Populations and Sustainability (6.3.2): OCR A Level Biology Exam Questi

18 questions · 40 marks · about 48 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · A level Paper 2 · June 2018 · Q22(d) · 2 marks

(d) Listed below are three approaches, A, B and C, that can be taken to maintain biodiversity:

A	*ex situ* conservation
B	*in situ* conservation
C	preservation

For each of the statements below, indicate whether it could be consistent with *in situ* conservation, *ex situ* conservation or preservation by inserting the correct **letter or letters** in the table.

	Approach
organisms are **not** removed from their natural habitat	
human intervention is happening	

[2]

Question 2 · A level Paper 3 · June 2024 · Q2(c) · 1 mark

(c) Timber can be produced sustainably to maintain biodiversity in woodland.

Describe **one** way in which timber can be produced sustainably.

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.....

..... **[1]**

Turn over

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Question 3 · A level Paper 2 · June 2022 · Q19(b)(i) · 3 marks

(b) It is important that commercial fishing is done in a sustainable way.

Fish farms are one potential solution to declining fish stocks.

(i) List **three** other strategies that governments could use to increase the sustainability of commercial fishing.

1 .....

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2 .....

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3 .....

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[3]

Question 4 · A level Paper 2 · June 2022 · Q19(b)(ii) · 1 mark

(ii) International agreements are an important approach to sustainability.

Suggest why international agreements are particularly important in the case of sustainable fishing.

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..... **[1]**

Turn over

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17 Penguins are flightless birds that eat fish. Most species of penguin live near the coast of Antarctica or on the many islands that surround Antarctica.

Fig. 17 shows the populations of three penguin species on an island off the coast of Antarctica.

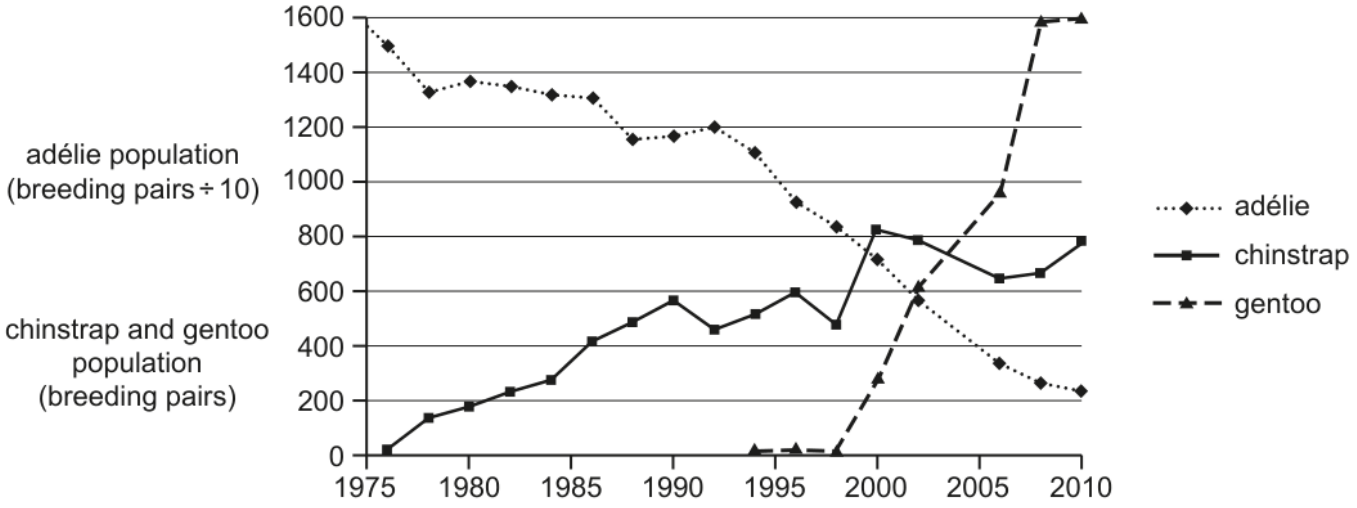


Fig. 17

(a) (i) Before 1975 the only penguin species on the island was the adélie penguin. Chinstrap penguins were first recorded on the island in 1976.

