LUI | | | | | | | | | | | School code | | | | |

School name

Given name/s

Family name

Attach your barcode ID label here

Book of books used

External assessment 2023

Question and response book

Marine Science

Paper 2

Time allowed

- Perusal time — 10 minutes
- Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.
- Write using black or blue pen.
- QCAA-approved calculator permitted.
- Planning paper will not be marked.

Section 1 (48 marks)

- 8 short response questions

Clear zone — margin trimmed off after completion of assessment

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

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Section 1

Instructions

- If you need more space for a response, use the additional pages at the back of this book.
  - On the additional pages, write the question number you are responding to.
  - Cancel any incorrect response by ruling a single diagonal line through your work.
  - Write the page number of your alternative/additional response, i.e. See page …
  - If you do not do this, your original response will be marked.

QUESTION 1 (4 marks)

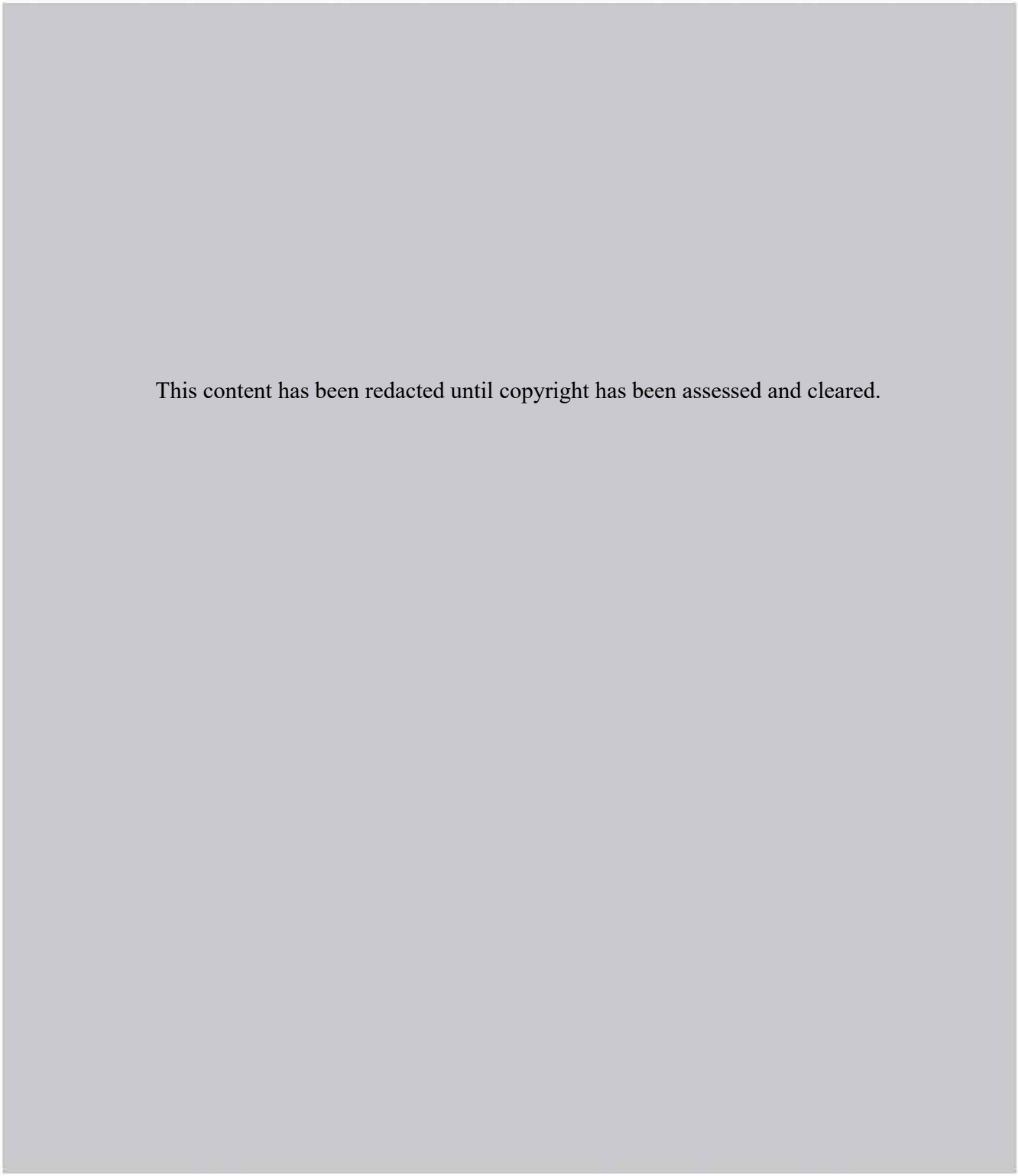
a) Explain the relationship between dissolved oxygen concentration and the distribution of coral reefs. *[2 marks]*

b) Identify two other abiotic factors that affect the distribution of coral reefs. *[2 marks]*

Do not write outside this box.

