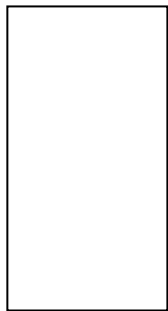# Monitoring and evaluation summary for MPA systems

Presented by Dr. Steve Palumbi
Master Plan Science Advisory Team
Central Coast Science Sub-Team
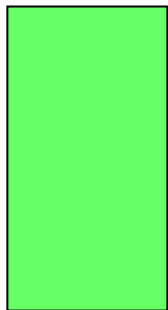
Presented to the MLPA Blue Ribbon Task Force
November 29-30, 2005 • Monterey, CA

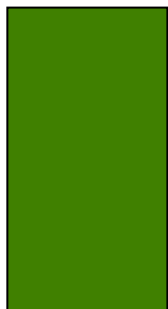# Monitoring MPAs and evaluating their performance

Three broad classes of comparisons:

Open access

Low level protection

Medium-high level protection

Monitoring MPAs and evaluating their performance

Three broad classes of comparisons:

Open access

Comparing areas allow the results of reserve protection to be evaluated.
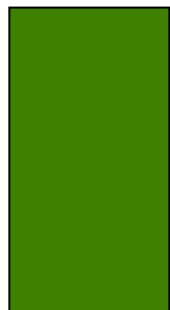
Medium-high level protection

But two areas may differ in more than just levels of protection

Typical experiments use replicates of every treatment
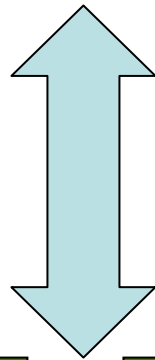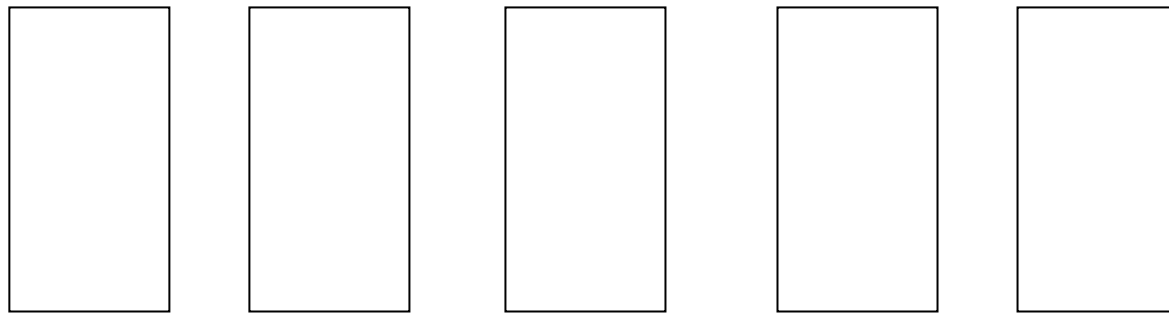
Comparing areas allow the results of reserve protection to be evaluated.
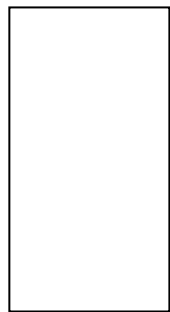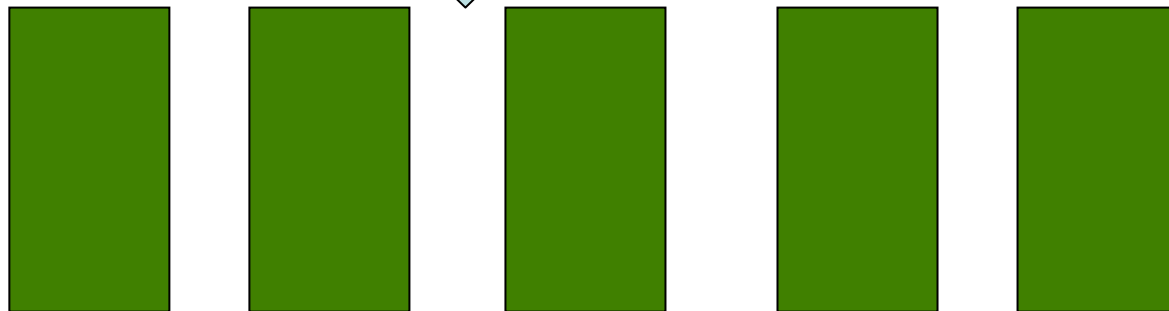
Monitoring MPAs and evaluating their performance
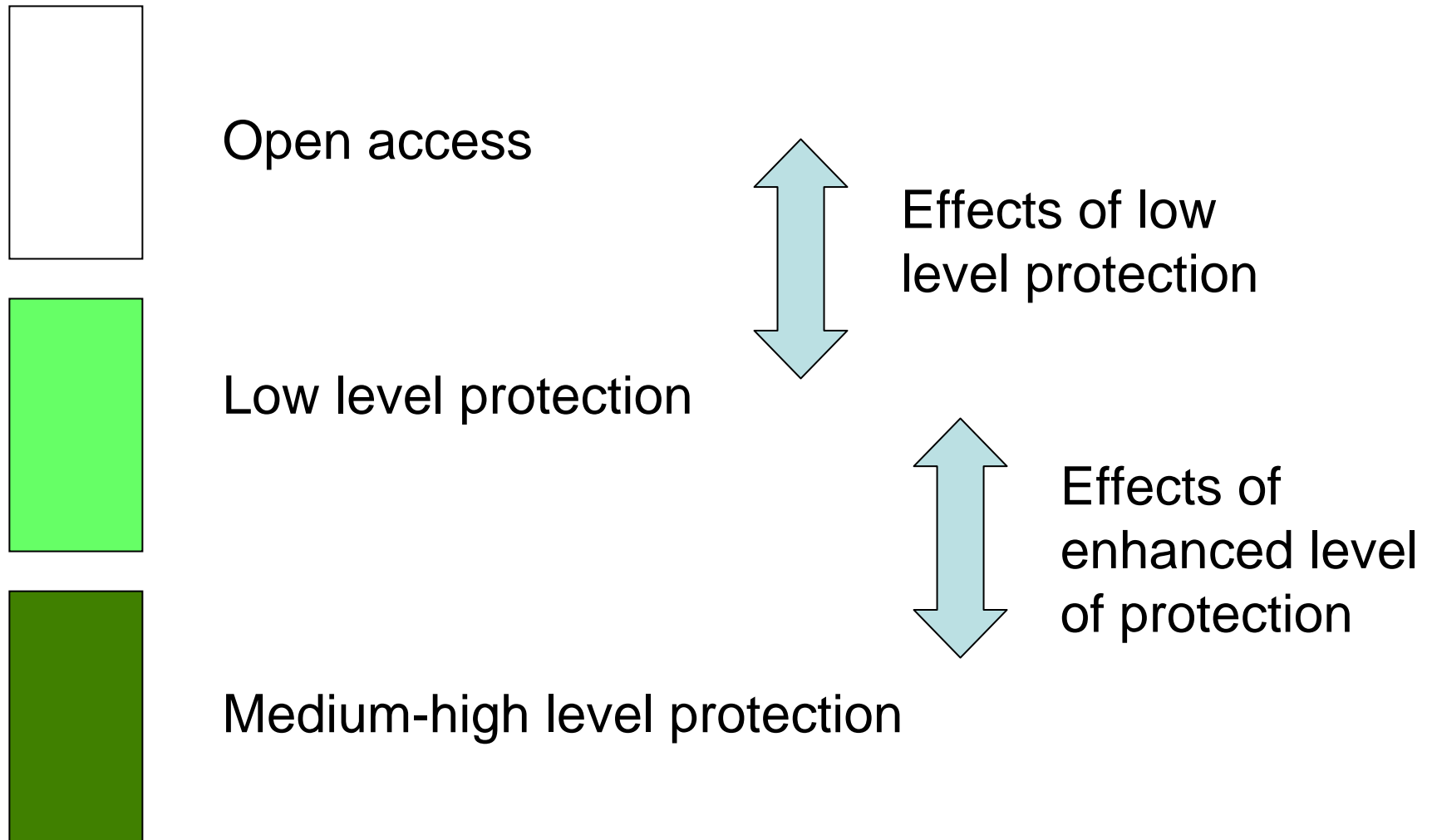
Three broad classes of comparisons:

Open access

Low level protection

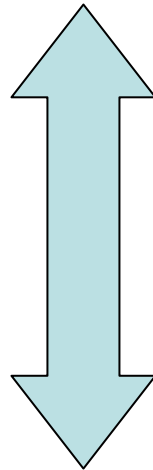Medium-high level protection

Effects of low level protection

Effects of enhanced level of protection

Monitoring MPAs and evaluating their performance

Three broad classes of comparisons:

Effects of low level protection

Effects of enhanced level of protection

proposal 1 MPAs

Legend: low MPAs, high MPAs

Habitat	low MPAs	high MPAs
Rocky intertidal	4	14
rocky 0-30	6	13
rocky 30-100	2	2
rocky 100-200	1	1
Rocky 200-3000	1	2
Soft 1-30	1	12
Soft 30-100	14	12
Soft 100-200	5	2
Soft 200-3000	1	5
Persistent kelp	1	9
Seagrasses	4	9
Estuary	3	2
Submarine canyon	1	4
Upwelling center	1	7
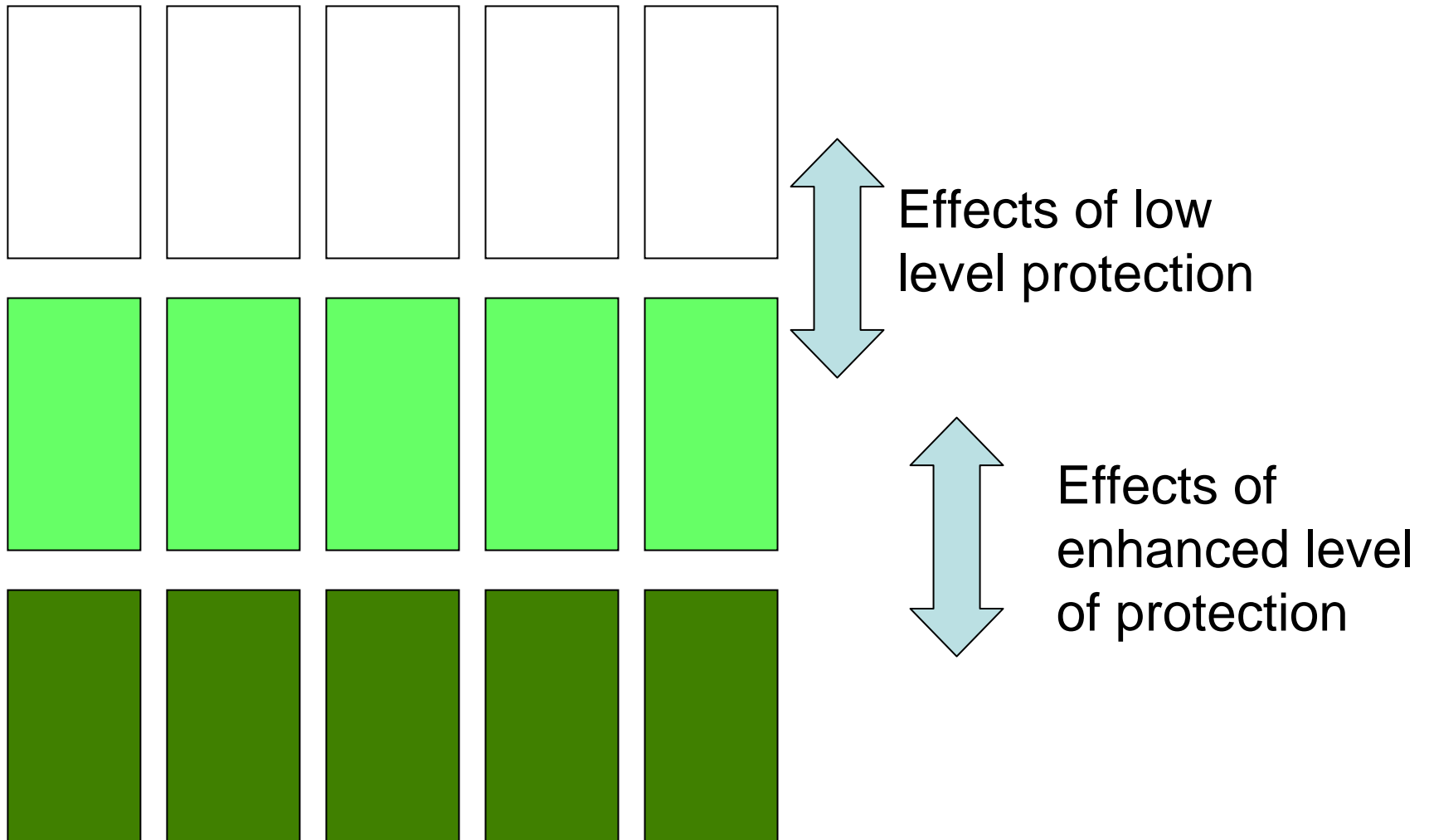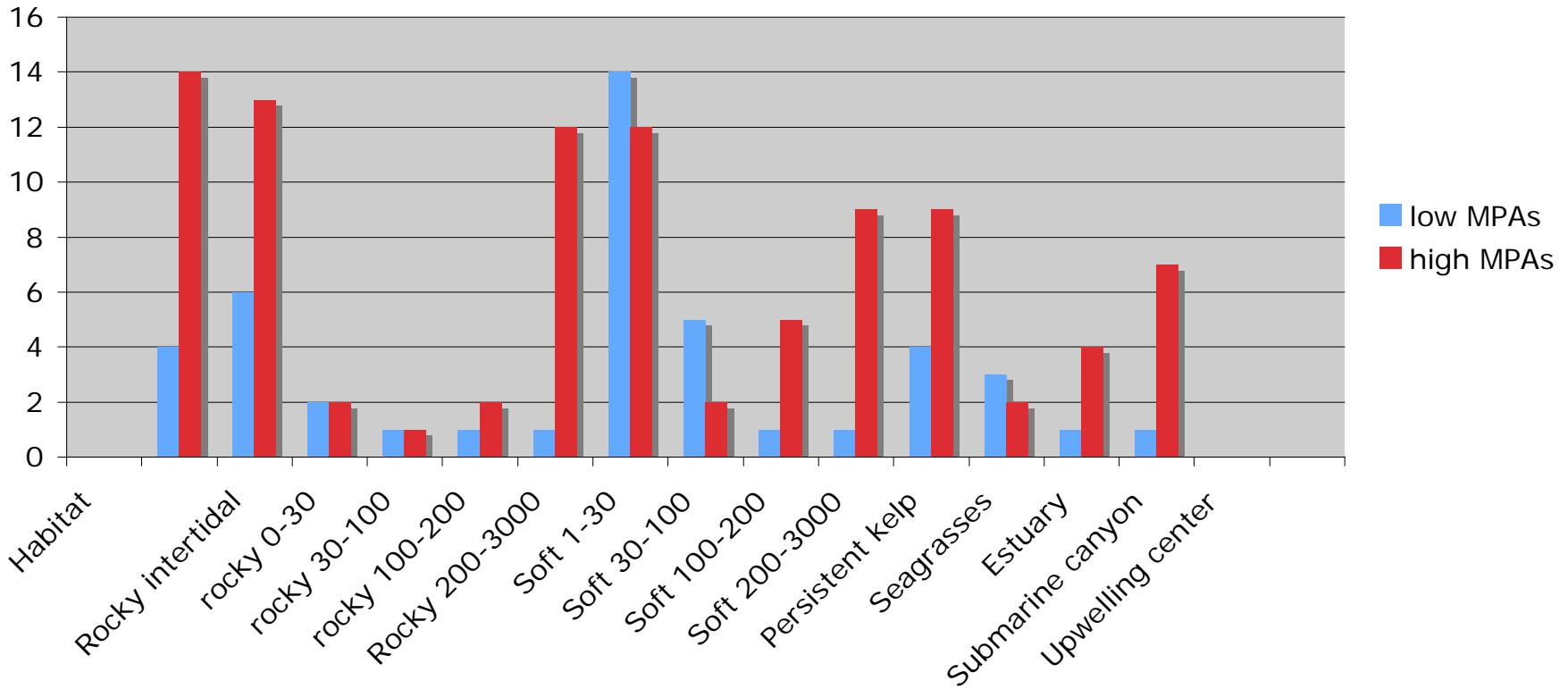
A large number of MPAs with high levels of protection occur in shallow waters, particularly in the rocky intertidal and soft-sediment areas less than 30 feet in depth. Replication in deeper water environments in much less common, with poor protection for rocky substrates deeper than 30 feet or for estuaries. Soft sediment areas 30-100 deep have better protection, but deeper than 100 ft, there is very little replication of MPAs of any kind.

