

**Northern Zone  
Rock Lobster (*Jasus edwardsii*)  
Fishery Status Report 2009/10**

Status Report to PIRSA Fisheries

**A. Linnane, R. McGarvey, J. Feenstra and M. Hoare**

**SARDI Publication No. F2007/000714-4  
SARDI Research Report Series No. 513**

**SARDI Aquatic Sciences  
PO Box 120 Henley Beach SA 5022**

**November 2010**

**Northern Zone  
Rock Lobster (*Jasus edwardsii*)  
Fishery Status Report 2009/10**

**Status Report to PIRSA Fisheries**

**A. Linnane, R. McGarvey, J. Feenstra and M. Hoare**

**SARDI Publication No. F2007/000714-4  
SARDI Research Report Series No. 513**

**November 2010**

This publication may be cited as:

Linnane, A., McGarvey, R., Feenstra, J. and Hoare, M (2010). Northern Zone Rock Lobster (*Jasus edwardsii*) Fishery Status Report 2009/10. Status Report to PIRSA Fisheries. South Australian Research and Development Institute (Aquatic Sciences), Adelaide. SARDI Publication No. F2007/000714-4. SARDI Research Report Series No. 513. 21pp.

**South Australian Research and Development Institute**

SARDI Aquatic Sciences

2 Hamra Avenue

West Beach SA 5024

Telephone: (08) 8207 5400

Facsimile: (08) 8207 5406

<http://www.sardi.sa.gov.au>

**DISCLAIMER**

The authors warrant that they have taken all reasonable care in producing this report. The report has been through the SARDI Aquatic Sciences internal review process, and has been formally approved for release by the Chief, Aquatic Sciences. Although all reasonable efforts have been made to ensure quality, SARDI Aquatic Sciences does not warrant that the information in this report is free from errors or omissions. SARDI Aquatic Sciences does not accept any liability for the contents of this report or for any consequences arising from its use or any reliance placed upon it.

**© 2010 SARDI**

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968* (Cth), no part may be reproduced by any process, electronic or otherwise, without the specific written permission of the copyright owner. Neither may information be stored electronically in any form whatsoever without such permission.

Printed in Adelaide: November 2010

SARDI Publication No. F2007/000714-4

SARDI Research Report Series No. 513

Author(s): A. Linnane, R. McGarvey, J. Feenstra and M. Hoare

Reviewer(s): C. Dixon, S.Roberts and L. Triantafillos

Approved by: A.J. Fowler  
Subprogram Leader – Wild Fisheries

Signed:



Date: 23 November 2010

Distribution: PIRSA Fisheries, Northern Zone Rock Lobster Fishermen's Association, SAASC Library and University of Adelaide Library

Circulation: Public Domain

## TABLE OF CONTENTS

<b>1</b>	<b>TABLE OF FIGURES</b>	<b>5</b>
<b>2</b>	<b>EXECUTIVE SUMMARY</b>	<b>6</b>
<b>3</b>	<b>FISHERY STATISTICS</b>	<b>7</b>
<b>3.1</b>	<b>Catch, effort and CPUE</b>	<b>7</b>
3.1.1	Zonal catch and effort	7
3.1.2	Within season trends	7
3.1.3	Regional catch and effort	8
3.1.4	Zonal CPUE	9
3.1.5	Within season trends in CPUE	9
3.1.6	Regional CPUE	10
3.1.7	Annual mean weight	11
3.1.8	Average number of days fished	11
<b>3.2</b>	<b>Puerulus settlement index</b>	<b>12</b>
<b>3.3</b>	<b>Pre-recruit index</b>	<b>12</b>
3.3.1	Zonal pre-recruit index	12
3.3.2	Regional pre-recruit index	13
<b>3.4</b>	<b>Length Frequency</b>	<b>14</b>
<b>4</b>	<b>MODEL OUTPUTS</b>	<b>15</b>
<b>4.1</b>	<b>Biomass</b>	<b>15</b>
<b>4.2</b>	<b>Egg Production</b>	<b>15</b>
<b>4.3</b>	<b>Percent of virgin egg production</b>	<b>16</b>
<b>4.4</b>	<b>Exploitation Rate</b>	<b>16</b>
<b>5</b>	<b>BIOLOGICAL PERFORMANCE INDICATORS</b>	<b>17</b>
<b>5.1</b>	<b>Reference points</b>	<b>17</b>
<b>5.2</b>	<b>Zonal catch rate</b>	<b>17</b>
<b>5.3</b>	<b>Regional catch rate</b>	<b>18</b>
<b>5.4</b>	<b>Zonal pre-recruit indices</b>	<b>18</b>
<b>5.5</b>	<b>Regional pre-recruit Index</b>	<b>19</b>
<b>6</b>	<b>SUMMARY</b>	<b>20</b>

## 1 TABLE OF FIGURES

Figure 1 Inter-annual trends in catch and effort in the NZRLF from 1970 to 2009. ....	7
Figure 2 Within season trends in catch and effort in the NZRLF for the 2009 season. ....	7
Figure 3 Percentage of total catch from Regions A-D in the NZRLF in 2009 (see Figure 21)..	8
Figure 4. Inter-annual trends in catch and effort in the four Regions of the NZRLF for the fishing seasons between 1970 and 2009 (refer to Figure 21). ....	8
Figure 5 Inter-annual trends in zonal CPUE in the NZRLF between 1970 and 2009. ....	9
Figure 6 Within season trends in CPUE in the NZRLF over the last three seasons. ....	9
Figure 7 Inter-annual trends in regional CPUE in the NZRLF between 1970 and 2009. ....	10
Figure 8 Inter-annual trends in mean lobster weight in the NZRLF from 1983 to 2009. ....	11
Figure 9 Average numbers of days fished per licence from 1994 to 2009 in the NZRLF. ....	11
Figure 10 Puerulus settlement Index (PSI) (+/-SE) in the NZRLF from 1996 to 2009. ....	12
Figure 11 Inter-annual trends in pre-recruit index (PRI) in the NZRLF from 1994 to 2009 based on logbook and voluntary catch sampling data. ....	12
Figure 12 Interannual trends in regional pre-recruit index (PRI) in the NZRLF from 1994 to 2009 based on voluntary catch sampling data. ....	13
Figure 13 Length frequency data of both male and female lobsters sampled during the voluntary catch sampling programme over the three seasons. ....	14
Figure 14 Estimates of biomass for the NZRLF as obtained from the qR fishery model. ....	15
Figure 15 Estimates of egg production for the NZRLF as obtained from the qR fishery model. ....	15
Figure 16 Estimates of % of virgin egg production for the NZRLF as obtained from the qR fishery model. ....	16
Figure 17 Estimates of exploitation rate in the NZRLF as obtained from the qR fishery model. ....	16
Figure 18 Zonal limit and target reference points for CPUE in the NZRLF including current estimates from the 2009 season. ....	17
Figure 19 Regional limit and target reference points for CPUE in the NZRLF including current estimates from the 2008 season. ....	18
Figure 20 Zonal pre-recruit indices (PRI) (1994-2009) with Limit Reference Point (LRP) and current 3-year average. ....	18
Figure 21 Regional pre-recruit indices (PRI) (1994-2009) with Limit Reference Points (LRPs) and current 3-year average. ....	19
Figure 22 Northern Zone sub-regions and Marine Fishing Areas in the South Australian Rock Lobster Fishery. ....	21

