



SEAMAP Offshore Reef Fish Survey of the FGBNMS

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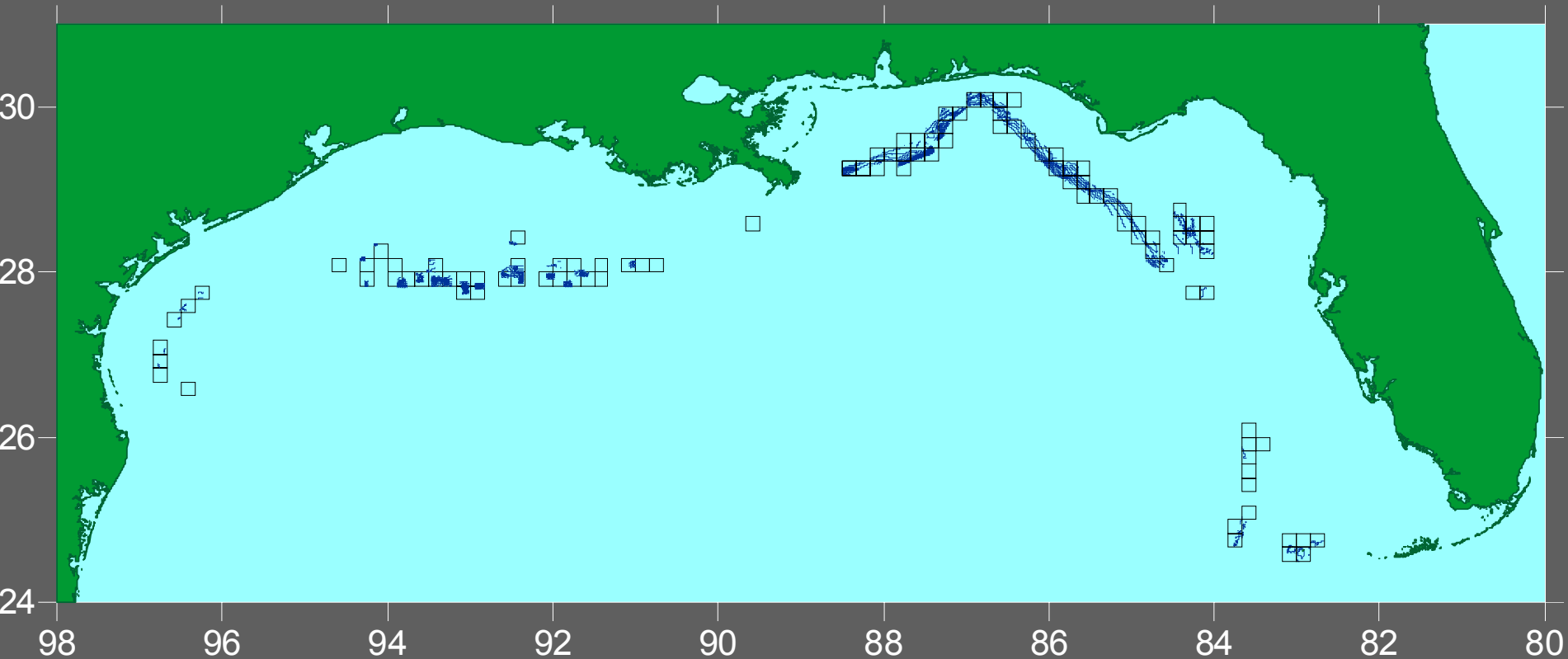
SEAMAP Reef Fish Video Survey

FGBNMS

- Survey Objectives
 - Sample Design
 - Evolution of Gear
 - Tape Viewing
 - Counts
 - Size estimation
 - Data Base
 - SEDARs
 - Future changes
- Annual sampling
 - Species Assemblage
 - Video trends over time
 - Catch data

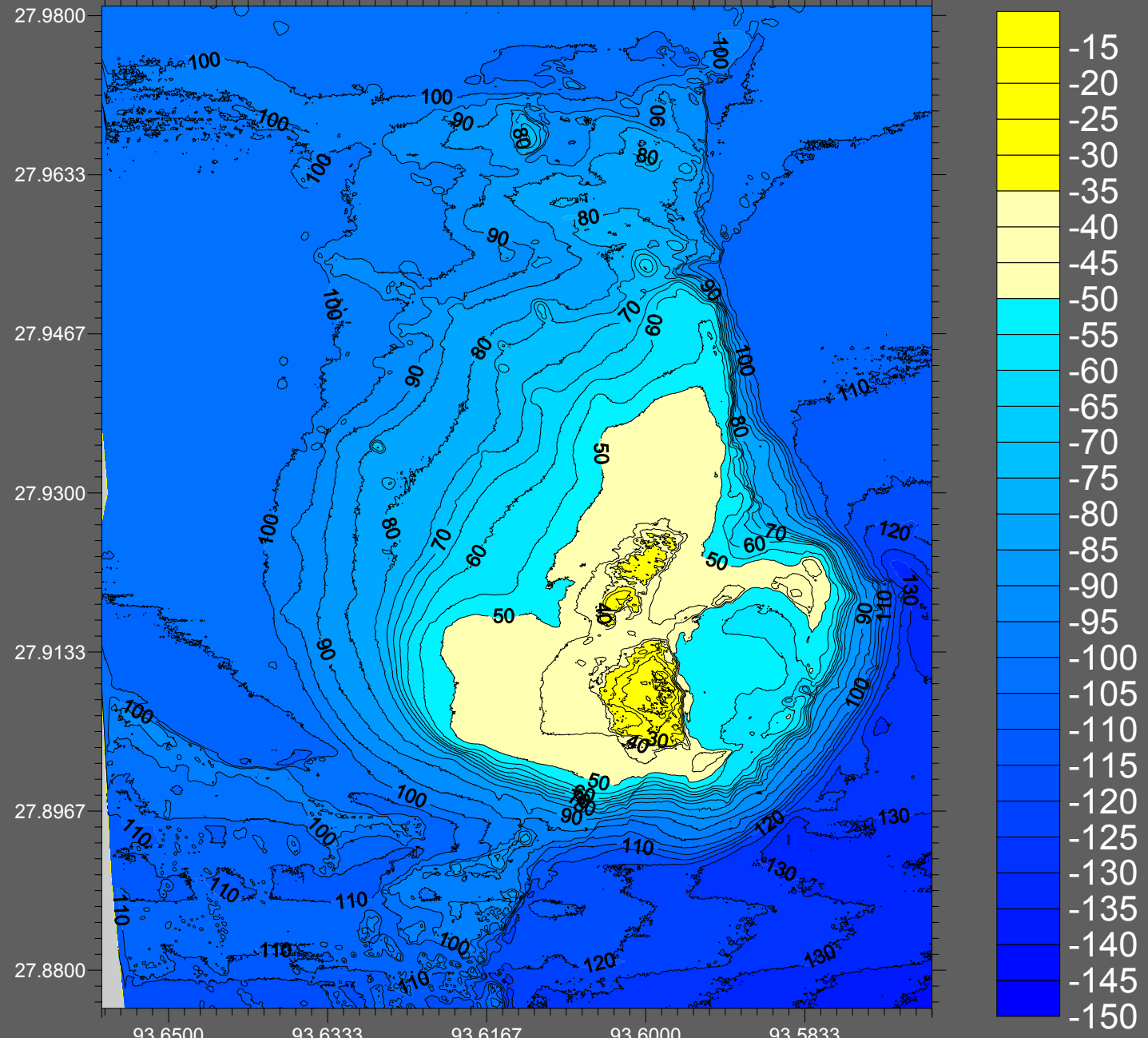


Holanthias martinicensis

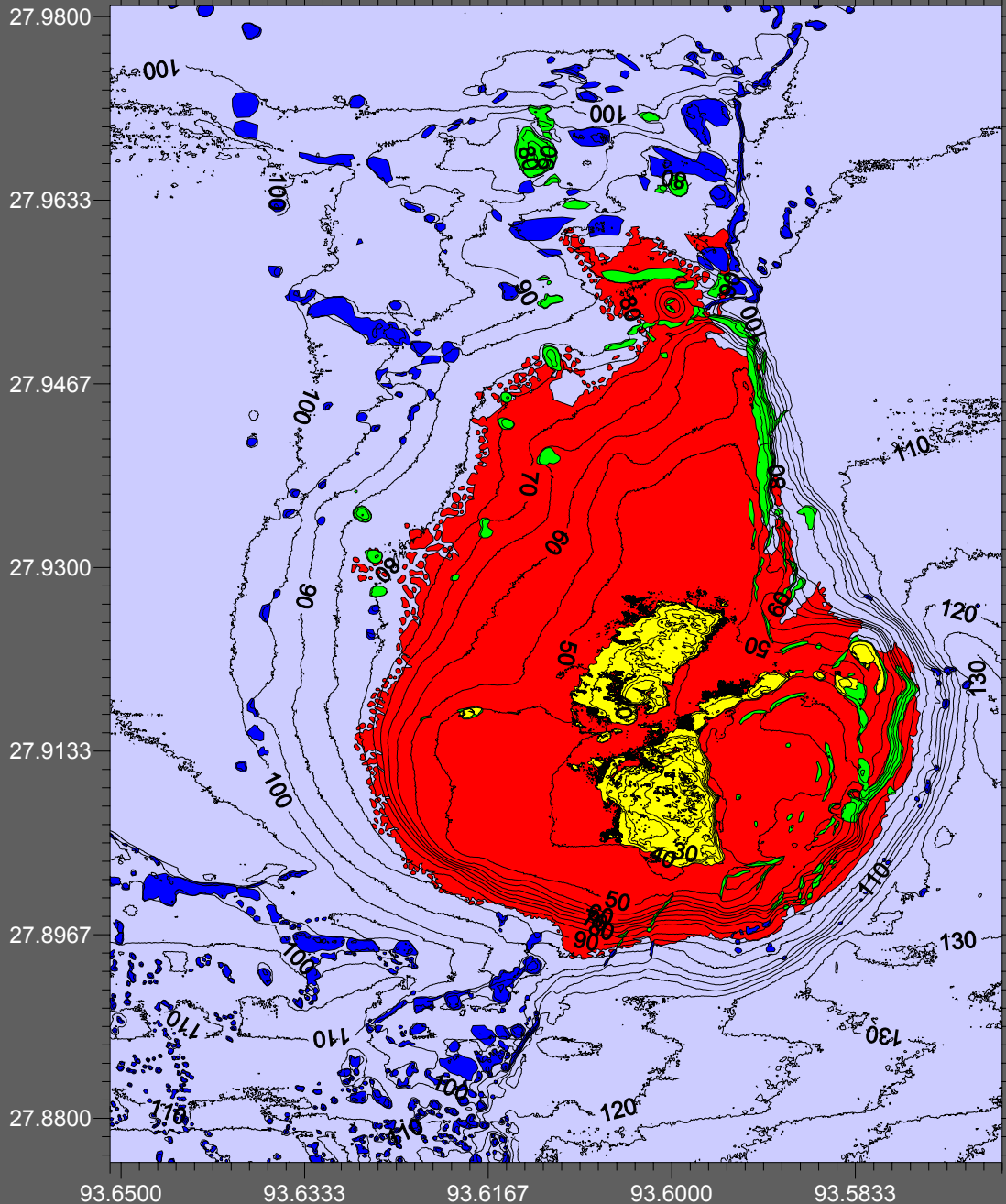


- Targets groupers, snappers, other Reef Fish FMP species.
- **Two** stage sampling. Primary Units are 10' Blocks of latitude and longitude. Ultimate sample units are reef sites.
- 1992-1997; 2001-2002, 2004-2007