The changes in the chinstrap penguin population are not directly related to abiotic factors.

Suggest explanations for the changes in the population of **chinstrap** penguins between 1976 and 2010.

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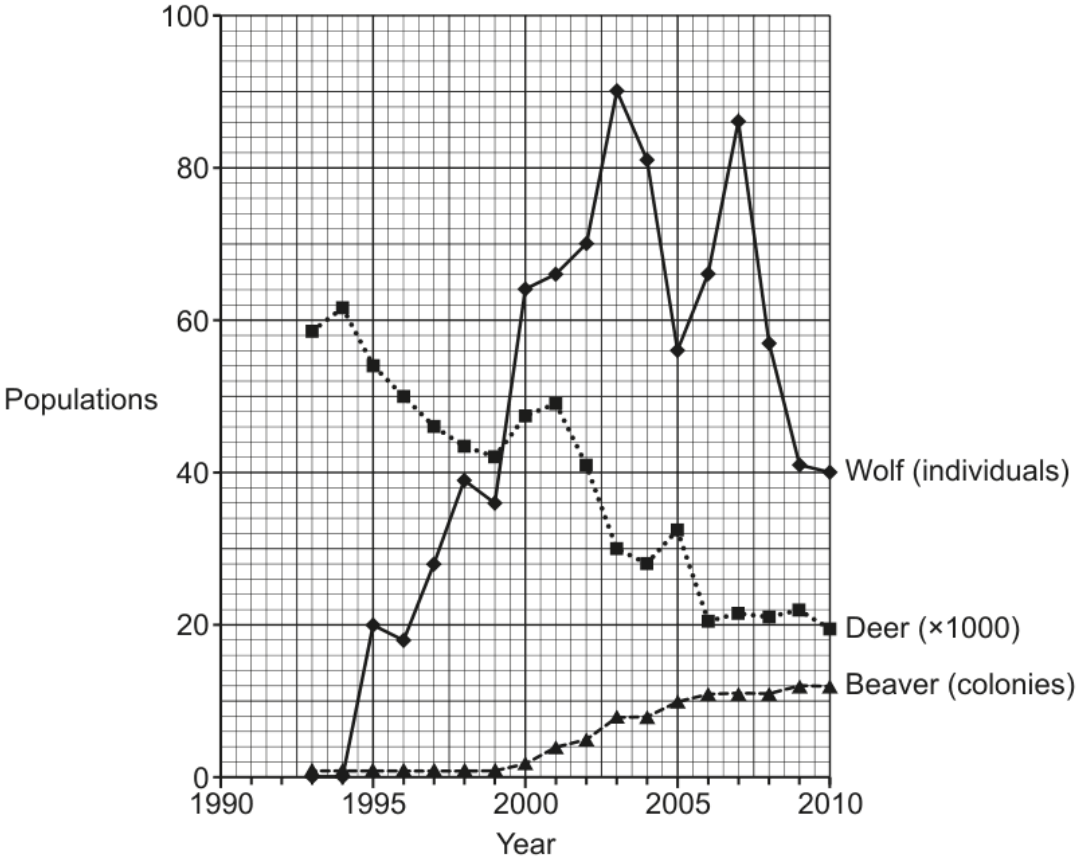
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Question 6 · A level Paper 2 · June 2023 · Q20(a) · 3 marks

20 Grey wolves became extinct in an area of North America in the 1920s. In 1993 some grey wolves were reintroduced into the same area.

Grey wolves feed mainly on large herbivores, such as deer.

The graph shows the population of grey wolves and some other species since the reintroduction.



(a) Describe the changes in the deer population since 1993.

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..... **[3]**

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Question 7 · A level Paper 2 · June 2023 · Q20(b)(ii) · 2 marks

(ii) Between 2003 and 2010 there were no significant changes in the climate of this area of North America and no disease outbreaks.

Suggest and explain **one** reason for the changes in the grey wolf population since 2003.

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..... **[2]**

Turn over

Question 8 · A level Paper 2 · June 2023 · Q20(d)(i) · 2 marks

(d) Beavers are a species that was once native to Britain. The species became extinct in Britain about 400 years ago.