QUESTION 2 (5 marks)

A coastal community plans to implement a shark control program to significantly reduce the tiger shark population because of their perceived threat to the fishing industry and swimmers. The diagram represents potential effects of ongoing changes in predation for a seagrass ecosystem.



Do not write outside this box.

a) Explain the effect of removing tiger sharks on seagrass ecosystems. *[3 marks]*

b) Predict the effect that the shark control program would have on the fishing industry in this coastal community. *[2 marks]*

Do not write outside this box.

QUESTION 3 (11 marks)

a) Identify the system that enables ocean water to resist pH change when exposed to increased atmospheric carbon dioxide (CO_2). *[1 mark]*

b) Identify one natural and two anthropogenic causes of increased atmospheric CO_2. *[3 marks]*

Natural: _____

Anthropogenic: _____

c) Describe how increased atmospheric CO_2 affects levels of hydrogen and carbonate ions in ocean waters. *[4 marks]*

Do not write outside this box.

d) Explain what implications a change in levels of carbonate ions from increased atmospheric CO_2 has for shell-forming organisms. *[3 marks]*

Do not write outside this box.

QUESTION 4 (5 marks)

a) In which life cycle stage of a typical reef-forming hard coral does site selection occur? *[1 mark]*

b) Explain how one biotic and one abiotic factor affect the site selection process. *[4 marks]*

Do not write outside this box.

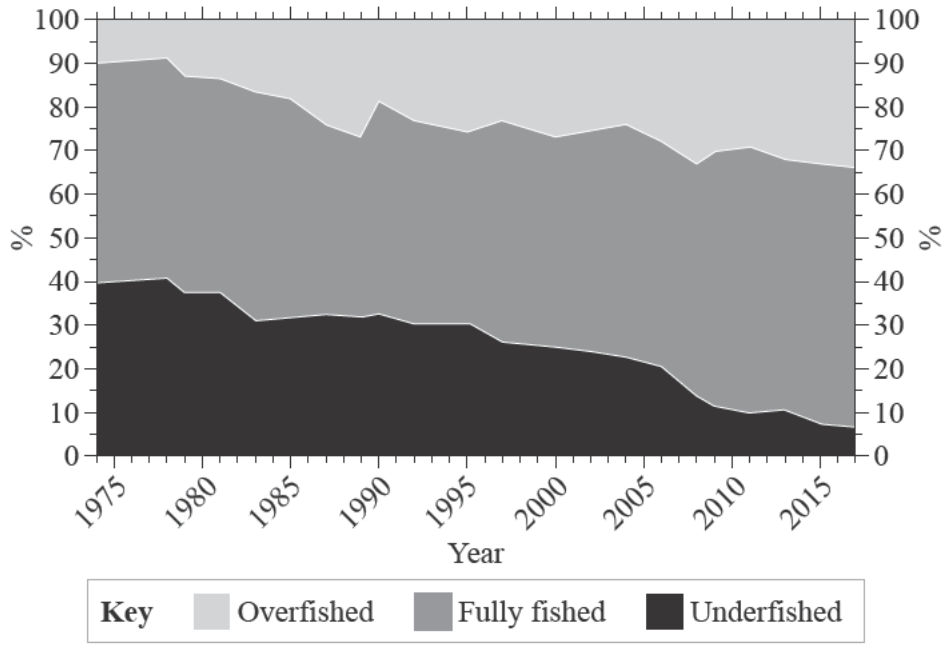
QUESTION 5 (3 marks)

Explain the role of connectivity in species replenishment, using a relevant fish species as an example.

Do not write outside this box.

QUESTION 6 (4 marks)

The graph shows global trends in marine fish stocks from 1974–2017.



a) Identify the percentage of stocks that were fully fished in 2017. *[1 mark]*

b) Draw a conclusion about the status of global fisheries. Justify your conclusion. *[3 marks]*