proposal 1 MPAs

Legend: low MPAs (blue), high MPAs (red)

Habitat categories: Habitat, Rocky intertidal, rocky 0-30, rocky 30-100, rocky 100-200, Rocky 200-3000, Soft 1-30, Soft 30-100, Soft 100-200, Soft 200-3000, Persistent kelp, Seagrasses, Estuary, Submarine canyon, Upwelling center
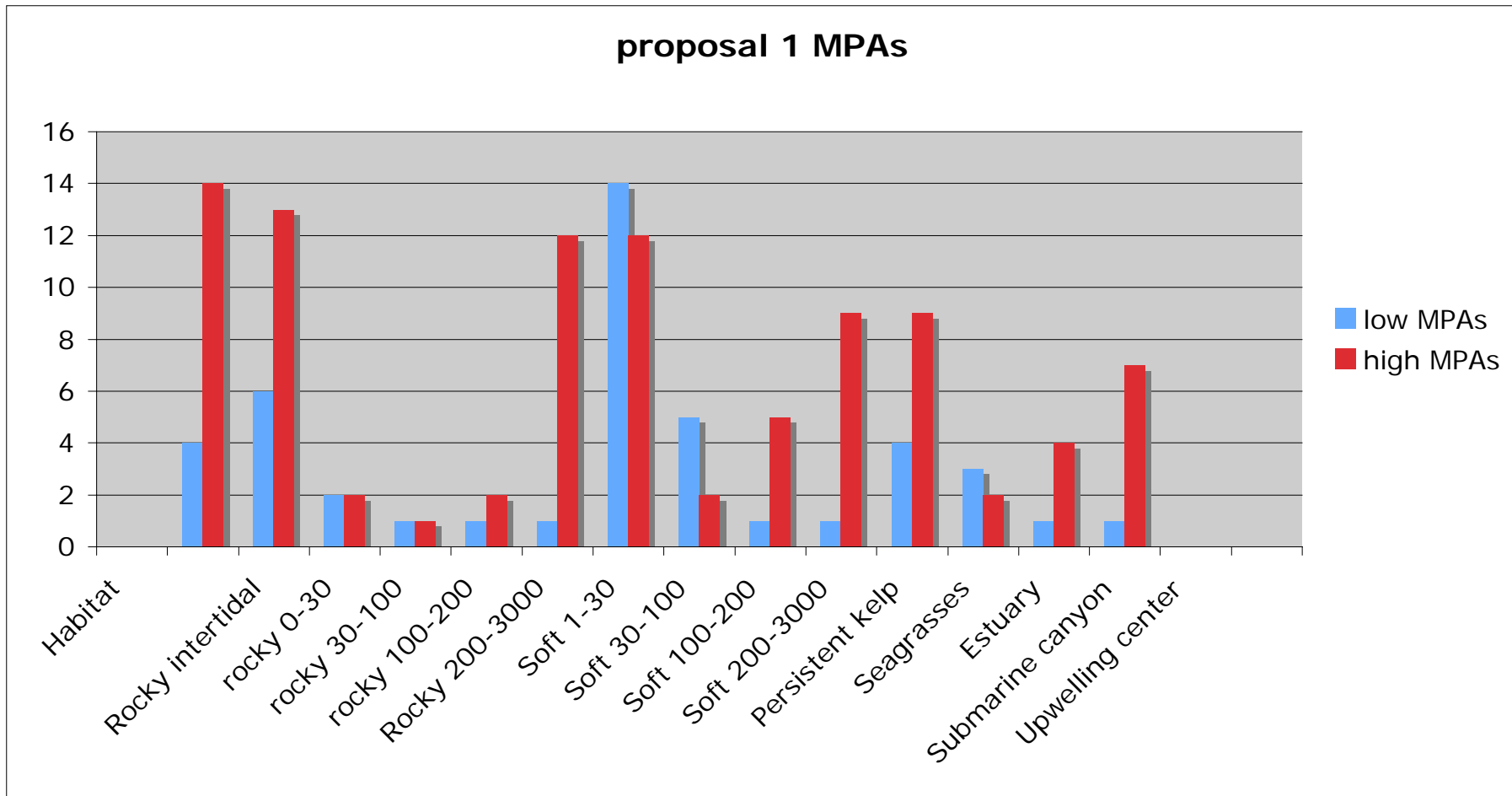
MPAs in shallow depths allow tests of open access versus reserve effects. Contrasts in results for no-MPA vs low vs high level MPA protection could be studied for shallow water areas, as well as for area with seagrasses. Few studies of protection of deep protection would be possible.

