SUSTAINABLE POPULATIONS & NETWORKS: SIZE, SPACING, FISHING & HABITAT

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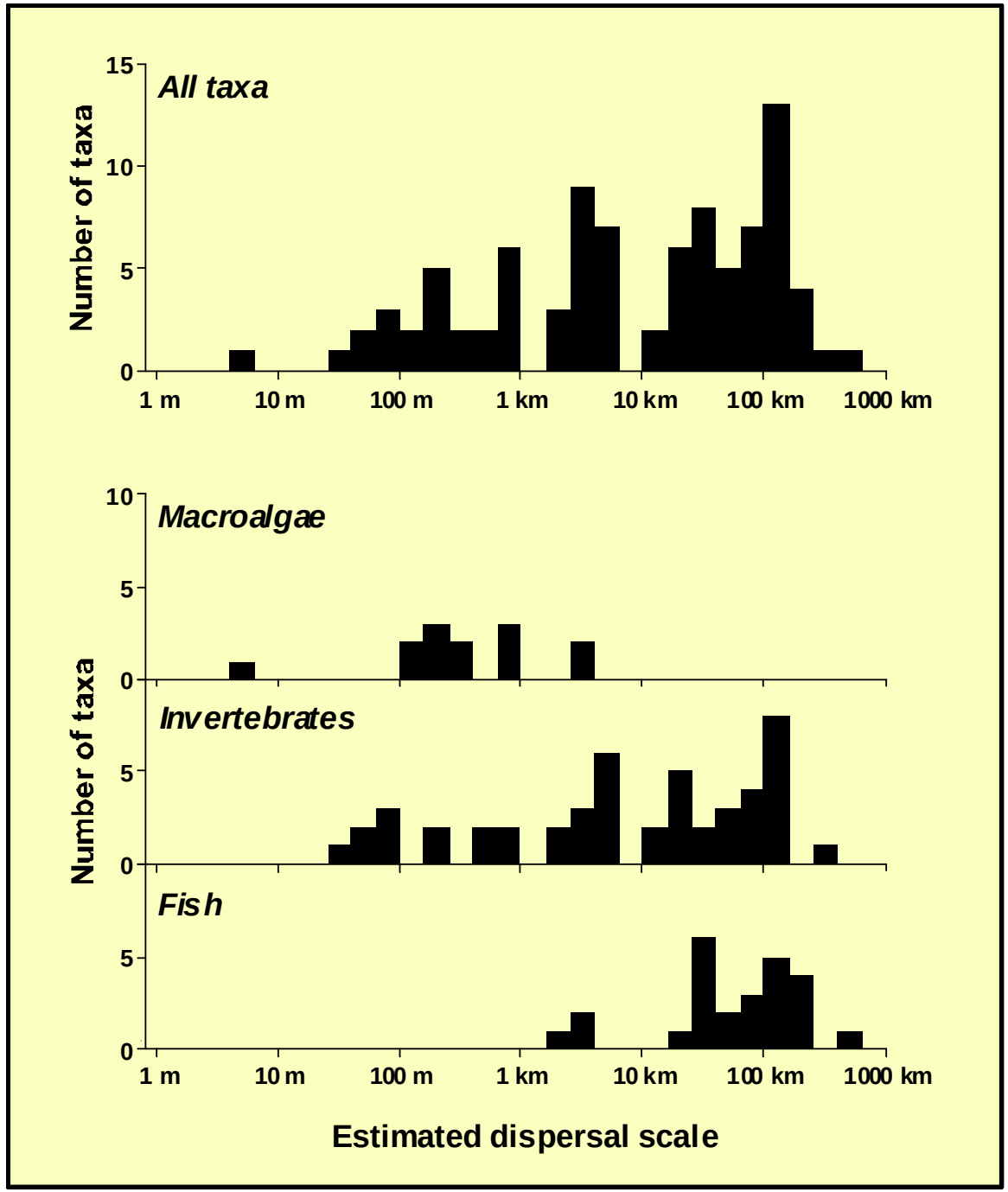
1. SAT assessed whether Guidelines on size and spacing were met

2. SAT assessed whether guidelines on habitats were met.

3. Fishery management is not a goal of the MLPA, but population status outside reserves affects sustainability in reserves.

