CSA

Continental Shelf Associates, Inc.

Video and Photographic
Reconnaissance of
Phleger and Sweet Banks,
Northwest Gulf of Mexico

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Washington, D.C.
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Prepared by
Continental Shelf Associates, Inc.

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ABSTRACT

A video and photographic reconnaissance of portions of Phleger and Sweet Banks was conducted for the purpose of documenting the associated biota prior to the potential leasing of oil and gas tracts that contain the banks within their boundaries. The hard bottom biota associated with the surveyed depths of 122 to 173 meters on Phleger Bank included sponges, comatulid crinoids, paramuricid sea fans, spiral sea whips (Cirrhipathes sp.), and the Roughtongue bass (Holanthias martinicensis). The surveyed area of Sweet Bank included Algal Nodule-Sponge and Antipatharian Zones. The algal nodule substrate was observed in water depths of 75 to 80 meters and the rock outcrops of the Antipatharian Zone from approximately 80 to 105 meters. The fauna of the Algal Nodule-Sponge Zone included leafy algae, sponges, gorgonians, an antipatharian, holothuroids and small tropical fish. The Antipatharian Zone was characterized by crinoids, antipatharian whips, alcyonarian sea fans and Roughtongue bass (Holanthias martinicensis).

I. INTRODUCTION

A. OBJECTIVES

Certain oil and gas lease tracts (Green Canyon 89, 90, 91, 133, 134 and 135), which include portions of Phleger and Sweet Banks within their boundaries, are being proposed for lease by the Bureau of Land Management (BLM) during Oil and Gas Lease Sale A-62. The purpose of this study, which was conducted on 19 May 1980 from the M/V Jim Lytal, was to provide qualitative visual reconnaissance data of the banks prior to the potential leasing of the tracts in order to document the associated biota. These data could then be used to identify potential impacts resulting from oil and gas operations.

B. DESCRIPTION OF SURVEY AREA

Figure 1 shows the geographic location of Phleger and Sweet Banks in the northwest Gulf of Mexico. They are located approximately 105 nautical miles offshore of Vermilion Bay, Louisiana in approximately 200 to 250 meters of water. Figure 2 shows the general bathymetry of the banks as reported by the National Ocean Survey (USDC, 1975). Phleger Bank, which has a relief of approximately 70 meters, ranges in depth from approximately 130 to 200 meters, while Sweet Bank has a relief of about 120 meters and ranges from 75 to 200 meters in depth.

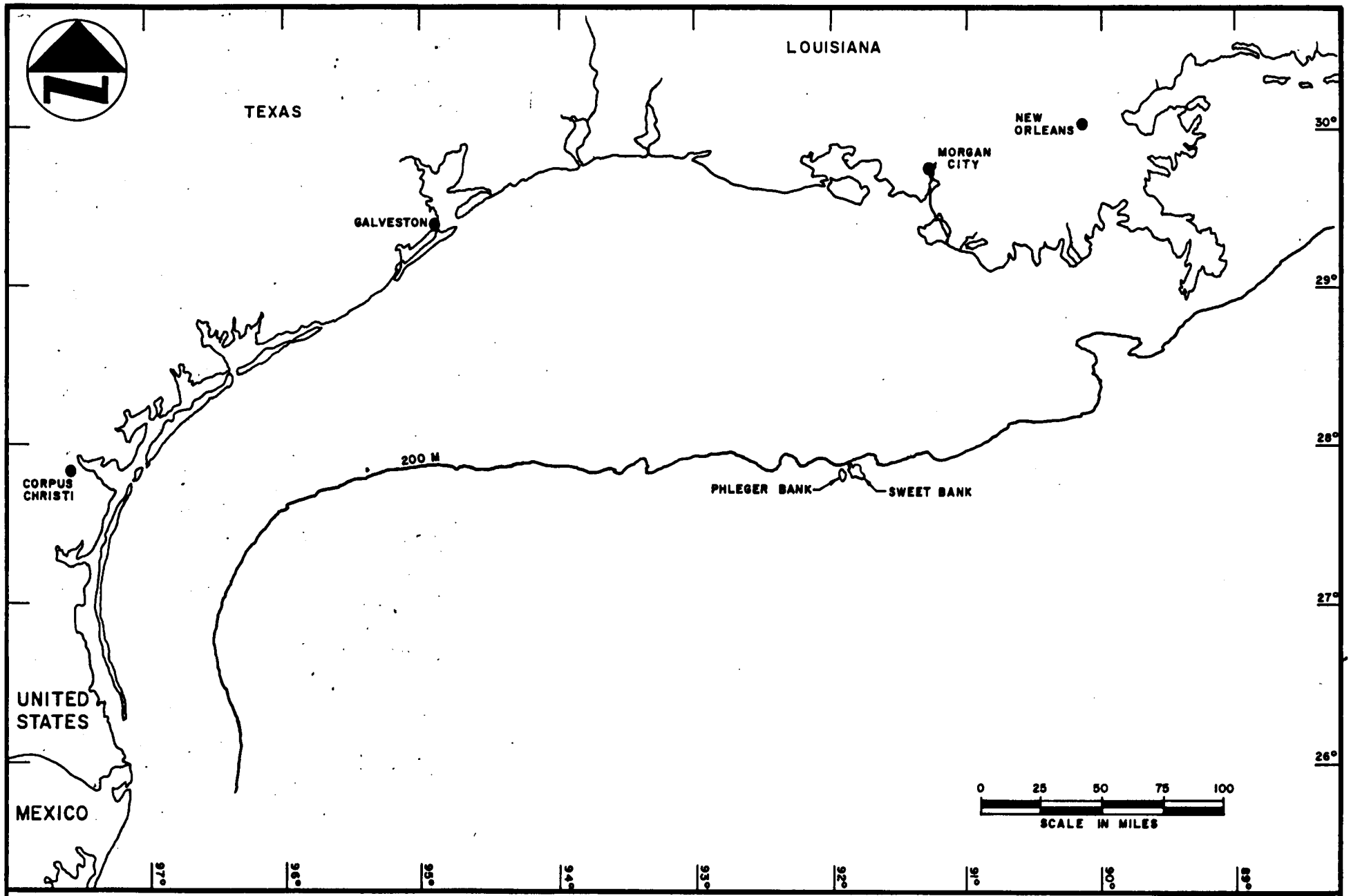


Figure 1. Geographic Location of Phleger and Sweet Banks in the Northwest Gulf of Mexico

