

Demersal Fish Utilization of Borrow Pits, Dredged Channels and Shoals in Lower Bay, New York Harbor

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Beneficial Use of Dredged Material

11 MCY of dredged material to be generated from harbor deepening over 10 years.

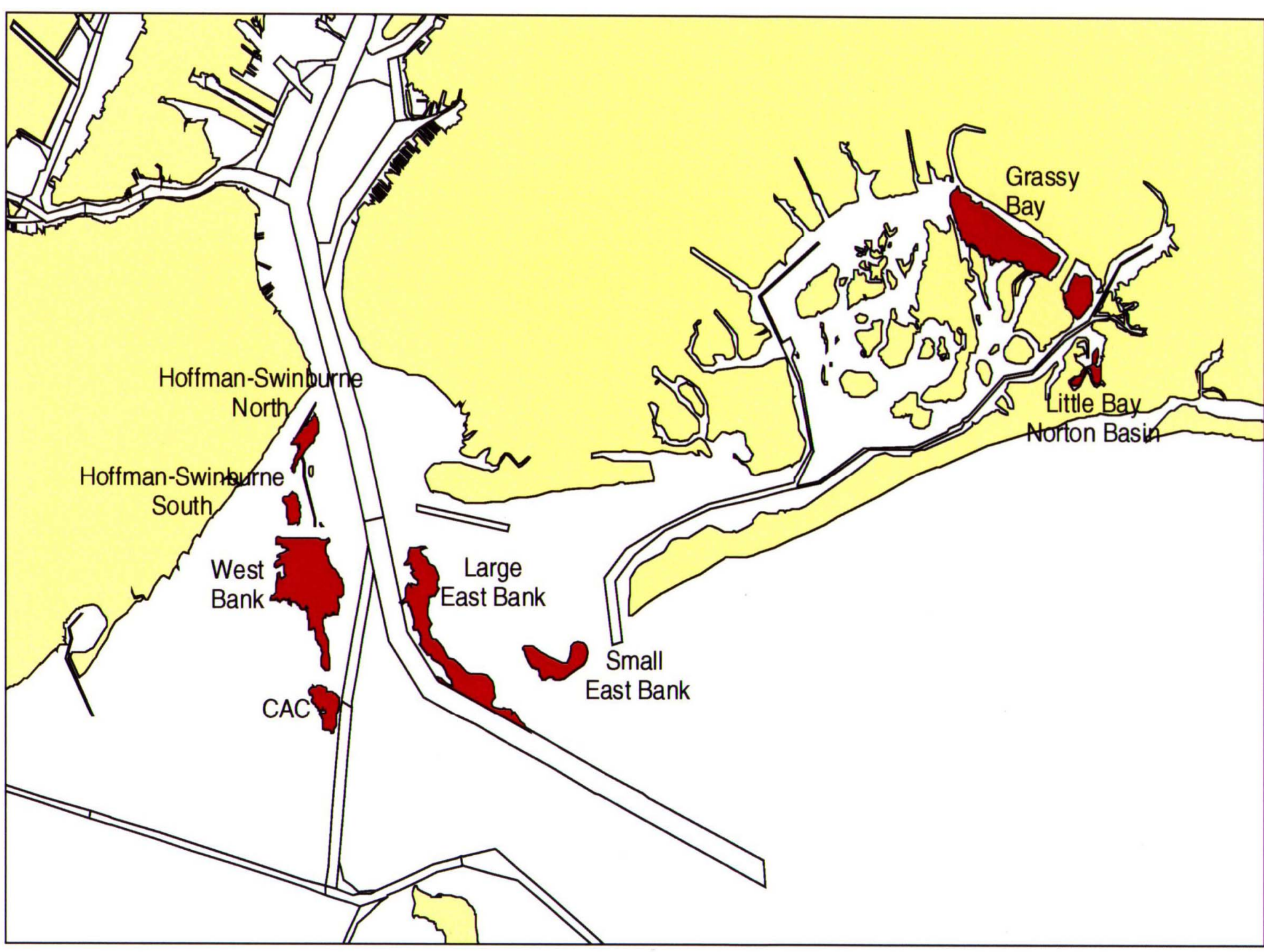
90% HARS-suitable; sand, gravel, rock, glacial till, red clay - can all be used for habitat development projects

Degraded borrow pits can receive all HARS-suitable sediments.

10% contaminated; requires special handling, stabilization and/or treatment.

Degradation status must be determined first.

All six Lower Bay pits examined in present study.