East Bank (Block 103) – Contours



East Bank Habitat Characterization



ZONES



Coral Reef



Coralline Algal
nodule

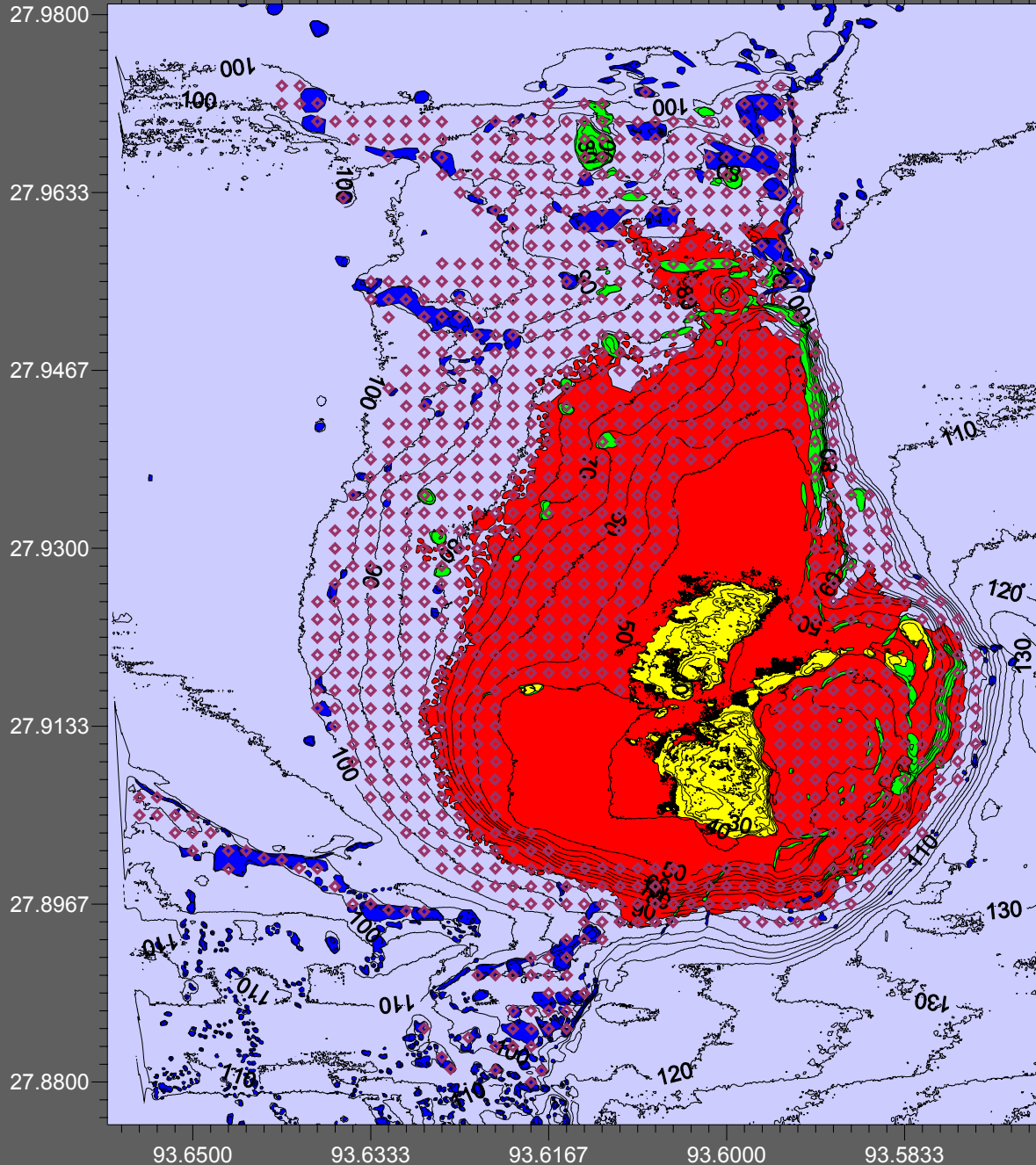


Coralline Algae
Reefs



Deep Coral

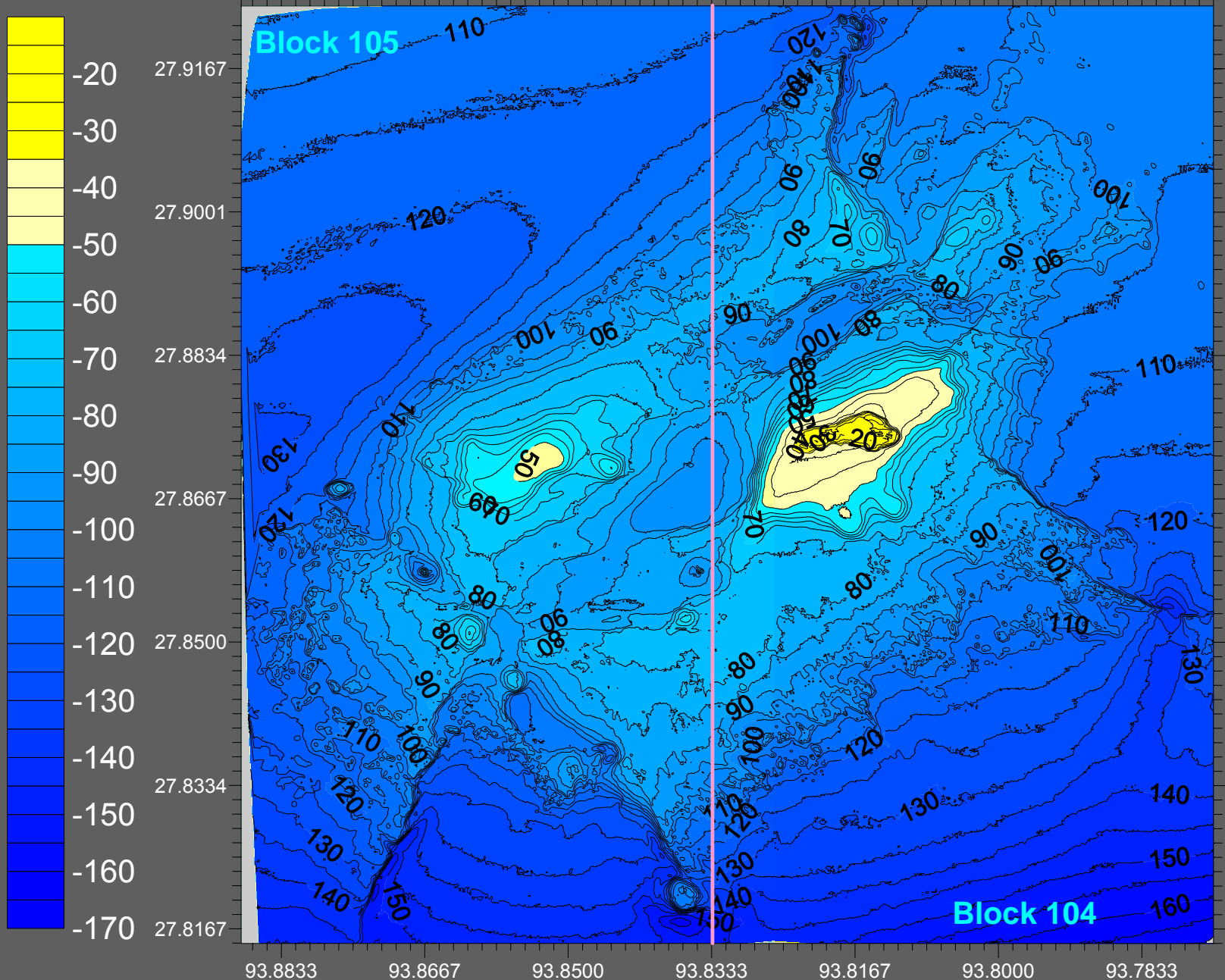
East Bank (Block 103) Sampling frame



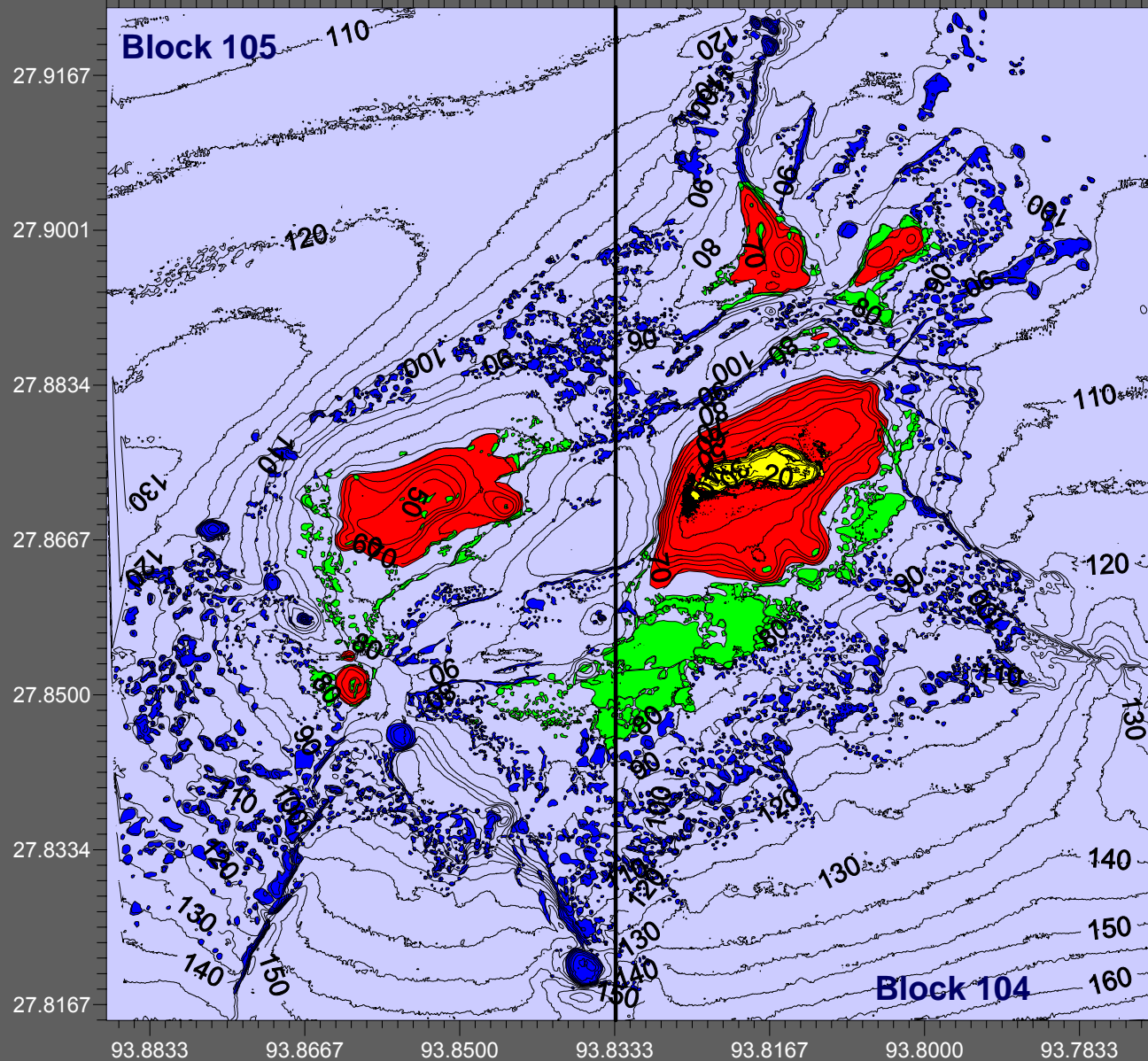
ZONES

-  Coral Reef
-  Coralline Algal nodule
-  Coralline Algae Reefs
-  Deep Coral

West Bank (Blocks 104 & 105) - Contours



West Bank Habitat Characterization



ZONES



Coral Reef



Coralline Algal
nodule

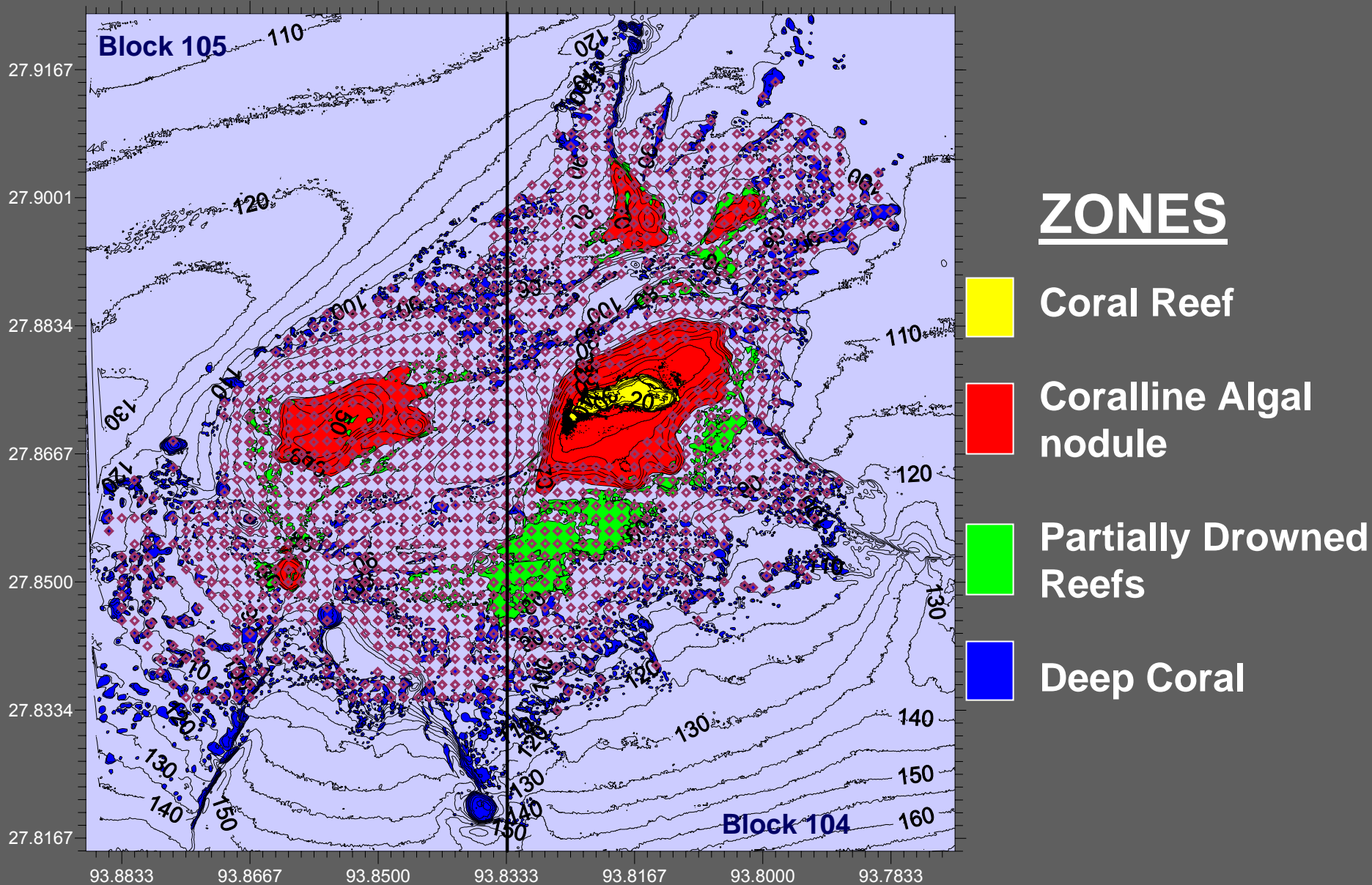


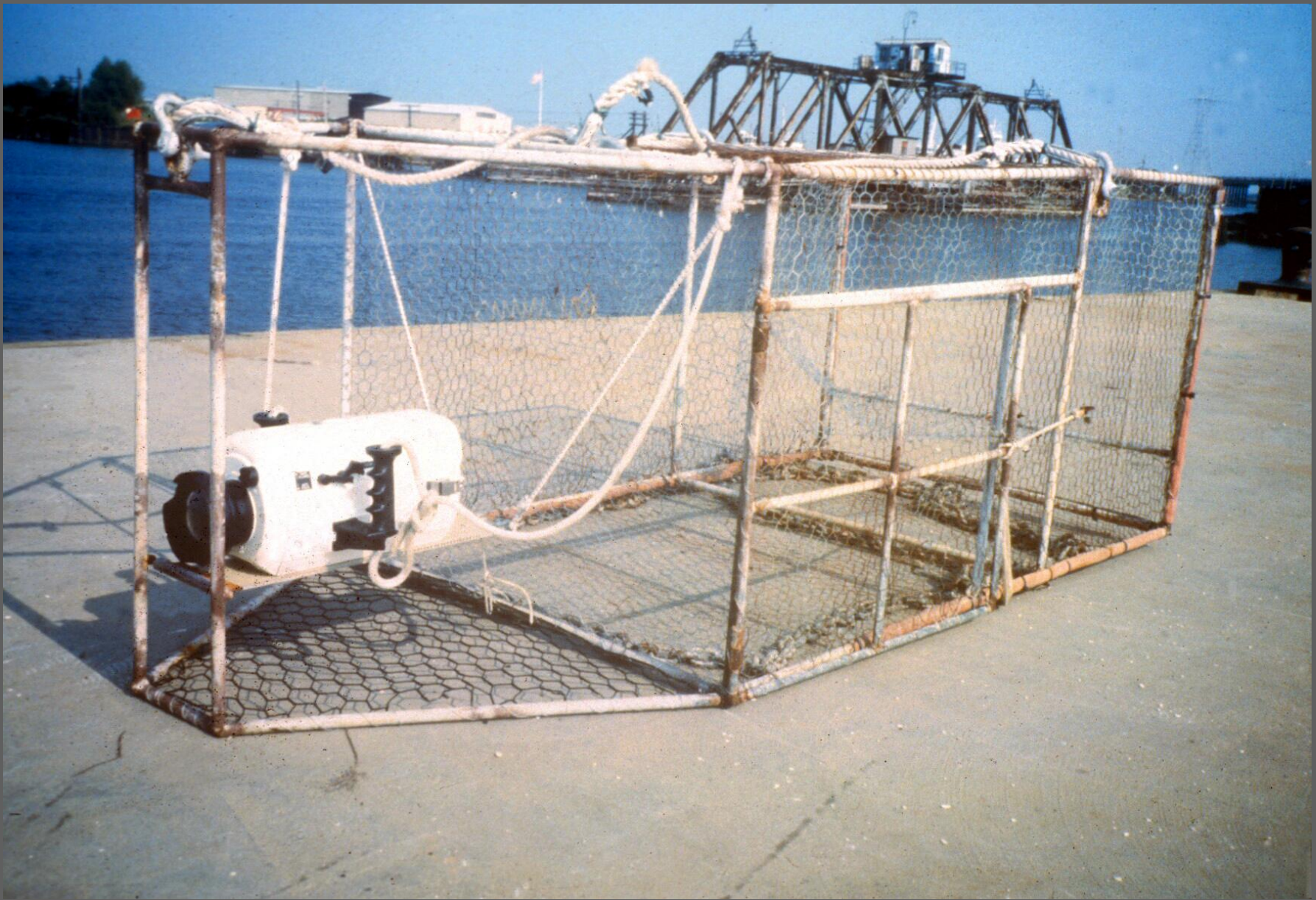
Partially Drowned
Reefs



Deep Coral

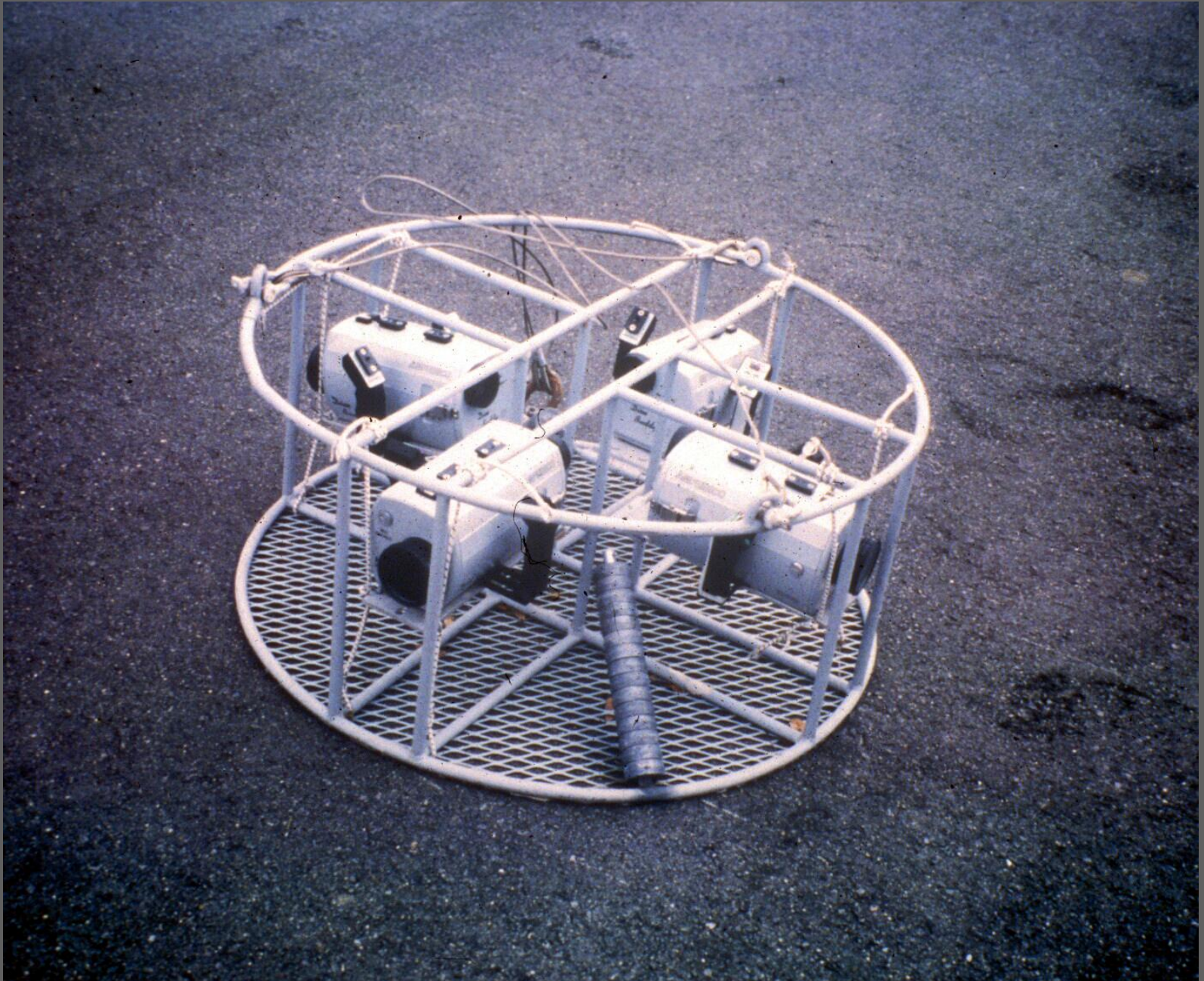
West Bank current sampling frame





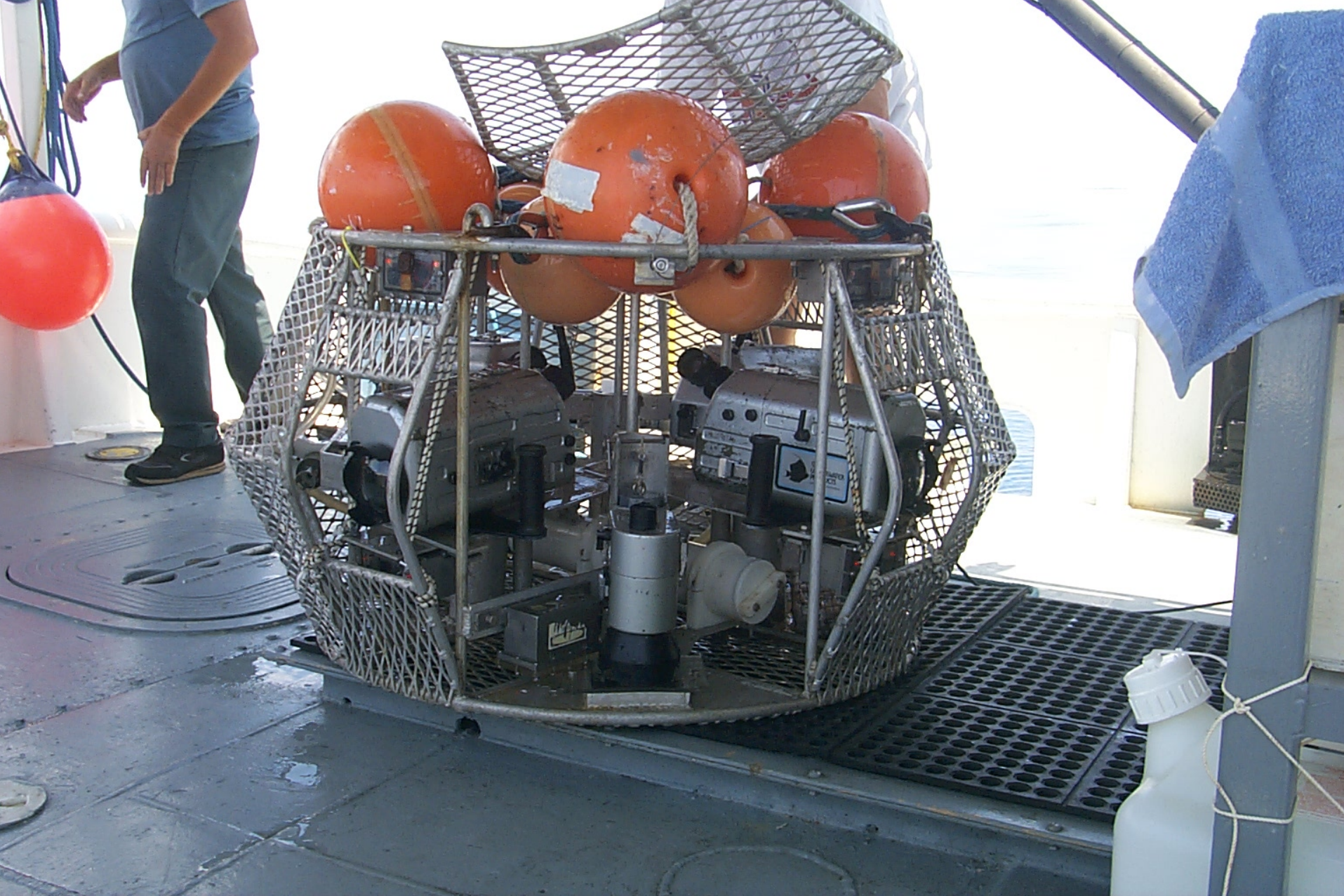
1992-1995: Single funnel fish trap with 8mm video camcorder (1992-1993) in Amphibico housing. Hi-8mm camcorder 1994-1997.

1995 - 97: 4 camera array using Hi8-mm video cameras in Amphibico housings.

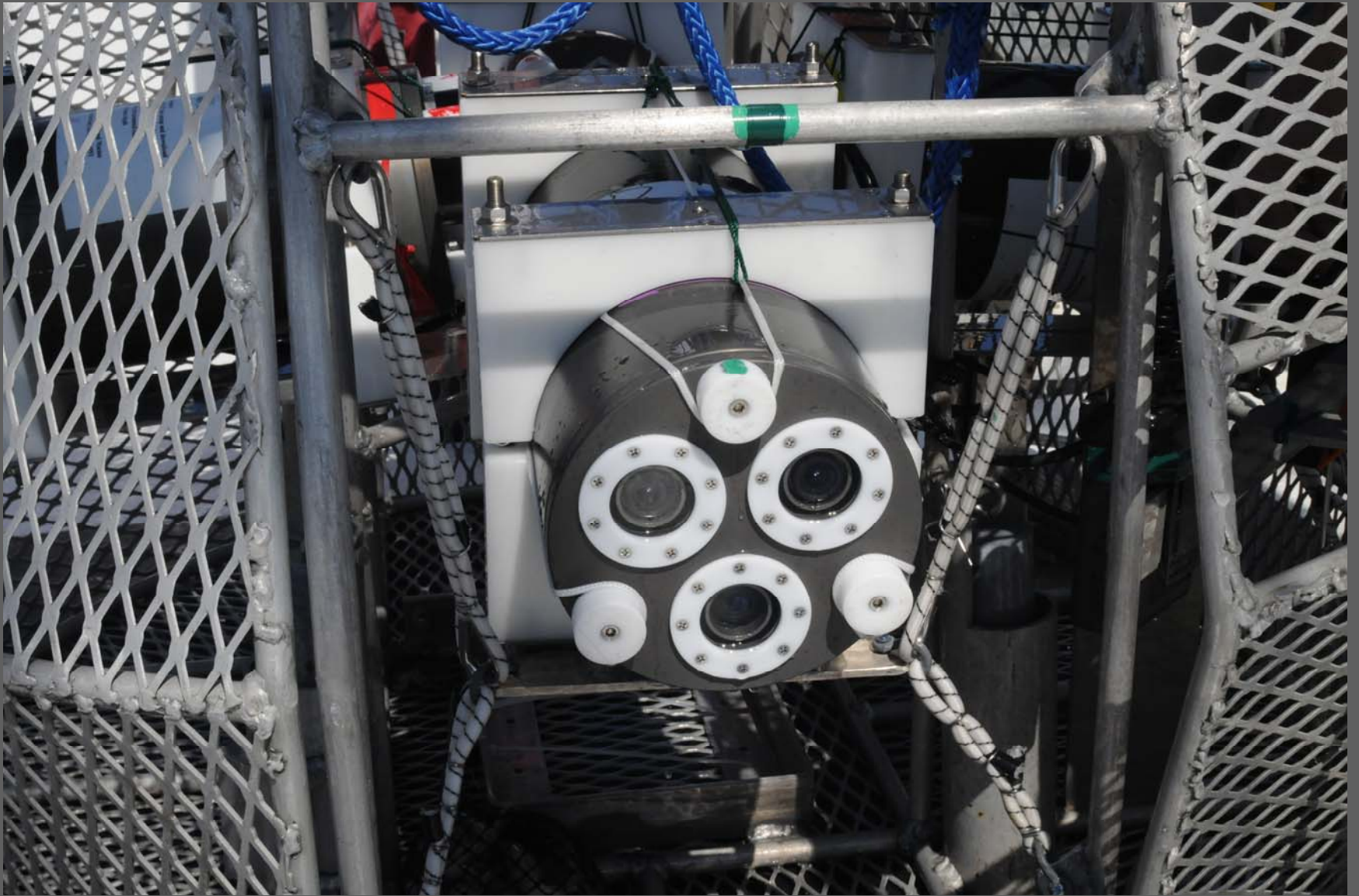




2001: Four camera pod using 4 Sony VX1000 digital camcorders in Gates housings with lasers.