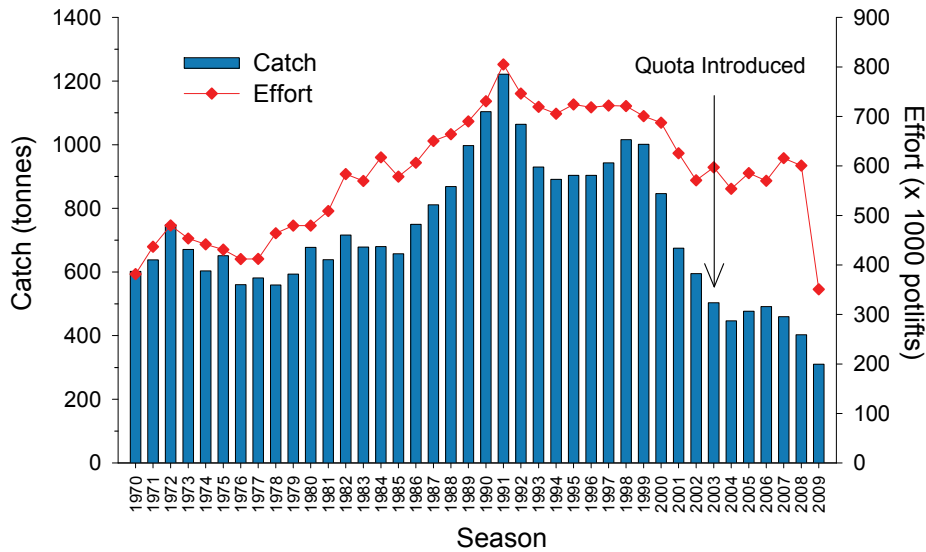
## 2 EXECUTIVE SUMMARY

- In 2009 (i.e. the 2009/10 season), the TACC in the NZRLF was 310 tonnes. The total reported commercial catch from logbook data was 310.29 tonnes, representing the first time that the TACC was fully taken since its introduction in 2003. From 1998 (1015.83 tonnes) to 2008 (402.72 tonnes) catch in the NZRLF decreased by 60%. Effort did not decline comparatively, decreasing by only 16.7% over the same period. However, effort in 2009 was just 350,838 potlifts, a 42% decrease from 2008 (600,347 potlifts) and the lowest estimate on record.
- Regional catch (refer to Figure 22) in 2009 was highest in Region B (123.06 tonnes), followed by Region D (103.94 tonnes), Region C (69.59 tonnes) and Region A (13.69 tonnes). The effort required to take the 2009 catch decreased substantially in all regions. For example, effort in Region B decreased by 49% from 246,386 potlifts in 2008 to 125,197 potlifts in 2009. Similarly, in Region D effort decreased by 39% from 216,284 potlifts to 131,929 potlifts over the same period.
- With the exception of marginal increases in 2005 and 2006, zonal catch per unit effort (CPUE; Nov-April inclusive) decreased from 1.40 to 0.67 kg/potlift from 1999 to 2008. In 2009 it was 0.88 kg/potlift, an increase of 31% from 2008. The 2009 increase was reflected in all regions with estimates of 1.31, 0.98, 0.83 and 0.78 kg/potlift in regions A, B, C and D respectively.
- Catch sampling based pre-recruit indices (PRIs) in 2008 and 2009 were two of the highest on record at 0.62 and 0.61 undersized/potlift, respectively. In the NZRLF, the estimated period between settlement and PRI is 3 years. As a result, the high PRIs in 2008 and 2009 are believed to reflect the high settlements in 2005 and 2006. It should be highlighted that the numbers of licences participating in the catch sampling program is currently <20%. As a result, estimates of PRI based on voluntary sampling should be treated with some caution.
- Estimates from the qR model indicate a general decline in lobster biomass in the NZRLF over the last 30 seasons. In 2009, it was estimated to be 1,751 tonnes, an increase of 344 tonnes from 2008 (1,407 tonnes). Current egg production equates to just 16% of virgin stock while the exploitation rate is estimated at 17%.
- In summary, the decline in catch and catch rate over the last 10 seasons reflects a corresponding decline in overall lobster biomass, details of which are provided in previous reports on the fishery. Despite this decline, some positive signs for the fishery were observed in 2009. For example, for the first time since its inception in 2003, the TACC for the fishery was fully taken. In addition, CPUE increased by 31% from 2008 estimates.
- While the increase in catch rate is positive, it should be highlighted that settlement in 2007 and 2008 was low suggesting that recruitment in 2011 and 2012 will be poor. In 2009, the TACC was reduced from 470 to 310 tonnes. Given the level of variation in recruitment and the sporadic nature of settlement to the NZRLF, it is recommended that conservative TACCs are maintained to ensure that peaks in recruitment entering the fishable biomass in 2009 and 2010 are protected over the following period of low recruitment in 2011 and 2012.

### 3 FISHERY STATISTICS

#### 3.1 Catch, effort and CPUE

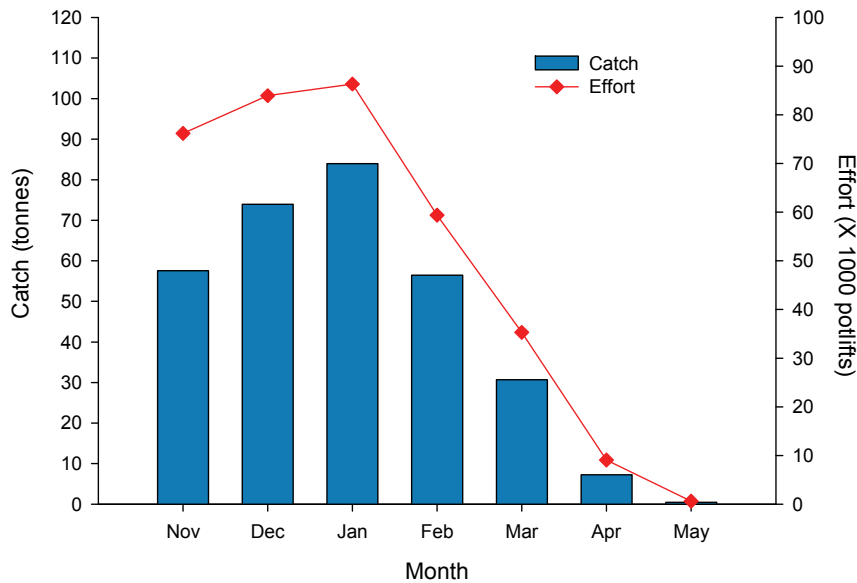
##### 3.1.1 Zonal catch and effort



**Figure 1** Inter-annual trends in catch and effort in the NZRLF from 1970 to 2009.

From 1998 (1015.8 tonnes) to 2008 (402.7 tonnes) catch in the NZRLF decreased by 60% (Figure 1). In 2003, a TACC of 625 tonnes was introduced which was incrementally reduced to 470 tonnes by 2008. In 2009, the TACC was set at 310 tonnes and for the first time was fully taken with a reported catch of 310.29 tonnes. Between 1998 (720,816 potlifts) and 2008 (600,347 potlifts) effort did not decline comparatively with catch, decreasing by only 16.7%. However, in 2009, the effort was 350,838 potlifts, a 42% decrease from 2008 and the lowest estimate on record.

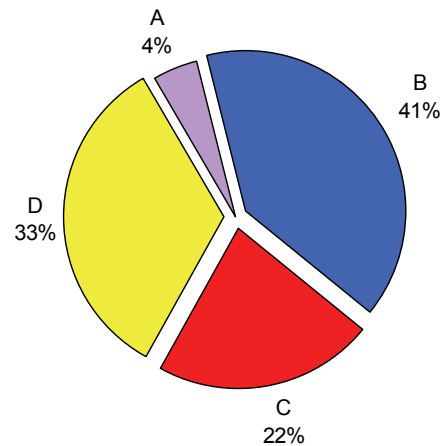
##### 3.1.2 Within season trends



**Figure 2** Within season trends in catch and effort in the NZRLF for the 2009 season.

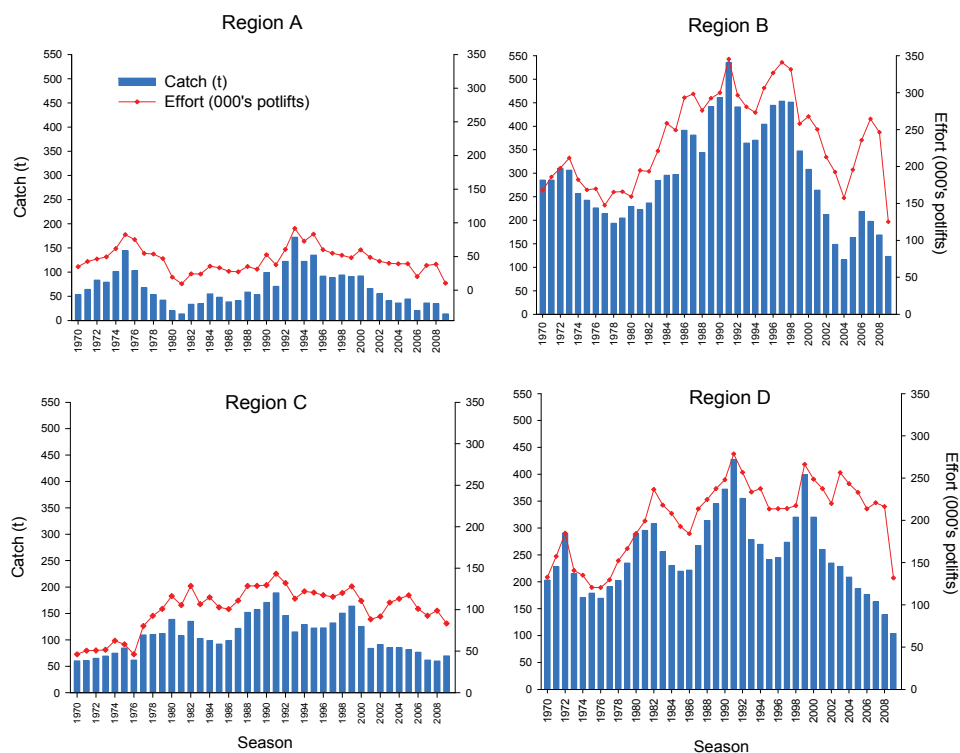
In 2009, the highest catch was taken in January (83.9 tonnes) with the lowest catch in May (0.45 tonnes) (Figure 2). The trends in effort reflected catch levels by month.