Research Question

Are there differences among demersal fish habitats within and between borrow pits, dredged channels, and shoals in Lower Bay?



Methods

116 otter trawl (30') samples distributed among pits, channels, and shoals; August-September 2002.

Samples enumerated, measured (TL), identified to species, and returned (exclusive of gut contents samples).

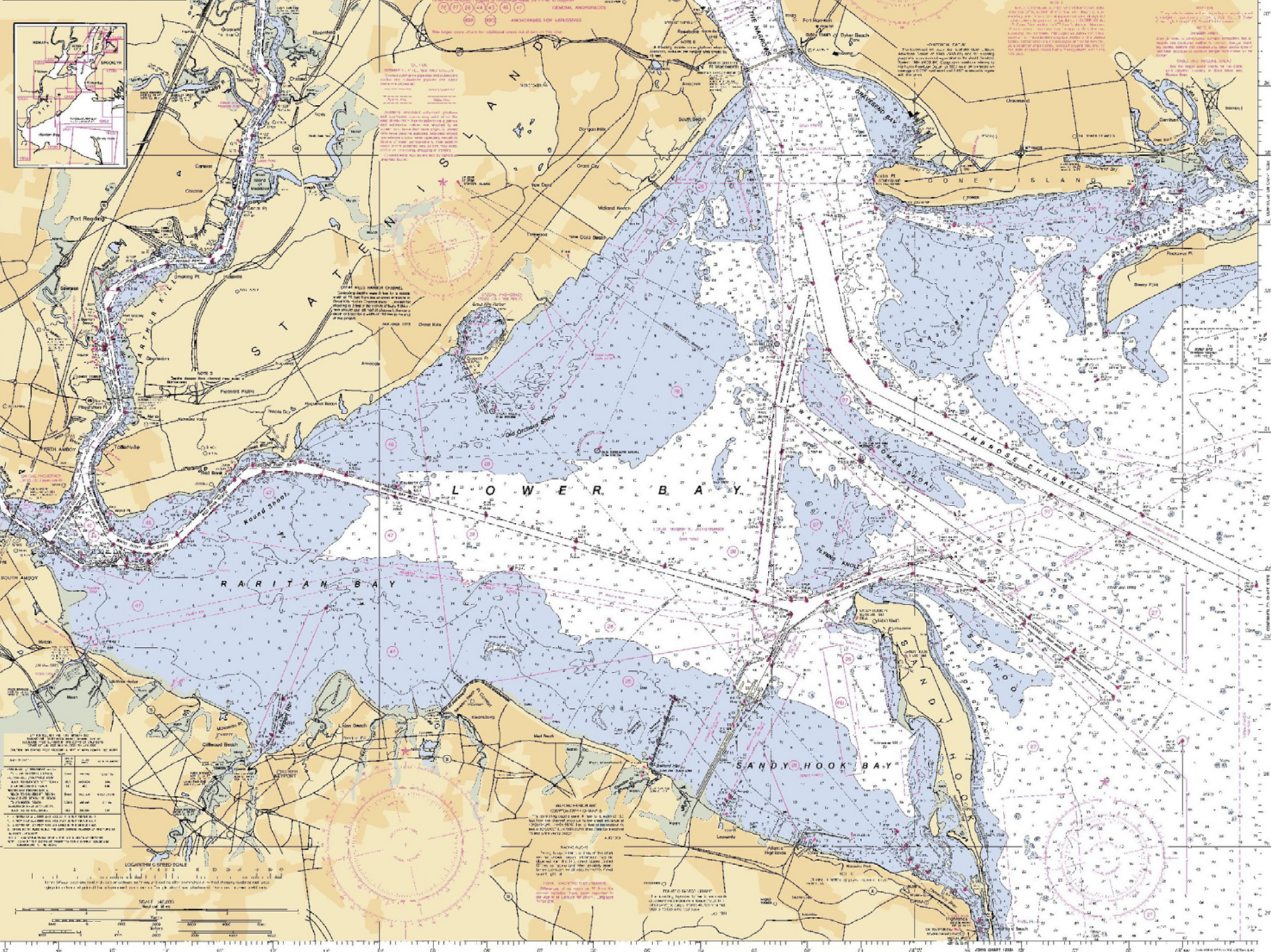
Calculated abundance, size range/mean, life stage and species richness.

Environmental conditions (DO, temperature, salinity) measured at surface, mid-depth and bottom for each sample.

August-September study period intended to capture worst expected DO conditions.

