Structure & Abundance of Invertebrates at Deepwater Shipwrecks in the Northern GOM

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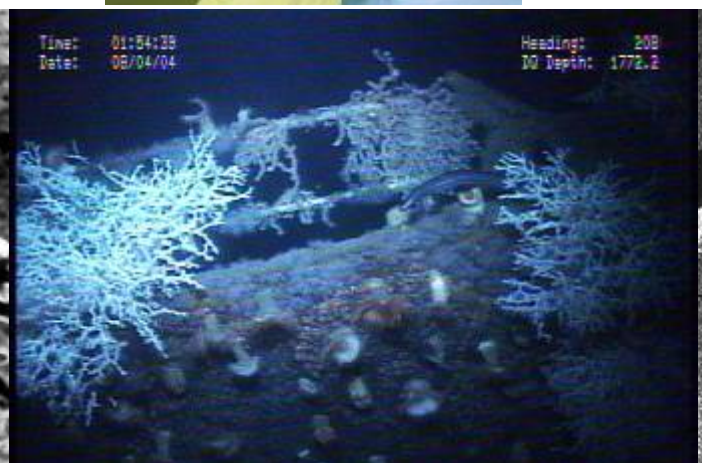
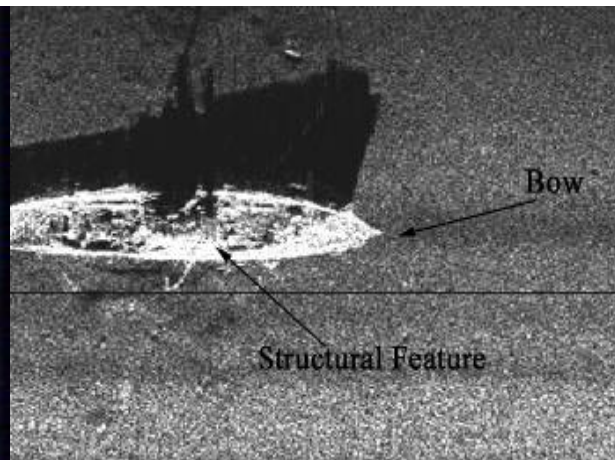




Study Objectives

Goals of the study:

- Will deep drilling structures serve as artificial reefs?
- 6 WWII shipwrecks were used as surrogates for deepwater oil structures in the GOM

Our focus:

- Macroinvertebrates (excluding corals) near and away from wrecks
- Emphasis on decapod crustaceans

http://www.pastfoundation.org/DeepWrecks

Study Site Depths

Wreck	Depth	Date Sunk	No. of Visits	Vessel Type
Virginia	99.97	12 May 1942	1	Tanker
Halo	143.26	20 May 1942	2	Tanker
Gulf Penn	533.70	12 May 1942	3	Tanker
U-166	1428.3	31 July 1942	1	U Boat
Robert E. Lee	1428.3	31 July 1942	2	Passenger Freighter
Alcoa Puritan	1950.7	6 May 1942	1	Cargo Freighter

M/V HOS Dominator: 72.5 m length, 1815 tons
4520 HP, 752 m^2 deck space
30 ton A-frame

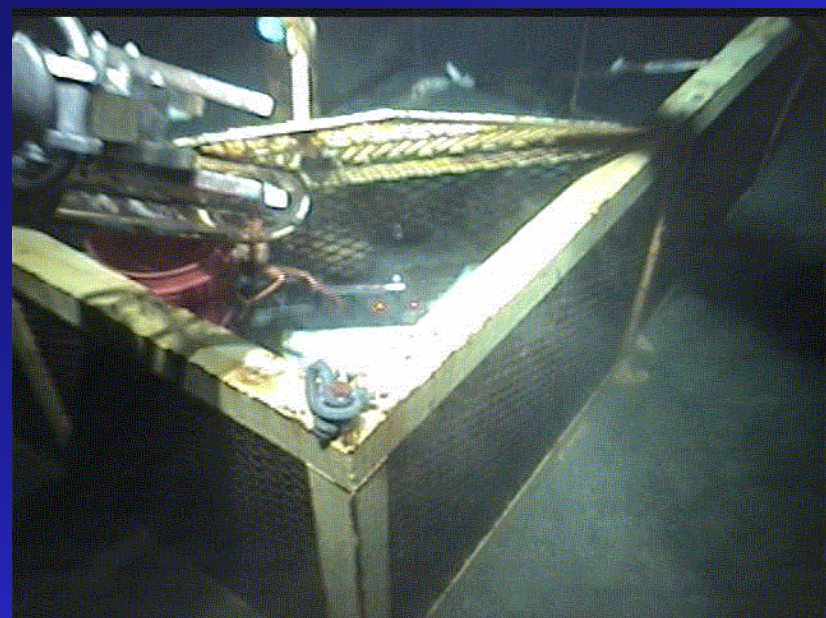
Methods

ROV:

- ROV collections were made at biologists' direction
- Manipulator arm used for larger specimens and suction hose for most samples

Drawbacks of ROV sampling:

- Limited by diameter of the suction gun and time
- ROV time was divided between fish, invertebrate, coral and microbiologists