### 3.1.3 Regional catch and effort



**Figure 3** Percentage of total catch from Regions A-D in the NZRLF in 2009 (see Figure 22).

In 2009, 41% of the 312.29 tonne total catch came from Region B with 33% and 22% coming from Regions D and C, respectively (Figure 3). Only 4% of the catch was taken in the western Region A. Compared to 2008, these proportions represent a 5% decrease in Region A (9% in 2008) and a 7% increase in Region C (15% in 2008), while Regions B and C were similar.

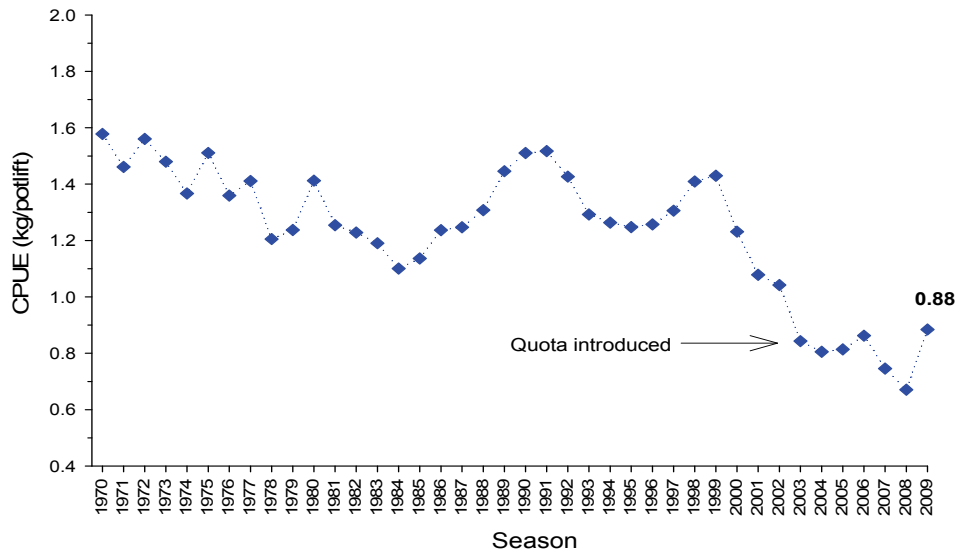


**Figure 4.** Inter-annual trends in catch and effort in the four Regions of the NZRLF for the fishing seasons between 1970 and 2009 (refer to Figure 22).

Catch generally decreased in all regions from 1998 to 2009 with the exception of Region B where it increased from 115.6 tonnes in 2004 to 218.7 tonnes in 2006, in line with increasing effort (Figure 4). In 2009, the estimates were 13.69, 123.06, 69.59, and 103.94 tonnes in Regions A, B, C and D respectively. Most notable were the significant decreases in effort in 2009. For example, effort in Region B decreased by 49% from 246,386 potlifts in 2008 to 125,197 potlifts in 2009. Similarly, in Region D effort decreased by 39% from 216,284 potlifts in 2008 to 131,929 potlifts in 2009.



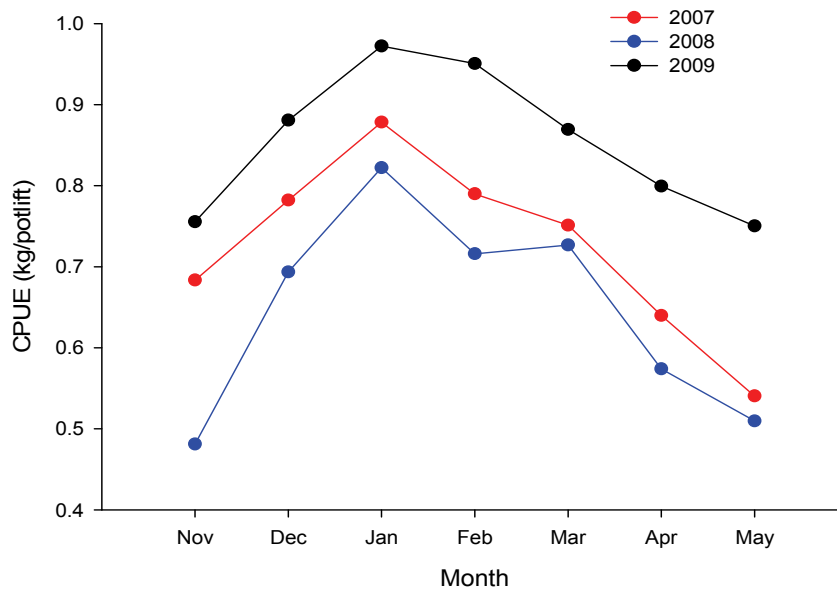
### 3.1.4 Zonal CPUE



**Figure 5** Inter-annual trends in zonal CPUE in the NZRLF between 1970 and 2009.

With the exception of marginal increases in 2005 and 2006, CPUE (Nov-April inclusive) in the NZRLF decreased over the period from 1999 to 2008 (Figure 5). In 2009, it was 0.88 kg/potlift, an increase of 31% from 2008 (0.67 kg/potlift). In the NZRLF, it is assumed that the period between settlement and recruitment is four years, with three years between settlement and pre-recruit index (PRI). Therefore, the increase in CPUE is likely to reflect recruitment into the fishable biomass resulting from strong settlement in 2005 and 2006 (Figure 10) and high pre-recruit index (PRI) observed in 2008 (Figure 11).

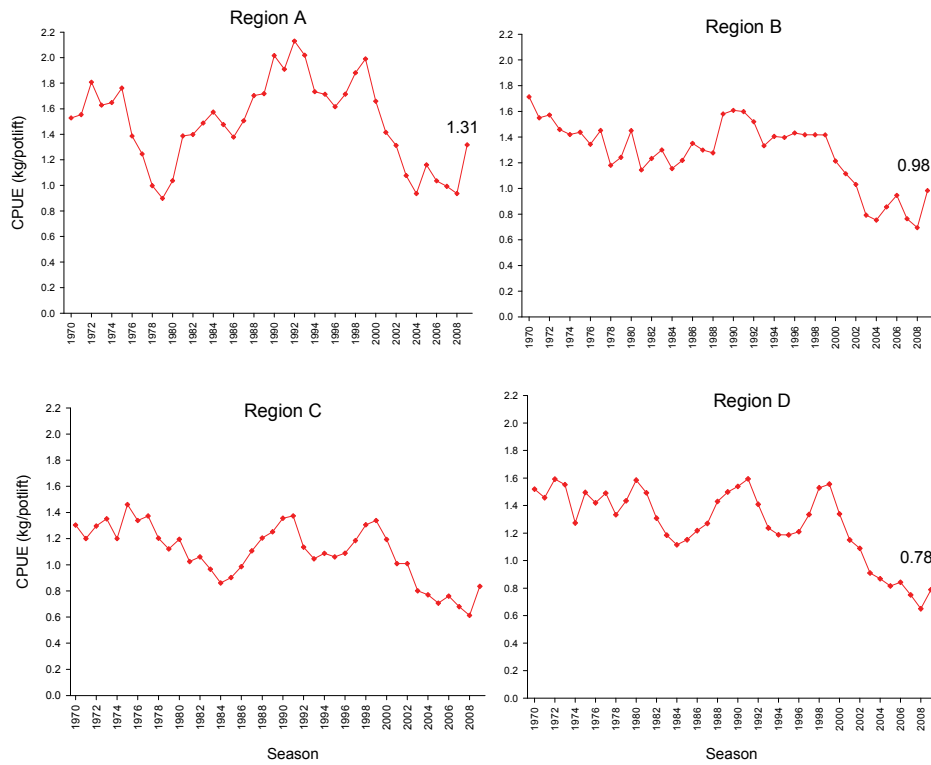
### 3.1.5 Within season trends in CPUE



**Figure 6** Within season trends in CPUE in the NZRLF over the last three seasons.

In 2009, CPUE was higher across all months of the season compared to 2008 and 2007 (Figure 6). CPUE increased from 0.75 kg/potlift in November to 0.97 kg/potlift in January before decreasing to 0.75 kg/potlift in May. Overall, within season trends in CPUE were generally consistent with previous years.

