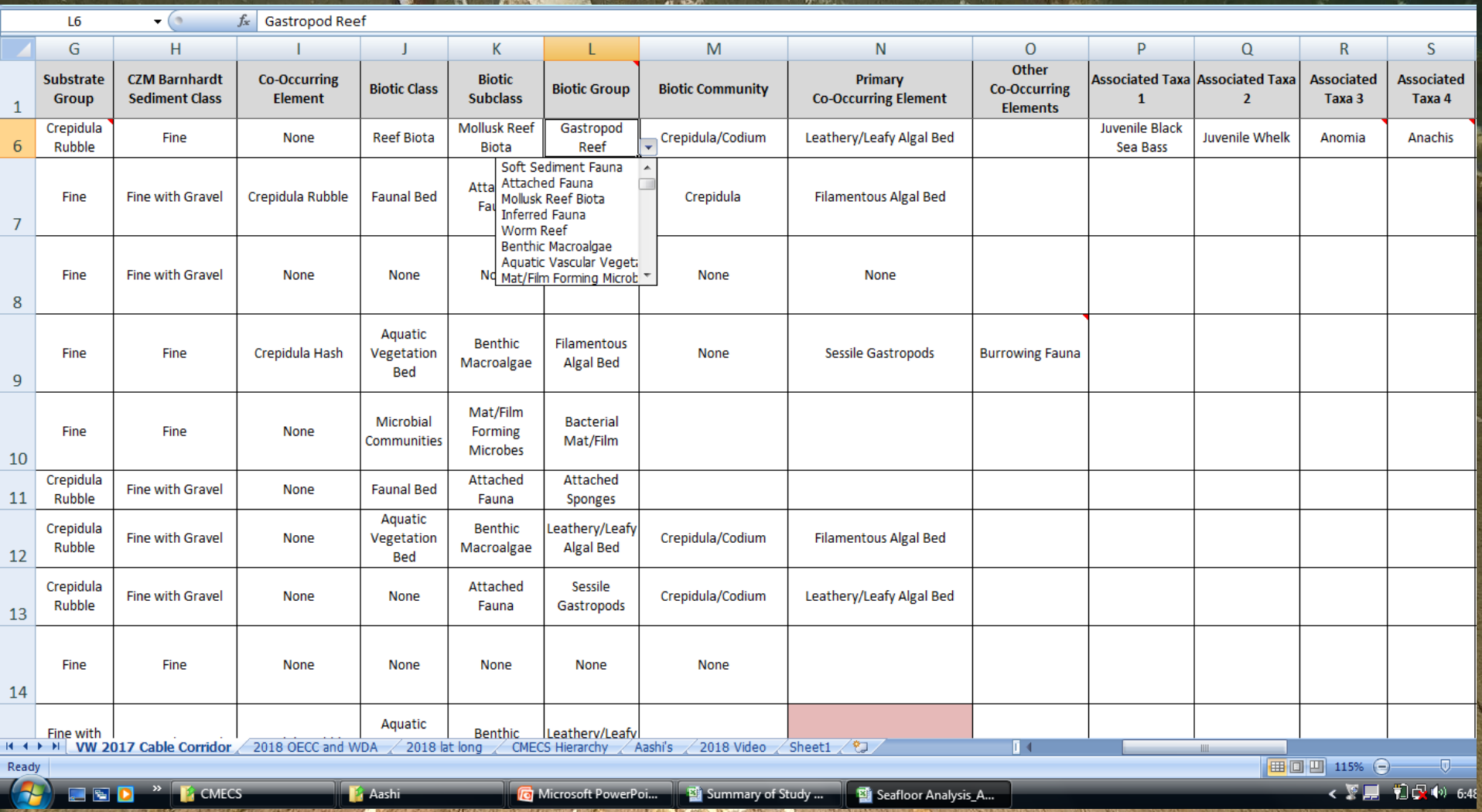
- Data Processing w/ VLC Media Player
- Staff or student time
- View video with spreadsheet at hand
- Drop boxes with local possibilities for easier entry
- Use stills to estimate densities (sand dollars)