SonSub Triton XL ROV

- Hydraulic arm
- Slurp
- Video

Suction pump

Suction hose

Collection cage

ROV - Sonsub


View of biobox

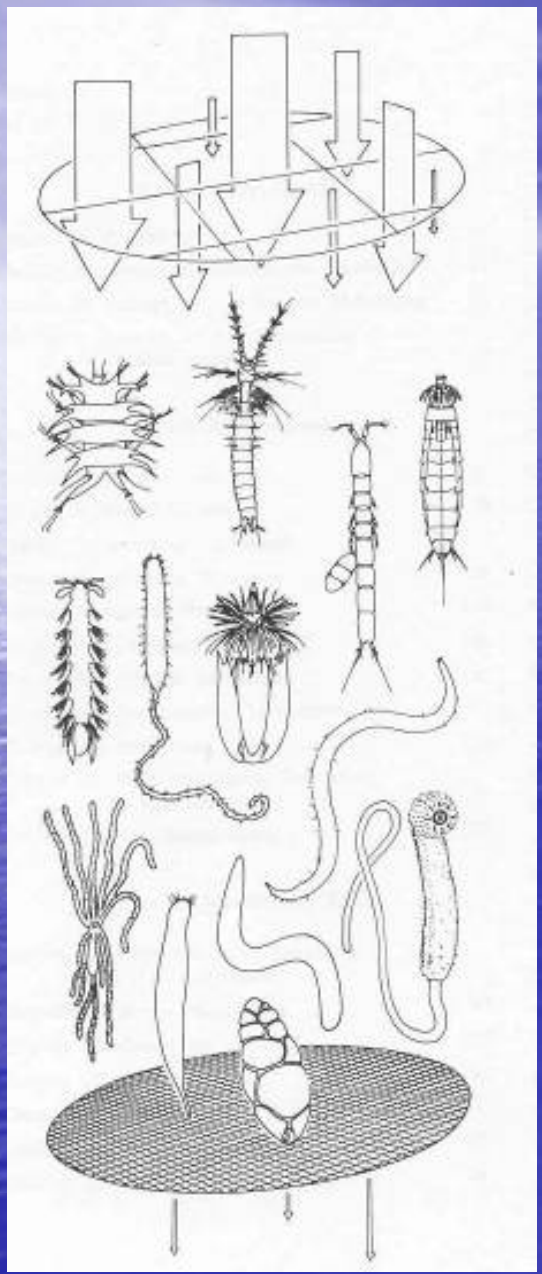
Methods

Traps

- 2 fish traps and 1 crab trap close to wreck
- 2 fish traps and 2 attached minnow traps far from wreck (333m)
- Fish traps baited w/herring & squid
- Crab traps baited w/cat food & glow stick
- Traps were soaked 8–16 hours

The vertebrate and invertebrate traps in the basket about to be lowered off the stern of HOS Dominator

