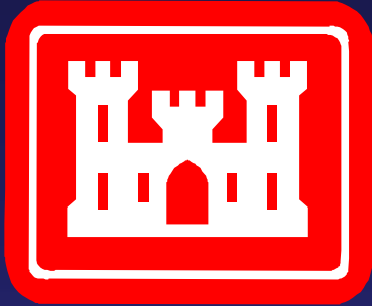
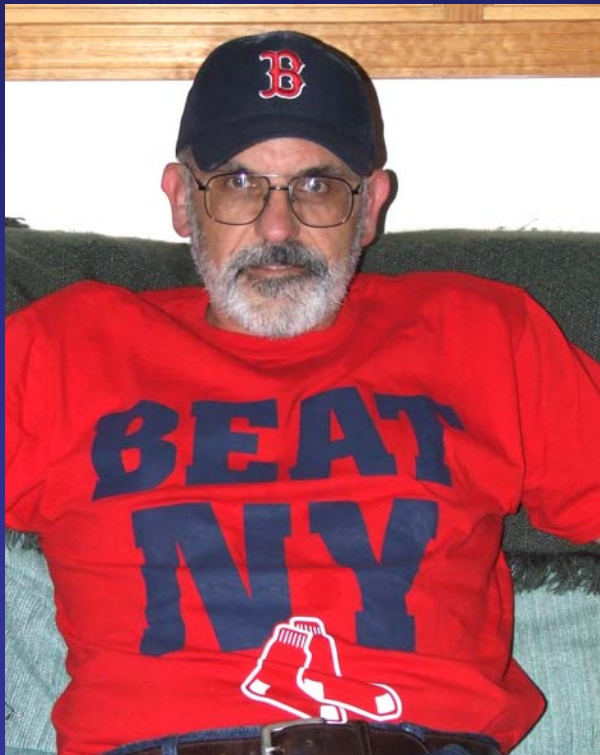




Ecological Characterization of the CAC Borrow Pit



DOUG CLARKE

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Research and
Development Center

ENVIRO MENTAL LABORATORY



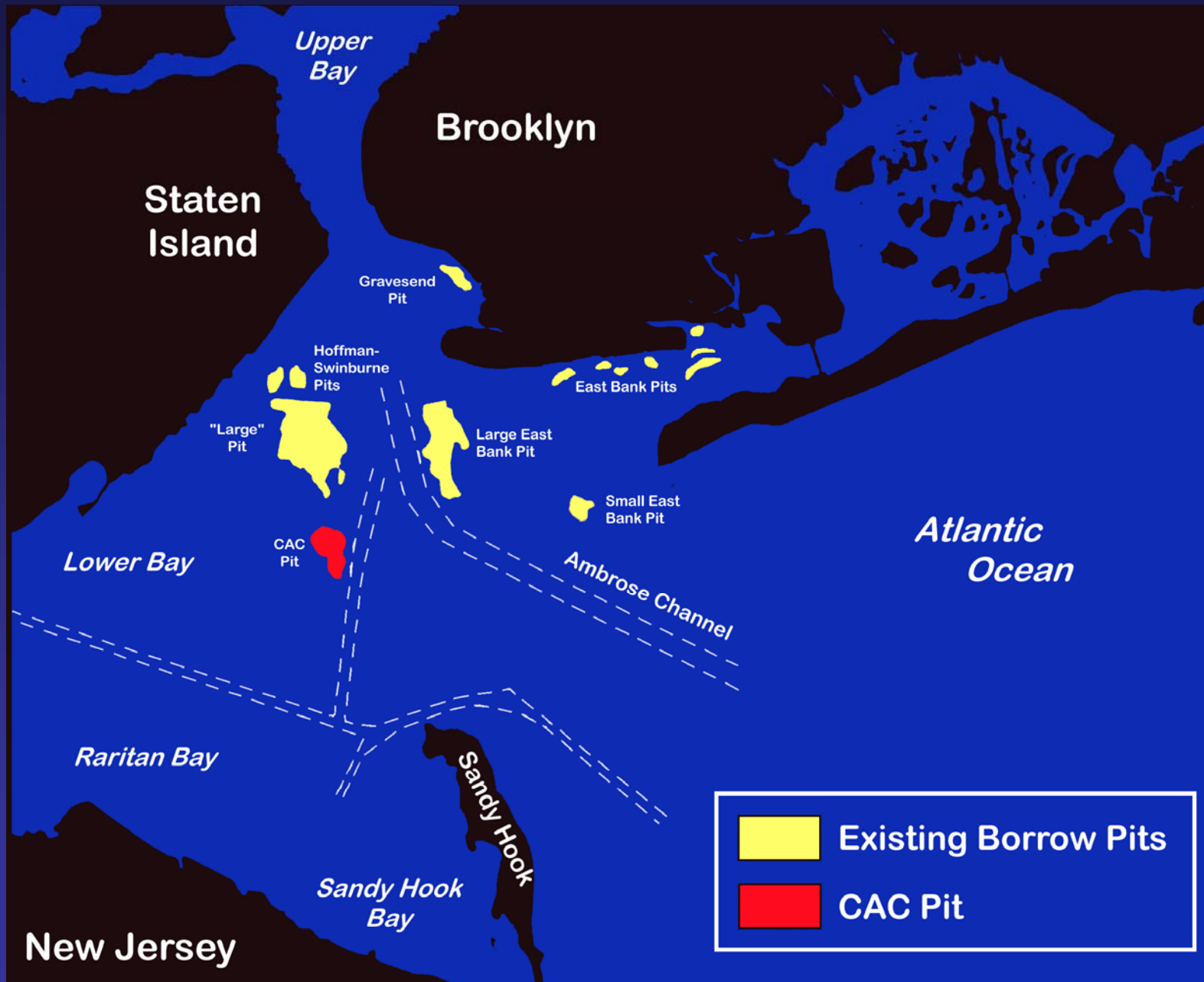
Background

- **1970s – Emphasis on impacts of sand mining**
- **1979 – MITRE report identifies pit-filling as DMDMP option**
- **Early 1980s – SUNY studies**
- **1981 – Operational demo at CAC pit halted by litigation**
- **1988 – Supplemental EIS**

Study Objectives

- **Address gaps in knowledge of borrow pit ecology**
- **Determine spatial and temporal patterns of fishery resource use of pits**
- **Provide insights for design of pits from fish habitat perspective**

Study Location



Data Collection

April 1997 – Fishery Hydroacoustics

June 1997 – Acoustics, SPI, Benthos

August 1997 – Acoustics, SPI, Benthos

September 1997 - Trawls

October 1997 – SPI, Trawls

**November 1997 – Acoustics, SPI, ADCP,
Benthos**

January 1998 – Acoustics, SPI, Trawls

March 1998 - Benthos

Fisheries Hydroacoustics



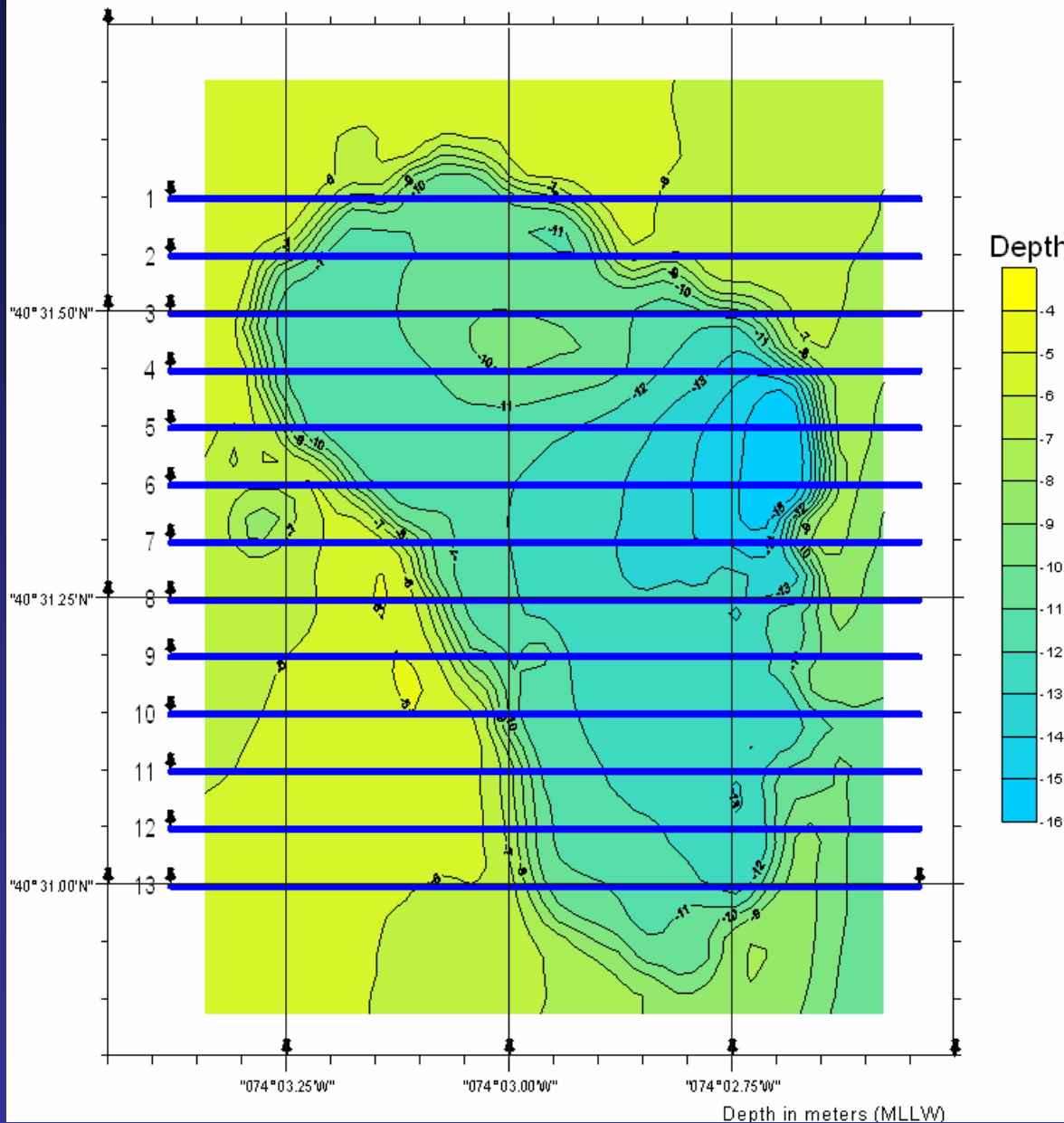
**DT 5000 (200 kHz)
Dual Beam Digital
Transducer**