proposal 2 MPAs

Legend: low (blue), high (red)
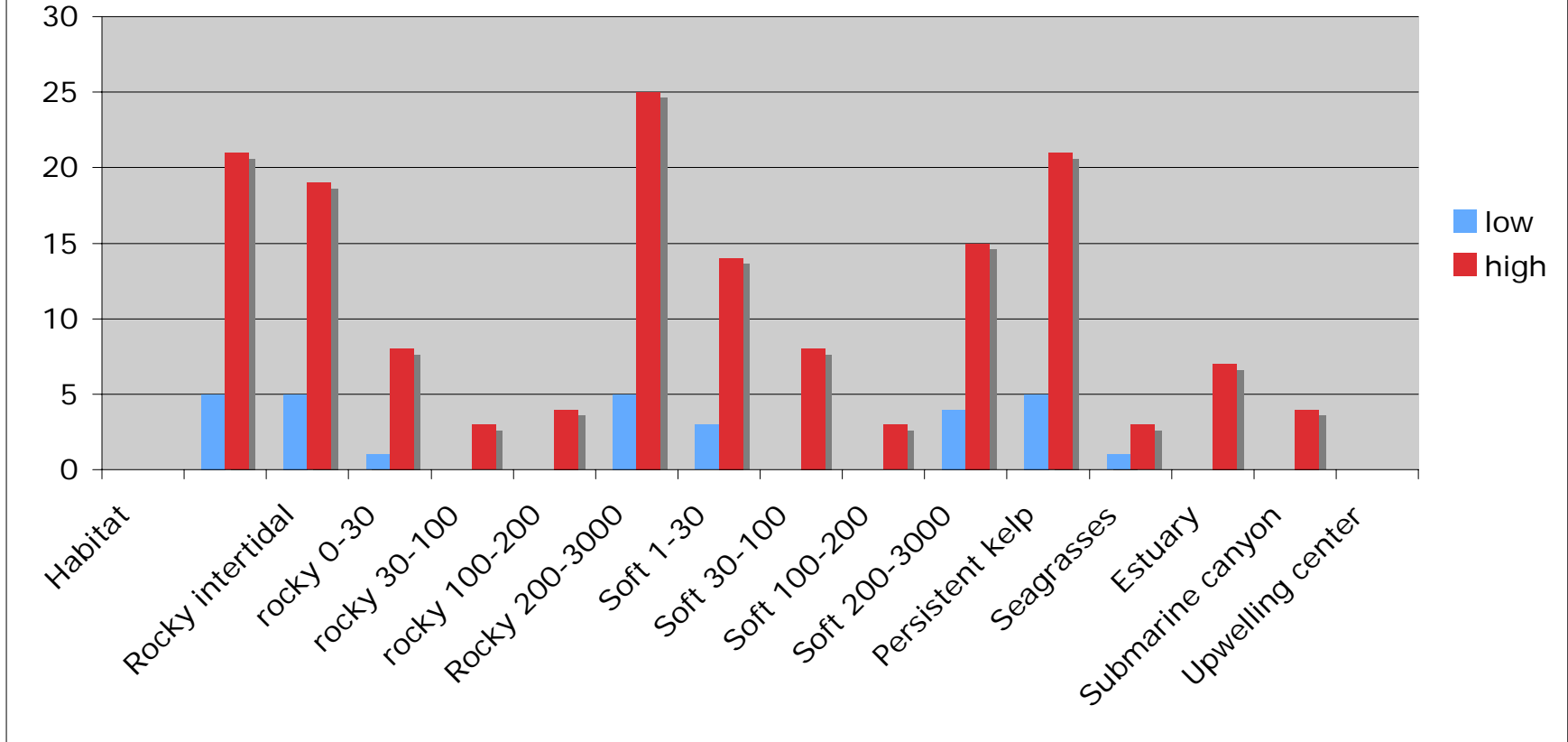
Replication numbers for highly protected MPAs are good for shallow – to - medium depth rocky and soft bottom habitats, kelp, and seagrass areas. Less replication is present in deep rocky areas, but all seem to have at least 3 replicate MPAs.