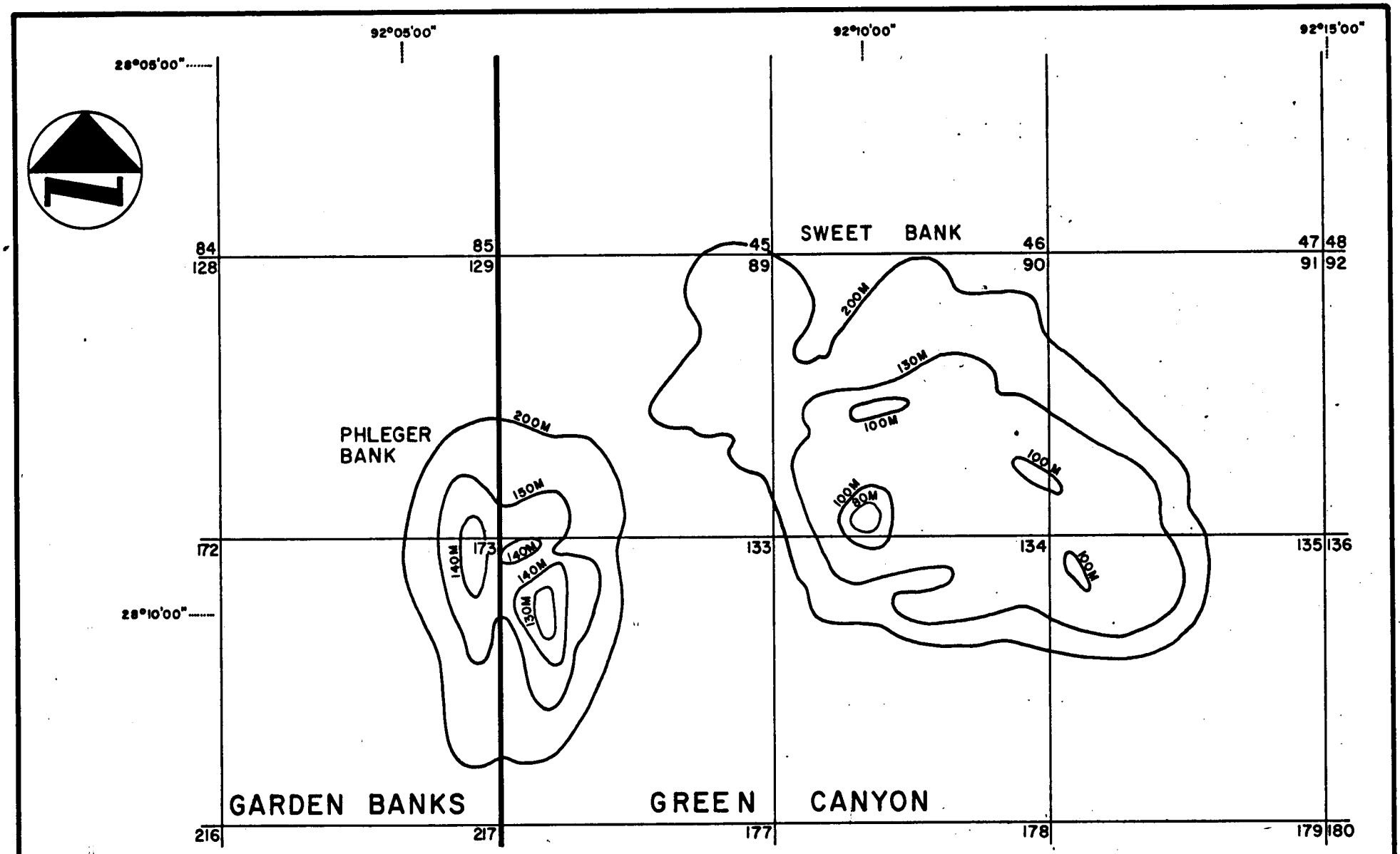


Figure 2. Bathymetry of Phleger and Sweet Banks (After U.S. Department of Commerce, 1975)

II. SURVEY EQUIPMENT AND METHODOLOGY

A. FIELD

1. Navigation and Bathymetry

Navigation and positioning were documented using a Nalco 700 Loran C unit. The Loran-C stations used were 7980-X (Raymondville, Texas) and 7980-Y (Jupiter, Florida). Bathymetric data were recorded using a Raytheon Model DE-731 Recording Fathometer and a Raytheon Model 7210, 40 kHz Hull-Mounted Transducer with a beam width of 17 x 25 degrees at -3db.

2. Television and Still Camera Observations

Four hours of television video footage of the bottom and associated fauna were recorded using a Hydro Products Model TC-125 Underwater Television Camera, Model RP-3 Pan and Tilt Unit, Model LT-7 Thallium Iodide Light with a 250 watt thallium iodide lamp, Model SC-303 Television System Control Unit, Elgar Model 121 Power Source (Frequency Stabilizer), and Sony Model VO-1800 Videocassette Recorder. The camera employed a f/1.4 lens. All operating functions of the camera were automatic with the exception of the lens focusing which was remotely controlled by a focus control switch. The Control Unit contained the television camera power supply, television monitor, and the lamp power supply in addition to all required operating controls. In addition to the video data, audio data including water depth and position fixes were placed on the videotapes.

Further documentation of the substrate and associated fauna was obtained by taking approximately 800 color slides using a Benthos Model 372 Deep Sea Standard Camera with data chamber, a Model 382 Deep Sea Standard Flash, and Ektachrome ASA 200, 35mm color slide film. On each slide, in a data insert, the day, hour, minute and second that the photograph was taken and two digit identifying number that corresponded to the last two digits of the survey number were recorded through the use of the data chamber.

The still camera and strobe were mounted along with the television camera and light on the pan and tilt unit which was bolted to a Continental Shelf Associates' tow sled.

The sled was towed with a wire-out-to-water depth ratio of approximately 1.5:1 at speeds of one to two knots. The pan and tilt unit was used when visibility was adequate to inspect a wider area and the tow speed was sufficiently slow to observe and photograph objects of interest that were not in the immediate path of the sled. The still camera shutter was surface activated following the observation of a suitable subject on the television monitor. The image recorded on the film was the same as that seen on the screen of the television monitor at the time of the shutter activation.

