



**Cyfoeth
Naturiol
Cymru**
**Natural
Resources
Wales**

Monitoring Waterbird Distributions and the Feeding Activity of Oystercatcher and Knot in the Burry Inlet SPA and Carmarthen Bay SAC – The winter of 2013/14

Calbrade, N.A., Burton, N.H.K., Flannagan, A.,
Howells, R.J., Hughes, D.S., Hall, G. & Dodson, O.
British Trust for Ornithology

Natural Resources Wales Evidence Report No. 19

About Natural Resources Wales

Natural Resources Wales is the organisation responsible for the work carried out by the three former organisations, the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales. It is also responsible for some functions previously undertaken by Welsh Government.

Our purpose is to ensure that the natural resources of Wales are sustainably maintained, used and enhanced, now and in the future.

We work for the communities of Wales to protect people and their homes as much as possible from environmental incidents like flooding and pollution. We provide opportunities for people to learn, use and benefit from Wales' natural resources.

We work to support Wales' economy by enabling the sustainable use of natural resources to support jobs and enterprise. We help businesses and developers to understand and consider environmental limits when they make important decisions.

We work to maintain and improve the quality of the environment for everyone and we work towards making the environment and our natural resources more resilient to climate change and other pressures.

Evidence at Natural Resources Wales

Natural Resources Wales is an evidence based organisation. We seek to ensure that our strategy, decisions, operations and advice to Welsh Government and others are underpinned by sound and quality-assured evidence. We recognise that it is critically important to have a good understanding of our changing environment.

We will realise this vision by:

- Maintaining and developing the technical specialist skills of our staff;
- Securing our data and information;
- Having a well-resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
- Communicating our evidence in an open and transparent way.

This Evidence Report series serves as a record of work carried out or commissioned by Natural Resources Wales. It also helps us to share and promote use of our evidence by others and develop future collaborations. However, the views and recommendations presented in this report are not necessarily those of NRW and should, therefore, not be attributed to NRW.

Report series: NRW Contract Science Report
Report number: Natural Resources Wales Evidence Report No. 19
Publication date: March 2014
Contract number: EAS0605
Contractor: British Trust for Ornithology (BTO)
Contract Manager: M. Murphy
Title: Monitoring Waterbird Distributions and the Feeding Activity of Oystercatcher and Knot in the Burry Inlet SPA and Carmarthen Bay SAC – The winter of 2013/14
Author(s): Calbrade, N.A., Burton, N.H.K., Flannagan, A., Howells, R.J., Hughes, D.S., Hall, G. & Dodson, O.
Series editor(s): None
Restrictions: None

Distribution List (core)

NRW Library, Bangor	2
National Library of Wales	1
British Library	1
Welsh Government Library	1
Scottish Natural Heritage Library	1
Natural England Library (Electronic Only)	1

Recommended citation for this volume:

Calbrade, N.A., Burton, N.H.K., Flannagan, A., Howells, R.J., Hughes, D.S., Hall, G. & Dodson, O. 2014. Monitoring Waterbird Distributions and the Feeding Activity of Oystercatcher and Knot in the Burry Inlet SPA and Carmarthen Bay SAC – The winter of 2013/14. Natural Resources Wales Evidence Report No. 19, 51pp, NRW/BTO.

Contents

1. Crynodeb Gweithredol	7
2. Executive Summary	9
3. Introduction.....	11
4. Methodology	13
4.1. Support for WeBS Low Tide Counts of the Burry Inlet, Pembrey Coast and Three Rivers Estuary	13
4.2. Provision of additional information on the feeding activity of Oystercatcher and Knot.....	13
4.3. Coverage.....	13
5. Results and Discussion	17
5.1. Numbers of Oystercatcher and Knot between November 2013 and February 2014	17
5.2. Locations of flocks of Oystercatcher and Knot between November 2013 and February 2014	18
5.3. Identification of prey species.....	18
5.4. Proportions of birds recorded feeding and roosting.....	36
6. References	45
7. Acknowledgements.....	46
8. Appendices.....	47
Appendix 1: Coverage of the Burry Inlet, Pembrey Coast, Three Rivers Estuary and western sections of Carmarthen Bay	47
Data Archive Appendix.....	51

List of Figures

Figure 4.1.1 Burry Inlet SPA count sectors.	14
Figure 4.1.2 Pembrey Coast, Gwendraeth, Taf and Tywi Rivers (Three Rivers) count sectors. 14	
Figure 4.1.3 Count sectors in the west of Carmarthen Bay.	15
Figure 5.2.1 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in November 2013.	19
1	
Figure 5.2.2 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in November 2013.	20
Figure 5.2.3 Distribution of feeding and roosting Knot in the Burry Inlet in November 2013. .	21
Figure 5.2.4 Distribution of feeding and roosting Knot on the Pembrey Coast and in the Three Rivers Estuary in November 2013.	22
Figure 5.2.5 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in December 2013.	23
Figure 5.2.6 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in December 2013.	24
Figure 5.2.7 Distribution of feeding and roosting Knot on the Pembrey Coast and in the Three Rivers Estuary in December 2013.	25
Figure 5.2.8 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in January 2014.	26
Figure 5.2.9 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in January 2014.	27
Figure 5.2.10 Distribution of feeding and roosting Knot in the Burry Inlet in January 2014.	28
Figure 5.2.11 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in February 2014.	29
Figure 5.2.12 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in February 2014.	30
Figure 5.2.13 Distribution of feeding and roosting Knot in the Burry Inlet in February 2014. .	31
Figure 5.2.14 Distribution of feeding and roosting Oystercatcher in the Burry Inlet during the winter 2013/2014.	32
Figure 5.2.15 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary during the winter 2013/2014.	33
Figure 5.2.16 Distribution of feeding and roosting Knot in the Burry Inlet during the winter 2013/2014.	34
Figure 5.2.17 Distribution of feeding and roosting Knot on the Pembrey Coast and in the Three Rivers Estuary during the winter 2013/2014.	35
Figure A1.1 Coverage in November 2013. Green=covered, red=not covered.	47
Figure A1.2 Coverage in December 2013. Green=covered, red=not covered.	48
Figure A1.3 Coverage in January 2014. Green=covered, red=not covered.	49
Figure A1.4 Coverage in February 2014. Green=covered, red=not covered.	50

List of Tables

Table 5.1.1 Number of Oystercatcher recorded each month.	17
Table 5.1.2 Number of Knot recorded each month.	17
Table 5.4.1. Number of Oystercatcher feeding and roosting in November 2013.	36
Table 5.4.2. Number of Oystercatcher feeding and roosting in December 2013.	37
Table 5.4.3. Number of Oystercatcher feeding and roosting in January 2014.	38
Table 5.4.4. Number of Oystercatcher feeding and roosting in February 2014.	39
Table 5.4.5. Average number of Oystercatcher feeding and roosting in Burry Inlet across the winter 2013/14.	40
Table 5.4.6. Average number of Oystercatcher feeding and roosting on the Pembrey Coast and in the Three Rivers Estuary across the winter 2013/14.	41
Table 5.4.7. Number of Knot feeding and roosting in November 2013.	42
Table 5.4.8. Number of Knot feeding and roosting in December 2013.	42
Table 5.4.9. Number of Knot feeding and roosting in January 2014.	42
Table 5.4.10. Number of Knot feeding and roosting in February 2014.	42
Table 5.4.11. Average number of Knot feeding and roosting in Burry Inlet across the winter 2013/14.	43
Table 5.4.12. Average number of Knot feeding and roosting on the Pembrey Coast and in the Three Rivers Estuary across the winter 2013/14.	44

1. Crynodeb Gweithredol

Yn dilyn y gwaith a gyflawnwyd yn 2006/07, 2007/08, 2008/09 a 2009/10, gwnaethpwyd Cyfrifon Distyll Arolwg Adar Gwlyptiroedd (WeBS) ym Mhorth Tywyn, Arfordir Pembre ac yn Aber y Tair Afon yn ystod gaeafau 2010/11, 2011/12 a 2012/13. Mae'r adroddiad yma yn cyflwyno canlyniadau gwaith ychwanegol a wnaethpwyd yn ystod gaeaf 2013/14. Nod yr astudiaeth yma oedd cadarnhau Cyfrifon Distyll Arolwg Adar Gwlyptiroedd ychwanegol a wnaethpwyd yn ystod gaeaf 2013/14 ynghyd â darparu mwy o wybodaeth ynglyn â gweithgaredd bwydo piod môr a phibyddion yr aber sy'n defnyddio Porth Tywyn, Arfordir Pembre ac Aber y Tair Afon yn ystod y cyfnod distyll.