4. Species to be protected disperse different distances

Propagule dispersal profiles for coastal marine organisms



Spatial Sustainability Analysis assesses how

(1) size and spacing in packages,
(2) habitat distributions,
(3) fishing and
(4) species dispersal distance

Work together to determine the sustainability of populations.

This addresses:

(1) MLPA Goal 2 (Sustainable Populations),
(2) MLPA Goal 6 (Functioning as a Network),
(3) MLPA Goal 1 (Ecosystems, made up of Populations).

SPATIAL SUSTAINABILITY ANALYSIS

For each package, we calculated the locations at which populations would persist for combinations of dispersal distance, habitat and fishing.

These calculations are more comprehensive, but depend on assumptions, uncertainties more than reserve dimensions and habitat fractions do.

This is the Best Available Science but of course it involves uncertainty in dispersal patterns, habitat distributions, sustainability thresholds, etc.. Resulting area calculations are interpreted in terms of trends indicated, rather than as specific predictions of population persistence at each location.

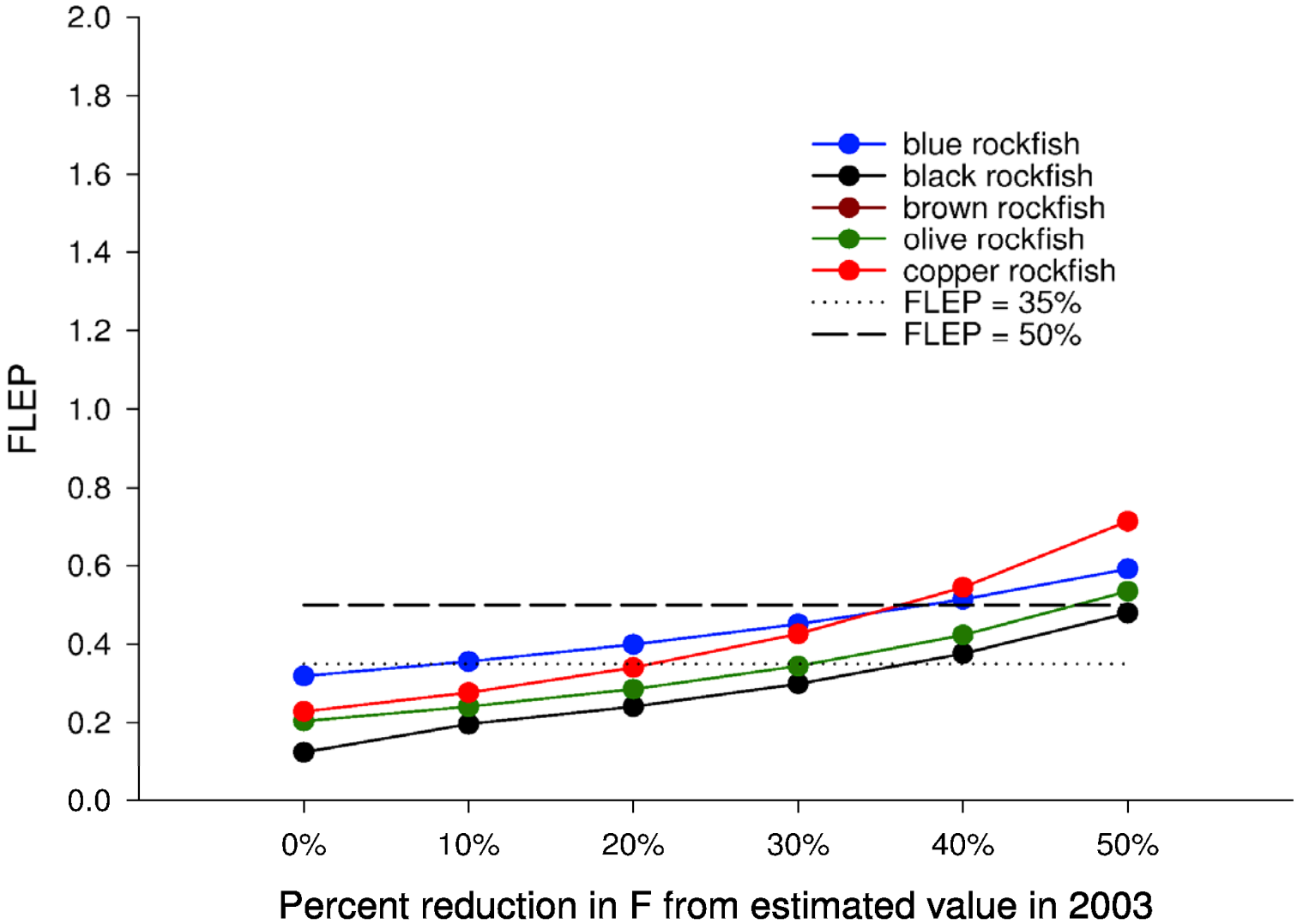
IMPORTANT VARIABLES

Dispersal distance:
Short - < 1 mile, e.g., abalone
Long - 20 miles and greater (see graph)

Fishing:
High F - level existing in some species (FLEP=.2)
Lower F - improvement possible outside MLPA (FLEP=.3)

Habitat:
Rock Bottom at Depth 0-100 feet - kelp beds, sea urchins, kelp, black and yellow, green rockfish
Rock Bottom at Depth 100-300 feet - vermillion, calico, china rockfish