2002 - 2007: Sony VX2000 Camcorders and Sony PC120 down-facing camcorder.



2008: Stereo Cameras



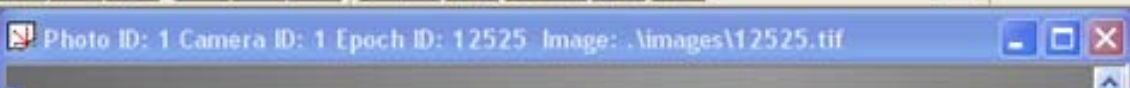
Stereo Camera Array – Feb. 2008 – MPA survey

Calibration uses a target frame imaged from 5 camera stations at 4 camera roll angles.

Images processed to characterize lens distortions and relative orientation of paired cameras.



Target Frame



Object Parameter Information

Object Name: grouper

Centroid Coordinates

X	Y	Z
-292.5425	-174.5907	-2512.9282

Object Length

507.1702 millimetres Precision: 5.2764

Residual Parallax (microns)

Value: 4.1 Limit: 0

Measured Point to Base Centre

Distance: 2541.6342 Angle: 7.4447

Description

Type

- Species
- grouper
- trigger
- snapper
- other

Load type database



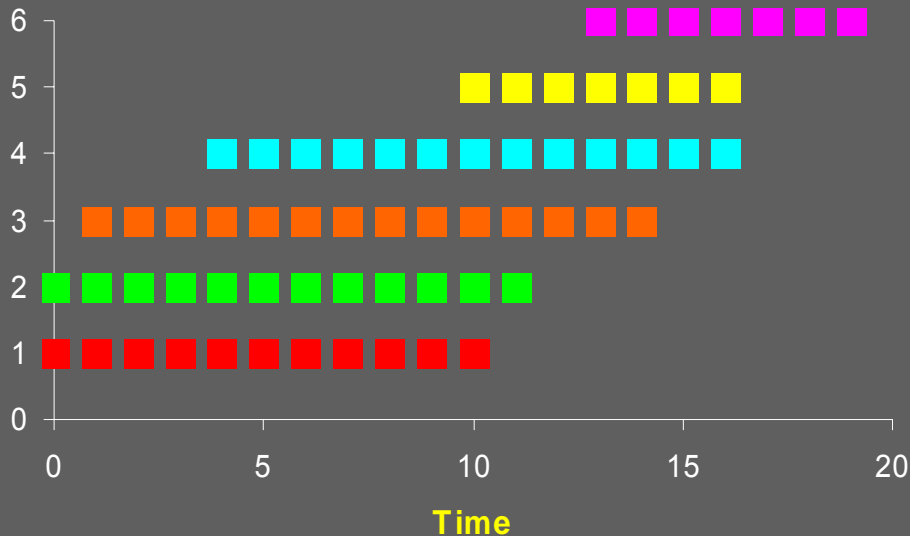
Gear characteristics

- Identification of fish ≥ 200 mm at range of 5 meters in waters with a transmissivity of $\geq 75\%$.
- Water transmissivity $\geq 60\%$.
- Maximum depth 150 m.
- Deployment of gear at depths greater than 100 m limited to mid-day.



Chevron fish trap used from 2001 to present.

Taxon	Time In	Time Out
Red snapper	00:00	00:10
	00:00	00:11
	00:01	00:14
	00:04	00:16
	00:10	00:16
	00:13	00:19



- ❑ In the example, a total of 6 red snapper entered and left the field of view. The total would be 6 fish.
- ❑ Five red snapper were all in the field of view at one time. The minimum number of red snapper present would be 5 fish.
- ❑ Time in and time out entered into data base.



1995: Lasers are used to estimate fish lengths.

Reef Fish SEDARS

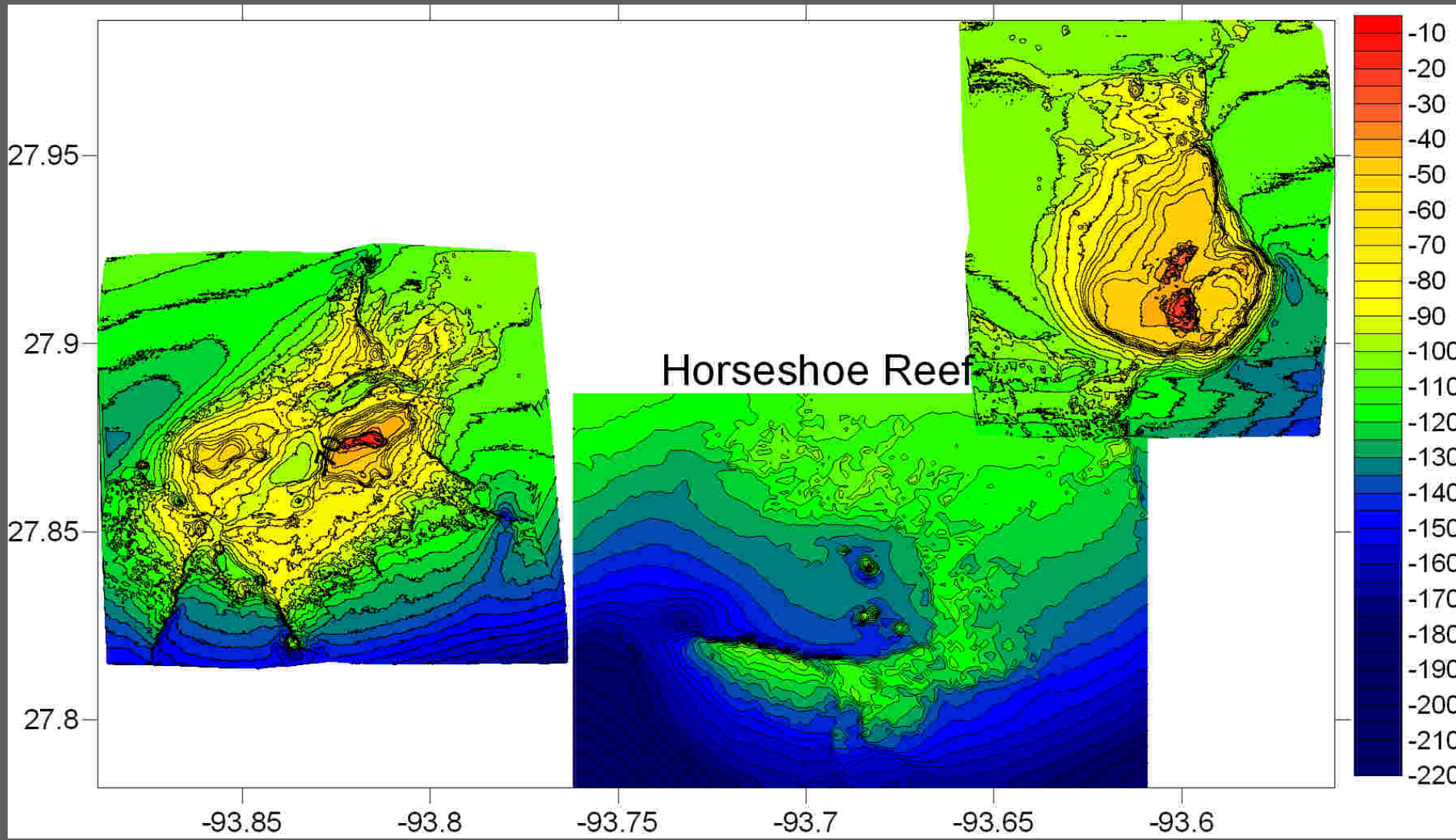
- SEDAR 7 Red Snapper
- SEDAR 9 Gray Triggerfish, Vermilion Snapper, Greater Amberjack
- SEDAR 10 Gag
- SEDAR 12 Red Grouper
- SEDAR 15A Mutton Snapper
- Index Adults

Data Base

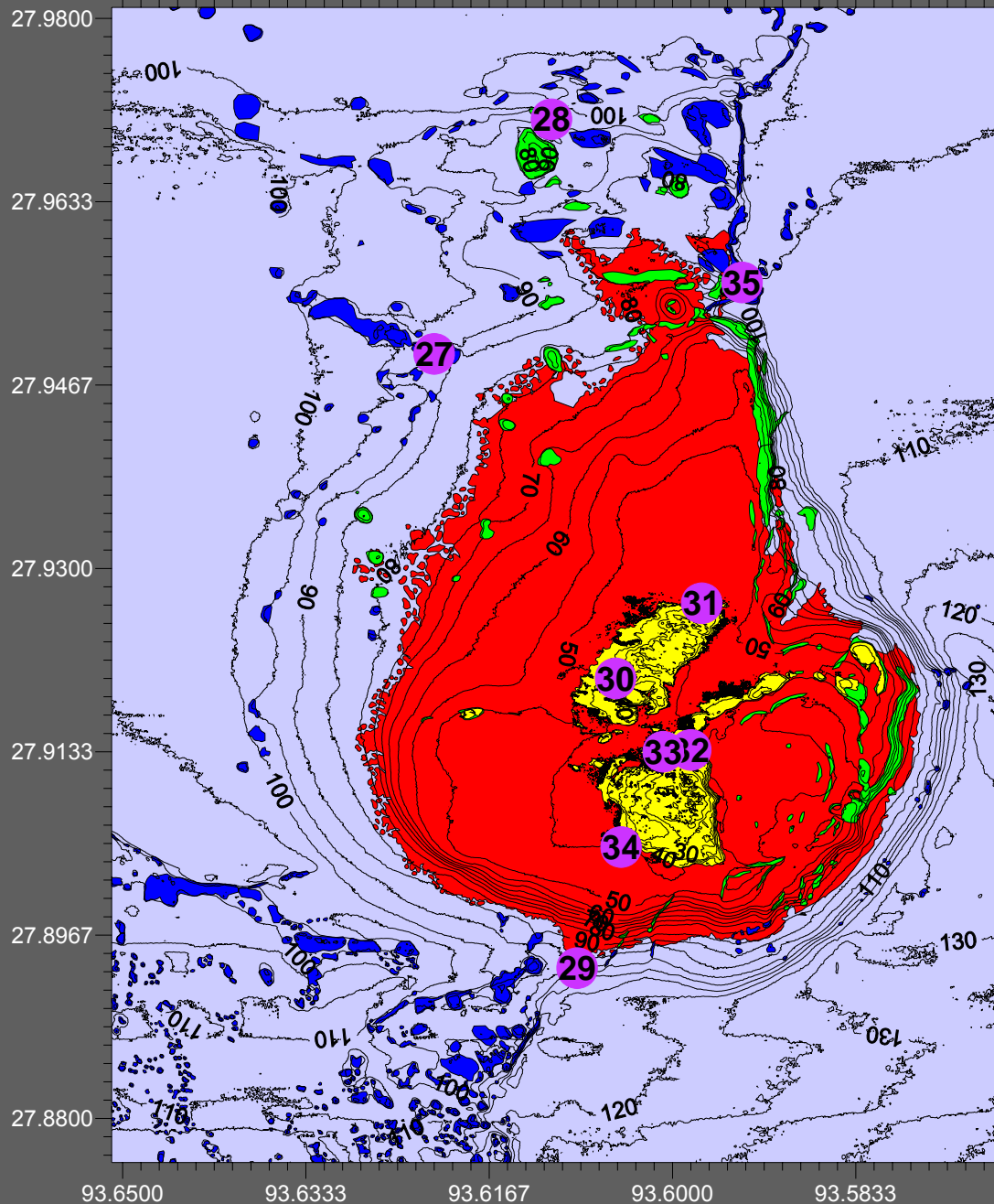
- SCS – Station Information
 - Access
- Count Data
 - Viewing Data – Dbase (Time In / Time Out Data) Identifications checked twice after initial viewing.
 - Species IDs reviewed prior to SEDAR.
 - Mincounts – Calculated prior to SEDAR. SAS Data Sets

Future Changes in Survey


- 2008: Implement Stereo Cameras.
- Additional multibeam sonar mapping of the shelf will result in an increase to sampling frame (e.g. Horseshoe Reef, Mapping of Pulley Ridge).
- Addition of a Series Lens Coupled Intensifier for CCD cameras will allow for deeper deployments.