Habitats Compared

Habitats	No. of Trawls	Depth Range (ft.)
Mid-Channel (MC)	24	30-74
Channel Edge (CE)	23	22-71
Pit Bottom (PB)	23	20-62
Pit Rim (PR)	23	10-25
Shoal (SH)	23	8-21



Habitat/Geographic Comparisons

MC vs. CE vs. PB vs. PR vs. SH

Pits (PB) vs. Channels (MC + CE)

Inter-pit (LWB vs. SEB vs. NHS vs. LEB vs. CAC VS. SHS)

Lower Bay pits vs. southeast Jamaica Bay (DO only).



Total Abundance Among Habitats

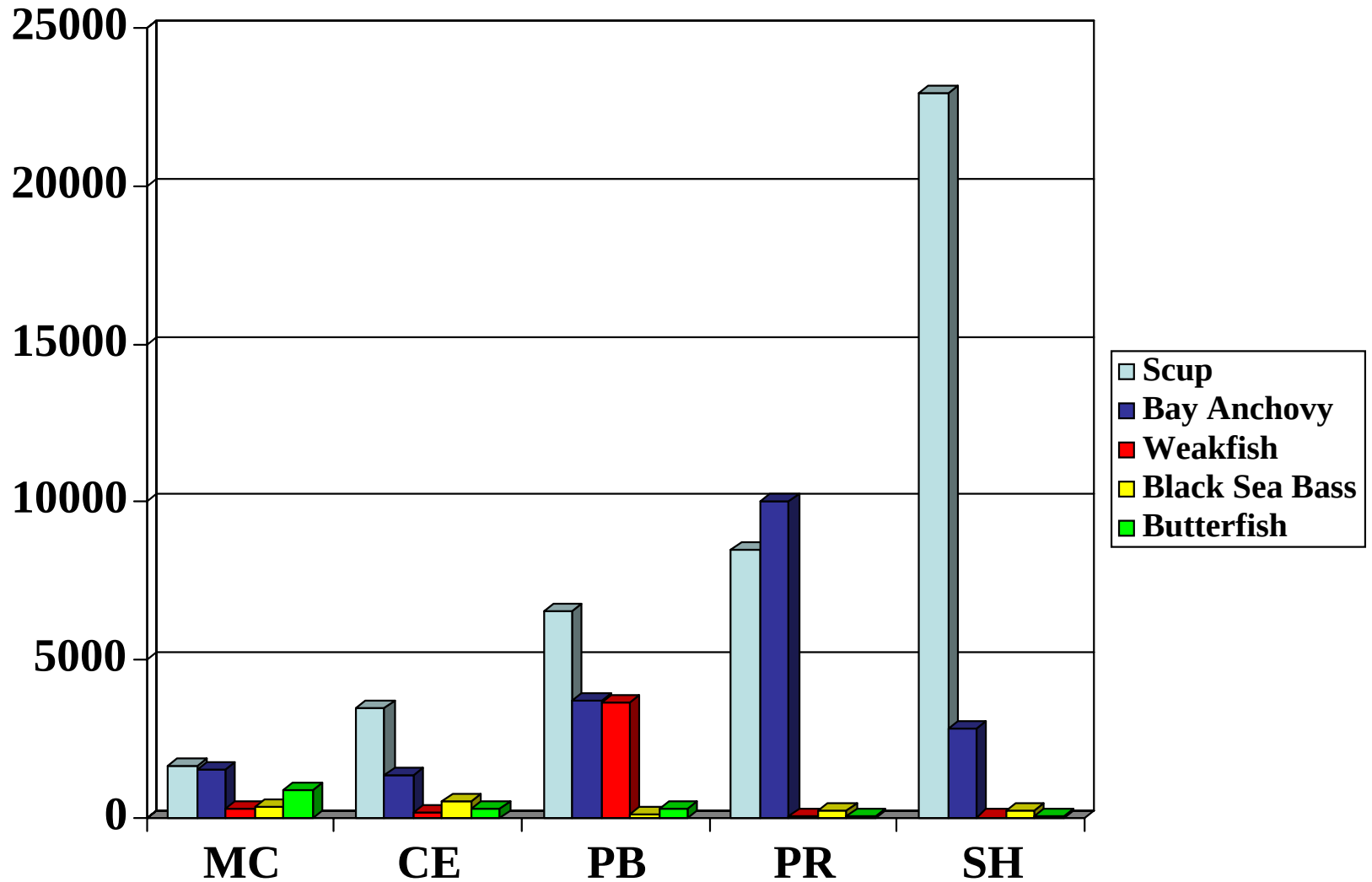
	Total Abundance	% Abundance
Shallow		
Shoal	26,304	36%
Pit Rim	19,139	<u>27%</u>
		63%
Pit Bottom	14,818	21%
Channels		
Channel Edge	6,513	9%
Mid-channel	5,270	<u>7%</u>
		16%
All Habitats	72,044	100%