proposal 2 MPAs

Habitat	low	high
Rocky intertidal	5	21
rocky 0-30	5	19
rocky 30-100	1	8
rocky 100-200		3
Rocky 200-3000		4
Soft 1-30	5	25
Soft 30-100	3	14
Soft 100-200		8
Soft 200-3000		3
Persistent kelp	4	15
Seagrasses	5	21
Estuary	1	3
Submarine canyon		7
Upwelling center		4
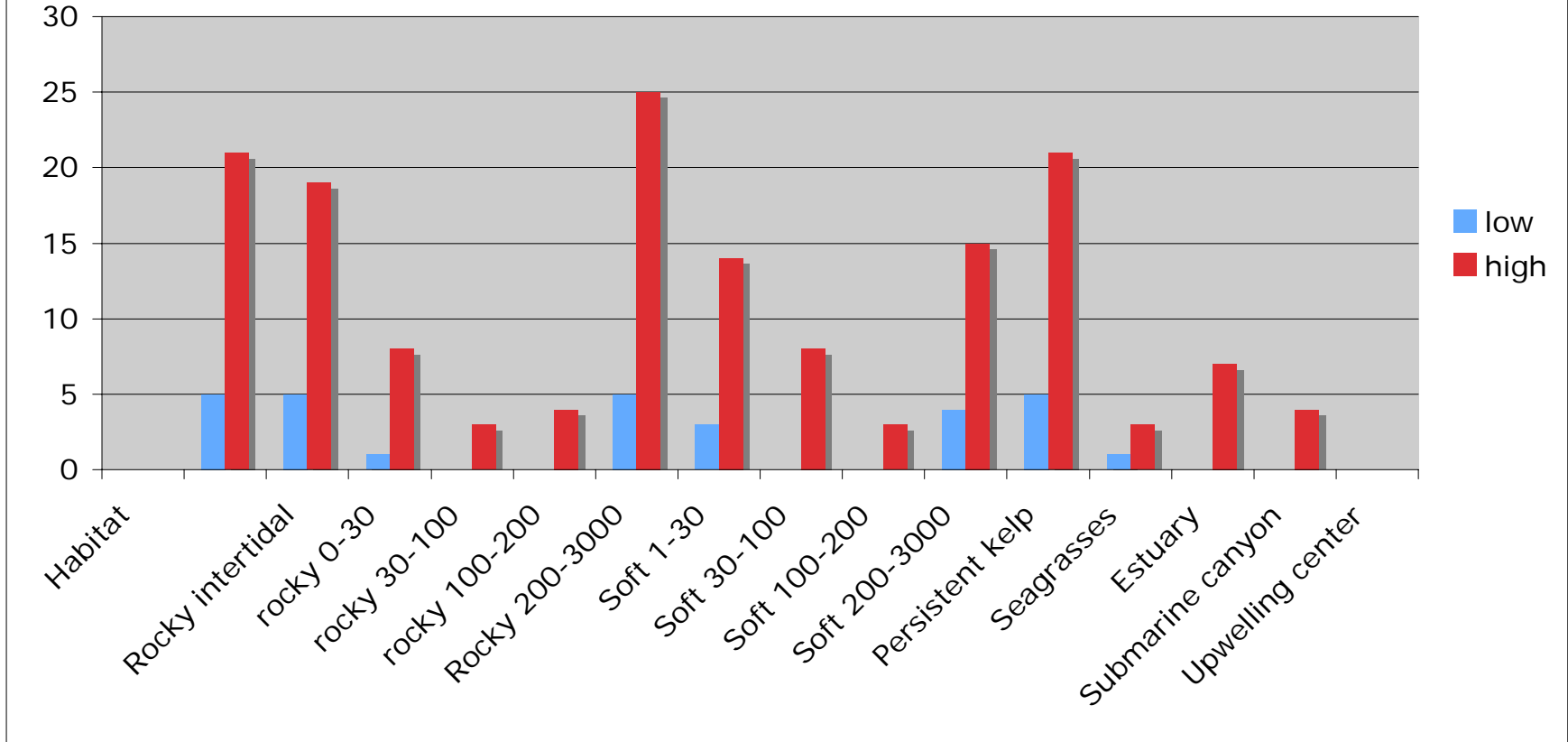
MPAs in shallow- to medium depths allow tests of open access versus reserve effects. Comparisons between open access, high protection and low protection would be possible for shallow rocky habitats, shallow soft bottom habitats and persistent kelp habitats.

proposal 3 MPAs

Legend: #REF! (blue), high (red)

Categories: Habitat, Rocky intertidal, rocky 0-30, rocky 30-100, rocky 100-200, Rocky 200-3000, Soft 1-30, Soft 30-100, Soft 100-200, Soft 200-3000, Persistent kelp, Seagrasses, Estuary, Submarine canyon, Upwelling center
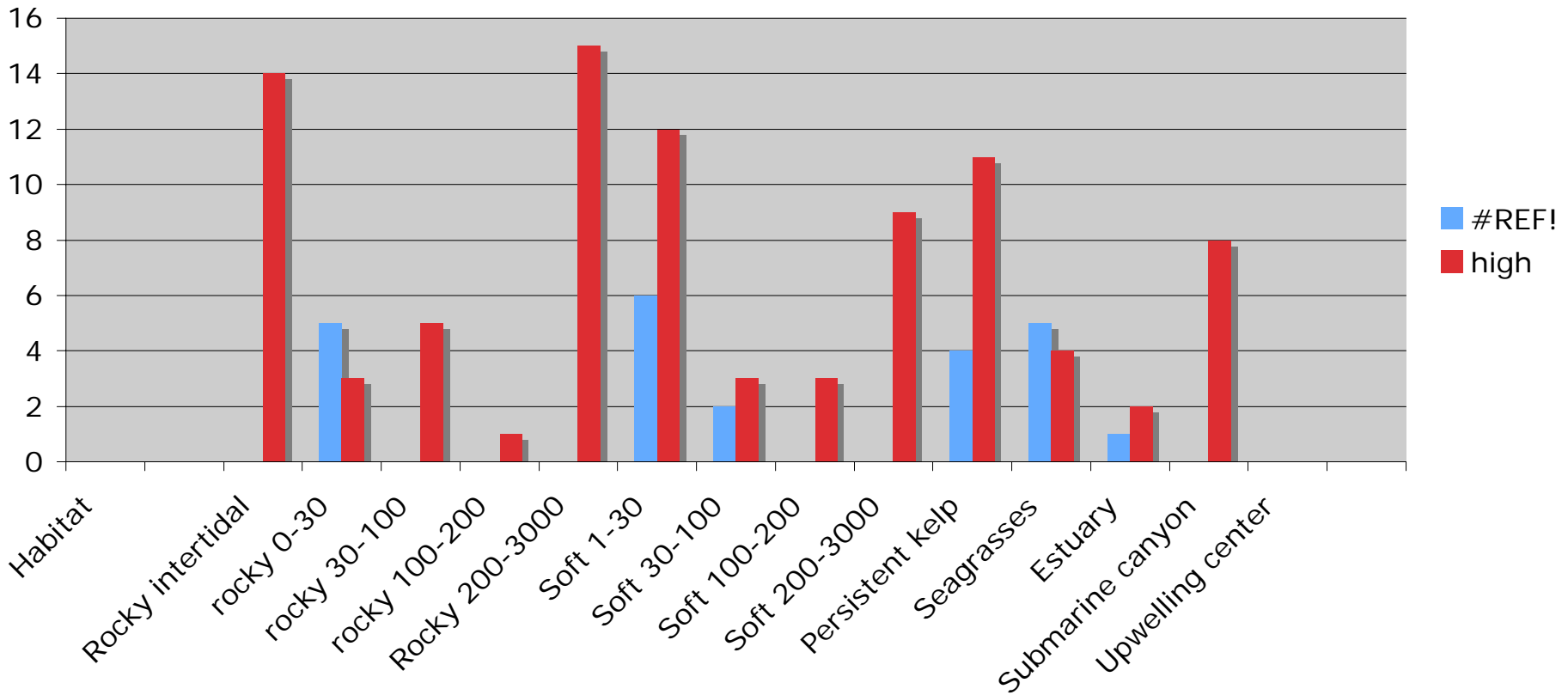
Replication is good for shallow rocky and soft bottom areas, kelp areas and seagrass beds. Upwelling centers receive more high level protection than in other proposals. Low replication for deep rocky reefs (>200 ft) is a concern in this proposal.

