**Supplemented Data in RAM Legacy Database**

**Data Labels:**

The RAM Legacy Stock Assessment Database uses data labels to indicate where data is supplemented or differentiated. These labels get appended to the typical time series ID to distinguish the supplemented data from data that are imported directly from the assessment. The list below covers the data labels used for reference points.

* **-extr-** (e.g., ERmsy-extr):  
  This label indicates the reference point was extracted from a X and X/Xmsy time series, where X is the time series data type (e.g., ERmsy-extr extracted from ER and ER/ERmsy).
* **-pr-** (e.g., SSBmsy-pr):  
  This label indicates the reference point is a proxy for a maximum sustainable yield-based reference point.
* **-calc-** (e.g., MSY-calc, TBmsy-calc):  
  A basic calculation took place in generating this supplemented reference point. This calculation always involves the equation: ERmsy=MSY/TBmsy.
* **-conv-** (e.g., MSY-conv, TBmsy-conv):  
  A conversion took place in generating this supplemented reference point. The two conversions possible are SSB converted to TB (see ‘RAM B-Conversion Guide....docx’), and TB0 converted to TBmsy (through the calculation TBmsy=0.368\*TB0). This data label is also present if a basic calculation occurs with converted data; the ‘conv’ label is inherited.
* **-mvo-** (e.g., MSY-mvo, ERmsy-mvo):  
  This data label indicates that while the data came from the assessment, it is used only in the model fits (or ‘extended’) version of the database at the request of assessors or regional experts.
* **- dvmb-** (e.g., MSY-dvmb, SSBmsy-dvmb):  
  This data label indicates that it was derived through method B (see Appendix B), or a parameter that had been was used to calculate this parameter.
* **-est-** (e.g., MSY-est, TBmsy-est):  
  A surplus production model fit was performed to generate this supplemented reference point (see ‘RAM SP Fit Guide....docx’). This data label is also present if a basic calculation occurred with model-estimated data; the ‘est’ label is inherited.

Time series data use a similar procedure in generating its data labels.

* **-calc-** (ie ER-calc, TBdivTBmsy-calc):  
  A basic calculation was performed to generate these data. If the data is of the form X-calc where X is the time series type, then the equation (ER=TC/TB) was used in the calculation. If the data is of the form XdivXmsy-calc where X is the time series type, then the calculation performed was X/Xmsy.
* **-conv-** (ie ERdivERmsy-conv):  
  For a time series of the form XdivXmsy-conv, where X is the time series type, the calculation X/Xmsy has a converted value in the Xmsy component (ie Xmsy-conv). See ‘RAM B-Conversion Guide....docx’.
* **-dvma-** (ie TBdivTBmsy-dvma):  
  For a time series of the form XdivXmsy-dvma, where X is the time series type, the time series was derived through Method A (See Appendix A).
* **-dvmb-** (ie TBdivTBmsy-dvmb):  
  For a time series of the form XdivXmsy-dvmb, where X is the time series type, the time series has a parameter that was derived through Method B (See Appendix B) or one was used in the calculation of that parameter.
* **-est-** (ie TBdivTBmsy-est):  
  For a time series of the form XdivXmsy-est, where X is the time series type, the calculation X/Xmsy has a surplus production model estimated value in the Xmsy component (ie Xmsy-est). See ‘RAM SP Fit Guide....docx’.

**Summarized Data Hierarchies:**

The RAM database also generates summarized data to make it easier to find commonly used data types without having to deal with several different data IDs, choose among them when more than one are available, or risk drawing values from different assessments when they should be drawn together.

Some of these summarized data types are a generalized B status or U status time series, some of which prefer MSY-based reference points if available (otherwise defaulting to mgt reference points) and others that prefer explicit management targets (mgt) as reference points if available (otherwise defaulting to MSY-based reference points). Lists 1-12 below show the default preference hierarchies used to generate the various summarized data types.