B. LABORATORY

1. Navigation and Bathymetry

Fix marks were plotted along the video/photographic transects on a Loran-C navigational map. Bathymetry, ship's compass heading, and/or the relation to reference buoys were used to interpolate between Loran-C fixes in

the survey of Sweet Bank due to intermittant Loran-C signals during the time of the survey. No correction was made for the cameras' locations relative to the Loran-C antenna on the survey vessel because of the insignificant setback (less than 60 meters maximum) associated with the towing operation. Figures 3 and 4 show the locations of the transects relative to the bathymetric contours of the banks. The depicted areas were selected for survey as it was believed that the most significant biological assemblages would be present at the shallowest portions of the banks.

2. Television and Still Camera Observations

The television videotapes were used to identify substrate types and to describe the biological assemblages.

All still camera slide film was developed and left in its original roll form (not mounted). Film was viewed using a Dukane Model 27A25 Microreader with a 36 centimeter screen. To correlate photographs with navigational fix numbers, the data inserts on each frame were compared with shipboard logs. Observations regarding substrate type (sand, shell, rock) and abundance of dominant epibenthic organisms and demersal fishes were made along each transect and for each navigational fix.

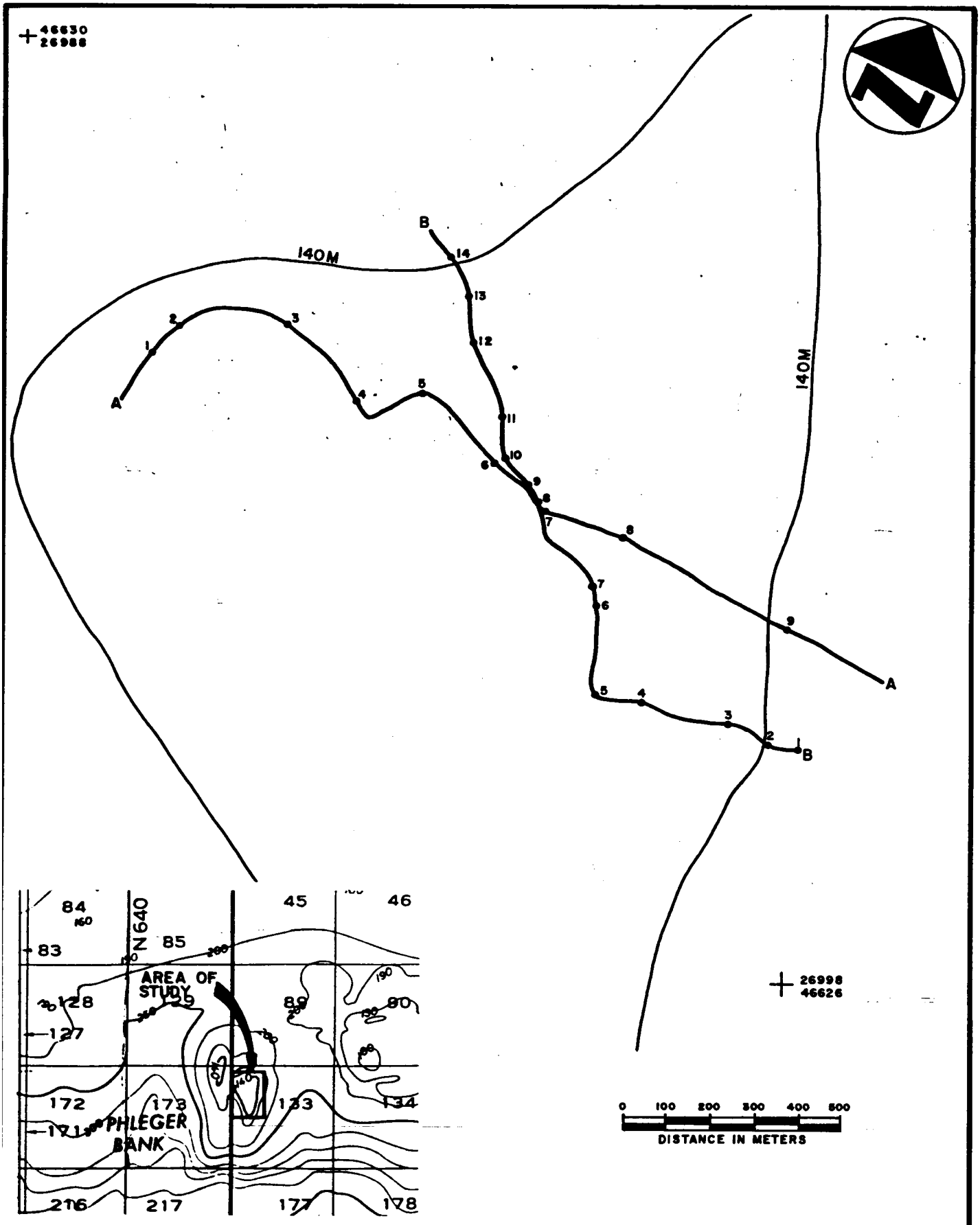


Figure 3. Video and Photographic Transects on Phleger Bank

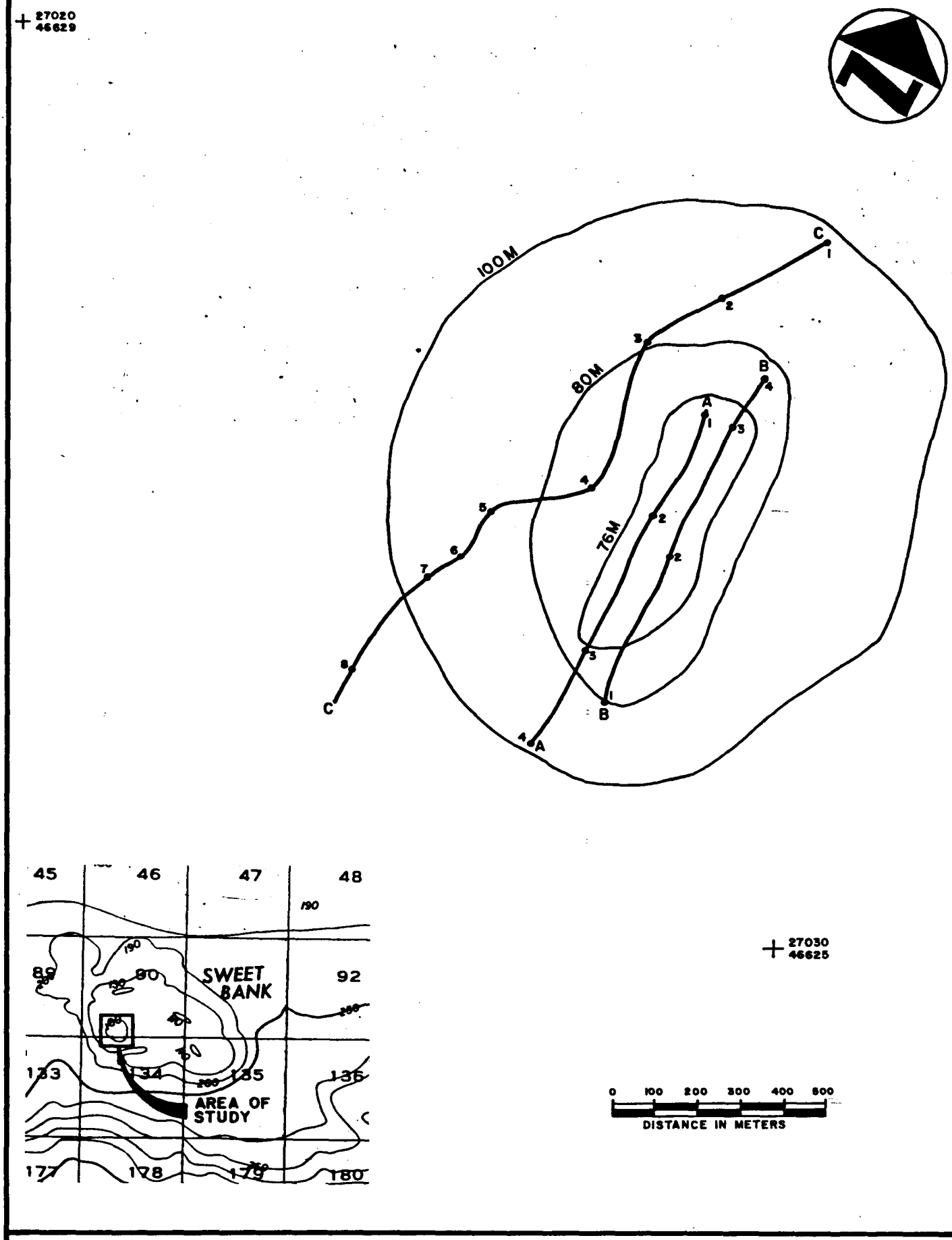


Figure 4. Video and Photographic Transects on Sweet Bank

III. RESULTS

A. PHLEGER BANK

Figure 5 shows the locations of the two video/photographic transects and the substrate types observed relative to one of the 140 meter isobaths of Phleger Bank. The transects were made in water depths ranging from 122 to 173 meters.

