Answers for extension worksheet – Option G

1 **a** The population of bacteria increases significantly just after the sewage outfall. (1)

b **i** The population of fish declines until about 80 m downstream from the outfall. After this point, the population begins to recover. (1)

ii Fish are active organisms that require oxygen for respiration. The level of oxygen is insufficient for them to survive close to the outfall. The presence of suspended solids from the sewage may also affect their gills. (2)

c The sewage is broken down by the movement of the water and by the action of bacteria that feed on it. (2)

d An indicator species is a species that is very sensitive to the presence or absence of a substance in the environment. The presence or absence of the species can therefore indicate pollution in the environment. (1)

e At 60 m, the water contains little oxygen so chironomous (blackfly) larvae, worms or pulmonate (lunged) snails might be found. At 120 m, the water would contain sensitive organisms such as mayfly or caddis fly larvae or crayfish whose oxygen requirements are greater. (2)

f Indicator species can show the presence or absence of a substance that may not be being measured in pollution checks. Changing populations of indicator species can indicate the environment is changing before high levels of pollutants are present. (2)

2 **a** **i** As the snails ate the crop, the availability of food declined so the population of snails fell. As the crop recovered, the snail population was also able to increase again. Also, the farmer may have used a pesticide for a short period to reduce snail numbers. (3)

ii Yes, the damage was sufficient to breach the economic threshold until the middle of period B. (2)

b A capture, mark, release, recapture method would be suitable to measure the snail population because they are relatively slow moving and can be marked without harming them. (2)

c a parasite that attacks the snails or a predatory species that feeds on them (1)

d The population of snails was substantially reduced by the introduction of the predator or parasite, which destroyed large numbers of snails. (2)

e During period C, the number of snails fluctuated but remained below the economic threshold. The fluctuations were probably caused by the number of the biological control species falling after the number of snails fell significantly. This enabled the snails to reproduce and their numbers rose again. This situation continued but the number of snails was kept at a level below the economic threshold so the damage they caused did not affect the farmer's livelihood. (1)

f This control method should work in the medium to long term so long as the snail does not develop resistance to the control species or the control species does not move away to seek other food when snail numbers fall to low levels. (2)

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3 **a** Biodiversity is a measure of the number of different organisms present in an ecosystem, the quantity of each different organism and its genetic diversity. (1)

b two from:
plants may be the source of new medicines or chemicals;
conservation protects the complex interactions between different species in the forest;
humans do not have the right to destroy species, which have evolved over a long period of time;
aesthetic reasons (2)

c **i** (2)

	Rainforest site	**Deciduous woodland site**
Total (*N*)	123	48
Simpson index *D*	9.30	11.87

ii The deciduous woodland is more diverse even though the number of species present is less. (2)

iii The Simpson index can indicate the 'health' of an ecosystem. The rainforest may be under threat from outside influences. A community is not said to be diverse if it is dominated by one or a few species, which could also account for the differences observed. (2)

d Global warming may lead to the loss of habitat if some areas become very dry or very wet. This would reduce biodiversity. Some species may move to new areas and affect the diversity of these new areas by replacing or competing with existing species. (2)

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