Populations in Ecosystems - Mark Scheme

Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	• correct calculation of numerator (1) • correct calculation of denominator (1) • correct calculation of diversity index / correctly plotted on the graph (1)	Example of calculation: (N(N-1) = 427 x 426 = 181 902) ÷ (Σn(n-1) =) 52 320) = 3.48 ; Allow full marks for correct answer with no working	**(3)**

Question Number	Acceptable Answer	Additional Guidance	Mark
(ii)	An explanation that makes reference to the following points: • succession is the sequence of { species / communities } replacing each other with time (1) • dune 4 is older than dune 1 (1) • no species of plant inhabits all 4 dunes /example from table quoted to show one species inhabiting no more than 3 dunes (1) • plant diversity increases with time (1) • description of increasing diversity index from dune 1 to dune 4 (1)	e.g. species G only found on dunes 3 and 4	**(5)**

Q2.

Question Number	Answer	Additional Guidance	Mark
(i)	**Effects on plants:** 1. { loss / eq } of (existing) species / extinction ; 2. idea of changes in distribution (of plants / species) ; 3. idea of changes in {numbers / size / growth / eq } (of plants / species) ; **Explanations (max 3):** 4. idea that there will be changes in rainfall patterns ; 5. idea of a change in growing seasons ; 6. idea that temperature may become too hot for some species OR credit a link made between temperature and enzyme activity ; 7. idea of increased carbon dioxide results in more {photosynthesis / GPP / NPP / biomass / eq} ; 8. idea of fall in pH in {oceans / rivers / eq} ;	**NB** any link to an affect must be correct 4 **ACCEPT** droughts 5 **ACCEPT** flowering times	**(4)**

Question Number	Answer	Additional Guidance	Mark
(ii)	1. idea of reduction of {herbivore / primary consumer} ; 2. idea that this would result in a reduction of {predator / secondary consumer / tertiary consumers} ; 3. idea that a change in {distribution / numbers / types / eq} of plants could result in a change in distribution of {herbivores / eq} ; 4. idea of loss of {habitat / eq} decreasing {breeding rate / numbers / eq } ; 5. idea of loss of {shelter / camouflage / eq} provides more food for predators so they would increase in {size / number} ;	**ACCEPT** converse for increase in plant {number / size / eq} 1 **ACCEPT** idea of loss of animals because of reduction in food supply 2 **ACCEPT** idea of loss of animals that feed on the herbivores 4 **ACCEPT** named example e.g. nesting place	**(3)**

Q3.

Question Number	Answer	Additional Guidance	Mark
(a)	1. idea that as the {distance from the front edge of the glacier / time} increases, the {complexity / biodiversity / size / eq } of the organisms increases ; 2. reference to (primary) succession ; 3. idea that {algae / lichens / pioneer species} are (the first) organisms to colonise bare rock / eq; 4. idea that {algae / lichen / pioneer species} improve conditions for plants ; 5. idea of competition (limiting species present) ;	1. ACCEPT idea that climax community only reached at distance from glacier edge 2. NOT secondary succession 4. including e.g. change rock into soil / increase humus content of soil / increase water content 5. e.g. newer species outcompete previous species	(3)

Question Number	Answer	Additional Guidance	Mark
(b)(i)	1. the {role / interaction / eq} of an { *Epilobium latifolium* / organism / species} within its { ecosystem / habitat / environment } ; 2. (*Epilobium latifolium*) is a producer ; 3. idea that *Epilobium latifolium* provides {food / energy} for other organisms (herbivores / primary consumers / decomposers) ; 4. idea that *Epilobium latifolium* improves soil e.g. holds soil structure together, increases nutrients ; 5. idea that *Epilobium latifolium* provides {shelter / (micro) habitat} for organisms ;	1. IGNORE community 3. NOT prey 4. IGNORE food in soil ACCEPT adds organic matter, humus 5. ACCEPT named organism e.g. insects	(3)

Question Number	Answer	Additional Guidance	Mark
(b)(ii)	1. idea of using a transect (from front edge of glacier); 2. credit method of sampling (along transect) ; 3. credit appropriate method of selecting sample sites (along transect) ; 4. description of estimate of abundance e.g. number of plants, percentage cover ; 5. idea of using more than one transect ; 6. credit appropriate method of recording quantitative data ;	2. e.g. clumps touching transect, quadrat (on transect), number of plants along perpendicular 3. e.g. set distance, regular, systematic, flip-flop quadrats NOT random 5. IGNORE references to repeating investigation 6. e.g. tally chart, table, graph	(4)

Question Number	Answer	Additional Guidance	Mark
(b)(iii)	1. credit appropriate named abiotic factor; 2. credit appropriate method of measurement of factor ; 3. credit appropriate description of where reading should be taken ; 4. idea of taking several readings and getting an average / eq ;	1. e.g. light, soil pH, water content, mineral content, temperature, salinity, wind IGNORE CO_2, O_2, rainfall, humidity 2.CE applied e.g. light {probe / sensor / meter / data logger}, {water gauge / drying out soil samples} 3. CE applied e.g. reading taken at height of plant, soil sample around roots, quadrat	(3)