1992 SEAMAP stations (n = 9)



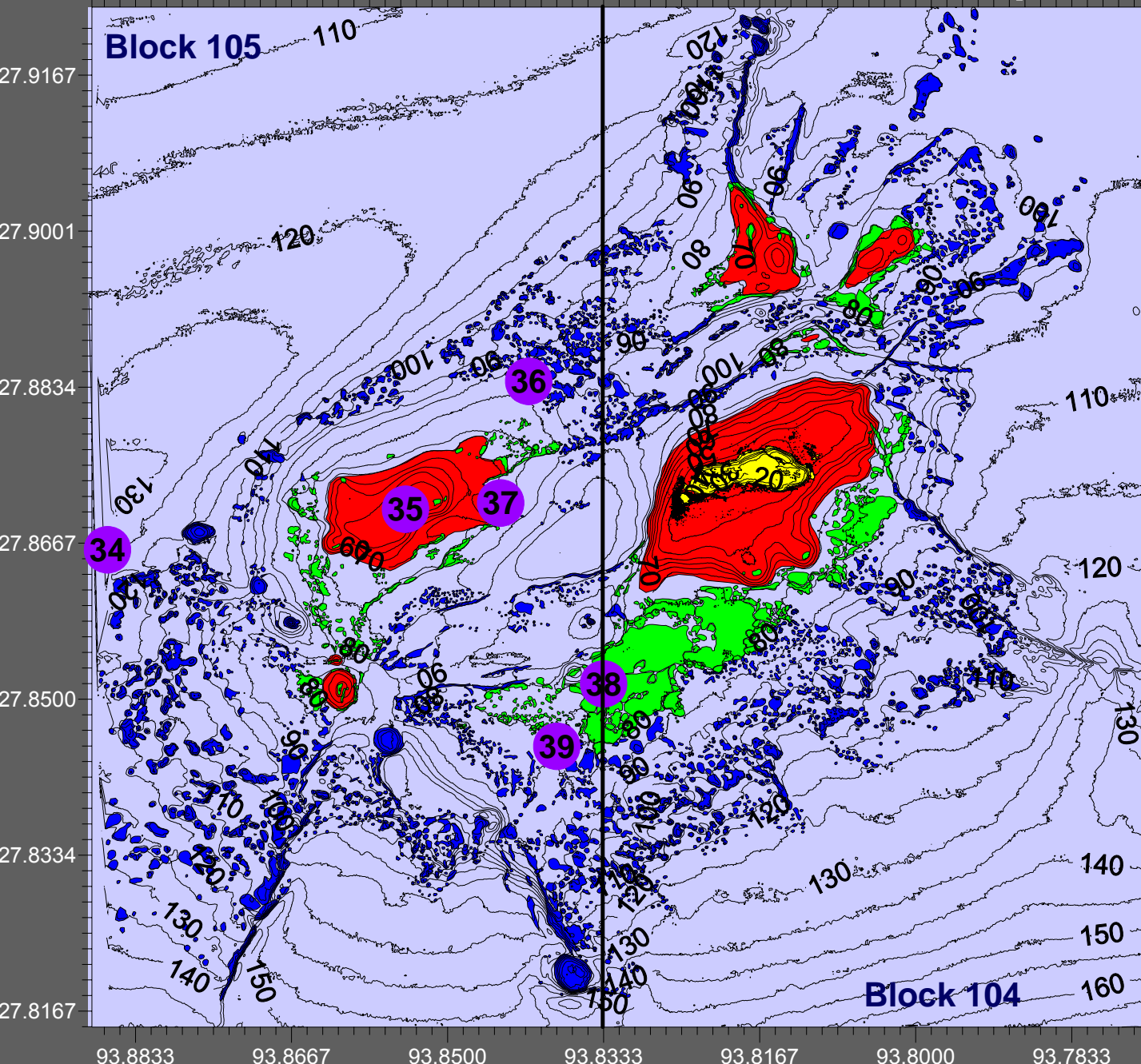
ZONES

-  Coral Reef
-  Coralline Algal nodule
-  Coralline Algae Reefs
-  Deep Coral







Trap/Video

1993 SEAMAP stations (n = 6)

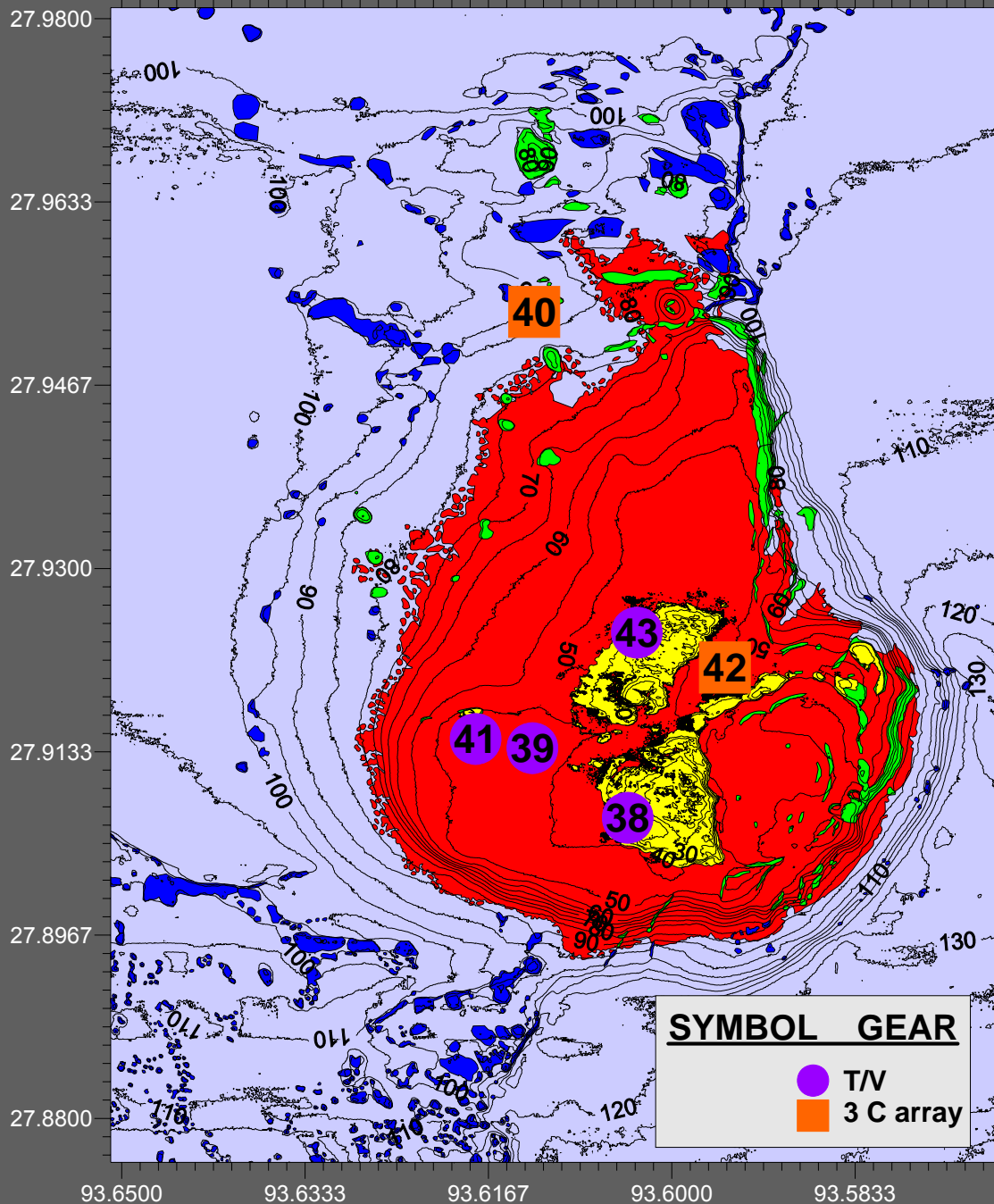


ZONES





-  Coral Reef
-  Coralline Algal nodule
-  Partially Drowned Reefs
-  Deep Coral



1994 SEAMAP stations (n = 6)





ZONES

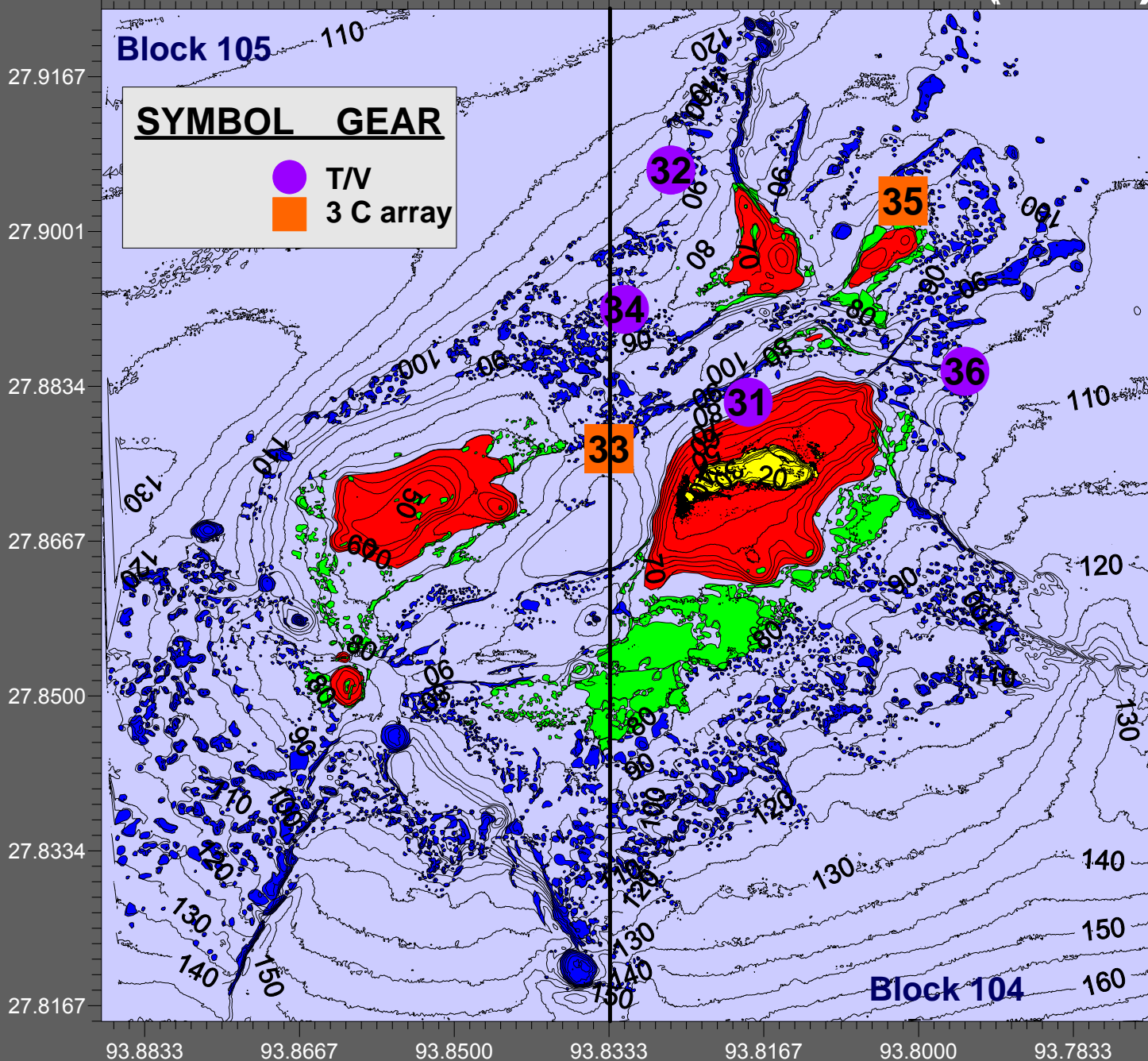
-  Coral Reef
-  Coralline Algal nodule
-  Coralline Algae Reefs
-  Deep Coral



SYMBOL GEAR

-  T/V
-  3 C array

1994 SEAMAP stations (n = 6)



<u>SYMBOL</u>	<u>GEAR</u>
●	T/V
■	3 C array

- ZONES
- Coral Reef
 - Coralline Algal nodule
 - Partially Drowned Reefs
 - Deep Coral

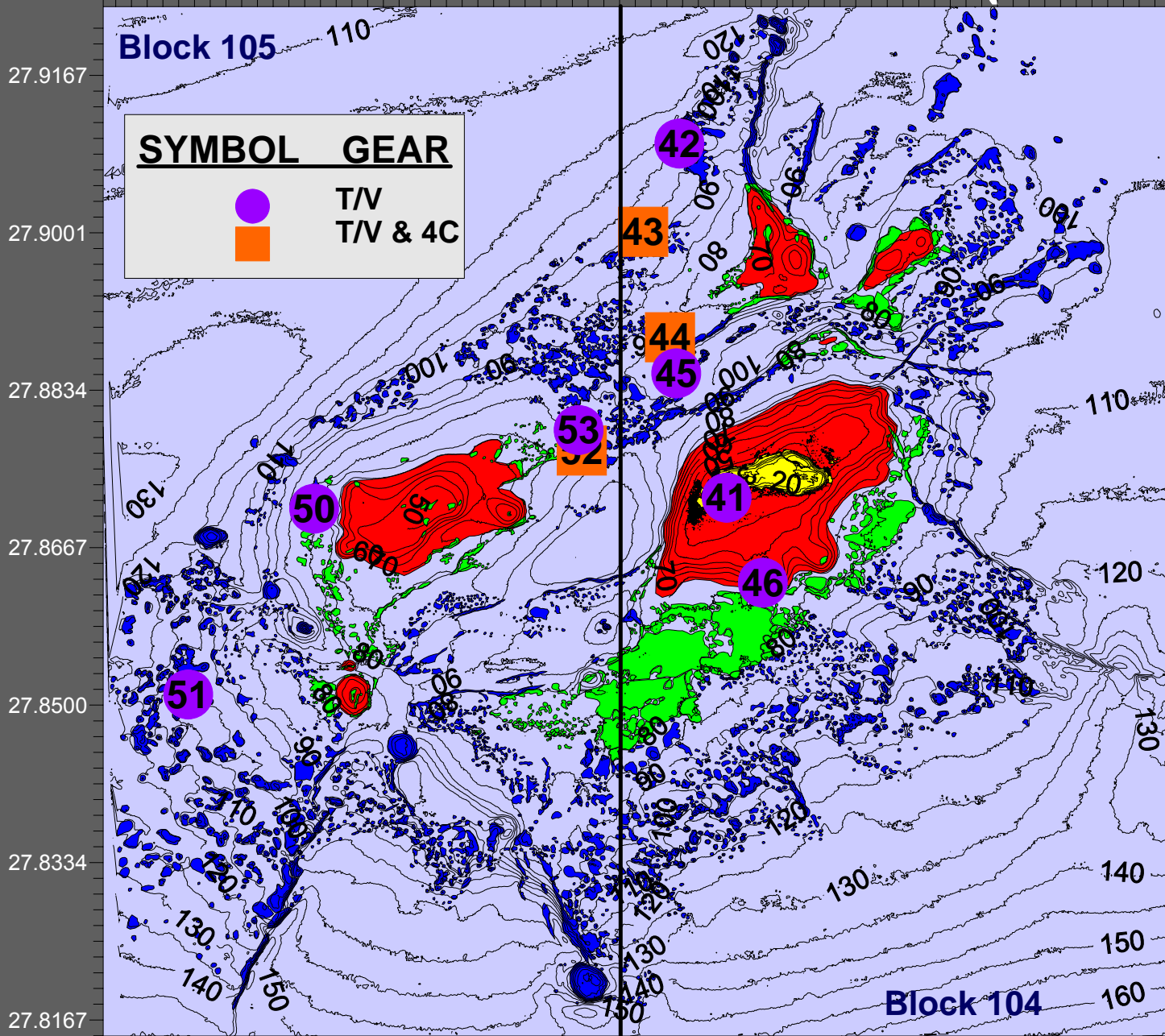


Trap/Video



3 Camera array

1995 SEAMAP stations (n = 10)



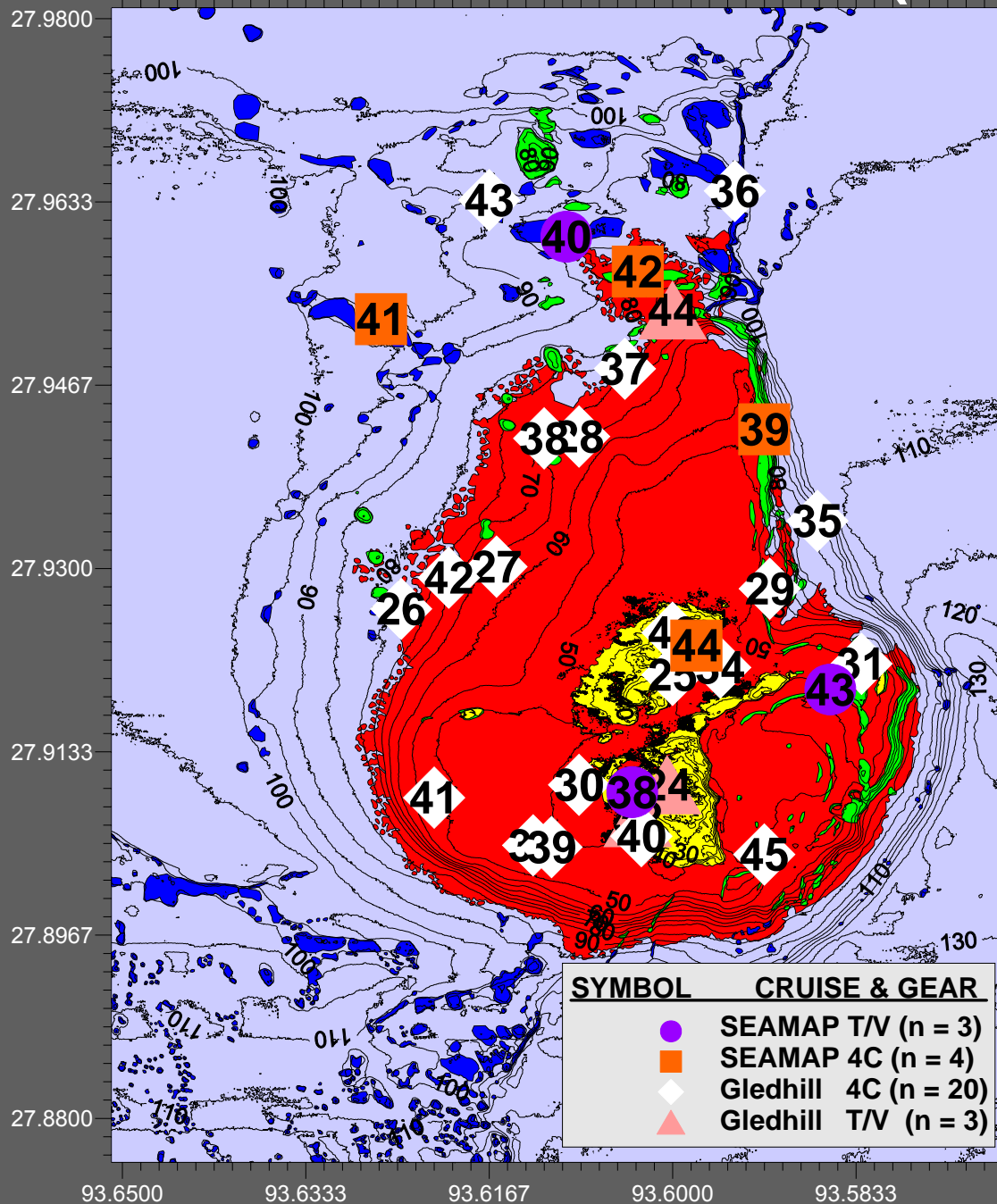
ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral

<u>SYMBOL</u>	<u>GEAR</u>
●	T/V
■	T/V & 4C



1996 stations (n = 30)



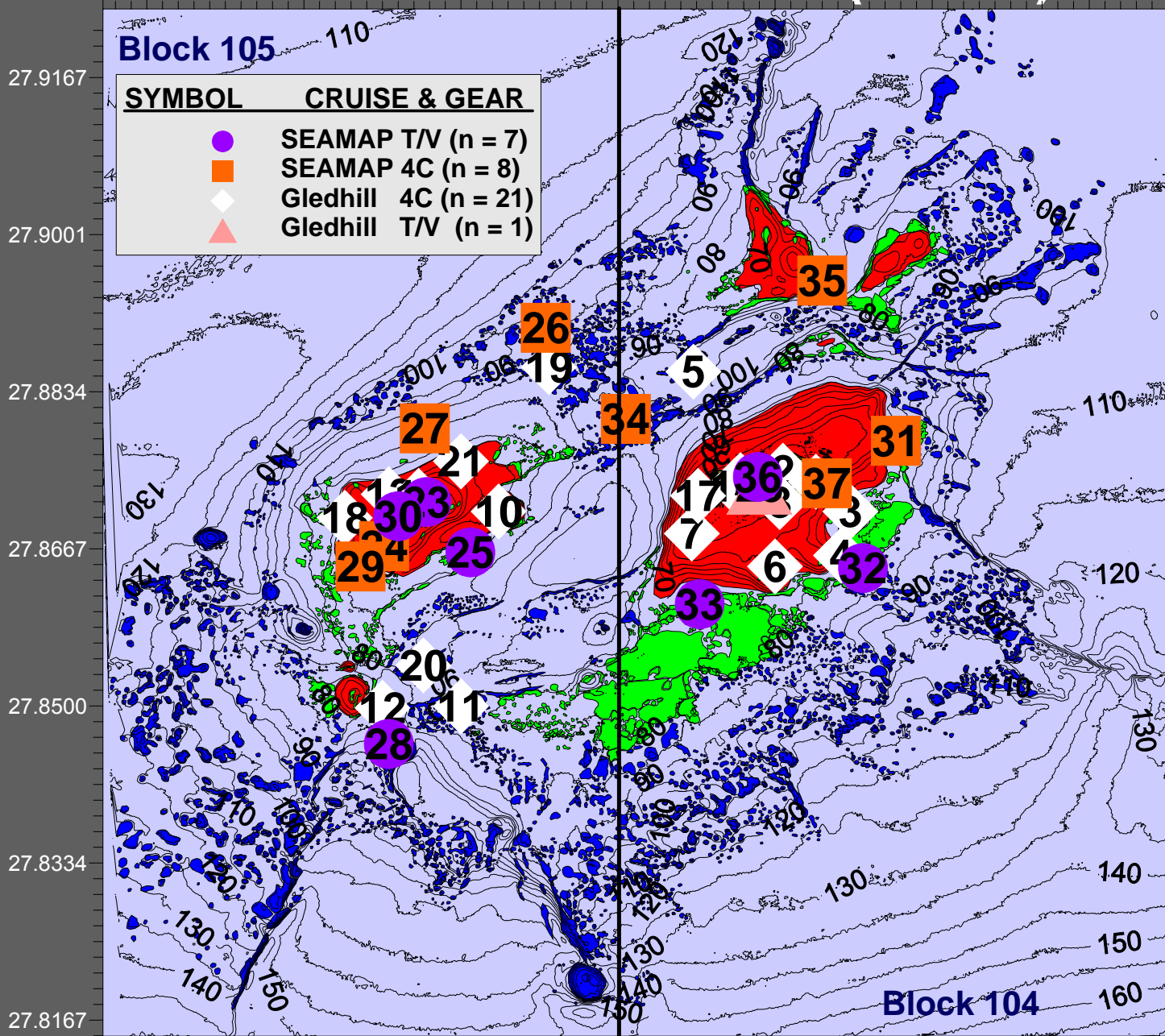
ZONES

- Coral Reef
- Coralline Algal nodule
- Coralline Algae Reefs
- Deep Coral



SYMBOL	CRUISE & GEAR
●	SEAMAP T/V (n = 3)
■	SEAMAP 4C (n = 4)
◇	Gledhill 4C (n = 20)
▲	Gledhill T/V (n = 3)

1996 stations (n = 37)

