Government of **Western Australia**
School Curriculum and Standards Authority

MARINE AND MARITIME STUDIES

ATAR course examination 2017

Marking Key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

2017/69589

Section One: Multiple-choice **20% (20 Marks)**

Question	Answer
1	a
2	d
3	c
4	b
5	b
6	d
7	d
8	a
9	c
10	d
11	b
12	a
13	b
14	c
15	a
16	b
17	c
18	b
19	d
20	c

Section Two: Short answer **50% (70 Marks)**

Question 21 **(17 marks)**

(a) Define phytoplankton. (2 marks)

Description	Marks
Floats with the current **or** very small organisms	1
photosynthetic	1
Total	**2**

(b) Name **two** groups of animals other than fish larvae that may be present in plankton. (2 marks)

Description	Marks
Any **two** of the following:	
• crustacean larvae • mollusc larvae • sea star larvae • zooplankton	1–2
Total	**2**
Accept any other relevant answers	

(c) Biologists sometimes refer to a plankton bloom. What do they mean by the term 'bloom'? (2 marks)

Description	Marks
large numbers of plankton	1
in a small volume/area	1
Total	**2**

(d) Comment on the amount of plankton you would expect to find in this current and give **one** reason for this amount of plankton. (2 marks)

Description	Marks
low amount of phytoplankton/plankton	1
low amount of nutrients to support phytoplankton/plankton	1
Total	**2**

(e) What would you expect to happen in these eddies to each of the following groups of organisms? State why you make each claim.

(i) Plankton present (2 marks)

Description	Marks
increase (in phytoplankton/plankton)	1
more nutrients (to support life)	1
Total	**2**

(ii) Fish larvae present (2 marks)

Description	Marks
increase/more (fish larvae)	1
more plankton present to support more life higher up food chains/pyramids	1
Total	**2**

(f) Propose a change to this fishery's specific boundaries that may need to be made if this change in the south flowing current continues. (1 mark)

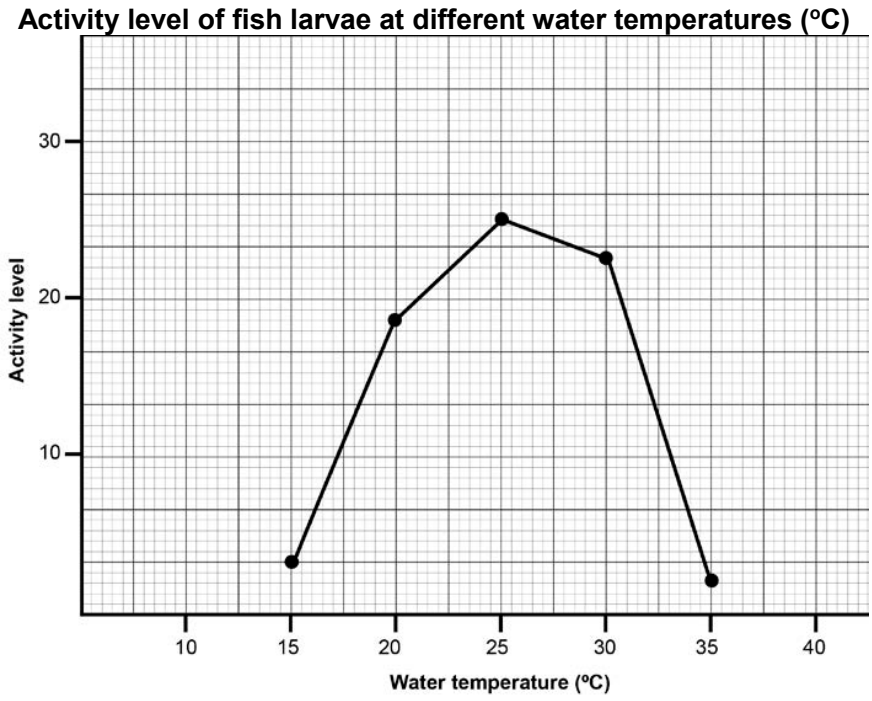
Description	Marks
change boundaries (of fishery) to be extended south	1
Total	**1**

(g) Explain why you have made the proposal in part (f) above. (4 marks)

Description	Marks
start of food chains/plankton move south	1
rest of food chain follows	1
fish of fishery move out of restricted area (to follow food supply)	1
vulnerable to exploitation/over fishing	1
Total	**4**

Question 22 **(12 marks)**

(a) Graph these results on the grid provided below. (5 marks)

Description	Marks
	
title (must have both variables in it)	1
appropriate scale & orientation of axes	1
axes labelled	1
correctly plotted points	1
join points	1
Total	**5**

(b) Write an hypothesis that the students may have been investigating in this experiment. (2 marks)

Description	Marks
as the temperature of the environment/water increases so does fish larvae activity (must have both variables and relationship)	1–2
Total	**2**

(c) List **two** variables the students should have controlled in this experiment. (2 marks)

Description	Marks
Any **two** of the following:	
• volume of water • salinity of water • number of fish • species of fish (same) • description of how to measure activity.	1–2
Total	**2**
Accept any other relevant answers.	

