Table 9. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>AAC</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>N</td>
</tr>
</tbody>
</table>

**Percentage of each prey as proportion of a predator's diet composition**
- **DC_{ij}**
  - Inputs: S (Static)
  - Spatially resolved: Y
  - Origin: Survey data
  - Variance incorporated: N
  - Derivation timeframe: N/A; for NEUS derived from data in 1973-2004

**Growth rate**
- **r_i**
  - Inputs: S (Static)
  - Spatially resolved: N
  - Source: Survey data, age data
  - Variance incorporated: N

**Abundance or biomass**
- **N (or B)**
  - Inputs: S (Static)
  - Spatially resolved: N
  - Source: Survey data
  - Variance incorporated: N

**Required Parameters**

**Assimilation Efficiency; Proportion of what predator eats that is used for growth.**
- **E_i**
  - Inputs: S (Static)
  - Spatially resolved: N
  - Origin: Literature
  - Variance incorporated: N

**Clearance rate; maximum ingestion rate by a predator; more commonly understood as handling time.**
- **C_j**
  - Inputs: S (Static)
  - Spatially resolved: Y
  - Origin: food habits data
  - Variance incorporated: N

**Consumption rate; derived from mean stomach contents.**
- **S_j**
  - Inputs: S (Static)
  - Spatially resolved: Y
  - Origin: food habits data
  - Variance incorporated: N
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Donut Selectivity Model</td>
</tr>
<tr>
<td>Required Inputs</td>
<td>N</td>
</tr>
<tr>
<td>Required Parameters</td>
<td>N/A, for NEUS based on data from 1973-1999</td>
</tr>
<tr>
<td>Inputs Static (S) or Dynamic (D)</td>
<td>Spatially resolved (Y or N) (does not mean it is not done for different regions, but directly in the model)</td>
</tr>
<tr>
<td>Origin, source, or method for derivation of value</td>
<td>Variance incorporated (Y or N)</td>
</tr>
<tr>
<td>Timeframe for derivation of value</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Inputs Static (S) or Dynamic (D)</th>
<th>Origin, source, or method for derivation of value</th>
<th>Variance incorporated (Y or N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donut Selectivity Model</td>
<td>N</td>
<td>Survey data, process studies</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required Inputs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P$_{ij}$</td>
<td>relative prey abundance</td>
<td>S</td>
<td>unitless</td>
</tr>
<tr>
<td>O$_{ij}$</td>
<td>Overlap</td>
<td>S</td>
<td>unitless</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required Parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rd$_{ij}$</td>
<td>Detection rank</td>
<td>S</td>
<td>rankings</td>
</tr>
<tr>
<td>Rr$_{ij}$</td>
<td>Reaction rank</td>
<td>S</td>
<td>rankings</td>
</tr>
<tr>
<td>Rc$_{ij}$</td>
<td>Capture rank</td>
<td>S</td>
<td>rankings</td>
</tr>
<tr>
<td>Ri$_{ij}$</td>
<td>Ingestion rank</td>
<td>S</td>
<td>rankings</td>
</tr>
<tr>
<td>R1$_{ij}$</td>
<td>&quot;Icing&quot; rank</td>
<td>S</td>
<td>rankings</td>
</tr>
</tbody>
</table>
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc Model</th>
<th>PSA</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Required Inputs-Productivity</th>
<th></th>
<th>Can be in form of rank uncertainties, but usually not N/A; for NEUS derived from data in 1973-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>r, intrinsic rate of growth</td>
<td>S rankings</td>
<td>Survey data, age data N</td>
</tr>
<tr>
<td>Maximum Age</td>
<td>S rankings</td>
<td>Survey data, age data N</td>
</tr>
<tr>
<td>Maximum Size</td>
<td>S rankings</td>
<td>Survey data, age data N</td>
</tr>
<tr>
<td>von Bertalanffy Growth Coefficient (k)</td>
<td>S rankings</td>
<td>Survey data, age data N</td>
</tr>
<tr>
<td>Estimated Natural Mortality</td>
<td>S rankings</td>
<td>Food habits data N</td>
</tr>
<tr>
<td>Measured Fecundity</td>
<td>S rankings</td>
<td>Age data N</td>
</tr>
<tr>
<td>Breeding Strategy</td>
<td>S rankings</td>
<td>Age data N</td>
</tr>
<tr>
<td>Recruitment Pattern</td>
<td>S rankings</td>
<td>Survey data, age data N</td>
</tr>
<tr>
<td>Age at Maturity</td>
<td>S rankings</td>
<td>Age data N</td>
</tr>
<tr>
<td>Mean Trophic Level</td>
<td>S rankings</td>
<td>Food habits data N</td>
</tr>
</tbody>
</table>
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc Model</th>
<th>Required Inputs-Susceptibility</th>
<th>Data description</th>
<th>Inputs Static (S) or Dynamic (D)</th>
<th>Spatially resolved (Y or N) does not mean it is not done for different regions, but directly in the model</th>
<th>Origin, source, or method for derivation of value</th>
<th>Variance incorporated (Y or N)</th>
<th>Timeframe for derivation of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Strategy</td>
<td>S</td>
<td>rankings</td>
<td>Mgt Plans, Socioeconomic data</td>
<td>Survey data, Landing data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Areal Overlap</td>
<td>S</td>
<td>rankings</td>
<td>Survey data, Landing data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographic Concentration</td>
<td>S</td>
<td>rankings</td>
<td>Survey data, Landing data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical Overlap</td>
<td>S</td>
<td>rankings</td>
<td>Survey data, Landing data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing rate relative to M</td>
<td>S</td>
<td>rankings</td>
<td>derived</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass of Spawners (SSB) or other proxies</td>
<td>S</td>
<td>rankings</td>
<td>Survey data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seasonal Migrations</td>
<td>S</td>
<td>rankings</td>
<td>Survey data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schooling/Aggregation and Other Behavioral Responses</td>
<td>S</td>
<td>rankings</td>
<td>Survey data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Morphology Affecting Capture</td>
<td>S</td>
<td>rankings</td>
<td>Survey data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Survival After Capture and Release</td>
<td>S</td>
<td>rankings</td>
<td>process studies, Literature</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desirability/Value of the Fishery</td>
<td>S</td>
<td>rankings</td>
<td>Economic data</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishery Impact to EFH or Habitat in General for Non-targets</td>
<td>S</td>
<td>rankings</td>
<td>process studies, Literature</td>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Model</th>
<th>Required Inputs</th>
<th>Required Parameters</th>
</tr>
</thead>
</table>
| Misc        | LeMans        | L_{ij} length, k_i growth rate           | a_i the intercept parameter of the length–weight relationship for species
|             |               | Spawning stock biomass, R_i recruits     | b_i the slope parameter of the length–weight relationship for species
|             |               | N_{ij} abundance at size, DC_{ij} diet composition | L_{\infty,i} asymptotic length parameter of the von Bertalanffy growth equation
|             |               |                                          | k_i growth parameter of the von Bertalanffy growth equation