Fishery Hydroacoustics

- **Density and biomass of off-bottom fishes**
- **Acoustic size distribution**
- **Precise positions of targets in water column**
- **Direction and speed of movement**
- **Non-destructive sampling**
- **Survey large areas on appropriate time scales (e.g., tidal phase)**
- **Can sample in areas inaccessible to conventional netting techniques**
- **Requires “ground truth data”**

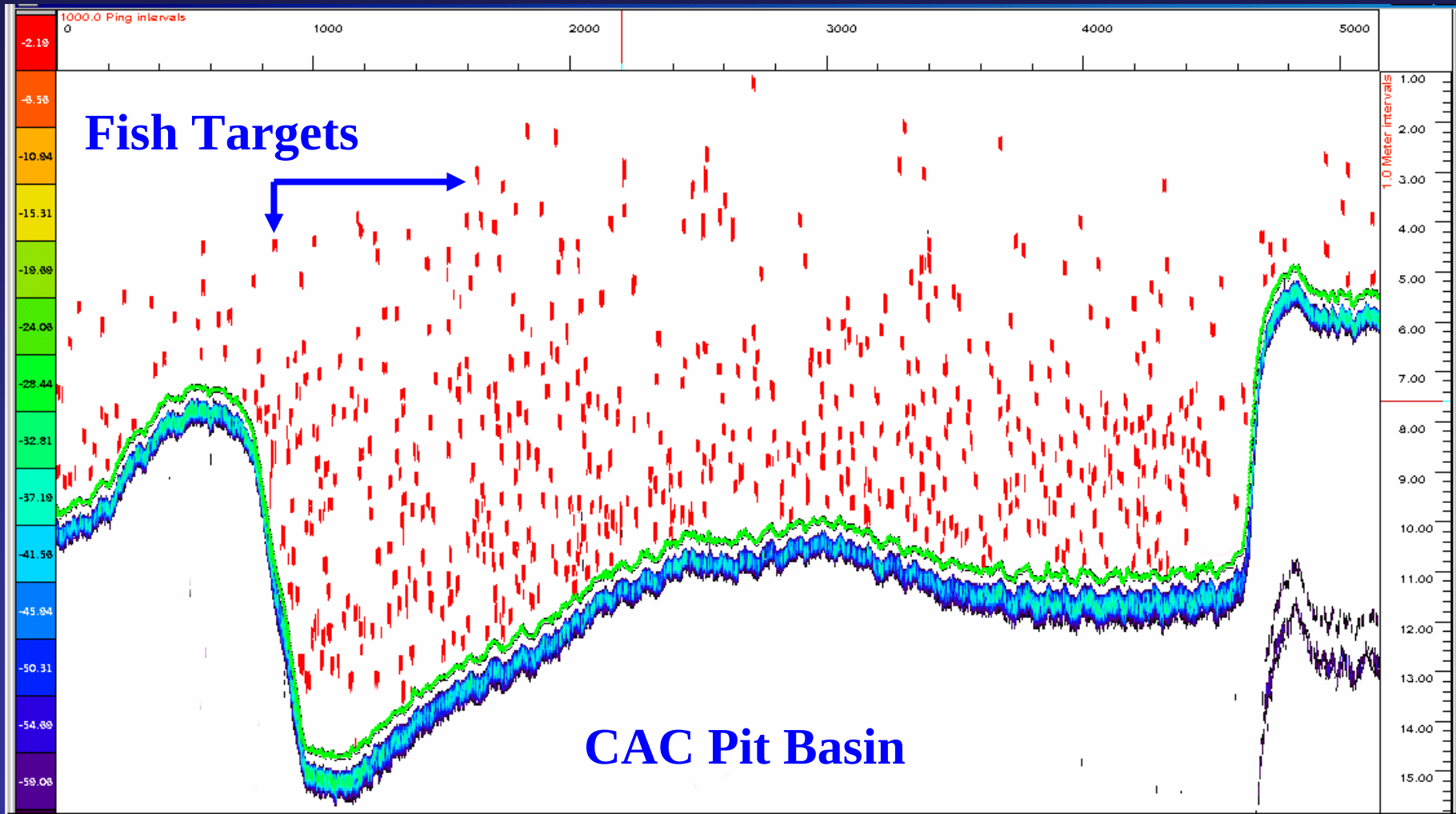
CAC Pit Transects