(d) Name **one** way in which the reliability of this experiment could be improved and explain how this would improve the reliability. (3 marks)

Description	Marks
Provides a way to improve reliability Answers may include: • repeat experiment (a number of times) • more fish larvae • more temperature readings (accuracy/range).	1
Explain how this improves reliability (explanation to match stated improvement method) Answers may include: • reduce random errors • reduce/identify outliers.	1–2
Total	**3**

Question 23 (9 marks)

(a) Predict what you would expect to occur to the coral from 1 February to 1 April. (1 mark)

Description	Marks
Makes a valid prediction	1
Total	**1**
Answer may also include: • coral bleaching will occur	

(b) Explain why you have made the prediction in part (a). (3 marks)

Description	Marks
Explains the prediction made in part (a)	3
Describes the prediction made in part (a)	2
States or mentions a fact about the prediction in part (a)	1
Total	**3**
An explanation must include the features of temperature and duration and subsequent effect. Answers may also include more specific temperatures: • sea temperature to 30.1 ^{o}C/for 1–3 days (late February) • sea temperature average over 29 ^{o}C/for up to 30 days (March) • sea temperature above 29 ^{o}C/for over 40 days • graphs of water temperature and coral bleaching indicates this time span will lead to bleaching	
Accept any other relevant answers.	

(c) Outline the process of coral bleaching leading to polyp death. (5 marks)

Description	Marks
Any **five** of the following:	
• When a stress occurs (e.g. temperature is too high) • Zooxanthellae are expelled/leave coral • Coral appears bleached • (when leave) coral do not get necessary nutrients • and so they die.	1–5
Total	**5**

Question 24 **(9 marks)**

(a) Define an introduced species. (1 mark)

Description	Marks
not local to area i.e. non-native/endemic	1
Total	**1**

(b) Why is it important to prevent these introduced species from entering the marine environment as a whole? (1 mark)

Description	Marks
Any **one** of the following:	
• out compete native organisms • predate on native organisms • introduce new disease	1
Total	**1**

(c) If an introduced species is discovered, list **three** steps the authorities could take to prevent it from spreading? (Do **not** use the examples given in part (d) of this question.) (3 mark)

Description	Marks
monitor area	1
trap/catch all organisms they can and destroy	1
notify public of potential species and what to do if it is thought to be found	1
Total	**3**
Accept any other relevant answers.	

(d) State **one** way in which each of these actions could aid in stopping the spread of White Spot Disease into Western Australia.

(i) banning the import of prawns (1 mark)

Description	Marks
prawns that may have WSD virus not able to get to WA (and so enter environment)	1
Total	**1**

(ii) not using food grade prawns as bait (1 mark)

Description	Marks
to stop virus being introduced to wild populations	1
Total	**1**

(iii) notifying the Department of Fisheries of any suspected cases of White Spot Disease (1 mark)

Description	Marks
they can check prawns for WSD and take action to reduce introduction	1
Total	**1**

(e) Give **one** reason for these prawns not being included in this prawn ban. (1 mark)

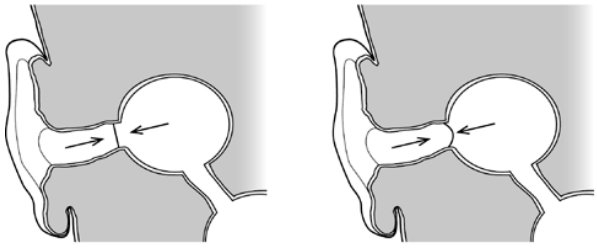
Description	Marks
Any **one** of the following:	
• are not from infected prawn ponds • prawn ponds only sell fit for human consumption • pond prawns will be approved for export from Queensland but not for bait • these prawns don't have the virus.	1
Total	**1**

Question 25 **(13 marks)**

(a) Outline the processes needed to prepare a newly purchased mask before using it for the first time. (2 marks)