**Dominant Species
(96% of Total Catch)**

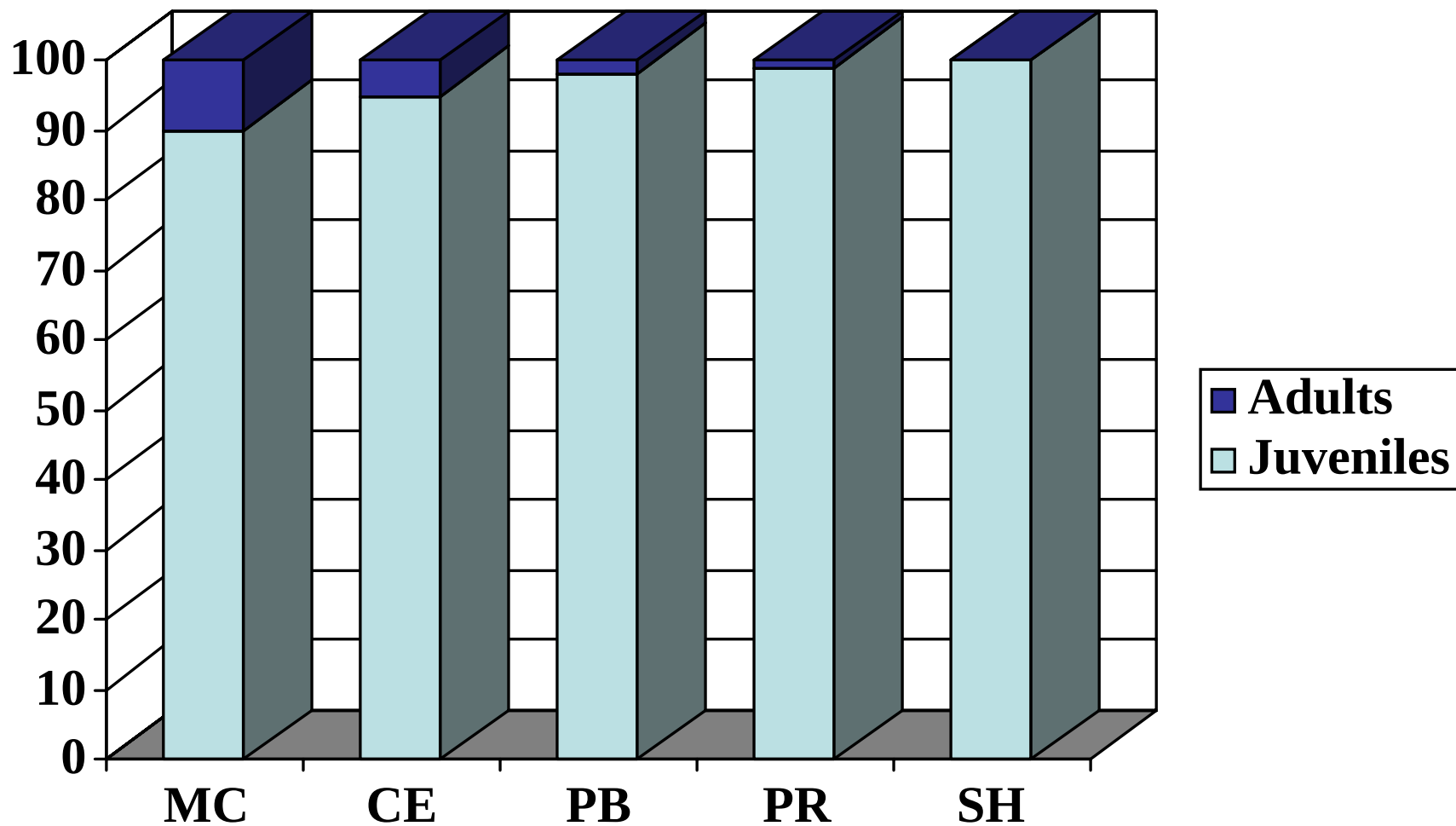
Scup (<i>Stenotomus chrysops</i>)	(59.8%)
Bay Anchovy (<i>Anchoa mitchilli</i>)	(26.9%)
Weakfish (<i>Cynoscion regalis</i>)	(5.7%)
Black Sea Bass (<i>Centropristis striata</i>)	(2.0%)
Butterfish (<i>Peprilus triacanthus</i>)	(1.6%)

Note: minus Bay anchovy, remaining four species = 70%.