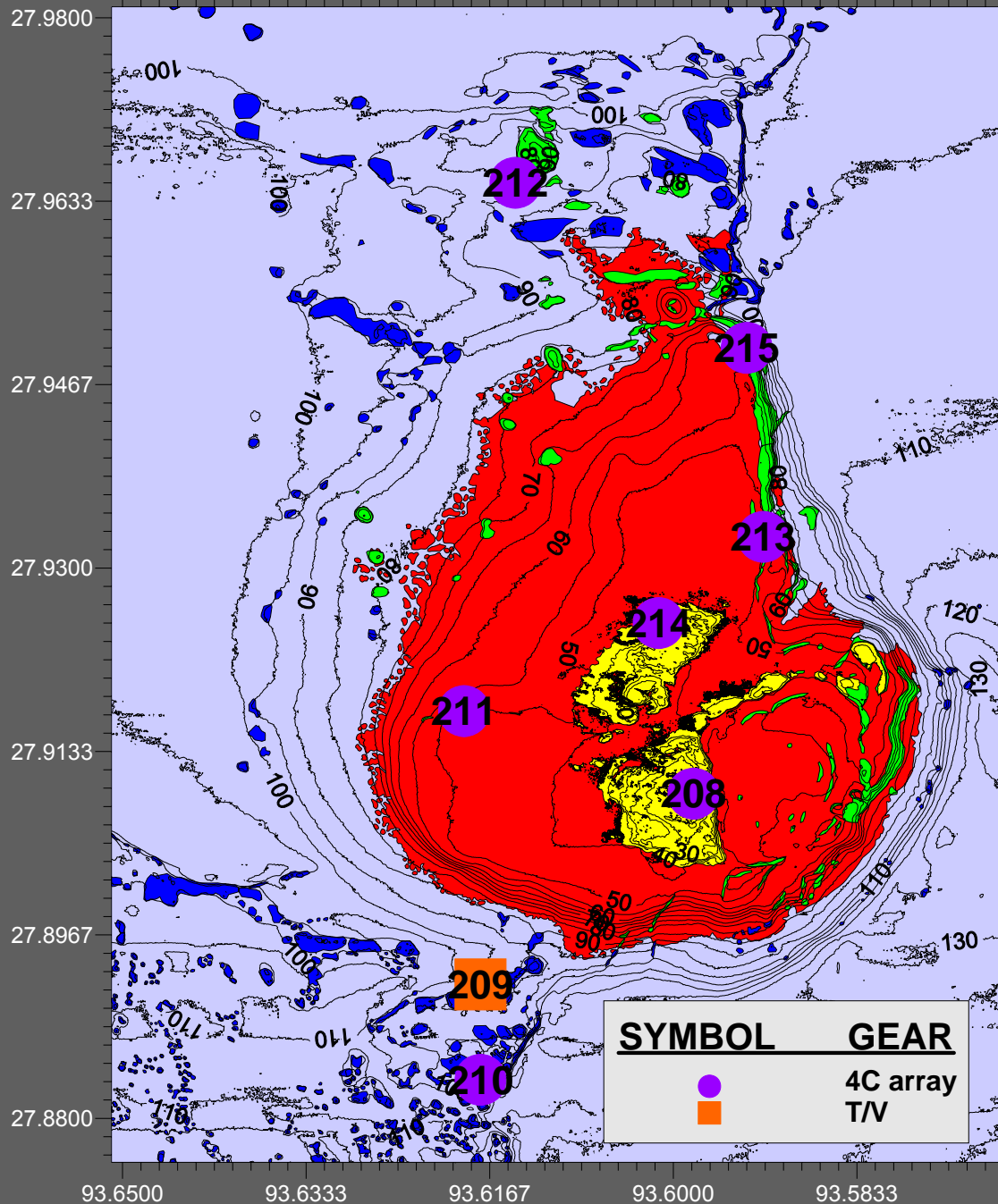


ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral



1997 SEAMAP stations (n = 8)



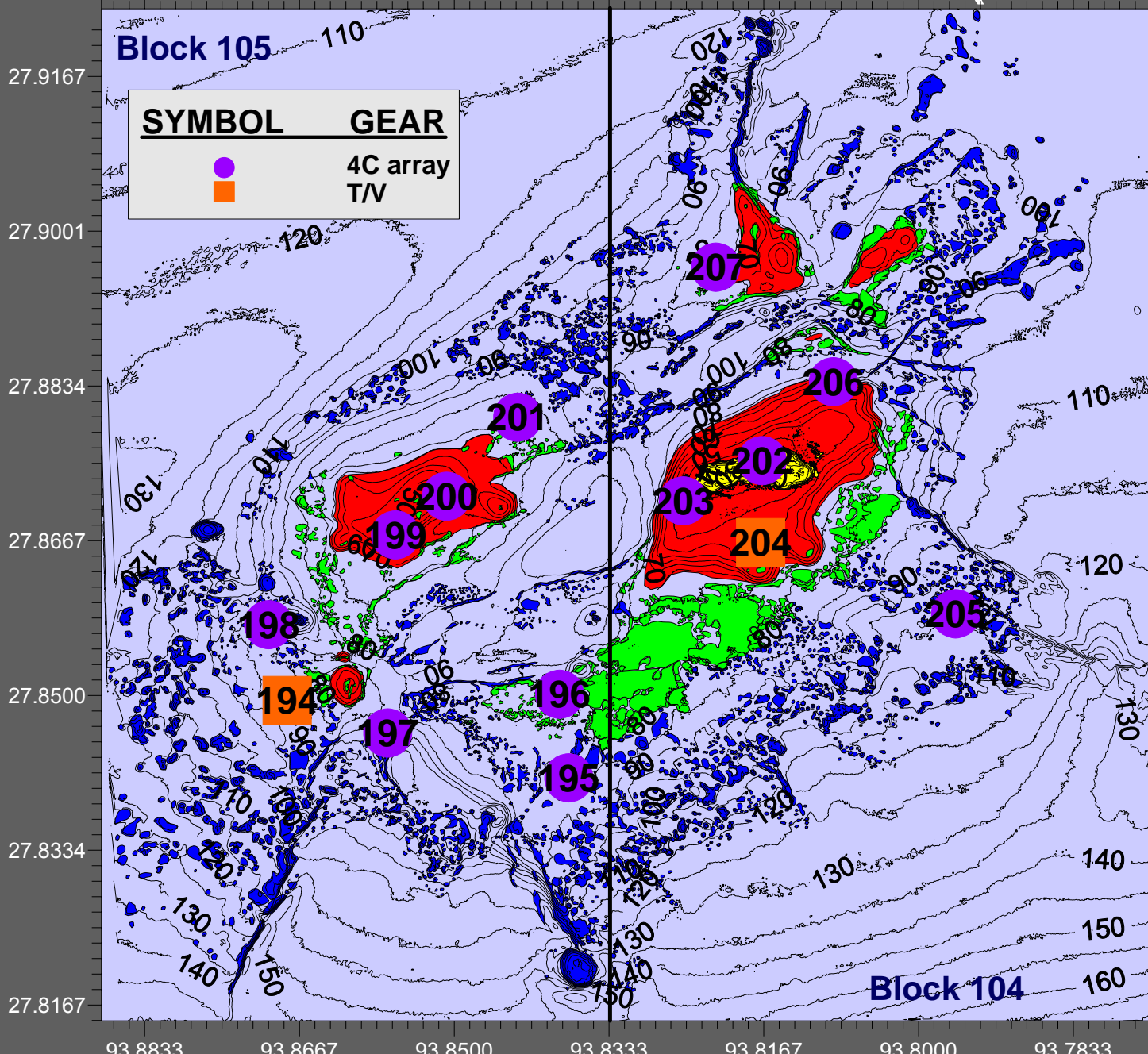
ZONES

- Coral Reef
- Coralline Algal nodule
- Coralline Algae Reefs
- Deep Coral



SYMBOL	GEAR
●	4C array
■	T/V

1997 SEAMAP stations (n = 14)

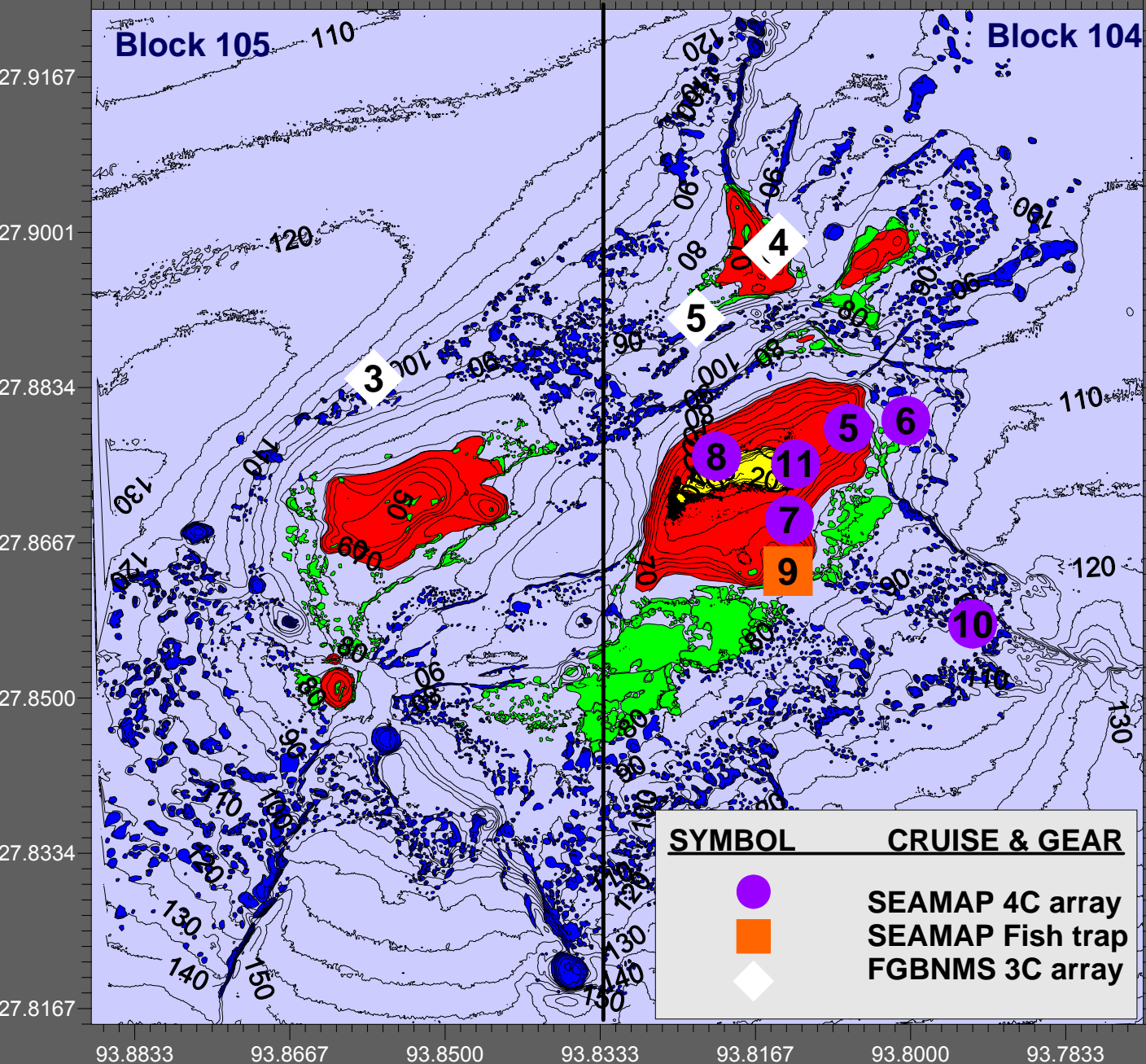


ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral



2001 stations (n = 11)

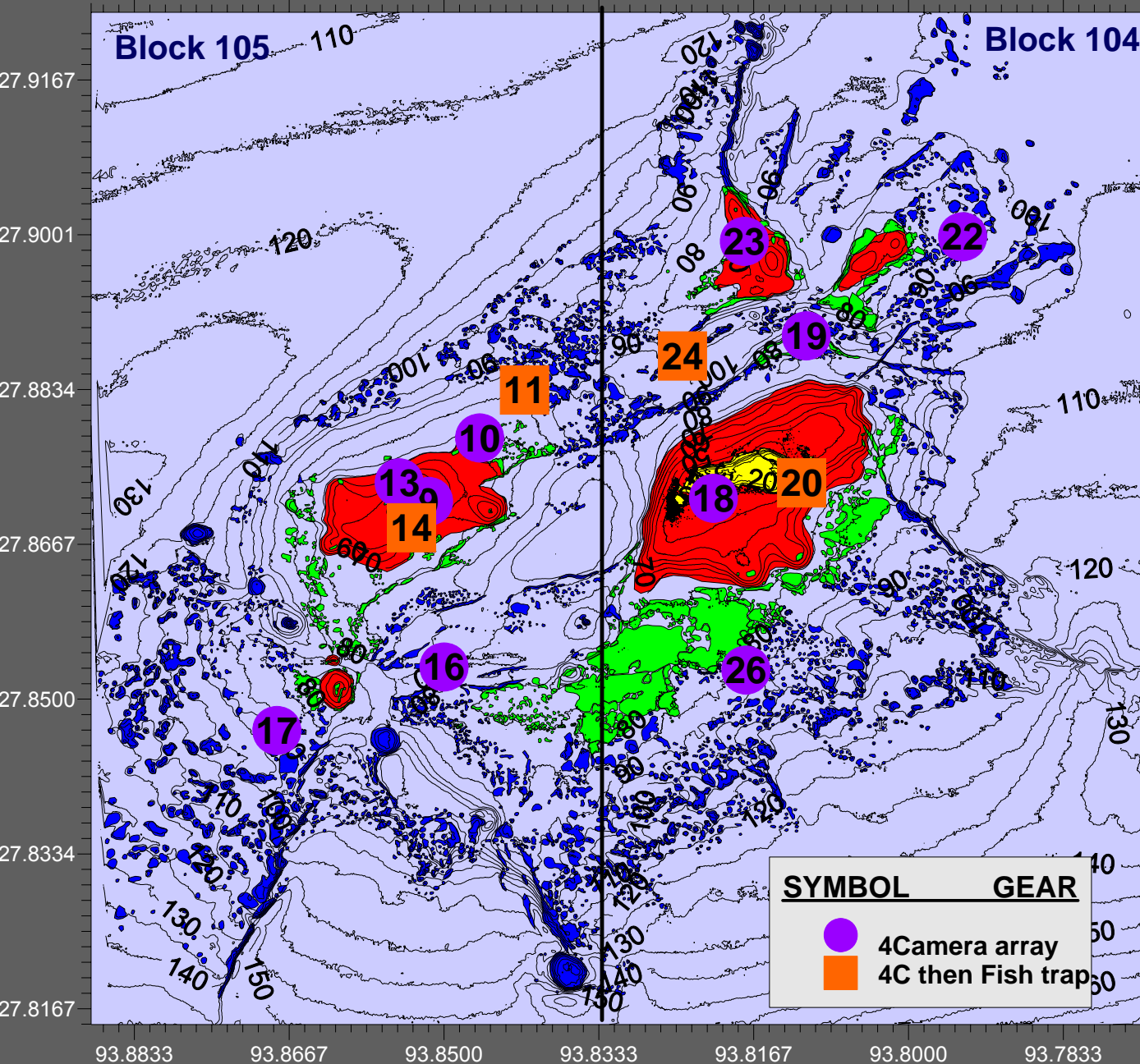


ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral



2002 SEAMAP stations (n = 14)



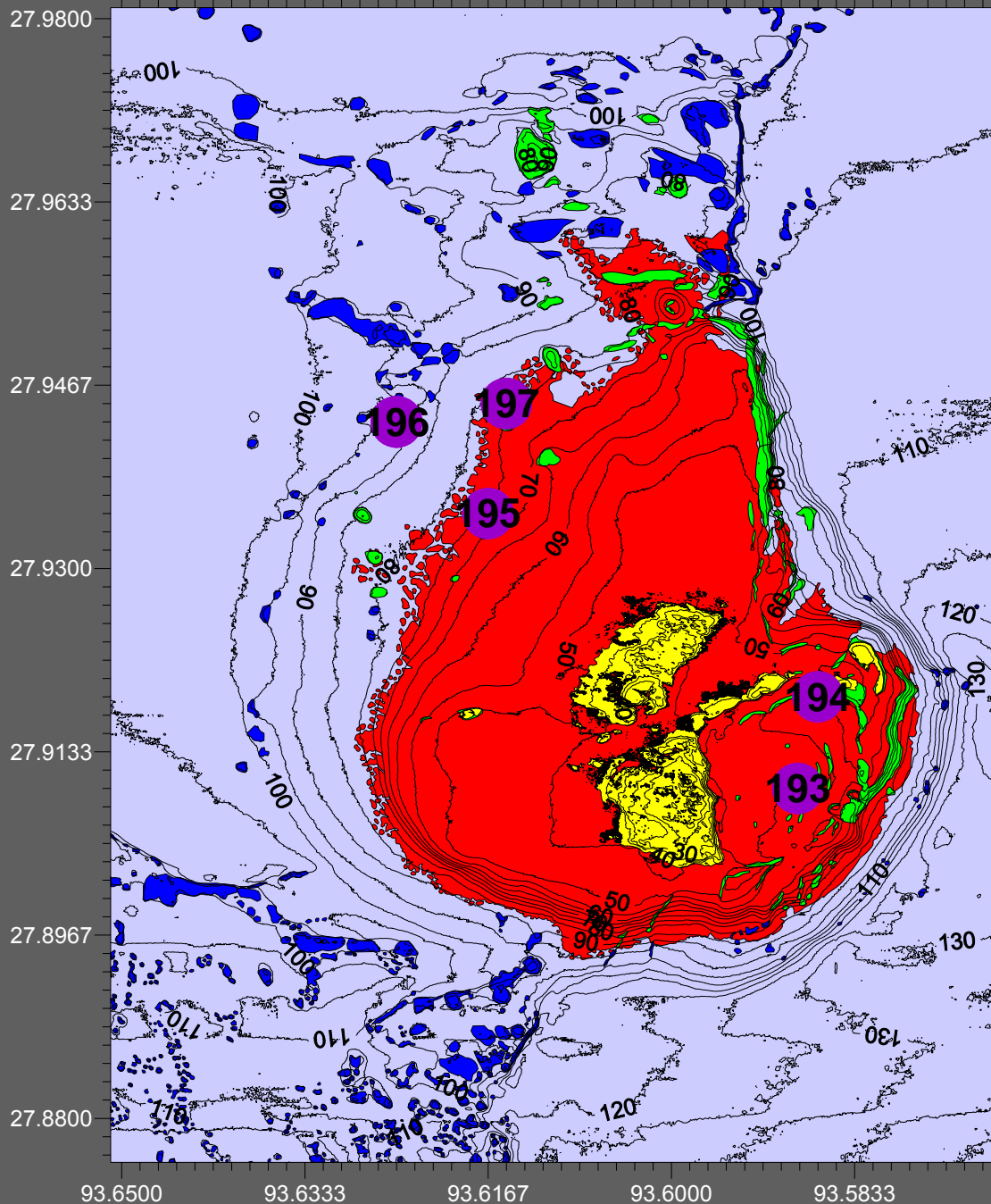
ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral


SYMBOL	GEAR
●	4Camera array
■	4C then Fish trap



2004 SEAMAP stations (n = 5)

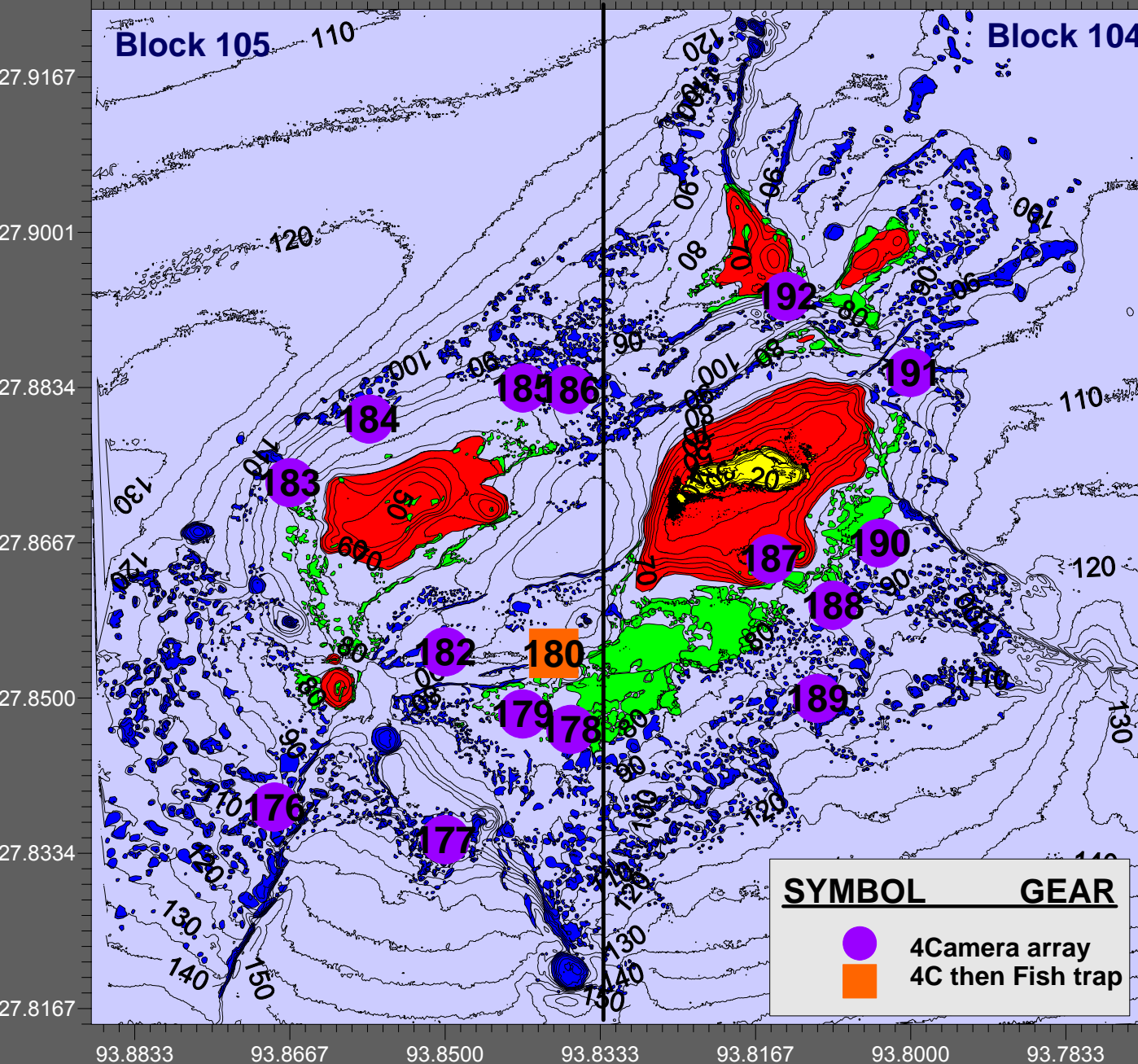


ZONES

-  Coral Reef
-  Coralline Algal nodule
-  Coralline Algae Reefs
-  Deep Coral



2004 SEAMAP stations (n = 16)



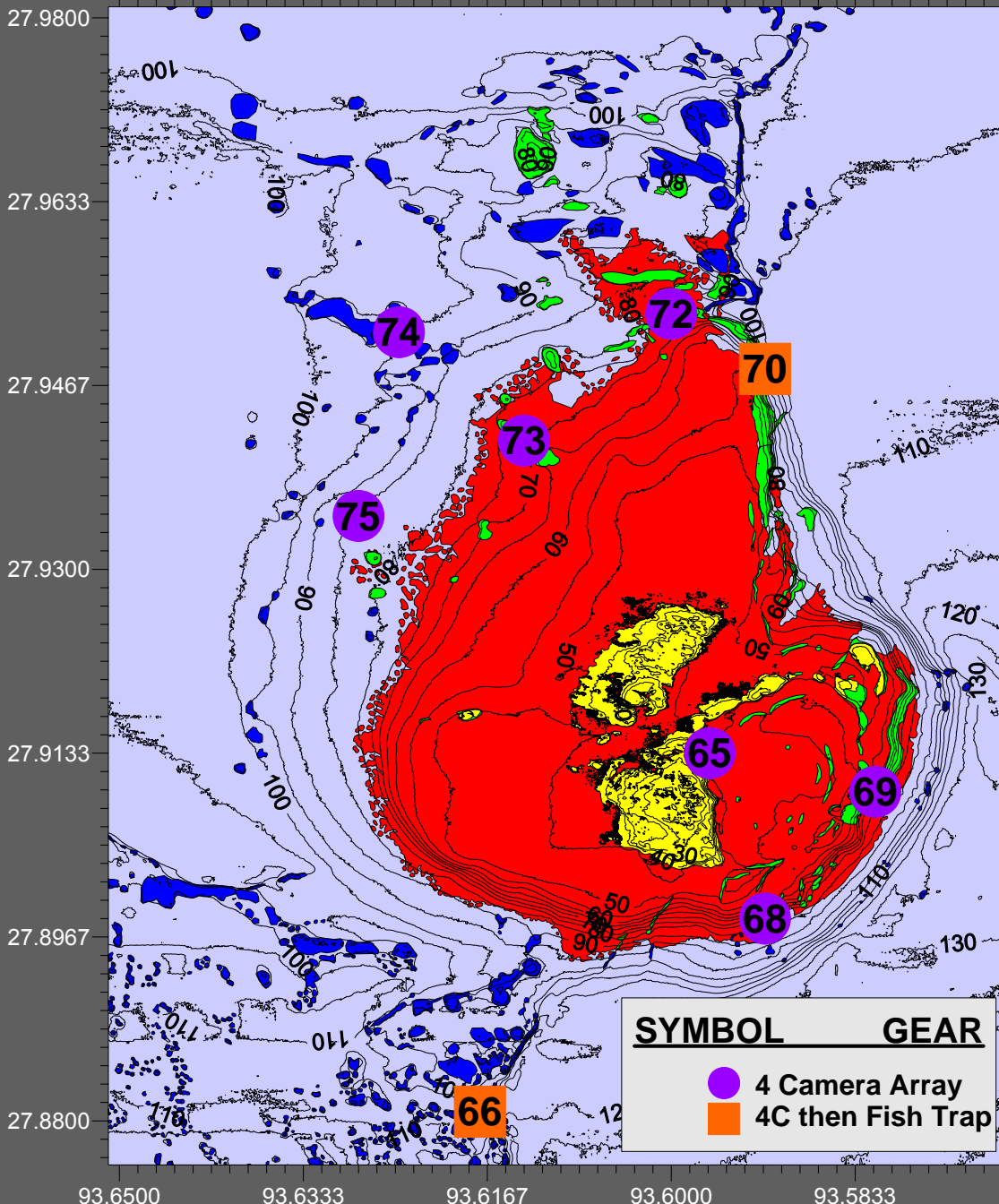
ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral



SYMBOL	GEAR
●	4Camera array
■	4C then Fish trap

2005 SEAMAP stations (n = 9)



ZONES

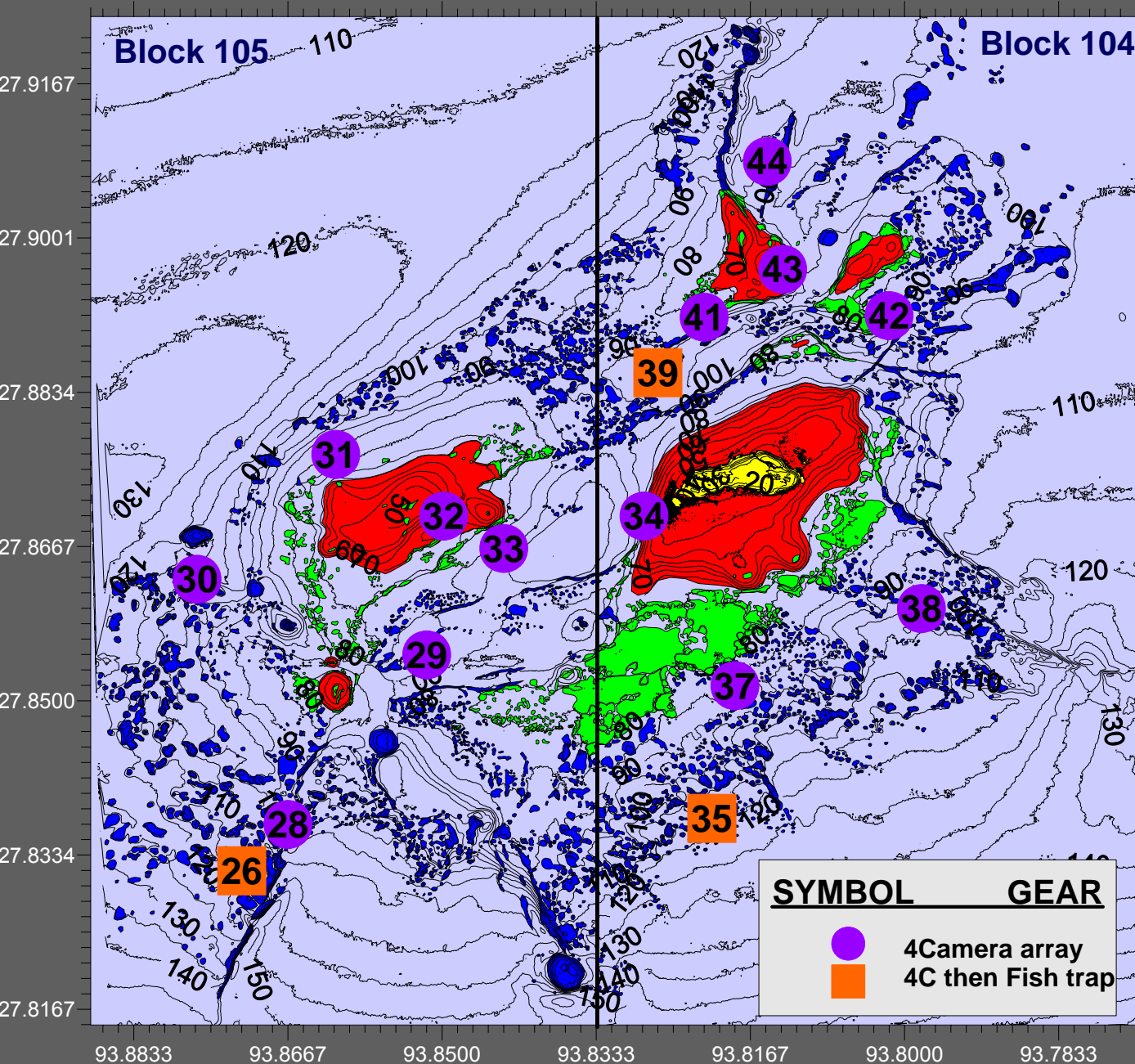
- Coral Reef
- Coralline Algal nodule
- Coralline Algae Reefs
- Deep Coral



SYMBOL	GEAR
●	4 Camera Array
■	4C then Fish Trap



2005 SEAMAP stations (n = 16)



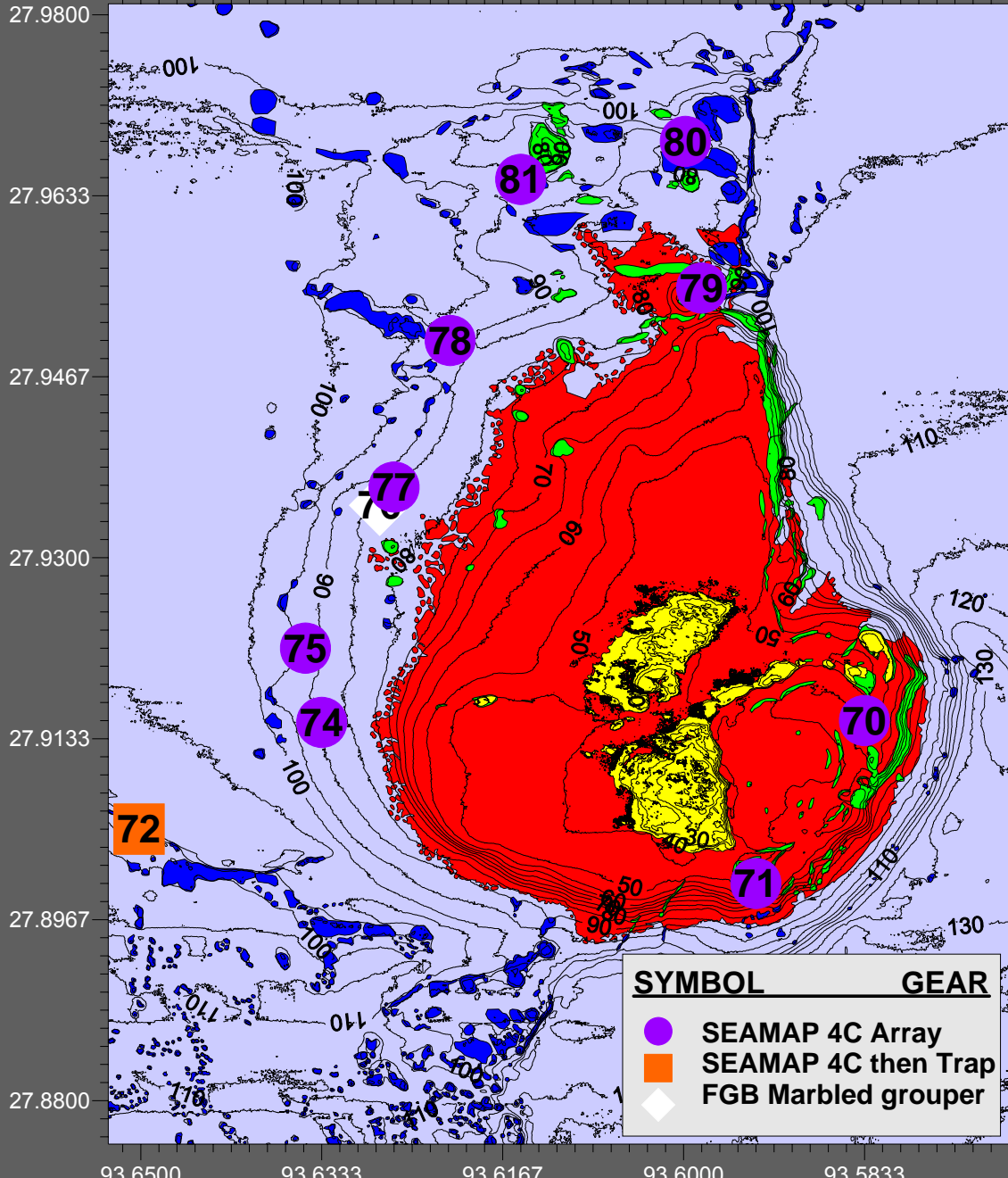
ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral



SYMBOL	GEAR
●	4Camera array
■	4C then Fish trap

2006 stations (n = 11)



ZONES

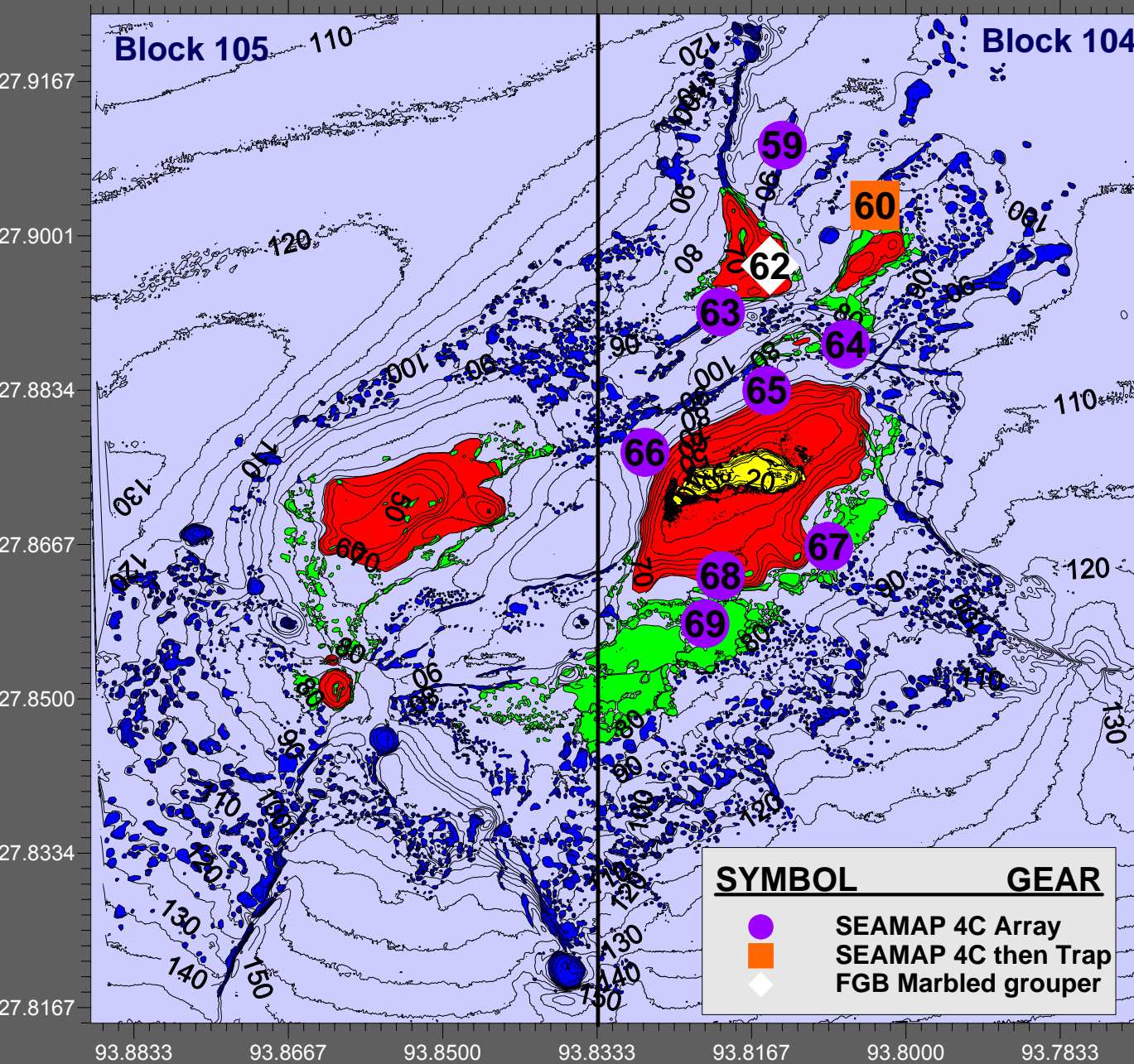
- Coral Reef
- Coralline Algal nodule
- Coralline Algae Reefs
- Deep Coral



SYMBOL	GEAR
●	SEAMAP 4C Array
■	SEAMAP 4C then Trap
◆	FGB Marbled grouper



2006 stations (n = 10)



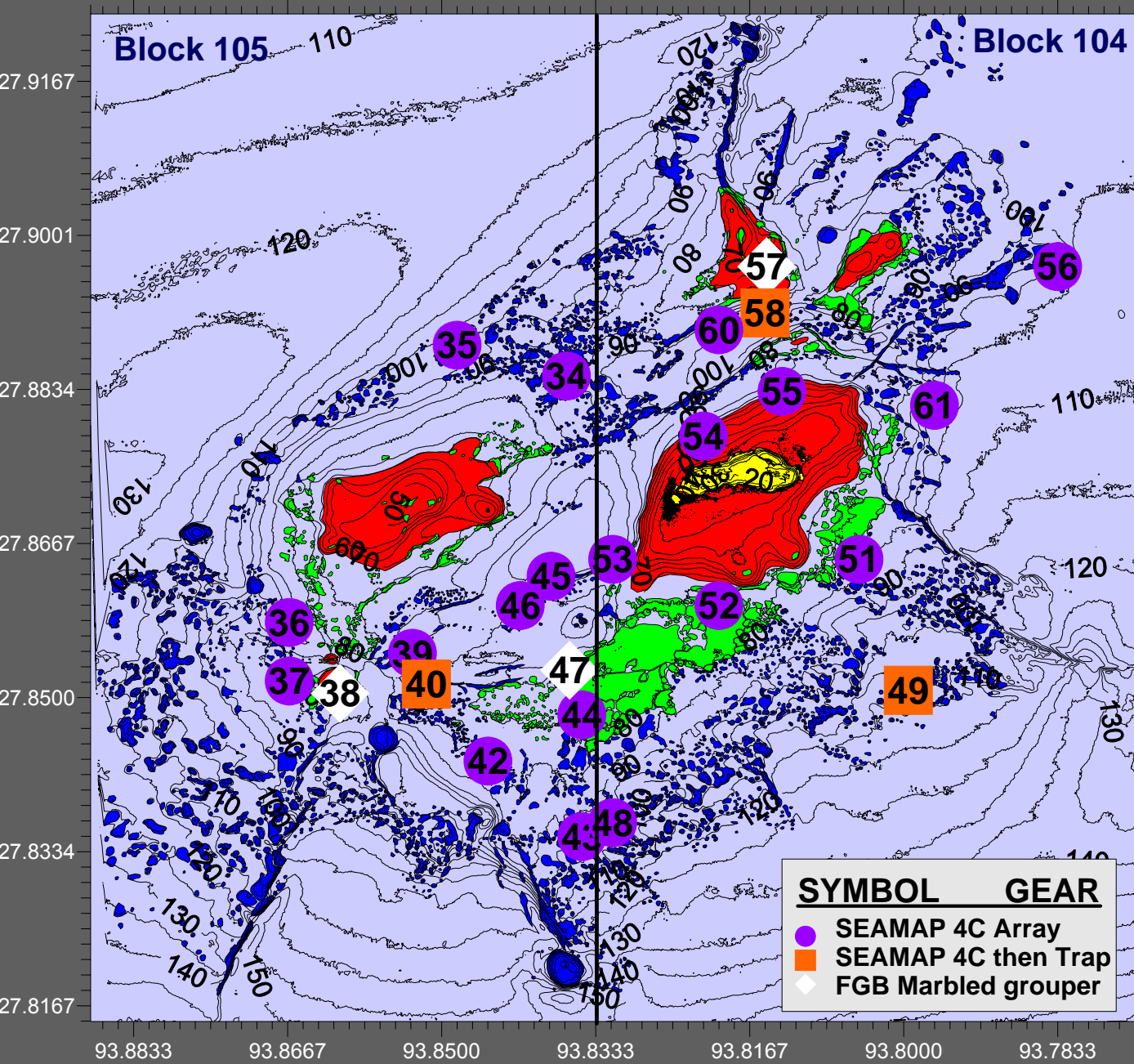
ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral

SYMBOL	GEAR
●	SEAMAP 4C Array
■	SEAMAP 4C then Trap
◆	FGB Marbled grouper



2007 stations (n = 25)



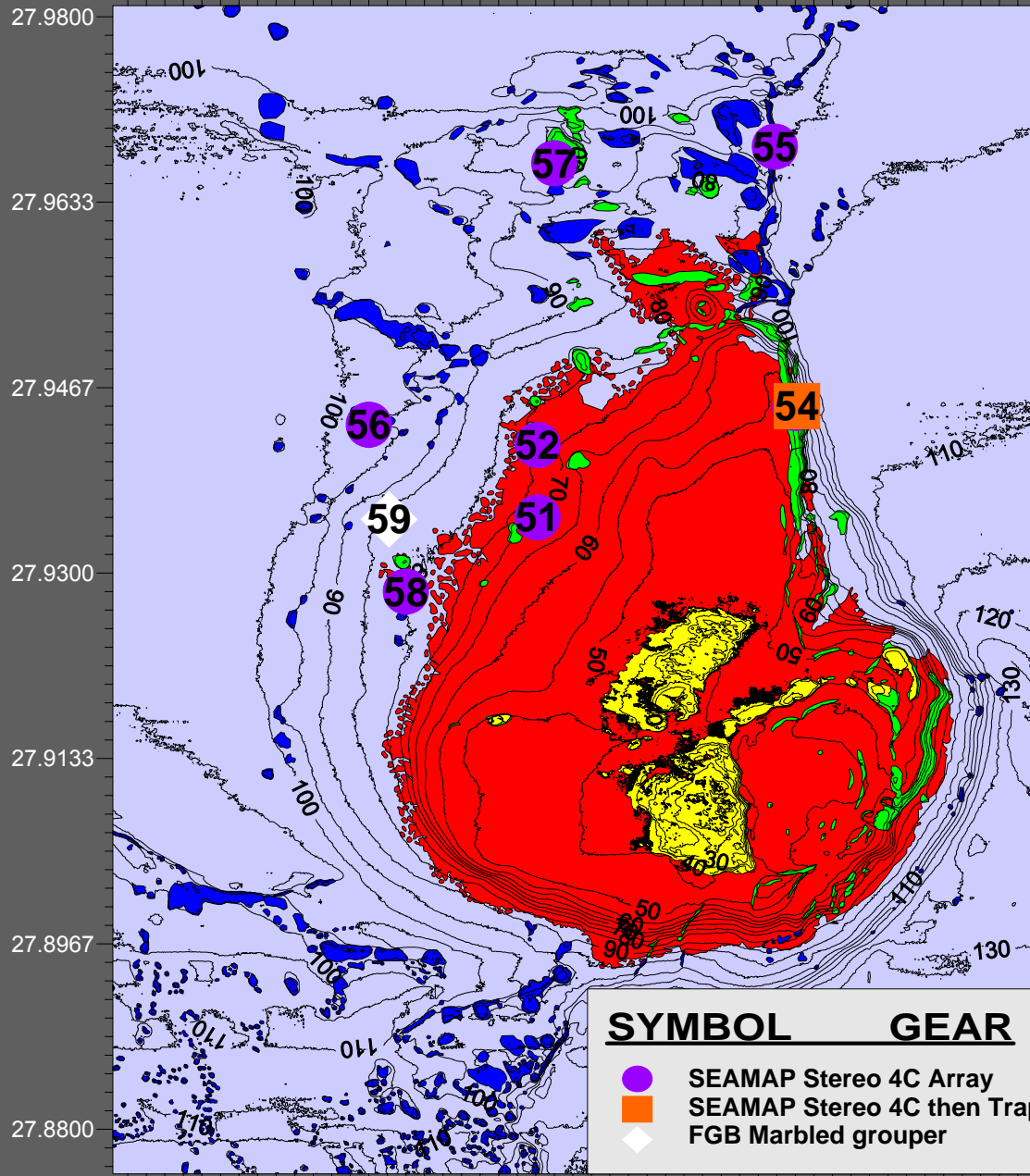
ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral



