Table 3. The major parameters and input required to initialize and execute the ecological class Extended Stock Assessment Models (ESAM), with notations of the major structural features.

			Data description	Inputs Static (S) or Dynamic (D)	Spatially resolved (Y or N) [does not mean it is not done for different regions, but directly in the model]	units	Origin, source, or method for derivation of value	Variance incorporated (Y or N)	Timeframe for derivation of value
Model Class	ESAM MRMs-Ecology								
	Model	S-R							
		Required Inputs			N				In NEUS, usually 40+ yrs (1963-present)
		R	Vector of Recruits	D		biomass or #	Survey data, age data	Y	
		SSB	Vector of Spawning Stock Biomass	D		biomass or #	Survey data, Age data, Landings data	Y	
		various	any covariates	D		variable	food habits data, NEUS FW Models	variable	
		Required Parameters	depending upon funcitonal form:						
		α_{ij}	scalar	S		unitless	dervied	N	
		β_{ij}	Exponential modifier	S		unitless	dervied	N	
		γ_{ij}	Exponential modifier for covariates	S		unitless	dervied	N	
		$F_{xx\%}$	Fishing Mortality	S		rate, B per yr	dervied	Y	
		optional βs	covariates	S		unitless	various	N	

Table 3, continued. The major parameters and input required to initialize and execute the ecological class Extended Stock Assessment Models (ESAM), with notations of the major structural features.

			Data description	Inputs Static (S) or Dynamic (D)	Spatially resolved (Y or N) [does not mean it is not done for different regions, but directly in the model]	units	Origin, source, or method for derivation of value	Variance incorporated (Y or N)	Timeframe for derivation of value
Model Class	ESAM MRMs-Ecology								
	Model	SS Prod							
		Required Inputs			N				In NEUS, usually 40+ yrs (1963-present)
		B	Vector of biomass	D		Biomass (e.g. mt)	Survey data	Y	
		L	Vector of landings (or catch)	D		Biomass (e.g. mt)	Landings data	Y	
		various	covariates	D		variable	food habits data, NEUS FW Models	Y	
		Required Parameters							
		r (derives Fmsy)	exponential rate of growth	S		rate, B per yr	derived	Y	
		K (derives Bmsy)	carrying capacity	S		biomass	derived	Y	
		optional βs	other tuning measures, associated with covariates	S		unitless	food habits data, NEUS FW Models, derived	Y	

Table 3, continued. The major parameters and input required to initialize and execute the ecological class Extended Stock Assessment Models (ESAM), with notations of the major structural features.

			Data description	Inputs Static (S) or Dynamic (D)	Spatially resolved (Y or N) [does not mean it is not done for different regions, but directly in the model]	units	Origin, source, or method for derivation of value	Variance incorporated (Y or N)	Timeframe for derivation of value
Model Class	ESAM MRMs-Ecology								
	Model	Age Structured			N				In NEUS, usually 40+ yrs (1963-present)
		Required Inputs							
		$\mathbf{N_{i,a}}$	Matrix of N	D		#	Survey data, age data	Y	
		$\mathbf{B_{i,a}}$	Matrix of B	D		biomass	Survey data, age data	Y	
		$\mathbf{W_{i,a}}$	Wt-at-age	S		biomass	Survey data, age data	Y	
		$\mathbf{O_{i,a}}$	Age-at-matruity	S		year	Survey data, age data	Y	
		$\mathbf{C_{i,a}}$	Catch-at-age	D		biomass	Landings data, age data	Y	
		various	covariates, usually in matrices at age	D		various	food habits data, NEUS FW Models	variable	
		Required Parameters							
		q, λ	Selectivity & Catchability	S		unitless	Survey data, model dervied	N	
		g	Growth between ages; in some forms	S		unitless	Age data	Y	
		F	Total Fishing Mortality	S		unitless	derived	Y	
		M2	Total Predation Mortality	S		unitless	derived	Y	
		M1	Total other Natural Mortality	S		unitless	derived	N	
		optional βs	covariates	S		unitless	derived	varies	

Table 3, continued. The major parameters and input required to initialize and execute the ecological class Extended Stock Assessment Models (ESAM), with notations of the major structural features.

			Data description	Inputs Static (S) or Dynamic (D)	Spatially resolved (Y or N) [does not mean it is not done for different regions, but directly in the model]	units	Origin, source, or method for derivation of value	Variance incorporated (Y or N)	Timeframe for derivation of value
Model Class	ESAM MRMs-Ecology								
	Model	Ecological Footprints			N				In NEUS, usually ~40 yrs (1973-present)
		Required Inputs							
		B_i	biomass or abundance of predator	D		biomass	Survey data	Y	
		C_i	consumption of predator	D		biomass per yr	food habits data, NEUS FW Models	Y	
		L_i	landings or catch of predator	D		biomass per yr	Landings data	Y	
		length	size structure of predator	both		cm	Age data, survey data	Y	
		S_i	mean stomach contents	D		biomass	food habits data	Y	
		Required Parameters							
		α_{ij}	scalar	S		unitless	derived, Literature	N	
		β_{ij}	Exponential modifier	S		unitless	derived, Literature	N	

Table 3, continued. The major parameters and input required to initialize and execute the ecological class Extended Stock Assessment Models (ESAM), with notations of the major structural features.

			Data description	Inputs Static (S) or Dynamic (D)	Spatially resolved (Y or N) [does not mean it is not done for different regions, but directly in the model]	units	Origin, source, or method for derivation of value	Variance incorporated (Y or N)	Timeframe for derivation of value
Model Class	ESAM MRMs-Ecology								
	Model	Ecological Footprints			N				In NEUS, usually ~40 yrs (1973-present)
		Required Inputs							
		B_i	biomass or abundance of predator	D		biomass	Survey data	Y	
		C_i	consumption of predator	D		biomass per yr	food habits data, NEUS FW Models	Y	
		L_i	landings or catch of predator	D		biomass per yr	Landings data	Y	
		length	size structure of predator	both		cm	Age data, survey data	Y	
		S_i	mean stomach contents	D		biomass	food habits data	Y	
		Required Parameters							
		α_{ij}	scalar	S		unitless	derived, Literature	N	
		β_{ij}	Exponential modifier	S		unitless	derived, Literature	N	