Methods: Specimen and Sediment Processing

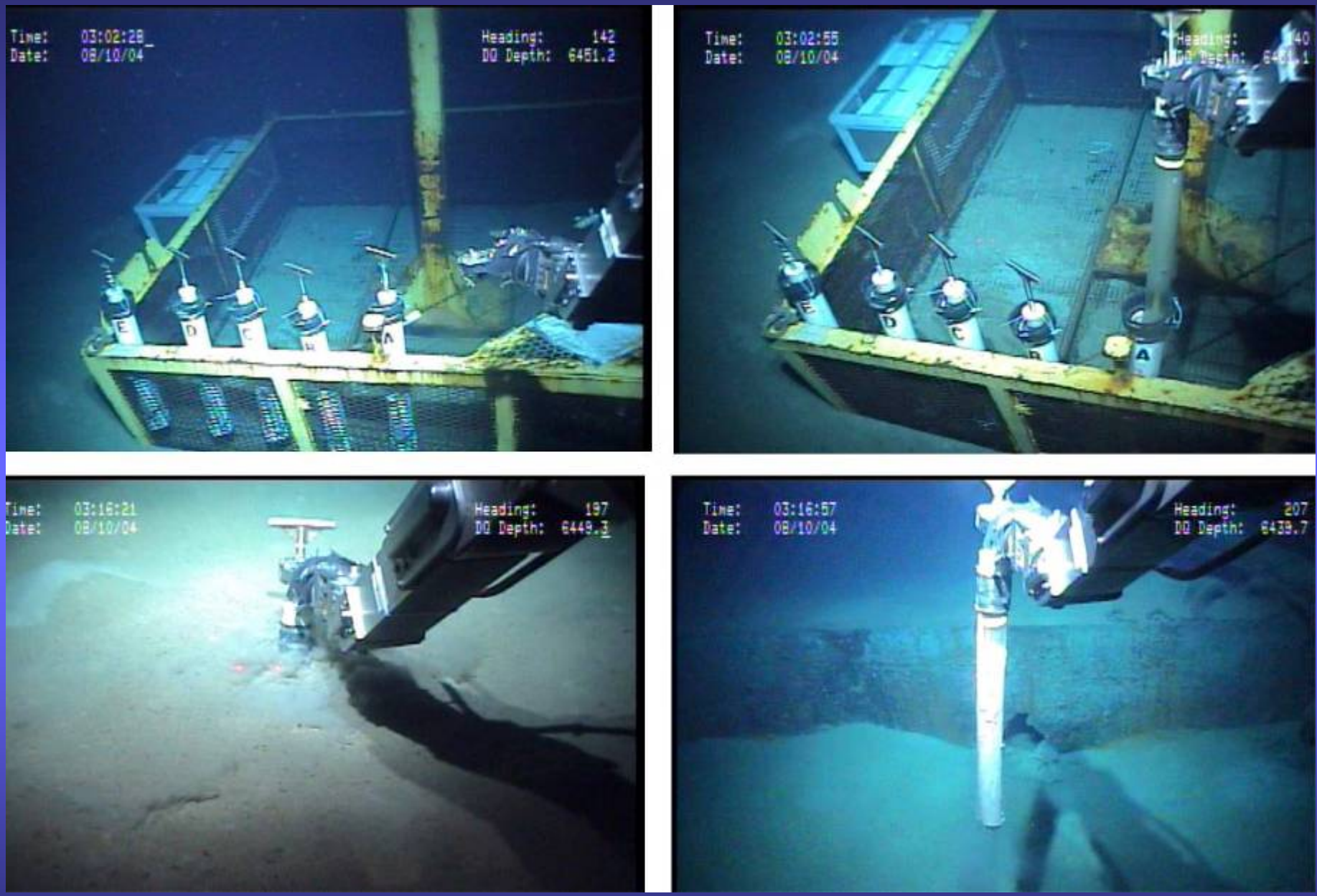


Macrofauna: organisms retained on a 0.500 mm mesh sieve

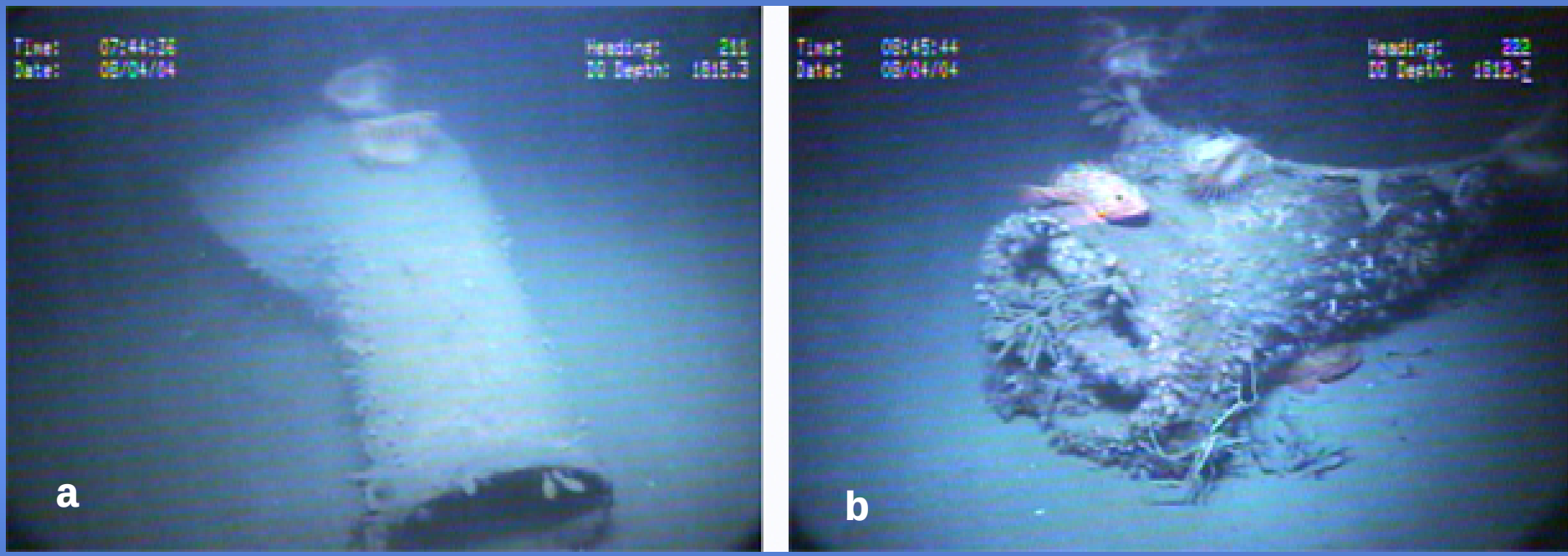
Meiofauna: organisms passing through a 0.500 mm mesh but retained on a 063 mm mesh

Elutriation with high density liquid (e.g., luddox), centrifugation & staining for high efficiency extraction

Macro and meiofauna fixed and preserved; tissues or whole animals frozen for genetic analysis