The majority of the observed substrate consisted of what appeared to be medium to fine sand with scattered one to two meter diameter rock outcrops. The rock outcrops generally showed relief of less than one meter though outcrops with approximately two meters of relief were observed. No visible biota were recorded on the sand bottom other than occasional burrows and trails. A number of epifaunal species were observed on the rock outcrops. Cup-shaped sponges (possibly Aciculites sp., Poecillastas sp. and/or Phakellia sp.), encrusting sponges, sea fans, sea whips, and crinoids were numerically dominant (Photographs A, C, and D).

Numerous Roughtongue bass (Holanthias martinicensis) were observed near rock outcrops (Photograph B). The Roughtongue bass is a protogynous hermaphrodite which changes during its life cycle from female to sub-dominant male to supermale. Supermales or alpha-males (Fishelson, 1975) are dominant males which form harems of females and sub-dominant males. The supermales are territorial, show pronounced coloration of fins and body, and are normally found higher in the water column than others of the species.

No other fish species were identified from videotape or photographic records, and only a single unidentifiable species was recorded at Phleger Bank. This observation does not suggest that only two fish species are present at Phleger Bank, but only that two were observed by the towed television/still camera system.

B. SWEET BANK

Figure 6 shows the locations of the two video/photographic transects and the substrate types observed relative to one of the 100 meter isobaths of Sweet Bank. The transects were made in water depths ranging from 75 to 122 meters.

The shallowest portion of the bank (75 to 76 meters) was identified during the initial bathymetric reconnaissance. It consisted of a relatively narrow 200 to 250 meter wide north/south running ridge (see Figure 6). The visual data from Transects A and B, which were made along this ridge, showed the sea floor to be relatively level and covered by a layer of algal nodules that was underlain by a coarse calcareous sand or hard bottom (Photograph E). As depth increased to 79 meters numerous rock outcrops ranging in relief from less than one to greater than three meters were observed (Photograph F). Rock ledges of four to seven meters of relief were also observed (Transect C, Fix Mark 2,