Gwnaethpwyd Cyfrifon Distyll Arolwg Adar Gwlyptiroedd gan dimau o wirfoddolwyr unwaith y mis rhwng Tachwedd 2013 a Chwefror 2014 ym Mhorth Tywyn, Arfordir Pembre ac yn Aber y Tair Afon gyda threfnwyr lleol yn cydgysylltu. Yr un oedd y sectorau cyfrif â'r rhai a ddefnyddiwyd yn arolygon y blynyddoedd blaenorol a chan gynllun Cyfrif Distyll Arolwg Adar y Gwlyptiroedd. Roedd y Cyfrifon yn canolbwyntio ar y rhywogaeth flaenoriaeth, sef y biod fôr a phibydd yr aber ond roedd hefyd yn cynnwys holl rwyogaethau adar gwlyptiroedd, ac fe wnaethpwyd y Cyfrifon yn ystod y ddwy awr bob ochr i'r distyll.

Nod y gwaith pellach oedd darparu gwybodaeth ychwanegol ar weithgaredd bwydo piod môr a phibyddion yr aber oedd yn defnyddio Porth Tywyn, Arfordir Pembre ac Aber y Tair Afon. Er mwyn cyflawni'r nod yma, anfonwyd ffurflenni cyfrif at y gwirfoddolwyr lle roedd hi'n bosib nodi cyfrif yr adar oedd yn bwydo ar wahân i'r cyfrif o adar oedd ddim yn bwydo. Anfonwyd mapiau atynt hefyd i gofnodi'n fwy penodol leoliadau heidiau o biod môr a phibyddion yr aber. Roeddent yn gallu nodi yn ogystal pa ysglyfaethau y gallai'r rhywogaethau fod yn ei fwyta.

Ar gyfartaledd, cafodd 8,549 a 4,693 o biod môr eu cofnodi yn ystod y gaeaf ym Mhorth Tywyn, ar Arfordir Pembre ac yn Aber y Tair Afon yn y drefn yna. Cafodd 108 a 421 o bibyddion yr aber eu cofnodi yn yr un modd yn ystod y gaeaf ym Mhorth Tywyn ac yn Aber y Tair Afon yn y drefn yna.

O fewn Arfordir Pembre ac Aber y Tair Afon, yr ardaloedd ar hyd adrannau'r de-ddwyrain DJ001-DJ004 ac adran DJ025 ar yr ochr orllenwinol oedd prif ardaloedd bwydo'r piod môr yn ystod gaeaf 2013/14 tra mai'r adrannau mewnol ger ceg yr afonydd oedd hoff leoedd yr adar oedd yn clwydo.

Roedd dosbarthiad y piod môr oedd yn bwydo ym Mhorth Tywyn yn ystod gaeaf 2013/14 yn eang, gyda Thrwyn Whiteford (DB029) a'r morfaedd i'r de o Lanelli (adrannau DB004, DB006, DB009 a DB020) yn hoff fannau. Roedd yr adar oedd yn clwydo wedi'u dosbarthu'n eang gyda'r heidiau mwyaf yn adrannau DB004, DB006, DB009, DB020, DB030 a DB099.

Cafodd nifer fechan o bibyddion yr aber eu cofnodi ym Mhorth Tywyn gydag adar oedd yn bwydo yn cael eu cofnodi yn DB016, DB099 a DB004. Yr haid fwyaf o bibyddion yr aber i'w cofnodi ym Mhorth Tywyn oedd 250 o adar.

Mae'r rhan fwyaf o'r Cwlwm cofnodi o fewn Arfordir Pen-bre a Moryd y Tair Afon yn ystod gaeaf 2013/14 yn bwydo adar, a geir ar hyd y rhannau de-ddwyrain DJ001-DJ004, a'r grŵp mwyaf oedd 566 o adar. Mae un grŵp o 40 o adar yn clwydo yn DJ008 oedd yr unig haid clwydo a gofnodwyd.

Ceir crynodeb o'r data ynglŷn â niferoedd yr adar a arsylwyd yn bwydo ac yn clwydo yn yr heidiau o biod môr a phibyddion yr aber.

Gan mai o gryn bellter y buwyd yn arsylwi'r adar oedd yn bwydo ni chofnodwyd ysglyfaethau yr un o'r rhywogaethau.

2. Executive Summary

Following the work undertaken in 2006/07, 2007/08, 2008/09 and 2009/10, standard WeBS Low Tide Counts of the Burry Inlet, Pembrey Coast and Three Rivers Estuary were carried out in the winter of 2010/11, 2011/12 and 2012/13. This report presents the results of additional work undertaken in the winter of 2013/14. The aims of this study were to support further WeBS Low Tide Counts carried out in the winter of 2013/14 and to provide additional information on the feeding activity of Oystercatcher and Knot using the Burry Inlet, Pembrey Coast and Three Rivers Estuary during the low tide period.

WeBS Low Tide Counts were carried out by teams of volunteers co-ordinated by local organisers at the Burry Inlet, Pembrey Coast and Three Rivers Estuary once a month from November 2013 to February 2014. Count sectors matched those used in the previous years' surveys and by the WeBS Low Tide Counts scheme. Counts were focused on the priority species of Oystercatcher and Knot but included all waterbird species, and were undertaken during the two hours either side of low tide.

Further work aimed to provide additional information on the feeding activity of Oystercatcher and Knot using the Burry Inlet, Pembrey Coast and Three Rivers Estuary. To achieve this aim, volunteer observers were sent count forms that allowed the separation of counts of feeding and non-feeding birds and maps to record more precisely the locations of flocks of Oystercatcher and Knot and to indicate what prey items the species may be feeding on.

On average, 8,549 and 4,693 Oystercatcher were recorded across the winter in the Burry Inlet, and on the Pembrey Coast and the Three Rivers Estuary respectively. An average of 108 and 421 Knot were similarly recorded across the winter in the Burry Inlet, and on the Pembrey Coast and the Three Rivers Estuary respectively.

Within the Pembrey Coast and the Three Rivers Estuary, the main feeding areas of Oystercatcher in the winter of 2013/14 were along the south-eastern sections DJ001-DJ004 and on the west side in DJ025, whilst the inner sections by the mouth of the rivers were favoured by roosting birds.

The distribution of feeding Oystercatcher in the Burry Inlet in the winter of 2013/14 was widespread, with Whiteford Point (DB029), and the flats south from Llanelli (sections DB004, DB006, DB009 and DB020) being favoured areas. Roosting birds were widespread with the largest flocks being in sections DB004, DB006, DB009, DB020, DB030 and DB099.

Small numbers of Knot were recorded in the Burry Inlet with feeding birds recorded in DB016, DB099 and DB004. The largest flock of Knot recorded in the Burry Inlet was 250 birds.

The majority of the Knot recorded within the Pembrey Coast and the Three Rivers Estuary in the winter of 2013/14 were feeding birds, found along the south-eastern sections DJ001-DJ004, the largest group being 566 birds. One group of 40 birds roosting in DJ008 was the only roosting flock recorded.

Data on the numbers of feeding and roosting birds in the flocks of Oystercatcher and Knot observed are summarised.

No prey identification was recorded for either species due to the distances that feeding birds were observed at.

3. Introduction

As part of Natural Resources Wales (NRW)'s monitoring and management programme of Natura 2000 sites, the British Trust for Ornithology (BTO) organised a series of co-ordinated four-hour low tide bird distribution surveys of the Carmarthen Bay & Estuaries Special Area of Conservation (SAC, including the Burry Inlet Special Protection Area (SPA), the Pembrey Coast and the Three Rivers Estuary) during the winters of 2006/07, 2007/08, 2008/09 and 2009/10 (Banks et al. 2007, Burton et al. 2008, 2009, 2010). Following this work, standard WeBS Low Tide Counts of the Burry Inlet, Pembrey Coast and Three Rivers Estuary were carried out in the winters of 2010/11, 2011/12 and 2012/13 (Calbrade et al. 2012, 2013). The Burry Inlet SPA supports nationally and internationally important populations of wintering wildfowl and waders (specifically Shelduck *Tadorna tadorna*, Pintail *Anas acuta*, Shoveler *Anas clypeata*, Oystercatcher *Haematopus ostralegus*, Knot *Calidris canutus*, Dunlin *Calidris alpina*, Black-tailed Godwit *Limosa limosa* and Curlew *Numenius arquata*).

Count sectors were based on those used for the volunteer Wetland Bird Survey (WeBS) Low Tide Count (LTC) scheme, though the project existed independently of WeBS and was funded directly by NRW. The principal aim of the study was to ascertain waterbird distributions in the period immediately before and after low water and whether there was evidence that birds might move between the Burry Inlet and the neighbouring Pembrey Coast and Three Rivers Estuary.

