TGAU

4781/53-A

W15-4781-53A-R1

GWYDDONIAETH B
UNED 1: Y Gofod, Egni a Bywyd

P.M. DYDD IAU, 15 Ionawr 2015

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53A001

Ffolder Adnoddau (Erthygl wedi'i rhyddhau ymlaen llaw)

I'w ddefnyddio gyda:

TGAU Gwyddoniaeth B (UNED 1) **ADRAN B** yr Haen Sylfaenol

TGAU Gwyddoniaeth B (UNED 1) **ADRAN A** yr Haen Uwch

Erthygl wedi'i Rhyddhau Ymlaen Llaw – Ocsigen wedi hydoddi *(dissolved)* a bywyd dyfrol

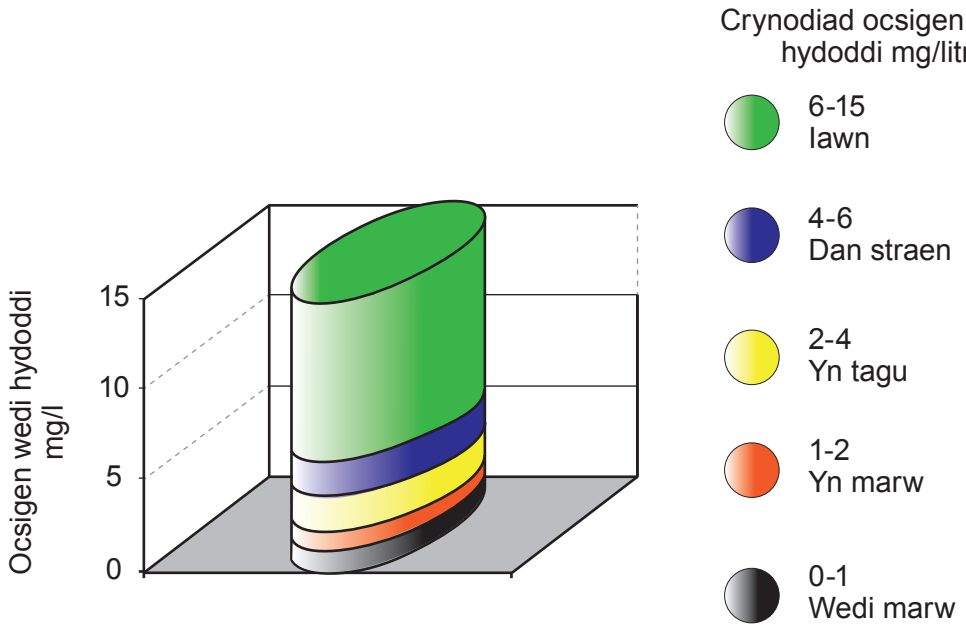
Yn yr 1970au, daeth i'r amlwg bod Chesapeake Bay, UDA yn cynnwys un o'r parthau marw morol cyntaf i gael ei adnabod ar y blaned. Roedd y dyfroedd mor brin o ocsigen (hypocsig) fel nad oedden nhw'n gallu cynnal bywyd, ac o ganlyniad bu farw niferoedd enfawr o bysgod.

O ble mae ocsigen wedi hydoddi yn dod?

Mae dwy brif ffynhonnell o ocsigen wedi hydoddi: aer a ffotosynthesis. Mae ffytoplancton a phlanhigion i'w cael mewn dŵr. Mae'r organebau hyn yn gynhyrchwyr net o ocsigen yn ystod y dydd, ond yn ystod y nos maen nhw'n troi'n ddefnyddwyr net o ocsigen. Ar arwyneb y dŵr, mae ocsigen o'r aer yn **dod i ecwilibriwm** ag ocsigen sydd wedi hydoddi yn y dŵr. Mae gan ddŵr sy'n symud arwyneb mwy garw na dŵr llonydd. Gyda mwy o arwynebedd arwyneb mewn cysylltiad â'r aer, bydd dŵr sy'n symud yn dod i ecwilibriwm â'r aer yn gyflymach.

Mae **prinder ocsigen** yn digwydd pan fydd crynodiad ocsigen wedi hydoddi **(OH)** yn lleihau. Mae **OH** yn cael ei fesur mewn miligramau y litr (mg/l).

