

Rock Lobster Stock Assessment Report 2012, Draft 1 (1 March 2012), RLRAG Meeting 7 (8 March 2012)

Victorian rock lobster fishery stock assessment report 2012

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Summary

In the Western Zone of the Victorian rock lobster fishery, following progressive increase in fishing effort since effort records were first collected in 1951–52, during the past decade, fishing effort fell to below two-thirds of the peak level in 2001–02, when quota management was introduced. During the period from 1993–94 to 2003–04, nominal catch per unit effort (CPUE) was stable at 0.59–0.70 kg per potlift, but then progressively declined continuously over the next six years to 0.37 kg per potlift in 2009–10, before increasing to 0.44 kg per potlift in 2010–11. The stock assessment model, extended to use additional data sets applied in one-month time-steps with standardised CPUE, estimated 'egg production' in 2010–11 at 72% of the 'egg production' in reference year 2001–02 (well above the 33% limit) and estimated 'available biomass' at 70% of the 'available biomass' in 2001–02 (well below the 173% target). The model 50% probability forward projection indicates that for a fully taken Total Allowable Commercial Catch (TACC) of 229 t, the available biomass would rebuild to the target within 10 years (by 2020–21). CPUE from logbooks (nominal and standardised), monitoring by onboard observer, and fixed-site survey are consistent with the model available biomass trajectory indicating a general decline in abundance and then a slight increase from 2009–10 to 2010–11 and to November–January of 2011–12, particularly for under-sized animals. The harvest of more than 40% of the available biomass annually immediately prior to the introduction of quota management reduced to below 30% during the past two years. Well above average recruitment during the 1990s fell to below average during the 2000s, with a spike in 2008–09 and a trend of weakening recruitment from west to east across the Western Zone.

In the Eastern Zone, for most of the period since 1951–52, fishing effort climbed to a peak of 260 thousand potlifts in 1993–94 and then fell to below half this level at 108 thousand potlifts in 2009–10. Nominal CPUE fell to its lowest levels in the mid-1990s, but subsequently recovered marginally as fishing effort declined. In 2010–11, catch (65 t), fishing effort (150 thousand potlifts), and CPUE (0.44 kg per potlift) all reached their highest levels since the beginning of the past decade. The stock assessment model using standardised CPUE estimated 'egg production' in 2010–11 at 137% of the 'egg production' in reference year 2001–02 (above the limit of 104%) and estimated 'available biomass' in 2010–11 at 110% of the 'available biomass' in 2001–02 (well below the 219% target). The model available biomass trajectory indicates that for a fully taken Total Allowable Commercial Catch (TACC) of 52 t, the available biomass would rebuild to the target within 10 years (by 2020–21). CPUE from logbooks (nominal and standardised), onboard observer, and fixed-site survey are all consistent with model biomass trajectory indicating steady abundance with an increase from 2009–10 to 2010–11 and to November–January of 2011–12. Harvest of about 30% of the available biomass annually during the 1990s gradually reduced to about half this level over the past decade. Recruitment has been below average during the past decade.

Introduction

The Rock Lobster Fishery Management Plan requires annual stock assessment of the southern rock lobster (*Jasus edwardsii*) (SRL) resource of Victoria to enable review of the Total Allowable Catch (TAC) by the TAC Forum open to all key stakeholders in each of the Western Zone (WZ) and Eastern Zone (EZ). The Management Plan requires the fishery to be assessed using prescribed stock performance indicators, biological reference points, triggers, rebuild rates, and risk levels associated with uncertainty.

The primary control tool for the fishery is individual catch quotas, where each licence holder is assigned annually a proportion of the Total Allowable Commercial Catch (TACC) through individual transferable quota units.

Understanding of the stock dynamics and maintenance of data and current knowledge of the population biology of SRL in response to fishing and environmental effects continues through a program of monitoring, research, and ongoing stock assessment maintained by Fisheries Victoria.

Stock assessment method

The stock assessment uses the 'rock lobster fishery model' designed for assessment of the rock lobster fisheries in Victoria, South Australia, and Tasmania. The model is length-structured (accounts for numbers of SRLs in specified length-classes) and assesses risk associated with uncertainty in the data. For males and females separately, the model tracks for each month the number of SRLs in the population larger than 60 mm carapace length, and accounts for natural mortality, fishing mortality, and variation with length of SRL in annual growth-increment, selectivity of pots fitted with escape-gaps, body mass, and number of eggs produced by females. The model is fitted simultaneously to several data sets: monthly standardised catch per unit effort (CPUE) expressed as kilograms per potlift, monthly mass and number of SRLs landed, and length-frequency distribution of the catch landed in port (above sized SRLs only) and of the catch observed at-sea (above and below sized SRLs). The model accounts for Marine Protected Areas (8% in WZ and 16% in EZ) and assumed levels of recreational catch.

The model estimates two stock performance indicators prescribed in the Management Plan: 'egg production' and 'available biomass'. 'Egg production' is a measure of the number of eggs produced by mature female SRLs. 'Available biomass' is a measure of the stock biomass of SRLs that can be legally caught (dependent on separate open seasons for males and females and size of SRLs relative to their legal minimum lengths). Each of these stock performance indicators (expressed with a specific probability) can be produced for the history of the fishery since 1951–52, when CPUE data first became available, and for various forward projections based on assumed constant catches adopted as proxies for alternative TACCs. Backward and forward projections, referred to as trajectories from hereon, to represent any required level of uncertainty made by the model through sampling probability distributions of several parameters estimated when fitting to the data and through sampling recruitment indices (model estimates of number of SRLs at 80 mm carapace length for the past 10 years). The only trajectories shown for the purpose of the present stock assessment are the 75% probability trajectory for egg production (i.e. 75% chance of being above and 25% chance of being below) and the 50% trajectory for available biomass (i.e. 50% chance of being above and 50% chance of being below).

The decision rules of the Management Plan require comparing the stock performance indicators with biological reference points (BRP) referred to as the 'limit BRP' and the 'target BRP'. Originally, the 'limit BRP' was 20% of the 1951–52 estimated egg production on the 75% probability trajectory and the 'target BRP' was 40% of the 1951–52 estimated available biomass on 50% probability trajectory. In each case, the trajectories were drawn relative to 1951–52 (i.e. 100% in 1951–52). For each of the WZ and EZ, separately, the egg production and available biomass trajectories produced for the 2011 stock assessment were transposed to express the target BRP and the limit BRP as percentages of their values relative to 2001–02, rather than 1951–52, as the 'reference year'. On this basis, the limit BRP adjusts from 20% of 1951–52 egg production to 33% in the WZ and 104% in the EZ of 2001–02 egg production. Similarly, the target BRP adjusts from 40% of 1951–52 available biomass to 173% in the WZ and 219% in the EZ of 2001–02 available biomass.