In 2009, a population of beavers was brought from Norway and released into the wild in Britain.

(i) Explain why the reintroduction of beavers to Britain is an example of conservation.

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..... **[2]**

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Question 9 · A level Paper 2 · June 2023 · Q20(d)(ii) · 1 mark

(ii) Suggest a situation in which preservation of a habitat would be necessary.

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..... **[1]**

Turn over

Question 10 · A level Paper 2 · June 2017 · Q16(b) · 3 marks

(b) The Madidi National Park is also home to approximately 260 000 humans who support themselves by means of cattle-farming, and the production of timber and brazil nuts (a large nut harvested from a local native tree).

Conservationists have been working with:

- local people to promote sustainable use of these resources; and
- government agencies to maintain the quality of the national park.

Explain why the Madidi National Park is an example of conservation rather than preservation.

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..... **[3]**

Turn over

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Question 11 · A level Paper 3 · November 2020 · Q5(c) · 2 marks

(c) The peat bog habitat had been damaged by peat extraction and by management of the neighbouring farmland. Ecologists decided to treat the peat bog in the following way:

- A buffer region was created between the peat bog and the neighbouring farmland.
- No visitors were allowed on the land.
- Ditches were blocked to raise water levels.
- Peat extraction, tree planting and the use of fertilisers were banned.

A student suggested that this was an example of preservation.

Evaluate the student's conclusion.

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..... **[2]**

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Question 12 · A level Paper 2 · June 2019 · Q18(a) · 2 marks

18 The Lake District is the largest National Park in England, covering an area of 2362 km^2.

It contains a wide variety of species, some of which are under threat or endangered. The resident human population is 41 000. In 2016 the Lake District received 18.4 million tourists.

The proportion of Lake District land used for different purposes is shown in Fig. 18.

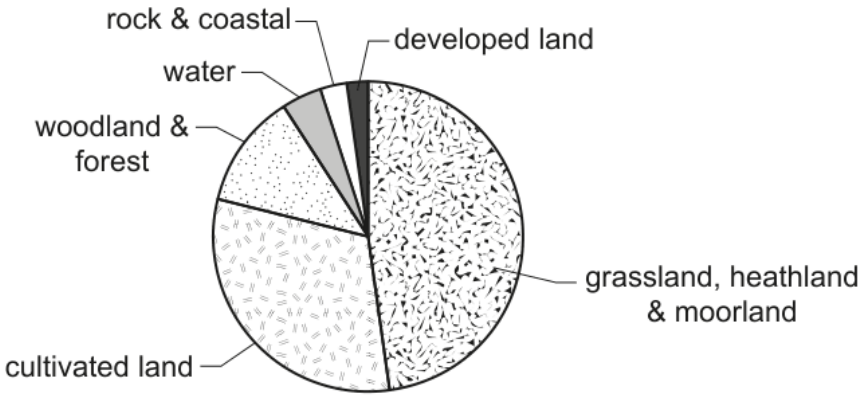


Fig. 18

(a) Explain **one** way in which tourists can lead to an increase in the biodiversity of an area.

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..... **[2]**

Question 13 · A level Paper 2 · June 2019 · Q18(b)(ii) · 2 marks

(ii) Timber can be produced economically by a technique called clear felling. Clear felling can damage biodiversity.

Explain how it is possible to produce timber sustainably using clear felling.

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..... **[2]**

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Question 14 · A level Paper 2 · June 2019 · Q18(b)(iii) · 6 marks

(iii)* A traditional timber-production process that is still used in parts of the Lake District is coppicing.

Describe the process of coppicing **and** explain the potential benefits of coppicing to the biodiversity of a woodland.

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Additional answer space if required.

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Question 15 · information from earlier in the question

(b) The hen harrier is the top predator on heather moorland in the UK.

Scientists are concerned about a recent decrease in the population of hen harriers.

The current estimate of the hen harrier population in the UK is 545 pairs. This represents 71% of the estimated population in 2004.

(i) Calculate the estimated population of UK hen harriers in 2004.

Estimated population = ... pairs **[2]**

Question 15 · A level Paper 2 · November 2021 · Q17(b)(ii) · 1 mark

(ii) Since 2004, the population of red grouse in the UK has been relatively stable and it is not thought that the population has been affected by changes in climate.