Results

	A	B	C	D	E	F
1	**Biotic Subclass**	**Biotic Group**	**Co-occurring Element 1**	**Co-occurring Elements**	**Associated Taxa 1**	**Associated Taxa 2**
2	Soft Sediment Fauna	Sand Dollar Bed	Diverse Soft Sediment Epifauna (blood star)	Burrowing Anemones, Scallop Bed (Sea Scallop), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (Crangon, *Pagurus*)	Mysid shrimp	Skate
3	Soft Sediment Fauna	Sand Dollar Bed	Burrowing Anemones	Diverse Soft Sediment Epifauna (bushy bryozoan, hermit crab, moon snail)	Mysid shrimp	Skate
4	Soft Sediment Fauna	Sand Dollar Bed	Burrowing Anemones	Burrowing Fauna (amphipods), Diverse Soft Sediment Epifauna (bushy bryozoan, sea star), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (*Cancer, Crangon, Pagurus*)	Mysid shrimp	Juvenile Winter Flounder
5	Soft Sediment Fauna	Sand Dollar Bed	Clam bed (quahog)	Burrowing Fauna (amphipods), Clam Bed (mussel), Diverse Soft Sediment Epifauna (sea star), Mobile Crustaceans on Mixed Substrates (*Cancer, Crangon, Pagurus*)	Mysid shrimp	Winter Flounder
6	Soft Sediment Fauna	Sand Dollar Bed?	VERY TURBID VIDEO	VERY TURBID VIDEO	Mysid shrimp	
7	Soft Sediment Fauna	Sand Dollar Bed	Burrowing Fauna (amphipods)	Clam Bed (quahog, razor clam)	Mysid shrimp	
8	Soft Sediment Fauna	Sand Dollar Bed	Clam bed (quahog, sea scallop, surf clam)	Burrowing Anemones, Diverse Soft Sediment Epifauna (bushy bryozoan, sulfur sponge), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (*Cancer, Pagurus*), Fecal mounds (worm castings)	Mysid shrimp	Winter Flounder
9	Soft Sediment Fauna	Sand Dollar Bed	Burrowing Fauna (amphipods)	Diverse Soft Sediment Epifauna (bushy bryozoan, sea star), Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (*Cancer, Pagurus*), Fecal mounds (worm castings), Egg Masses (skate)	Mysid shrimp	Windowpane Flounder
10	Soft Sediment Fauna	Sand Dollar Bed	Clam bed (quahog)	Diverse Soft Sediment Epifauna (burrowing anemone, bushy bryozoan, Mobile Mollusks on Soft Sediments (moon snail), Mobile Crustaceans on Mixed Substrates (*Cancer, Crangon, Pagurus*), Fecal mounds (worm castings)	Mysid shrimp	Juvenile Winter Flounder + Skate

Associated Taxa 2 = commercially important species

Results



L6 | Gastropod Reef

	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Substrate Group	CZM Barnhardt Sediment Class	Co-Occurring Element	Biotic Class	Biotic Subclass	Biotic Group	Biotic Community	Primary Co-Occurring Element	Other Co-Occurring Elements	Associated Taxa 1	Associated Taxa 2	Associated Taxa 3	Associated Taxa 4
6	Crepidula Rubble	Fine	None	Reef Biota	Mollusk Reef Biota	Gastropod Reef	Crepidula/Codium	Leathery/Leafy Algal Bed		Juvenile Black Sea Bass	Juvenile Whelk	Anomia	Anachis
7	Fine	Fine with Gravel	Crepidula Rubble	Faunal Bed	Atta Fau		Crepidula	Filamentous Algal Bed					
8	Fine	Fine with Gravel	None	None	No		None	None					
9	Fine	Fine	Crepidula Hash	Aquatic Vegetation Bed	Benthic Macroalgae	Filamentous Algal Bed	None	Sessile Gastropods	Burrowing Fauna				
10	Fine	Fine	None	Microbial Communities	Mat/Film Forming Microbes	Bacterial Mat/Film							
11	Crepidula Rubble	Fine with Gravel	None	Faunal Bed	Attached Fauna	Attached Sponges							
12	Crepidula Rubble	Fine with Gravel	None	Aquatic Vegetation Bed	Benthic Macroalgae	Leathery/Leafy Algal Bed	Crepidula/Codium	Filamentous Algal Bed					
13	Crepidula Rubble	Fine with Gravel	None	None	Attached Fauna	Sessile Gastropods	Crepidula/Codium	Leathery/Leafy Algal Bed					
14	Fine	Fine	None	None	None	None	None						
	Fine with			Aquatic	Benthic	Leathery/Leafy							

Soft Sediment Fauna
Attached Fauna
Mollusk Reef Biota
Inferred Fauna
Worm Reef
Benthic Macroalgae
Aquatic Vascular Vegeta
Mat/Film Forming Microb