Under the decision rules, if a stock assessment indicates egg production is below the limit BRP (i.e. limit BRP triggered), the Management Plan prescribes adoption of the reduced TACC required to lift egg production above the limit BRP within 2 years. Otherwise, the Management Plan prescribes adoption of the TACC required to reach the target BRP by 2020–21.

All assessments, including 2012, applied the model as a single area for each zone, but several changes applied to the 2012 stock assessment. Past stock assessments operated the model in one-year time-steps, but the 2012 stock assessment operated in one-month time-steps. Other changes included use of pre-recruit (undersized SRLs) length-frequency data from fixed-site survey and onboard observer monitoring and merging growth determined from analysis of tag release-recapture length-increment data at 14 separate sites. In addition, the model was fitted to 'standardised CPUE' rather than 'nominal CPUE' as in the past. CPUE was standardised for each zone separately by adjusting for differences among the regions, fishing depth ranges, fishing years, fishing months and vessel-fishers. For standardisation, the regions were Portland, Warrnambool and Apollo Bay in WZ and Queenscliff, San Remo and Lakes Entrance in EZ, and fishing depth ranges were <40 m and ≥ 40 m. Only data from vessel-fishers contributing data in more than two separate fishing years and contributing 200 or more records were included in the CPUE standardisation.

Western Zone Stock Assessment 2012 Results

Western Zone trends from commercial catch and effort logbook data available from 1951–52 to 2010–11 (fishing year November–September) indicate continual growth in fishing effort until 2001–02, when quota management was introduced followed by progressive decline to two-thirds of peak effort (Table 1.1 and Figure 1.1). Catch initially peaked in 1980–81 at 549 t taken by 680 thousand potlifts and then peaked again in 2000–01 at 525 t, with 32% higher fishing effort at 895 thousand potlifts. Since adoption of quota management, catch declined to a minimum of 235 t in 2008–09, a level not reported since the 1950s. During the period from 1993–94 to 2003–04, CPUE was stable at 0.59–0.70 kg per potlift, but then progressively declined continuously over the next six years to 0.37 kg per potlift in 2009–10, before increasing to 0.44 kg per potlift in 2010–11. The present TACC is 79% caught with four months of the present licensing period remaining, but was 96% and 99% caught during the two preceding licensing periods (Table 1.2).

Onboard observer (from 2004–05 to 2009–10) and fixed-site survey (from 2001–02 to 2010–11) monitoring indicate a general decline in CPUE for males and females with an increase at the end of the period, particularly for the under-sized SRLs (Figure 1.2). There has been a general decline in puerulus settlement since 1993 when puerulus monitoring began.

The stock assessment model estimated egg production in 2010–11 at 72% of egg production in the reference year of 2001–02, which is well above the limit BRP of 33% in 2001–02 and estimated available biomass at 70% (well below the 173% target BRP) (Figure 1.3). The harvest of more than 40% of the available biomass annually immediately prior to the introduction of quota management reduced to below 30% during the past two years. The model indicated pre-recruitment (relative number of SRLs of 80 mm total carapace) improved through the past decade, with a spike in 2008–09, but was generally below the levels during the previous decade. The model also indicated a progressive weakening of recruitment from west to east across the Western Zone. The 50% probability trajectory indicates that, for a TACC of 229 tonnes taken continuously, the available biomass would build to the 173% target by 2020–21. CPUE from logbooks (nominal and standardised), monitoring by onboard observer, and fixed-site survey are consistent with the model 50% probability trajectory of available biomass indicating a general decline in abundance recently and then a slight increase from 2009–10 to 2010–11 and then to November–January of 2011–12.

Eastern Zone Stock Assessment 2012 Results

During the period from 1951–52 to 2010–11, the Eastern Zone commercial catch peaked in 1954–55 at 182 t taken by 66 thousand potlifts and the catch mostly exceeded 100 t until the mid-1980s (Table 2.1, Figure 2.1). The catch then ranged 66–97 t until 2000–01, then 52–56 t until 2006–07, and for the past four years stepped down to 46 and 39 t, before a final upturn of 55 and 65 t. Since 1951–52, fishing effort climbed to a peak of 260 thousand potlifts in 1993–94 and then fell to well below half this level at 108 thousand potlifts in 2008–09, before recovering to 150 thousand potlifts in 2010–11. CPUE fell to its lowest levels in the mid-1990s, but subsequently recovered marginally as fishing effort declined. In 2010–11, catch (65 t), fishing effort (150 thousand potlifts), and CPUE (0.44 kg per potlift) all reached their highest levels since the beginning of the past decade. The TACC is likely to be fully caught for the first time this year (Table 2.2).

Onboard observer (from 2004–05 to 2009–10) and fixed-site survey (from 2001–02 to 2009–10) monitoring indicate an increase in CPUE for males and females, particularly for under-sized animals (Figure 2.2). There has been no monitoring of puerulus settlement in EZ.

The current model applied with standardised CPUE estimated egg production in 2010–11 at 137% of egg production in the reference year of 2001–02, which is above the limit BRP of 104% in 2001–02 and estimated available biomass at 110% (below 219% of target BRP) (Figure 2.3). The model indicated pre-recruitment (relative number of SRLs of 80 mm total carapace) was similar to the long-term average during the past decade. The median forward projection indicates that, for a fully taken TACC of 52 tonnes taken continuously, the available biomass will rebuild to the 219% target by 2020–21. About 30% of the available biomass was taken annually during the 1990s and has gradually been reduced to about half this level over the past decade. Recruitment has been below average during the past decade. CPUE from logbooks (nominal and standardised) and monitoring by onboard observer, and fixed-site survey are consistent with the model 50% probability trajectory of available biomass indicating a general decline in abundance recently and then a slight increase from 2009–10 to 2010–11 and then to November–January of 2011–12.

