**West Coast rock lobster Reference Set and Initial set of Robustness Tests**

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**Reference Set**

In 2007 the reference set of operating models used for basic OMP testing comprised the following:

Table 1: The 27 possible scenarios, which result as combinations of uncertainties regarding future recruitment, future somatic growth and current abundance.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Scenario** | **Recruitment** | **Somatic growth** | **Current Abundance** | **R WT** | **G WT** | **A WT** | **Total WT** | **Cum WT** |
| 1 | FRM | FSGL | RC | 0.6 | 0.5 | 0.5 | 0.15 | 0.15 |
| 2 | FRM | FSGL | ALTL | 0.6 | 0.5 | 0.25 | 0.075 | 0.225 |
| 3 | FRM | FSGL | ALTH | 0.6 | 0.5 | 0.25 | 0.075 | 0.3 |
| 4 | FRM | FSGM | RC | 0.6 | 0.4 | 0.5 | 0.12 | 0.42 |
| 5 | FRM | FSGM | ALTL | 0.6 | 0.4 | 0.25 | 0.06 | 0.48 |
| 6 | FRM | FSGM | ALTH | 0.6 | 0.4 | 0.25 | 0.06 | 0.54 |
| 7 | FRM | FSGH | RC | 0.6 | 0.1 | 0.5 | 0.03 | 0.57 |
| 8 | FRM | FSGH | ALTL | 0.6 | 0.1 | 0.25 | 0.015 | 0.585 |
| 9 | FRM | FSGH | ALTH | 0.6 | 0.1 | 0.25 | 0.015 | 0.6 |
| 10 | FRH | FSGL | RC | 0.3 | 0.5 | 0.5 | 0.075 | 0.675 |
| 11 | FRH | FSGL | ALTL | 0.3 | 0.5 | 0.25 | 0.0375 | 0.7125 |
| 12 | FRH | FSGL | ALTH | 0.3 | 0.5 | 0.25 | 0.0375 | 0.75 |
| 13 | FRH | FSGM | RC | 0.3 | 0.4 | 0.5 | 0.06 | 0.81 |
| 14 | FRH | FSGM | ALTL | 0.3 | 0.4 | 0.25 | 0.03 | 0.84 |
| 15 | FRH | FSGM | ALTH | 0.3 | 0.4 | 0.25 | 0.03 | 0.87 |
| 16 | FRH | FSGH | RC | 0.3 | 0.1 | 0.5 | 0.015 | 0.885 |
| 17 | FRH | FSGH | ALTL | 0.3 | 0.1 | 0.25 | 0.0075 | 0.8925 |
| 18 | FRH | FSGH | ALTH | 0.3 | 0.1 | 0.25 | 0.0075 | 0.9 |
| 19 | FRL | FSGL | RC | 0.1 | 0.5 | 0.5 | 0.025 | 0.925 |
| 20 | FRL | FSGL | ALTL | 0.1 | 0.5 | 0.25 | 0.0125 | 0.9375 |
| 21 | FRL | FSGL | ALTH | 0.1 | 0.5 | 0.25 | 0.0125 | 0.95 |
| 22 | FRL | FSGM | RC | 0.1 | 0.4 | 0.5 | 0.02 | 0.97 |
| 23 | FRL | FSGM | ALTL | 0.1 | 0.4 | 0.25 | 0.01 | 0.98 |
| 24 | FRL | FSGM | ALTH | 0.1 | 0.4 | 0.25 | 0.01 | 0.99 |
| 25 | FRL | FSGH | RC | 0.1 | 0.1 | 0.5 | 0.005 | 0.995 |
| 26 | FRL | FSGH | ALTL | 0.1 | 0.1 | 0.25 | 0.0025 | 0.9975 |
| 27 | FRL | FSGH | ALTH | 0.1 | 0.1 | 0.25 | 0.0025 | 1 |

Where:

Median Future recruitment **WT**

* FRM: Geometric Mean of  and  0.60
* FRH: Maximum of  and  0.30
* FRL: Minimum of  and  0.10

Future Somatic growth (2005+) **WT**

* FSGL: = FSGM for 3 years (2005, 2006, 2007) then 0.50

 will equal the 1989-2004 average (see Figure 1)

* FSGM: linearly to 1968-2004 ave over 10 yrs 0.40
* FSGH: linearly to 1968-2004 ave over 3 yrs 0.10

[The above apply to the growth rates for Areas 3-4, 5-6, 7 and 8. The somatic growth rate for Area 1-2 will be assumed to remain constant in the future at the 1989-2004 average level for all scenarios.]

