Supplementary material

S.1 Example of stochastic trajectories and associated viability probabilities

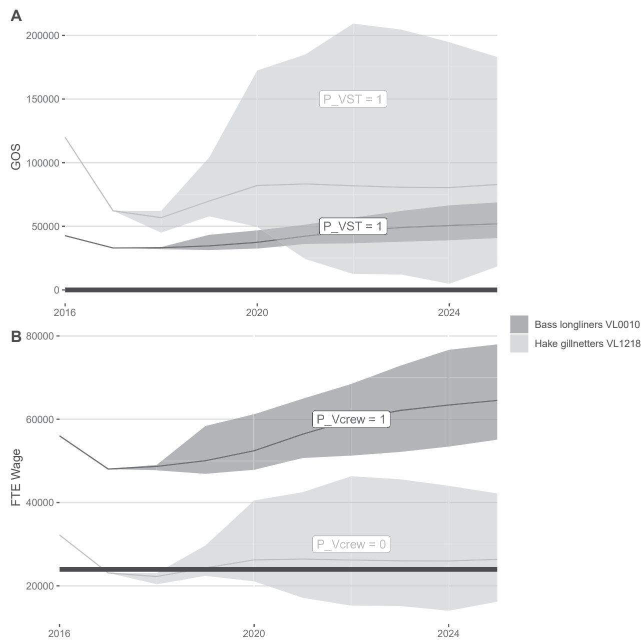

Figure S.1: Examples of stochastic trajectories (200 replicates) of Gross Operating Surplus and FTE crew wage for 2 fishing segments. The solid black line shows the viability threshold used to estimate the probability of viability of each segment across the 10-year projection period. Source: IAM model

In this example, bass longliners have a 100% probability of meeting both short-term profits and crew wage constraints, whereas hake gillnetters have 0% probability of meeting the crew wage constraint since it is breached for all replicates in 2018.

S.2 Model parametrization

S.2.1 Biological parameters

Table S.1: Biological parameters

Species	Parameter	Age						
		2	3	4	5	6	7	8+
Common sole	Initial abundance $N_{a,2016}$ $(*10^6)$	18.92	1.45	6.65	3.70	2.32	1.87	2.12
	Natural mortality rate M_a (yr^{-1})	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Initial fishing mortality rate F_a (yr^{-1})	0.07	0.28	0.55	0.41	0.42	0.56	0.56
	$\overline{F}$ ponderation p_a	0	1	1	1	1	0	0
	Weight at age w_a (kg)	0.2	0.25	0.3	0.37	0.39	0.4	0.56
	% of mature individuals Mat_a	0.32	0.83	0.97	1	1	1	1
	Discard rate D_a	0	0	0	0	0	0	0
	Mean recruitment $(*10^6)$	21.0						

Species	Parameter	Age								
		1	2	3	4	5	6	7	8	9+
Norway lobster	Initial abundance $N_{a,2016}$ $(*10^3)$	631351	559691	290669	131520	43031	16892	5977	3112	2500
	Natural mortality rate M_a (yr^{-1})	0.3	0.3	0.25	0.25	0.25	0.25	0.25	0.25	0.25
	Initial fishing mortality rate F_a (yr^{-1})	0.01	0.18	0.57	0.93	1.03	0.68	0.71	0.65	0.65
	$\overline{F}$ ponderation p_a	0	1	1	1	1	0	0	0	0
	Weight at age w_a (kg)	0.004	0.009	0.017	0.026	0.034	0.044	0.051	0.056	0.067
	Proportion of mature individuals Mat_a	0	0	0.75	1	1	1	1	1	1
	Discard rate D_a	1	0.93	0.42	0.18	0.11	0.08	0.08	0.18	0.08