Table 1.1. Western Zone catch, fishing effort and CPUE

Fishing year, November–September; SRL, southern rock lobster; CPUE, catch per unit effort.

| Fishing year | Catch (tonne) | Catch ('000) | Nominal effort ('000 potlifts) | Nominal CPUE (kg per potlifts) | Standardised CPUE (kg per potlifts) | Mean mass of SRL (kg) | Recreational catch (t) |
|--------------|---------------|--------------|--------------------------------|--------------------------------|-------------------------------------|-----------------------|------------------------|
| 1951–52 | 102 | | 42 | 2.41 | | | 2.1 |
| 1952–53 | 132 | | 54 | 2.43 | | | 2.8 |
| 1953–54 | 177 | | 69 | 2.56 | | | 3.7 |
| 1954–55 | 292 | | 115 | 2.54 | | | 6.1 |
| 1955–56 | 177 | | 87 | 2.03 | | | 3.7 |
| 1956–57 | 134 | | 75 | 1.79 | | | 2.8 |
| 1957–58 | 152 | | 93 | 1.64 | | | 3.2 |
| 1958–59 | 147 | | 84 | 1.75 | | | 3.1 |
| 1959–60 | 182 | | 104 | 1.75 | | | 3.8 |
| 1960–61 | 268 | | 138 | 1.95 | | | 5.6 |
| 1961–62 | 396 | | 202 | 1.96 | | | 8.3 |
| 1962–63 | 326 | | 226 | 1.44 | | | 6.9 |
| 1963–64 | 279 | | 201 | 1.39 | | | 5.9 |
| 1964–65 | 233 | | 175 | 1.33 | | | 4.9 |
| 1965–66 | 325 | | 250 | 1.30 | | | 6.8 |
| 1966–67 | 308 | | 288 | 1.07 | | | 6.5 |
| 1967–68 | 372 | | 373 | 1.00 | | | 7.8 |
| 1968–69 | 413 | | 455 | 0.91 | | | 8.7 |
| 1969–70 | 430 | | 495 | 0.87 | | | 9.1 |
| 1970–71 | 441 | | 497 | 0.89 | | | 9.3 |
| 1971–72 | 458 | | 583 | 0.79 | | | 9.6 |
| 1972–73 | 463 | | 638 | 0.73 | | | 9.8 |
| 1973–74 | 429 | | 555 | 0.77 | | | 9.0 |
| 1974–75 | 286 | | 430 | 0.67 | | | 6.0 |
| 1975–76 | 303 | | 406 | 0.75 | | | 6.4 |
| 1976–77 | 339 | | 464 | 0.73 | | | 7.1 |
| 1977–78 | 309 | | 433 | 0.71 | | | 6.5 |
| 1978–79 | 486 | 485 | 622 | 0.78 | 0.82 | 1.00 | 9.1 |
| 1979–80 | 453 | 444 | 576 | 0.79 | 0.85 | 1.02 | 9.5 |
| 1980–81 | 549 | 548 | 680 | 0.81 | 0.85 | 1.00 | 11.7 |
| 1981–82 | 499 | 499 | 637 | 0.78 | 0.81 | 1.00 | 10.6 |
| 1982–83 | 460 | 455 | 608 | 0.76 | 0.83 | 1.01 | 9.5 |
| 1983–84 | 421 | 414 | 571 | 0.74 | 0.75 | 1.02 | 9.5 |
| 1984–85 | 406 | 394 | 578 | 0.70 | 0.69 | 1.03 | 8.4 |
| 1985–86 | 345 | 346 | 569 | 0.61 | 0.60 | 1.00 | 7.4 |
| 1986–87 | 351 | 353 | 595 | 0.59 | 0.60 | 0.99 | 7.3 |
| 1987–88 | 345 | 349 | 557 | 0.62 | 0.60 | 0.99 | 7.5 |
| 1988–89 | 304 | 322 | 577 | 0.53 | 0.53 | 0.94 | 6.2 |
| 1989–90 | 331 | 355 | 613 | 0.54 | 0.53 | 0.93 | 7.0 |
| 1990–91 | 317 | 337 | 650 | 0.49 | 0.49 | 0.94 | 6.3 |
| 1991–92 | 408 | 439 | 712 | 0.57 | 0.59 | 0.93 | 8.1 |
| 1992–93 | 408 | 433 | 779 | 0.52 | 0.54 | 0.94 | 8.4 |
| 1993–94 | 448 | 456 | 754 | 0.59 | 0.56 | 0.98 | 9.6 |
| 1994–95 | 435 | 444 | 789 | 0.55 | 0.50 | 0.98 | 9.2 |
| 1995–96 | 423 | 442 | 761 | 0.56 | 0.49 | 0.96 | 9.1 |
| 1996–97 | 402 | 414 | 787 | 0.51 | 0.45 | 0.97 | 8.3 |
| 1997–98 | 466 | 492 | 841 | 0.55 | 0.49 | 0.95 | 9.5 |
| 1998–99 | 516 | 568 | 861 | 0.60 | 0.53 | 0.91 | 10.3 |
| 1999–00 | 521 | 592 | 897 | 0.58 | 0.51 | 0.88 | 10.9 |
| 2000–01 | 525 | 598 | 895 | 0.59 | 0.49 | 0.88 | 11.7 |
| 2001–02 | 438 | 510 | 704 | 0.62 | 0.53 | 0.86 | 22.5 |
| 2002–03 | 430 | 495 | 630 | 0.68 | 0.56 | 0.87 | 22.5 |
| 2003–04 | 461 | 515 | 659 | 0.70 | 0.56 | 0.89 | 22.5 |
| 2004–05 | 408 | 451 | 667 | 0.61 | 0.49 | 0.90 | 22.5 |
| 2005–06 | 358 | 405 | 705 | 0.51 | 0.41 | 0.88 | 22.5 |
| 2006–07 | 336 | 392 | 698 | 0.48 | 0.41 | 0.86 | 22.5 |
| 2007–08 | 289 | 338 | 668 | 0.43 | 0.36 | 0.85 | 19.0 |
| 2008–09 | 235 | 268 | 606 | 0.39 | 0.32 | 0.88 | 16.0 |
| 2009–10 | 239 | 277 | 650 | 0.37 | 0.33 | 0.86 | 16.0 |
| 2010–11 | 253 | 306 | 586 | 0.43 | 0.39 | 0.83 | 12.0 |

Data source: Fisheries Victoria CandE Database (16 November 2011) for period from 1978–79 to 2010–11.

Table 1.2. Western Zone history of TACCs for each quota period from 2002–03 to present

Present quota year (1 July 2011–30 June 2012) is incomplete; TACC is Total Allowable Commercial Catch.

| Quota year | Quota period | TACC set | | TACC caught | Number of months fished | Number of active licences | Number of vessels |
|------------|------------------|----------|---------|-------------|-------------------------|---------------------------|-------------------|
| | | (tonne) | (tonne) | | | | |
| 2002–03 | 1 April–31 March | 450 | 440 | 98 | 12 | 79 | 83 |
| 2003–04 | 1 April–31 March | 450 | 436 | 97 | 12 | 80 | 79 |
| 2004–05 | 1 April–31 March | 450 | 421 | 94 | 12 | 79 | 86 |
| 2005–06 | 1 April–31 March | 450 | 405 | 90 | 12 | 75 | 77 |
| 2006–07 | 1 April–31 March | 450 | 329 | 73 | 12 | 71 | 68 |
| 2007–08 | 1 April–31 March | 380 | 319 | 84 | 12 | 68 | 64 |
| 2008–09 | 1 April–31 March | 320 | 244 | 76 | 12 | 61 | 60 |
| 2009 | 1 April–30 June | 55.2 | 36 | 64 | 3 | 54 | 53 |
| 2009–10 | 1 July–30 June | 240 | 230 | 96 | 12 | 54 | 55 |
| 2010–11 | 1 July–30 June | 240 | 237 | 99 | 12 | 55 | 55 |
| 2011–12 | 1 July–30 June | 240 | 190 | 79 | 8 | 50 | 42 |

Data source: Fisheries Victoria, FILS Database (1 March 2012).