Suggest an explanation for the decrease in hen harrier numbers since 2004.

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..... **[1]**

Turn over

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Question 16 · information from earlier in the question

19 The Farne Islands are a group of small islands off the coast of Northern England.

The Farne Islands are a National Nature Reserve and Site of Special Scientific Interest. They are home to many species of bird, including arctic terns, guillemots, cormorants, shags, eider ducks, razorbills, and a variety of gulls. Particularly popular with the public are puffins. Considered by some to be a keystone species, puffins are small birds with large colourful beaks that fly very close to the surface of the sea. They come to the islands only to breed, nesting in underground burrows.

Local tour operators transport large numbers of visitors to the islands each year but no visitors are allowed on the islands during the winter to allow conservation work to be carried out. Such work includes repairing boardwalks and fences, tagging individual birds, and counting how many puffin burrows have been in use.

In 2023, an outbreak of bird flu caused a drop in the numbers of many species, including puffins, and visitors were banned from the islands. Local tour operators reported a drop in income.

(a)

(i) Identify evidence from the information above that supports each of the following claims:

Puffins are important for aesthetic reasons .....

.....

Puffins are important for ecological reasons .....

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Puffins are important for economic reasons .....

.....

[3]

Question 16 · A level Paper 2 · June 2025 · Q19(a)(ii) · 1 mark

(ii) The Farne Islands can be seen as an environmental resource that is affected by human activities.

Identify **one** example of conservation that is necessary as a direct result of human activities.

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..... **[1]**

Questions, mark schemes and examiners' report extracts © OCR.

Question 17 · A level Paper 2 · June 2025 · Q19(a)(iii) · 1 mark

(iii) There are no mammalian predators, such as rats and stoats, on the Farne Islands. Mammalian predators eat birds and their eggs.

Part of the conservation work involves ensuring that the islands remain free of these mammalian predators.

Suggest how human activity could be responsible for the arrival of these predators.

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..... **[1]**

Question 18 · information from earlier in the question

(b) Puffins, like many species on the Farne Islands, eat small fish. Their main predators are large gulls. Puffins are on the IUCN Red List for threatened species.

The puffin population can be estimated from the number of burrows that are occupied.

After the bird flu outbreak in 2023 the number of occupied burrows declined.

(i) It is important not to disturb the burrows and there is not enough money available to allow puffin burrows to be constantly monitored, either by humans or cameras.

Suggest **one other** type of evidence that could be used to infer that a burrow was being occupied by puffins.

..... **[1]**

Question 18 · A level Paper 2 · June 2025 · Q19(b)(ii) · 4 marks

(ii) Discuss the effect a decline in puffin population could have on other species in the area.

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..... **[4]**

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Mark schemes

Question 1 · A level Paper 2 · June 2018 · Q22(d) · 2 marks

(d)			
		Is consistent with…	
	organisms are **not** removed from their natural habitat	B **and** C	✓
	human intervention is happening	A **and** B	✓
			Total

2	**ALLOW** *in situ* and preservation **ALLOW** ex situ and in situ
8	

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Question 2 · A level Paper 3 · June 2024 · Q2(c) · 1 mark

2	(c)	rotate the trees that are harvested ✓ (rotational) coppicing ✓ replant trees (rather than rely on natural regrowth) ✓ selective felling / described ✓

Question	Answer
1 max	**Mark first answer given** **ALLOW** 'rotational felling' **ALLOW** pollarding **ALLOW** description (e.g. 'cut trees so that a stump remains near the ground') e.g. 'cut only the largest / oldest / most valuable / fastest growing, trees (each year) **ALLOW** 'strip felling' **IGNORE** clear felling **IGNORE** afforestation

Mark	Guidance

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Question 3 · A level Paper 2 · June 2022 · Q19(b)(i) · 3 marks

	(b)	(i)	**1** quotas / limiting (mass of) fish caught ✓ **2** use nets with larger mesh ✓ **3** limit fishing to certain times (of year) ✓ **4** areas where fishing is banned ✓ **5** allow catching of certain (non-endangered) species only ✓ **6** *idea of* strict enforcement of any one of the above ✓