Species	Parameter	Age																				
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20+
European seabass	Initial abundance $N_{a,2016}$ $(*10^3)$	36406	15650	16902	4824	6516	8643	2688	2447	2518	1769	1243	695	607	602	296	290	112	93	76	43	101
	Natural mortality rate M_a (yr^{-1})	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
	Initial fishing mortality rate F_a (yr^{-1})	0.00	0.00	0.00	0.00	0.03	0.08	0.12	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
	$\bar{F}$ ponderation p_a	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
	Weight at age w_a (kg)	0.00	0.02	0.08	0.18	0.33	0.52	0.74	0.98	1.23	1.49	1.76	2.02	2.27	2.52	2.75	2.97	3.18	3.37	3.55	3.71	4.15
	Proportion of mature individuals Mat_a	0	0	0	0	0.04	0.21	0.51	0.75	0.89	0.95	0.98	0.99	0.99	1	1	1	1	1	1	1	1
	Discard rate D_a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Species	Parameter	Morph	Sem.	Age 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
Northern hake	Initial abundance $N_{a,2016}$ $(*10^4)$	M1	S1	13.77	5.06	2.13	2.54	1.55	0.24	0.09	0.06	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00
			S2	12.45	4.48	1.86	2.15	1.28	0.20	0.07	0.05	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00
			S3	11.22	3.92	1.60	1.76	1.02	0.16	0.06	0.04	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00
			S4	9.87	3.44	1.36	1.44	0.82	0.13	0.05	0.04	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00
		M2	S1	0.00	11.60	4.88	2.38	2.35	0.86	0.40	0.12	0.17	0.05	0.01	0.00	0.00	0.00	0.00	0.00
			S2	27.44	10.33	4.28	2.03	1.95	0.71	0.34	0.10	0.14	0.04	0.01	0.00	0.00	0.00	0.00	0.00
			S3	24.82	9.04	3.70	1.68	1.57	0.57	0.27	0.08	0.12	0.03	0.01	0.00	0.00	0.00	0.00	0.00
			S4	22.32	7.92	3.20	1.38	1.26	0.46	0.22	0.07	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00
		M3	S1	0.00	5.61	2.36	2.96	1.96	0.31	0.11	0.08	0.10	0.02	0.00	0.00	0.00	0.00	0.00	0.00
			S2	0.00	5.03	2.08	2.54	1.63	0.26	0.09	0.07	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00
			S3	11.74	4.41	1.80	2.13	1.32	0.21	0.08	0.05	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00
			S4	10.62	3.85	1.57	1.78	1.06	0.17	0.06	0.04	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	Initial fishing mortality rate in number Fq_a $(year^{-1})$	M1	S1	0.00	0.08	0.14	0.27	0.37	0.36	0.32	0.29	0.26	0.25	0.24	0.24	0.24	0.24	0.24	0.24
			S2	0.02	0.14	0.22	0.39	0.48	0.47	0.43	0.40	0.38	0.37	0.37	0.37	0.36	0.36	0.36	0.36
			S3	0.11	0.12	0.23	0.41	0.47	0.44	0.39	0.36	0.34	0.33	0.33	0.32	0.32	0.32	0.32	0.32
			S4	0.09	0.13	0.29	0.45	0.46	0.41	0.36	0.33	0.31	0.30	0.30	0.29	0.29	0.29	0.29	0.29
		M2	S1	0.00	0.06	0.12	0.24	0.36	0.37	0.33	0.29	0.27	0.25	0.25	0.24	0.24	0.24	0.24	0.24
			S2	0.00	0.13	0.18	0.35	0.47	0.48	0.44	0.41	0.39	0.38	0.37	0.37	0.37	0.36	0.36	0.36
			S3	0.02	0.13	0.18	0.38	0.47	0.45	0.41	0.37	0.35	0.33	0.33	0.32	0.32	0.32	0.32	0.32
			S4	0.06	0.12	0.24	0.42	0.47	0.43	0.37	0.34	0.31	0.30	0.30	0.29	0.29	0.29	0.29	0.29
		M3	S1	0.00	0.04	0.11	0.20	0.33	0.38	0.34	0.30	0.27	0.26	0.25	0.24	0.24	0.24	0.24	0.24
			S2	0.00	0.12	0.16	0.30	0.45	0.48	0.45	0.42	0.39	0.38	0.37	0.37	0.37	0.36	0.36	0.36
			S3	0.00	0.14	0.15	0.33	0.46	0.46	0.42	0.38	0.35	0.34	0.33	0.32	0.32	0.32	0.32	0.32
			S4	0.01	0.11	0.19	0.39	0.47	0.44	0.38	0.34	0.32	0.31	0.30	0.29	0.29	0.29	0.29	0.29
	Initial mortality rate from landings FLw_a $(year^{-1})$	M1	S1	0.00	0.00	0.07	0.37	0.85	1.19	1.42	1.63	1.86	2.10	2.32	2.53	2.71	2.87	3.00	3.11
			S2	0.00	0.01	0.13	0.61	1.22	1.70	2.10	2.49	2.89	3.27	3.62	3.93	4.20	4.43	4.63	4.80
			S3	0.00	0.02	0.20	0.76	1.32	1.70	2.01	2.32	2.65	2.97	3.27	3.53	3.76	3.95	4.11	4.26
			S4	0.00	0.04	0.32	0.92	1.39	1.68	1.94	2.21	2.50	2.77	3.03	3.26	3.46	3.63	3.77	3.89
		M2	S1	0.00	0.00	0.04	0.26	0.74	1.12	1.37	1.58	1.80	2.04	2.27	2.48	2.67	2.83	2.97	3.08
			S2	0.00	0.00	0.08	0.46	1.08	1.60	2.00	2.39	2.79	3.17	3.53	3.86	4.14	4.38	4.58	4.76
			S3	0.00	0.01	0.12	0.60	1.20	1.61	1.93	2.24	2.57	2.89	3.20	3.47	3.70	3.91	4.08	4.22
			S4	0.00	0.02	0.21	0.77	1.29	1.62	1.87	2.14	2.42	2.71	2.97	3.21	3.41	3.59	3.73	3.86
		M3	S1	0.00	0.00	0.02	0.18	0.61	1.04	1.31	1.52	1.74	1.98	2.21	2.43	2.62	2.79	2.94	3.06
			S2	0.00	0.00	0.05	0.32	0.92	1.48	1.91	2.30	2.69	3.08	3.45	3.78	4.07	4.32	4.53	4.71

