# Results

## Prioritizr

### Selections

Immagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamenteImmagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamente

Figure. Hierarchical dendrogram displaying the similarities between planning scenarios of prioritizr based on planning unit selection frequencies, for D. sargus (left) and M. surmuletus (right)

For both species, the selections of PUs were different between problems. The Jaccard distances between problems using single PCA axes were high and significant (Jaccard distances = 0.9; all permutation tests p < 0.001). However, planning problems did not cluster together according to the classification method or the number of classes used (Figure). The Jaccard distances between problems using multiple PCA axes were smaller but still significant (Jaccard distance = 0.5, permutation test p < 0.001).

### Amount held

Immagine che contiene testo, schermata, diagramma, Diagramma

Descrizione generata automaticamenteImmagine che contiene testo, schermata, diagramma, Diagramma

Descrizione generata automaticamente

Figure. Mean amount held for conservation features of each planning problem (columns) by selections of PUs found in each planning problem (colours and marker type). The amount held was averaged over the conservation features of each problem and the 100 solutions evaluated.

We evaluated whether the solutions found in the different planning problems could also achieve the targets for conservation features defined in other ways. In both species, the solutions reached the 15% target for most conservation features or were within the 2% optimality gap. However, the *k*-means method with the lowest number of clusters (2 for *D. sargus* and 3 for *M. surmuletus*) often failed to meet the conservation targets of the other problems. In addition, for *D. sargus*, conservation features defined with the “equal” and “standard deviation” method were often difficult to protect adequately with solutions found with other methods, particularly when 6 or 12 classes were used.

### Conservation cost

Immagine che contiene testo, diagramma, schermata, Carattere

Descrizione generata automaticamenteImmagine che contiene testo, diagramma, schermata, Carattere

Descrizione generata automaticamente

figure x. Conservation cost. The boxplots show the distribution of conservation costs over the 100 solutions obtained in each conservation problem in prioritizr.

For *D. sargus*, conservation costs ranged between xxx and xxx, while in *M. surmuletus* it ranged between xxx and xxx. In all cases, conservation costs were higher than those required to protect 15% of the species distributions only (i.e. 15% \* 2266 PUs = 340 PUs in *D. sargus* and 15% \* 3626 PUs = 544 PUs in *M. surmuletus*). Conservation costs were smaller in planning problems using fewer classes or clusters and increased with the number of classes or clusters, while there were small differences in conservation costs between methods used to define classes. As *M. surmuletus* has a larger distribution area, it had higher conservation costs than *D. sargus*.

## Raptr

### Selections

Immagine che contiene testo, diagramma, Disegno tecnico, Piano

Descrizione generata automaticamenteImmagine che contiene testo, diagramma, Carattere, schermata

Descrizione generata automaticamente

figure x. Hierarchical dendrogram displaying the similarities between planning scenarios of raptr based on planning unit selection frequencies, for D. sargus (left) and M. surmuletus (right)

In *D. sargus*, the selections of PUs in planning problems using single PCA axes to define genetic spaces were not different among them (mean pairwise Jaccard distance: 0, n.s.), but they were clearly separated from those combining PCA axes to define genetic spaces (mean pairwise Jaccard distance between solutions of single PCA and combined PCA axes: 0.9, p < 0.001; Figure). The solutions of combined PCA axes were also different among them (mean pairwise Jaccard distance: 0.9, p < 0.001). In *M. surmuletus*, all selections except one were statistically similar (mean Jaccard distance: 0, n.s.). CLOSER INSPECTION? MAPS?

### Targets met

Immagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamenteImmagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamente

Figure. Mean space held for genetic spaces of each planning problem (columns) by selections of PUs found in each planning problem (colours and marker type). The space held was averaged over the genetic spaces of each problem and the 100 solutions evaluated.

In both species, one-dimensional genetic spaces defined using single PCA axes were more easily protected than multidimensional genetic spaces by selections of PUs found with any planning problem. Within each planning problems, the different selections were equivalent in terms of proportion of genetic spaces held, except for the selections found with the hypervolume method with 20 demand points in *D. sargus*, which resulted in lower proportions of genetic spaces held.

### Conservation cost

Immagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamenteImmagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamente

figure x. Conservation cost. The boxplots show the distribution of conservation costs over the 100 solutions obtained in each conservation problem in raptr.

In both species, conservation costs were only slightly higher than those required to protect only the species distributions (i.e. 340 PUs in *D. sargus* and 544 PUs in *M. surmuletus*). Conservation costs were practically invariable among planning problems, averaging 340 or 341 PUs in D. sargus and 545 PUs in M. surmuletus, i.e. the number of PUs required to protect 15% of the species distributions.

### Maximum targets

Immagine che contiene testo, schermata, Carattere, diagramma

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figure x. Maximum targets. The boxplot shows the distribution of maximum targets over the genetic spaces of each planning problem in raptr, for D. sargus (left) and M. surmuletus (right)

IN both species, maximum targets were higher and close to 1 in problems with one-dimensional genetic spaces than in problems with multidimensional genetic spaces. Within problems, the different genetic spaces exhibited some variation in their maximum targets. HERE EXPLAIN WITH EXAMPLES

## Evaluation of the current network of Mediterranean marine reserves

Immagine che contiene testo, schermata, diagramma, Carattere

Descrizione generata automaticamenteImmagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamente

figure x. Mean shortfall of each planning problem of prioritizr under the current network of MR

Immagine che contiene testo, schermata, Carattere, diagramma

Descrizione generata automaticamenteImmagine che contiene testo, schermata, diagramma, Carattere

Descrizione generata automaticamente

figure x. Mean held proportion over all the genetic spaces of each planning problem of raptr under the current network of MR