- **Inputs Static (S) or Dynamic (D)**: Indicates if the input is static or dynamic.
- **Spatially resolved (Y or N)**: Indicates if the input is spatially resolved (Y) or not (N). Note: N does not mean it is not done, but rather that it is not done in different regions but directly in the model.
- **Units**: Units for each input.
- **Origin, source, or method for derivation of value**: Source or method for the derivation of the value.
- **Variance incorporated (Y or N)**: Indicates if variance is incorporated.
- **Timeframe for derivation of value**: Timeframe for the derivation of the value.

**Misc Model**

- **LeMans**

<table>
<thead>
<tr>
<th>Required Inputs</th>
<th>Description</th>
<th>Static/Dynamic</th>
<th>Units</th>
<th>Source, Method</th>
<th>Variance</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>L_{ij}</td>
<td>length</td>
<td>S</td>
<td>cm</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>k_i</td>
<td>growth rate</td>
<td>S</td>
<td>rate</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>S_i</td>
<td>biomass</td>
<td>D</td>
<td>biomass</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>R_i</td>
<td>recruits</td>
<td>D</td>
<td>#</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>N_{ij}</td>
<td>Abundance at size</td>
<td>D</td>
<td>#</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>DC_{ij}</td>
<td>Diet composition</td>
<td>S</td>
<td>unitless</td>
<td>Food habits data</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

