

1 **Table S3: Model Use and Trade-Off Summary Table**

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3 The Model Use and Trade-Off Summary Table compiles the information that model developers  
4 provided in the Model Characteristics and Performance Evaluation Matrices and the Model  
5 Categorization and Descriptors Summary Table. This table notes the presence or absence of  
6 particular model characteristics and qualities in an overview form that facilitates comparison across  
7 models. There is a row for each model and with the columns indicating model characteristics  
8 according to main cover of use and types of use, as well as major trade offs in relation to the use.

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10 The columns of the table categorize each model in terms of six major factors. The main uses and  
11 focus of the model are identified (main coverage of use). The governance body the model is meant  
12 to provide and the degree to which advice from the model has been implemented is specified  
13 (management advice). It is indicated whether a paper has been published in a peer reviewed journal  
14 on the model or only a report or internal agency/department documents exists and whether it has  
15 been frequently cited. The age of the model is shown along with the level of model development.  
16 The latter covers the level of model development, application and implementation. Finally model  
17 trade-offs are noted according to whether the model is simple or complex, whether it is specialized  
18 or flexible, and whether the model is highly technical and usable only by model developers or it is  
19 open access and user friendly.

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21 The specific categories are detailed according to the following:

- 22 • *Main coverage of use*

23 Follow a specific policy or data collection program, evaluation of necessary data as  
24 trade-off to data costs (i.e., value of information); Single stock assessment / advice /

25 management; Multi-Species assessment / advice / management; Ecosystem (or trophic  
26 level) assessment / advice / management; Mixed Fisheries (full fishery, fleet, métier)  
27 advice / management - TAC, Effort, Profit/Revenue; ITQ / ITE advice / management,  
28 Amount / Value; Broader Bio-Economic advice / management; Social aspects  
29 evaluation and advice / management (e.g. parameters on employment and/or  
30 distribution among crew and fishing fleets as well as how models may be used to  
31 evaluate the implications of management changes on broader social concerns such as  
32 security of resource supply to regional or local community industry. Bio-economic  
33 models may also proxy for family status or tradition by modifications to fisher  
34 behavior parameters affecting fishing trip duration or, fishing effort allocation, etc.);

35 • *Management advice level*

36 National; ICES; EU; North American; Other;

37 • *Level of implementation and application*

38 High (several cases of implementation in advice locally, regionally or worldwide);  
39 Medium (few cases of implementation in advice); Low (only one case of  
40 implementation for which the model was developed); No (no implementation in  
41 advice);

42 • *Academic*

43 Internal; Report; Peer Reviewed Published: published in peer reviewed literature;  
44 Frequently cited in peer reviewed literature or reports;

45 • *Level of model development*

46 Age of model; Advanced; Big Development Group; Manual/Website;

47 • *Trade-Offs*

48 There are trade-offs in management of marine resources and provision of ecosystem  
49 services such as fishing, aquaculture, renewable energy, shipping, conservation, and  
50 recreation, but models capable of evaluating the trade-offs are more complex. There  
51 are many trade-offs in model design. Modelers need to make trade-offs to best meet  
52 the needs of the intended uses and users for each model. The specific trade-offs  
53 included in the table SM Table S3 are the following: Developer / Educated / All;  
54 Simple / Complex; Specialized / Flexible; Technical-System / Open Access\* / User-  
55 friendly (\*Access: open access, freeware, software implementation vs. closed model,  
56 not free-ware, licenses, solvers needed). This means that there are trade offs according  
57 to whether the model is simple or complex, whether it is specialized or flexible, and  
58 whether the model is usable only by model developers or is open access and user  
59 friendly. There are trade-offs between the use and extent of inclusion of ecosystem or  
60 economic or social complexity, as well as trade-offs when attempting to limit  
61 complexity to make models more tractable and easier for managers and stakeholders  
62 and stakeholders to use. The table also shows trade-offs in relation to model  
63 implementation (experience with the model), model expertise needed to use the  
64 model, and the accessibility of the model to users. Because there is correlation  
65 between model use and level of implementation with the age of the models, there is a  
66 trade-off between introducing a new model, even it is an improvement, and sticking  
67 with or adapting an existing model. This is also associated with trade-off between  
68 successful implementation of a model and the previous effort put into analysis of the  
69 context the model should be used in. Finally, there are trade-offs between the model  
70 projection period, i.e. the time scale, in the advice or management evaluation it  
71 informs and the precision of the model output and advice result.

**Table S3. Model use overview according to main cover of use and types of use, as well as major trade offs in relation to the use.**

MODEL	Model Use and Type of Use																																			
	Main Coverage of Use			Management Advice	Level of Implementation	Academic	Level of Model Development	Trade-Offs																												
	D	S	M	E	M	I	B	S	N	I	E	N	O	H	M	L	N	I	R	P	F	M	A	B	M	D	E	A	S	C	S	F	T	O	U	
	A	I	U	C	I	T	I	O	A	C	U	O	T	I	E	O	O	N	E	E	R	O	D	I	A	E	D	L	I	O	P	L	E	P	S	
	T	N	L	O	X	Q	O	C	T	E	R	H		G	D	W	N	T	P	E	E	D	V	G	N	V	U	L	M	M	E	E	E	C	E	E
	A	G	T	S	E	E	I	S	I	S	T	E	H	H	I	E		E	O	R	Q	E	A	U	E	C	P	P	C	X	H	N	R			
	C	L	I	Y	D	C	A	O	L	O	H	R		U	R	R	U	L	N	D	A	L	A	L	A	L	L	I	I	N	I	A	F			
	O	S	T	F	R	N			A	A				A	E	N		A	E	V		A	E	P	E	D	X	L	L		A	C	C	R		
	L	S	P	E	I	O			L	M				L	V	T		G	D	E	O	E	D							I	E	A	C	I		
	L	T	E	M	S	M								L	L			E	L	R	R									Z	L	E	E			
	E	O	C	H	I	I									P	Y			O											E	S	N				
	C	C	I	E	T	C									U	I	P	W									D	/	S	D	L	L				
	T	K	E	R	E										B	C	N	E	E																	
	I	S	Y												L	I																				
	O														I	T	Y	S																		
	N														S	E	E	G	I																	
															H	D	A	R	T	E																
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