Supplementary information:

Maximum sustainable yield (MSY) is the maximum long-term catch at equilibrium that can be achieved by fishing at a certainty intensity. F_{MSY} represents the fishing intensity (in the form of fishing mortality rates) corresponding to the MSY (Fig. S4). To calculate the value of F_{MSY}, we use the developed projection model to project the fishery under a gradient of fishing mortality from 0.01 to 0.6 with the interval of 0.01 until the stock size reaches equilibrium. We then compare the annual catch level at equilibrium and identify the peak value (MSY) and the corresponding fishing mortality rate (F_{MSY} at 0.25). This is a purely model-based approach, the result of which is close to the estimation from length-based methods (0.27 by Sun et al. (2018)).
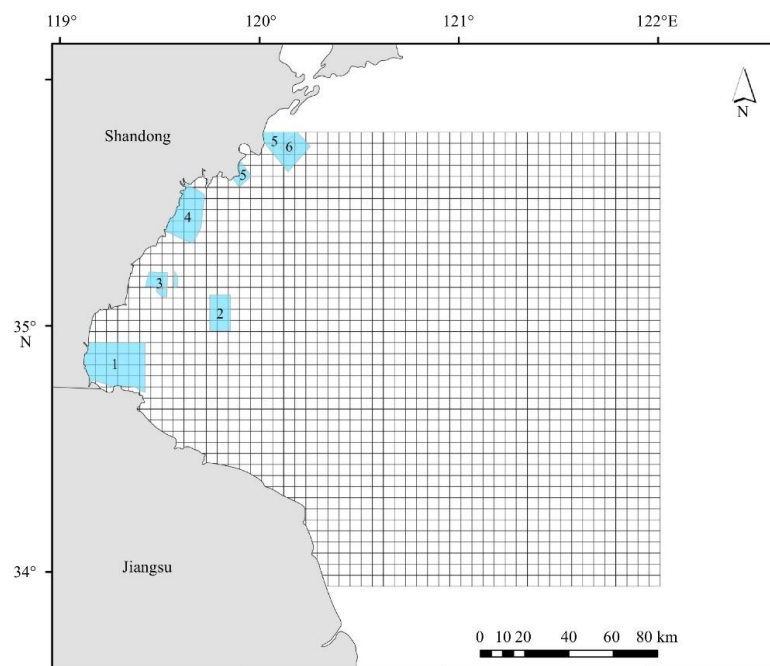

Fig. S1. Distribution of existing marine closured area in the study region (figures from Li et al. (2019)).
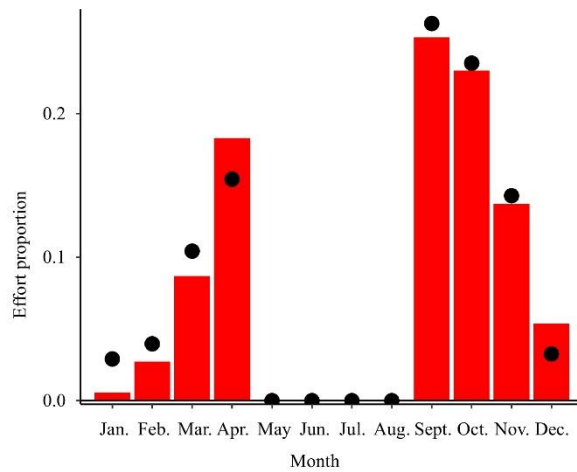
Fig. S2. Catch allocation pattern used in this study. The black dots indicate the catch pattern observed from the local fishery monitoring program. The red bars indicate the adjusted catch allocation pattern fit to a Gaussian function, which is used in this study for simulation.

Fig. S3. Modifications made to the temporal and spatial closured measures in historical years. These modifications are considered in the hindcasting.
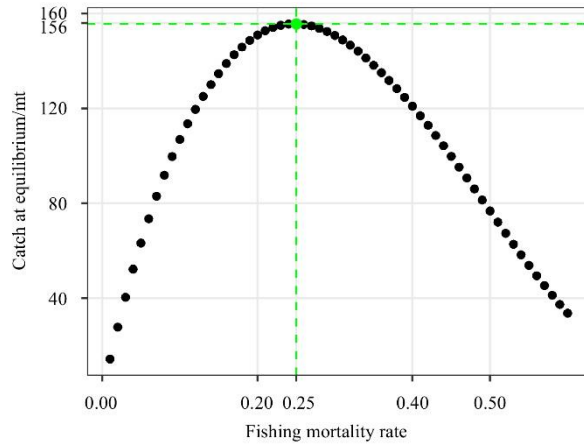
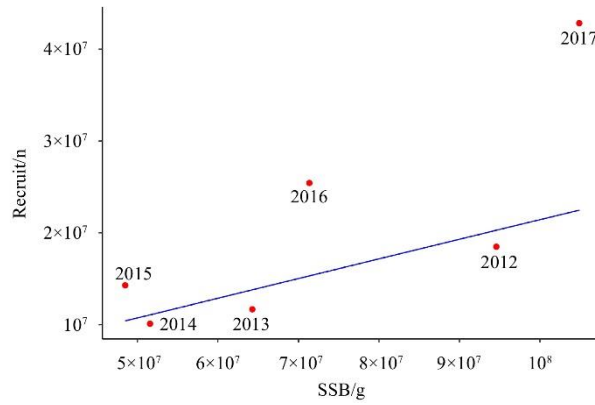**Fig. S4.** Determination of F_{MSY} with the projection model.