Diagram 1 Faint o ocsigen yn y dŵr sydd ei angen ar greaduriaid dyfrol?

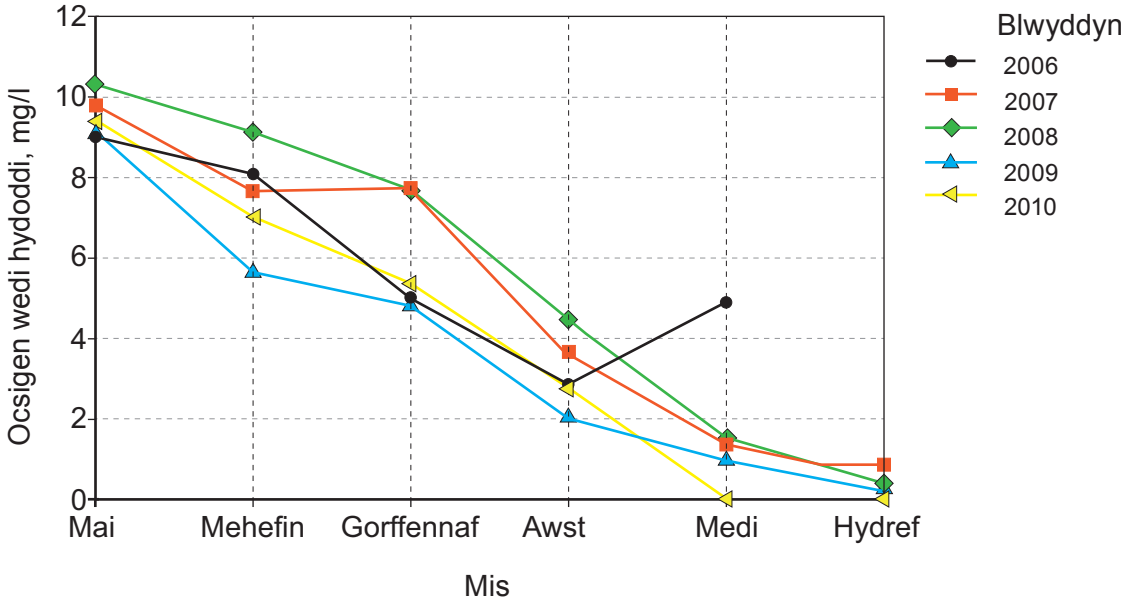


Beth sy'n achosi i lefelau ocsigen wedi hydoddi amrywio?

Mae swm yr ocsigen wedi hydoddi yn cael ei benderfynu gan y canlynol:

- faint o ocsigen mae'r dŵr yn gallu ei ddal (yn ddibynnol ar y tymheredd)
- dyfnder y dŵr
- faint o arwynebedd arwyneb sydd ar gael ar gyfer tryledia d o'r aer
- faint o ocsigen sy'n cael ei gynhyrchu gan ffotosynthesis
- faint o ocsigen sy'n cael ei ddefnyddio gan resbiradaeth.

Graff 1. **Sut mae crynodiad ocsigen wedi hydoddi (OH) yn amrywio gyda misoedd y flwyddyn**



Tabl 1. Sut mae uchafswm crynodiad yr ocsigen wedi hydoddi (OH) yn amrywio gyda thymheredd

Tymheredd (°C)	OH (mg/l)
0	14.60
1	14.19
2	13.81
3	13.44
4	13.09
5	12.75
6	12.43
7	12.12
8	11.83
9	11.55
10	11.27
11	11.01
12	10.76
13	10.52
14	10.29
15	10.07
16	9.85
17	9.65
18	9.45
19	9.26
20	9.07
21	8.90
22	8.72

Tymheredd (°C)	OH (mg/l)
23	8.56
24	8.40
25	8.24
26	8.09
27	7.95
28	7.81
29	7.67
30	7.54
31	7.41
32	7.28
33	7.16
34	7.16
35	6.93
36	6.82
37	6.71
38	6.61
39	6.51
40	6.41
41	6.41
42	6.22
43	6.13
44	6.04
45	5.90

Graff 2 **Sut mae tymheredd dyddiol cymedrig y dŵr yn amrywio gyda mis y flwyddyn**