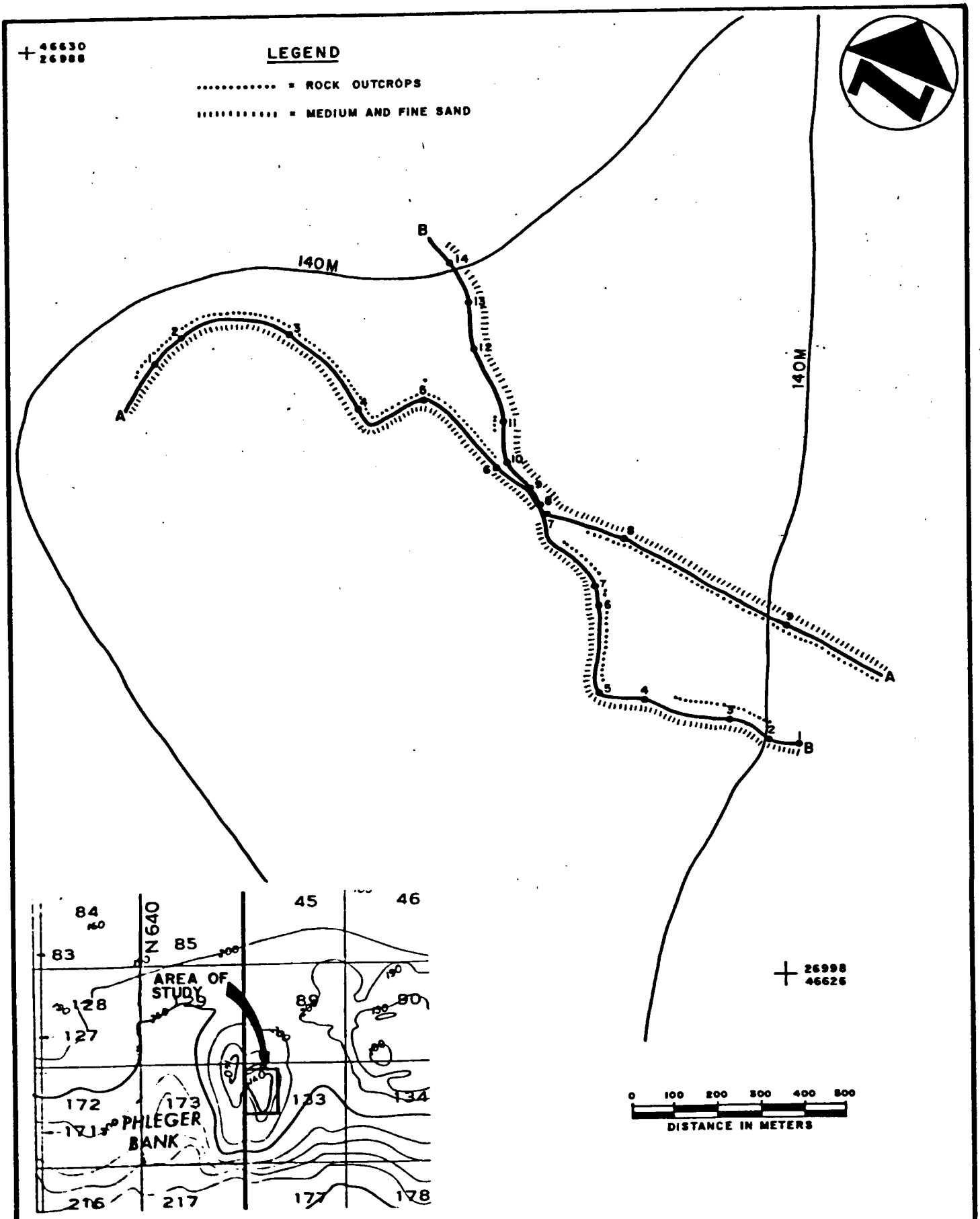
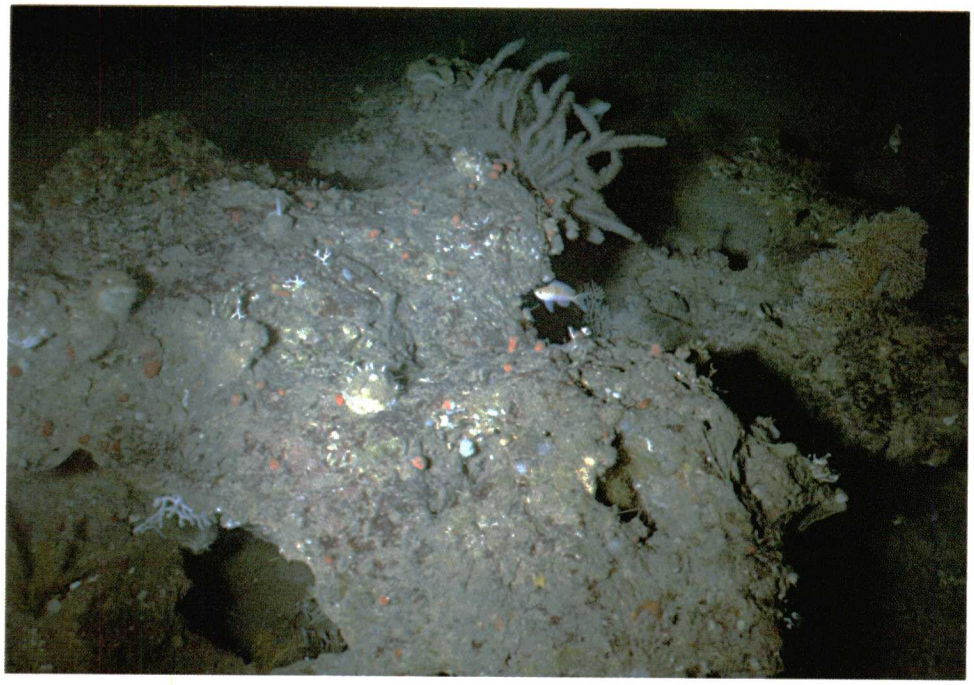


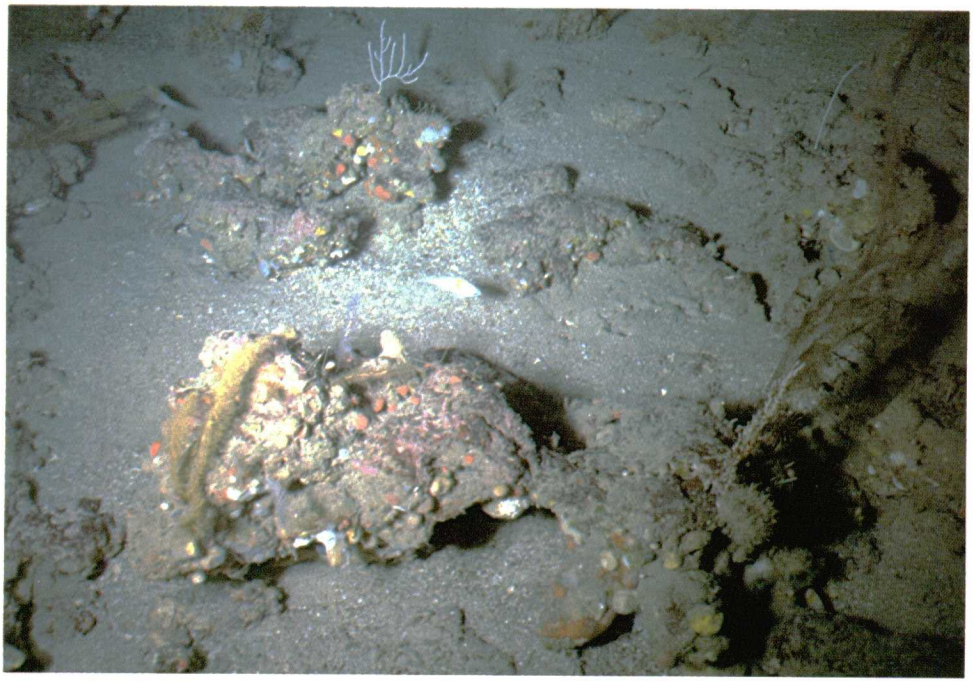
Figure 5. Substrate Types Based on Video and Photographic Transects on Phleger Bank

Photograph A. Cup-shaped sponges, sea fans, sea whips and crinoids on emergent hard bottom at a depth of 132 meters on Phleger Bank (Transect B, Shotpoint 3).