The work focussed on Oystercatcher and Knot, species which predominantly feed on cockles and mussels and thus which might be affected by the large shellfishing operations in the area. The study thus particularly aimed to record the feeding distributions of these species so as to inform management decisions aimed at reducing conflict between the cockle and mussel fisheries and the designated features of the SPA.

The study emphasized the importance of the intertidal areas of the Pembrey Coast and the Three Rivers Estuary for wintering waterbirds, numbers of Oystercatcher being not dissimilar to those at the Burry Inlet. Both the count data collected and observations of Oystercatcher dye-marked on the Burry Inlet provided some evidence that Oystercatcher moved between sectors on the Burry Inlet SPA and those on the Pembrey coast / Three Rivers Estuary area.

Following the work undertaken in 2006/07, 2007/08, 2008/09, 2009/10, 2010/11, 2011/12 and 2012/13, standard WeBS Low Tide Counts were again carried out in the winter of 2013/14.

This report presents the results of additional work undertaken in the winter of 2013/14. The aims of this work were twofold:

- i. To support further WeBS Low Tide Counts carried out in the winter of 2013/14;

ii. To provide additional information on the feeding activity of Oystercatcher and Knot using the Burry Inlet, Pembrey Coast and Three Rivers Estuary during the low tide period.

4. Methodology

4.1. Support for WeBS Low Tide Counts of the Burry Inlet, Pembrey Coast and Three Rivers Estuary

WeBS Low Tide Counts were carried out by teams of volunteers co-ordinated by local organisers at the Burry Inlet, Pembrey Coast and Three Rivers Estuary once a month from November 2013 to February 2014. Count sectors matched those used in the previous years' surveys and by the WeBS Low Tide Counts scheme (Figures 4.1.1-4.1.3). Counts were focused on the priority species of Oystercatcher and Knot but included all waterbird species, and were undertaken during the two hours either side of low tide (see <http://www.bto.org/volunteer-surveys/webs/taking-part/low-tide-counts-methods> for more details of the scheme methods).

A team of five local WeBS counters undertook the surveys, with support from BTO staff to aim to ensure that as complete coverage as possible was obtained. Preferred count dates were agreed in advance with the WeBS local organisers.

4.2. Provision of additional information on the feeding activity of Oystercatcher and Knot

Further work aimed to provide additional information on the feeding activity of Oystercatcher and Knot using the Burry Inlet, Pembrey Coast and Three Rivers Estuary in the winter of 2013/14. To achieve this aim, volunteer observers were sent count forms that allowed the separation of counts of feeding and non-feeding birds and maps to record more precisely the locations of flocks of Oystercatcher and Knot and to indicate (where it was possible to observe this) what prey items the species may have been feeding on.

4.3. Coverage

Good coverage of the main areas where Oystercatchers and Knot have been observed in past surveys was achieved in November, December and January. Unfortunately, the storms in late January and February caused quite a lot of damage around Carmarthen Bay and the team of counters who work for the local council were busy mending damage and so were not able to carry out counts in February. Many of the sections on the west side of Carmarthen Bay were not covered this winter, but in the past has not been found to be a high priority area for feeding or roosting Oystercatcher and Knot. The maps of the coverage of both Burry Inlet and Carmarthen Bay appear in Appendix 1.

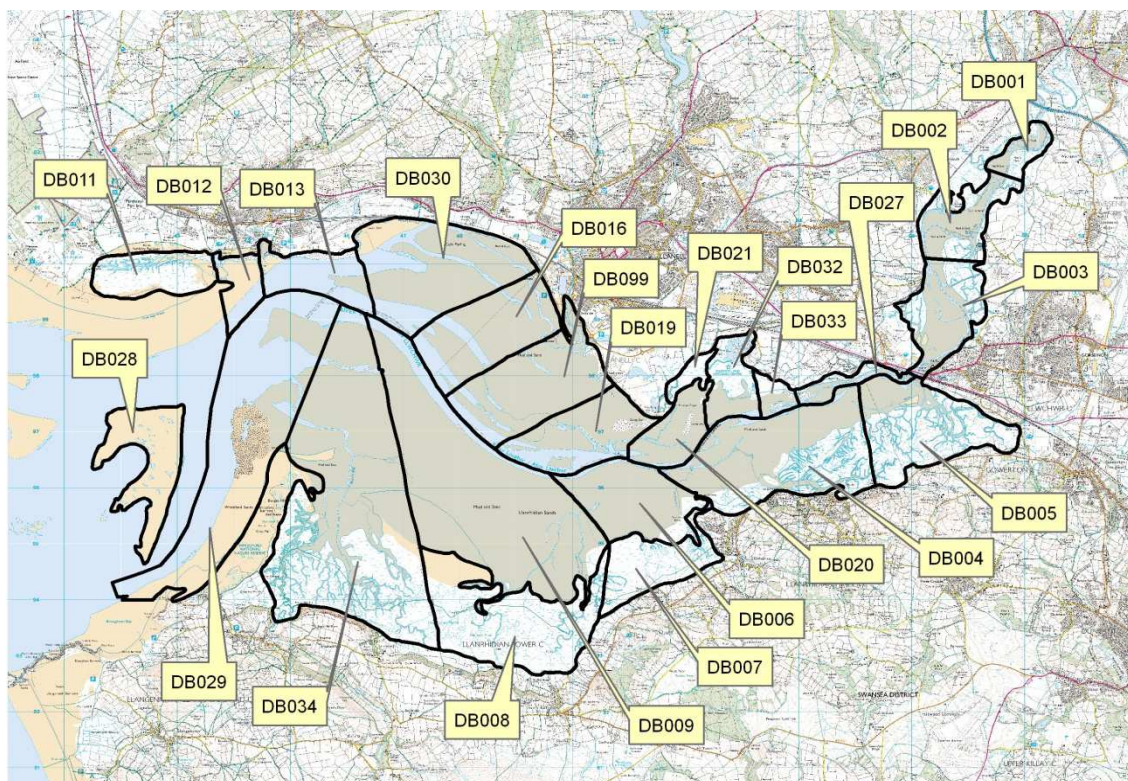


Figure 4.1.1 Burry Inlet SPA count sectors.

©Crown Copyright. All rights reserved. Licence Number: 100021787.

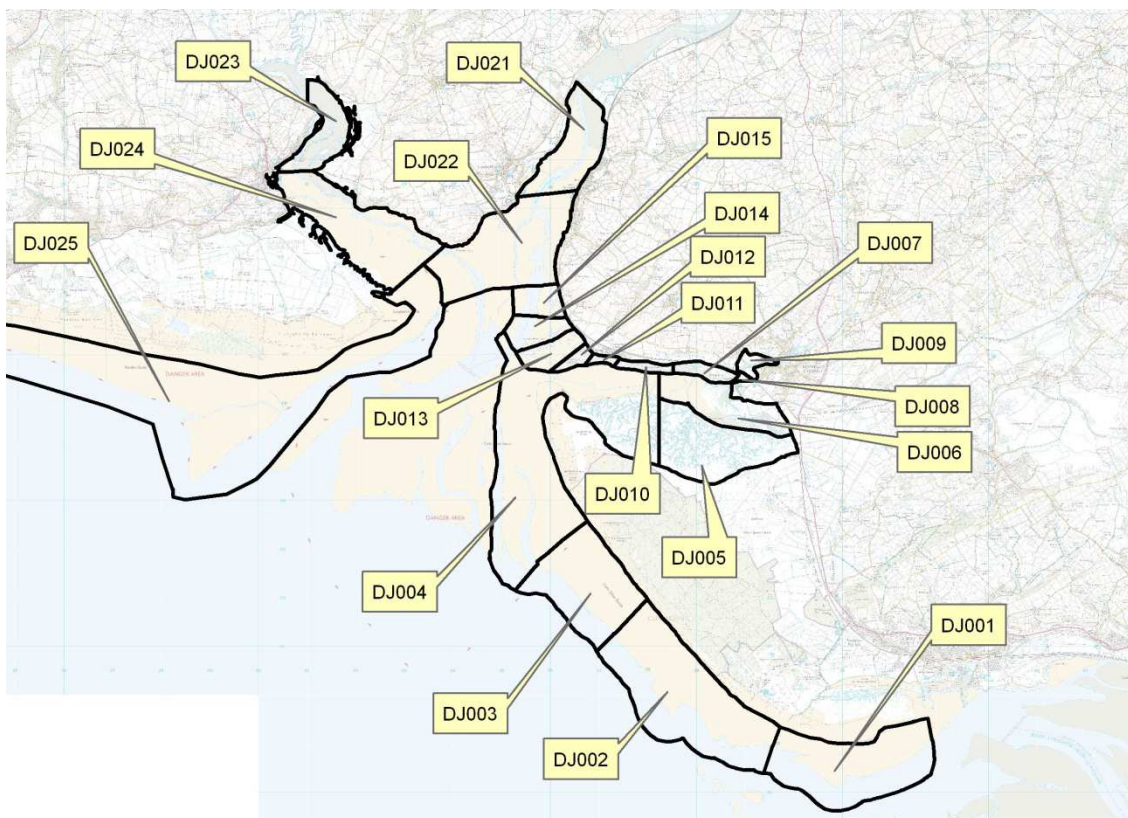


Figure 4.1.2 Pembrey Coast, Gwendraeth, Taf and Tywi Rivers (Three Rivers) count sectors.