Hake

Species	Parameter	Morph	Sem.	Age 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15+
			S3	0.00	0.00	0.07	0.45	1.06	1.53	1.85	2.16	2.49	2.81	3.12	3.40	3.65	3.86	4.04	4.19
			S4	0.00	0.01	0.12	0.61	1.18	1.55	1.81	2.07	2.35	2.64	2.91	3.15	3.36	3.55	3.70	3.83
	Initial mortality rate from discards FDw_a ($year^{-1}$)	M1	S1	0.00	0.01	0.02	0.03	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S2	0.00	0.01	0.03	0.06	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S3	0.00	0.01	0.04	0.05	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S4	0.00	0.02	0.04	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		M2	S1	0.00	0.01	0.03	0.06	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S2	0.00	0.01	0.02	0.05	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S3	0.00	0.01	0.03	0.05	0.04	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S4	0.00	0.01	0.04	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		M3	S1	0.00	0.00	0.01	0.03	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S2	0.00	0.01	0.02	0.05	0.05	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S3	0.00	0.01	0.02	0.05	0.05	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
			S4	0.00	0.01	0.03	0.05	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	$\overline{F}$ ponderation p_a	-	-	0.29	1	1	1	1	0.4	0	0	0	0	0	0	0	0	0	0
	Natural mortality rate M_a (yr^{-1})	-	-	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Mature weight at age $MatWt_a$ (kg)	M1	-	0.00	0.00	0.20	1.01	2.11	3.35	4.67	6.01	7.29	8.48	9.54	10.5	11.3	12.0	12.6	13.1
		M2	-	0.00	0.00	0.09	0.77	1.82	3.03	4.34	5.68	6.98	8.19	9.29	10.3	11.1	11.8	12.4	12.9
		M3	-	0.00	0.00	0.03	0.55	1.54	2.71	4.00	5.34	6.66	7.90	9.03	10.0	11.9	11.7	12.3	12.8
Hake	Mean recruitment N_0 ($*10^4$)	M1	S1	9.22															
		M2	S2	16.4															
		M3	S3	7.87															

S.2.2 Economic parameters

Depreciation costs were calculated according to the Perpetual Inventory Method (PIM) as described in [1]. Vessel prices at construction time were provided by DPMA.