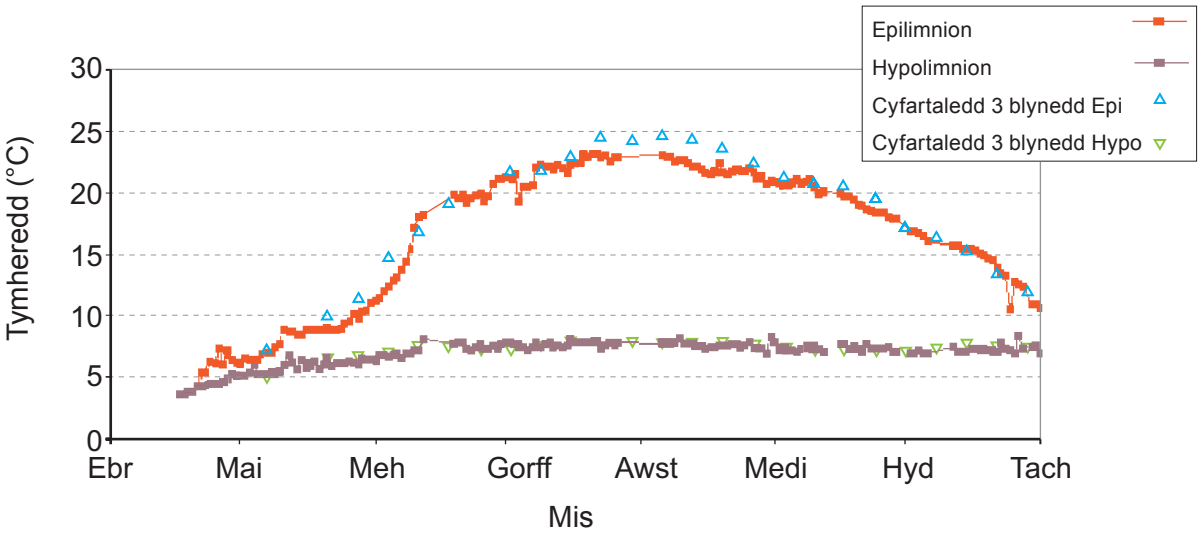
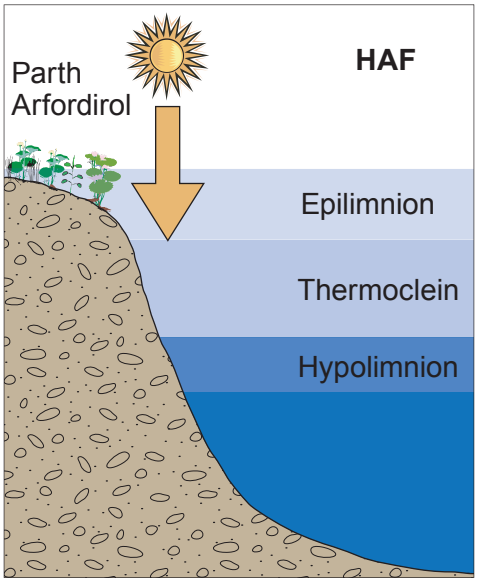
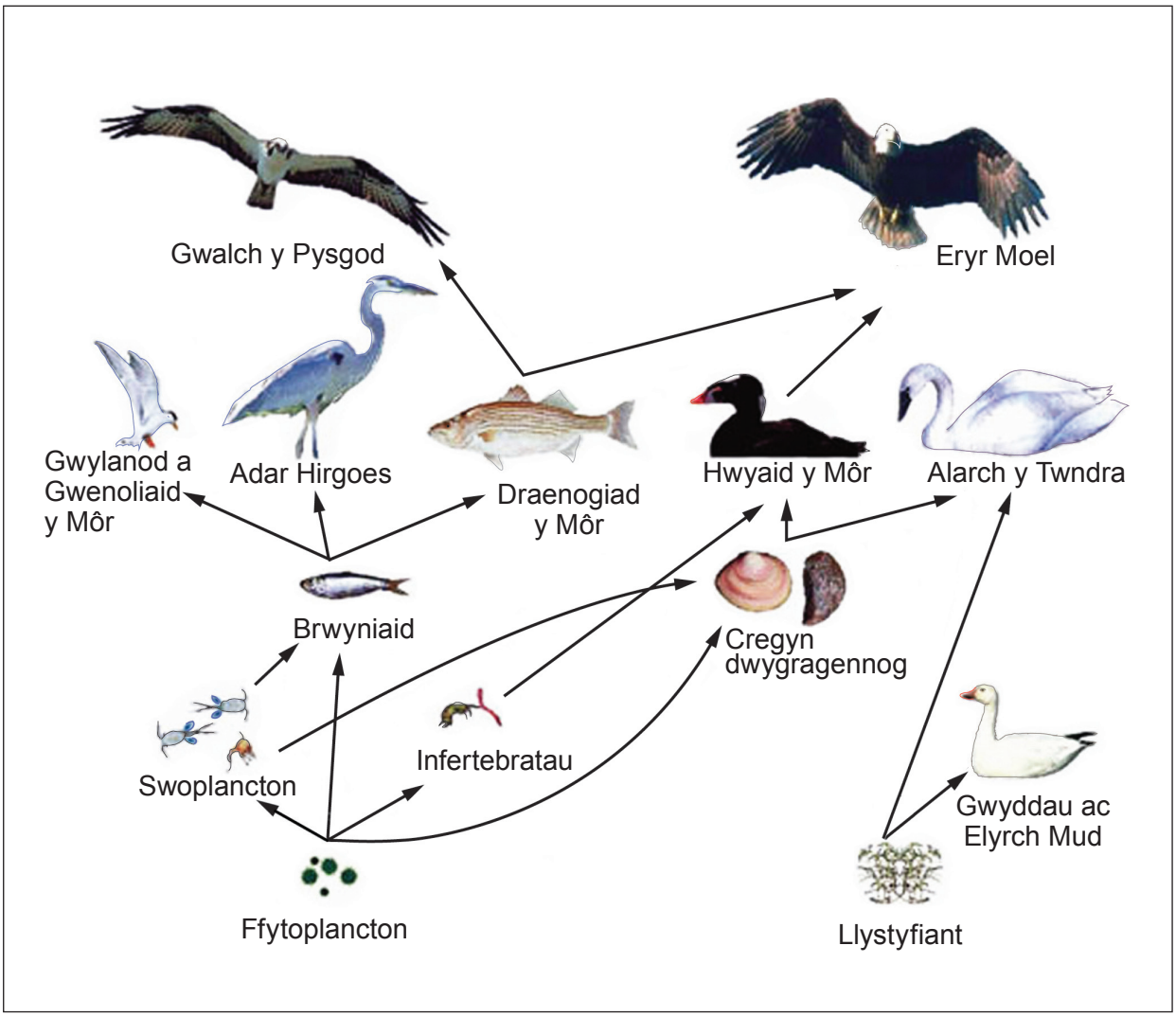