**Note: *these default preferences can be changed on a stock-by-stock basis to reflect the preferred variables that are actually used in management or portrayal of stock status***. For example, in (1) below, if both SSB/SSBmsy and TB/TBmsy are available from an assessment, the default preference is to use SSB/SSBmsy, but this can be overridden wherever necessary. To change the default preferences, contact us using the issue tracker site below and let us know which stock(s) should have preferences changed.

<https://github.com/ramadmin/RLSADB/issues>

1. **Generalized B status time series, preferring MSY-based reference points:**

|  |  |
| --- | --- |
| **Order** | **BdivBmsypref-dimensionless** |
| 1 | SSBdivSSBmsy-dimensionless |
| 2 | SSBdivSSBmsy-calc-dimensionless |
| 3 | TBdivTBmsy-dimensionless |
| 4 | TBdivTBmsy-calc-dimensionless |
| 5 | TNdivTNmsy-calc-dimensionless |
| 6 | SSBdivSSBmgt-dimensionless |
| 7 | SSBdivSSBmgt-calc-dimensionless |
| 8 | TBdivTBmgt-dimensionless |
| 9 | TBdivTBmgt-calc-dimensionless |
| 10 | survBdivsurvBmgt-dimensionless |
| 11 | SSBdivSSBmsy-conv-dimensionless |
| 12 | TBdivTBmsy-conv-dimensionless |
| 13 | TBdivTBmsy-dvma-dimensionless |
| 14 | SSBdivSSBmsy-dvmb-dimensionless |
| 15 | TBdivTBmsy-dvmb-dimensionless |
| 16 | SSBdivSSBmsy-est-dimensionless |
| 17 | TBdivTBmsy-est-dimensionless |

1. **Generalized U status time series, preferring MSY-based reference points:**

|  |  |
| --- | --- |
| **Order** | **UdivUmsypref-dimensionless** |
| 1 | ERdivERmsy-dimensionless |
| 2 | ERdivERmsy-calc-dimensionless |
| 3 | FdivFmsy-dimensionless |
| 4 | FdivFmsy-calc-dimensionless |
| 5 | ERdivERmgt-dimensionless |
| 6 | ERdivERmgt-calc-dimensionless |
| 7 | FdivFmgt-dimensionless |
| 8 | FdivFmgt-calc-dimensionless |
| 9 | ERdivERmsy-conv-dimensionless |
| 10 | FdivFmsy-conv-dimensionless |
| 11 | ERdivERmsy-dvma-dimensionless |
| 12 | ERdivERmsy-est-dimensionless |

1. **Generalized B status time series, preferring management targets as reference points:**

|  |  |
| --- | --- |
| **Order** | **BdivBmgtpref-dimensionless** |
| 1 | SSBdivSSBmgt-dimensionless |
| 2 | SSBdivSSBmgt-calc-dimensionless |
| 3 | TBdivTBmgt-dimensionless |
| 4 | TBdivTBmgt-calc-dimensionless |
| 5 | SSBdivSSBmsy-dimensionless |
| 6 | SSBdivSSBmsy-calc-dimensionless |
| 7 | TBdivTBmsy-dimensionless |
| 8 | TBdivTBmsy-calc-dimensionless |
| 9 | TNdivTNmsy-calc-dimensionless |
| 10 | survBdivsurvBmgt-dimensionless |
| 11 | SSBdivSSBmsy-conv-dimensionless |
| 12 | TBdivTBmsy-conv-dimensionless |
| 13 | TBdivTBmsy-dvma-dimensionless |
| 14 | SSBdivSSBmsy-dvmb-dimensionless |
| 15 | TBdivTBmsydvmb-dimensionless |
| 16 | SSBdivSSBmsy-est-dimensionless |
| 17 | TBdivTBmsy-est-dimensionless |