Increase in FLEP as Fishing Rate is Reduced

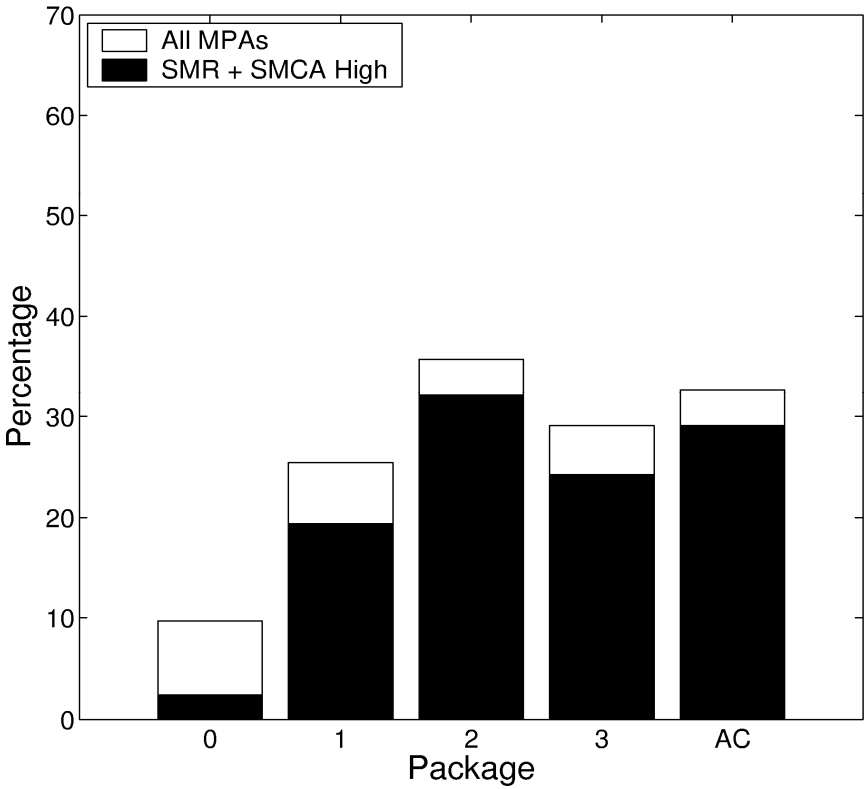


GENERAL OBSERVATIONS

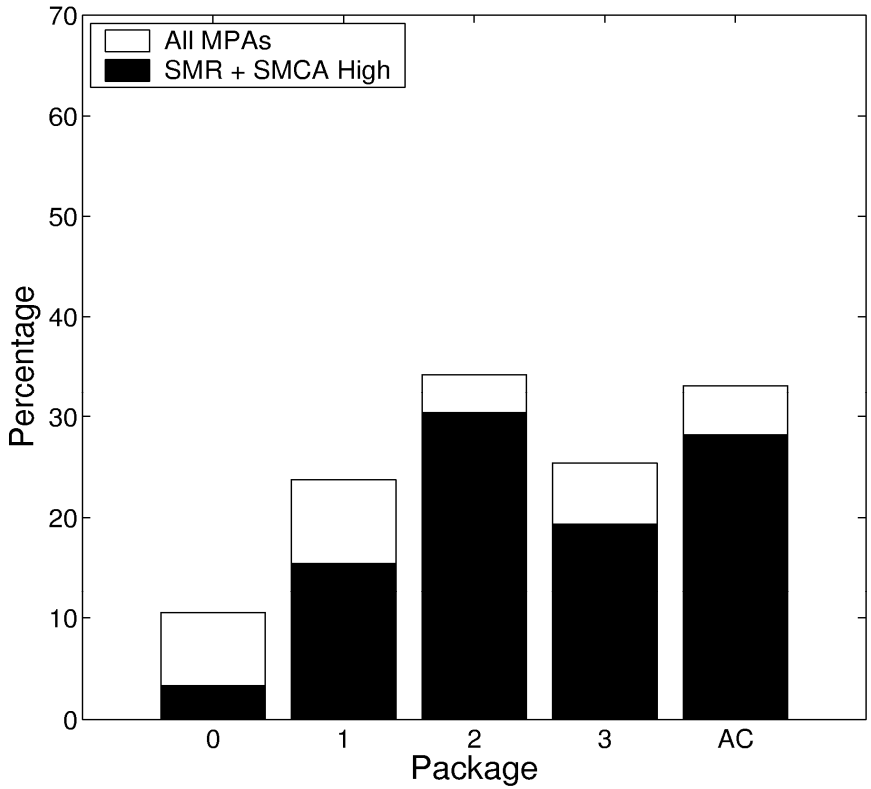
ALL PACKAGES: For **short** distance dispersers, fraction of habitat with sustainable populations is the fraction of habitat protected. So to compare fraction of habitat with short distance dispersers present, we need only look at fraction in reserves.

The ability of a proposed package to function as a NETWORK is reflected in the fraction of habitat with **long** distance dispersers present. This varies among packages, and can be greater than the fraction of habitat in reserves.