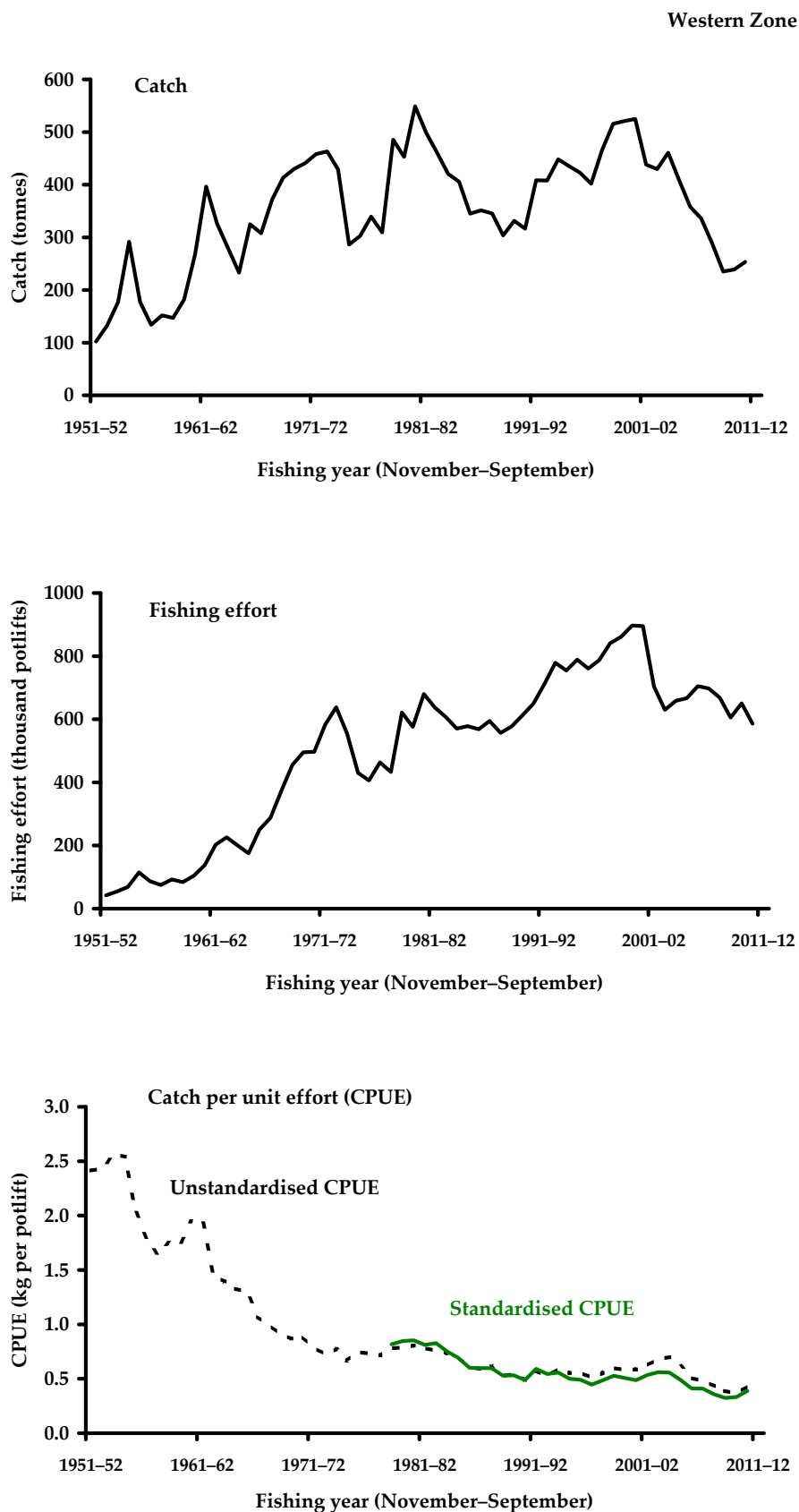


Figure 1.1. Western Zone catch, fishing effort, and CPUE from 1951-52 to 2010-11

CPUE, catch per unit effort.