Diagram 2 **Sut mae dyfnder yn effeithio ar grynodiad yr ocsigen wedi hydoddi**



Mae'r haul yn gwresogi haen uchaf y dŵr, yr epilimnion, sy'n achosi iddo fynd yn llai dwys. Dydy'r haen waelod, yr hypolimnion, ddim yn derbyn golau'r haul ac felly mae'n parhau'n oer. Gan fod yr epilimnion yn llai dwys, mae'n arnofio uwchben yr hypolimnion a dydy'r ddau ddim yn cymysgu. Y thermoclein yw'r ardal rhwng yr haen uchaf a'r haen waelod sy'n gwahanu'r ddwy. Yr epilimnion yw unig ran y llyn lle mae golau'r haul yn gallu treiddio trwyddi.

Diagram 3 Gwe fwydydd Chesapeake



Cydnabyddiaethau:

http://www.epa.gov/glnpo/monitoring/d_o/

http://en.wikipedia.org/wiki/Chesapeake_Bay

Arholwr yn unig

Atebwch **bob** *cwestiwn yn y lleoedd gwag priodol.*

Defnyddiwch y wybodaeth yn y Ffolder Adnoddau sydd ar wahân i ateb y cwestiynau canlynol.

1. *(a)* (i) Rhowch **un** rheswm pam mai **dim ond** yn ystod oriau golau'r haul mae ffytoplancton a phlanhigion yn cynyddu crynodiad yr ocsigen. [1]

.....