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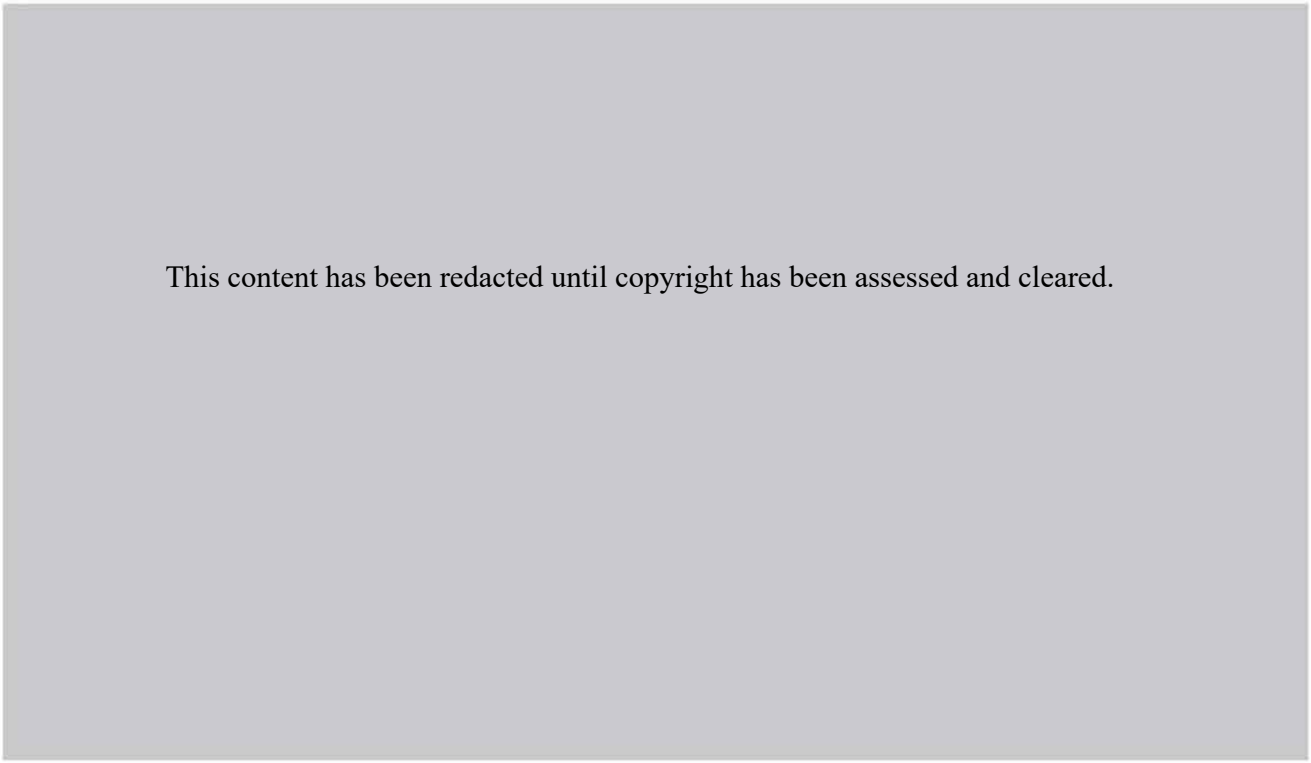
QUESTION 7 (11 marks)

The graph shows Australian prawn production by sector from 2006–07 to 2026–27.



a) Identify the financial year in the historical data when wild caught prawn production had the highest economic value. *[1 mark]*

b) Describe the trend in total economic value for Australian prawns from 2016–17 to 2021–22. Suggest two possible reasons for this trend. *[3 marks]*

Do not write outside this box.

c) Compare the historical and predicted economic value of Australian prawns. *[3 marks]*

Similarity: _____

_____

_____

Difference: _____

_____

_____

Significance: _____

_____

_____

_____

_____

d) Explain two attributes that make prawns a desirable species to farm. *[4 marks]*