SYMBOL	GEAR
●	SEAMAP 4C Array
■	SEAMAP 4C then Trap
◆	FGB Marbled grouper

2008 stations (n = 8)



ZONES

- Coral Reef
- Coralline Algal nodule
- Partially Drowned Reefs
- Deep Coral

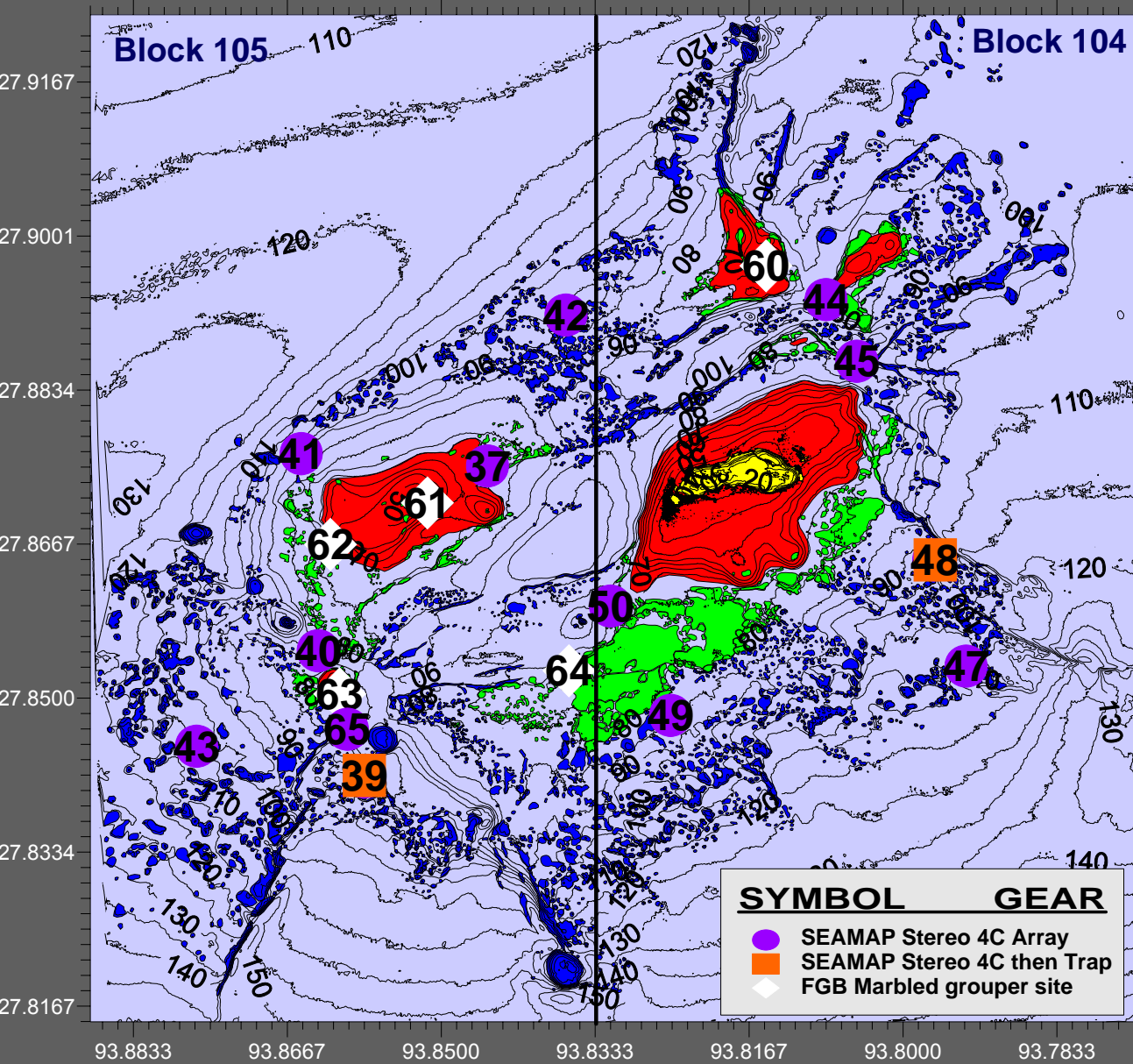


Stereo camera array



Chevron fish trap

2008 stations (n = 18)



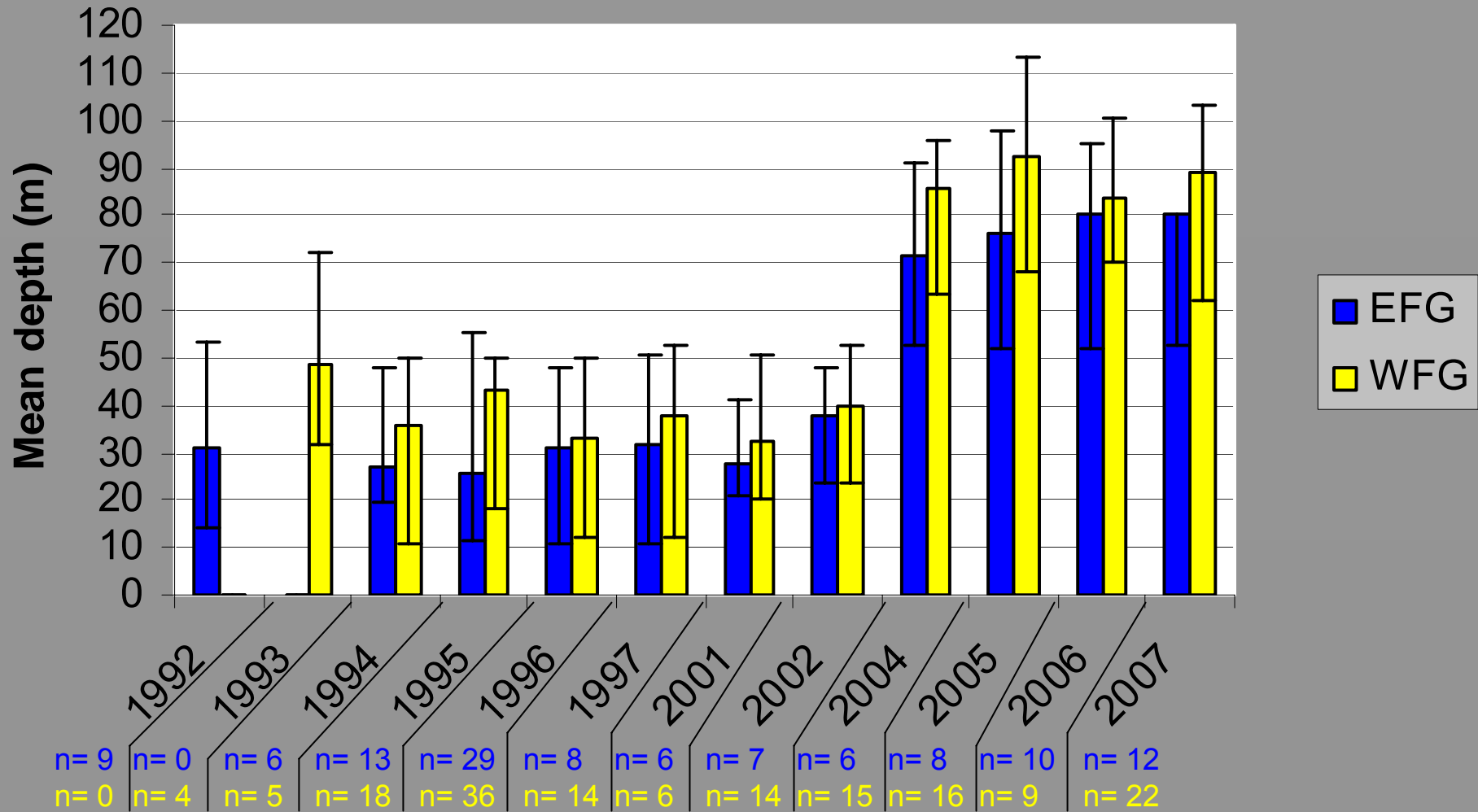
ZONES

- Coral Reef
- Coralline Algal nodule
- Coralline Algae Reefs
- Deep Coral



SYMBOL	GEAR
●	SEAMAP Stereo 4C Array
■	SEAMAP Stereo 4C then Trap
◆	FGB Marbled grouper site

Mean Video depths per year per bank



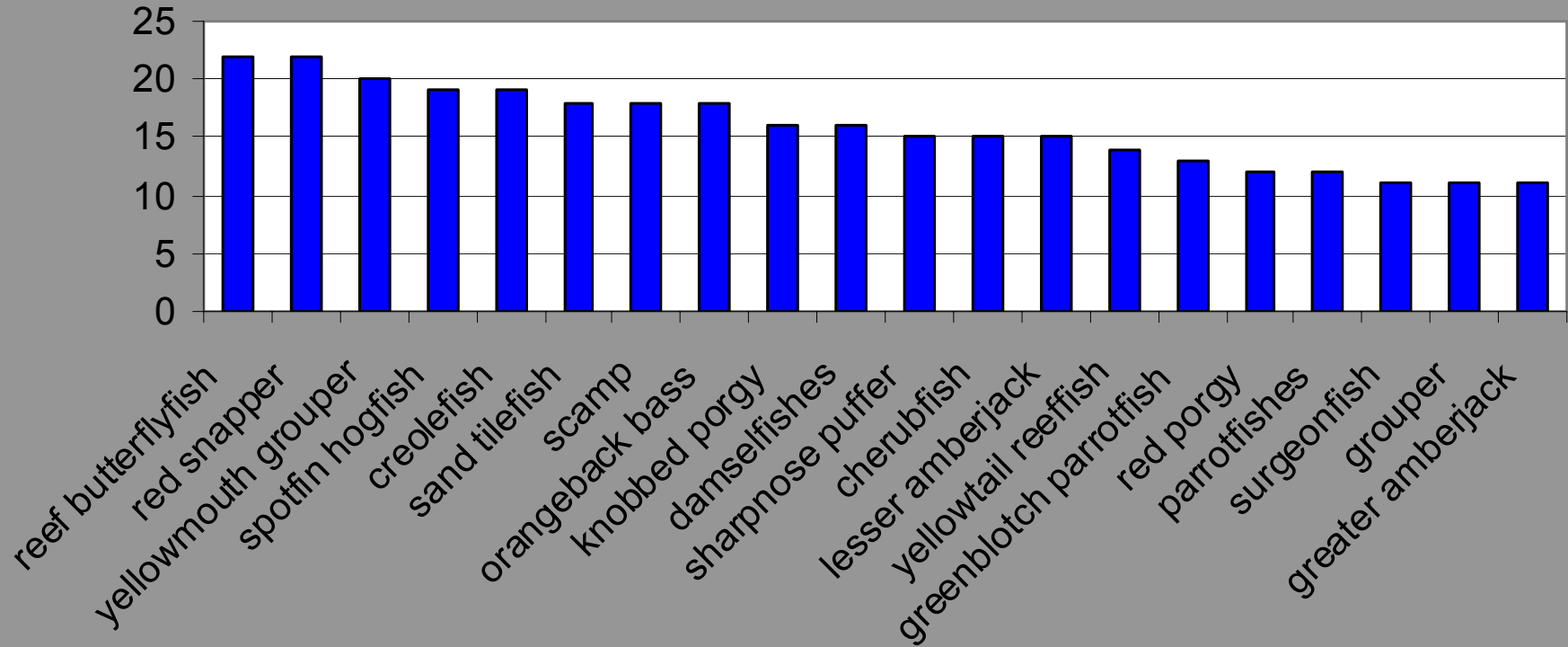
EFGB Video species assemblage

- reef butterflyfish
- red snapper
- yellowmouth grouper
- spotfin hogfish
- creolefish
- sand tilefish
- scamp
- orangeback bass
- knobbed porgy
- sharpnose puffer
- cherubfish
- lesser amberjack
- yellowtail reeffish
- greenblotch parrotfish
- red porgy
- greater amberjack
- bluehead wrasse
- queen triggerfish
- blue chromis
- blue anglefish
- French anglefish
- sunshinefish
- rock beauty
- vermilion snapper
- redband parrotfish
- Spanish hogfish
- red hind
- wrasse bass
- wenchman
- spotted goatfish
- tattler
- stoplight parrotfish
- greenband wrasse
- queen anglefish
- blue tang
- gray triggerfish
- ocean triggerfish
- bar jack
- graysby
- longsnout butterflyfish
- brown chromis
- rock hind
- sea chub
- bicolor damselfish
- queen parrotfish
- great barracuda
- yellow jack
- spotfin butterflyfish
- yellowhead wrasse
- squirrelfish
- doctorfish
- whitespotted filefish
- creole wrasse
- little tunny
- longjaw squirrelfish
- Anthiids
- gray snapper
- yellowfin grouper
- princess parrotfish
- dwarf goatfish
- scrawled filefish
- blue runner
- crevalle jack
- purple reeffish
- red hogfish
- marbled grouper
- jackknife-fish
- spotted moray
- roughtongue bass
- Bonnetmouths
- smooth trunkfish
- dog snapper
- black durgon
- king mackerel
- saddle bass
- redspotted hawkfish
- cardinalfish
- combtooth blennies
- lefteye flounders
- saucereye porgy
- whitebone porgy
- goldface puffer
- horse-eye jack
- black jack
- blackline tilefish
- coney
- bank butterflyfish
- southern stingray
- balloonfish
- sand perch
- sharksucker
- warsaw grouper
- cornetfish
- nurse shark
- cottonwick
- striped grunt
- blue goby
- scrawled cowfish
- trunkfish
- blackfin snapper
- lane snapper
- yellowtail damselfish
- reticulate moray
- gag
- yellowtail snapper
- lancer dragonet
- threespot damselfish
- banded rudderfish
- sargassum triggerfish
- *Gobiosoma* sp.
- *Hemanthias* sp.

Top 20 Taxa on Video

East Flower Garden Bank (n=114)

Observed Frequency

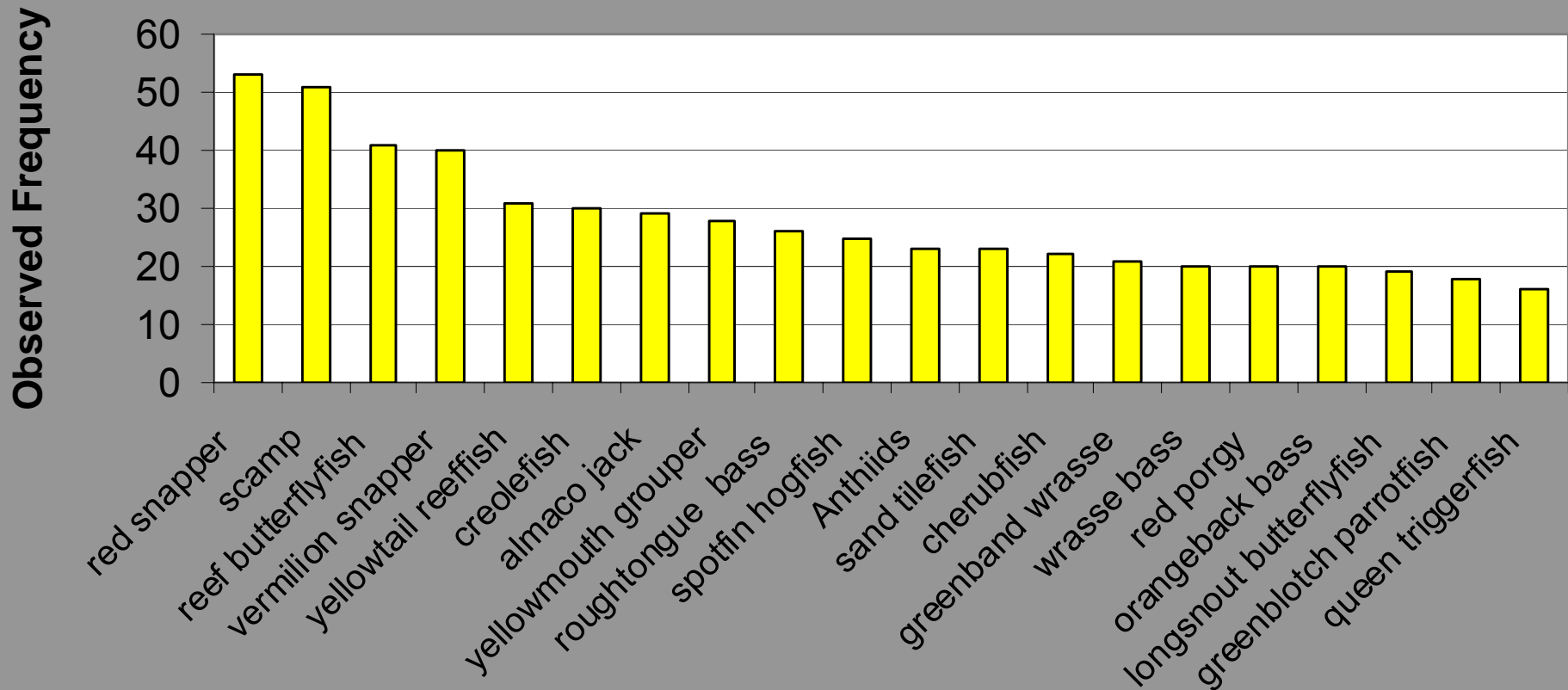


WFGB Video species assemblage

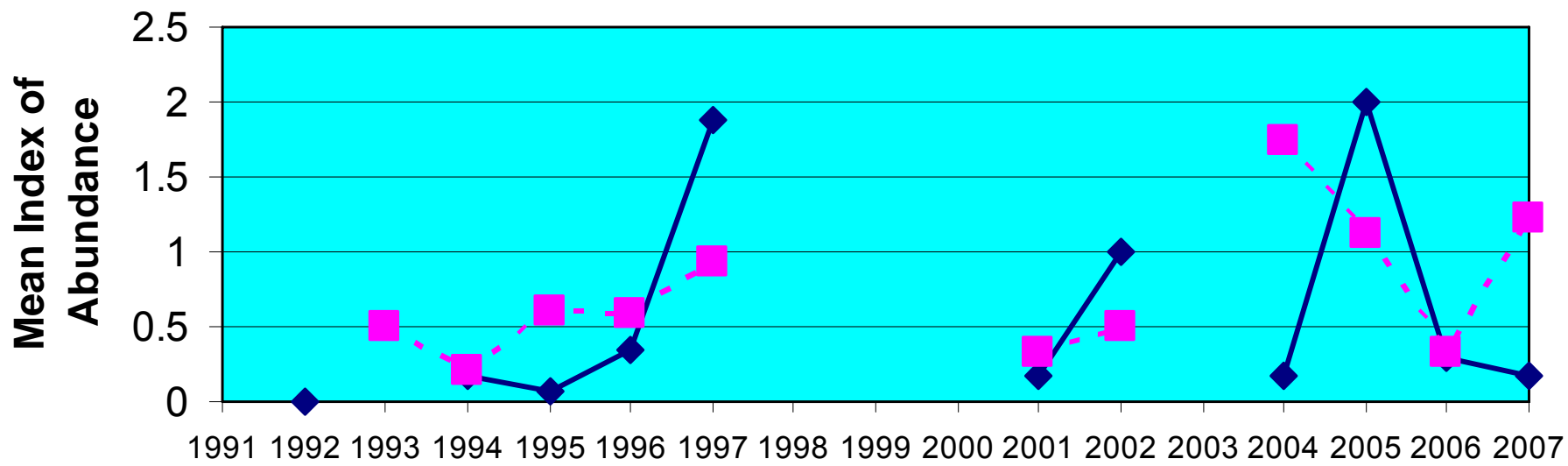
- red snapper
- scamp
- reef butterflyfish
- vermilion snapper
- yellowtail reeffish
- creole-fish
- almaco jack
- yellowmouth grouper
- roughtongue bass
- spotfin hogfish
- Anthiids
- sand tilefish
- cherubfish
- greenband wrasse
- wrasse bass
- red porgy
- orangeback bass
- longsnout butterflyfish
- greenblotch parrotfish
- queen triggerfish
- tattler
- sharpnose puffer
- greater amberjack
- *Hemanthias* sp.
- knobbed porgy
- bluehead wrasse
- blue anglefish
- sunshinefish
- spotted goatfish
- blue chromis
- rock beauty
- ocean triggerfish
- bank butterflyfish
- bicolor damselfish
- stoplight parrotfish
- goldface puffer
- brown chromis
- Spanish flag
- spotted moray
- squirrelfish
- Bonnetmouths
- French anglefish
- wenchman
- queen parrotfish
- blue tang
- Spanish hogfish
- creole wrasse
- red hind
- redband parrotfish
- yellowhead wrasse
- queen anglefish
- black durgon
- blackline tilefish
- graysby
- jackknife-fish
- sea chub
- great barracuda
- sargassum triggerfish
- redspotted hawkfish
- gray triggerfish
- whitespotted filefish
- bar jack
- goldface tilefish
- spotfin butterflyfish
- purple reeffish
- red hogfish
- marbled grouper
- longjaw squirrelfish
- gray snapper
- yellowtail damselfish
- gag
- doctorfish
- whitebone porgy
- blue runner
- crevalle jack
- black jack
- requiem sharks
- slippery dick
- scrawled cowfish
- smooth trunkfish
- princess parrotfish
- saddle bass
- dwarf goatfish
- ocean surgeonfish
- scrawled filefish
- trumpetfish
- combtooth blennies
- lefteye flounders
- saucereye porgy
- orangespotted filefish
- spinner shark
- coney
- southern stingray
- red hogfish
- scad
- *Emblemaria* sp.
- rock hind
- warsaw grouper
- yellowedge grouper
- blackbar drum
- little tunny
- cornetfish
- cottonwick
- puddingwife
- longspine squirrelfish
- blue goby
- spotted trunkfish
- smooth puffer
- dog snapper
- slender filefish
- smooth dogfish
- tiger grouper
- yellowfin grouper
- yellowhead jawfish
- bigeye soldierfish
- bigeye
- king mackerel
- lesser amberjack
- black grouper
- yellowfin grouper