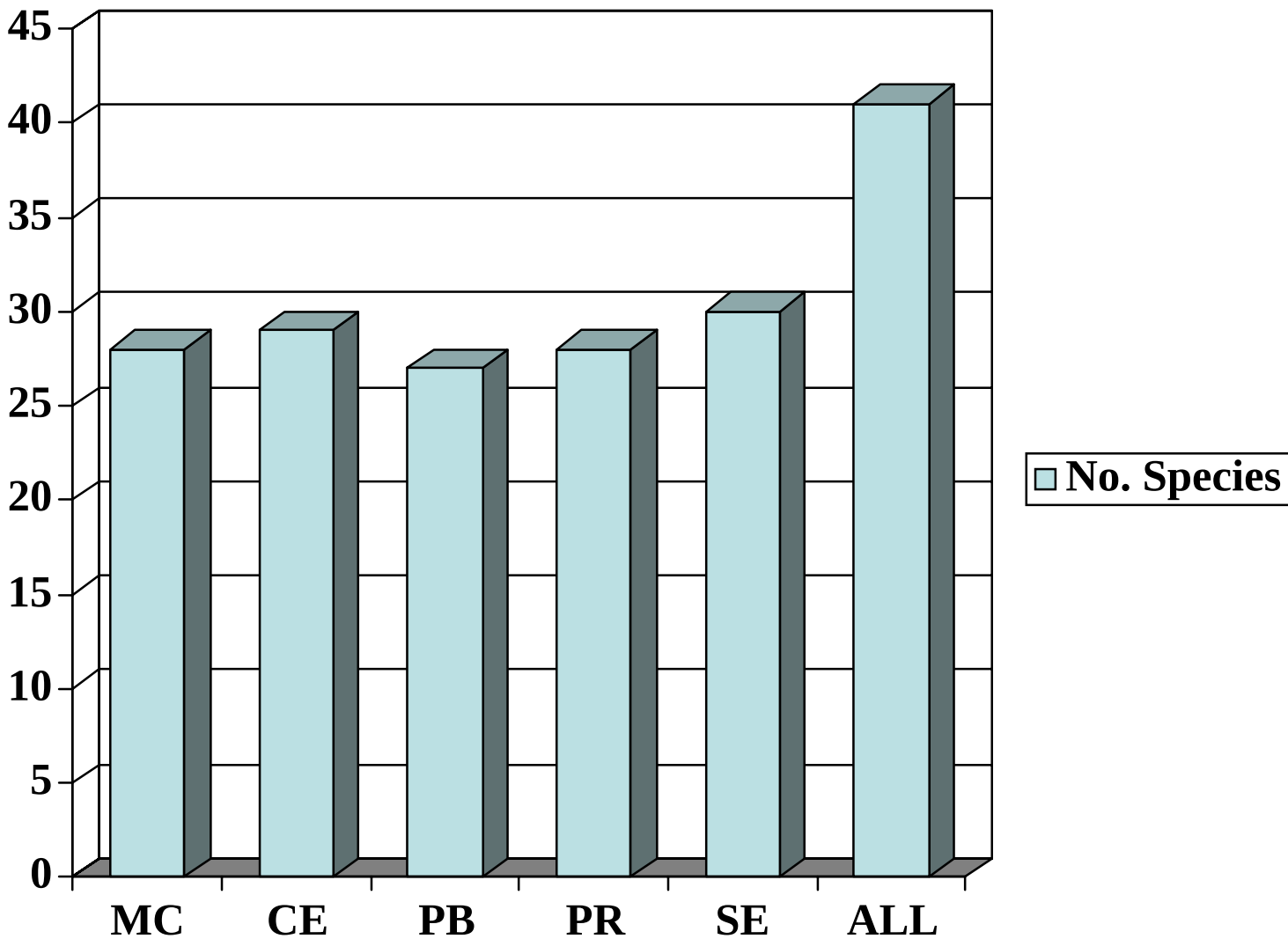
Distribution of Dominant Species Among Habitats