1.5 km

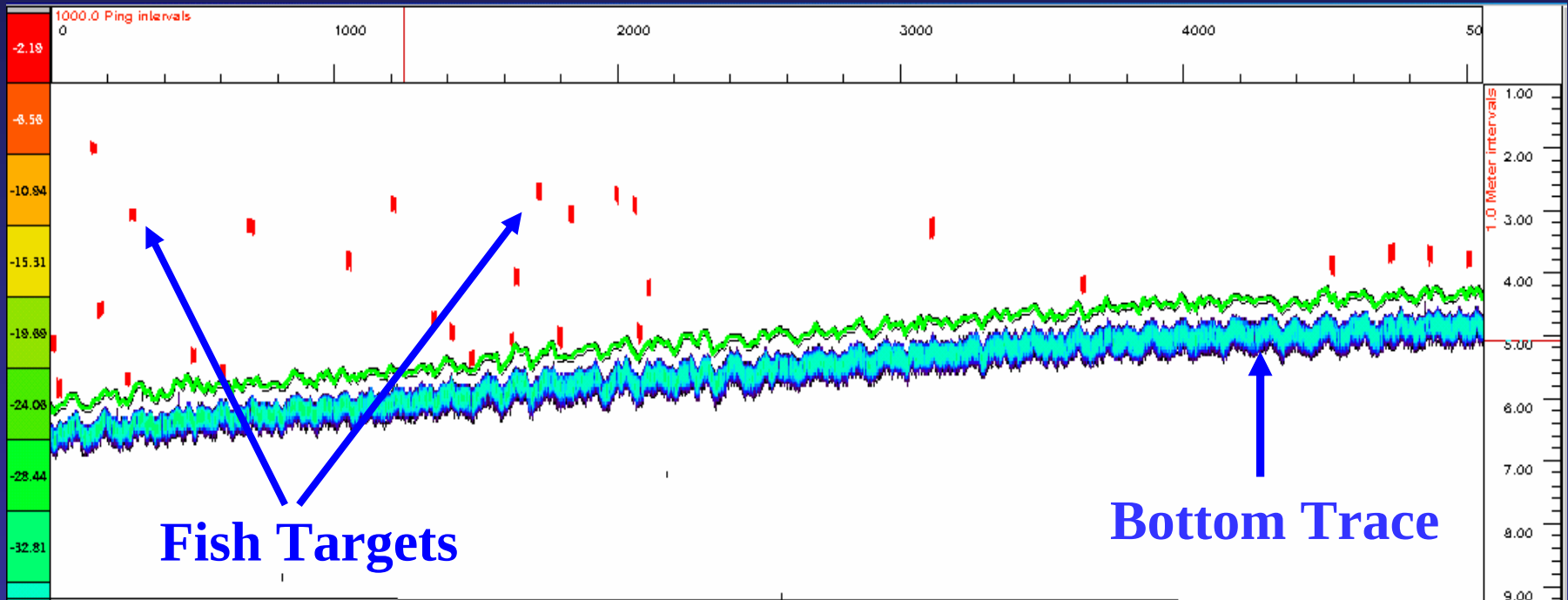
1.0 km

Example Pit Echogram

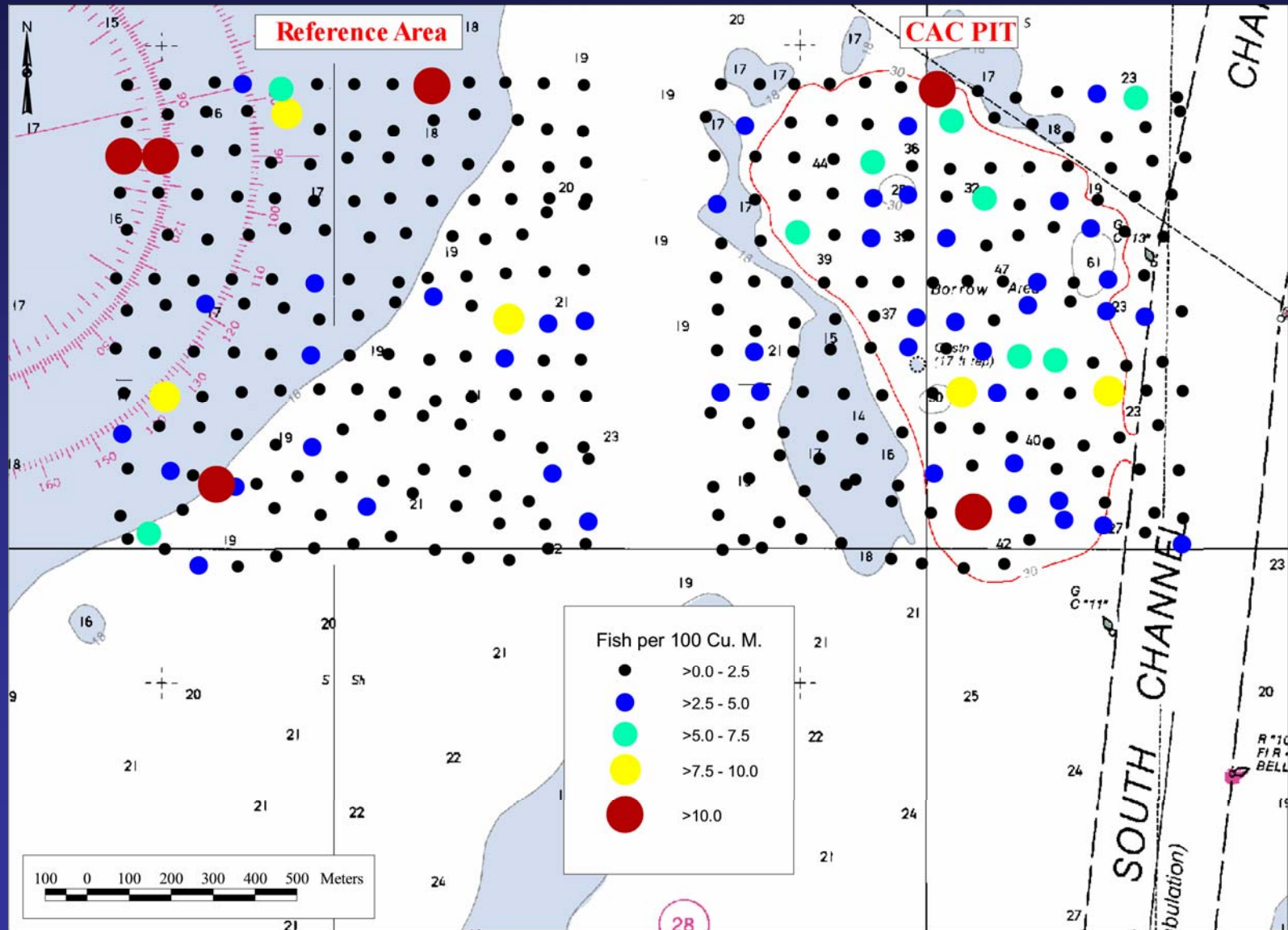


TRANSECT #4 – FLOOD

Example Adjacent Shoal Echogram

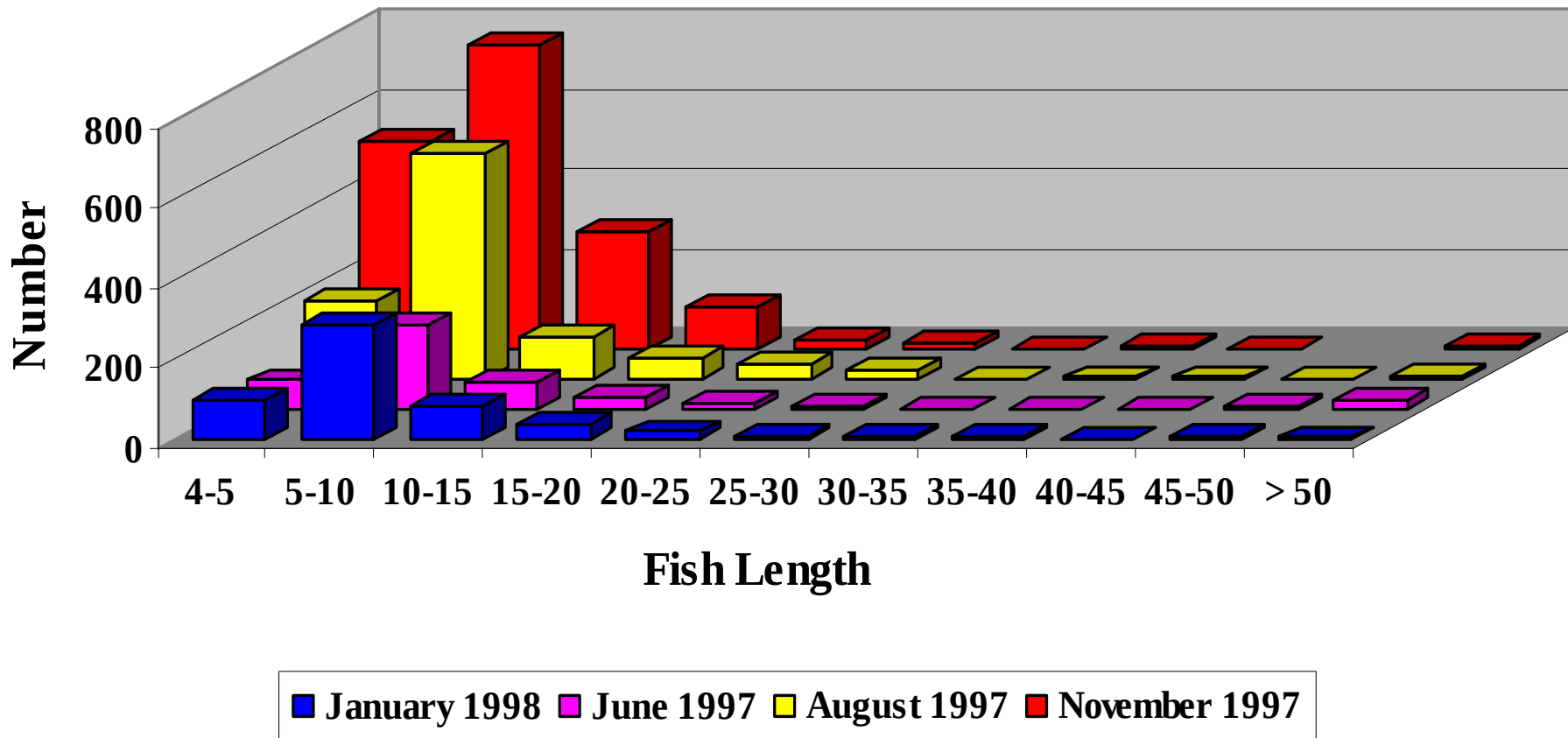


Fish Density



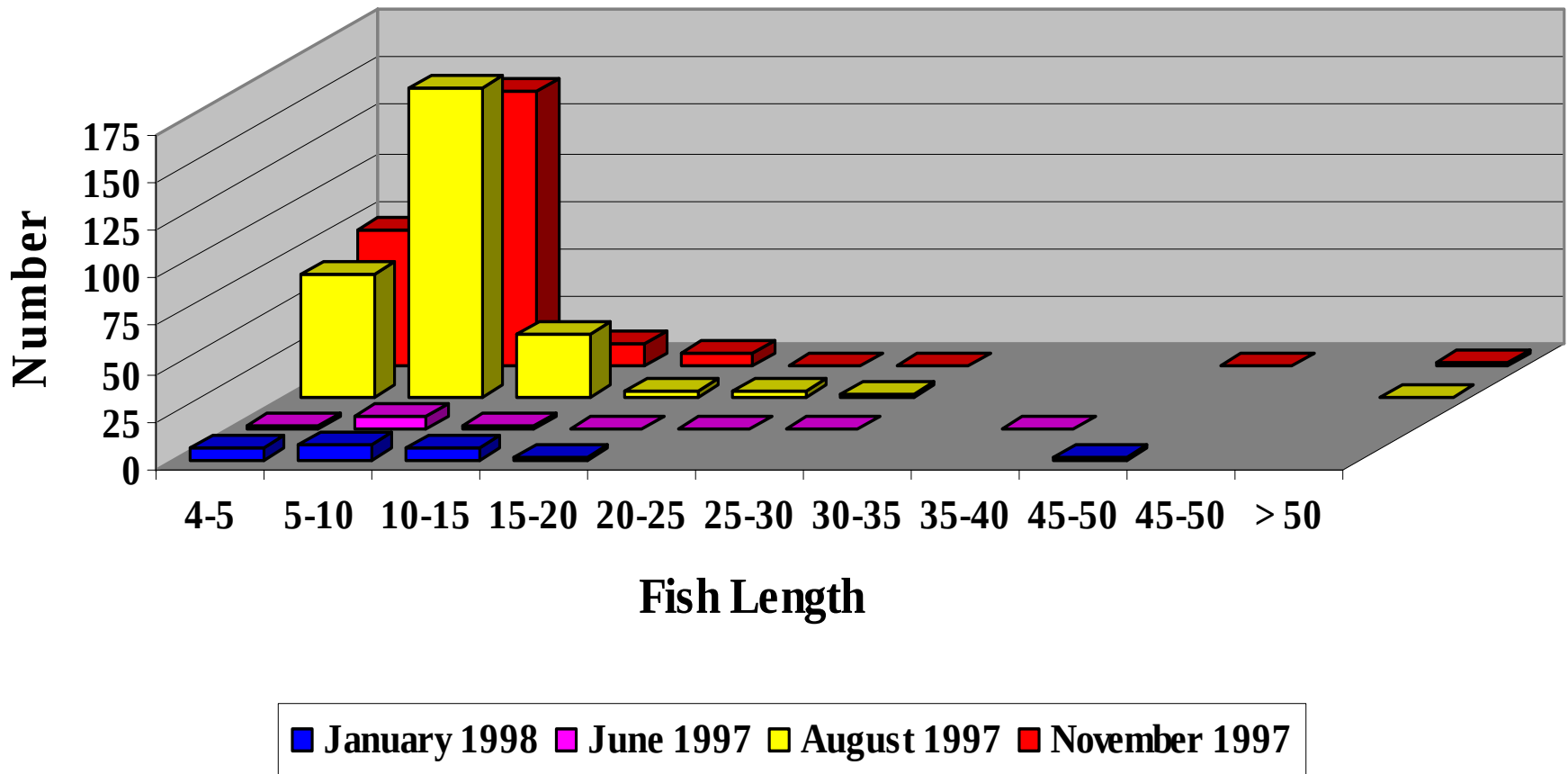
Fish Length Frequency Distribution

(Single Targets in CAC Pit)

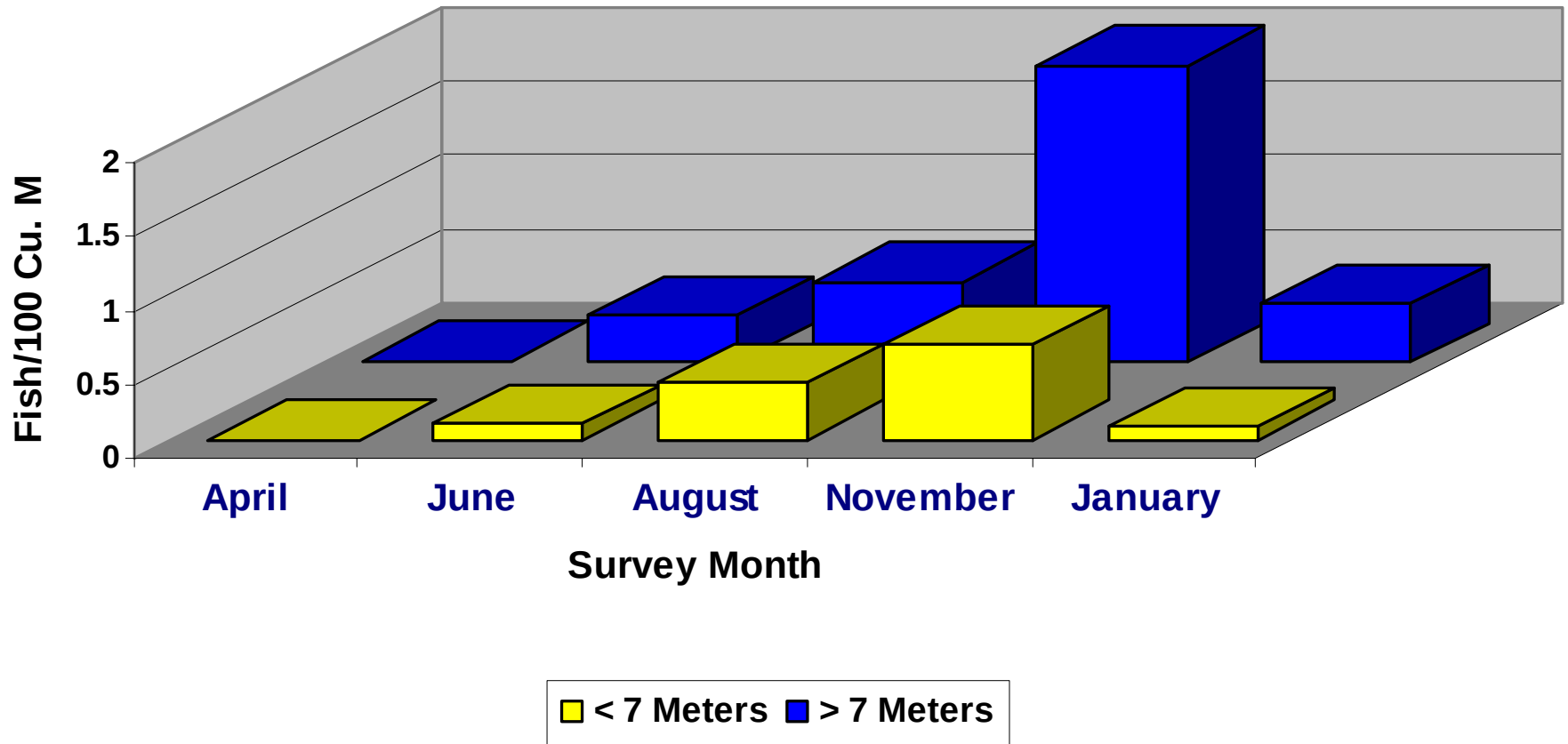


Fish Length Frequency Distribution

(Single Targets in Reference Area)