Description	Marks
Any **two** of the following:	
• clean inside of glass thoroughly with toothpaste/detergent (to remove factory coating on the glass) • rinse fully • apply anti-fog • fit to face and adjust strap so is good fit/ just held in place (not too tight or loose).	1–2
Total	**2**

(b) Explain with the aid of diagram(s), what is occurring to cause this pain in the diver's ears. (5 marks)



Normal At depth

Description	Marks
diagram showing normal tympanum position	1
diagram showing tympanum position when submerged/at depth	1
at surface ear drum/tympanum is straight as pressure on inside same as outside	1
as go down water pressure causes eardrum to bend inwards (as inside ear at atmospheric pressure)	1
stretch of eardrum causes pain. Not occur back at surface as pressure now equalized	1
Total	**5**

(c) List **two** methods a person snorkelling can use to try to prevent this pain. Explain how these methods work. (4 marks)

Description	Marks
Action to take: as go down (any two of); • Valsalva • block nose and try to breath out thru nose • swallow • wriggle jaw • yawn.	1–2
Explanation: • open Eustachian tube • lets air into tube and so equalise pressure (either side of Tympanum).	1–2
Total	**4**
Accept any other relevant answers.	

(d) (i) Give **one** advantage of using a mask when snorkelling. (1 mark)

Description	Marks
Any **one** of the following:	
• see clearly • eyes in air space • not get sore eyes	1
Total	**1**

(ii) Give **one** limitation of using a mask when under water. (1 mark)

Description	Marks
Any **one** of the following:	
• mask squeeze • magnification of objects and distances.	1
Total	**1**

Question 26 **(10 marks)**

(a) How could the actual number of cannons that should be on the identified wreck site be determined? (1 mark)

Description	Marks
historical records in country of origin/ pictures of the actual vessel or sister ships/log book.	1
Total	**1**

(b) At the wreck site, describe what needs to be done to locate and identify the cannons that are present. (2 marks)

Description	Marks
Any **two** of the following:	
• use a magnetometer/sonar/scanner • grid search/map carefully all cannons at the site and its surrounds • count them and each type identified • unidentified cannon-types need to be identified.	1–2
Total	**2**

(c) Give **one** conclusion that can be made for each of the following situations if

(i) the number of cannons at the site matches the *Zeewijk*? (1 mark)

Description	Marks
Any **one** of the following:	
• could be only one wreck (and not two as claimed) • could still be two wrecks as not all cannons found/some guns lost or hidden in reef structure.	1
Total	**1**

(ii) the number of cannons at the wreck site does **not** match the *Zeewijk*? (1 marks)

Description	Marks
Any **one** of the following:	
• more than one ship wreck at the site • it is not the Zeewijk • wrong supplies list/manifest/ list of materials on vessel • took on more cannons at later port.	1
Total	**1**

(d) If the cannon tally at the wreck site is greater than that shown in known records, what **five** actions could be taken to draw the conclusion that there are two wrecks? (5 marks)

Description	Marks
Any **five** of the following:	
• identify cannons as different age • identify metal composition to that normally used/known to be used on the known wreck • check manifest/records from any ports of call • identify different manufacture markings on cannons • identify different manufacture techniques • identify different manufacture locations • identify names of vessels/navy/company on cannons different • identify other features such as damage on cannons • find another distinguishing material(s) other than cannons to identify the wreck	1–5
Total	**5**
Accept any other relevant answers.	

Section Three: Extended answer **30% (40 Marks)**

Question 27 **(20 marks)**

(a) List **four** rules governing human behaviour around whales or whale sharks (especially those rules to be followed by tour operators) and discuss how these rules impact human interaction with the animal(s). (8 marks)

Description	Marks
1 mark per rule governing human behaviour	
Lists a rule governing human behaviour around whales or whale sharks	1–4
Discusses how the rules impact on the interactions with the animal(s)	4
Discusses briefly how the rules impact on the interactions with the animal(s)	3
Provides a limited discussion on how a rule impacts on the interactions with the animal(s)	2
Mentions or states how a rule impacts on the interaction with animal(s)	1
Total	**8**

Answers might include:

Governing rules:
- no contact
- adhere to correct distance to be kept by boat
- adhere to correct distance to be kept by people (in water)
- number of people in the water at any one time
- number of boats interacting with each animal
- maximum number of attempts in water
- no contact with an animal which has a calf.

How rules impact on the interactions with the animal(s):
- not block passage/activities of animal(s) with boat (or people)
- no interference with activities of animal(s)
- reduces potential stress on animal(s)
- minimises impact on reproductive behaviour
- minimises impact on feeding behaviours.