Photograph B. Numerous Roughtongue bass (Holanthias martinicensis - supermales) near rock outcrops at a depth of 133 meters on Phleger Bank (Transect A, Shotpoint 4).



Photograph C. Sea fans, crinoids and sponges on a rock outcrop at a depth of 132 meters on Phleger Bank (Transect A, Shotpoint 3). Note the Roughtongue bass (Holanthias martinicensis - supermale).



Photograph D. Typical low relief rock outcrops with associated biota at a depth of 132 meters on Phleger Bank (Transect A, Shotpoint 3).

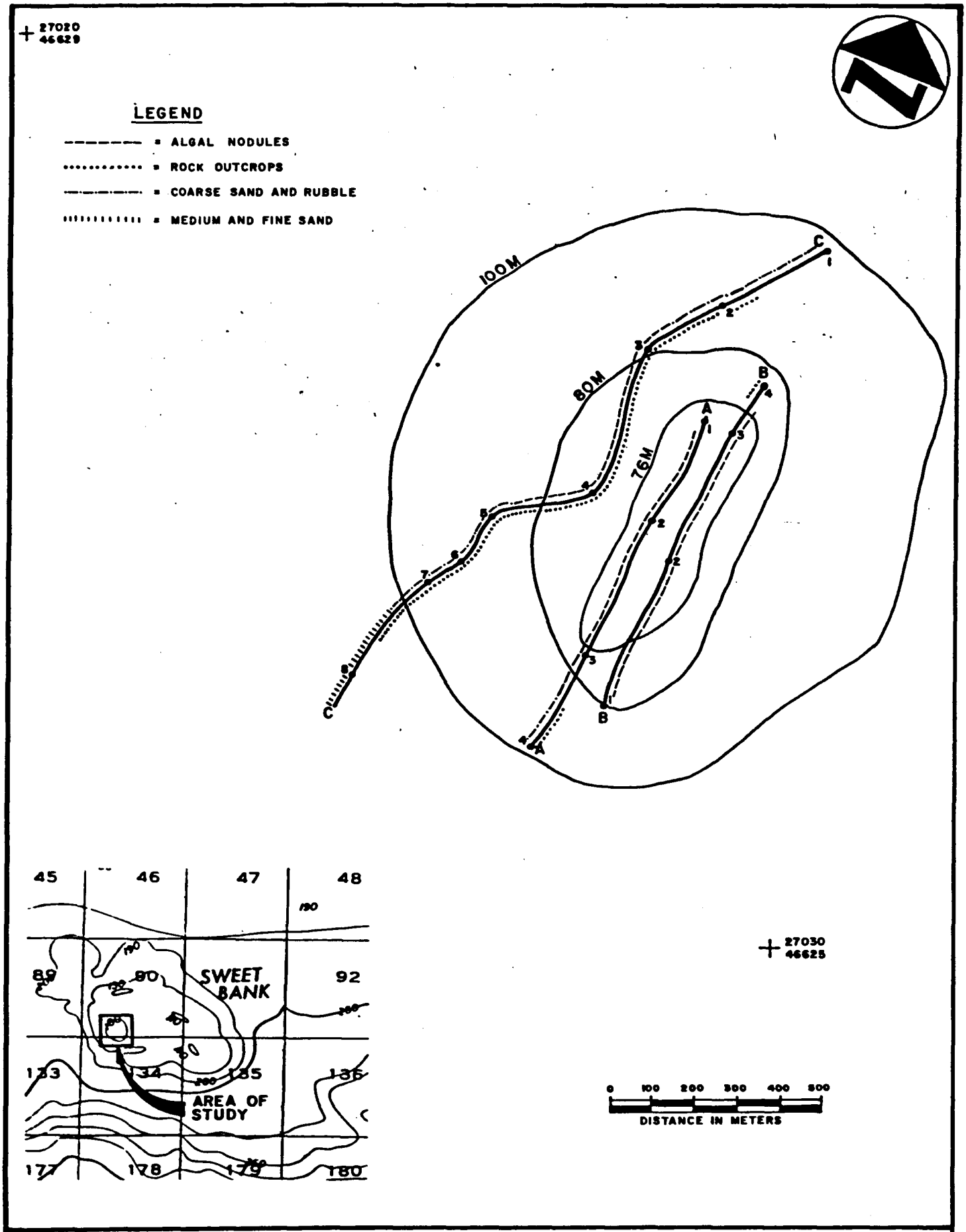
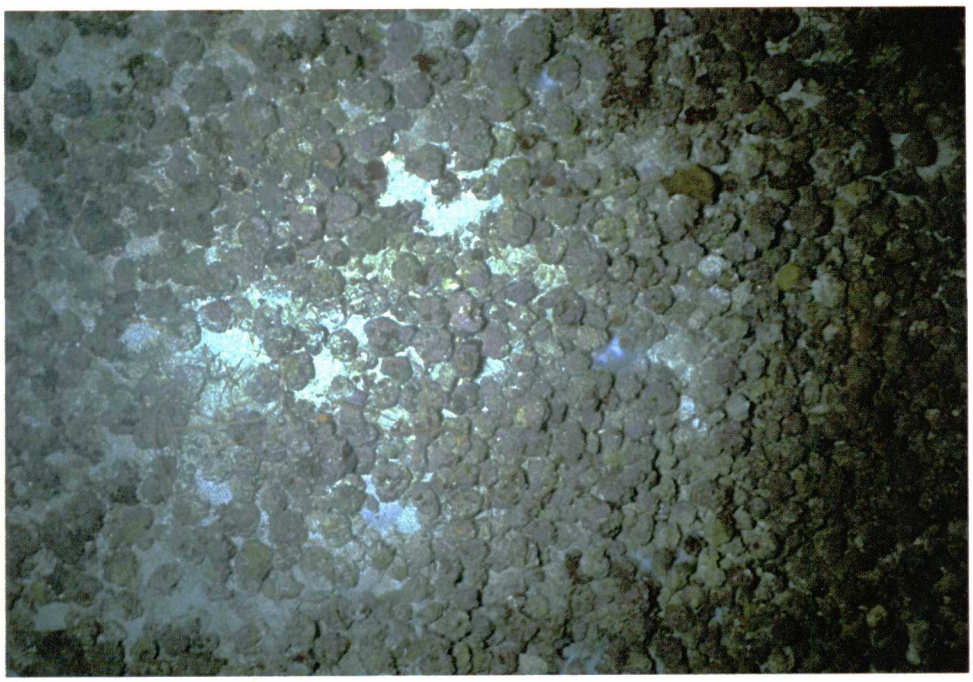


Figure 6. Substrate Types Based on Video and Photographic Transects on Sweet Bank



Photograph E. Typical coralline algal nodule substrate at a depth of 75 meters on Sweet Bank (Transect B, Shotpoint 2).