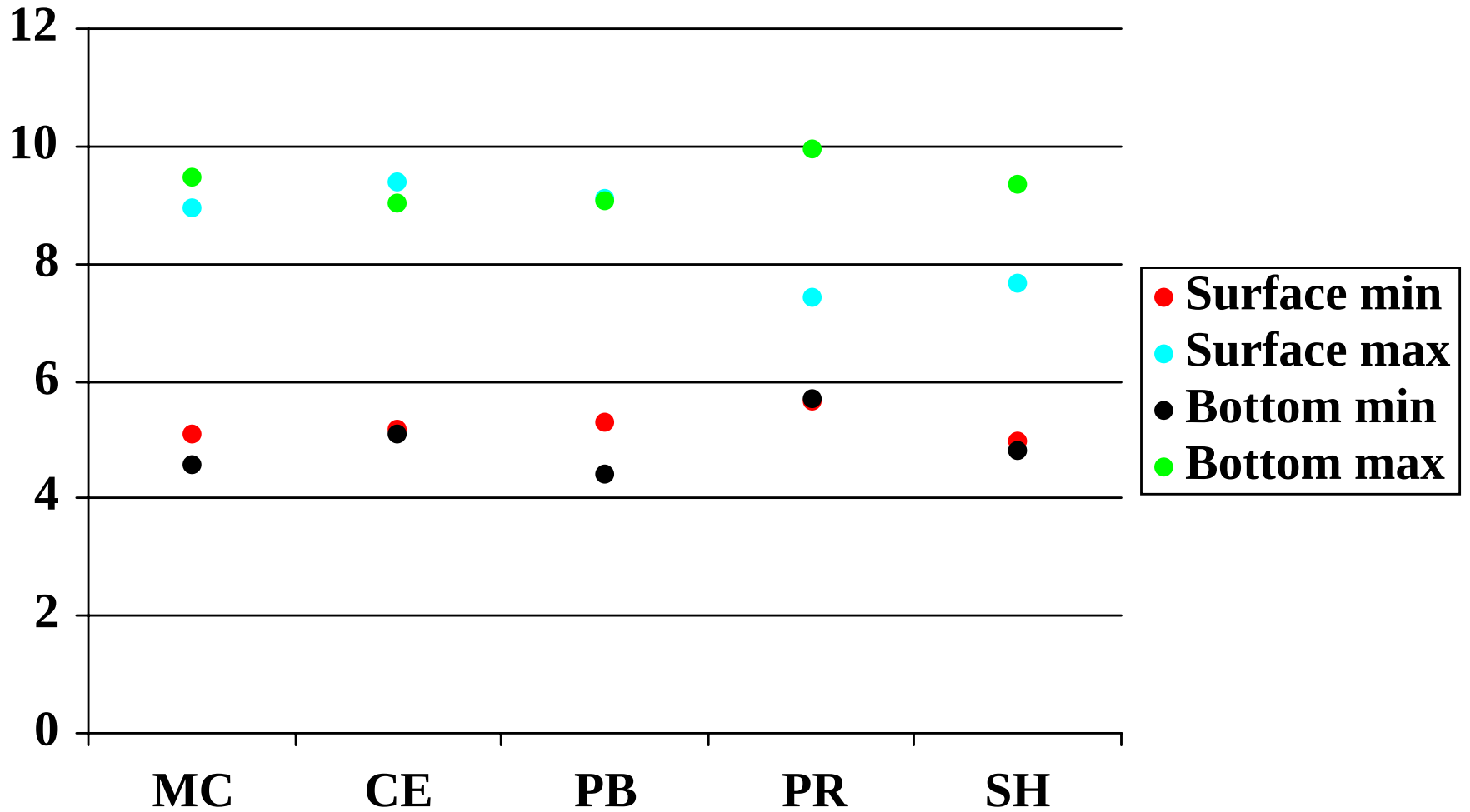
% Composition of Life Stage among Habitats



No. of Species Among Habitats



Dissolved Oxygen Among Habitats



Lower Bay Borrow Pits

Large West Bank (LWB)

Small East Bank (SEB)

North Hoffman-Swinburne (NHS)

Large East Bank (LEB)

Construction Aggregates (CAC)