1. **Generalized U status time series, preferring management targets as reference points:**

|  |  |
| --- | --- |
| **Order** | **UdivUmgtpref-dimensionless** |
| 1 | ERdivERmgt-dimensionless |
| 2 | ERdivERmgt-calc-dimensionless |
| 3 | FdivFmgt-dimensionless |
| 4 | FdivFmgt-calc-dimensionless |
| 5 | ERdivERmsy-dimensionless |
| 6 | ERdivERmsy-calc-dimensionless |
| 7 | FdivFmsy-dimensionless |
| 8 | FdivFmsy-calc-dimensionless |
| 9 | ERdivERmsy-conv-dimensionless |
| 10 | FdivFmsy-conv-dimensionless |
| 11 | ERdivERmsy-dvma-dimensionless |
| 12 | ERdivERmsy-est-dimensionless |

1. **best representation of TB:**

|  |  |
| --- | --- |
| **Order** | **TBbest-MT** |
| 1 | TB-MT |
| 2 | SSB-MT (converted) |

1. **best representation of TC:**

|  |  |
| --- | --- |
| **Order** | **TCbest-MT** |
| 1 | TC-MT |
| 2 | TL-MT |

1. **best representation of ER:**

|  |  |
| --- | --- |
| **Order** | **ERbest-ratio** |
| 1 | ER-ratio |
| 2 | ER-calc-ratio |

1. **best representation of TBmsy:**

|  |  |
| --- | --- |
| **Order** | **TBmsybest-MT** |
| 1 | TBmsy-MT |
| 2 | TBmsy-pr-MT |
| 3 | TBmsy-extr-MT |
| 4 | TBmsy-calc-MT |
| 5 | SSBmsy-MT (converted) |
| 6 | SSBmsy-pr-MT (converted) |
| 7 | SSBmsy-extr-MT (converted) |
| 8 | SSBmsy-calc-MT (converted) |
| 9 | TB0-MT (converted) |
| 10 | SSB0-MT (converted) |
| 11 | TBmsy-conv-MT |
| 12 | SSBmsy-conv-MT (converted) |
| 13 | TBmsy-dvmb-MT |
| 14 | SSBmsy-dvmb-MT (converted) |
| 15 | TBmsy-est-MT |
| 16 | SSBmsy-est-MT (converted) |

1. **“best” representation of ERmsy:**

|  |  |
| --- | --- |
| **Order** | **ERmsybest-ratio** |
| 1 | ERmsy-ratio |
| 2 | ERmsy-pr-ratio |
| 3 | ERmsy-extr-ratio |
| 4 | ERmsy-calc-ratio |
| 5 | ERmsy-mvo-ratio |
| 6 | ERmsy-conv-ratio |
| 7 | ERmsy-dvmb-ratio |
| 8 | ERmsy-est-ratio |

1. **“best” representation of MSY:**

|  |  |
| --- | --- |
| **Order** | **MSYbest-MT** |
| 1 | MSY-MT |
| 2 | MSY-calc-MT |
| 3 | MSY-mvo-MT |
| 4 | MSY-conv-MT |
| 5 | MSY-dvmb-MT |
| 6 | MSY-est-MT |

1. **“best” representation of TBmgt:**

|  |  |
| --- | --- |
| **Order** | **TBmgtbest-MT** |
| 1 | TBmgt-MT |
| 2 | SSBmgt-MT (converted) |

1. **“best” representation of ERmgt:**

|  |  |
| --- | --- |
| **Order** | **ERmgtbest-ratio** |
| 1 | ERmgt-ratio |

**Views Table Assessment Hierarchy:**

Another way RAM summarizes data is in the generation of its views tables. These tables present the most used data types, and for each stock, fills them in according to a hierarchy based on assessment year and data source. Views tables generally give preference to less-manipulated assessment data over heavily modified supplemented data.