Photograph F. Anthozoans, encrusting coralline algae, and Roughtongue bass (Holanthias martinicensis) associated with hard bottom at a depth of 79 meters on Sweet Bank (Transect C, Shotpoint 3).

Photograph G. Coarse shell and rubble substrate at a depth of 95 meters on Sweet Bank (Transect C, Shotpoint 1).

Photograph H. Several Creole fish (Paranthias furcifer) and Roughtongue bass (Holanthias martinicensis) clustered near a rock outcrop at a depth of 79 meters on Sweet Bank (Transect C, Shotpoint 2).

depth 91 meters). As the water depth increased from the 76 meter ridge, the 95 to 100 percent coverage of algal nodules gradually decreased to less than 10 percent at approximately 80 meters. The nodule substrate was replaced by coralline algal rubble and coarse sand which in turn changed to medium and fine sand at a depth of approximately 110 meters. Photograph G shows coarse shell and rubble substrate at a depth of 95 meters.

Biota observed to be associated with the algal nodule substrate included leafy algae, sponges (? Verongula sp. or Xestospongia sp.), gorgonians (including Swiftia exserta), the antipatharian Cirrhipathes sp., holothuroids, and fishes (Reef butterflyfish - Chaetodon sedentarius and Scrawled cowfish - Acanthostracion quadricornis).

Biota associated with the rock outcrops were rather sparse, but included encrusting sponges, gorgonians, antipatharians (especially Cirrhipathes sp.) and crinoids. Fishes observed near rock outcrops such as in Photograph H included Creole fish (Paranthias furcifer), Roughtongue bass (Holanthias martinicensis), and Yellowtail reeffish (Chromis enchrysurus). Creole wrasse (Clepticus parrai) and Greater amberjack (Seriola dumerili) were also observed associated with the hard bottom.

IV. DISCUSSION

The crests of both Phleger and Sweet Banks are below the depths where major concentrations of hermatypic corals would be expected. Although Algal Nodule Zones have been identified at Ewing, Parker, Bouma and Bright Banks, these zones generally were observed to terminate in sand substrates prior to a depth of 75 to 80 meters which corresponds to the crest of Sweet Bank. However, the crest of Sweet Bank is within the lower depth range of the Algal-Sponge Zone (viz., Algal Nodule-Sponge Zone) identified at the East and West Flower Garden, 18 Fathom and 28 Fathom Banks (Bright, 1978 a,b). Therefore, the presence of the Algal Nodule Zone at the crest of Sweet Bank is not unexpected. See Figure 7 for the geographic locations of the aforementioned banks relative to Phleger and Sweet.

The biota associated with the substrate appears to be similar, though perhaps depauperate, compared to that observed by Bright (1978a,b) in the Algal Nodule Zones of other banks. This difference is not believed to be a function of the observational tools (submersible versus towed television/still camera) for the epibiota, though lower estimates of fish may be obtained by the towed system compared to the submersible.

The apparent lack of fish at Sweet Bank as compared to the Algal Nodule Zone of other banks (Bright 1978 a,b) may be due to a lack of relief (rock outcrops) in the the Algal Nodule Zone of Sweet Bank.

The rock outcrops observed to a depth of approximately 110 meters on Sweet Bank and 175 meters on Phleger Bank are in water depths that exceed the hard bottom observed on all the shelf-edge banks except perhaps 28 Fathom Bank where rock outcrops occurred to a depth of approximately 135 meters (Bright, 1978a). A significant series of nepheloid layers were associated with depths of 80 to 135 meters on 28 Fathom Bank, but none were observed on Sweet or Phleger Bank at the depths at which observations were conducted. However, a nepheloid layer may certainly be associated with the bank near its point of termination with the surrounding level bottom.

The biota associated with the rock outcrops encountered at a depth of 79 to 110 meters on Sweet Bank appear to be similar to the Antipatharian Zone observed at many other banks in the Gulf of Mexico (Bright, 1978a,b). The numerical dominance of crinoids, antipatharian whips and alcyonarian sea fans are characteristic of the zone. Roughtongue bass (Holanthias martinicensis) which was observed to be numerically dominant may be Reef Fish "A" as described by Bright (1978a,b).

The biota associated with the rock outcrops encountered at a depth of 122 to 173 meters on Phleger Bank appear to be similar to the Lithistid Sponge Zone observed at 28 Fathom Bank in water depths of 100 to 135 meters by Bright (1978a). The cup-shaped sponge observed at Phleger Bank may be the hard bodied lithistid sponge, Corallistes sp., identified at 28 Fathom Bank. Comatulid crinoids, paramuricid sea fans, and Cirrhipathes sp. are also found at both banks. Characteristic species present at 28 Fathom Bank, though not observed at Phleger Bank, were a solitary coral (Oxysmilia rotundifolia) and sponge (Geodia gibberosa).