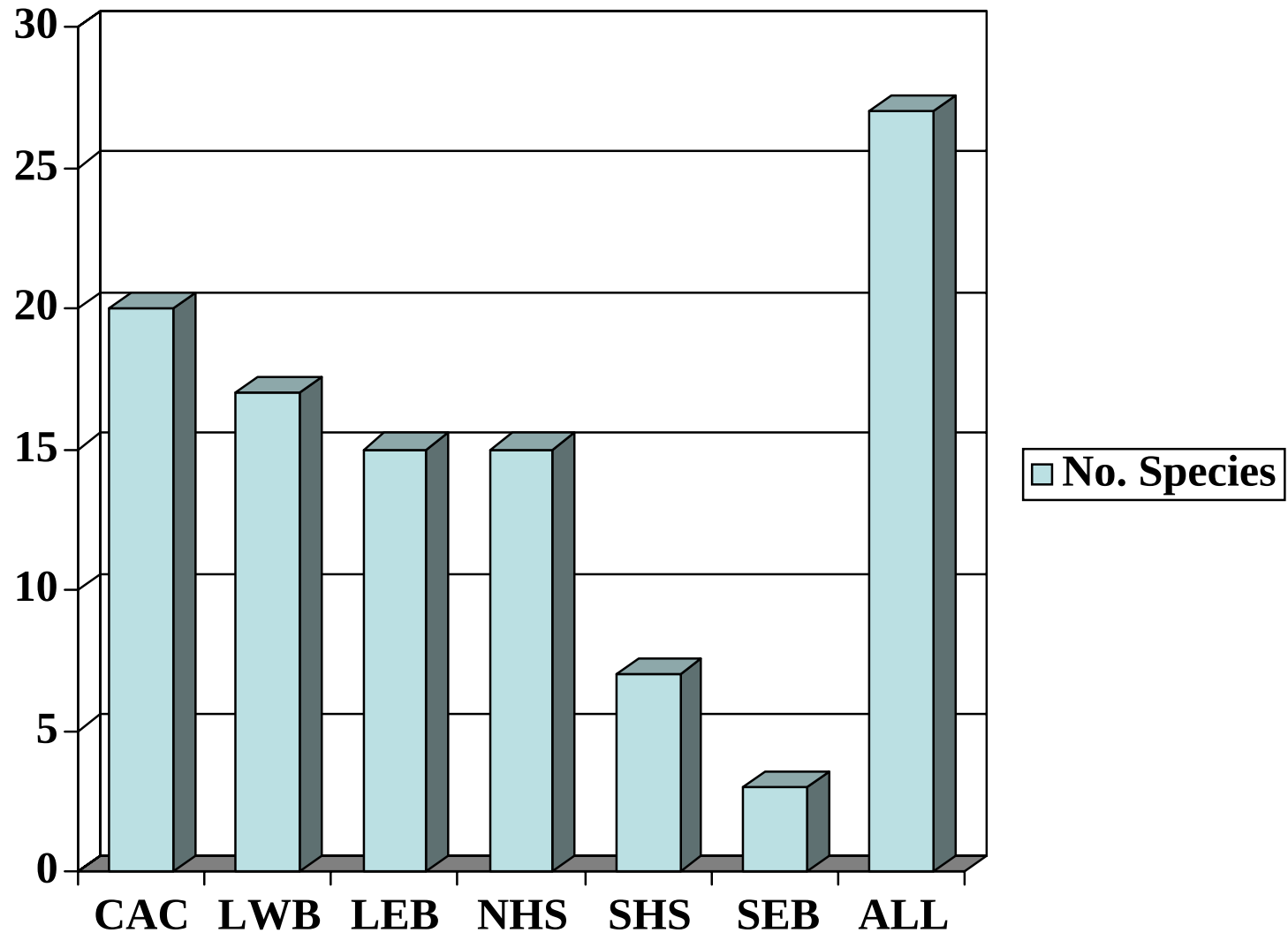
South Hoffman-Swinburne (SHS)