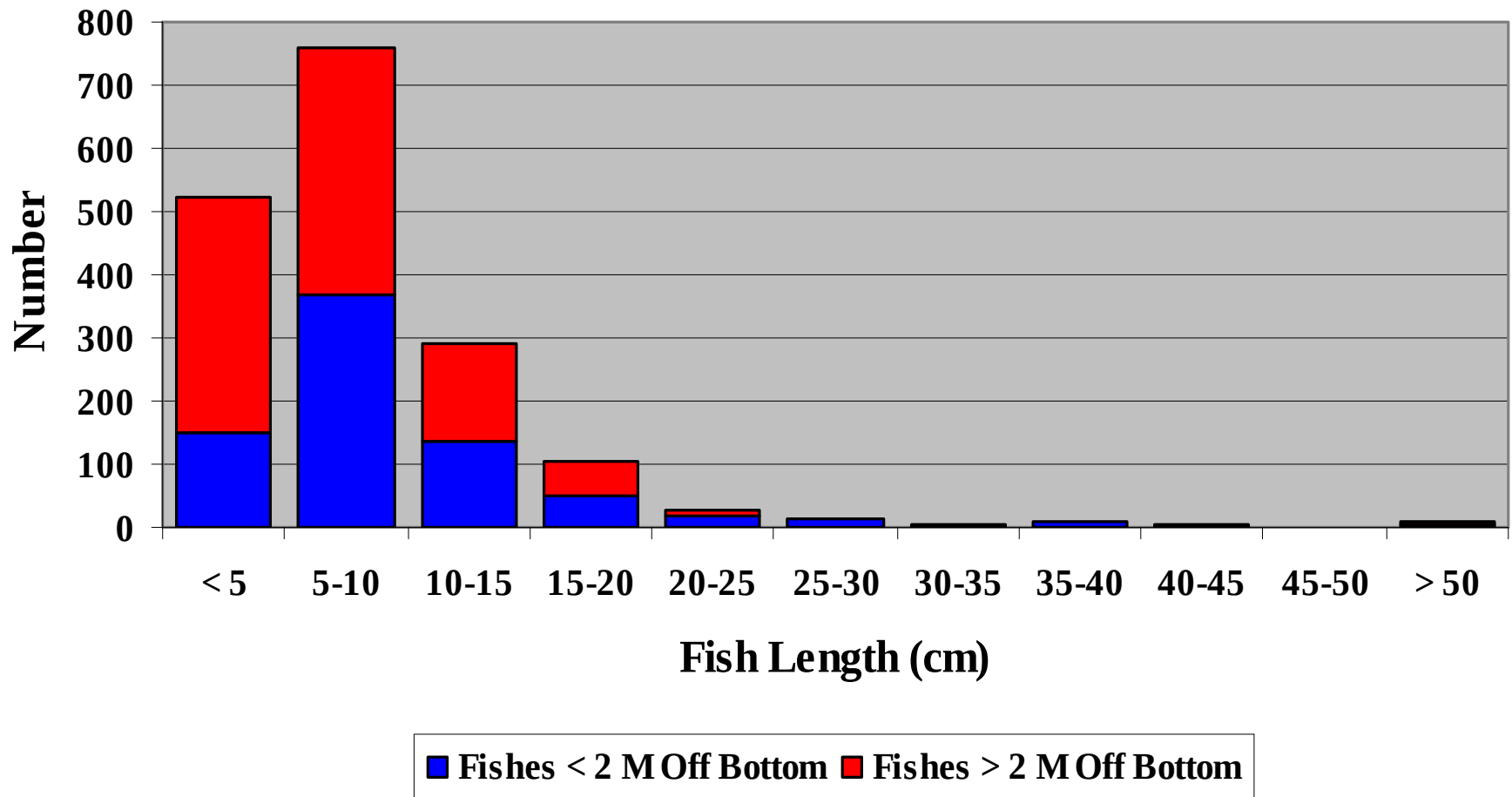


Fish Density in CAC Pit



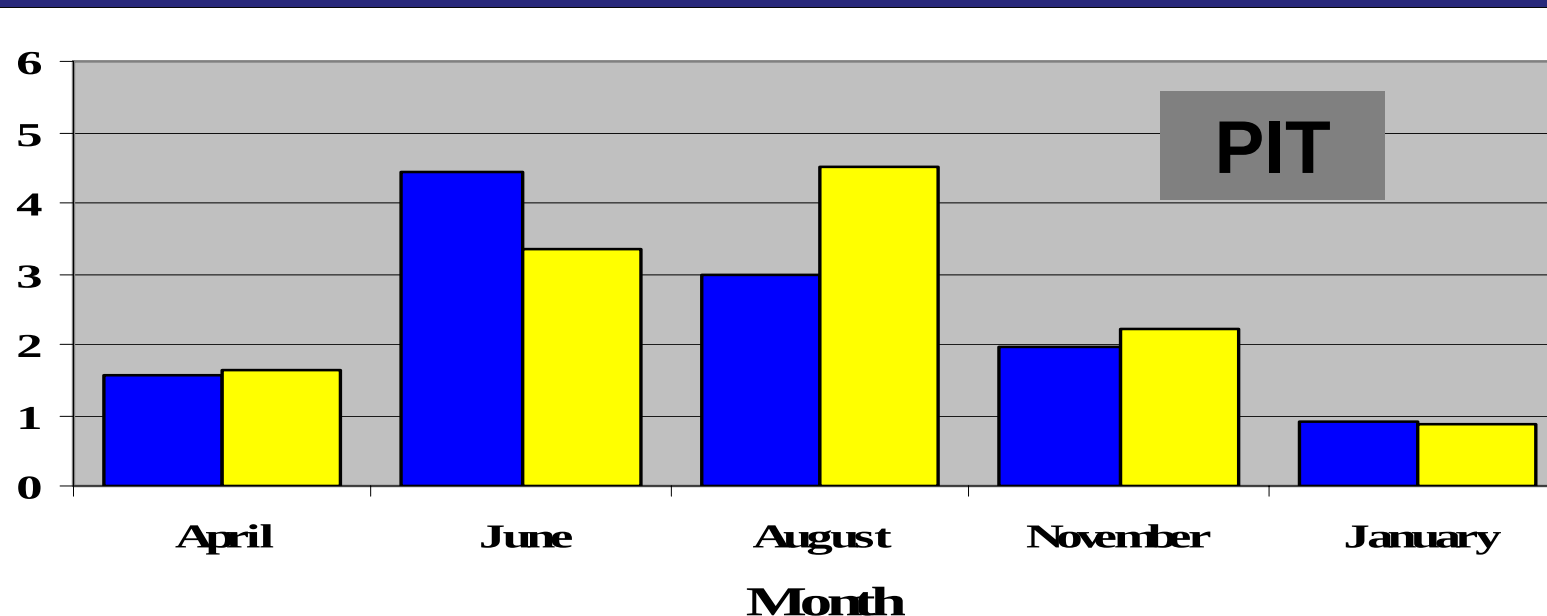
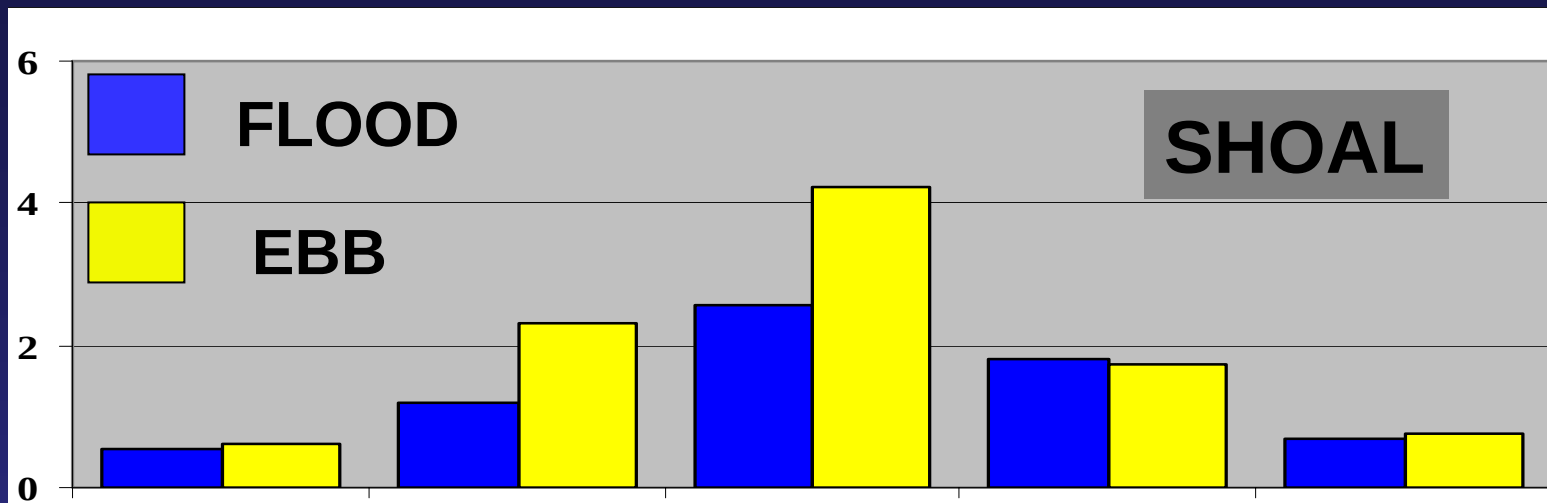
Near-Bottom and Mid-Water Fishes

(CAC Pit-November 1997)



Echointegration Results

FISH/100 CU M



Dominant Species in Trawl Catch

September 1997

Weakfish (59.4%)

Winter Flounder (0.6%)

Bay Anchovy (33.9%)

October 1997

Weakfish (26.7%)

Bay Anchovy (14.1%)

Winter Flounder (25.2%)

Windowpane (12.6%)

January 1998

Silver Hake (35.6%)

Winter Flounder (11.1%)

Atlantic Herring (6.7%)

Alewife (15.6%)

Windowpane (8.9%)

Blueback Herring (2.2%)