Top 20 Taxa on Video

West Flower Garden Bank (n=159)

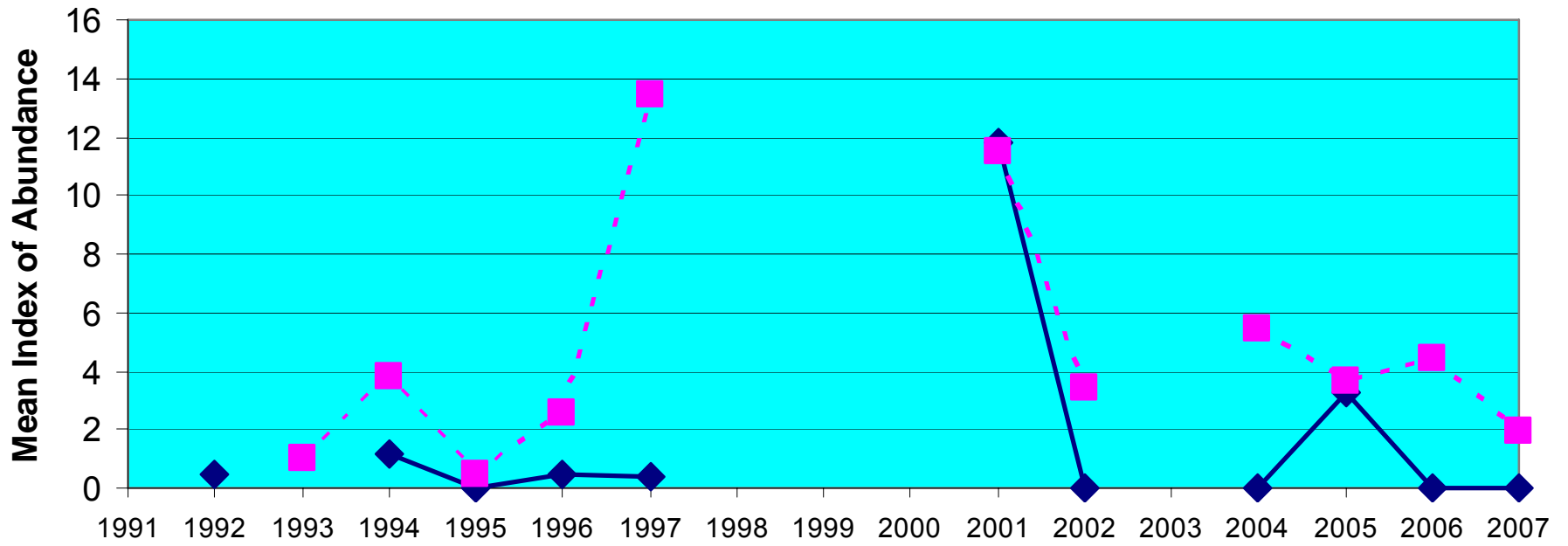


Red snapper

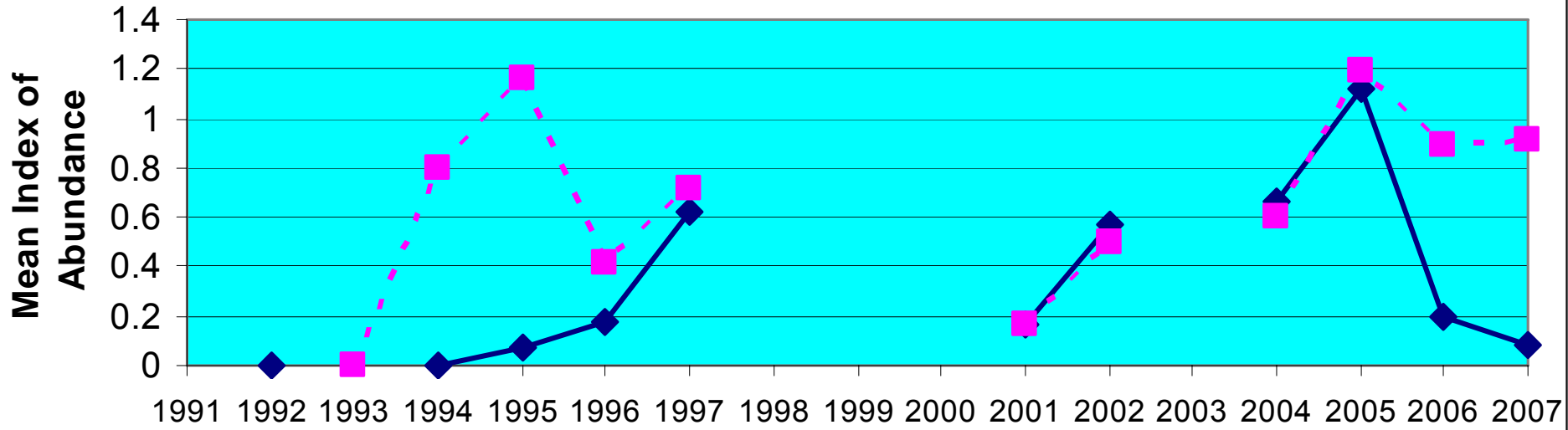
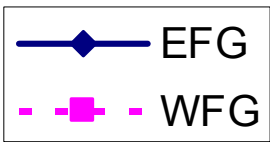


Vermilion snapper

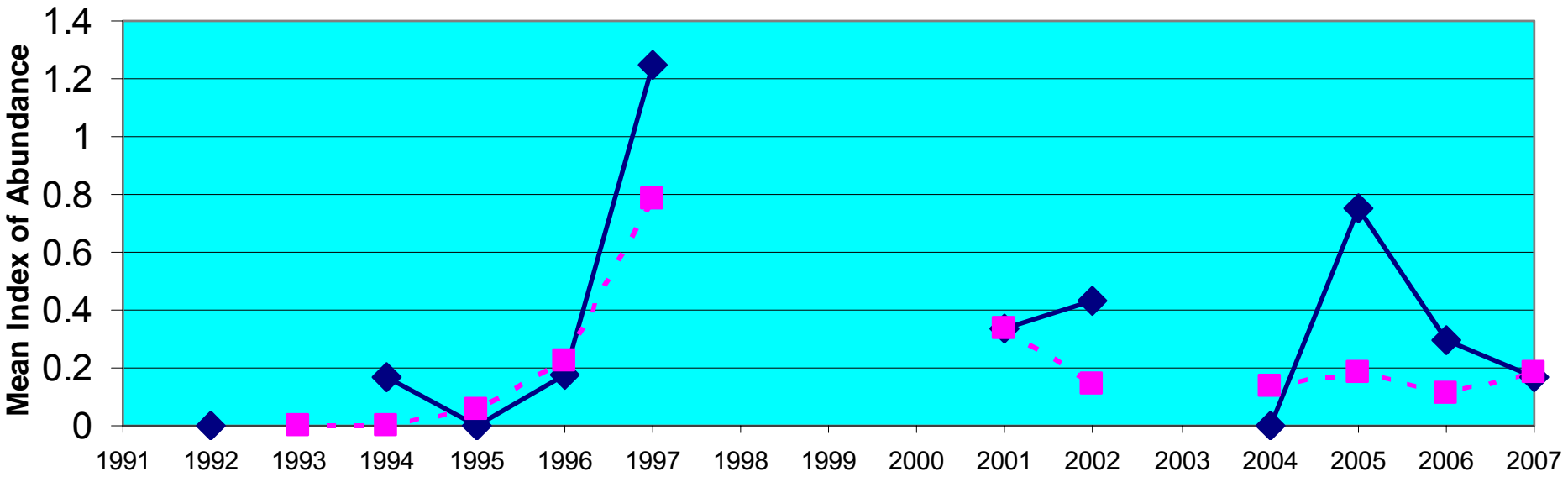
◆ EFG
■ WFG



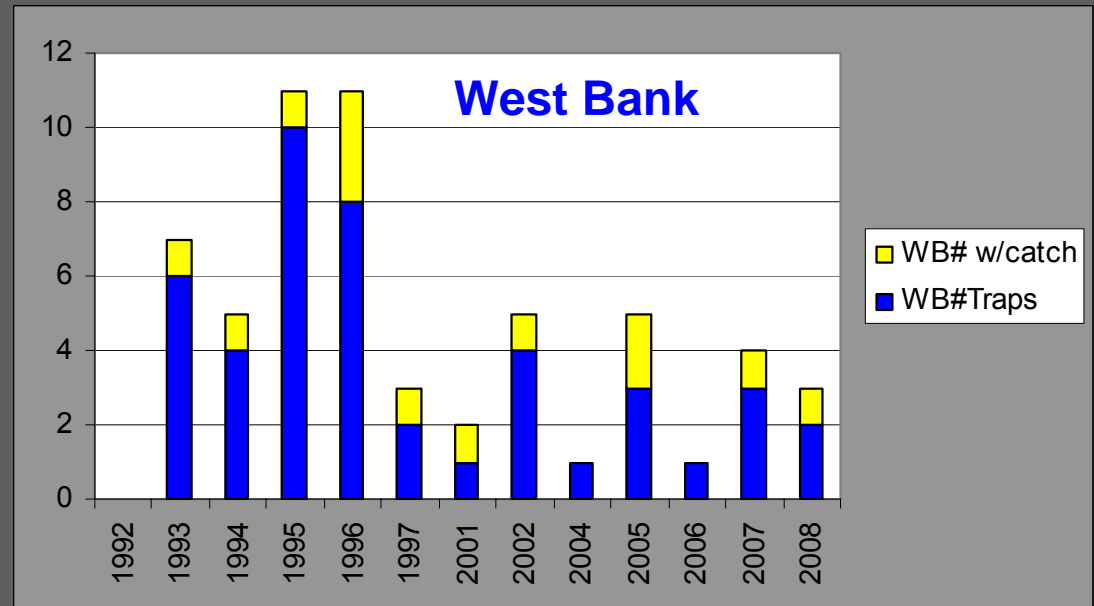
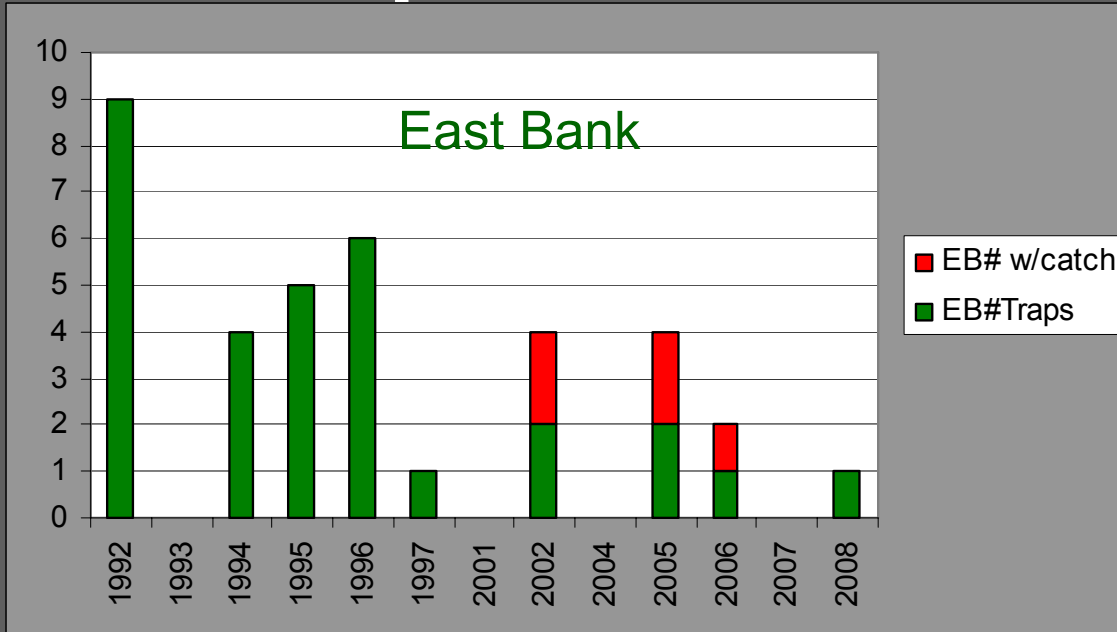
Scamp



Yellowmouth grouper



Trap Catches in the FGBNMS



Species assemblage from Traps

East Bank

- red snapper
- vermilion snapper
- scamp
- snowy grouper
- gray triggerfish
- cottonwick
- reef butterflyfish



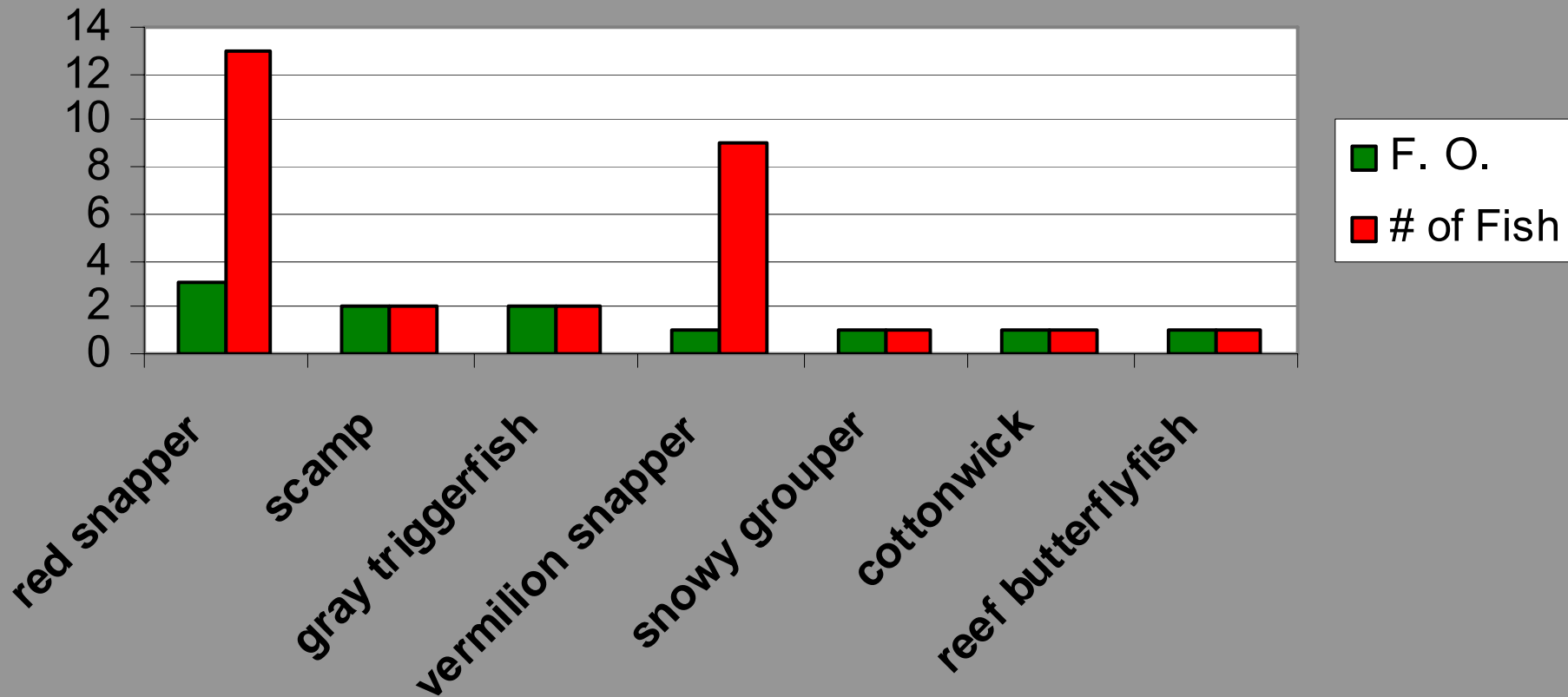
West Bank

- red snapper
- vermilion snapper
- scamp
- creolefish
- red porgy
- whitebone porgy



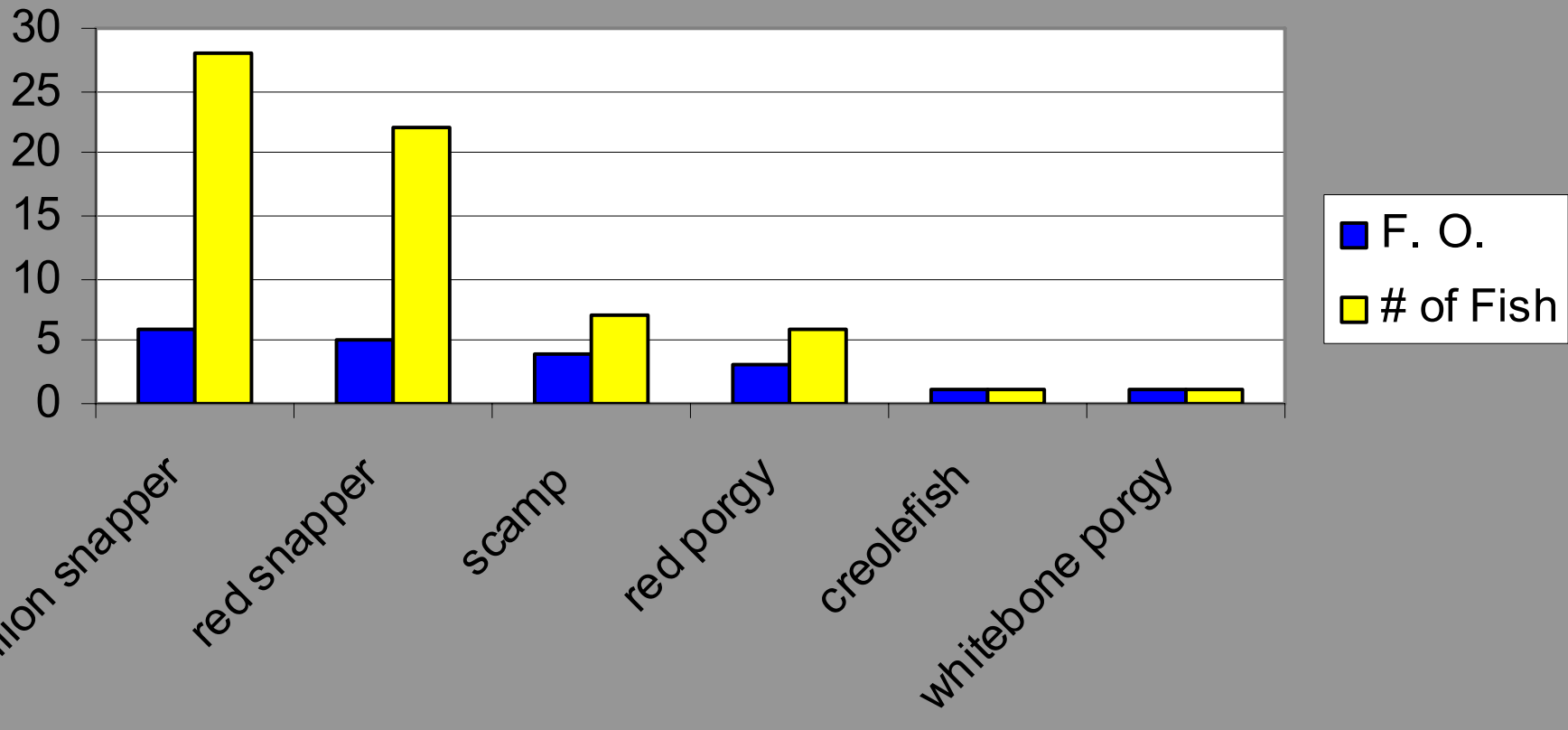
Frequency of Occurrence and # of Fish caught per species

East Bank Trap Catch (n = 31)



Frequency of Occurrence and # of Fish caught per species

West Bank Trap Catch (n = 45)



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