0-100 ft Rocky Habitat

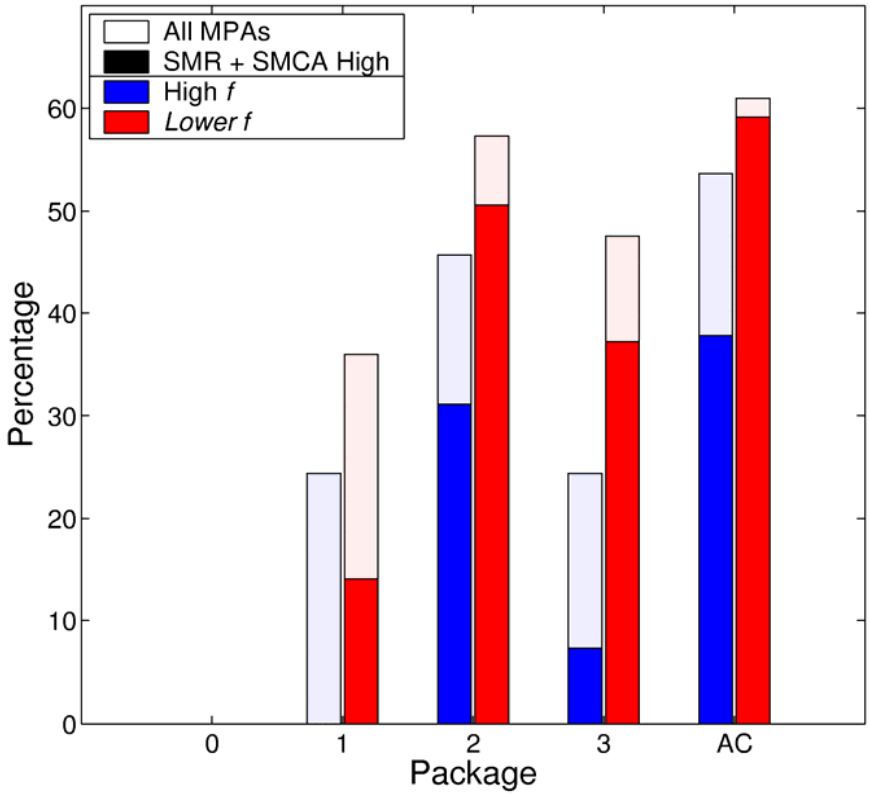


100-300 ft Rocky Habitat



Comparison of fraction of area in rocky habitat . This is also fraction of area where short distance dispersers will persist.