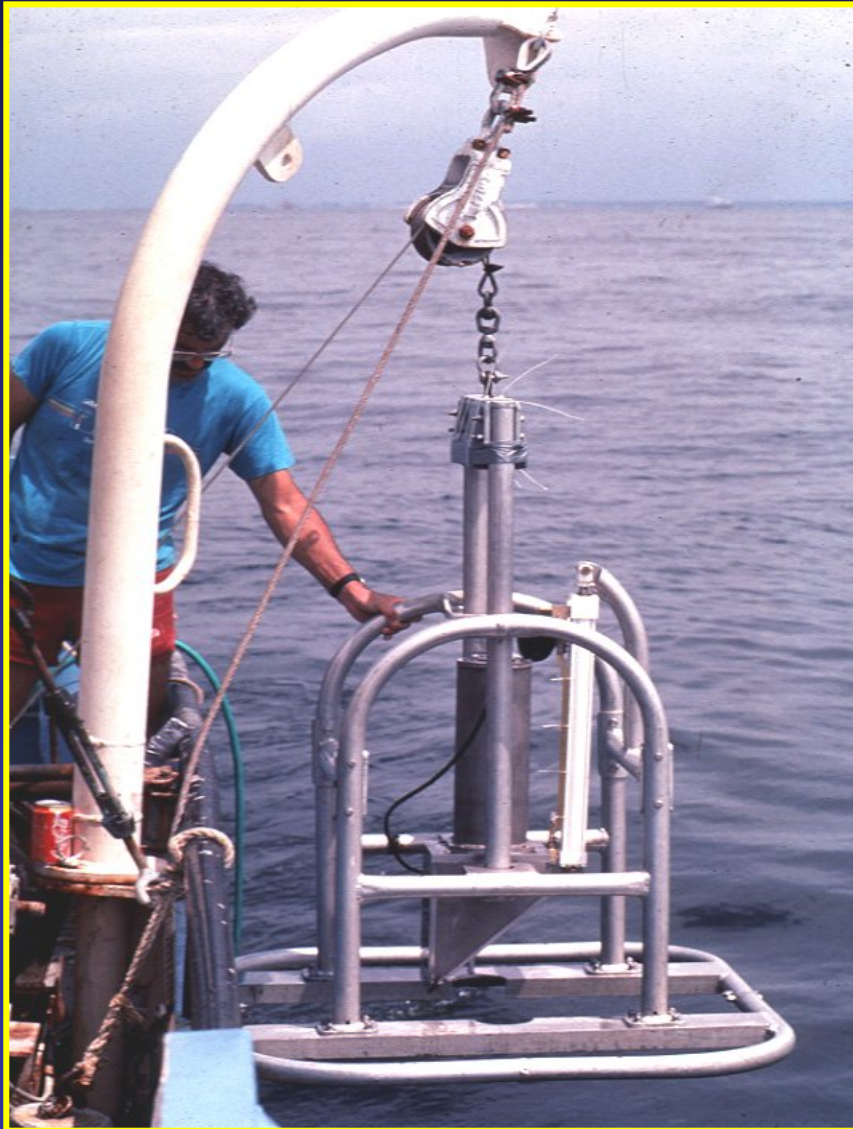
Fish Occupation of CAC Pit

- High spatial variation among surveys
- No strong associations with slopes or basin relief
- Densities generally higher within few meters of the bottom
- Densities peak in summer with incursion of juveniles
- High densities of anchovies and juvenile weakfish

DO Concentrations

- **Swartz & Brinkhuis (1978) – 3.4 ppm on bottom in May and 5.0 ppm in June**
- **Conover et al. (1985) – 3.2 ppm in July and 6.0 ppm in November**
- **COE study (1997) – 5.1 ppm in August, 6.5 ppm in June, no evidence of stratification of the water column in any month**