Fixed costs in the model ($Cfix$) is the aggregation of repair costs $Crep$, the crew costs in addition to wages $Ccrewoth_i$ (vacation and employer contribution calculated based on legislation in force in 2016), and other fixed costs $Cfixoth$. Variable costs are the sum of fuel costs $Cfuel$ and other variable costs $Cvaroth$ (ice, food supply ...). The crew share $cshr$ was calculated as the proportion of crew wages (calculated as crew costs $Ccrew$ minus the additional crew costs mentioned previously) relative to the "rest to be shared".

Table S.2: Individual economic parametrization from fleets' cost structures

Cost	**Calculation**
Variable costs per unit effort	$CvarUEi = (CfuelGVL_f + CvarothGVL_f) \times GVL_i \times \frac{1}{E_i}$
Fixed costs	$Cfix_i = (CfixothGVL_f + CrepGVL_f) \times GVL_i + Ccrewoth_i$
Crew share	$cshr_i = cshr_f$
Value of vessel at construction time	$K_i = VP_{f,VL} \times VL_i$ $VP_{f,VL}$ = Vessel price per meter for vessels of fleet f and length class VL VL_i = length of vessel i
Depreciation costs	$Cdep_i = Cdep_{hull_i} + Cdep_{motor_i} + Cdep_{elec_i} + Cdep_{other_i}$ with element k linearly depreciated over its life length nb_yr_k, and its price p_k calculated as a fraction pK_k of vessel value K: $Cdep_k = \frac{p_k}{nb\_yr_k} = \frac{pK_k \times K}{nb\_yr_k}$

Table S.3: Depreciation parameters

Element	**Parameter**	
	pK	nb_yr
Hull	0.6	40
Motor	0.2	10
Electronics	0.1	5
Other	0.1	7

Table S.4: Cost structures. Sources: DPMA, Ifremer-Système d'Informations Halieutiques and "SSP (Service de la Statistique et de la Prospective), Enquête sur la production de données économiques dans le secteur des pêches maritimes"

Fleet	**Length**	**Variable**					
		nb_crew	$CcrewGVL$	$CfixothGVL$	$CrepGVL$	$CfuelGVL$	$CvarothGVL$
Bass longliners	VL0010	1.45	0.42	0.10	0.05	0.04	0.14
	VL1012	2.33	0.43	0.11	0.09	0.06	0.13
Danish seineurs	VL1840	4.73	0.36	0.08	0.14	0.12	0.12
Demersal trawlers_ outBoB	VL1012	2.64	0.38	0.10	0.07	0.09	0.19
	VL1218	3.41	0.37	0.10	0.09	0.13	0.16
	VL1824	4.95	0.34	0.08	0.11	0.17	0.18
	VL2440	7.50	0.29	0.15	0.11	0.23	0.15
	VL40xx	18.26	0.30	0.14	0.11	0.11	0.13
Gillnetters_ outBoB	VL0010	1.60	0.48	0.16	0.07	0.04	0.14
	VL1012	3.23	0.48	0.14	0.04	0.05	0.14
	VL1218	4.56	0.44	0.11	0.06	0.05	0.10
	VL2440	12.52	0.38	0.12	0.04	0.05	0.05
Hake gillnetters	VL1824	7.89	0.34	0.13	0.05	0.04	0.12
	VL1218	7.89	0.34	0.13	0.05	0.04	0.12
	VL2440	12.52	0.38	0.12	0.04	0.05	0.05
Hake longliners	VL0010	2.75	0.49	0.13	0.06	0.05	0.12
	VL1012	2.75	0.49	0.13	0.06	0.05	0.12
	VL1840	15.52	0.33	0.14	0.05	0.08	0.13
Hake longliners_ outBoB	VL1840	15.52	0.33	0.14	0.05	0.08	0.13
Mixed demersal trawlers	VL0010	1.45	0.39	0.14	0.06	0.10	0.12
	VL1012	2.13	0.39	0.10	0.09	0.12	0.12
	VL1218	3.49	0.40	0.08	0.09	0.14	0.14
	VL1824	4.77	0.36	0.08	0.09	0.15	0.13
	VL2440	7.48	0.33	0.10	0.05	0.16	0.10
Mixed gillnetters	VL1218	4.61	0.45	0.14	0.07	0.04	0.14
	VL1824	6.17	0.46	0.12	0.10	0.05	0.15
	VL0010	1.42	0.40	0.17	0.08	0.04	0.07
	VL1012	2.33	0.45	0.14	0.09	0.06	0.13
	VL2440	12.52	0.38	0.12	0.04	0.05	0.05
Non-specialized Nephrops trawlers	VL0012	2.02	0.39	0.06	0.07	0.13	0.13
	VL1218	2.97	0.40	0.07	0.10	0.14	0.16
	VL1824	4.87	0.40	0.06	0.13	0.14	0.13
Pelagic trawlers	VL1218	4.86	0.41	0.07	0.10	0.14	0.13
	VL1824	5.65	0.38	0.08	0.11	0.13	0.15
Sole gillnetters	VL0010	2.15	0.44	0.12	0.06	0.05	0.10
	VL1012	3.61	0.44	0.15	0.07	0.05	0.12
	VL1218	4.61	0.45	0.14	0.07	0.04	0.14
	VL1824	6.17	0.46	0.12	0.10	0.05	0.15
Specialized Nephrops trawlers	VL0012	2.25	0.39	0.08	0.09	0.11	0.09
	VL1218	3.48	0.45	0.08	0.12	0.12	0.10
	VL1824	4.87	0.40	0.06	0.13	0.14	0.13
Vessels using active and passive gears	VL0010	1.37	0.41	0.15	0.05	0.06	0.15
	VL1012	1.74	0.39	0.16	0.06	0.08	0.12
Vessels using active and passive gears_ outBoB	VL0010	1.44	0.35	0.11	0.07	0.04	0.16
	VL1012	3.27	0.49	0.17	0.08	0.04	0.18
Vessels using other active gears	VL0010	1.03	0.48	0.16	0.06	0.05	0.11
Vessels using polyvalent active gears	VL0010	1.39	0.38	0.11	0.05	0.06	0.10
	VL1012	2.70	0.39	0.09	0.05	0.10	0.09
	VL1218	3.10	0.42	0.10	0.13	0.12	0.15