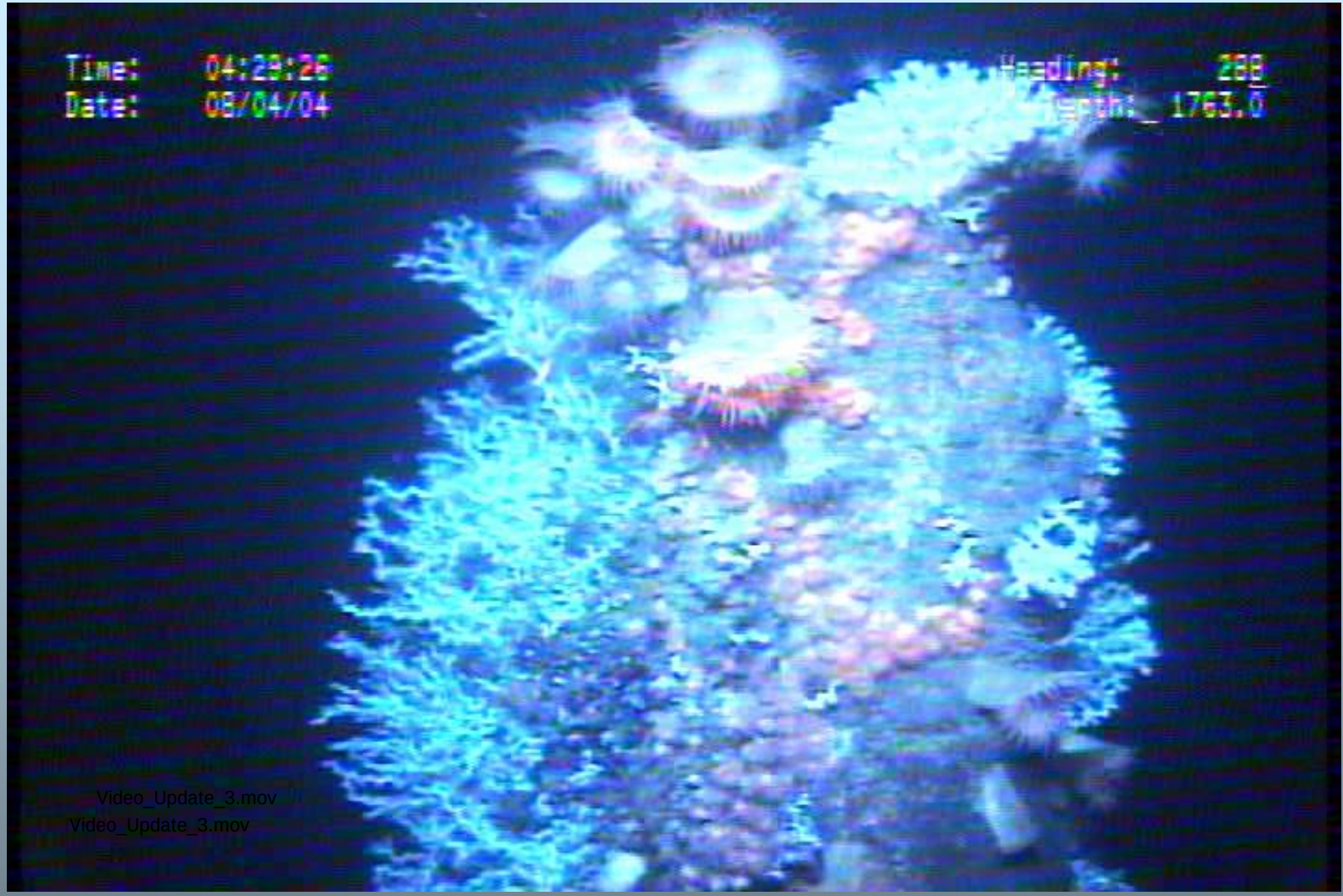


Sediment push core collected by the SonSub Triton XL ROV



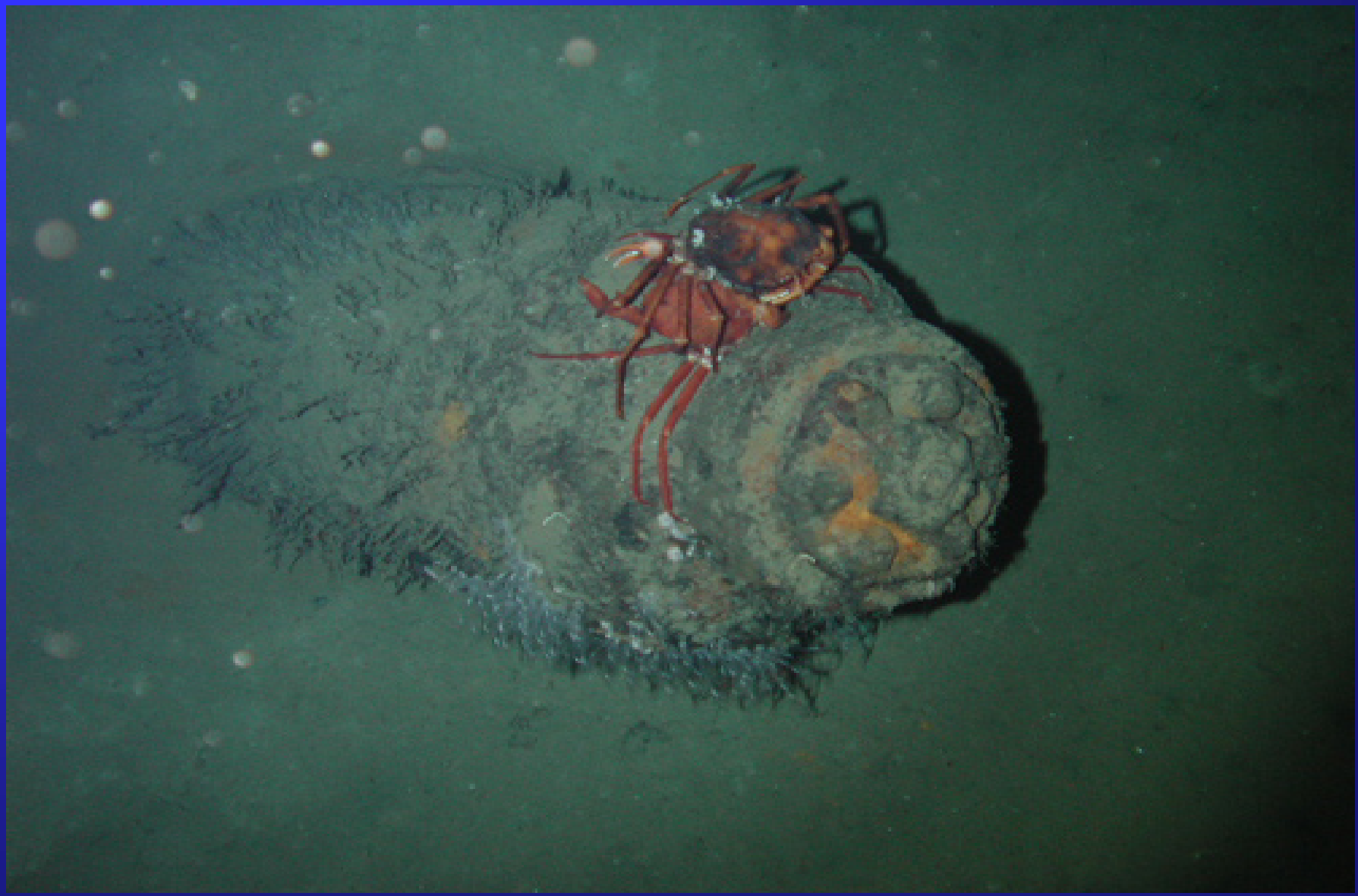
a) Vent hood lying near the separated stern section of the *Gulfpenn*

b) Vent hood lying near the northern extent of the debris field



Pourtalosmilia conferta **attached near the top of the extant mast. The specimen is located on the aft deck of Gulfpenn at a depth of 537 m.**