Fig. S5. Stock recruitment relationship fitted from Liu et al. 2015 (blue line) and the observed recruit in Haizhou Bay (red dots).
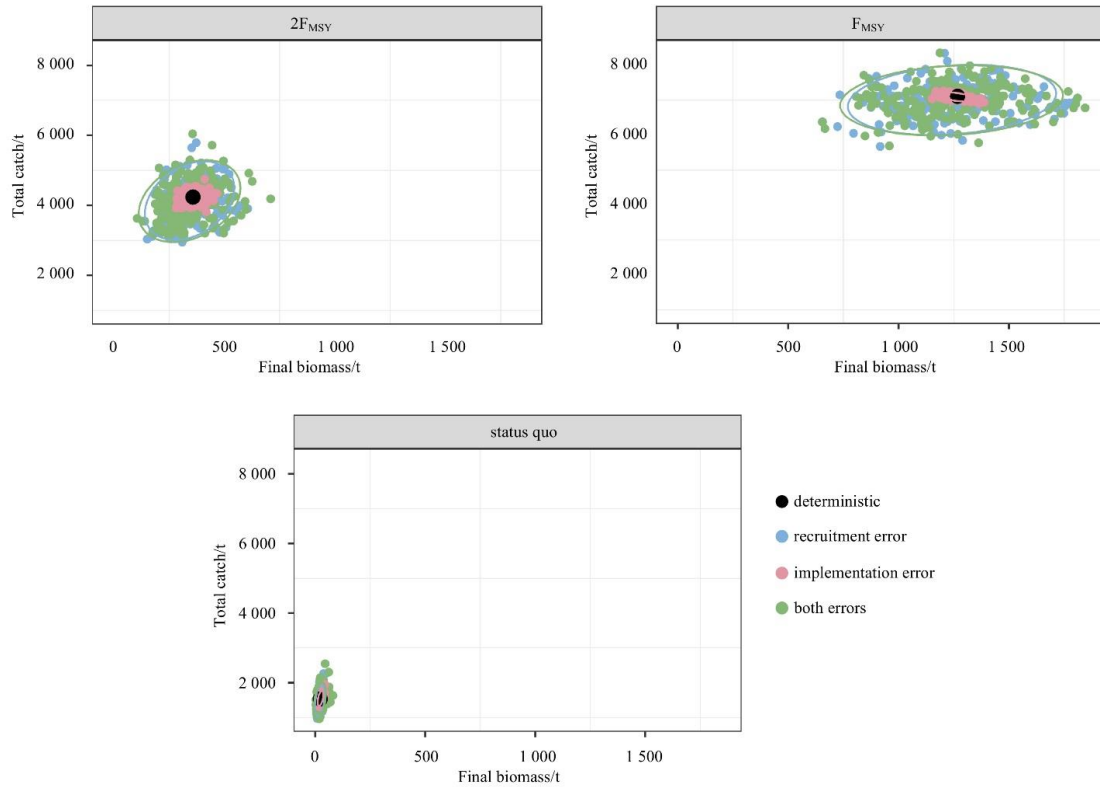
Fig. S6. Accumulative catch and final biomass for three management scenarios under the influence of uncertainty (unified scale).

Table S1 Information on the actual historical stock status. Estimations are obtained from Li et al. (2020)

Quantities	2011	2012	2013	2014	2015	2016	2017
Fishing mortality rate	0.92	0.89	1.06	0.65	0.41	0.41	0.66

Reference

- Li, Y., Zhang, C., Xue, Y., Xu, B., Sun, M., Ren, Y., & Chen, Y. 2019. Developing a marine protected area network with multiple objectives in China. Aquatic Conservation: Marine and Freshwater Ecosystems, 29 (6), 952–963

- Li, Y., Sun, M., Zhang, C., Zhang, Y., Xu, B., Ren, Y., & Chen, Y. 2020. Evaluating fisheries conservation strategies in the socio-ecological system: A grid-based dynamic model to link spatial conservation prioritization tools with tactical fisheries management. PLoS ONE, 15: 1–19

- Sun, M., Zhang, C., Chen, Y., Xu, B., Xue, Y., & Ren, Y. 2018. Assessing the sensitivity of data-limited methods (DLMs) to the estimation of life-history parameters from length–frequency data. Canadian Journal of Fisheries and Aquatic Sciences, 75: 1563–1572