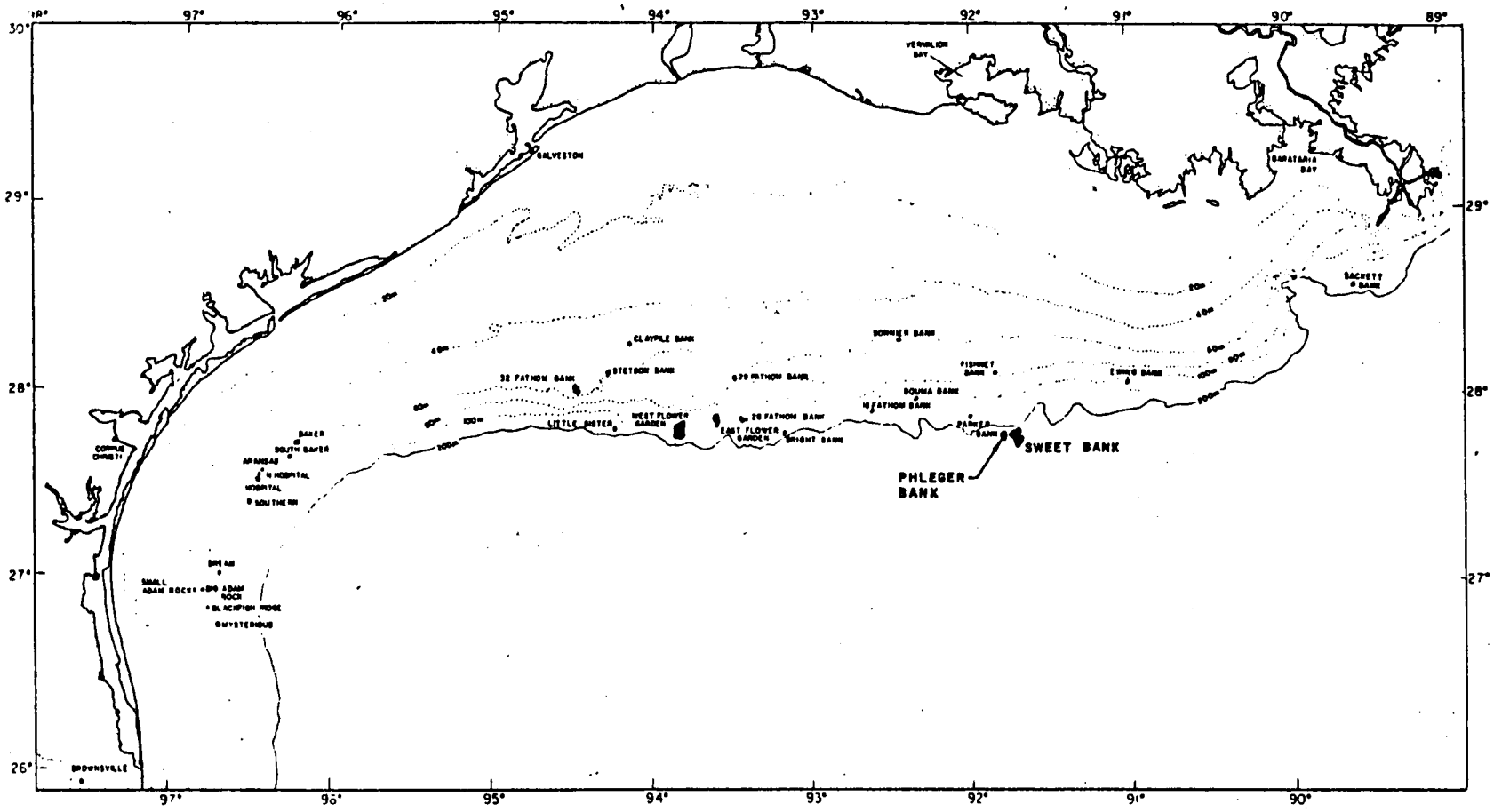


Figure 7. Geographic Location of Phleger and Sweet Banks Relative to Other Banks in the Northwest Gulf of Mexico

It appears that the biota associated with Phleger and Sweet Banks is similar to that observed at the shelf-edge banks previously investigated by Bright (1978a,b). These shelf-edge banks were identified as being of primary environmental concern due to the significant and unique biota that were present. The impact of the placement of structures and drilling activities on the biota of Phleger and Sweet Banks is not easily predictable. There would probably be an enhancement effect on the fish population due to the presence of the structure. The structure would also be colonized to a certain degree by epifauna. The amount of physical damage to the epibiota during the actual placement and eventual removable is difficult to determine. The impact of extended near-surface discharges on the biota is also difficult to predict. The drilled cuttings would initially bury a portion of the original substrate, but would probably be later colonized by a biota which was identical to that buried.

V. SUMMARY

A video and photographic reconnaissance of portions of Phleger and Sweet Banks was conducted on May 19, 1980. The purpose of the survey was to document the associated biota prior to the potential leasing of oil and gas tracts that contain the banks within their boundaries.

Phleger and Sweet Banks are located approximately 105 nautical miles offshore of Louisiana in 200 to 250 meters of water. The crests of the banks rise to within 130 and 75 meters of sea surface, respectively. Portions of Phleger Bank that ranged in depth from 122 to 173 meters were observed. The areas of Sweet Bank that were surveyed ranged in depth from 75 to 122 meters.

The observed substrate of Phleger Bank consisted of sand with scattered one to two meter diameter rock outcrops. The hard bottom associated biota were a cup-shaped sponge, comatulid crinoids, paramuricid sea fans and the spiral sea whip Cirrhipathes sp. The Roughtongue bass (Holanthias martinicensis) was the primary fish species observed. This faunal assemblage was similar to the Lithistid Sponge Zone described by Bright (1978a) for water depths of 100 to 135 meters at 28 Fathom Bank.

The crest of Sweet Bank (75 to 80 meters) was generally covered by a layer of algal nodules that was underlain by a sand or hard bottom. The algal nodule substrate was gradually replaced by rubble and coarse sand at approximately 80 meters. This substrate generally graded into medium to fine grain size sand at a depth of 95 meters. Rock outcrops were present from 79 to approximately 105 meter depths.

The biota associated with the algal nodule substrate, though perhaps more depauperate, was similar to the Algal-Sponge Zone (viz., Algal Nodule-Sponge Zone) previously described by Bright (1978a,b). The biota included leafy algae, sponges, gorgonians, an antipatharian, holothuroids and small tropical fish. The faunal assemblage associated with the rock outcrops appeared to be similar to the Antipatharian Zone described by Bright (1978 a,b). Crinoids, antipatharian whips, alcyonarian sea fans and the Roughtongue bass (Holanthias martinicensis) were numerically dominant. It appears that the observed biota at Phleger and Sweet Banks were similar to those previously described and identified on shelf-edge banks as being of primary environmental concern.

VI. LITERATURE CITED

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VII. ACKNOWLEDGEMENTS

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Jennifer W. Lowry	Octocorallia
Shirley A. Pomponi	Porifera

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.