proposal 3 MPAs

Legend: #REF! (blue), high (red)

Categories: Habitat, Rocky intertidal, rocky 0-30, rocky 30-100, rocky 100-200, Rocky 200-3000, Soft 1-30, Soft 30-100, Soft 100-200, Soft 200-3000, Persistent kelp, Seagrasses, Estuary, Submarine canyon, Upwelling center
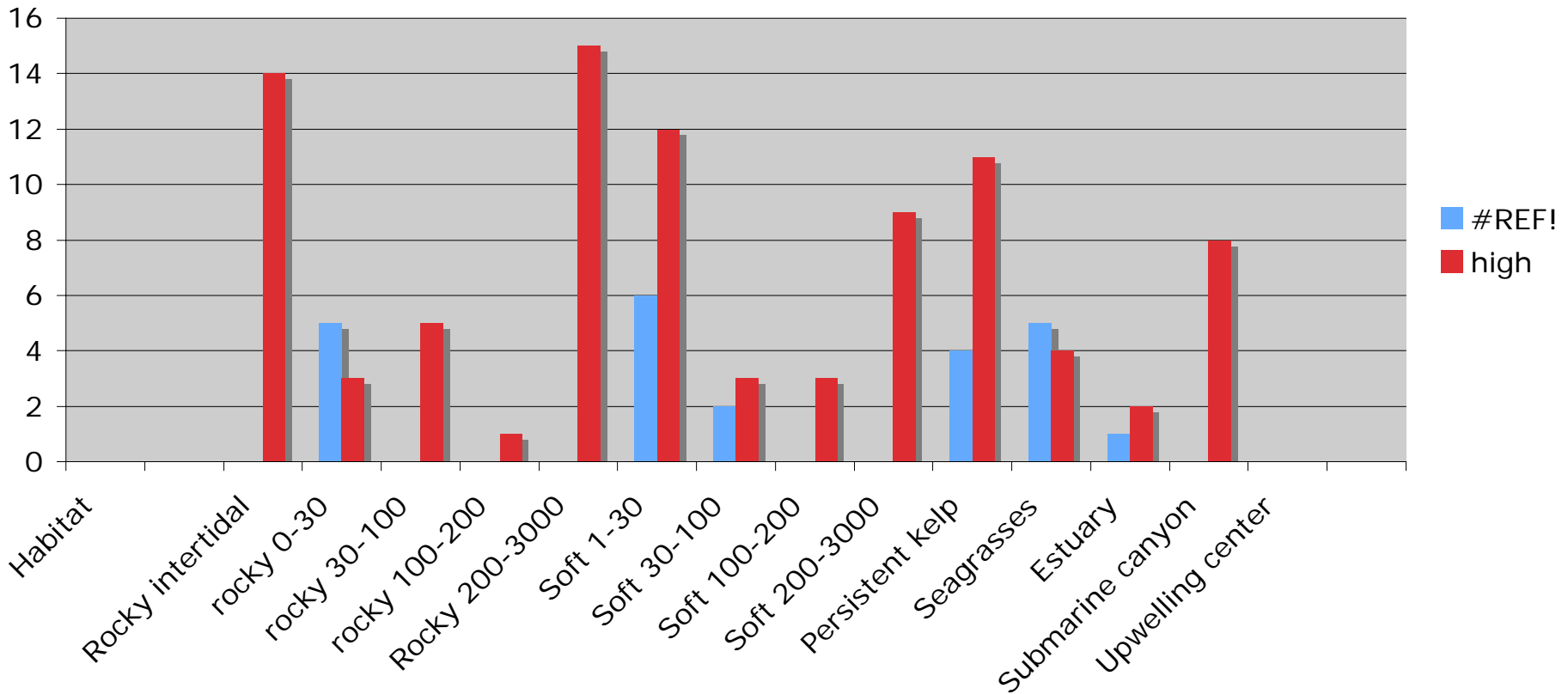
MPAs in shallow- to medium depths allow tests of open access versus reserve effects. Analysis of open access vs low level vs high level protection would be possible in shallow rocky, shallow soft bottom, seagrass and estuary habitats.

PROPOSAL 4

NUMBER OF MPAS

Legend:
- low MPAs Proposal 4
- high MPAs proposal 4

Categories: Rocky intertidal, rocky 0-30, rocky 30-100, rocky 100-200, Rocky 200-3000, Soft 1-30, Soft 30-100, Soft 100-200, Soft 200-3000, Persistent kelp, Seagrasses, Estuary, Submarine canyon, Upwelling center

PROPOSAL A

Legend:
- low Proposal A
- high proposal A

Category	low Proposal A	high proposal A
Rocky intertidal	3	14
rocky 0-30	3	10
rocky 30-100		8
rocky 100-200		4
Rocky 200-3000		3
Soft 1-30	4	12
Soft 30-100	1	14
Soft 100-200		5
Soft 200-3000		3
Persistent kelp	3	9
Seagrasses	3	12
Estuary		2
Submarine canyon	1	5
Upwelling center		5