Accept any other relevant answers.

(b) Name **one** method of fishery management involving a volume or area of water and describe how this can help a fishery to remain viable. (3 marks)

Description	Marks
Names one method of fishery management	1
Describes how the method can help a fishery to remain viable	2
Describes briefly how the method can help a fishery to remain viable	1
Total	**3**

Answers might include:

Method of fishery management:
- seasonal fishing times
- size restrictions/bag limits/quotas/weight limited (within a specified body of water)
- exclusion zone
- sanctuary zone
- close nursery ground to fishing
- restrictions on fishing gear.

Describes how method can help a fishery to remain viable:
- stops/reduces any activity that may impact on fish behaviour
- stops/reduces any fishing activity
- reduces or stops ability to catch fish
- enables survival from human predation.

Accept any other relevant answers.

(c) Name **two** fishery management methods that involve a species directly and describe how each method can help that fishery to remain viable. (6 marks)

Description	Marks
2 names × 1 mark each	
Names a fishery management method	1–2
For each viable fishery management method (2 × 2 marks)	
Describes how each fishery management method can help a fishery to remain viable	2
Describes briefly how each fishery management method can help a fishery to remain viable	1
Total	**6**

Answers might include:

Fishery management method
- adjusting/changing catch numbers
- adjusting/changing catch size/length
- sex keepers
- species assistance.

Describes how the method can help a fishery to remain viable:
- adjusting/changing catch numbers may allow more of the species to breed
- adjusting/changing catch size/length may allow a greater population of a species to reach breeding size
- sex keepers is where females of the species are returned to allow greater breeding opportunities for the species
- species assistance is where artificial breeding programs are introduced to increase numbers of a species.

Accept any other relevant answers.

(d) Name **one** method that is used by the Department of Fisheries to monitor species stocks in a fishery and describe a problem with this monitoring method. (3 marks)

Description	Marks
Names a method used to monitor a fishery	1
Describes a problem with the fishery monitoring method	2
Mentions or states a fact about the fishery monitoring method	1
Total	**3**

Answers might include:

Methods used by the Department of Fisheries to monitor species
- log books
- ramp counts
- sample fish species stocks by researchers (catching fish)
- Department of Fisheries can board boats – check gear and catch
- compliance – check type/s of fishing license
- 'Send us your skeletons' program

Problem with the fishery monitoring method
- log books – fishers may incorrectly (accidental or deliberate) complete log books
- ramp counts – it is unlikely that all boat ramps could be staffed by Department of Fisheries or volunteer staff. In addition, volunteer staff do not have the authority to search boats at a ramp. There are also a number of private piers and unofficial boat ramps that may be used by fishers.
- Sample fish species by researchers/sending in skeletons – this is a labour intensive method in which the sampling of species as a single method is unlikely to give an accurate estimate of fish stocks
- Department of Fisheries can board boats – This is a labour intensive method in which it is unlikely that the Department of Fisheries could board all boats. In the event of being boarded fishers may dispose of illegal fishing equipment or illegal catches prior to the Department of Fisheries boarding a boat. In addition, some fishers may choose to hide a catch from the Department of Fisheries by using deceptive methods (such as the use of secret compartments and false floors).
- Compliance - This is a labour intensive method in which it is unlikely that the Department of Fisheries could check all fisher's licences. Fishers may attempt to falsify or mislead their true identity to a Department of Fisheries Officer.

Accept any other relevant answers.

Question 28 **(20 marks)**

(a) Describe the processes to be undertaken from prior to the recovery of the concretion from the wreck site through to its recovery and analysis to identify the type and condition of any objects within it. (8 marks)

Description	Marks
Describes the processes prior to recovery	2
Describes the processes for recovery	3
Describes the processes for analysis	2
Keep in storage solution/wet until ready to commence preservation/conservation of material/s and/or objects	1
Total	**8**

Answers might include:

Processes required prior to recovery.
Map site:
- photography
- grid mapping

Processes required to recover the objects.
Extraction:
- careful removal from surrounding material/s
- mark/identify object and catalogue

Removal to surface:
- use of lift bags
- air lifts

Surface:
- care on surface

Processes required for the analysis of the object(s).
- x-ray/ultrasound to identify materials and/or object/s
- analyse material/s and/or object/s to identify the state of corrosion (such as metals)
- document material/s and/or object/s, treatments and results of analysis

Accept any other relevant answers.