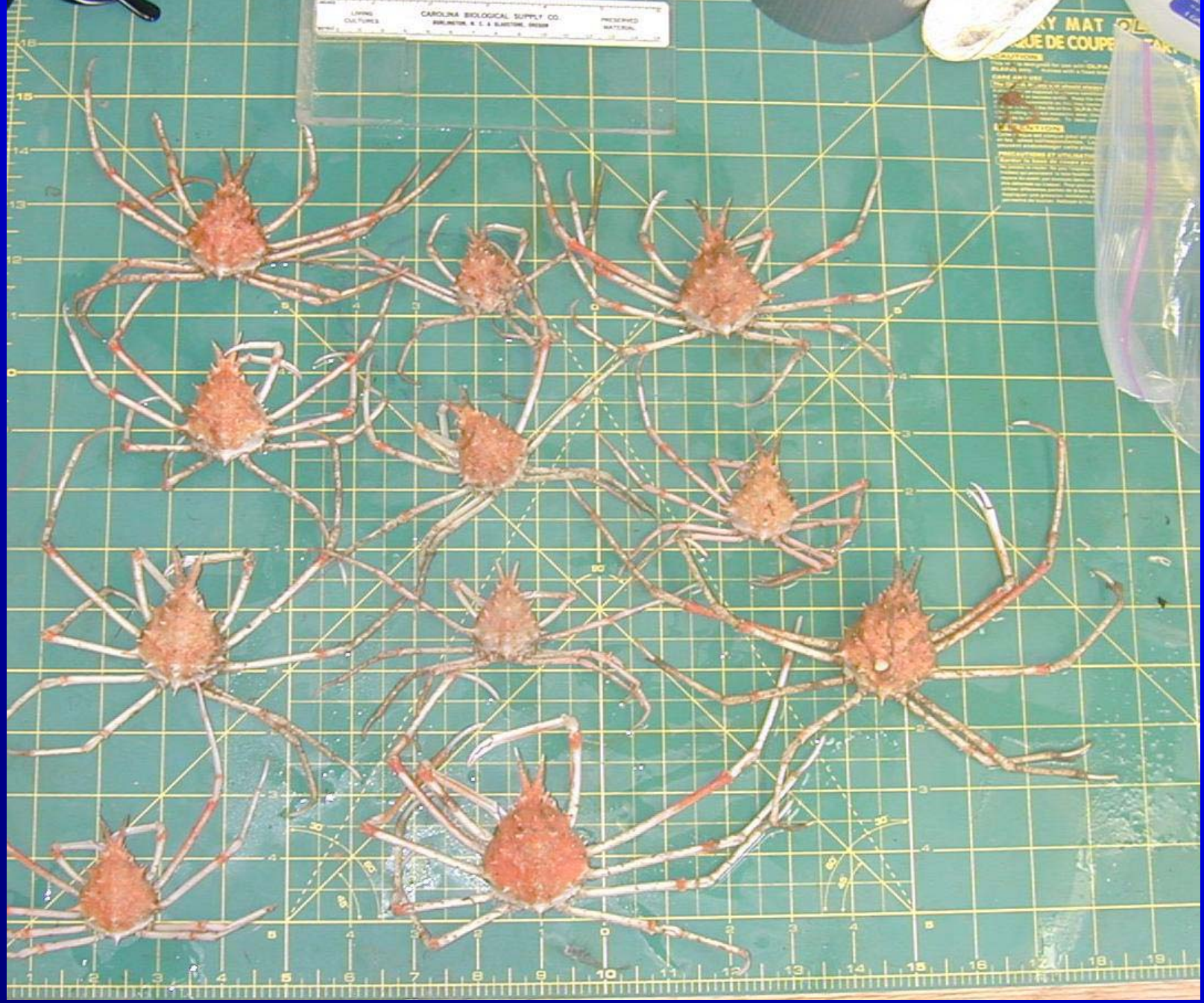

Chaceon quinquedens
BURLINGTON, N. C. & GLADSTONE, OREGON
MK0127



Pressurized cylinder from *U-166* (Artifact No. 47)

Two red deep-sea crabs (*Chaceon quinquedens)* found at the U-166 site. The male is carrying the female in a premating embrace. The red dots in the image are the parallel laser scale (12.7 cm scale).

Lifeboat from *Robert E. Lee* with *Chaceon* on bow



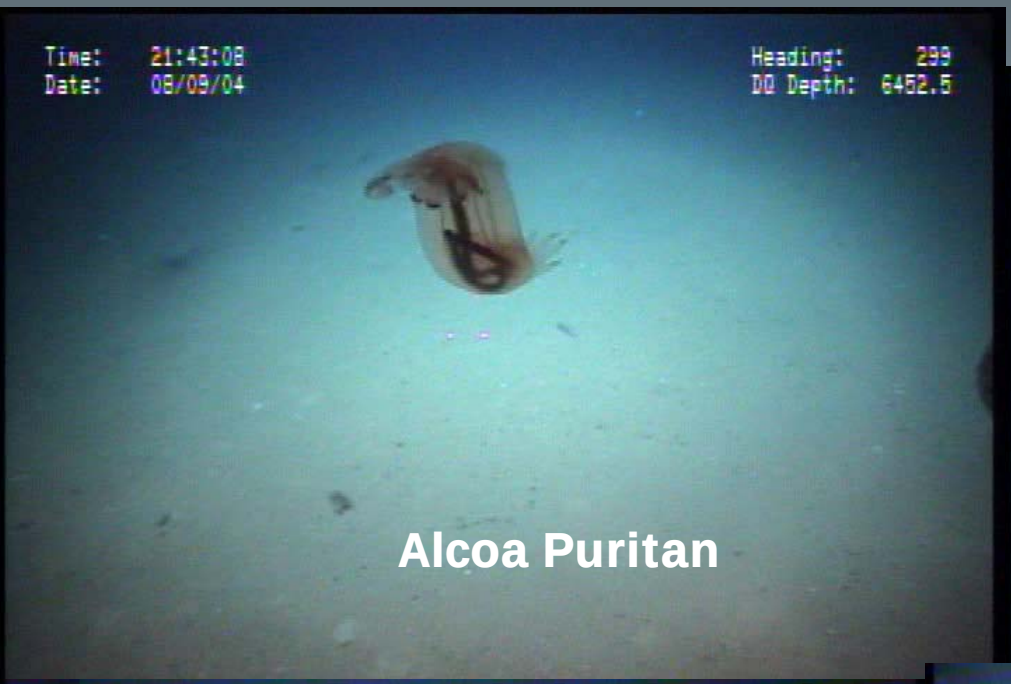
The spider crab *Rochinia crass*a was abundant at the *Gulfpenn* site.


Bathynomus giganteus
MK0100


Colossendeis bicincta
MK0300


Parapagurus pilimanus
MK0066

Snack time!



Alcoa Puritan

Video_Update_3.mov

GulfPenn

Two red deep-sea crabs (*Chaceon quinquedens*) at the U-166 site. The male is carrying the female.