©Crown Copyright. All rights reserved. Licence Number: 100021787.

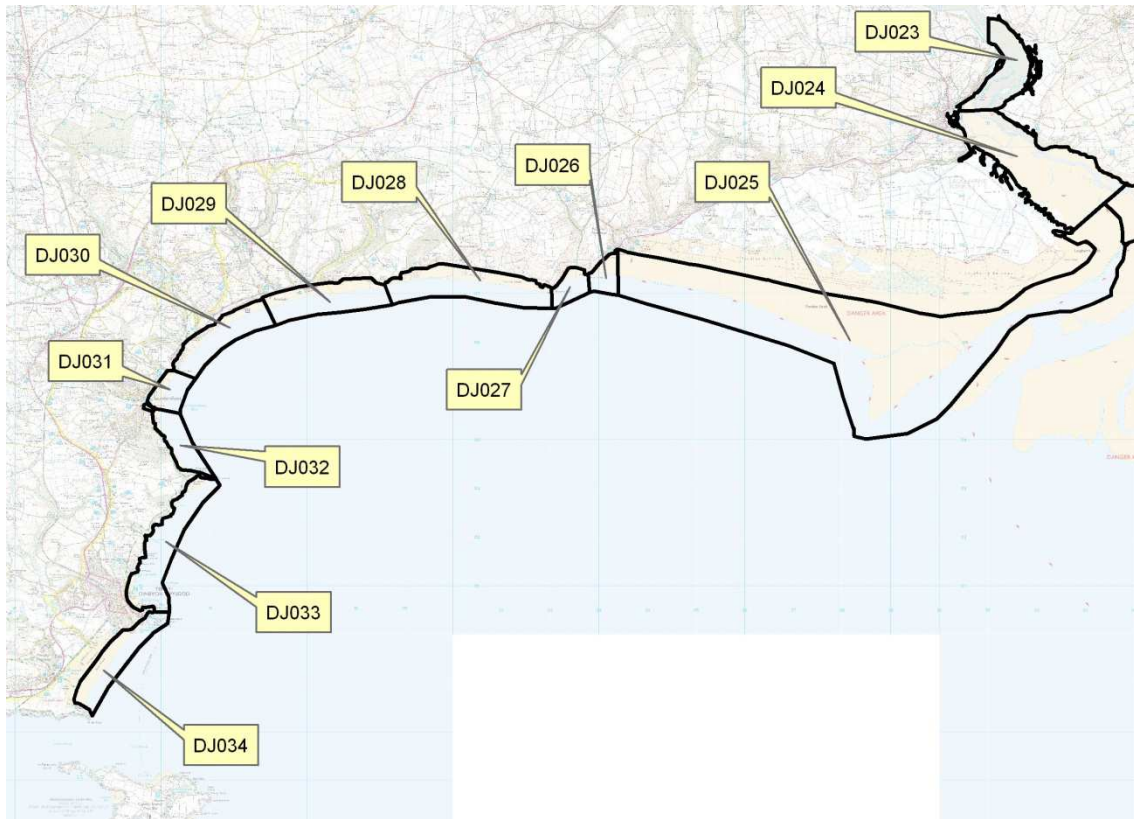


Figure 4.1.3 Count sectors in the west of Carmarthen Bay.
©Crown Copyright. All rights reserved. Licence Number: 100021787.

5. Results and Discussion

5.1. Numbers of Oystercatcher and Knot between November 2013 and February 2014

Tables 5.1.1 and 5.1.2 show the number of Oystercatcher and Knot recorded each month in the winter of 2013/14, as well as winter means (calculated as the sums of the means for each sector across the winter). Note, as counts may be carried out over several days, birds moving between sections may potentially be counted more than once, or alternatively, missed.

On average, 8,549 and 4,693 Oystercatcher were recorded across the winter in the Burry Inlet, and on the Pembrey Coast and the Three Rivers Estuary respectively (total = 13,342). An average of 108 and 421 Knot were similarly recorded across the winter in the Burry Inlet, and on the Pembrey Coast and the Three Rivers Estuary respectively (total = 529).

Table 5.1.1 Number of Oystercatcher recorded each month.

	Burry Inlet			Pembrey Coast and the Three Rivers Estuary			Total		
	Feeding	Roosting	Total	Feeding	Roosting	Total	Feeding	Roosting	Total
Nov	5,058	5,921	10,979	3,082	3,010	6,092	8,140	8,931	17,071
Dec	4,585	1,000	5,585	2,554	1,268	3,822	7,139	2,268	9,407
Jan	3,833	820	4,653	3,192	992	4,184	7,025	1,812	8,837
Feb	5,436	3,031	8,467	0	423	423	5,436	3,454	8,890
Winter Mean	4,815	3,732	8,549	2,867	1,826	4,693	7,682	5,558	13,242

Table 5.1.2 Number of Knot recorded each month.

	Burry Inlet			Pembrey Coast and the Three Rivers Estuary			Total		
	Feeding	Roosting	Total	Feeding	Roosting	Total	Feeding	Roosting	Total
Nov	251	0	251	1,116	40	1,156	1,367	40	1,407
Dec	0	0	0	110	0	110	110	0	110
Jan	94	0	94	0	0	0	94	0	94
Feb	82	0	82	0	0	0	82	0	82
Winter Mean	108	0	108	408	13	421	516	13	529

5.2. Locations of flocks of Oystercatcher and Knot between November 2013 and February 2014

Figures 5.2.1-5.2.13 summarising the locations of feeding and roosting Oystercatcher and Knot in the winter of 2013/14 were created using ArcView GIS 10 from the maps produced by the counters in the field. Figures 5.2.14-5.2.15 and 5.2.16-5.2.17 provide an average picture for Oystercatcher and Knot respectively across the winter as a whole. There were no Knot recorded in the Burry Inlet in December and no Knot recorded in the Pembrey Coast and the Three Rivers Estuary in January or February.

The distribution of feeding Oystercatcher in the Burry Inlet in the winter of 2013/14, with Whiteford Point (DB029) and the flats south from Llanelli (sections DB004, DB006, DB009 and DB020) being favoured areas. Roosting birds were widespread with the largest flocks being in sections DB004, DB006, DB009, DB020, DB030 and DB099.

Within the Pembrey Coast and the Three Rivers Estuary in the winter of 2013/14, the main feeding areas of Oystercatcher were along the south-eastern sections DJ001-DJ004 and on the west side in DJ025. The inner sections by the mouth of the rivers were largely favoured by roosting birds, though some mixed flocks were recorded.

Small numbers of Knot were recorded in the Burry Inlet with feeding birds recorded in DB016, DB099 and DB004 and no records of any roosting birds. The largest flock of Knot recorded in the Burry Inlet was 250 birds in DB020 in November 2013; it was not possible to allocate a flock of 400 seen only in flight in February 2014 to any one section and so this has not been included in the data presented.

The majority of the Knot recorded within the Pembrey Coast and the Three Rivers Estuary in the winter of 2013/14 were feeding birds, found along the south-eastern sections DJ001-DJ004, the largest group being 566 birds. One group of 40 birds roosting in DJ008 was the only roosting flock recorded.

5.3. Identification of prey species

Due to the distances involved in counting the flocks of birds, we received no formal identification of prey items for either species.