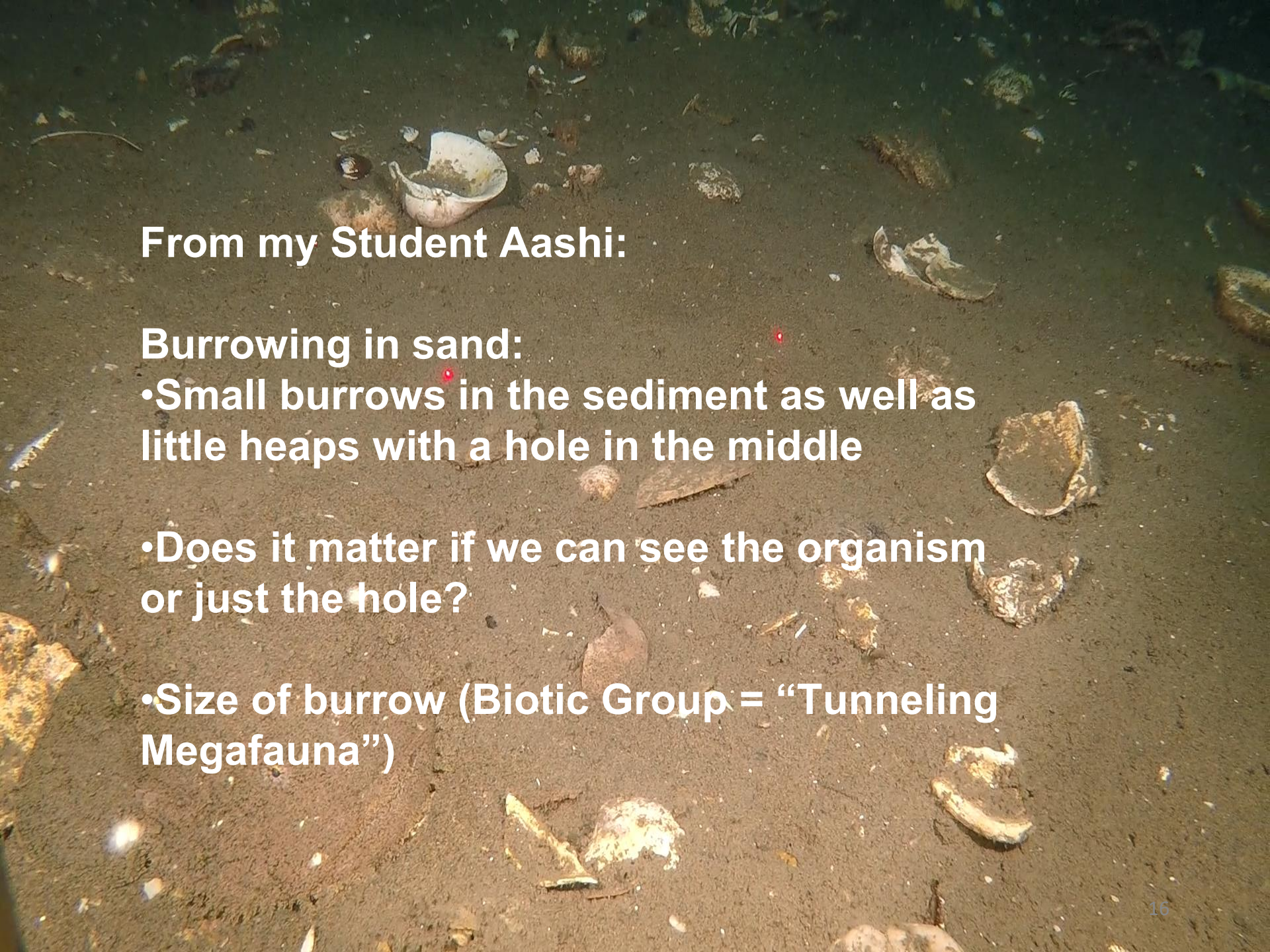
VW 2017 Cable Corridor | 2018 OECC and WDA | 2018 lat long | CMECS Hierarchy | Aashi's | 2018 Video | Sheet1

Ready 115%

CMECS | Aashi | Microsoft PowerPoi... | Summary of Study ... | Seafloor Analysis_A... 6:48