Current (2005) Abundance (*B*75) **WT**

* RC: Best Estimate (from current RC1-like model) 0.50
* ALTL: Estimated lower 12.5%ile 0.25
* ALTH: Estimated upper 12.5%ile 0.25

For 2011, it is suggested that the following modifications be considered.

1. Drop the scenarios that assume some future increase in somatic growth towards pre-1989 levels, i.e. drop FSGM and FSGH. There has been no suggestion of this for what is now a considerable period of time. Perhaps replace these by variants of the FSGL level.
2. For future recruitment, add *R*2000 to the estimable parameters considered in each test.
3. Current abundance will now refer to 2010.

**Robustness Tests**

The following table provides an initial list of proposed robustness tests which will be used to test the robustness of the underlying operating models to various model assumptions (Category A tests) and to evaluate the performance of various candidate OMPs (Category B tests). Suggested priority of each test is given, where I is the highest priority.

**CATEGORY A**: One (or several) of the assumptions of the underlying operating model itself, or the data to which it was fitted, are altered, thus requiring the model to be re-fitted to the data by maximising the likelihood function.

**CATEGORY B:** These tests examine the robustness to assumptions relating to the future of the resource and monitoring data. During the OMP testing, it is assumed that the OMP is not “aware” of these changes.

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| --- | --- | --- |
| **CATEGORY A TESTS** | **Description** | **SuggestedPriority** |
| **HC** | Examine alternate inter-areal split of historic catches | II |
| **SEL** | Alternate selectivity functional forms | I |
| **MOD** | Start model in 1970 | II |
| **NS1** | Male natural survivorship = 0.88 (RC = 0.90) | I |
| **NS2** | Male natural survivorship = 0.92 | I |
| **NS3** | Alter natural survivorship function so that maximum survivorship occurs at 80mm (not 60mm) | II |
| **D2** | Discard mortality = 0.2 (RC = 0.1) | II |
| **D3** | Discard mortality increases 5 yrs prior to min size change in 1993 | II |
| **SG1** | Adult growth is 0.5mm more than thought | II |
| **SG2** | 1870-1967 growth = 68-88 average (i.e. historic growth excludes low growth period in average) | I |
| **SG3** | Pre-1990 growth shifted down to 1990+ average level | II |
| **SG5** | Adult somatic growth rate smaller at large sizes | III |
| **W1** | 1990+ 225 MT walkout each yr | III |
| **W2** | Once every decade 1870-1990 500 MT walkout | III |
| **P** | Poaching has increased linearly in the last five years by 10% p.a. | I |
|  |  |
| **CATEGORY B TESTS** |  |  |
| **C1** | Future TAC levels are over caught by 5% | II |
| **E1** | Recruitment drops 50% for a 3 year period, once in 1995-2010 | I |
| **E3** | 25% all lobsters die once 2003-2016 | II |
| **P1** | Poaching reduced next 5 years from 500 to 200 MT | III |
| **P2** | Poaching increased next 5 years from 500 to 1000 MT | I |
| **TH1** | Future trap:hoop 60:40 (RC: 80:20) | II |
| **B2** | Future adult somatic growth 0.5mm than thought | III |
| **B3** | Future adult somatic growth 0.5mm less than thought | II |
| **W1 future** | Future walkouts continue at 1990s rate | I |
| **W3** | W1 above, but 400 MT walk-out annually 2006+ | III |
| **M1** | FIMS index missing | III |
| **M2** | Somatic growth index missing | III |
| **COMP** | Hard combination of tests | I |
| **RECR** | Recreational implementation error | I |
| **IR** | Interim relief error | I |