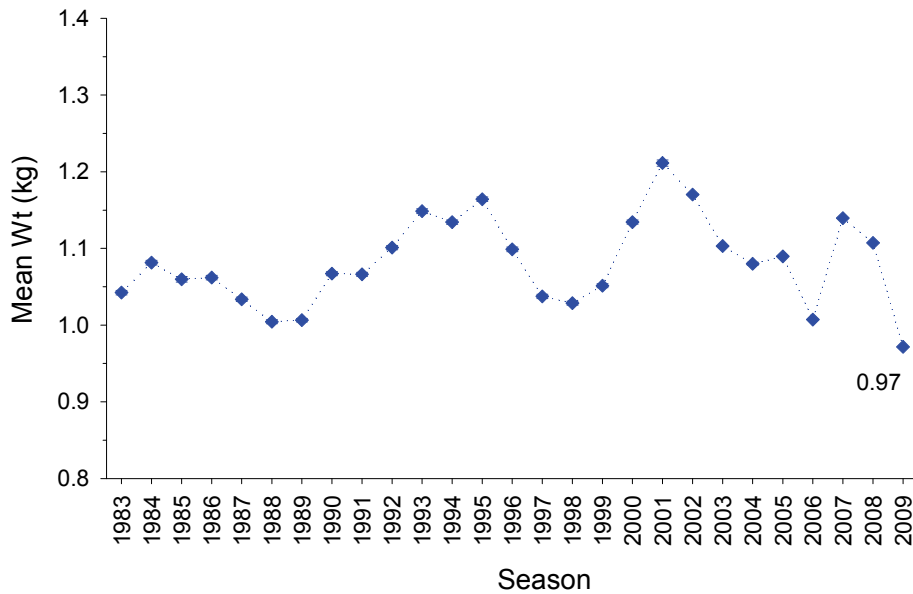
### 3.1.6 Regional CPUE



**Figure 7** Inter-annual trends in regional CPUE in the NZRLF between 1970 and 2009.

Regional trends in CPUE (November-April inclusive) (Figure 7 and refer to Figure 22) broadly reflect those of zonal catch rate (Figure 5). CPUE generally decreased in all major regions over the period 1999 to 2005 before marginally increasing in 2006. However, over the next two seasons CPUE again decreased within the fishery with the 2008 estimates the lowest on record in all areas except Region A. In 2009, CPUE increased in all regions with estimates of 1.31, 0.98, 0.83 and 0.78 in regions A, B, C and D respectively.

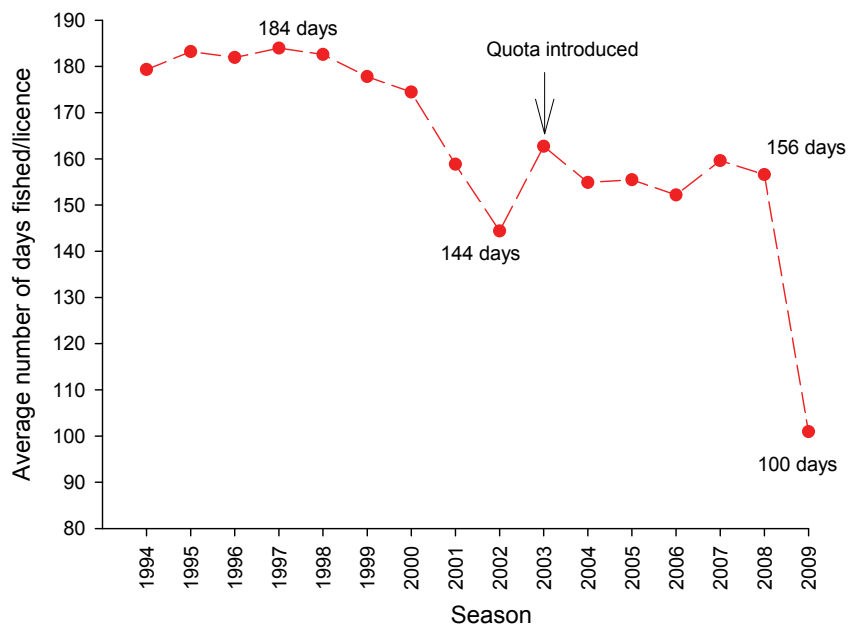
### 3.1.7 Annual mean weight



**Figure 8** Inter-annual trends in mean lobster weight in the NZRLF from 1983 to 2009.

With the exception of 2005, mean weight in the NZRLF decreased over the period 2001 to 2006 (Figure 8). However, in 2007, mean weight increased to 1.13 kg, the highest on record since 2002. Over the next two seasons mean weight again decreased and in 2009 was 0.97 kg, the lowest on record. The 2009 estimate is likely to reflect recruitment entering the fishery, as confirmed by increased catch rates both zonally and regionally (Figure 5 and Figure 7).

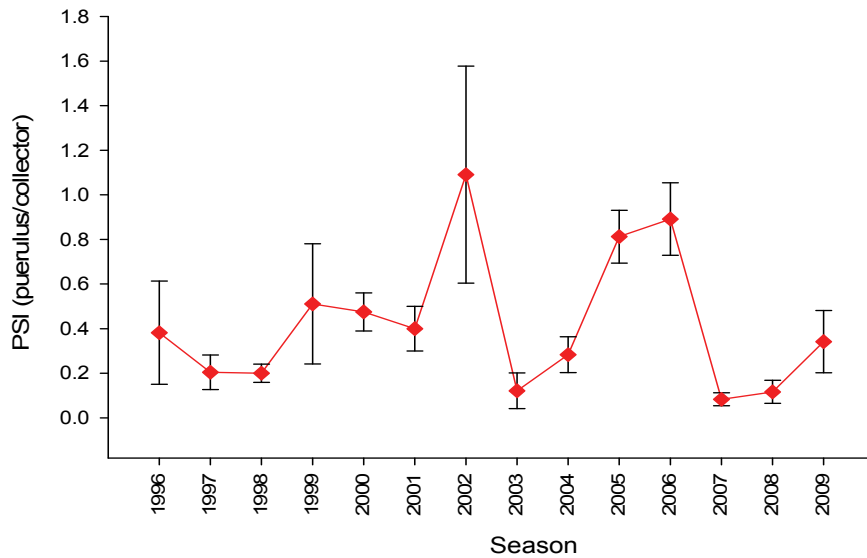
### 3.1.8 Average number of days fished



**Figure 9** Average numbers of days fished per licence from 1994 to 2009 in the NZRLF.

The average numbers of days fished/licence holder decreased from 184 days in 1997 to 144 days in 2002. This decrease reflects direct limitations on the number of fishable days prior to the introduction of quota. After the introduction of quota in 2003, the number of days fished did not decrease, remaining between 150-160. In 2009, the estimate was 100 days representing a decrease of 39% from 2008 (156 days).