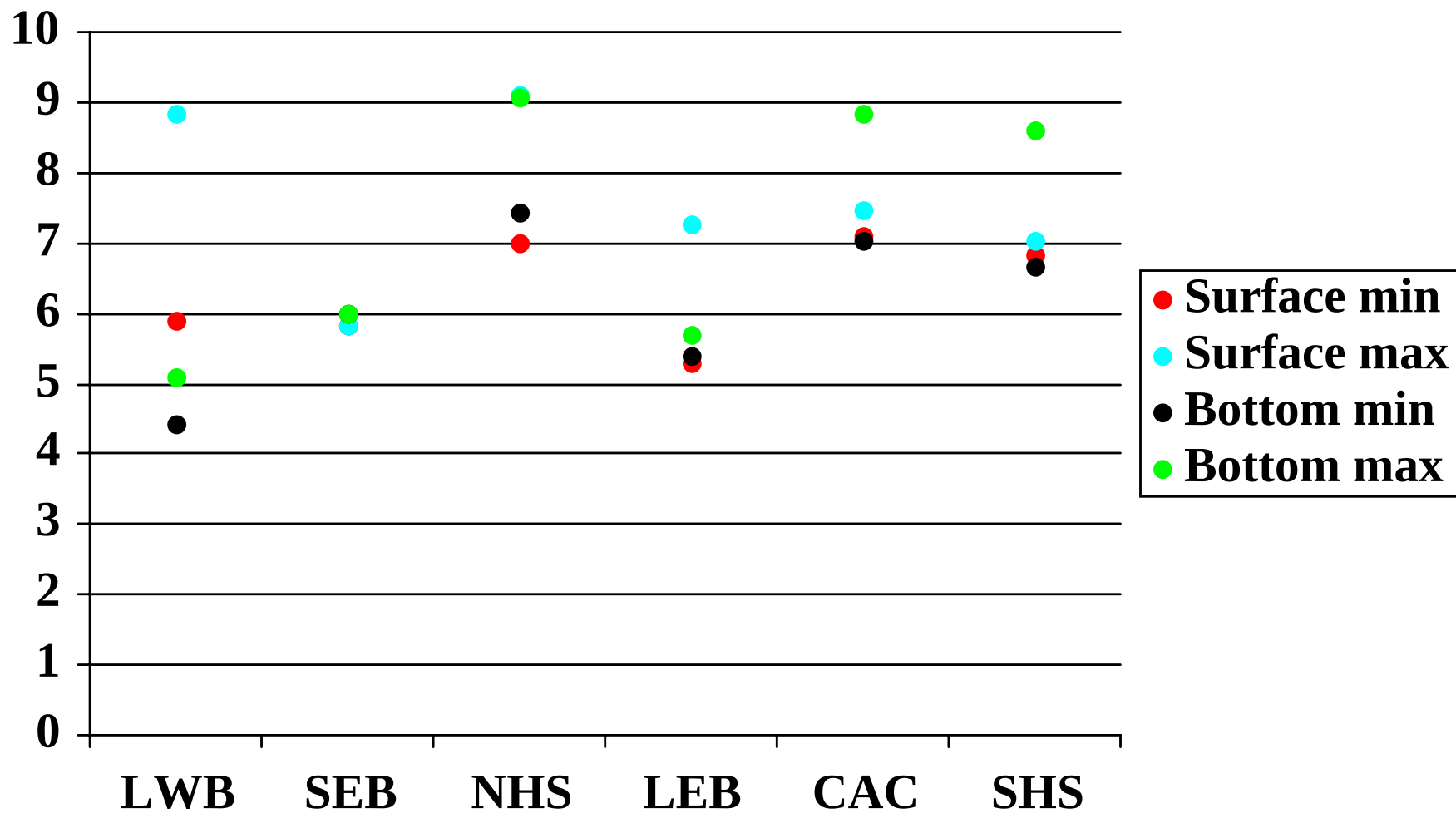
Borrow Pit Abundance

Pit	Total Minutes	Total Catch	CPUE (No./min.)	Size Range (mm)
LWB	50	9,231	184.6	31 - 640
SEB	10	1,522	152.2	55 - 380
NHS	40	1,788	44.7	29 - 1200
LEB	50	1,140	22.8	25 - 670
CAC	50	1,045	20.9	35 - 1600
SHS	30	35	1.2	49 - 470

No. of Species Among Pits



Dissolved Oxygen Among Pits



Comparison of Dissolved Oxygen Between Lower Bay Pits and Southeast Jamaica Bay, August - September 2002

Bottom DO (mg/L)

Large West Bank	4.42 - 5.10
North Hoffman-Swinburne	7.42 - 9.08
Little Bay	< 1.0
Norton Basin	~ 2.0
Grass Hassock Channel	2.0 - 4.0

Conclusions

All six Lower Bay borrow pits have acceptable bottom DO concentrations and represent important demersal fish habitats.

Rank order abundance by site = SH > PR > PB > CE > MC.

Relatively few species (Skate, flatfish, smooth dogfish) represented the majority of fish biomass in channels.

Juveniles (especially Scup and Black Sea Bass) tend to concentrate in CE, not MC.

Pits attract more juveniles (especially weakfish), while channels attract more flatfish.

Juvenile Weakfish were concentrated in the two largest West Bank pits.

18 species (44%) common to all five habitats; 27 species (66%) common to at least one deep and one shoal habitat; 12 species (29%) found exclusively in either deep or shoal habitat.

No significant thermoclines observed.

Management Implications

The ecological status of each pit needs to be evaluated independently.

Except for perhaps the South Hoffman-Swinburne pit, the Lower Bay pits are probably not candidate sites for demersal fish habitat restoration.