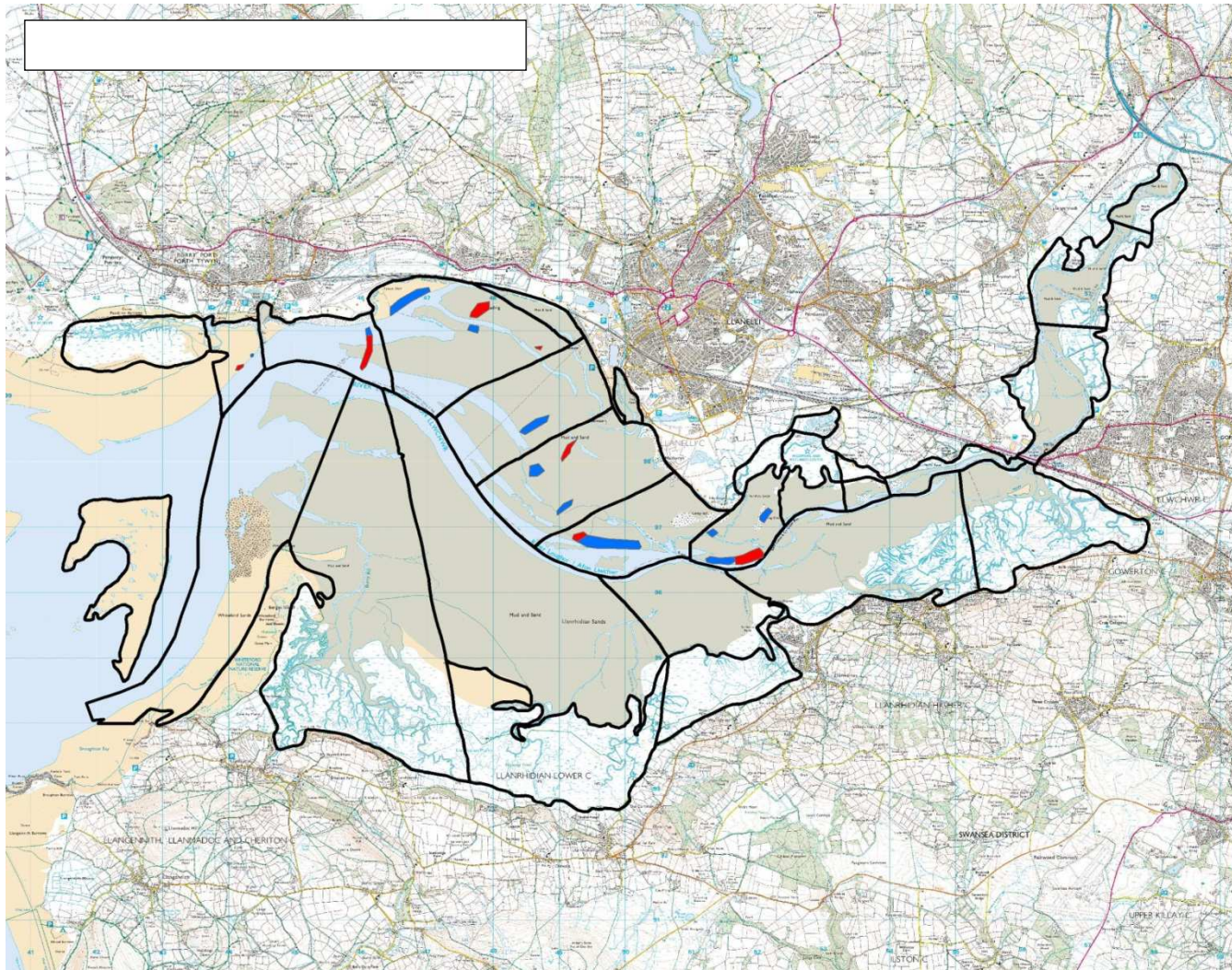


Figure 5.2.1 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in November 2013.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

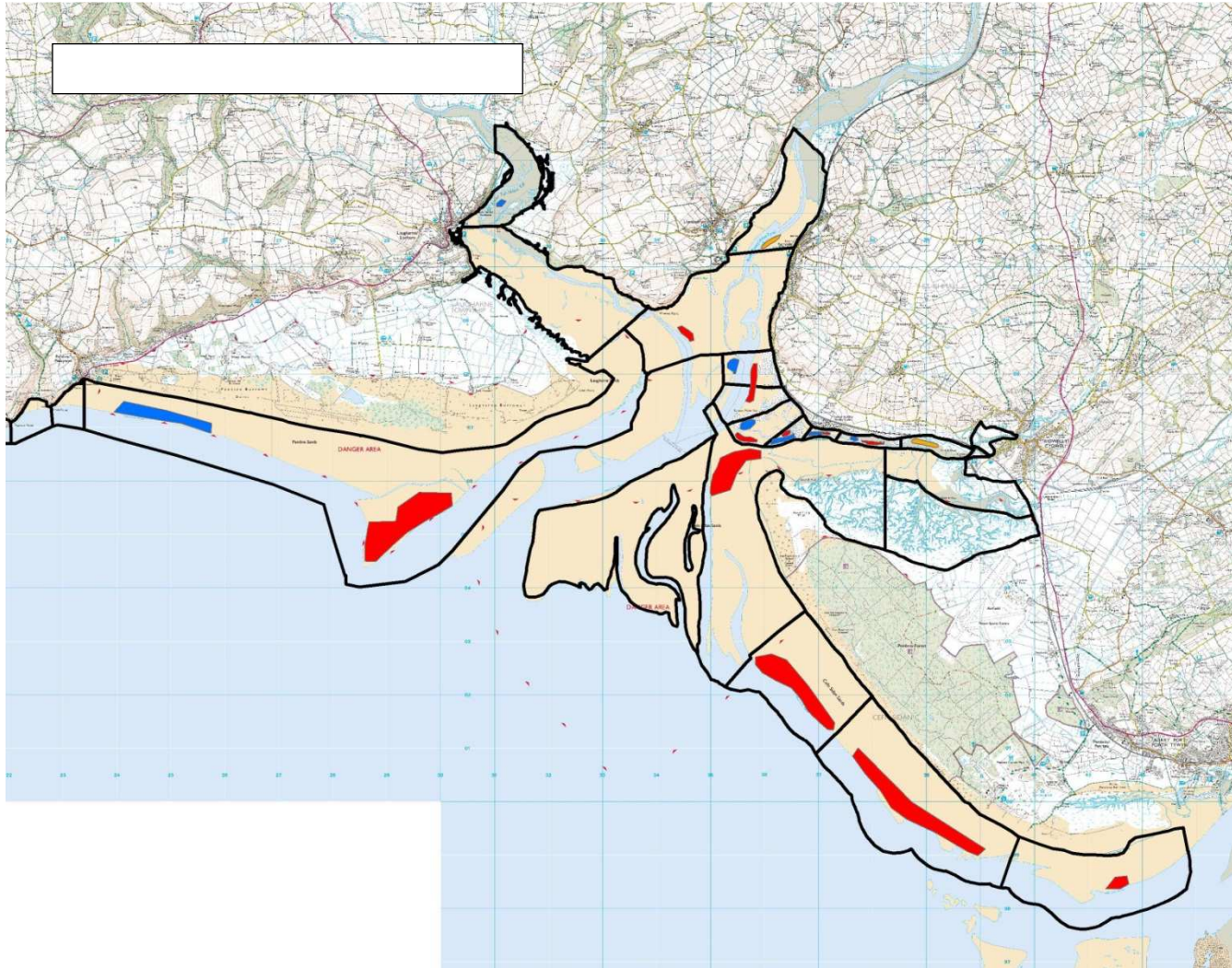


Figure 5.2.2 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in November 2013. Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