0-100 ft Rocky Habitat



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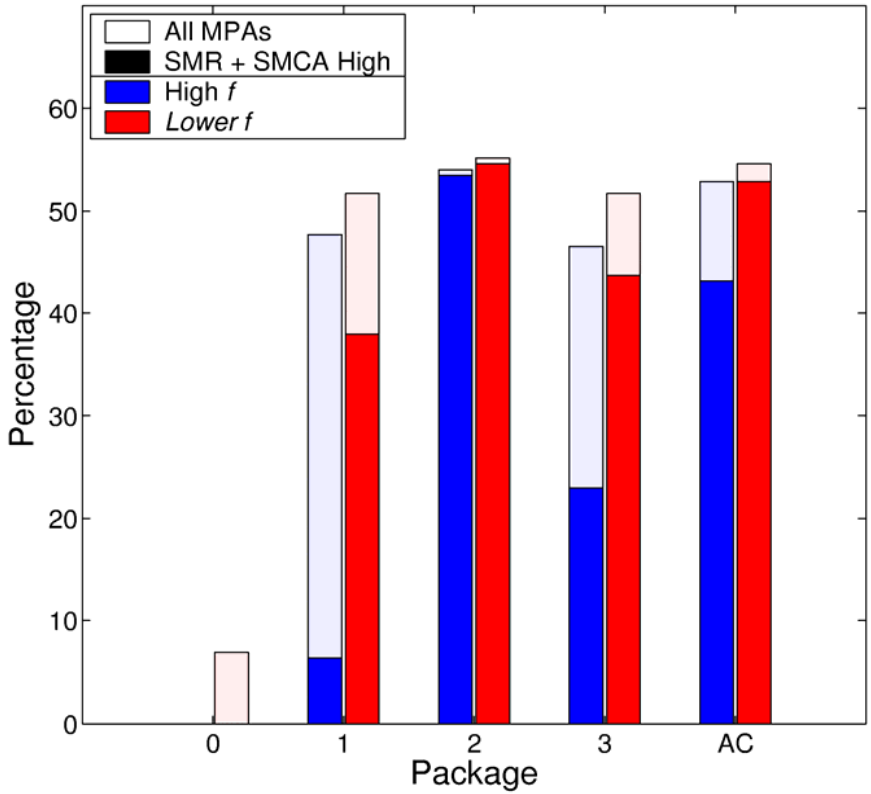
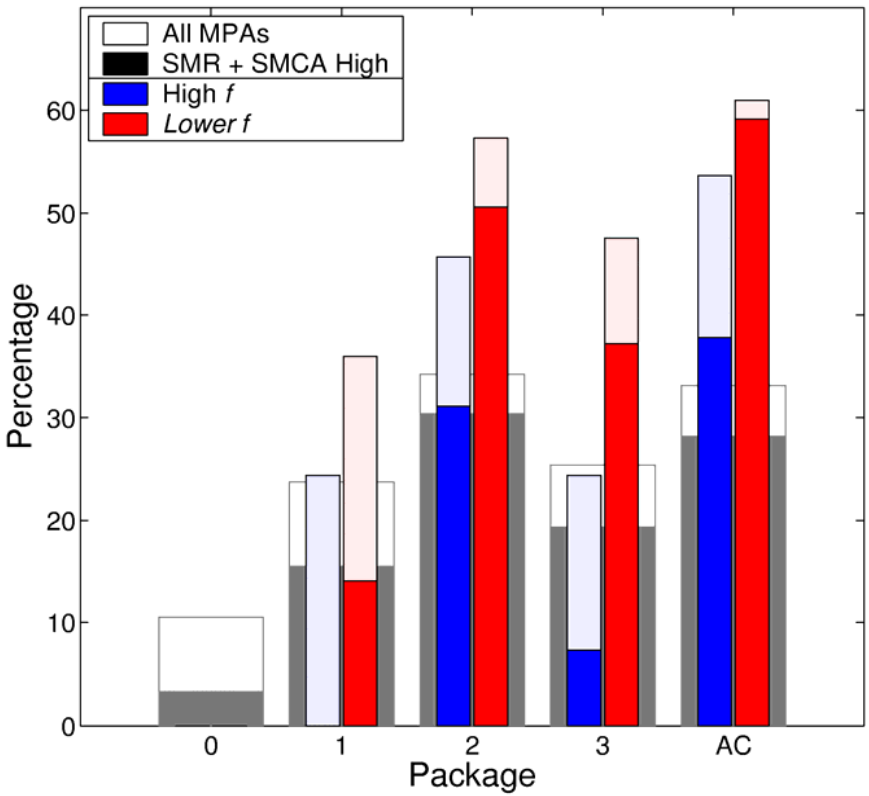