.....

(ii) Rhowch **un** rheswm pam mai **dim ond** yn haen epilimnion y dŵr mae ffytoplancton byw a phlanhigion eraill i'w cael. [1]

.....

.....

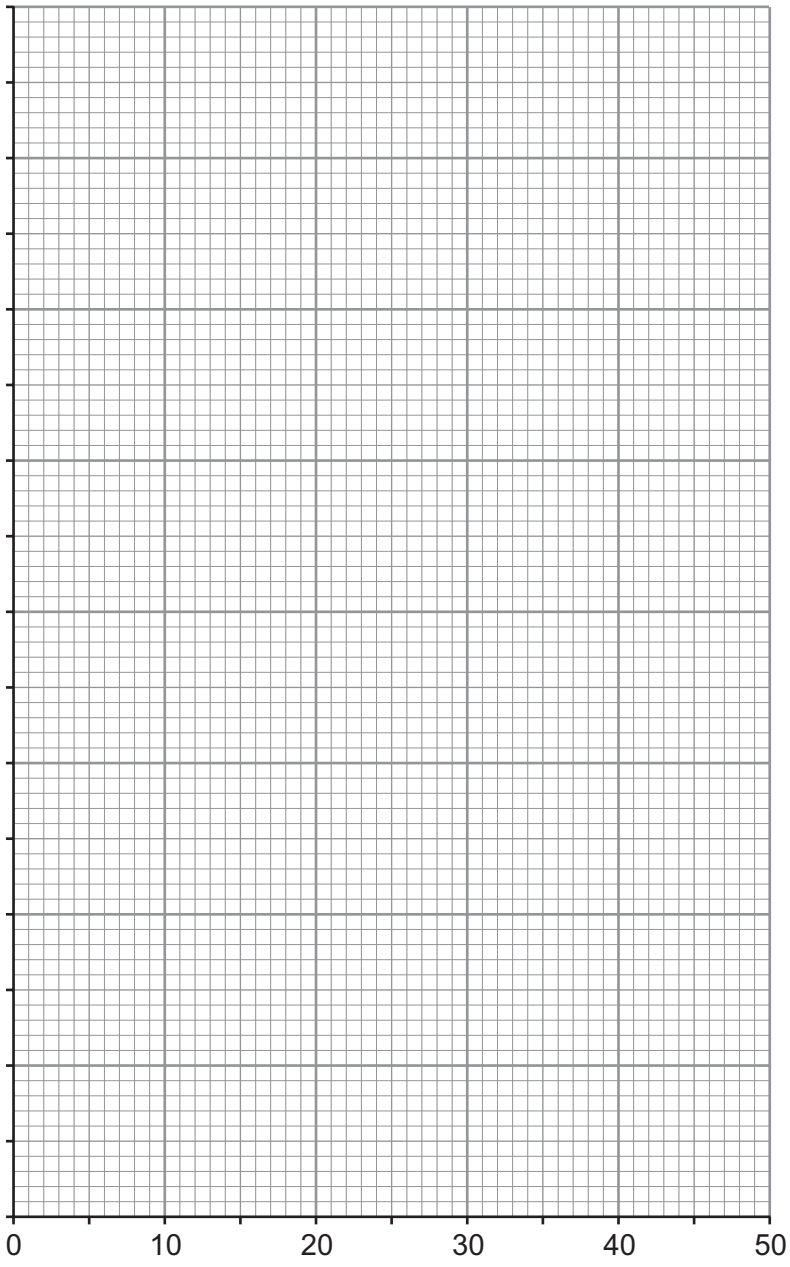
(b) Enwch y broses pan fydd ffytoplancton a phlanhigion yn lleihau crynodiad yr ocsigen yn ystod y nos. [1]

.....

(c) (i) Defnyddiwch y wybodaeth yn **Tabl 1** i gwblhau'r tabl isod. Yna, plotiwch graff i ddangos sut mae crynodiad yr ocsigen wedi hydoddi yn amrywio gyda thymheredd. [5]

Tymheredd (°C)	Crynodiad yr ocsigen wedi hydoddi (OH) (mg/l)
0	.....
6	.....
10	.....
14	.....
20	.....
26	.....
30	.....
40	.....