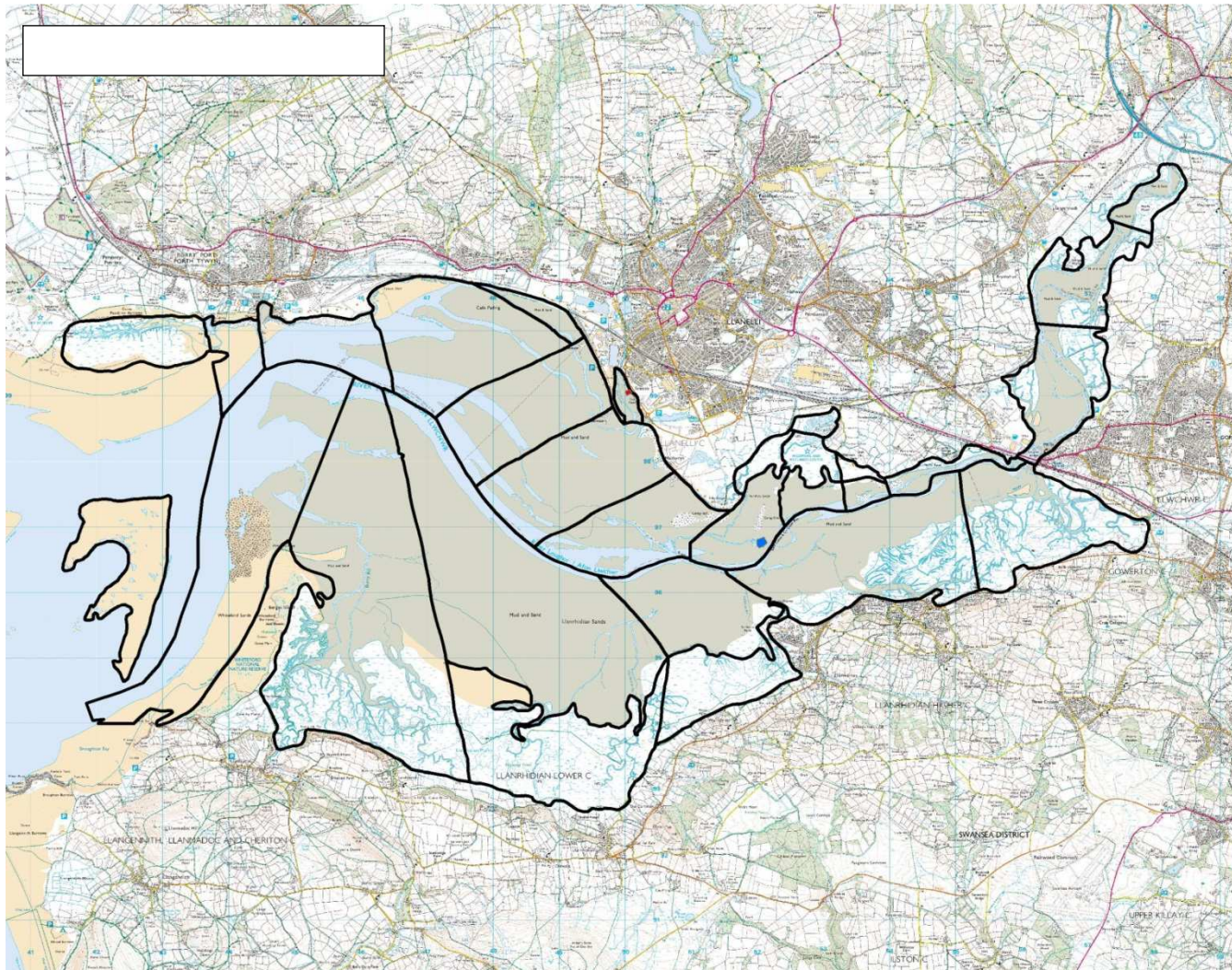


Figure 5.2.3 Distribution of feeding and roosting Knot in the Burry Inlet in November 2013.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

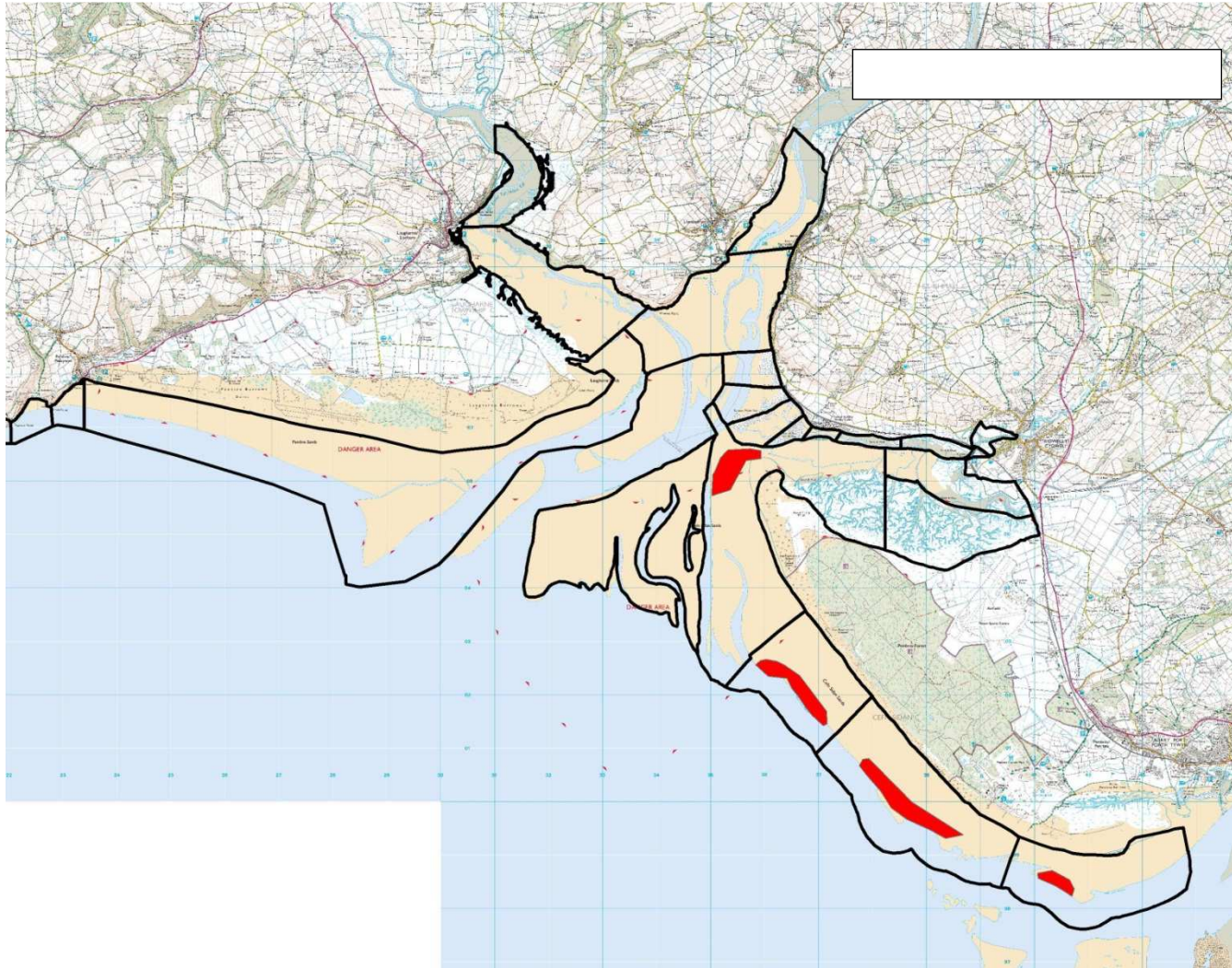


Figure 5.2.4 Distribution of feeding and roosting Knot on the Pembrey Coast and in the Three Rivers Estuary in November 2013. Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