## 3.2 Puerulus settlement index

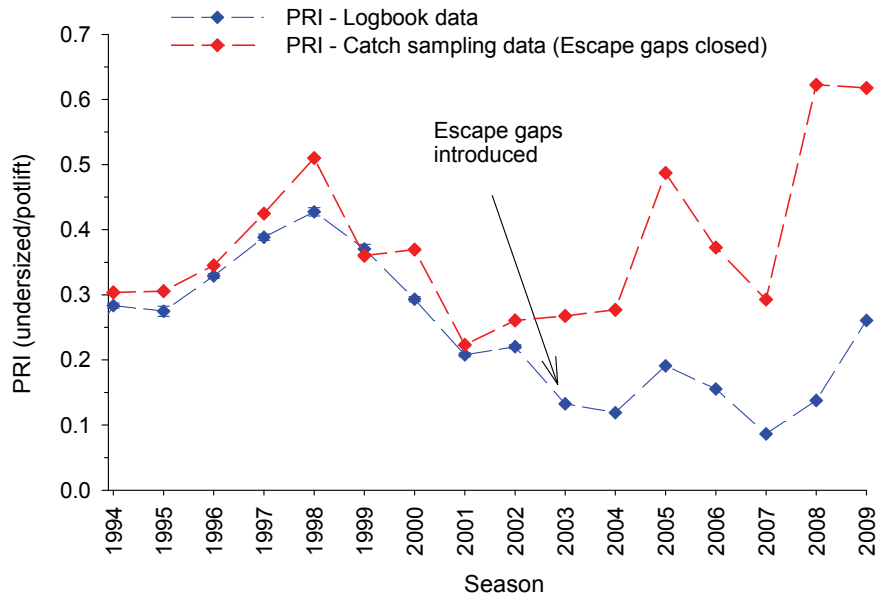


**Figure 10** Puerulus settlement Index (PSI) (+/-SE) in the NZRLF from 1996 to 2009.

PSI trends in the NZRLF are highly variable (Figure 10). High PSIs were observed in 2005 (0.81 puerulus/collector) and 2006 (0.89 puerulus/collector) before historically low estimates in 2007 (0.08 puerulus/collector) and 2008 (0.11 puerulus/collector). In 2009, the PSI was 0.34 puerulus/collector. In the NZRLF, the estimated period between settlement and recruitment is 4 years. As a result, the increase in CPUE in 2009 (Figure 5) is believed to reflect the strong settlement in 2005. Increased recruitment is expected to continue in 2010 before decreases in 2011 and 2012.

## 3.3 Pre-recruit index

### 3.3.1 Zonal pre-recruit index

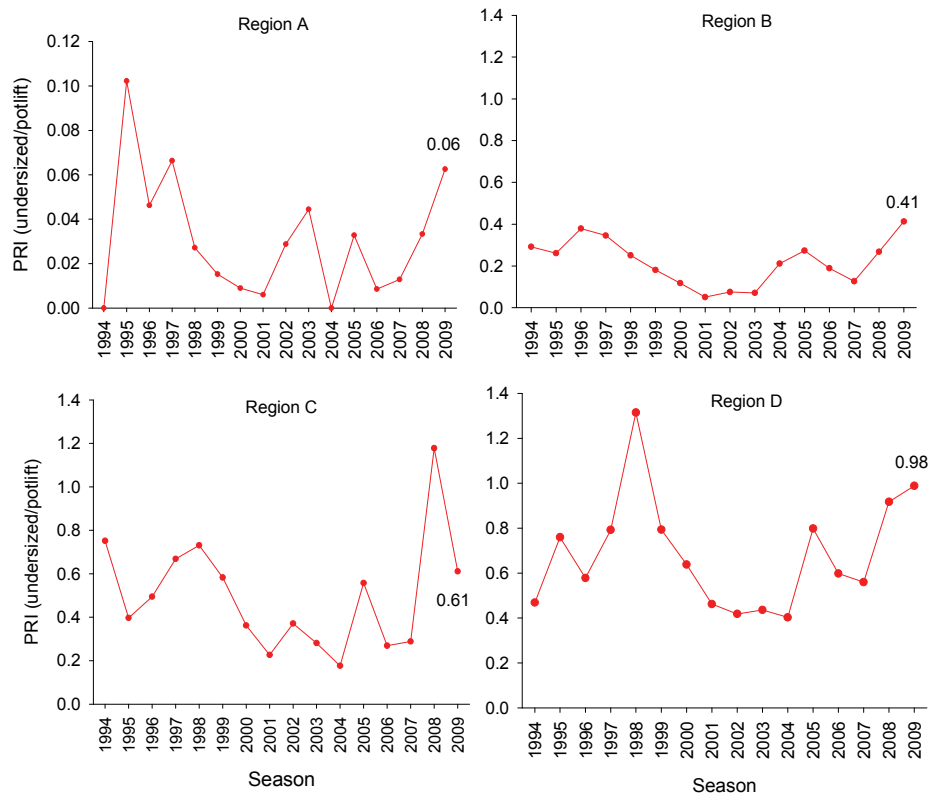


**Figure 11** Inter-annual trends in pre-recruit index (PRI) in the NZRLF from 1994 to 2009 based on logbook and voluntary catch sampling data.

PRI (Nov-Mar inclusive), based on logbook data is underestimated due to mandatory introduction of escape gaps in 2003 (Figure 11). Catch sampling based PRIs (where the escape gaps are closed) in 2008 and 2009 were two of the highest on record at

0.62 and 0.61 undersized/potlift respectively. In the NZRLF, the estimated period between settlement and PRI is 3 years. As a result, the high PRIs in 2008 and 2009 are believed to reflect the high settlements in 2005 and 2006 (Figure 10). It should be highlighted that the numbers of licences participating in the catch sampling program is currently <20%. As result, estimates of PRI based on voluntary sampling should be treated with some caution.

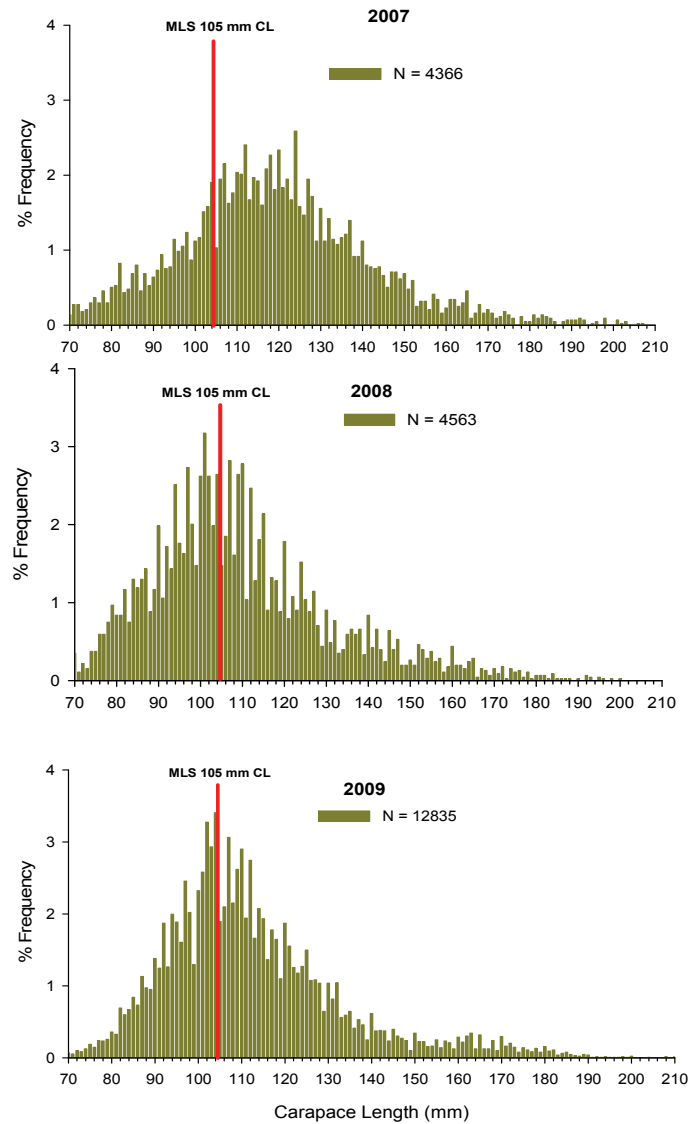
### 3.3.2 Regional pre-recruit index



**Figure 12** Interannual trends in regional pre-recruit index (PRI) in the NZRLF from 1994 to 2009 based on voluntary catch sampling data.

In 2009, regional trends in PRI (Nov-Mar inclusive) were 0.06, 0.41, 0.61 and 0.98 undersized/potlift in Regions A, B, C and D respectively. It should be highlighted that low participation in the voluntary catch sampling means that regional estimates of PRI should be viewed with some caution. Nonetheless, the increase in PRI is consistent with the higher than average PSI observed in 2005 and 2006 (Figure 10) in the NZRLF. The estimated period between settlement and PRI in the NZRLF is 3 years. Note that the scale of y-axis in Region A differs from other regions.