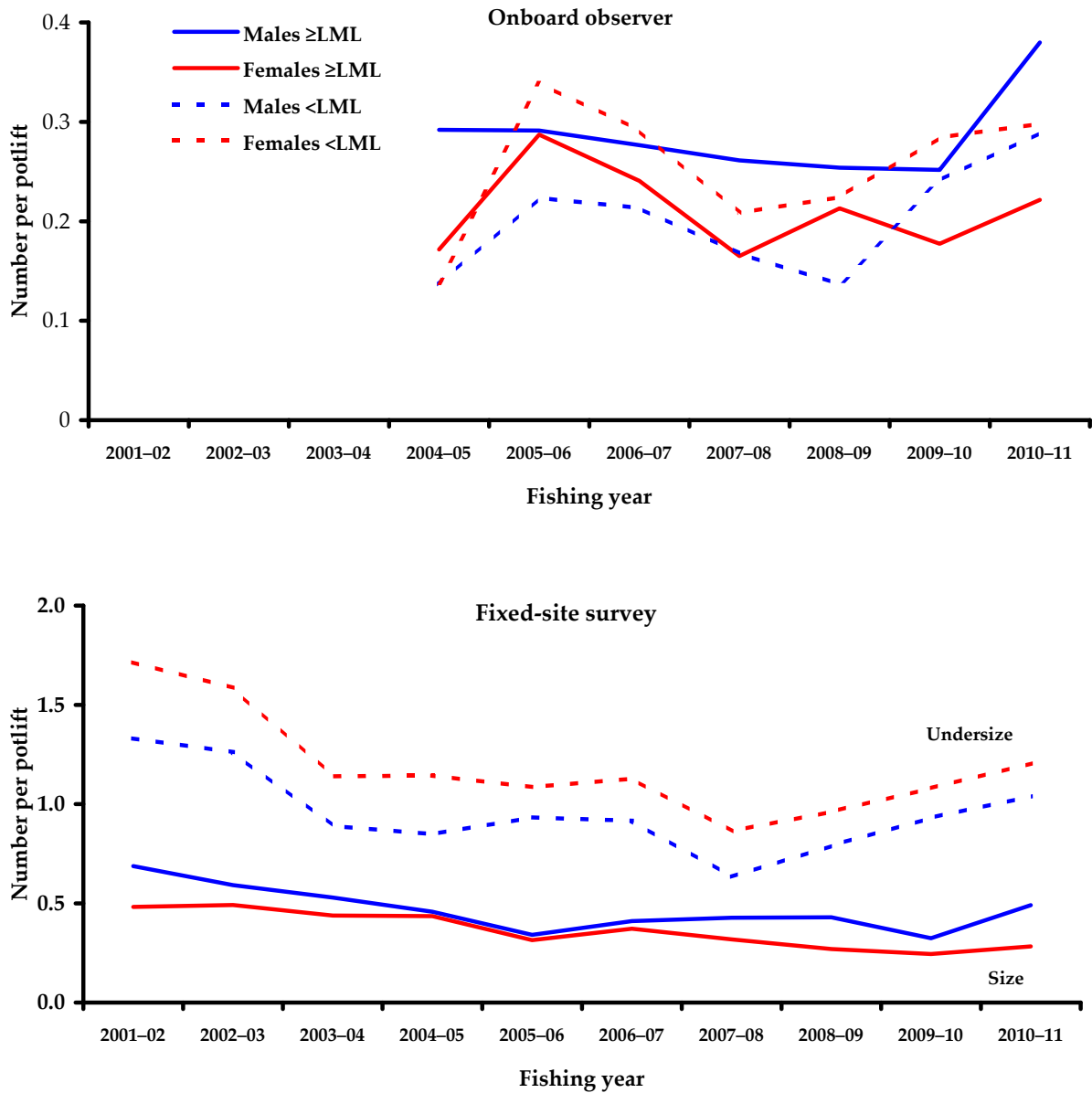


Figure 1.2. Western Zone onboard observer program and fixed site monitoring CPUE trends

LML, legal minimum length, CPUE, catch per unit effort

Source: Rock Lobster Program, Fisheries Victoria (15 December 2011)

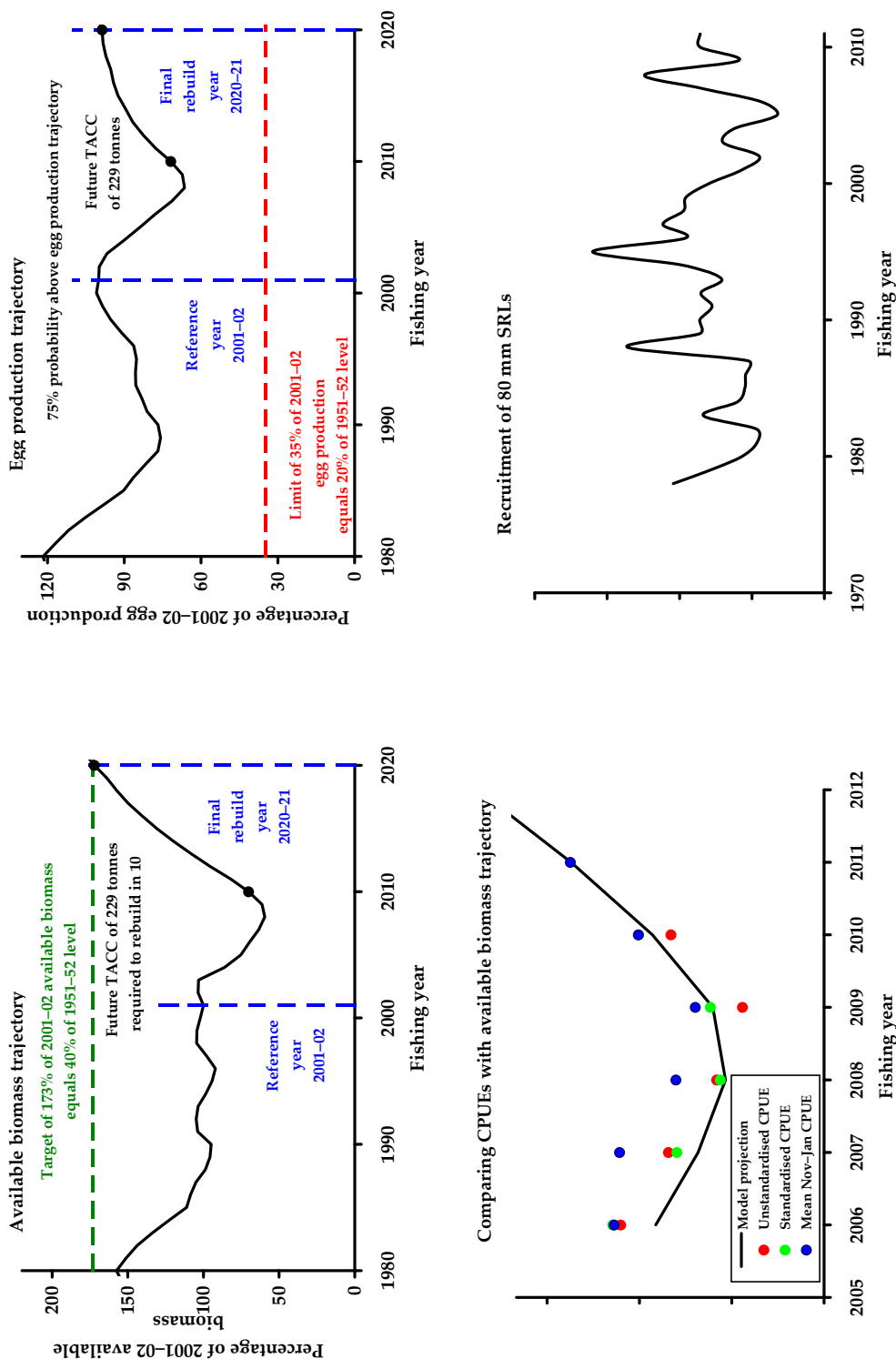


Figure 1.3. Western Zone model outputs

The fishing year is labelled on the graph by the first of the two calendar years straddled; for example, the fishing year labelled 2010 is 2010-11 (16 November 2010-15 September 2011).