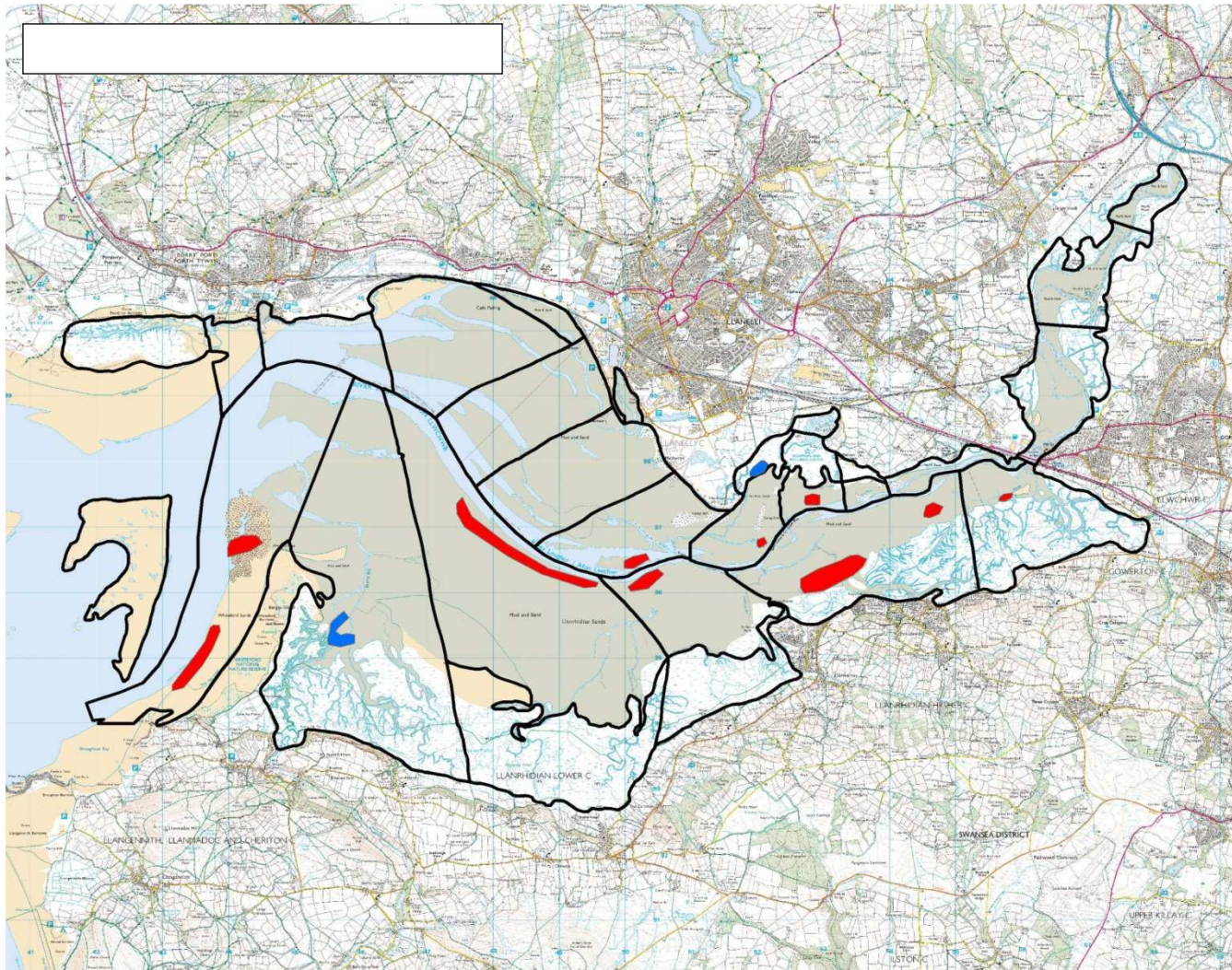


Figure 5.2.5 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in December 2013.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

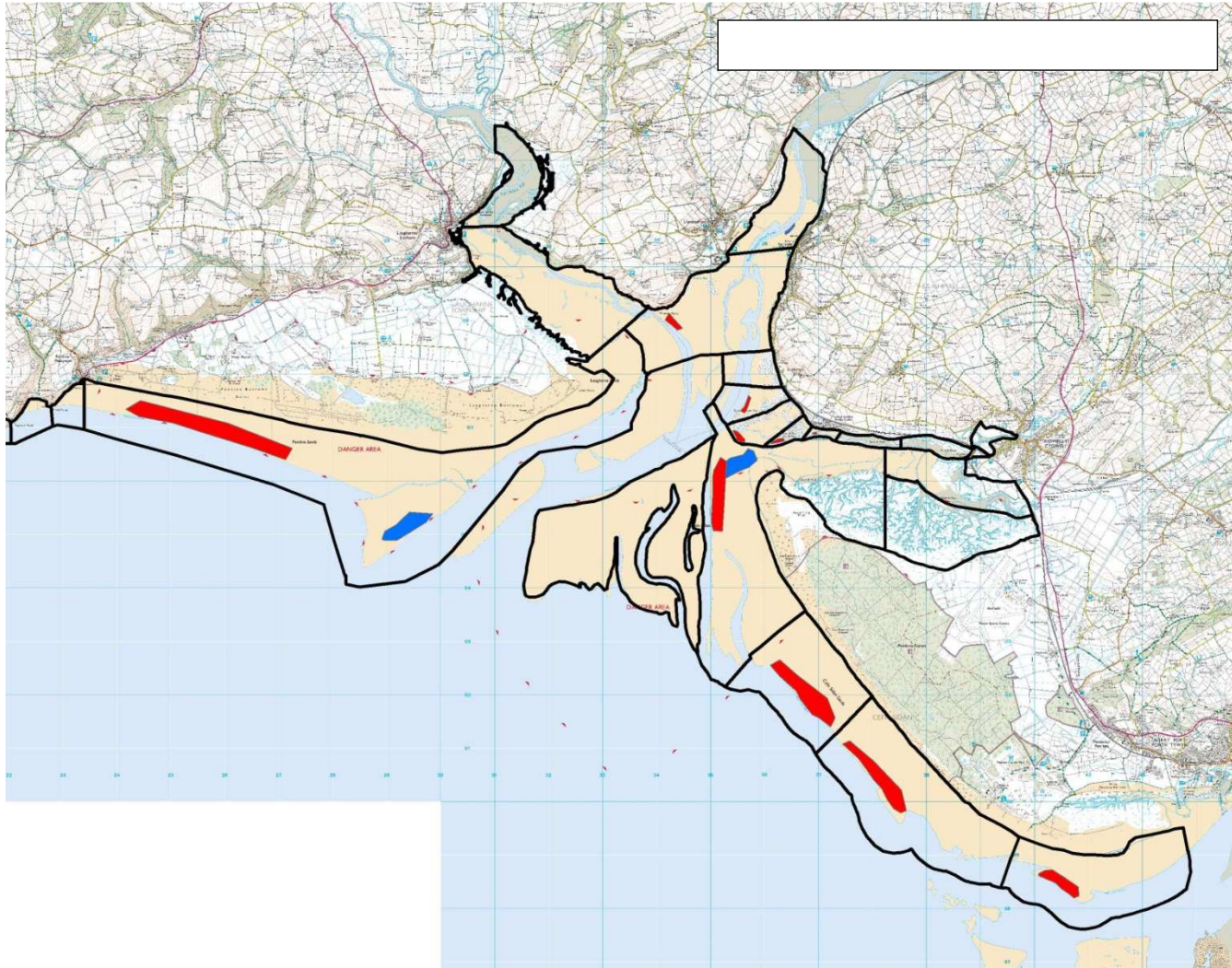


Figure 5.2.6 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in December 2013. Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

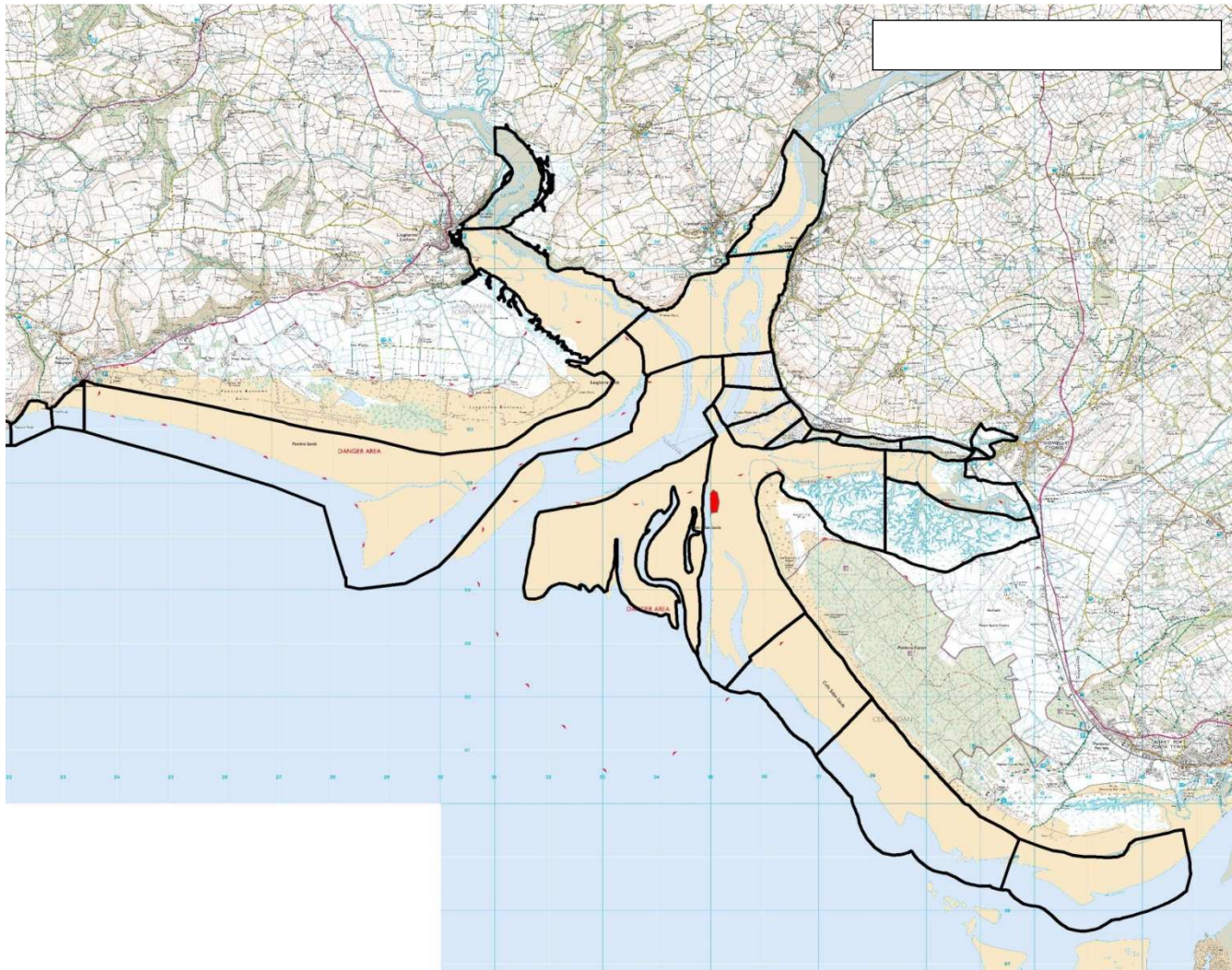


Figure 5.2.7 Distribution of feeding and roosting Knot on the Pembrey Coast and in the Three Rivers Estuary in December 2013. Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