Vessels using polyvalent active gears only_ outBoB	VL1012	2.70	0.39	0.09	0.05	0.10	0.09
Vessels using polyvalent passive gears	VL0010	2.83	0.48	0.15	0.08	0.04	0.11
	VL1012	2.63	0.49	0.09	0.05	0.04	0.13
Vessels using polyvalent passive gears_ outBoB	VL0010	1.13	0.48	0.20	0.05	0.07	0.14
Vessels using pots/traps	VL1012	1.25	0.42	0.12	0.03	0.02	0.08
	VL0010	1.34	0.38	0.14	0.05	0.04	0.12
Vessels using pots/traps_ outBoB	VL1012	3.07	0.43	0.09	0.05	0.05	0.17
	VL1012	2.97	0.45	0.08	0.06	0.05	0.22

S.3 IAM model

S.3.1 Details of the Management Procedures module

The management procedures module mimics the process of estimating each year the TAC for the following year so that the stock will be harvested at a fishing mortality F_{targ}. It is a multi-step process:

1. Projection of the numbers at age for year $t+1$ ($N^*_{s,a,t+1}$) given a mean recruitment R_{mean} and the stock dynamics equation in Table S.6a.
2. Calculation of current $\overline{F}$:

$$\overline{F}_{s,t} = \sum_a p_{s,a} \times F_{s,a,t}$$

   with $p_a = 1$ if age a is accounted for in the calculation of $\overline{F}$, and 0 otherwise
3. Calculation of fishing mortalities at age to reach $\overline{F}_{target}$:

$$F_{s,a,t+1} = F_{s,a,t} \times \frac{\overline{F}_{s,t}}{\overline{F}_{target,s}}$$

4. Calculation of corresponding landings:

$$L_{s,a,t+1} = \frac{F_{s,a,t+1}}{Z_{s,a,t+1}} \times N^*_{s,a,t+1} \times (1 - e^{-Z_{s,a,t+1}})$$

$$TAC_{s,t+1} = \sum_a L_{s,a,t+1}$$

S.3.2 Biological dynamics and catch equations

Table S.5: IAM variables

(a) Subscripts

s	species
mo	morph
a	age
t	year
se	season
i	individual harvester
f	fleet
m	metier

