

- M1.** (a) Greater variety / different foods;
 More habitats/niches;
Answers only referring to 'more food' should not be credited but allow 'more food sources'. 2
- (b) Also measures number of individuals in a species / different proportions of species;
 Some species may be present in low/high numbers;
First marking point can only be awarded if there is a reference to species. 2
- (c) (i) Large surface area to volume (ratio);
 Correct reference to diffusion;
 (Eggs) cannot move (out of water);
 Permeable/thin (outer layer); 2 max
- (ii) Concentration (of pesticide) is increased; 1
- [7]
- M2.** (a) Number of a/each (species);
Accept answers expressed differently providing they convey this information.
Ignore extra information if it does not contradict answer. 1
- (b) 1. Lower diversity of plants/few species of plants/less variety of plants/few plant layers;
 2. Few sources/types of food/feeding sites;
 3. Few habitats/niches;
 4. Fewer (species of) herbivore so few (species of) carnivores;
 5. Aspect of agriculture (killing insects);
Must be a reference to species or kinds, not just fewer insects and fewer plants.
Not less food. 3 max
- (c) (i) Cannot predict/do not know intermediate values; 1
- (ii) To see what would happen/compare with no management work/to see if numbers fell anyway/To show that it was not a factor;
Management as a term not required. Allow explanations. 1

- (d) 1. Total number of birds along ditch B/ditch with one side cleared greater than along ditch A/ditch with both sides cleared;
2. But only gives data for all birds/does not give data for species/ data not about diversity;
3. Single ditch/single occasion/not repeated/no control;
- Principles:*
Correct from evidence
Total number not diversity
Flaws in technique

3

[9]

- M3.** (a) (i) Two marks for correct answer of 4.3;

Q An answer of 4 scores 1 mark

One mark for incorrect answer that clearly shows understanding of $\sum n(n-1)/188$ as denominator;

2

- (ii) Measures number of individuals (of each species) and number of species;

Q First marking point can only be awarded if there is a reference to species.

Some species only present in small numbers;

2

- (b) (i) Reduced as one crop/species grown/other species removed;
- Use of herbicides/weeding/ploughing;
- Wheat (better) competitor for named factor e.g. light/nutrients;

2 max

- (ii) (Reduced) as less variety of food sources;

(Reduced) as fewer habitats/niches;

(Reduced) by pesticides/chemicals;

Q Answers only referring to 'less food' should not be credited

2 max

[8]

- M4.** (a) to maintain diversity;
to maintain organisms' habitats/ecosystem; 2
- (b) (i) exponential relationship/described;
smaller the area, greater the rate of extinction; 2
- (ii) one reason, explained, e.g. :
smaller areas are/have (many) fewer species/number of individuals
and thus smaller/less stable communities;
greater chance of competition;
human impacts more damaging;
diseases spread more easily;
greater impact of new diseases/predators;
smaller number of sites meeting niche of species; 1 max
- [5]
- M5.** (i) for correct use of sigma;
numerator = 380 and denominator = 132; 2
- 2.87 to 2.9 gains 2 marks
(do not allow 2.8 or denominator = 135)
- (ii) more types of prey found on strawberries; 1
- [3]
- M6.** (a) suitable method of capture;
mark individuals and release;
count percentage recaptured/use Lincoln index/equation; 2 max
- (b) $\frac{282 \times 281}{25384} = 3.12$
(accept 3.1/3.122) 2
- (c) decrease in total numbers of butterflies;
(reject population)
change in proportion of species/example(s);
increase in diversity in logged forest/ calculation(4.01); 2 max
- [6]

- M7.** (a) Randomly collected/collected from many ponds/same species/same time of year;
Accept other answers providing they might reasonably impact on data
- 1**
- (b) 9;
- 1**
- (c) Curve/line of best fit;
 Shows upward slope/positive correlation/description of positive correlation;
 Correlation does not necessarily mean causation;
 Some other factor might be involved;
 Some ponds had no worms but had frogs with deformed legs;
Q No mark awarded for "yes" or "no"
- 4 max**
- (d) (i) Sample too small to establish a pattern/to be representative/ to identify anomalies;
- 1**
- (ii) Must compare like with like/must be a fair test;
Note that fair test is acceptable if used in context defined in How Science Works glossary
 Some factors differ in mountains/named factor differs in mountains;
- 2**
- (e) 27% of the frogs had deformed legs in pond 2;
 Agricultural run-off and cage mesh diameter of 500 μm ;
- 2**
- (f) Worms cause deformed legs;
 Deformed legs in 500 μm mesh cages /deformed legs when worms in cage;
 Run off (on its own) does not cause deformed legs;
 No deformed legs with run off and 75 μm mesh/no worms;
 When run off present makes effect of worms worse;
 Quantitative statement e.g. increased by factor of 7 to 8 times;
- 4 max**

[15]

- M8.** (a) (i) EITHER: Correct answer: 3.45 / 3.44 / 3.4 = 2 marks
OR: Understanding of $\sum n(n-1)$ / use of
 $134/(2 + 90 + 12 + 30)$
+ wrong answer = 1 mark

max 2

- (ii) Takes account of number of individuals/abundance/
population size (as well as number of species);

1

- (b) The species at *A/F.spiralis* loses less water/
loses water less rapidly/ loses less mass;

The species at *A/F.spiralis* better adapted to/can survive where
exposed for longer / to drier conditions;

Water conservation is necessary for metabolism / named aspect;

The species at *A/F.spiralis* avoids competition;

For named aspect – e.g. light/substratum/space/ CO_2 ;

ACCEPT converse argument re. F. serratus

max 3

[6]

- M9.** (a) cultivation of single species/variety of crop/named crop /
one crop grown over a large area;

1

- (b) (i) more space for crop;
easier to use machines/named machine;
removes habitat for pests;
lower labour costs in maintenance;
less competition with (crop) plants for named resource;

2 max

- (ii) more habitats/niches/food sources/more animal/insect/mammal/
bird species present/more species diversity/larger food webs/
more food chains;

2

- (c) food source killed by pesticide;
insufficient food (for survival)/lack of alternative sources/specialist feeder;

OR

pesticide passed through food chain;
biomagnification/bioaccumulation/concentration higher in top carnivores;

OR

stored in fat; released over time;

OR

run off/leached into rivers;
kills aquatic life;

(animals eat pests containing the pesticide gains 1 mark)

2

[7]

M10.

- (a) (i) Two marks for correct answer of 3.21;;
One mark for incorrect answer that clearly shows understanding
of $\sum n(n-1)$;

2

- (ii) Measures number of individuals and number of species;
Some species only present in small numbers;

*Q First marking point can only be awarded if there is a reference to
species*

2

- (b) (i) Directly proportional/positive correlation/bird species
diversity depends on plant structural diversity;

1

- (ii) The more varied the structure, the greater the number of
habitats/niches/places for birds to live;
Birds feed/nest at different heights in vegetation;

*Q Since candidates will not have studied ecological principles in
detail, they cannot be expected to use such terms as habitat and
niche in this question*

2

- (iii) Increase, more habitats/niches/variety of food sources;

1

[8]