What worked, and what didn't …

- Shell "reef" vs. "rubble"
  - Conglomerated, self-adhered, particle size 4096 mm or > in any direction
  - Living or nonliving shells w/ median particle size of 64-4096 mm
  - There is no way to see "particles" this size via video



From my Student Aashi:

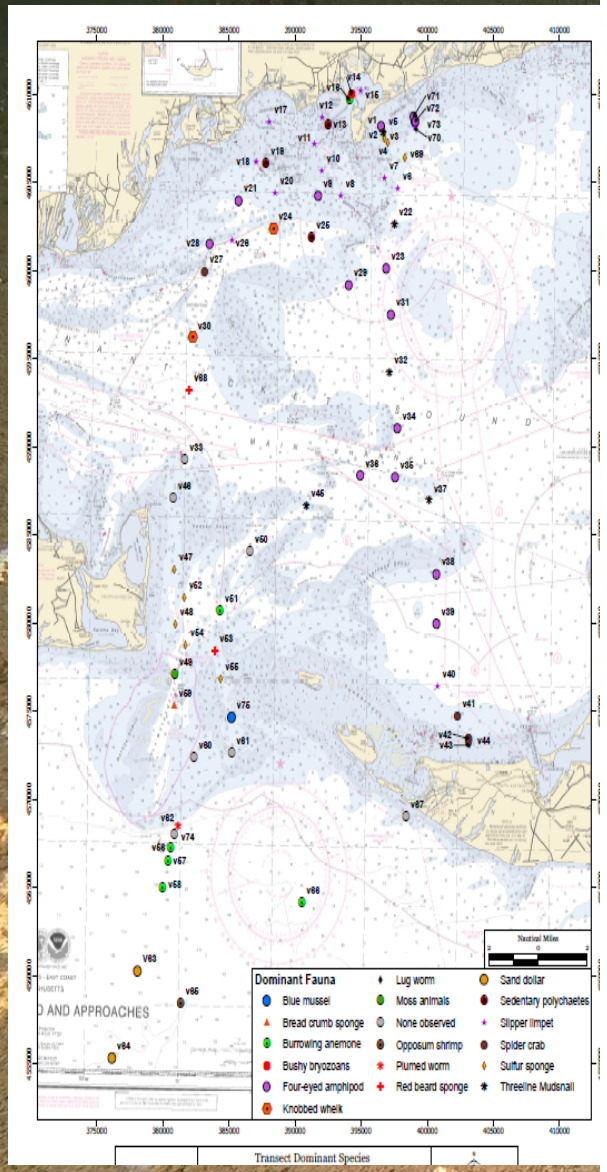
Burrowing in sand:

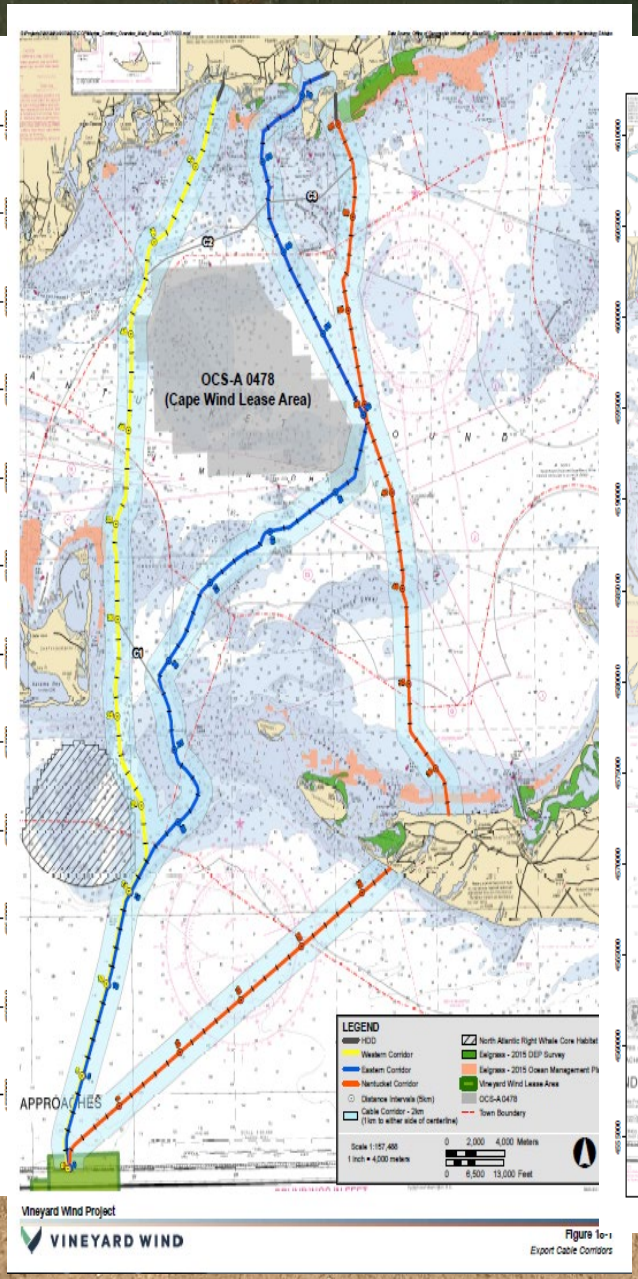
- Small burrows in the sediment as well as little heaps with a hole in the middle