_____

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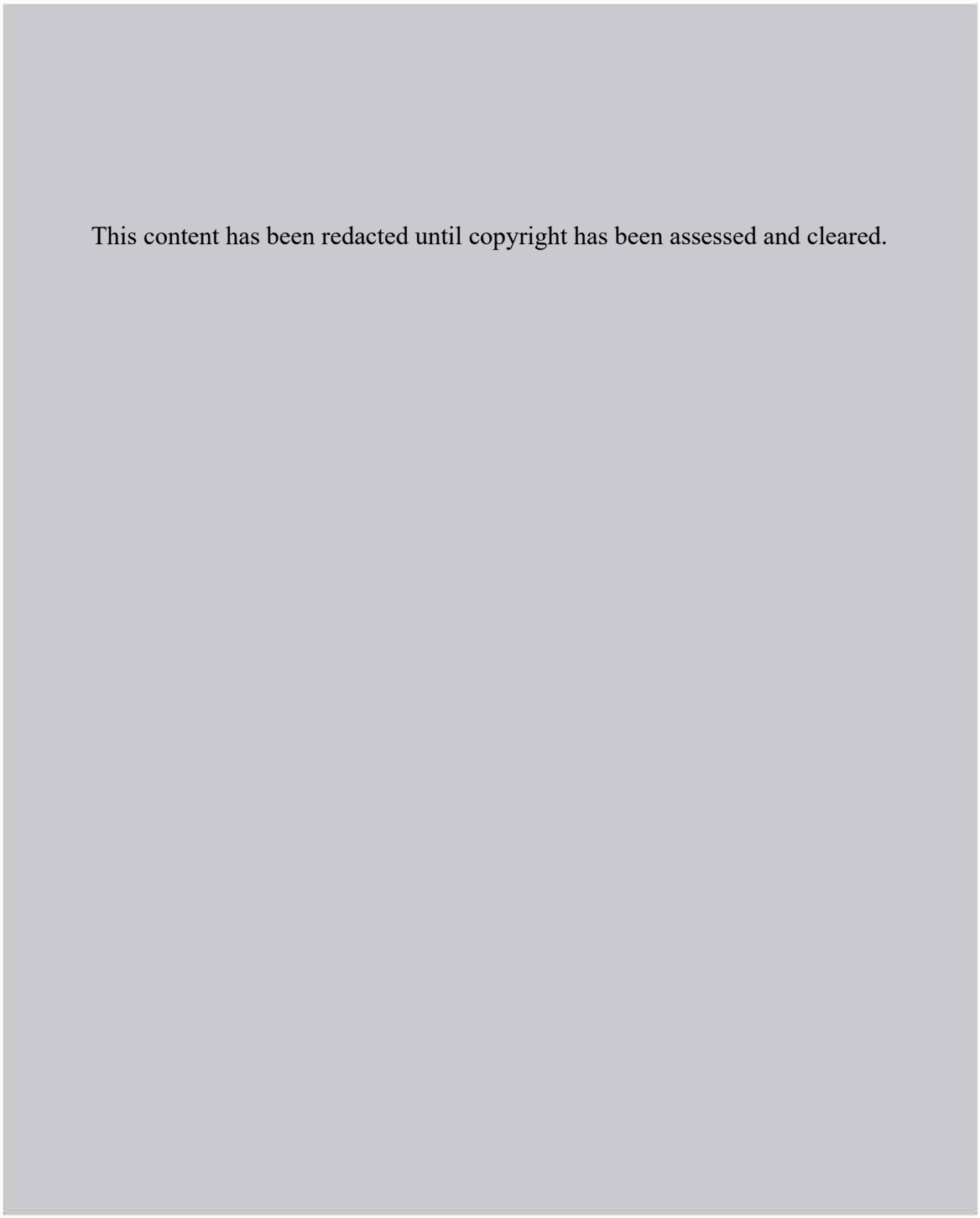
QUESTION 8 (5 marks)

A long-term program monitors changes in hard coral cover along the Great Barrier Reef (GBR) for three locations. Average coral cover (and 95% confidence intervals) from 1986--2021 are shown.



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a) Identify which region had the highest proportion of reefs with very high coral cover. Show your reasoning. *[2 marks]*

b) Identify a similarity and a difference in the trend in coral cover from 2012–2021 for the northern and southern regions. *[2 marks]*

Similarity:

Difference:

c) Identify a limitation of the data. *[1 mark]*

END OF PAPER

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

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Write the question number you are responding to.

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References

Question 2

Adapted from Heithaus et. al. 2014, Figure 2. Schematic representation of potential ecosystem responses to loss of turtles (moving from the top to the left) or loss of large sharks with turtle conservation (moving from the top to the right) in 'Seagrasses in the age of sea turtle conservation and shark overfishing', *Frontiers in Marine Science*, vol. 1, issue 28, https://doi.org/10.3389/fmars.2014.00028. CC-BY 4.0.

Question 7

ABARES 2022, Figure 16: Australian prawn production values by sector, 2006–07 to 2026–27 in 'Australian fisheries and aquaculture outlook 2022', *Department of Agriculture, Fisheries and Forestry*, www.agriculture.gov.au/abares/research-topics/fisheries/fisheries-economics/fisheries-forecasts#prawns. © Department of Agriculture, Fisheries and Forestry 2022. Creative Commons Attribution (CC-BY) 4.0 International licence

Question 8

Australian Institute of Marine Science 2021, *Long-term monitoring program — Annual summary report of coral reef condition 2020/2021*, www.aims.gov.au/reef-monitoring/gbr-condition-summary-2020-2021. Creative Commons Attribution 4.0 Australia licence