***Eumunida picta* from the Gulf Penn.**

***Chicoreus bauei* from the Virginia wreck**

Eumunida picta **collected from** ***Gulfpenn***

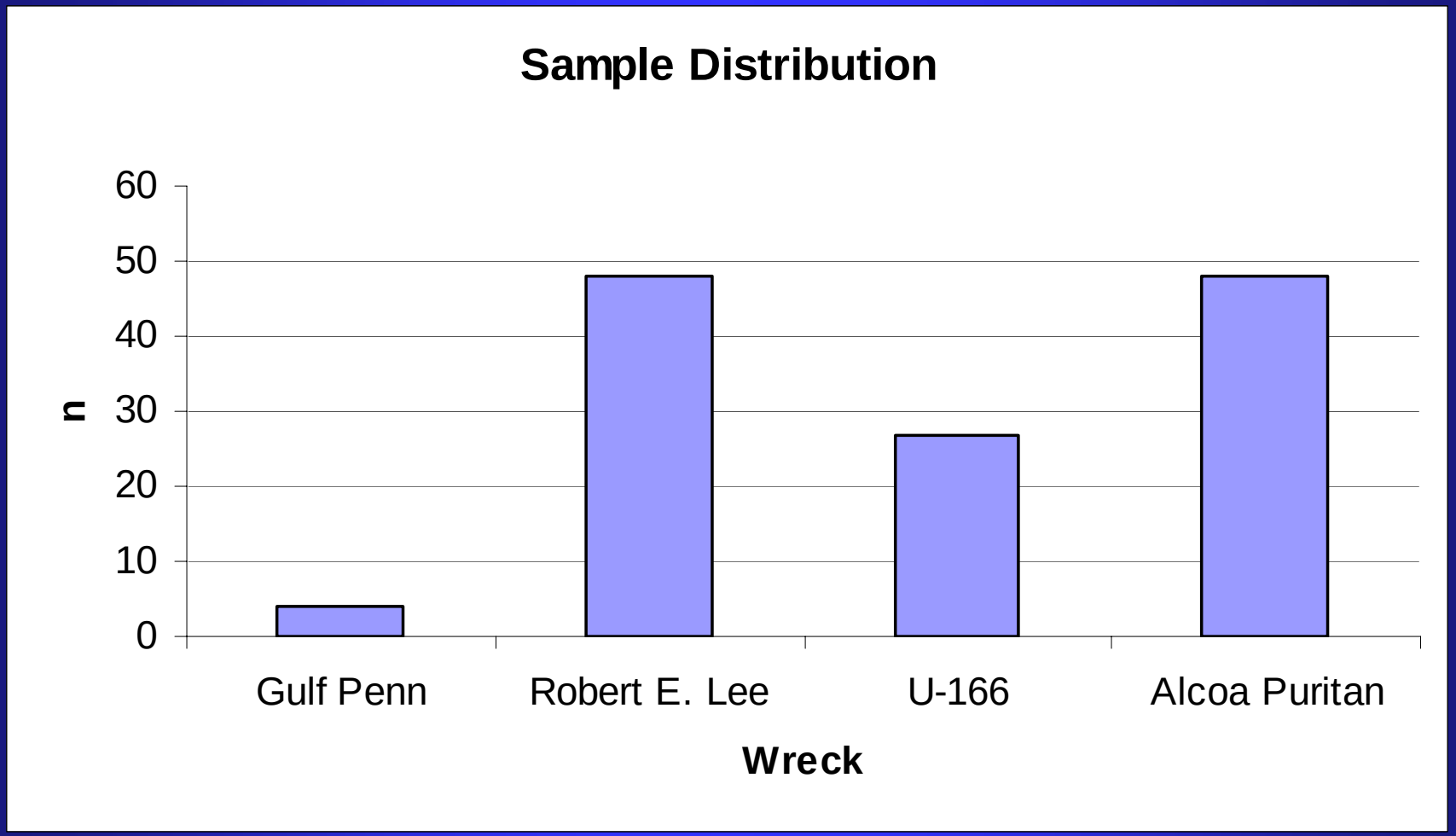
***E. picta* on *L. pertusa* on the Gulfpenn**

Depth Segregation

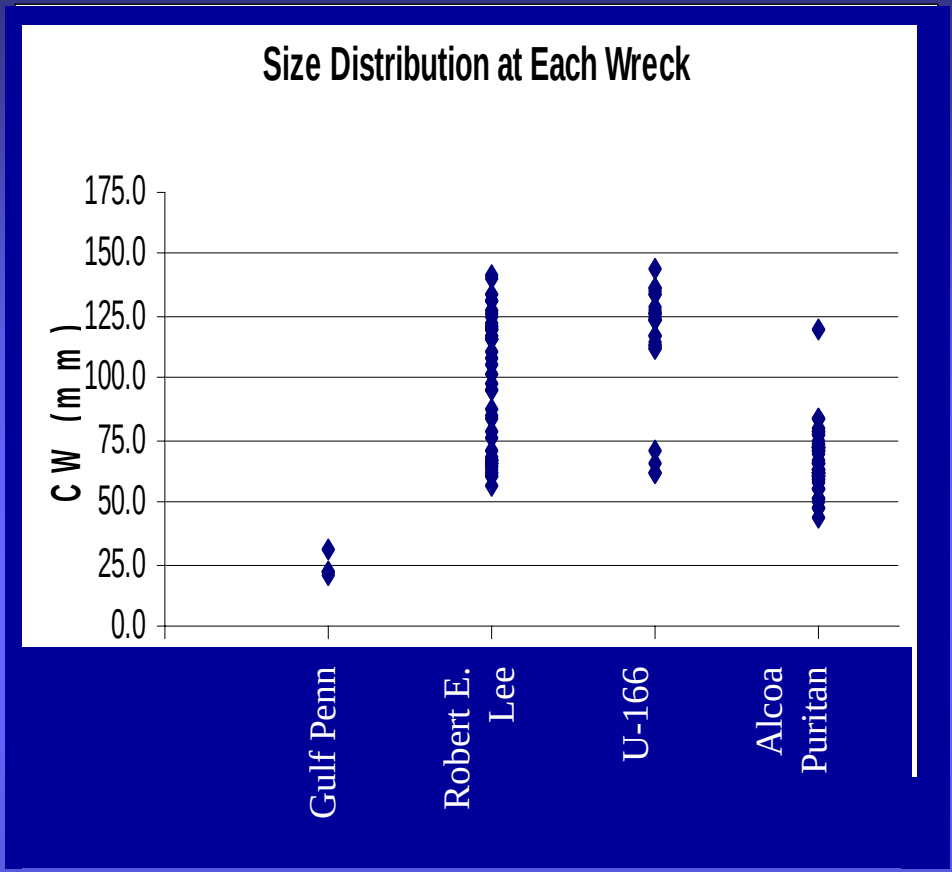
- *C. quinquedens* was the most numerous species collected
- Observed at four sites
- Previous studies hypothesize decreasing depth with ontogeny
  - Proposed reason: prevent adult predation on young
- Also, potential depth segregation with sex;
  Females are typically found in shallower depths than males