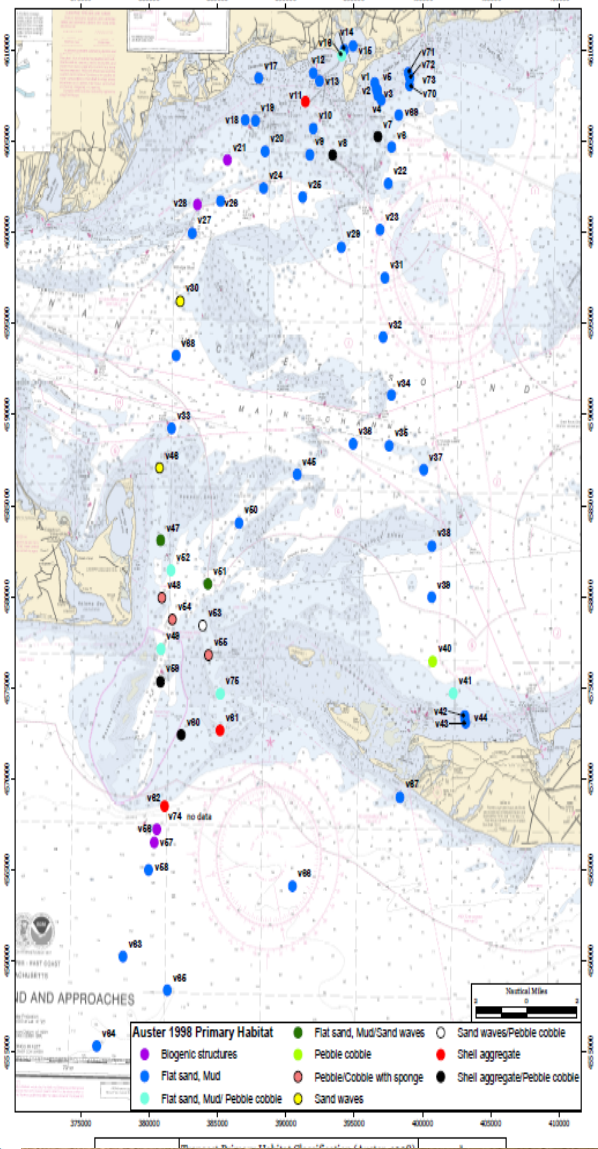
- Does it matter if we can see the organism or just the hole?

- Size of burrow (Biotic Group = “Tunneling Megafauna”)

What to do with sponge that is functionally cobble?


Dominant Fauna
Blue mussel
Bread crumb sponge
Burrowing anemone
Bushy bryozoans
Four-eyed amphipod
Knobbed whelk
Lug worm
Moss animals
None observed
Opposum shrimp
Plumed worm
Red beard sponge
Sand dollar
Sedentary polychaetes
Slipper limpet
Spider crab
Sulfur sponge
Threeline Mudsnail
Transect Dominant Species


OCS-A 0478
(Cape Wind Lease Area)
LEGEND
Western Corridor
Eastern Corridor
Nantucket Corridor
Vineyard Wind Lease Area
OCS-A 0478
Vineyard Wind Project
VINEYARD WIND
Figure 1a-1
Export Cable Corridors


Auster 1998 Primary Habitat
Biogenic structures
Flat sand, Mud
Flat sand, Mud/ Pebble cobble
Flat sand, Mud/Sand waves
Pebble cobble
Pebble/Cobble with sponge
Sand waves
Sand waves/Pebble cobble
Shell aggregate
Shell aggregate/Pebble cobble
no data