3 max	1.1	*Mark first three answers only or first answer on each prompt line, which ever gives the candidate most benefit.* **1 ALLOW** limit , number / amount , of fish caught **1 IGNORE** restrict fishing / limit boats **2 ALLOW** different shaped mesh **2 IGNORE** different sized nets / different mesh size **3 ALLOW** regulate fishing seasons **4 ALLOW** regulate areas where you can catch fish **5 ALLOW** regulate which fish can be caught **6 ALLOW** e.g., issuing licences

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Question 4 · A level Paper 2 · June 2022 · Q19(b)(ii) · 1 mark

(ii)	fish swim between countries ✓ much of ocean does not belong to any one country ✓ people catch fish in countries other than their own ✓

1 max	2.1	**ALLOW** fish are caught in countries far from where they are sold

Question 5 · A level Paper 2 · June 2018 · Q17(a)(i) · 3 marks

17	**(a)**	**(i)**		**3 max**
			1 penguin species have overlapping / AW , niches ✓	
			2 competitive exclusion ✓	
			3 increase as , food / nesting sites / resources (available) ✓	
			4 increase as , no / little , competition / limiting factors ✓	
			5 plateau / drop, because of (increased) competition ✓	
			6 drop / plateau , due to , arrival of / competition from , gentoo ✓	

ALLOW 'fish' as AW for 'food' throughout **for this question only**
CREDIT marking points 3-5 in the context of either intraspecific or interspecific competition

3 IGNORE refs to predator

3 & 4 ALLOW increase as no competition for food = 2 marks
3 & 4 ALLOW increase as outcompetes Adélie for food = 2 marks

5 CREDIT reached carrying capacity

5 & 6 'plateaus because of competition from gentoo' = 2 marks

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Question 6 · A level Paper 2 · June 2023 · Q20(a) · 3 marks

20	**(a)**	**1**	overall / AW , decrease ✓	**3 max**
		2	fluctuates (before 2006) ✓	
		3	little / no , change after 2006 ✓	
		4	figures that illustrate any of the above points ✓	

2.6	**1 IGNORE** 'decrease' unless the whole period (or until 2006) is implied **2 IGNORE** individual descriptions of short-term rises and falls **3 ALLOW** plateau after 2006 **4 ALLOW** e.g., fall of 39000 (67%) from 1993 to 2010 / around 20000 (after 2006) **4 AWARD** only if the m.p. that the figures illustrate has been awarded **3&4** varies by < 2000 after 2006 = **2 marks**

Question 7 · A level Paper 2 · June 2023 · Q20(b)(ii) · 2 marks

(b)	**(ii)**	fall in deer (population) ✓ means less , food / prey (for wolves) ✓ *idea that* spike in wolf population in 2007 related to higher deer population in 2005 ✓	**2**	2.6

Question 8 · A level Paper 2 · June 2023 · Q20(d)(i) · 2 marks

(d)	**(i)**	*idea of* human intervention ✓ habitat / ecosystem / biodiversity , changed / restored , (when they were reintroduced) ✓	**2**

2.1	**ALLOW** e.g., population actively moved **IGNORE** maintain

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Question 9 · A level Paper 2 · June 2023 · Q20(d)(ii) · 1 mark

		(ii)	*idea of* habitat being sensitive to damage ✓	1	1.1	**ALLOW** e.g., a rare / endangered / threatened , species lives there

Question	Answer	Marks	AO element	Guidance

Question 10 · A level Paper 2 · June 2017 · Q16(b) · 3 marks

(b)	*conservation because…* there are (local) people there ✓ sustainable use ✓ (area used for) logging / farming / nut production ✓ active measures / work , to maintain , biodiversity / habitat / park ✓	
		Total

3 max	Cannot be implied from another marking point. Look for positive statement, **CREDIT** if preservation people would not be there **CREDIT** logging / farming / nut production , not consistent with preservation **CREDIT** preservation would leave park untouched **CREDIT** active management **NB** preservation would leave park untouched by people = mp 4 not mp 1
11	