PROPOSAL C

soft bottom protection by d

depth

prop 1
prop 2
prop 3
prop 4
prop A
prop C
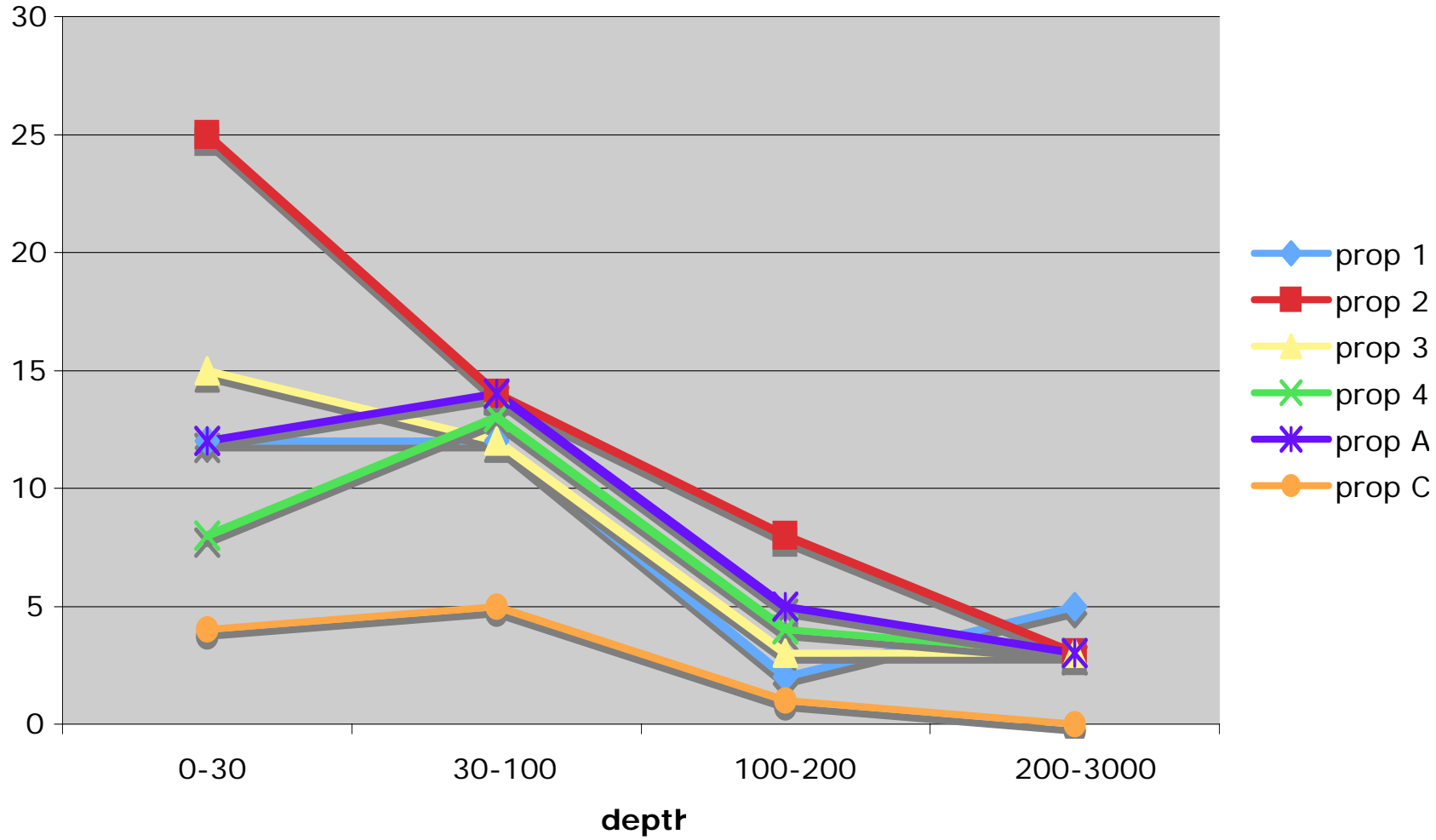
Rocky habitat MPAs by depth

Legend:
- prop 1
- prop 2
- prop 3
- prop 4
- prop A
- prop C
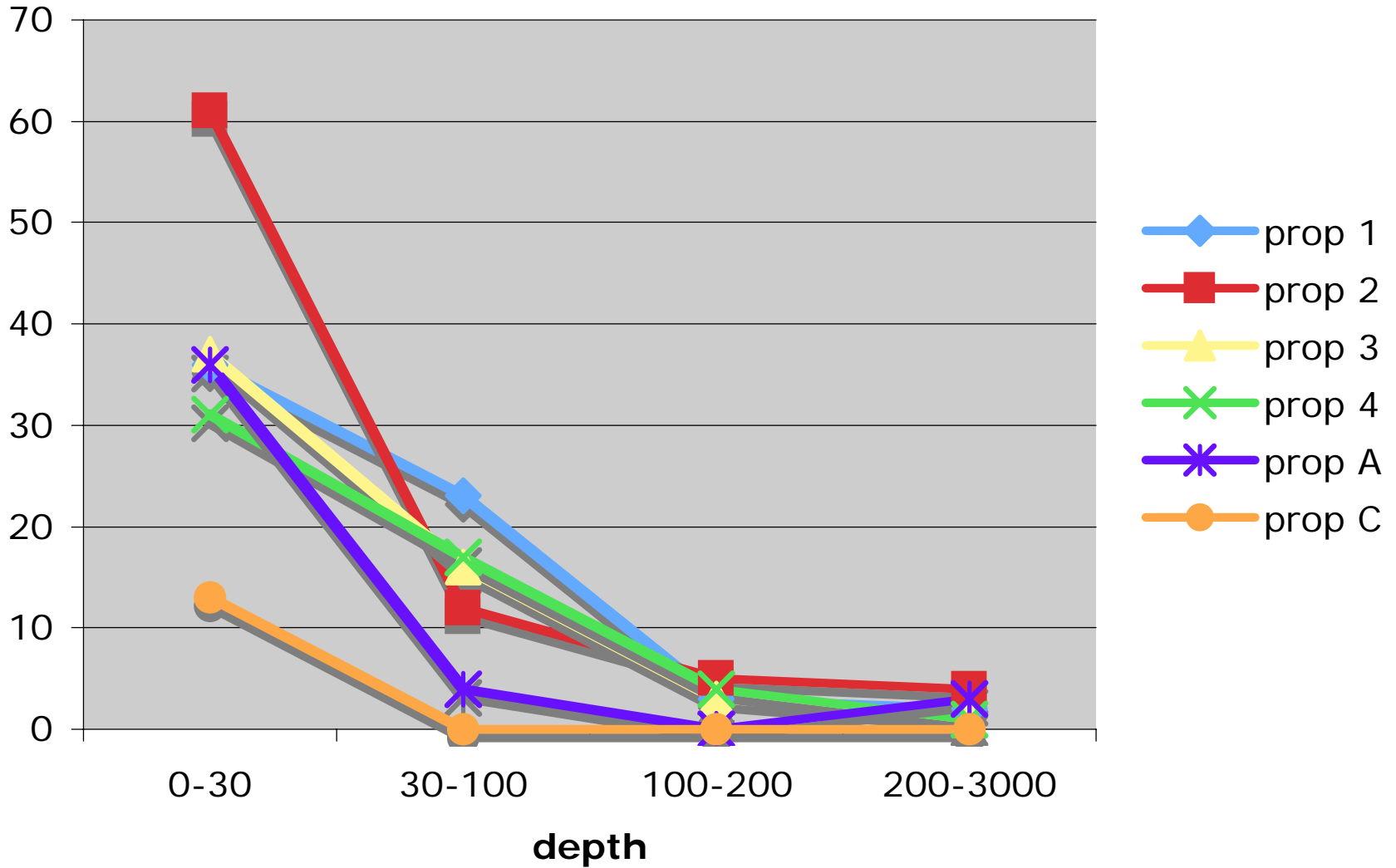
depth