Table 2.1. Eastern Zone catch, fishing effort and CPUE

Fishing year, November–September; SRL, southern rock lobster; CPUE, catch per unit effort.

| Fishing year | Catch (tonne) | Catch ('000) | Nominal effort ('000 potlifts) | Nominal CPUE (kg per potlifts) | Standardised CPUE (kg per potlifts) | Mean mass of SRL (kg) | Recreational catch (t) |
|--------------|---------------|--------------|--------------------------------|--------------------------------|-------------------------------------|-----------------------|------------------------|
| 1951–52 | 92 | | 34 | 2.70 | | | 9.2 |
| 1952–53 | 141 | | 68 | 2.07 | | | 14.2 |
| 1953–54 | 166 | | 77 | 2.16 | | | 16.8 |
| 1954–55 | 182 | | 66 | 2.75 | | | 18.4 |
| 1955–56 | 116 | | 51 | 2.27 | | | 11.7 |
| 1956–57 | 116 | | 57 | 2.01 | | | 11.6 |
| 1957–58 | 147 | | 76 | 1.93 | | | 14.8 |
| 1958–59 | 123 | | 82 | 1.50 | | | 12.4 |
| 1959–60 | 135 | | 73 | 1.84 | | | 13.6 |
| 1960–61 | 147 | | 86 | 1.70 | | | 14.8 |
| 1961–62 | 177 | | 92 | 1.92 | | | 17.8 |
| 1962–63 | 158 | | 84 | 1.88 | | | 15.9 |
| 1963–64 | 139 | | 91 | 1.52 | | | 14.0 |
| 1964–65 | 121 | | 99 | 1.22 | | | 12.2 |
| 1965–66 | 131 | | 105 | 1.25 | | | 13.2 |
| 1966–67 | 120 | | 109 | 1.10 | | | 12.1 |
| 1967–68 | 77 | | 77 | 1.01 | | | 7.8 |
| 1968–69 | 107 | | 93 | 1.15 | | | 10.8 |
| 1969–70 | 174 | | 159 | 1.10 | | | 17.6 |
| 1970–71 | 160 | | 176 | 0.91 | | | 16.1 |
| 1971–72 | 123 | | 183 | 0.67 | | | 12.4 |
| 1972–73 | 118 | | 169 | 0.70 | | | 11.9 |
| 1973–74 | 128 | | 152 | 0.84 | | | 12.9 |
| 1974–75 | 93 | | 114 | 0.81 | | | 9.3 |
| 1975–76 | 104 | | 123 | 0.84 | | | 10.5 |
| 1976–77 | 108 | | 130 | 0.83 | | | 10.9 |
| 1977–78 | 102 | | 122 | 0.83 | | | 10.2 |
| 1978–79 | 139 | 123 | 192 | 0.72 | 0.66 | 1.13 | 12.6 |
| 1979–80 | 116 | 108 | 171 | 0.67 | 0.65 | 1.07 | 12.3 |
| 1980–81 | 133 | 123 | 180 | 0.74 | 0.67 | 1.09 | 13.4 |
| 1981–82 | 131 | 120 | 193 | 0.67 | 0.58 | 1.09 | 13.3 |
| 1982–83 | 143 | 132 | 212 | 0.68 | 0.64 | 1.09 | 13.6 |
| 1983–84 | 136 | 128 | 230 | 0.59 | 0.59 | 1.06 | 14.1 |
| 1984–85 | 113 | 96 | 201 | 0.56 | 0.48 | 1.17 | 12.7 |
| 1985–86 | 95 | 81 | 175 | 0.54 | 0.41 | 1.17 | 9.8 |
| 1986–87 | 78 | 66 | 145 | 0.54 | 0.43 | 1.18 | 7.9 |
| 1987–88 | 70 | 62 | 130 | 0.54 | 0.37 | 1.13 | 7.8 |
| 1988–89 | 64 | 60 | 145 | 0.44 | 0.34 | 1.06 | 6.1 |
| 1989–90 | 83 | 85 | 198 | 0.42 | 0.36 | 0.99 | 8.0 |
| 1990–91 | 72 | 72 | 172 | 0.42 | 0.38 | 1.00 | 7.3 |
| 1991–92 | 65 | 64 | 175 | 0.37 | 0.34 | 1.02 | 6.6 |
| 1992–93 | 69 | 63 | 224 | 0.31 | 0.28 | 1.10 | 6.5 |
| 1993–94 | 79 | 68 | 260 | 0.30 | 0.25 | 1.16 | 8.3 |
| 1994–95 | 72 | 58 | 253 | 0.28 | 0.23 | 1.24 | 7.1 |
| 1995–96 | 57 | 48 | 220 | 0.26 | 0.22 | 1.19 | 6.1 |
| 1996–97 | 60 | 48 | 222 | 0.27 | 0.21 | 1.25 | 5.6 |
| 1997–98 | 66 | 54 | 221 | 0.30 | 0.23 | 1.23 | 6.8 |
| 1998–99 | 67 | 58 | 220 | 0.31 | 0.26 | 1.16 | 6.2 |
| 1999–00 | 75 | 71 | 232 | 0.32 | 0.27 | 1.05 | 7.3 |
| 2000–01 | 73 | 67 | 219 | 0.33 | 0.28 | 1.08 | 7.3 |
| 2001–02 | 53 | 50 | 151 | 0.35 | 0.31 | 1.08 | 6.0 |
| 2002–03 | 52 | 48 | 134 | 0.39 | 0.33 | 1.09 | 6.0 |
| 2003–04 | 56 | 51 | 133 | 0.42 | 0.36 | 1.09 | 6.0 |
| 2004–05 | 55 | 49 | 136 | 0.40 | 0.36 | 1.13 | 6.0 |
| 2005–06 | 52 | 46 | 122 | 0.43 | 0.36 | 1.14 | 6.0 |
| 2006–07 | 54 | 48 | 136 | 0.40 | 0.36 | 1.13 | 6.0 |
| 2007–08 | 46 | 39 | 123 | 0.37 | 0.34 | 1.19 | 6.6 |
| 2008–09 | 39 | 32 | 108 | 0.37 | 0.33 | 1.24 | 6.6 |
| 2009–10 | 55 | 50 | 146 | 0.38 | 0.35 | 1.11 | 6.6 |
| 2010–11 | 65 | 62 | 150 | 0.43 | 0.41 | 1.05 | 6.6 |

Data source: Fisheries Victoria CandE Database (16 November 2011) for period from 1978–79 to 2010–11.