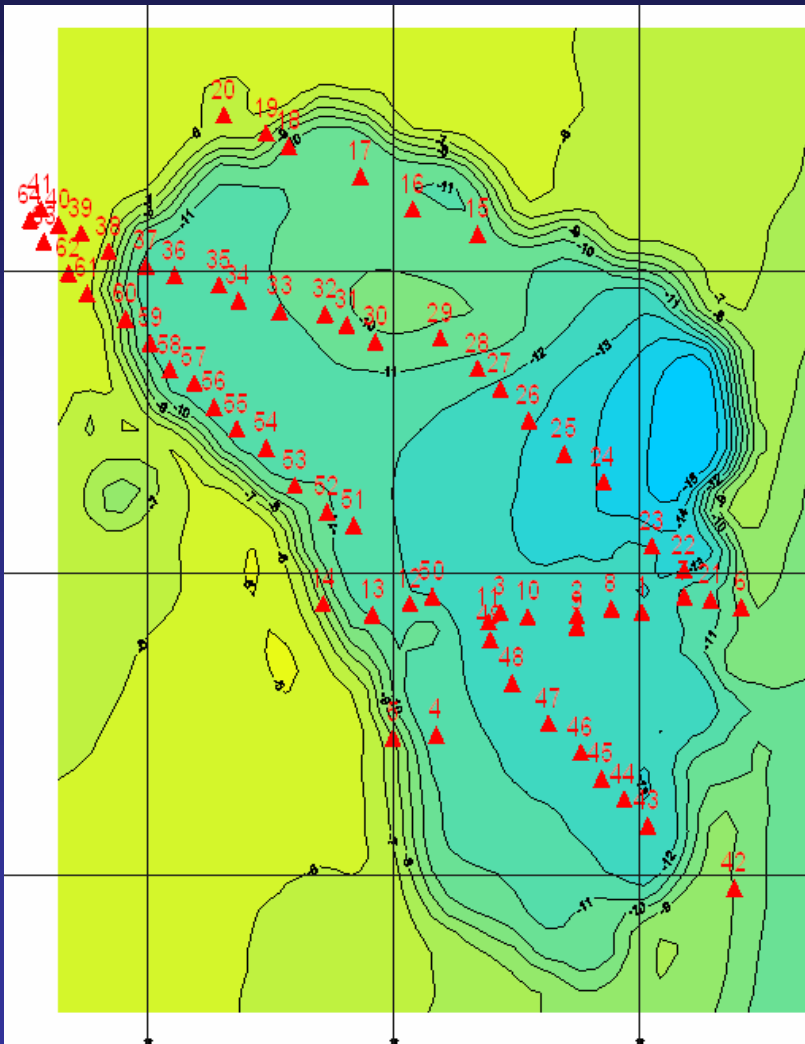
Sediment Profiling Imagery



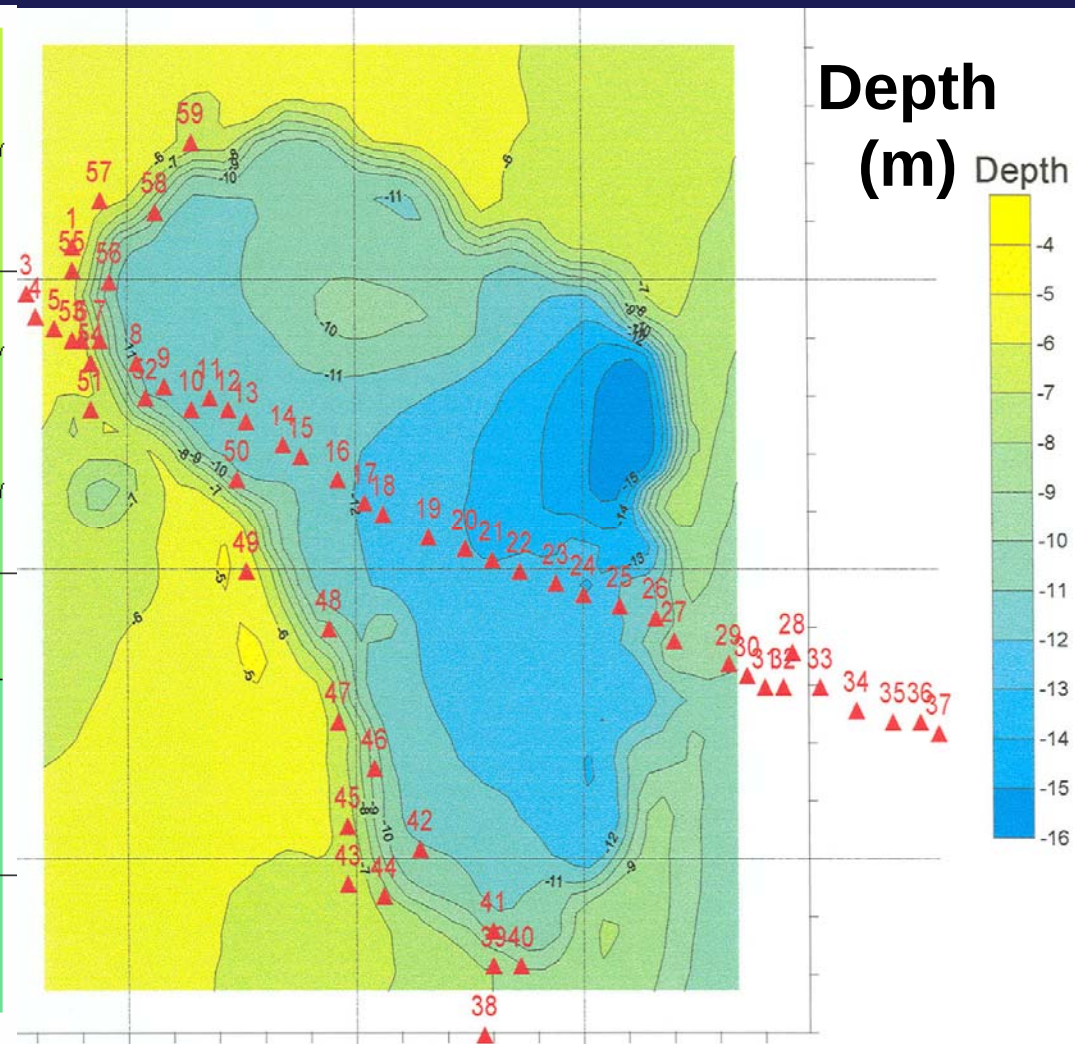
← 15 CM →

Sediment Profile Camera Stations

JUNE

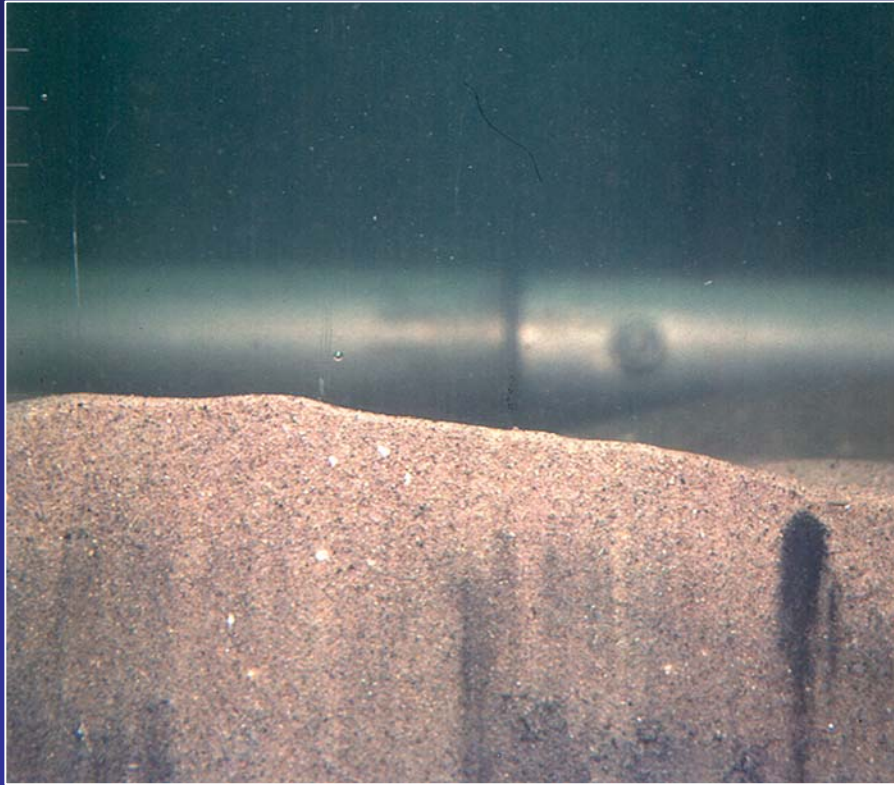


OCTOBER



SPI – October 97

PIT RIM



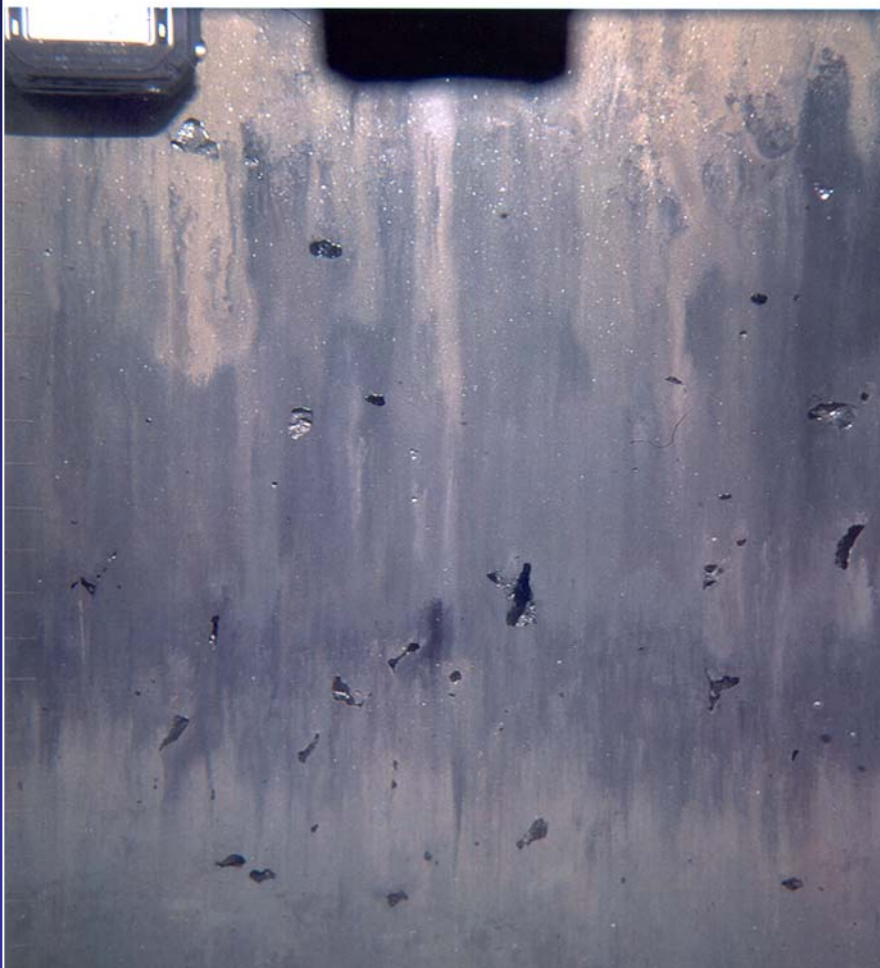
STA 49



STA 53

SPI – October 97

NW SHALLOW BASIN

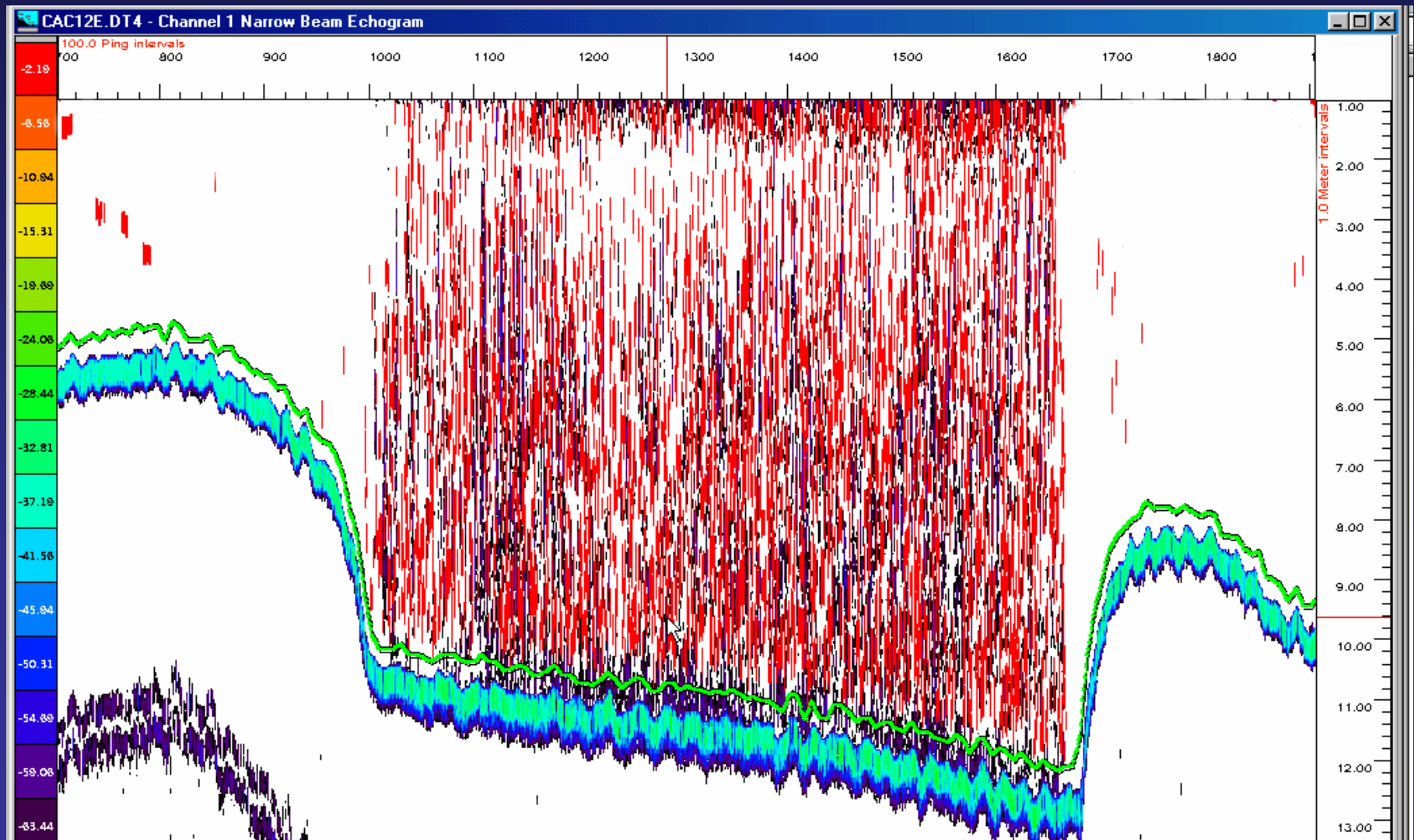


STA 10



STA 16