Reserves and connectivity

plan 1
plan 2
plan 4
plan A

Distance (mi) between adjacent SMR
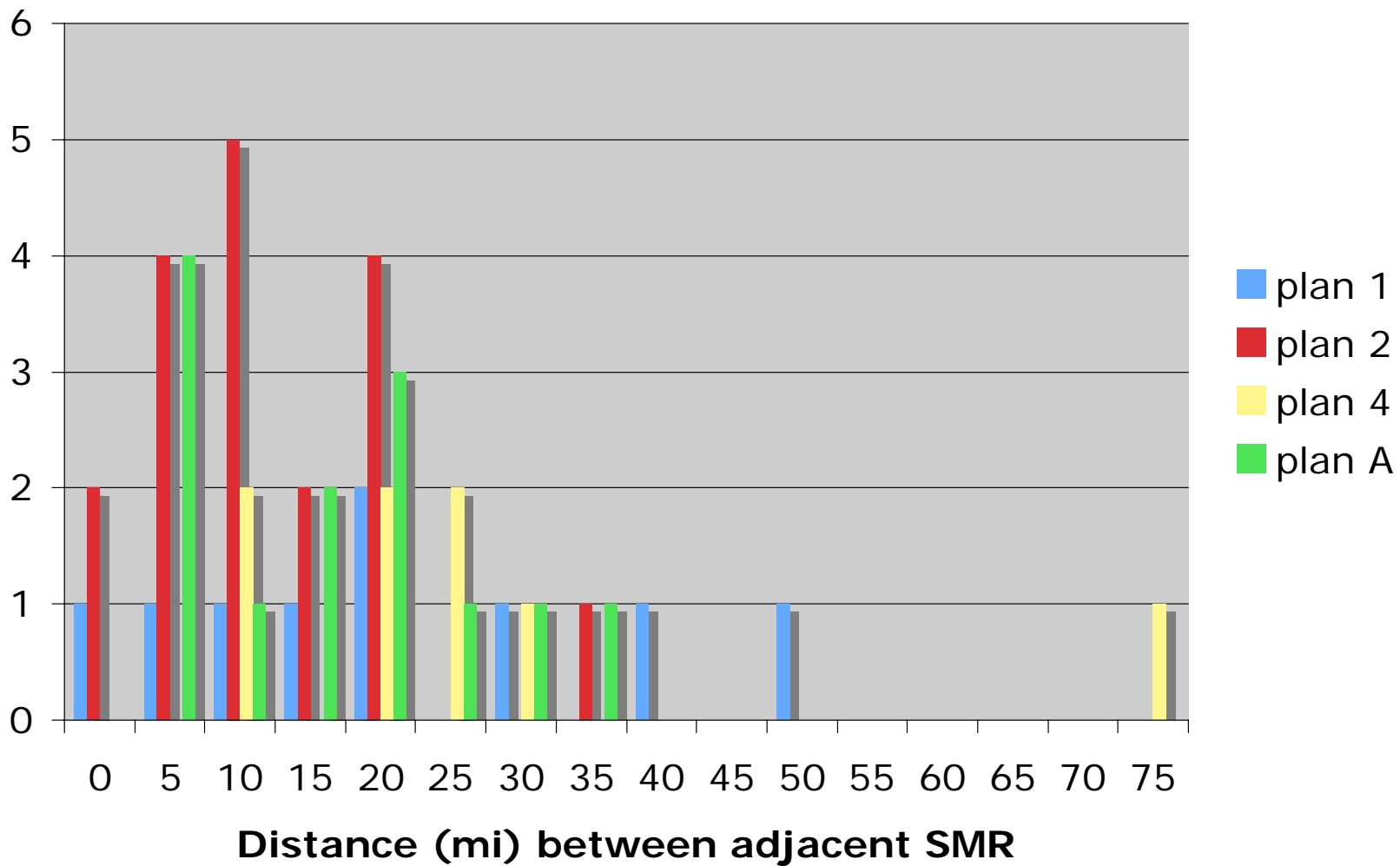
California Marine Life Protection Act Initiative
MLPA Master Plan Science Advisory Team - Central Coast Sub-Team
Analysis of Habitats by Depth for Candidate MPA Packages in the Central Coast Study Region
"November 29, 2005"

Habitat	low MPAs Proposal 1	low Proposal 2	low Proposal 3	low MPAs Proposal 4	low Proposal A	low Proposal C	high MPAs proposal 1	high proposal 2	high proposal 3	high MPAs proposal 4	high proposal A	high proposal C
Rocky intertidal	4	5	6	8	3	2	14	21	12	11	14	6
rocky 0-30	6	5	5	8	3	1	13	19	14	9	10	5
rocky 30-100	2	1	0	4	0	0	2	8	3	6	8	3
rocky 100-200	1	0	0	0	0	0	1	3	5	3	4	0
Rocky 200-3000	1	0	0	0	0	0	2	4	1	1	3	0
Soft 1-30	1	5	6	8	4	1	12	25	15	8	12	4
Soft 30-100	14	3	2	7	1	1	12	14	12	13	14	5
Soft 100-200	5	0	0	1	0	0	2	8	3	4	5	1
Soft 200-3000	1	0	0	0	0	0	5	3	3	3	3	0
Persistent kelp	1	4	4	7	3	0	9	15	9	10	9	1
Seagrasses	4	5	5	5	3	0	9	21	11	11	12	2
Estuary	3	1	1	0	0	0	2	3	4	0	2	0
Submarine canyon	1	0	0	0	1	0	4	7	2	4	5	2
Upwelling center	1	0	0	2	0	2	7	4	8	3	5	3
Rocky habitats	prop 1	prop 2	prop 3	prop 4	prop A	prop C						
0-30	36	61	37	31	36	13						
30-100	23	12	16	17	4	0						
100-200	3	5	3	4	0	0						
200-3000	2	4	1	1	3	0						
Soft bottom habitats	prop 1	prop 2	prop 3	prop 4	prop A	prop C						
0-30	12	25	15	8	12	4						
30-100	12	14	12	13	14	5						
100-200	2	8	3	4	5	1						
200-3000	5	3	3	3	3	0						