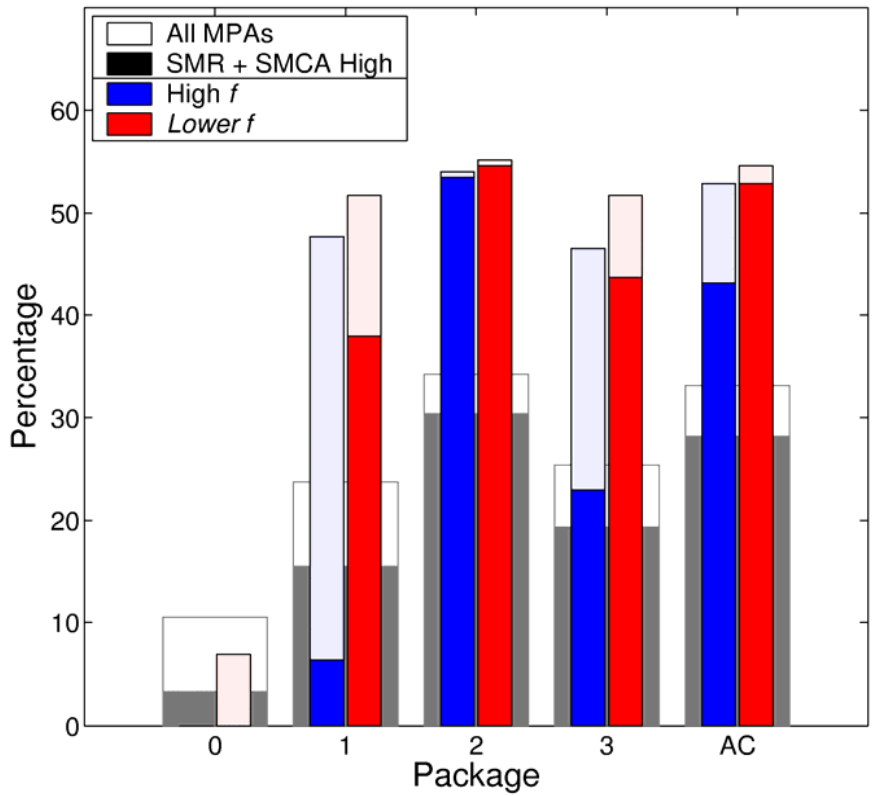


Comparison of fraction of area in which long distance dispersers will be present. Useful to compare this to fraction of rocky habitat in reserves (next slide).