Sediment Degassing



SPI – October 97

DEEP BASIN



STA 21

TOE OF SLOPE BELOW SILL



STA 26

SPI – October 97

PIT SILL



STA 29

PIT SILL



STA 32

SPI – October 97

CHANNEL SIDE SLOPE



STA 34

CHANNEL BASIN



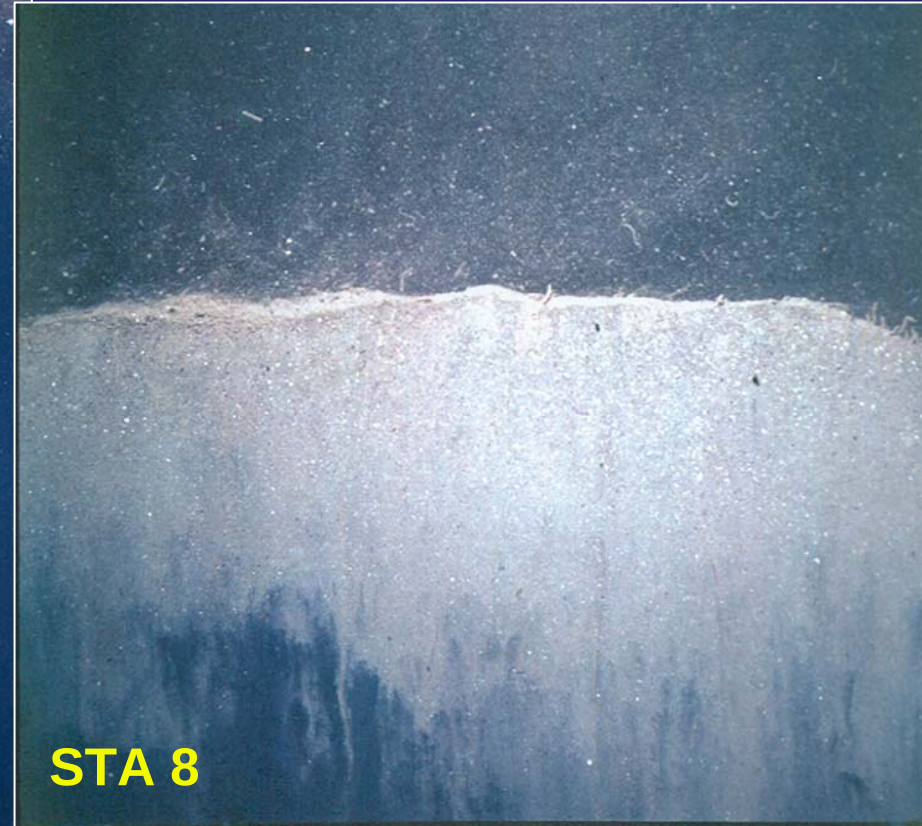
STA 36

SPI – June 97



STA 32

SPI – August 97

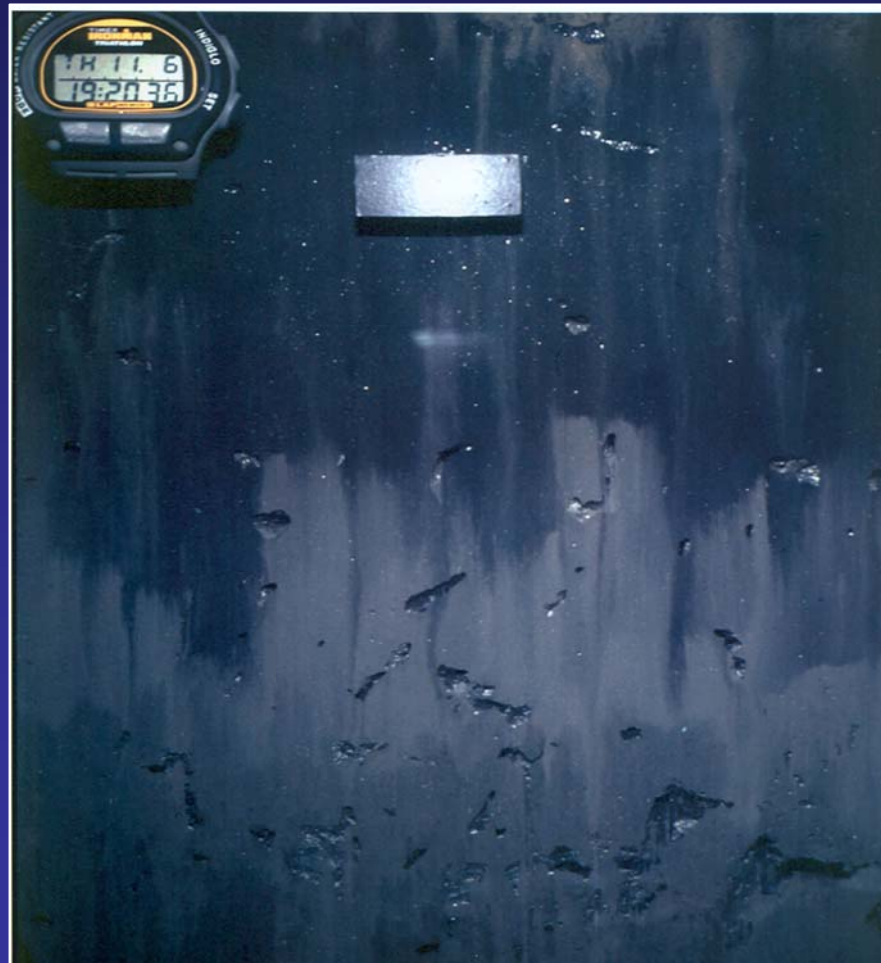


SPI – November 97

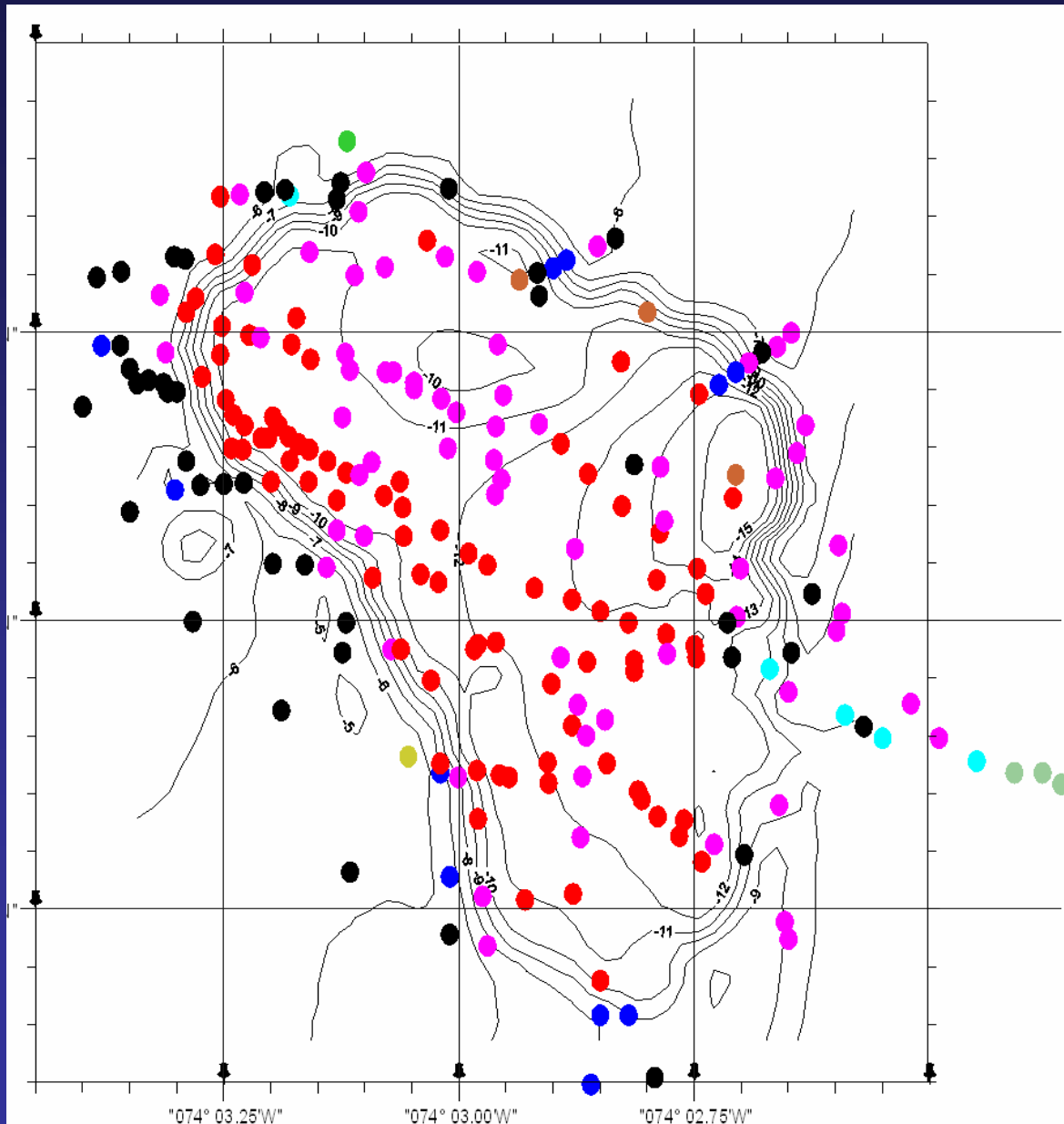
STA 19



STA 25



Sediment Type



CAC PIT CHARACTERIZATION STUDY

- **Findings**

- CAC pit not hypoxic during summer of 1997
- Moderate densities of benthic macroinvertebrates present
- ADCP data indicate low current velocities in pit basins
- SPI data indicate significant infilling across pit basin with unconsolidated silts as well as sand lenses moving down eastern side slope