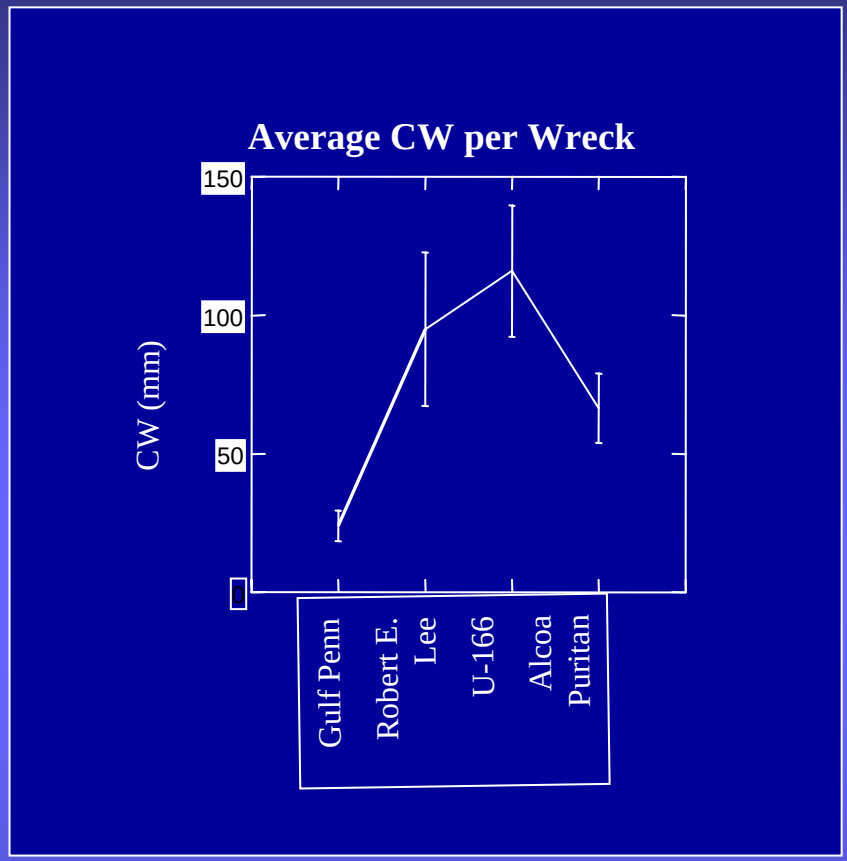
Results *Chaceon quinquedens*

A total of 133 specimens were collected



Size vs Depth



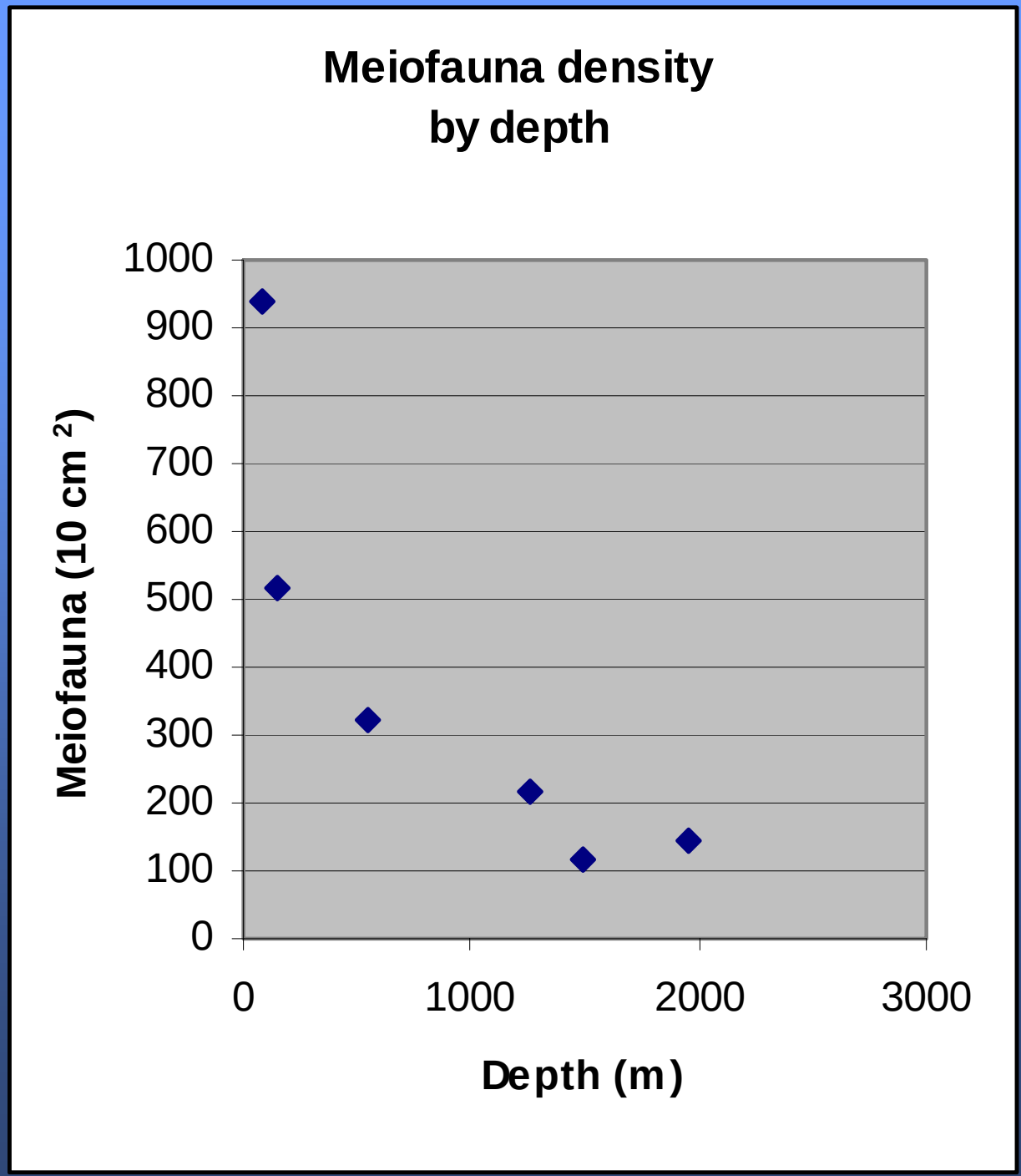


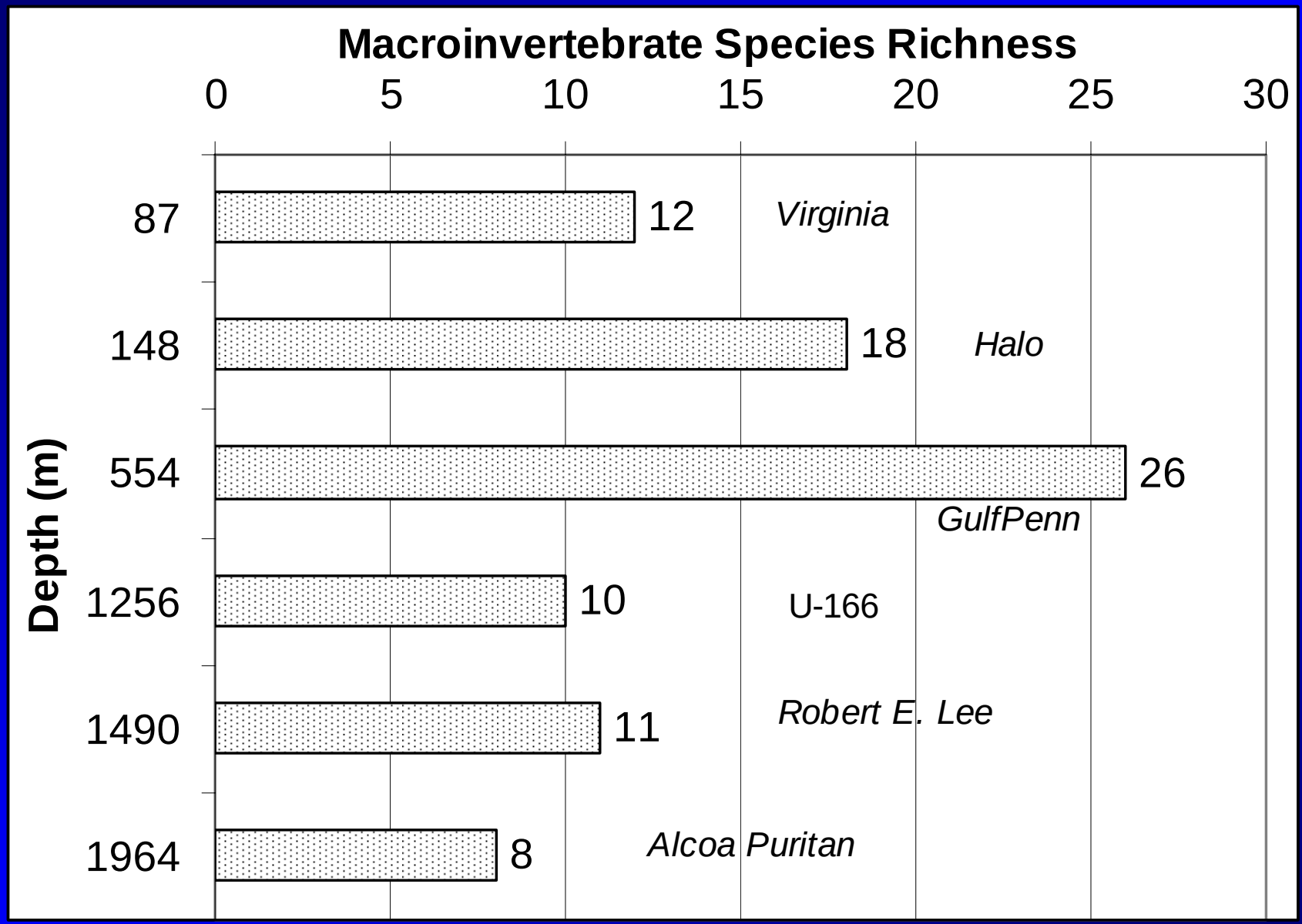
Wreck	Avg. CW (mm)	Min CW (mm)	Max CW (mm)
Gulf Penn	24.1	21.2	31
Robert E. Lee	95	56.5	141.1
U-166	116	61.5	136.5
Alcoa Puritan	66.5	43.7	120.3

Summary for *Chaceon quinquedens*

- Smallest crabs were at shallowest depth
- Largest crabs were found at intermediate depths
- Linear regression showed – no relationship between depth and CW

Changes in average meiofauna density (number per 10 cm^2) with depth





Changes in species richness with depth among the wreck sites

Summary

- Many rare or uncommon species found.
  Many range extensions & new depth ranges.

- Species richness and abundance were higher near (61 m) than away (>61 m) from wrecks.

- Species richness of macroinverts was highest at intermediate depth (554 m).

- Species richness of micromollusks declined abruptly with depth.

- Meiofauna abundance decreased with depth.