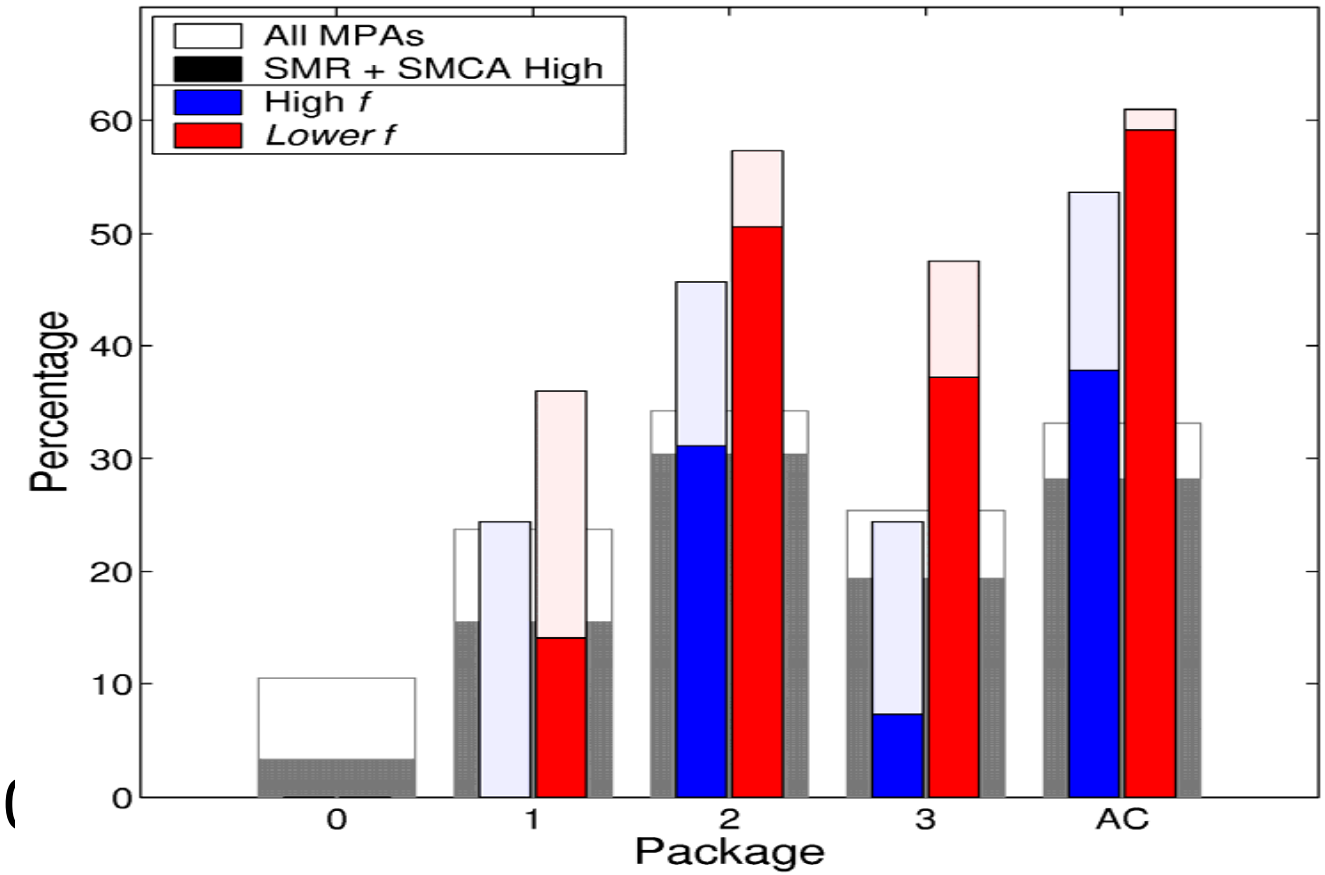
0-100 ft Rocky Habitat



100-300 ft Rocky Habitat



Comparison of fraction of area in which long distance dispersers will be present, with fraction in reserves as a comparison. Note some follow pattern, some have a greater fraction present than fraction in reserves (i.e., better network effect).