Arholwr yn unig



(ii) Disgrifiwch y patrwm sy'n cael ei ddangos gan eich graff. [2]

.....

.....

(iii) Ymestynnwch *(continue)* eich graff i amcangyfrif y tymheredd pan fydd lefelau'r ocsigen yn mynd yn ddigon isel i achosi straen i bysgod. [1]

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Arholwr yn unig

(ch) (i) Defnyddiwch **Graff 2** a'ch ateb i *(c)*(ii) i ddisgrifio sut bydd crynodiad yr ocsigen wedi hydoddi yn amrywio yn yr epilimnion rhwng mis Mai a mis Tachwedd. [3]

.....

.....

.....

.....

(ii) Defnyddiwch y wybodaeth yn **Diagram 1** a **Graff 1** i gwblhau'r tabl isod ar gyfer y flwyddyn **2006**. [4]

Mis	Crynodiad yr ocsigen wedi hydoddi (OH) (mg/l)	Cyflwr y pysgod
Mai	9	Iawn
Mehefin	.....	.....
Gorffennaf	.....	.....
Awst	.....	.....
Medi	.....	.....

Arholwr yn unig

(d) Defnyddiwch y we fwydydd *(food web)* yn **Diagram 3** i ateb y cwestiwn canlynol.
Mae crynodiad yr ocsigen wedi hydoddi yn gostwng digon i leihau nifer y brwyniaid.
Disgrifiwch sut bydd hyn yn effeithio ar y pethau byw eraill yn y we fwydydd. [6 ACY]

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GCSE MARKING SCHEME

SCIENCE B

JANUARY 2015

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<table>
<tr><th colspan="3">Question</th><th>Marking point</th><th>Marks</th></tr>
<tr><td>1</td><td>(a)</td><td>(i)</td><td>That is the time <u>photosynthesis</u> occurs [1]</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Light penetrates this layer / does not penetrate lower. [1]</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Respiration [1]</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><table><tr><th>Temperature (^{0}C)</th><th>Dissolved oxygen (DO) (mg/l)</th></tr><tr><td>0</td><td>14.60</td></tr><tr><td>6</td><td>12.43</td></tr><tr><td>10</td><td>11.27</td></tr><tr><td>14</td><td>10.29</td></tr><tr><td>20</td><td>9.07</td></tr><tr><td>26</td><td>8.09</td></tr><tr><td>30</td><td>7.54</td></tr><tr><td>40</td><td>6.41</td></tr></table>Table [1]
DO scale which covers at least half the axis [1]
Points [2]
Smooth curve [1]</td><td>5</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>As temperature increases the dissolved oxygen decreases / negative correlation [1] non uniformly [1]</td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Between 44-45˚C (from candidates graph)</td><td>1</td></tr>
<tr><td></td><td>(ch)</td><td>(i)</td><td>Temperature increases (May-Aug) <u>and</u> then decreases (to Nov) [1] (May to August) DO decreases <u>and</u> then increases (to November) [1] reference to months [1]</td><td>3</td></tr>
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Question			Marking point	Marks
	(d)		Indicative content • Food supply / prey of the anchovies will increase i.e. zooplankton and phytoplankton. • Less competition for these food sources will result in an increase in invertebrates and bivalves. • Animals that feed on anchovies will decrease in number e.g. gulls, waders and bass. • Since they have no other food source they may die. • Ospreys will decrease / die. • Bald eagles will feed more on Sea Ducks so their numbers will decrease meaning less competition for swans so their number will increase **Marking bands** **5-6 marks.** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6

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GCSE SCIENCE

JANUARY 2015 MARK SCHEME

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Question	Marking point	Marks
(e)	**Indicative content** • Food supply / prey of the anchovies will increase i.e. zooplankton and phytoplankton. • Less competition for these food sources will result in an increase in invertebrates and bivalves. • Animals that feed on anchovies will decrease in number e.g. gulls, waders and bass. • Since they have no other food source they may die. • Ospreys will decrease / die. • Bald eagles will feed more on Sea Ducks so their numbers will decrease meaning less competition for swans so their number will increase **Marking bands:** **5-6 marks.** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6

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