Variable, is a simulator, but set up for GB based on data from 1963-2000; ran for 25 years.
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc Model</th>
<th>Required Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>LeMans</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data description</th>
<th>Inputs Static (S) or Dynamic (D)</th>
<th>Spatially resolved (Y or N) (does not mean it is done for different regions, but directly in the model)</th>
<th>Origin, source, or method for derivation of value</th>
<th>Variance incorporated (Y or N)</th>
<th>Timeframe for derivation of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\phi_{ij}$</td>
<td>The proportion of species $i$ in size class $j$ that move to the next size class in a single time step</td>
<td>S</td>
<td>unitless</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>$\alpha_i$</td>
<td>Productivity parameter of the Ricker stock-recruitment equation for species $i$</td>
<td>S</td>
<td>unitless</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>$\beta_i$</td>
<td>Density dependence parameter of the Ricker stock-recruitment equation for species $i$</td>
<td>S</td>
<td>biomass</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>$S_{max,i}$</td>
<td>The maximum observed spawning stock biomass of species $i$</td>
<td>S</td>
<td>biomass</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>$\kappa_i$</td>
<td>Curvature parameter for the maturity ogive of species $i$</td>
<td>S</td>
<td>unitless</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>$L_{50}$</td>
<td>The length at which 0.5 of species $i$ are mature</td>
<td>S</td>
<td>cm</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>$\omega_{ij}$</td>
<td>The proportion of species $i$ in size class $j$ that are mature</td>
<td>S</td>
<td>unitless</td>
<td>Survey data, age data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>$F_{ij}$</td>
<td>Instantaneous rate of fishing mortality on species $i$ in size class $j$</td>
<td>S</td>
<td>rate</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc Model</th>
<th>Data description</th>
<th>Inputs Static (S) or Dynamic (D)</th>
<th>Spatially resolved (Y or N) (does not mean it is not done for different regions, but directly in the model) units</th>
<th>Origin, source, or method for derivation of value</th>
<th>Variance incorporated (Y or N)</th>
<th>Timeframe for derivation of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LeMans</td>
<td></td>
<td></td>
<td>A binary variable indicating whether species i is fished</td>
<td>S unitless</td>
<td>Landings data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The maximum annual fishing mortality rate for a fully recruited fish</td>
<td>S unitless</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Steepness parameter for the fishing selectivity ogive</td>
<td>S unitless</td>
<td>Survey data, age data, Landings data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The length at which 0.5 selection by the fishery occurs</td>
<td>S cm</td>
<td>Survey data, age data, Landings data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Natural (nonmodelled) mortality for species i in size class j</td>
<td>S rate</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Parameters of the beta distribution for M1</td>
<td>S unitless</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Predation mortality for species i in size class j</td>
<td>S rate</td>
<td>derived</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The preference for prey species m by predator species i</td>
<td>S unitless</td>
<td>food habits data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Size preference for prey of size n by predator of size j</td>
<td>S unitless</td>
<td>food habits data</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Model</th>
<th>Data description</th>
<th>Inputs Static (S) or Dynamic (D)</th>
<th>Spatially resolved (Y or N) (does not mean it is not done for different regions, but directly in the model)</th>
<th>Origin, source, or method for derivation of value</th>
<th>Variance incorporated (Y or N)</th>
<th>Timeframe for derivation of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc</td>
<td>LeMans</td>
<td>(v_{i,j,m,n}) The relative preference (suitability) for predator i of size j of prey m of size n</td>
<td>S</td>
<td>unitless</td>
<td>food habits data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(I_{ij}) The ration (ingestion rate) that must be consumed by species i in size class j to account for modeled growth in a given time step</td>
<td>S</td>
<td>biomass</td>
<td>food habits data</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(G_{ej}) The growth efficiency (proportion of food consumed that is converted to body mass) of fish in size class j</td>
<td>S</td>
<td>unitless</td>
<td>Literature</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Size Spectra</td>
</tr>
<tr>
<td><strong>Required Inputs</strong></td>
<td></td>
</tr>
<tr>
<td>B per size unit</td>
<td>biomass (or sometimes abundance)</td>
</tr>
<tr>
<td>log of size</td>
<td>size bins</td>
</tr>
<tr>
<td><strong>Required Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>( \beta )</td>
<td>slope</td>
</tr>
<tr>
<td>( \alpha )</td>
<td>intercept</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>CCA/CanCorr/RDA</td>
</tr>
<tr>
<td><strong>Required Inputs</strong></td>
<td>Can be, usually not</td>
</tr>
<tr>
<td>( Y )</td>
<td>Matrix of times series of various response -- usually biotic (e.g. fish abundances) -- variables</td>
</tr>
<tr>
<td>( X )</td>
<td>Matrix of times series of various explanatory-usually human (e.g. landings), and environmental (e.g. SST) -- variables</td>
</tr>
<tr>
<td><strong>Required Parameters</strong></td>
<td></td>
</tr>
<tr>
<td>( U )</td>
<td>Eigenvectors to establish canonical &quot;regression&quot;</td>
</tr>
<tr>
<td>( Y^U )</td>
<td>fitted canonical response</td>
</tr>
</tbody>
</table>
Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.

<table>
<thead>
<tr>
<th>Model Class</th>
<th>Misc</th>
<th>Model</th>
<th>DFA/MAFA</th>
<th>Required Inputs</th>
<th>Data description</th>
<th>Spatially resolved (Y or N)</th>
<th>Units</th>
<th>Origin, source, or method for derivation of value</th>
<th>Variance incorporated (Y or N)</th>
<th>Timeframe for derivation of value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td></td>
<td>DFA/MAFA</td>
<td>Can be, usually not</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Survey data, Age data, Landings data, food habits data, Oceanographic Data, Climatological Data, Economic Data</td>
<td>Y</td>
<td>Variable, in NEUS, usually 40+ yrs (1963-present)</td>
</tr>
<tr>
<td>Required Parameters</td>
<td></td>
<td></td>
<td>Matrix of times series of various response -- usually biotic (e.g. fish abundances)--variables</td>
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<td>Variable, in NEUS, usually 40+ yrs (1963-present)</td>
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<td>Required Parameters</td>
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<td>X</td>
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Table 9, continued. The major parameters and input required to initialize and execute the miscellaneous models, with notations of the major structural features.