### 3.4 Length Frequency

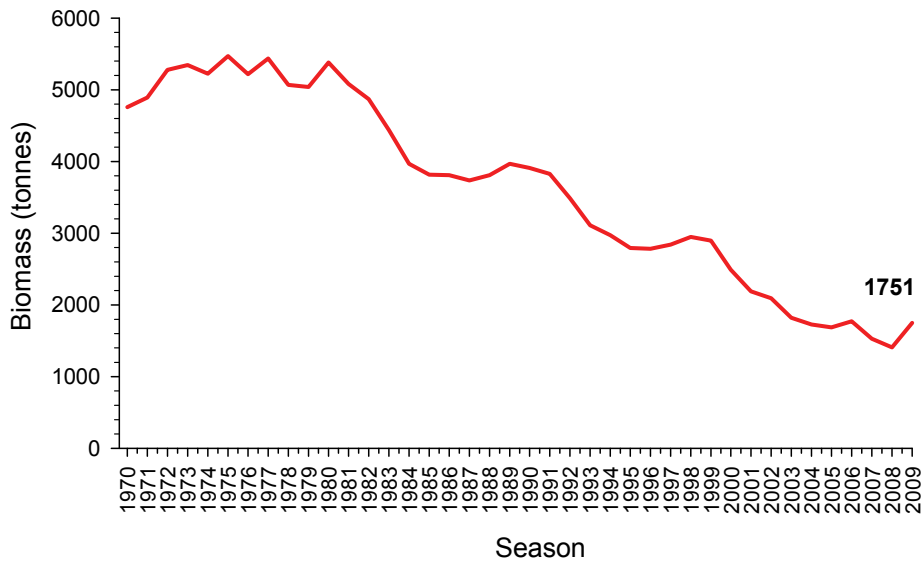


**Figure 13** Length frequency data of both male and female lobsters sampled during the voluntary catch sampling programme over the three seasons.

Length frequency data as obtained through the voluntary catch sampling programme confirm commercial catch rate indices (Figure 13). The frequency of undersized lobsters below the minimum legal size (MLS) increased in 2008 and 2009 reflecting the high pre-recruit indices observed through the voluntary catch sampling program in both those seasons (Figure 11). The frequency of legal sized lobsters above the MLS decreased between 2007 and 2008, but increased in 2009, reflecting known trends in legal sized CPUE over the same period (Figure 5).

## 4 MODEL OUTPUTS

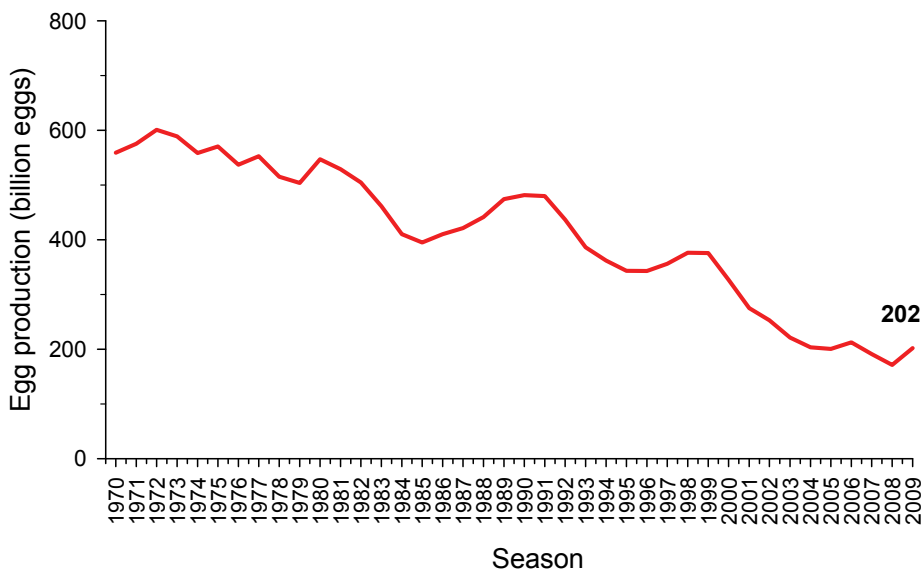
### 4.1 Biomass



**Figure 14** Estimates of biomass for the NZRLF as obtained from the qR fishery model.

Estimates from the qR model indicate a general decline in lobster biomass in the NZRLF over the last 30 seasons (Figure 14). In 2009, it was estimated to be 1,751 tonnes, an increase of 344 tonnes from 2008 (1,407 tonnes).

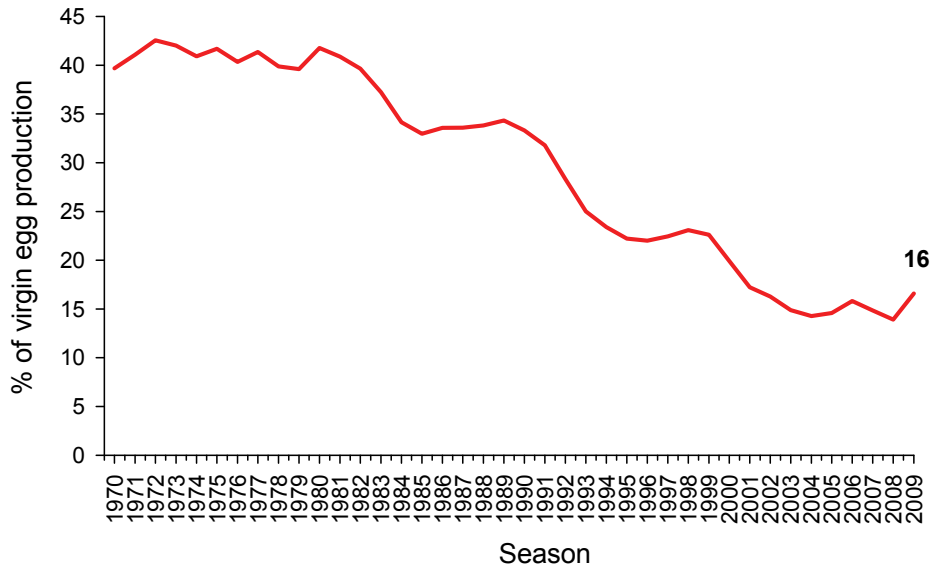
### 4.2 Egg Production



**Figure 15** Estimates of egg production for the NZRLF as obtained from the qR fishery model.

Due to decreasing biomass trends, egg production in the NZRLF has also decreased since the inception of the fishery (Figure 15). In 2009, total egg production was estimated to be 202 billion eggs, reflecting a marginal increase from 2008 (171 billion).

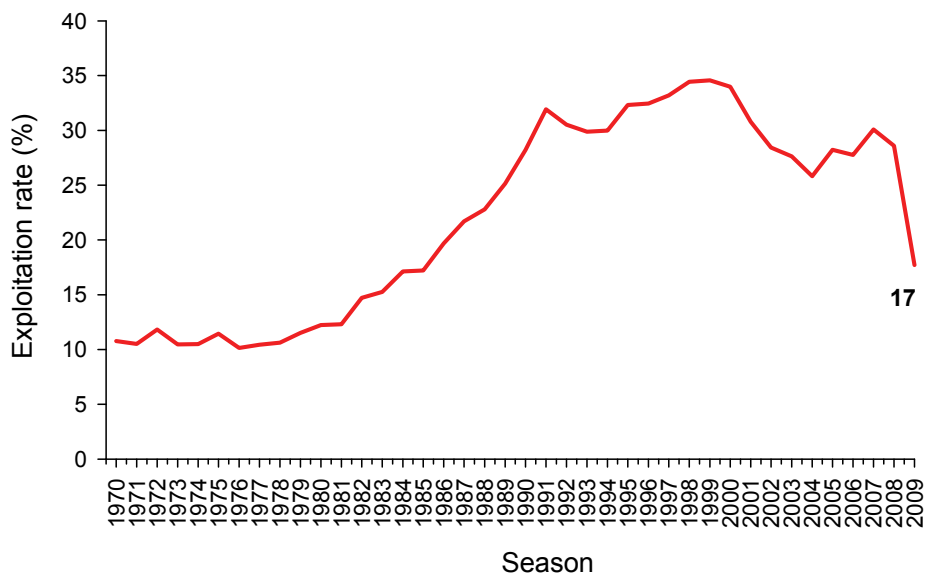
### 4.3 Percent of virgin egg production



**Figure 16** Estimates of % virgin egg production for the NZRLF as obtained from the qR fishery model.

Model outputs for the 2009 season suggest that current egg production in the NZRLF equates to 16% of virgin egg production (Figure 16).