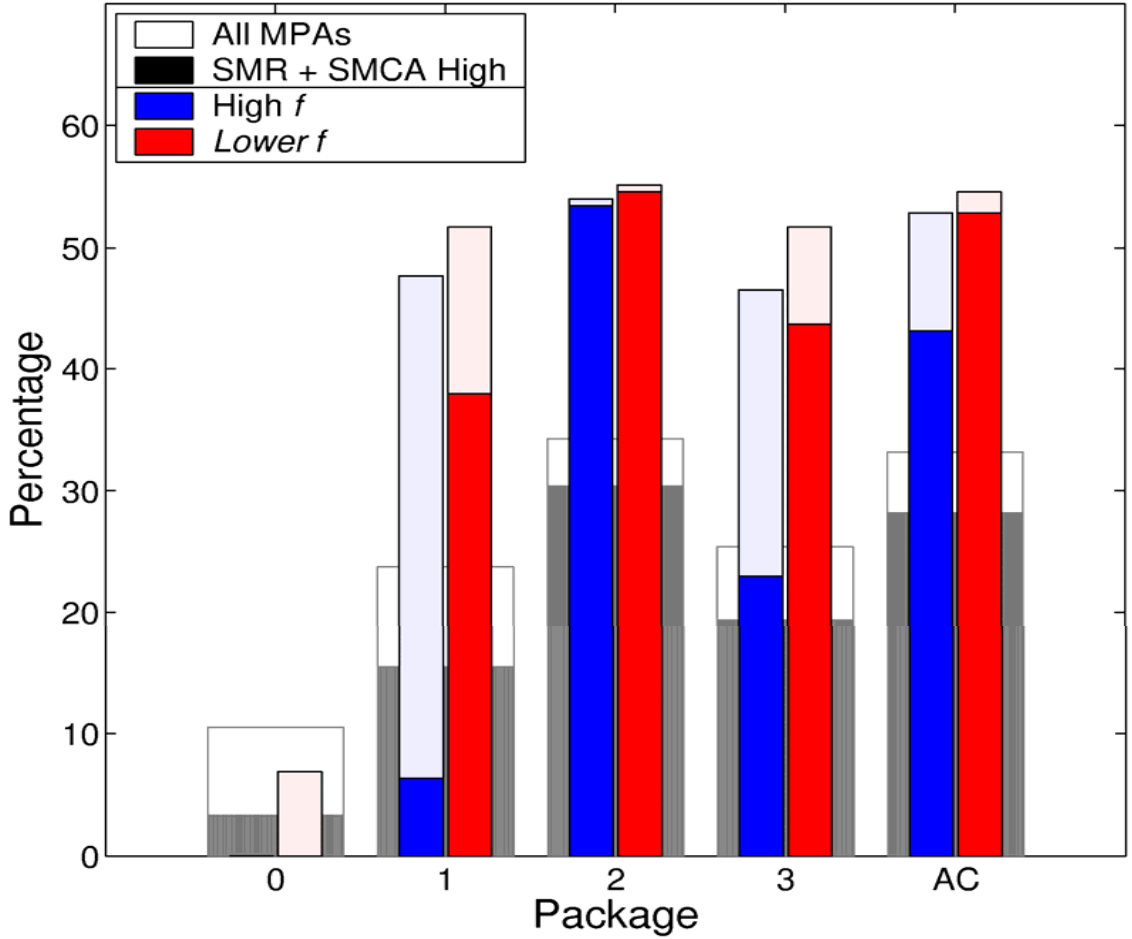
0-100 ft Rocky Habitat

P0 ineffective as network

P2, PAC about the same

P1 lower because less area in MPAs

P1, P3 sensitive to fishing



100-300 ft
Rocky Habitat

P0 ineffective as network

All Ps the same when considering all MPAs

P1, P3 sensitive to fishing and MPA type

Package Comparison

0-100 ft

- P0 ineffective as network
- P2, PAC about the same
- P1 lower because less area in reserves
- P3 sensitive to fishing

100-300 ft

- P0 SMR+ ineffective as network
- All Ps the same when considering all reserves
- P1, P3 SMR+ sensitive to fishing and reserve type