(b) Variables

Variable	**Signification**	**Unit**
N	Number of individuals	$\emptyset$
N_0	Recruitment	$\emptyset$
B	Biomass	kg
w	Individual weight	kg
Mat	% of mature individuals	$\emptyset$
$MatWt$	Mature weight	kg
SSB	Spawning Stock Biomass	kg
F	Fishing mortality rate	yr^{-1}
FLw	Mortality rate from landings in weight	yr^{-1}
FDw	Mortality rate from discards in weight	yr^{-1}
D	Discard rate	$\emptyset$
p	Ponderation for the calculation of $\overline{F}$	
M	Natural mortality rate	yr^{-1}
Z	Total mortality $(F + M)$	$\emptyset$
E	Fishing effort	day
q	Catchability	$\text{year}^{-1}.\text{day}^{-1}$
L	Landings	t
$LPUE$	Landings per unit effort	kg.day^{-1}
GVL	Gross value of landings	€
$cshr$	Crew share	$\emptyset$
$Crep$	Repair costs	€
$Cfix$	Fixed costs	€
$opersc$	Other crew costs	€
$Cdep$	Depreciation costs	€
$CvarUE$	Variable costs per unit effort	$€.\text{day}^{-1}$
NOS	Net operating surlpus	€
FTE	Full-time equivalent number of crew members	$\emptyset$
TAC	Total Allowable Catch	t
Q_i	Individual quota	t

Table S.6: IAM equations

(a) Biological module

Variable	Model	Equation
Number of individuals	age-based (annual)	$N_{s,a+1,t+1} = N_{s,a,t}\, e^{-Z_{s,a,t}}$
	age-based (quarterly)	$N_{s,a,se+1,mo,t} = N_{s,a,se,mo,t}\, e^{-Z_{s,a,se,mo,t}/n_{se}}$ if $se < n_{se}$
		$N_{s,a,se=1,mo,t+1} = N_{s,a-1,se=n_{se},mo,t}\, e^{-Z_{s,a-1,se=n_{se},mo,t}/n_{se}}$ if $se = n_{se}$
Spawning stock biomass	age-based	$SSB_{s,t} = \sum_a N_{s,a,t}\, w_{s,a}\, Mat_{s,a}$

(b) Catch module

Variable	Model	Equation
Catchability rate	age-based (annual)	$q_{i,m,s,a} = {F_{i,m,s,a,t_0}}/{E_{i,m,t_0}}$
	age-based (quarterly)	$q_{i,m,s,a} = {Fq_{i,m,s,a,t_0}}/{E_{i,m,t_0}}$
		$qLw_{i,m,s,a} = {FLw_{i,m,s,a,t_0}}/{E_{i,m,t_0}}$
Fishing mortality rate	age-based (annual)	$F_{i,m,s,a,t} = q_{i,m,s,a} \times E_{i,m,t}$
	age-based (quarterly)	$Fq_{i,m,s,a,t} = q_{i,m,s,a} \times E_{i,m,t}$
		$FLw_{i,m,s,a,t} = qLw_{i,m,s,a} \times E_{i,m,t}$
Landings in weight	age-based (annual)	$L_{i,m,s,a,t} = (1 - d_{i,m,s,a})\, \frac{F_{i,m,s,a,t}}{Z_{s,a,t}}\, N_{s,a,t}\, (1 - e^{-Z_{s,a,t}})\, w_{s,a}$
	age-based (quarterly)	$L_{i,m,s,a,t} = \sum_{se,mo} \frac{FLw_{i,m,s,a,mo,se,t}}{Z_{s,a,mo,se,t}}\, N_{s,a,mo,se,t}\, (1 - e^{-Z_{s,a,mo,se,t}/n_{se}})$
	static	$L_{i,m,s,t} = LPUE_{i,m,s} \times E_{i,m,t}$

References

[1] Onlus, I. Evaluation of the capital value, investments and capital costs in the fisheries sector. Technical Report FISH/2005/03, October 2006.