### 4.4 Exploitation Rate



**Figure 17** Estimates of exploitation rate in the NZRLF as obtained from the qR fishery model.

Exploitation levels increased substantially through the 70's 80's and 90's, reaching a peak of 35% in 1999 (Figure 17). Since then, they have generally decreased and in 2009 were estimated at 17%. The 2009 figure reflects a substantial decrease from 2008 (28%) and is the lowest on record since 1985.



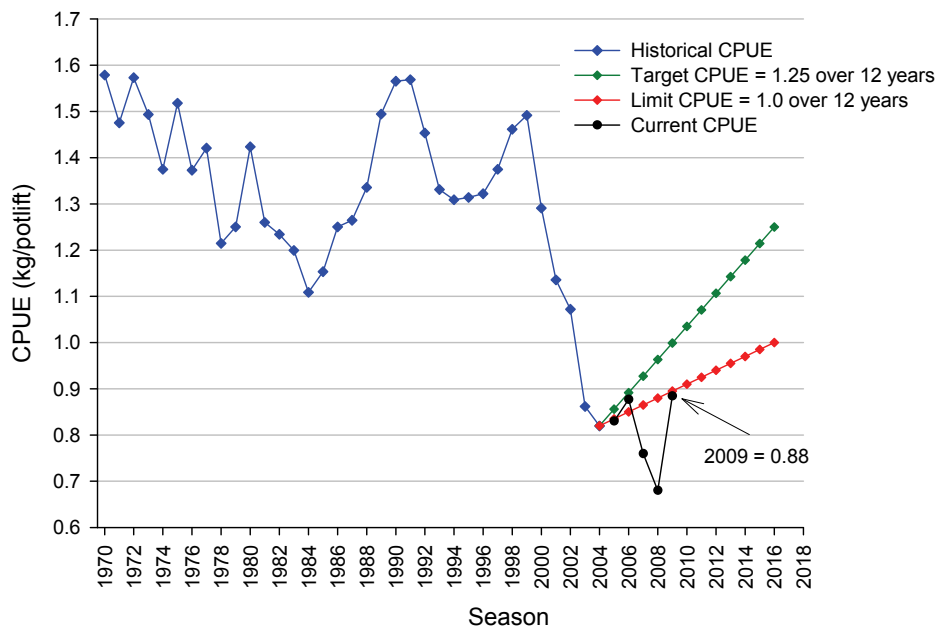
## 5 BIOLOGICAL PERFORMANCE INDICATORS

### 5.1 Reference points

**Table 1** Target and limit reference points for both catch rate and pre-recruit index in the NZRLF (refer to Sloan and Crosthwaite, 2007). Note that Region A is not included in the analyses as less than 10% of the total catch was taken from this Region in 2008.

Region	Catch rate (kg/potlift)		Pre-recruit index (Pot sampling data)
	Target	Limit	Limit
Northern Zone	1.25	1.0	0.33
A	1.4	1.1	0.03
B	1.2	0.9	0.19
C	1.1	0.85	0.42
D	1.25	1.0	0.61

### 5.2 Zonal catch rate

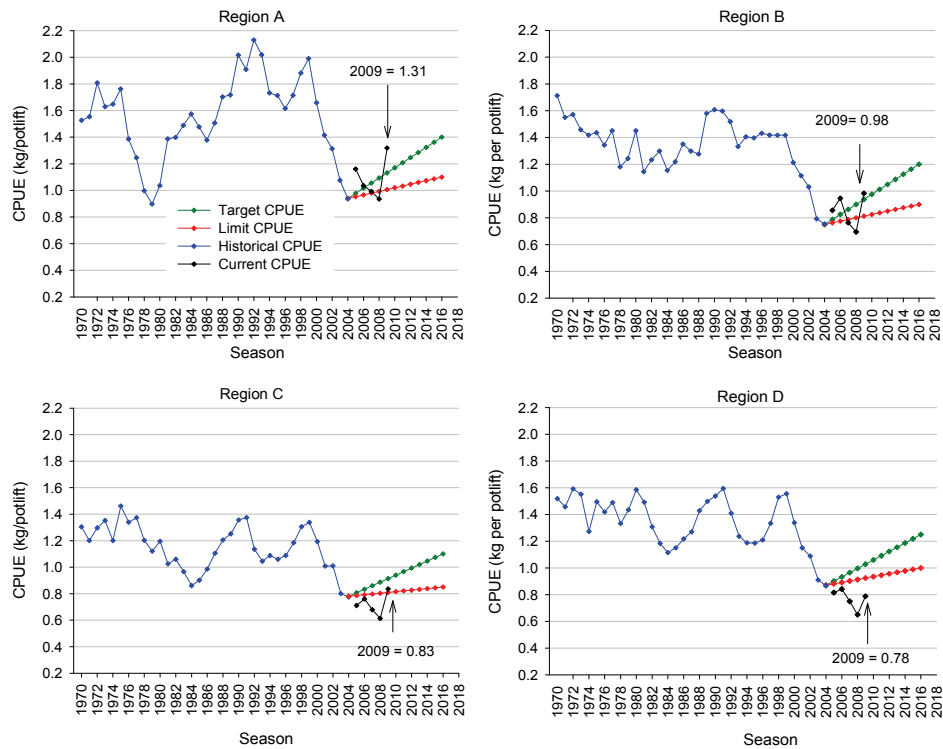


**Figure 18** Zonal limit and target reference points for CPUE in the NZRLF including current estimates from the 2009 season.

In 2009, the zonal estimate of 0.88 kg/potlift was marginally below (the 2009 trajectory point is 0.90 kg/potlift) the limit reference trajectory of 1.00 kg/potlift over 12 years (Figure 18) as per the Management Plan for the resource (Sloan and Crosthwaite 2007).

### 5.3 Regional catch rate

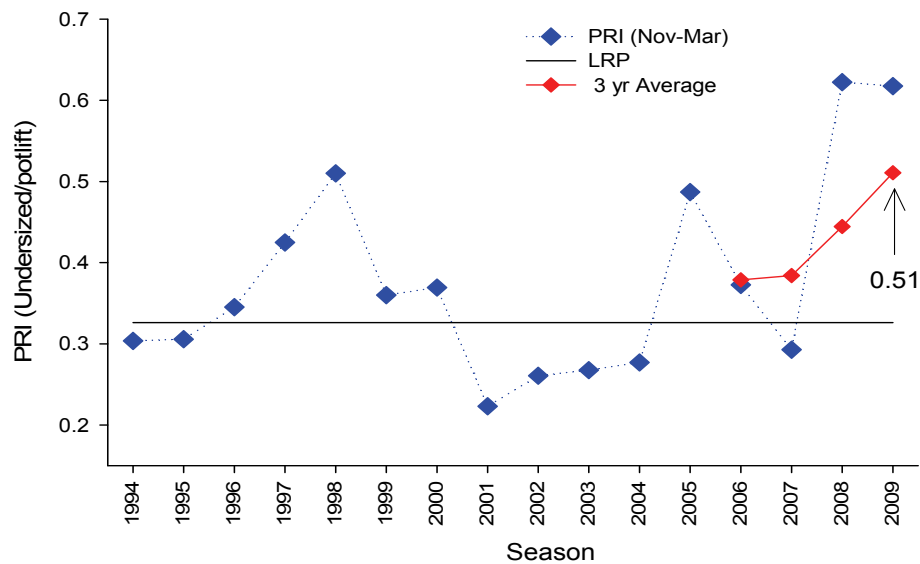
**Figure 19** Regional limit and target reference points for CPUE in the NZRLF including current



estimates from the 2008 season.

In 2009, regional CPUE was above the target reference points in Regions A and B. (Figure 19). It was above the limit reference point in Region C but below it in Region D.