(b) Describe the steps to be taken to prepare and preserve these objects for display.

(8 marks)

Description	Marks
Describes the processes of preparation for silver	3
Describes the processes of preparation for iron	3
Describes the processes of preservation for silver and iron	2
Total	**8**

Answers might include:

Processes of preparation:
Storage:
- If objects are made of silver – keep in storage solution/wet
- if object/s are made of iron - storage prior to full treatment – leave encrusted (concretion) and store in alkaline solution (e.g. sodium hydroxide, carbonate or sesquicarbonate) over pH 8 but best to be at pH 10–13

Cleaning:
- clean most of the concretion away from object/s
- use ultrasonic, manual and/or chemical methods unless metal objects are too corroded (for example, silver)

Electrolysis:
- if object is made of silver - electrolysis of object/s to convert to a more stable material (and remove corrosion layers to anode)
- if object is made of iron – electrolysis of substrate (still in concretion) until reduced to stable object

Rinse and drying:
- if object/s are made of silver – dithionate reduction in alkaline solution
- if object/s are made of iron – rinse until all Cl^- is removed. May need to add gluconate or chromates to rinse to prevent corrosion
- if object/s are made of silver or iron – dry thoroughly ensuring all water is removed

Processes of preservation:
Protective coating:
- if object/s are made of silver – consolidate with lacquer or wax to prevent further corrosion
- if object/s are made of iron – 'coat' in microcrystalline wax or other such protective coating to prevent oxygen reaching the iron object/s

Accept any other relevant answers.

(c) Explain what you would do if the metal objects were found to be so corroded that they could not be prepared for display. (4 marks)

Description	Marks
Explains what to do if the metal objects were so corroded that they could not be prepared for display	3
Describes briefly what to do if the metal objects were so corroded that they could not be prepared for display	2
Mentions or states a fact about what to do if the metal objects were so corroded that they could not be prepared for display	1
Uses correct sequence to replicate objects	1
Total	**4**

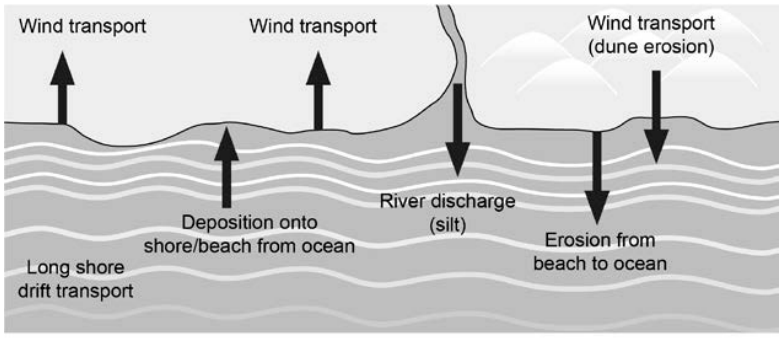
Answers might include:

- remove some of the concretion (not all) so that the material and/or object/s are manageable
- carefully cut in half or remove the object/s corroded metal material so left with a hollow imprint of the metal object/s within the concretion
- use a material such as a resin or silicon rubber to create a mould of the object/s within the hollowed concretion/s
- use this mould to cast/make a replica of the object/s

Accept any other relevant answers.

Question 29 **(20 marks)**

(a) Draw a labelled diagram(s) of a beach area in which a 'sand budget' is in equilibrium. (5 marks)

Description	Marks
 Diagram to show erosion/accretion which may include: • waves • currents • wind up beach • sand source.	1–4
State or diagram must illustrate that there is an equilibrium of sand movement where there is equal sand inputs (entering) and sand outputs (leaving) the beach area	1
Total	**5**

(b) Describe **three** reasons why cities such as Surfers Paradise are at possible risk due to the enhanced greenhouse effect (global warming). (6 marks)

Description	Marks
3 reasons x 2 marks	
Describes a reason why cities are at possible risk due to the enhanced greenhouse effect (global warming)	2
Describes briefly a reason why cities are at possible risk due to the enhanced greenhouse effect (global warming)	1
Total	**6**
Answers might include: • as atmospheric temperature rises heat passes into oceans • water expands (when heated) • get increase in volume of oceans (and so) • ocean levels rise (loss of beach due to) • inundates coastal regions • increases erosion of beaches/sandy shorelines • erosion patterns change due to weather pattern changes • change in currents (removal deposition of sand changes) and change in wind and wave patterns change sand deposition and removal patterns.	
Accept any other relevant answers.	