The most recent assessment year (say year T) is checked for assessment data or data that was generated through only basic calculations. If no data are found, then the next-most recent assessment year (year T-1) is checked for assessment data or data that was generated through only basic calculations. This is repeated until all assessment years have been checked in decreasing order (years T-2, T-3, and so on). If no data was found to fill that field, then the most recent assessment year (year T) is checked for data generated from more involved supplementation methods such as converted data or model-estimated data. If no data are found then the next-most recent year (year T-1) is checked, and so on for prior assessment years (year T-2, T-3, etc.). In other words, level of data manipulation takes precedence over recency in determining preference.

|  |  |  |
| --- | --- | --- |
| **Order** | **Assessment Year** | **Data Source** |
| 1 | Year T | Assessment data or uses calculated values |
| 2 | Year T-1 | Assessment data or uses calculated values |
| 3 | Year T-2 | Assessment data or uses calculated values |
| x | … | Assessment data or uses calculated values |
| x+1 | Year T | Uses converted or model-estimated data |
| x+2 | Year T-1 | Uses converted or model-estimated data |
| x+3 | Year T-2 | Uses converted or model-estimated data |
| x+x | … | Uses converted or model-estimated data |

**Database Version Differences:**

Two versions of RAM get generated with each new release with differing levels of data supplementation. The “Assessment Data Only” version only supplements data with basic calculations. The “Model Fits Included” version further supplements with conversions and model-estimated data.

|  |  |  |
| --- | --- | --- |
| **Data Comparisons** | **Assessment Data Only Version [“asmt”]** | **Model Fits Included Version [“mdl”]** |
| 1 | Includes data from assessment | Includes data from assessment |
| 2 | Includes basic combined data (e.g. TB and TBmsy to generate TB/TBmsy) | Includes basic combined data (e.g. TB and TBmsy to generate TB/TBmsy) |
| 3 | Includes basic calculated data (e.g. using ER=TC/TB) | Includes basic calculated data (e.g. using ER=TC/TB) |
| 4 |  | Includes converted data (e.g. SSBmsy converted to a TBmsy) |
| 5 |  | Includes data derived from supplementary methods (ie Method A), and data designated to only be in model fits version by regional experts |
| 6 |  | Includes model fit data (reference points generated from a Pella-Tomlinson model) |

**Appendix A: Derived Method A**

This method was derived to estimate a full time series of TB/TBMSY and ER/ERMSY from a data scenario encountered with West African FAO assessments where the stock in an assessment had:

* One year (current) of TB/TBMSY and/or ER/ERMSY
* A time series of survey data in metric tons
* A time series of catch data (for the ER calculation) in metric tons

This method essentially involves re-scaling the time series variation in estimated survey biomass to the one known year of TB/TBMSY. If we denote the current year of TB/TBmsy as with *T* being the last (current) year of the biomass time series, the survey time series as *S*, and a proxy reference point SMSY associated with *S*, then the method is as follows:

1. Treating *S* as a proxy for *B*, we use the relationship for any time *t*.
2. Since we know one value (*T*) of the ratio for *B*, and all values of *S*, we can solve for the reference point SMSY on the time value *T*: .
3. *S/SMSY* can now be calculated with the newly calculated proxy reference point, and since we also know *B/BMSY.*
4. For *ER/ERMSY,* a proxy *ER* must first be generated, denoted here as *ES*. Since the survey and catch share the same units we can calculate the proxy as .
5. *ES* is then used with *ER/ERMSY* the same way *S* was used with *B/BMSY* to calculate *ESMSY*, and subsequently *ES/ESMSY*.

To summarize, the survey data is treated as a proxy for *TB*, and a proxy “*TBMSY*” is calculated in the current year, and then used to back calculate the remaining *TB/TBMSY* time series in years shared with the survey time series. A similar process is used for *ER/ERMSY*, with the additional step of first calculating the *ER* proxy.

**Appendix B: Derived Method B**

This method was derived to generate approximate *BMSY* values for ICES stocks that had *Blim* values but no *BMSY* or *B* management target values. If an assessment fulfilled the described scenario, then the following calculation is performed to generate the approximation: *Bmsy-dvmb* = *Blim* \* 2