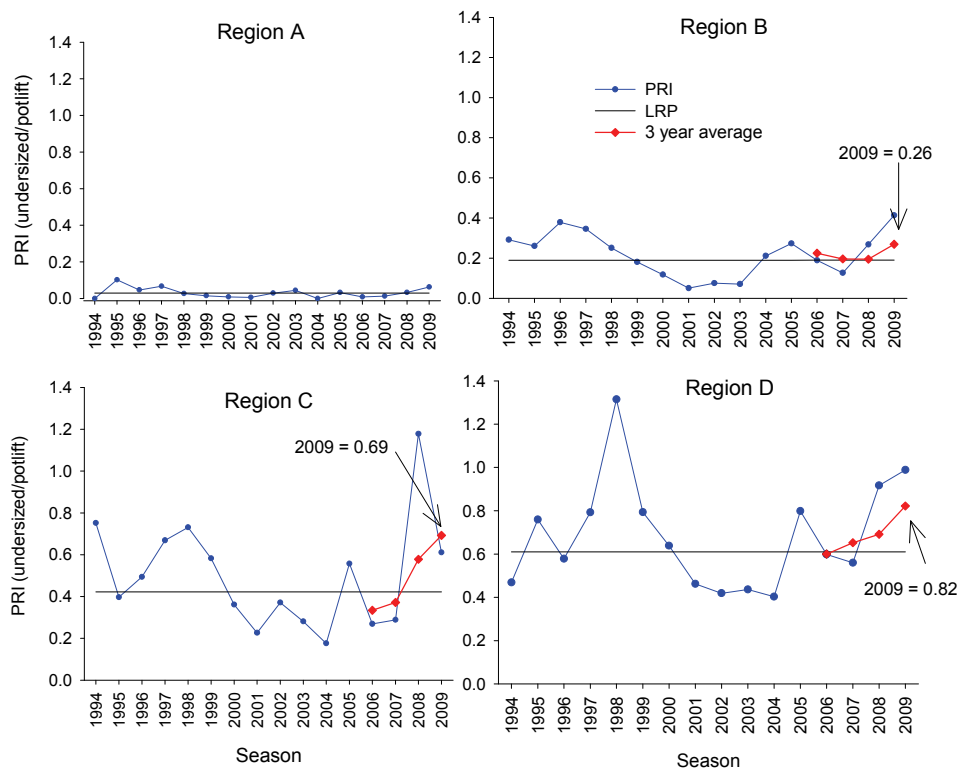
### 5.4 Zonal pre-recruit indices



**Figure 20** Zonal pre-recruit indices (PRI) (1994-2009) with Limit Reference Point (LRP) and current 3-year average.

In 2009, the zonal 3-year average PRI (2007-2009) was 0.51, which is above the long-term LRP for the NZRLF (Figure 20).

## 5.5 Regional pre-recruit Index



**Figure 21** Regional pre-recruit indices (PRI) (1994-2009) with Limit Reference Points (LRPs) and current 3-year average.

In 2009, the regional 3-year average PRI (2007-2009) was above the on the long-term limit reference points in Region B, C and D (Figure 21).

## 6 SUMMARY

The decline in stock status of the NZRLF over the last has ten seasons has been detailed in previous reports on the fishery (e.g. Linnane et al., 2010). These highlighted the decrease in catch from 1015 tonnes in 1998 to just 403 tonnes on 2008. In addition, CPUE decreased from 1.40 to 0.67 kg/potlift over the same period. Despite this decline, some positive signs for the fishery were observed in 2009. For example, for the first time since its inception in 2003, the TACC for the fishery was fully taken. In addition, CPUE increased by 31% from 2008 estimates.

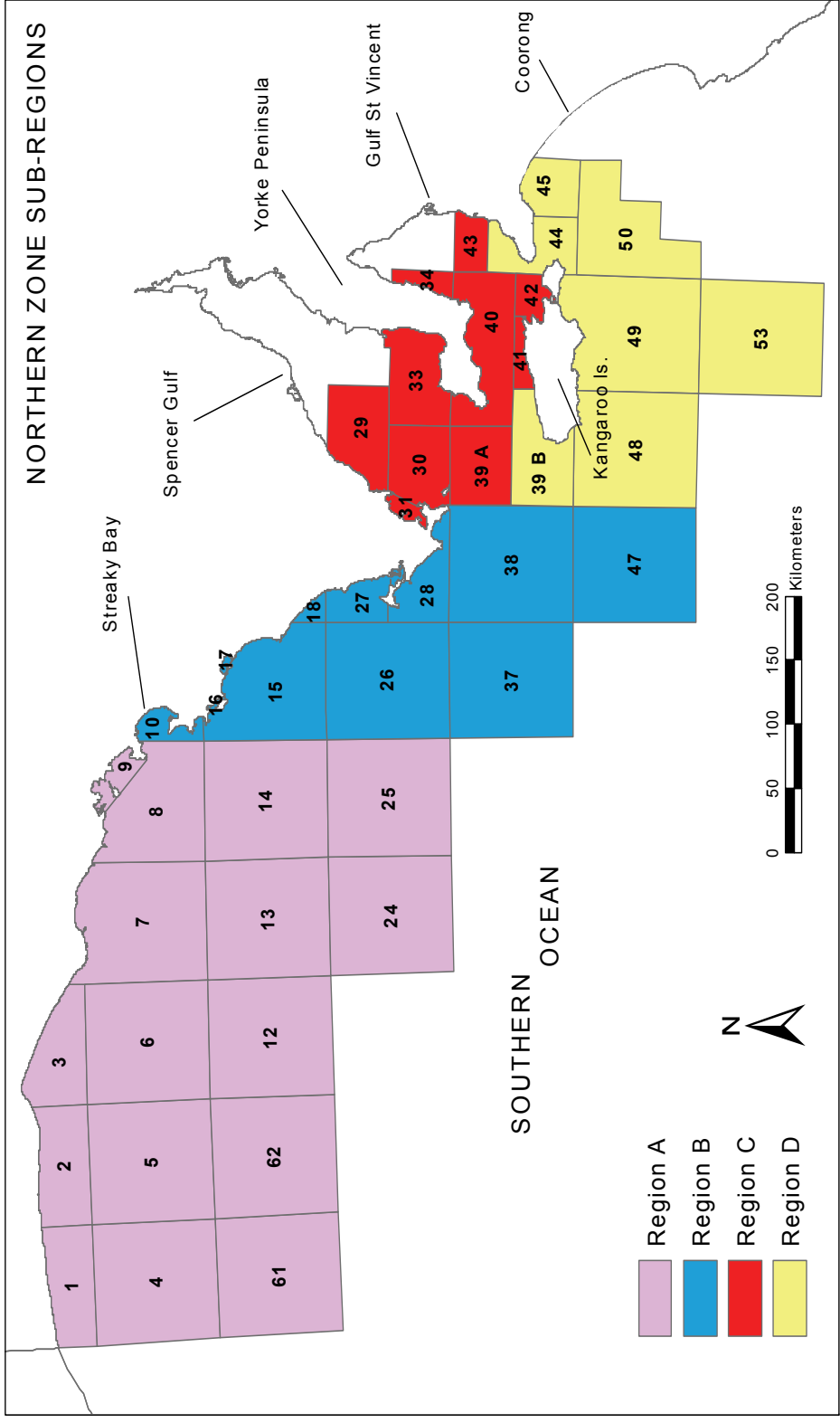
The increase in CPUE is likely to reflect increased recruitment into the fishery based on high puerulus settlement in 2005 and 2006 which resulted in a high pre-recruit index in 2008. The 2009 pre-recruit index was also high suggesting that increased recruitment should continue into the fishery in 2010. In 2009, CPUE was only marginally below the limit reference point zonally and above it in two of the three main regions. As a result, it is reasonable to assume that it did not trigger. PRI was above the limit reference point both zonally and in all regions.

While the increase in catch rate is positive, it should be highlighted that settlement in 2007 and 2008 was low suggesting that recruitment in 2011 and 2012 will be poor. In 2009, the TACC was reduced from 470 to 310 tonnes. Given the level of variation in recruitment and the sporadic nature of settlement to the NZRLF, it is recommended that conservative TACCs are maintained to ensure that peaks in recruitment entering the fishable biomass in 2009 and 2010 are protected over the following period of low recruitment in 2011 and 2012.

### References

Linnane, A., McGarvey, R., Feenstra, J and M. Hoare 2010. Northern Zone Rock Lobster (*Jasus edwardsii*) Fishery 2008/09. Fishery assessment report to PIRSA. South Australian Research and Development Institute (Aquatic Sciences), Adelaide, 83 pp. SARDI Publication Number F2007/00320-3. SARDI Research Report Series No. 475.

Sloan, S. & Crosthwaite, K., 2007. Management Plan for the South Australian Northern Zone Rock Lobster Fishery. South Australian Fisheries Management Series Paper No.51. Primary Industries and Resources South Australia. Adelaide, 82pp.



**Figure 22** Northern Zone sub-regions and Marine Fishing Areas in the South Australian Rock Lobster Fishery.