Table 2.2. Eastern Zone history of TACs for each quota period from 2002-03 to present
 Present quota year (1 July 2011-30 June 2012) is incomplete; TACC is Total Allowable Commercial Catch.

| Quota year | Quota period | TACC set | | TACC caught | | Number of months fished | Number of active | | Number of vessels |
|------------|------------------|----------|---------|-------------|----------|-------------------------|------------------|----------|-------------------|
| | | (tonne) | (tonne) | (tonne) | Per cent | | licences | licences | |
| 2002-03 | 1 April-31 March | 60 | 49.9 | 83 | 83 | 12 | 39 | 34 | |
| 2003-04 | 1 April-31 March | 60 | 54.4 | 91 | 91 | 12 | 41 | 37 | |
| 2004-05 | 1 April-31 March | 60 | 53.2 | 89 | 89 | 12 | 39 | 38 | |
| 2005-06 | 1 April-31 March | 60 | 55.7 | 93 | 93 | 12 | 33 | 32 | |
| 2006-07 | 1 April-31 March | 60 | 53.5 | 89 | 89 | 12 | 30 | 30 | |
| 2007-08 | 1 April-31 March | 66 | 50.1 | 76 | 76 | 12 | 31 | 31 | |
| 2008-09 | 1 April-31 March | 66 | 41.3 | 63 | 63 | 12 | 25 | 23 | |
| 2009-09s | 1 April-30 June | 6.9 | 5.8 | 84 | 84 | 3 | 18 | 19 | |
| 2009-10 | 1 July-30 June | 66 | 43.8 | 66 | 66 | 12 | 22 | 21 | |
| 2010-11 | 1 July-30 June | 66 | 56.7 | 86 | 86 | 12 | 26 | 25 | |
| 2011-12 | 1 July-30 June | 66 | 55.1 | 83 | 83 | 8 | 26 | 21 | |

Data source: Fisheries Victoria FILS Database (1 March 2012).

Eastern Zone

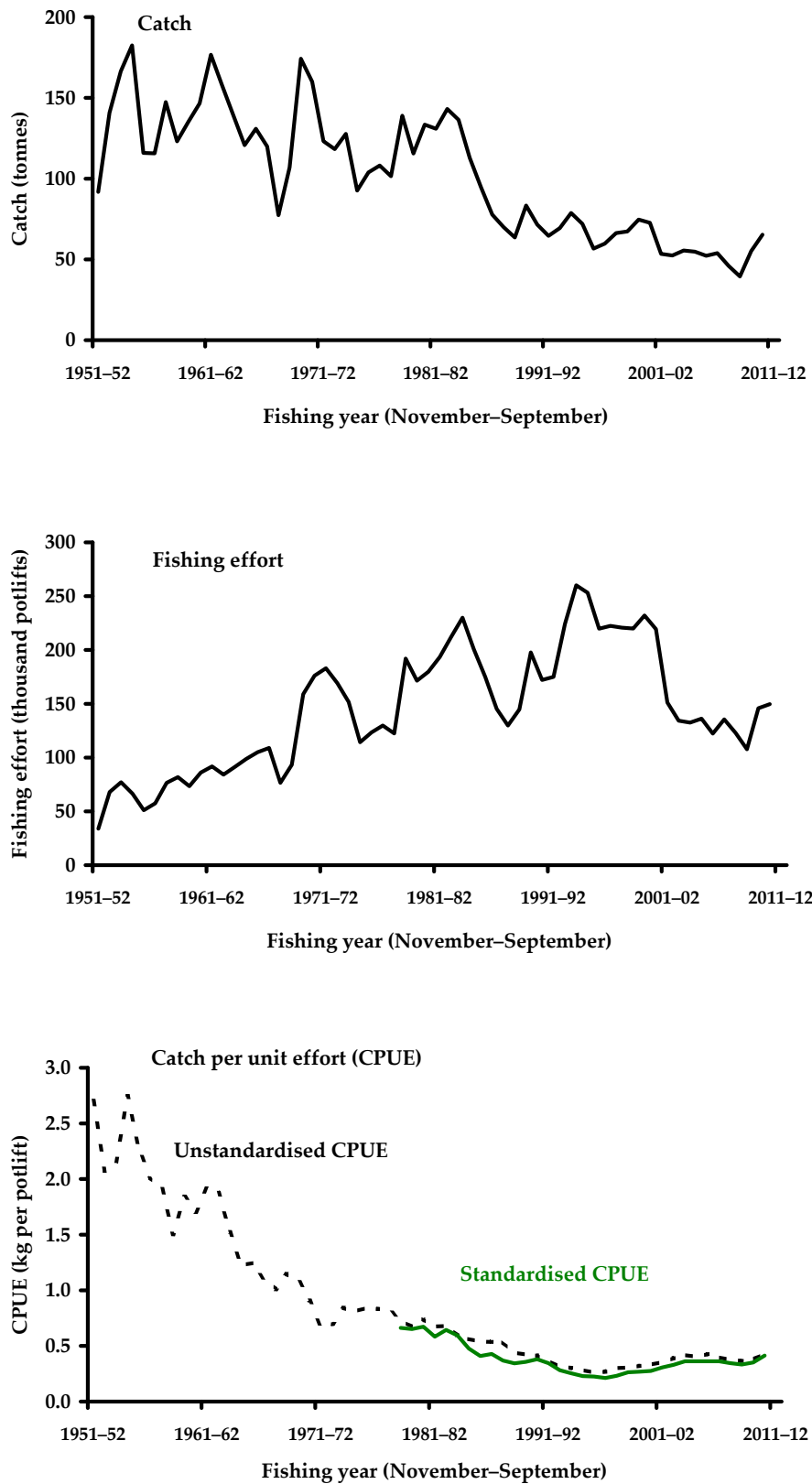


Figure 2.1. Eastern Zone catch, fishing effort, and CPUE from 1951-52 to 2010-11

CPUE, catch per unit effort.