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Question 11 · A level Paper 3 · November 2020 · Q5(c) · 2 marks

c	*preservation because* no visitors allowed **OR** human interference / peat extraction/ tree planting, restricted ✓ *not preservation / is conservation because* the habitat was being managed / example of management described (e.g. water levels raised / ditches blocked) **OR** the habitat had already been changed / was not the original habitat ✓	**2 max**

3.2	**DO NOT ALLOW** no human interference

Question 12 · A level Paper 2 · June 2019 · Q18(a) · 2 marks

1 8	**(a)**	**1** ecotourism ✓ **2** *idea that* money from tourists is used to support conservation ✓ **3** example of conservation project (facilitated by tourism revenue) ✓

2 max	**3 CREDIT** only if **2** has been awarded e.g. planting trees wildlife rangers maintain footpath rewilding removal of non-native species creating nature reserves reintroduction programmes

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Question 13 · A level Paper 2 · June 2019 · Q18(b)(ii) · 2 marks

(ii)	**1** limit size of area that is (felled) ✓	**2**
	2 replanting (of trees that have been felled) ✓	
	3 minimum distance between (replanted) trees ✓	
	4 allow time for new trees to fully grow / AW (before next felling) ✓	
	5 reference to limiting soil erosion after felling ✓	

1 ALLOW strip / rotational , felling

2 ALLOW replace

3 ALLOW optimum distance between (replanted) trees

1&4 'rotate areas that are felled to allow trees to mature' **= 2 marks**

1&5 'limit the size of the area that is felled to reduce soil erosion' **= 2 marks**

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		(iii)		
			Level 3 (5–6 marks) Describes the processes involved in coppicing in some detail **and** clearly explains some benefits to biodiversity. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated* **Level 2 (3–4 marks)** Describes some processes involved in coppicing **and** explains a benefit to biodiversity. *There is a line of reasoning with some structure. The information presented is relevant and supported by some evidence.* **Level 1 (1–2 marks)** Describes the process of coppicing **or** explains a benefit to biodiversity. *There is an attempt at a logical structure with a line of reasoning. The information is, in the most part, relevant.* *0 marks* *No response or no response worthy of credit.*	**6**

Indicative scientific points may include

Process of coppicing

- trunk cut close to ground level
- several new shoots grow from cut surface
- protect young shoots from grazers
- process repeated after certain time
- broadleaved species
- rotational coppicing
- can be repeated indefinitely

Benefits of coppicing…

- new stems grow more rapidly than saplings
- lifespan of tree extended
- provides variety of light levels
- fewer large trees means more light for smaller plants
- provides a variety of habitats
- roots prevent soil erosion
- maintains soil quality
- prevents succession
- large machinery not needed

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Question 15 · A level Paper 2 · November 2021 · Q17(b)(ii) · 1 mark

(ii)	deliberate killing to maintain grouse numbers / pollution / pesticides / disease / loss of ~~another~~ food source / competition from new predator ✓	1	2.5	*Mark as prose* **IGNORE** habitat loss **ALLOW** hunting

Question 16 · A level Paper 2 · June 2025 · Q19(a)(ii) · 1 mark

19	(a)	(ii)	repairing , boardwalks / fences ✓	1	2.1	**IGNORE** banning of visitors (as implies preservation)

Question 17 · A level Paper 2 · June 2025 · Q19(a)(iii) · 1 mark

19	(a)	(iii)	arrive on boats ✓	1	2.5	**IGNORE** pets

Question 18 · A level Paper 2 · June 2025 · Q19(b)(ii) · 4 marks

19	(b)	(ii)	1 decline in , predators / (large) gulls / species at higher trophic level / AW ✓ 2 (initial) decrease in , other prey species / species eaten by (large) gulls ✓ 3 increase in (small) fish ✓ 4 more competition between gulls / fish ✓ 5 increase in other (named) species , that eat (small) fish / that eat the same food (as puffins) / due to decreased competition ✓ 6 increase in other species that nest in burrows ✓ 7 decrease in species eaten by (small) fish / AW ✓ 8 reduced soil fertility affecting plant growth ✓	**4 max**	**2.6**

IGNORE interspecific / intraspecific

ALLOW more burrows available (for other animals / species)

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