(c) Name **three** engineering solutions and outline how each might reduce the impact of the enhanced greenhouse effect (global warming) on cities such as Surfers Paradise. (9 marks)

Description	Marks
Name an engineering solution (3 × 1 mark) Outline of how solution reduces erosion effects (3 × 2 mark)	
Artificial reef: • to purposefully create man-made structures off the coast • reduce/redirect current flow • reduce wave action/impact on beach • reduce sand movement	1–3
Sand by-pass systems: • is the use of turbine/pump to move sand from offshore beach • replaces sand artificially faster than the natural sand deficit • minimises erosion by depositing sand in areas of sand drift/wave action	1–3
Sea wall/sand bagging shores/sand dune region: • is the addition of a concrete wall or large bags of sand as physical barriers to wind/wave/current erosion • reduces erosion by wave action and currents at the beach	1–3
Groynes: • artificial/man-made structures/rocks extending at an angle from the beach into the sea/ocean • reduces erosion by slowing/redirecting currents • reduces wave action	1–3
Total	**9**
Any other valid engineering solution and its impact on erosion effects.	

Question 30 (20 marks)

(a) Describe **three** problems that dredging a channel might create for the surrounding abiotic environment. (6 marks)

Description	Marks
3 problems x 2 marks	
Describes a problem that dredging a channel might create for the surrounding abiotic environment	2
Mentions or states a problem that dredging a channel might create for the surrounding abiotic environment	1
Total	**6**

Answers might include:

- deposition of spoil may foul another region at sea or land
- dredging may alter/change/interfere/impact on/with water and/or sand movement
- dredging may alter/change/interfere/impact on/with buildings and/or structures
- muddy/cloud up the water column resulting in reduced light penetration (aesthetics)
- silt deposit on nearby areas/regions

Accept any other relevant answers.

(b) Explain what effects this dredging could have on the biomass pyramids (food chains and webs) based in this sound. (5 marks)

Description	Marks
Explains the effects this dredging could have on a number of biota and its effects on the biomass pyramid	5
Describes the effects this dredging could have on a number of biota and its effects on the biomass pyramid	4
Describes briefly the effects this dredging could have on a number of biota and its effects on the biomass pyramid	3
Mentions or states a fact about dredging could have on a number of biota and its effect on the biomass pyramid	2
Mentions or states a fact an effect the dredging could have on the biomass pyramids	1
Total	**5**

Answers might include:

An explanation would include a systematic breakdown of the biomass pyramid:

- a loss of sunlight within the water column, which could lead to
- a reduction in photosynthetic organisms, which could lead to
- a reduction in other organism that are symbiotic with the photosynthetic organism, and/or reduction in plankton, which could lead to
- a reduction in food sources for first order predators, which could lead to,
- a reduction in food sources for secondary/tertiary predators, which could lead to,
- a reduction in top level predators

Identification of individual effects on the biomass pyramid may include:

- reduction in available sunlight for photosynthesis
- reduction in plant material for start of food chain
- loss of habitat for plants or animals
- continual disruption to environment due to regular dredging may scare animals away
- loss of ecosystems to support plant life or those environs which facilitate breeding grounds

Accept any other relevant answers.

(c) Identify **three** potential pollutants, their sources and what management actions can be taken to reduce their impact. (9 marks)

Description	Marks
Any **three** of the following: One mark for pollutant, one mark for source and one mark for actions to reduce impact	
oil/fuel spill source: oil leaking fuel hoses/spillage while loading actions to reduce impact: • trap using flocculants • trap using physical barriers • use detergents to disperse/emulsify oil/fuel • use pumps to remove oil/fuel	1–3
anti-fouling and paints source: applying anti-foul and paints in port (over open water) actions to reduce impact: • not cleaning hull in port • not applying antifoul in port • not applying paint in port	1–3
bilge water source: accidental bilge water discharge in port actions to reduce impact: • no discharge of bilge into port water • no discharge of bilge at sea • any necessary discharge of bilge is contained on land in special areas	1–3
foreign organisms source: foreign organisms on hull actions to reduce impact: • remove and kill organisms • notify fisheries/relevant authorities • check rest of hull • check ocean floor in close proximity to vessel	1–3
Total	**9**
Accept any other relevant answers.	

ACKNOWLEDGEMENTS

Question 29(a) Diagram adapted from: Oikos – team. (2007). Accretion and erosion of sediments in a costal system. In *Wikipedia*. Retrieved April, 2017, from https://commons.wikimedia.org/wiki/File:Sedimentbudg.jpg

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