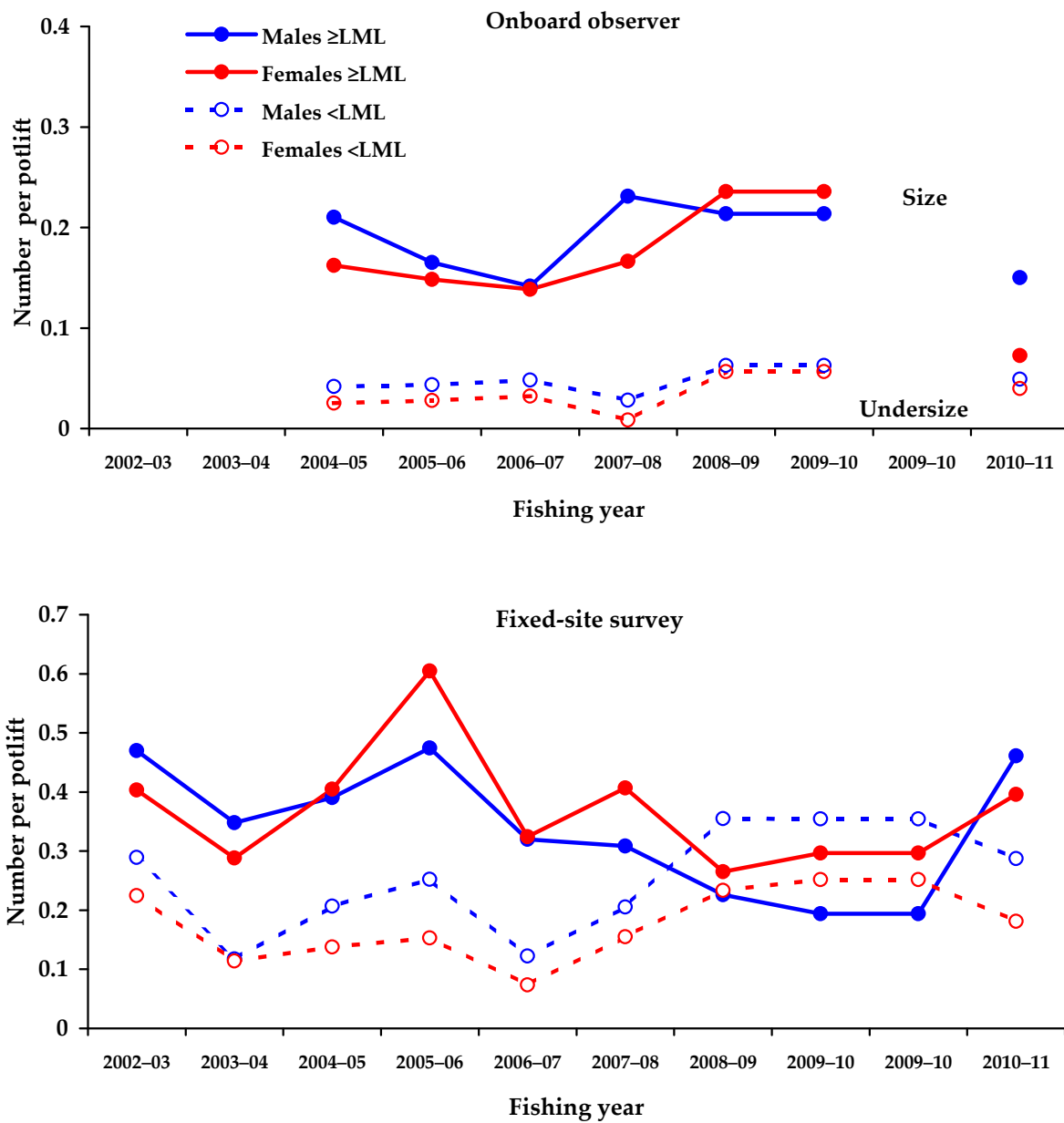


Figure 2.2. Eastern Zone onboard observer program and fixed site monitoring CPUE trends

LML, legal minimum length, CPUE, catch per unit effort

Source: Rock Lobster Program, Fisheries Victoria (15 December 2011)

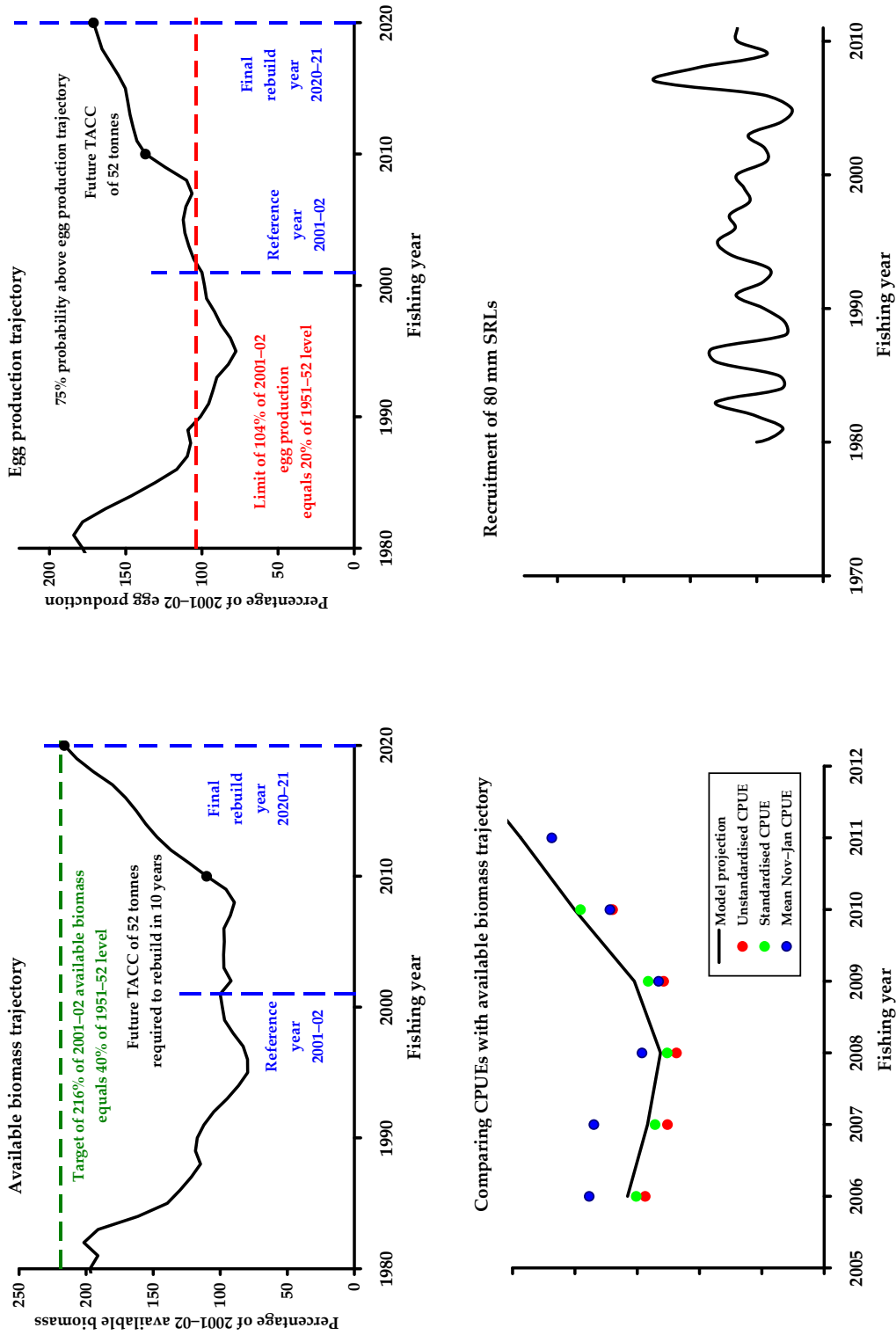


Figure 2.3. Eastern Zone model outputs

The fishing year is labelled on the graph by the first of the two calendar years straddled; for example, the fishing year labelled 2010 is 2010-11 (16 November 2010-15 September 2011).