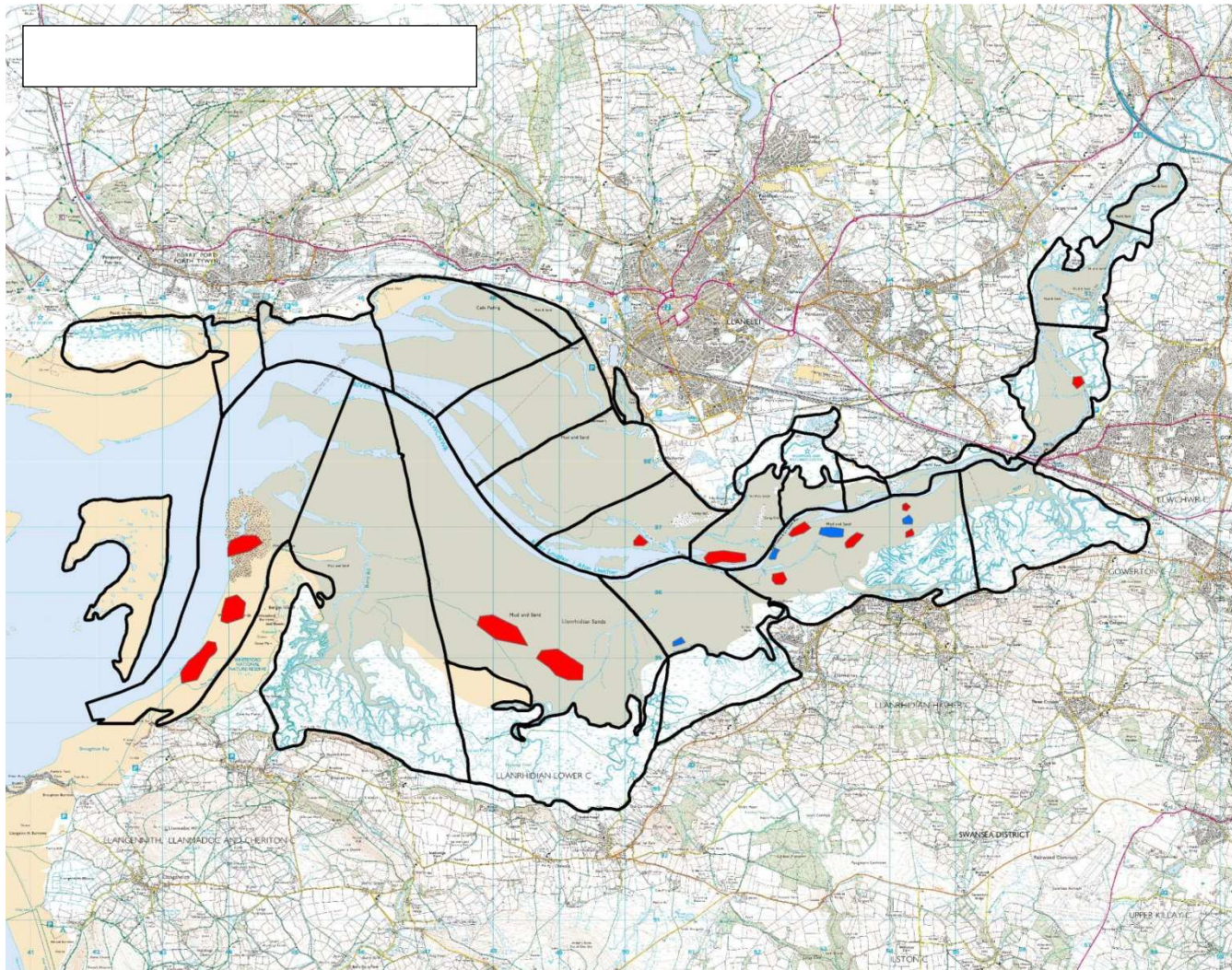


Figure 5.2.8 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in January 2014.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

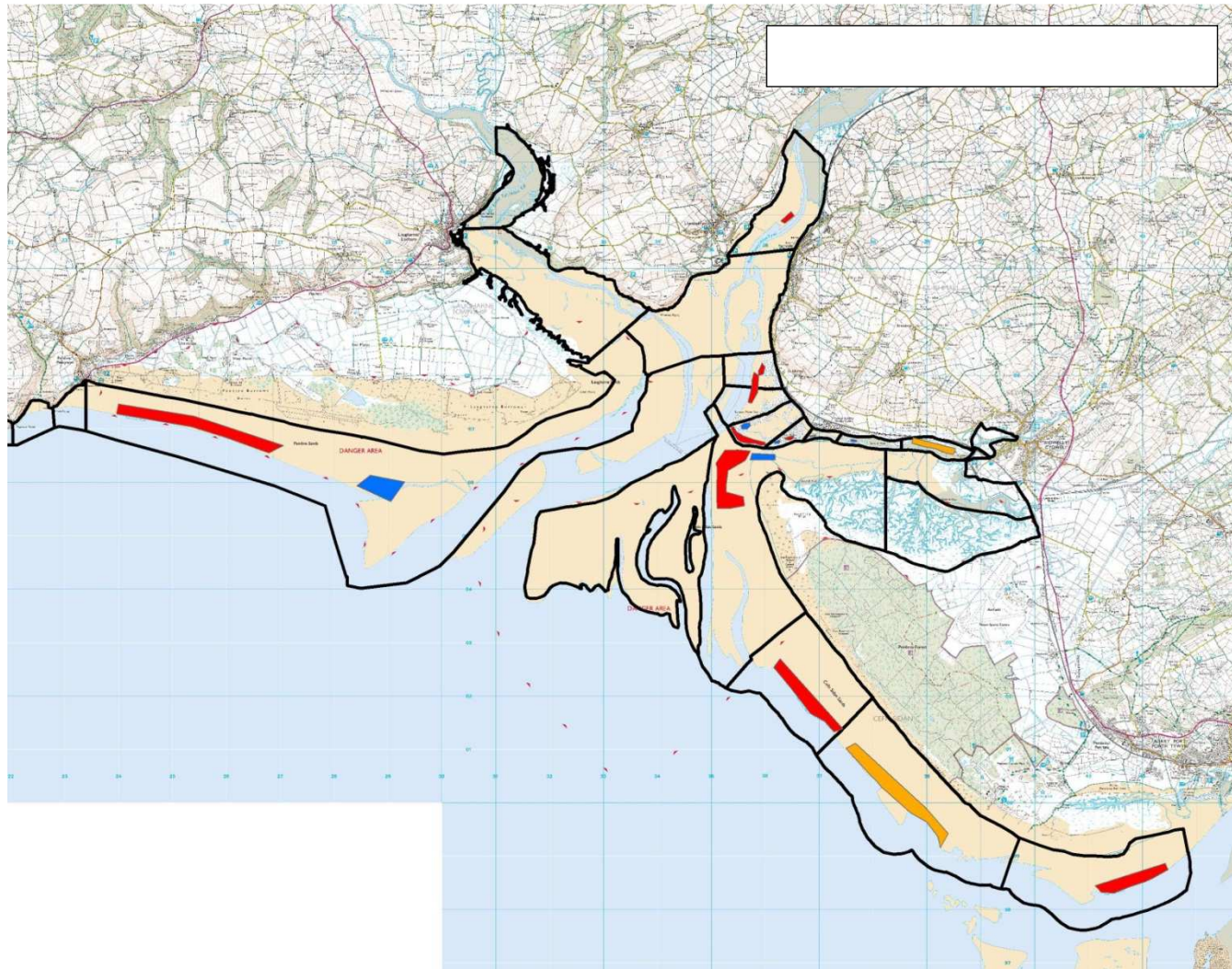


Figure 5.2.9 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in January 2014. Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

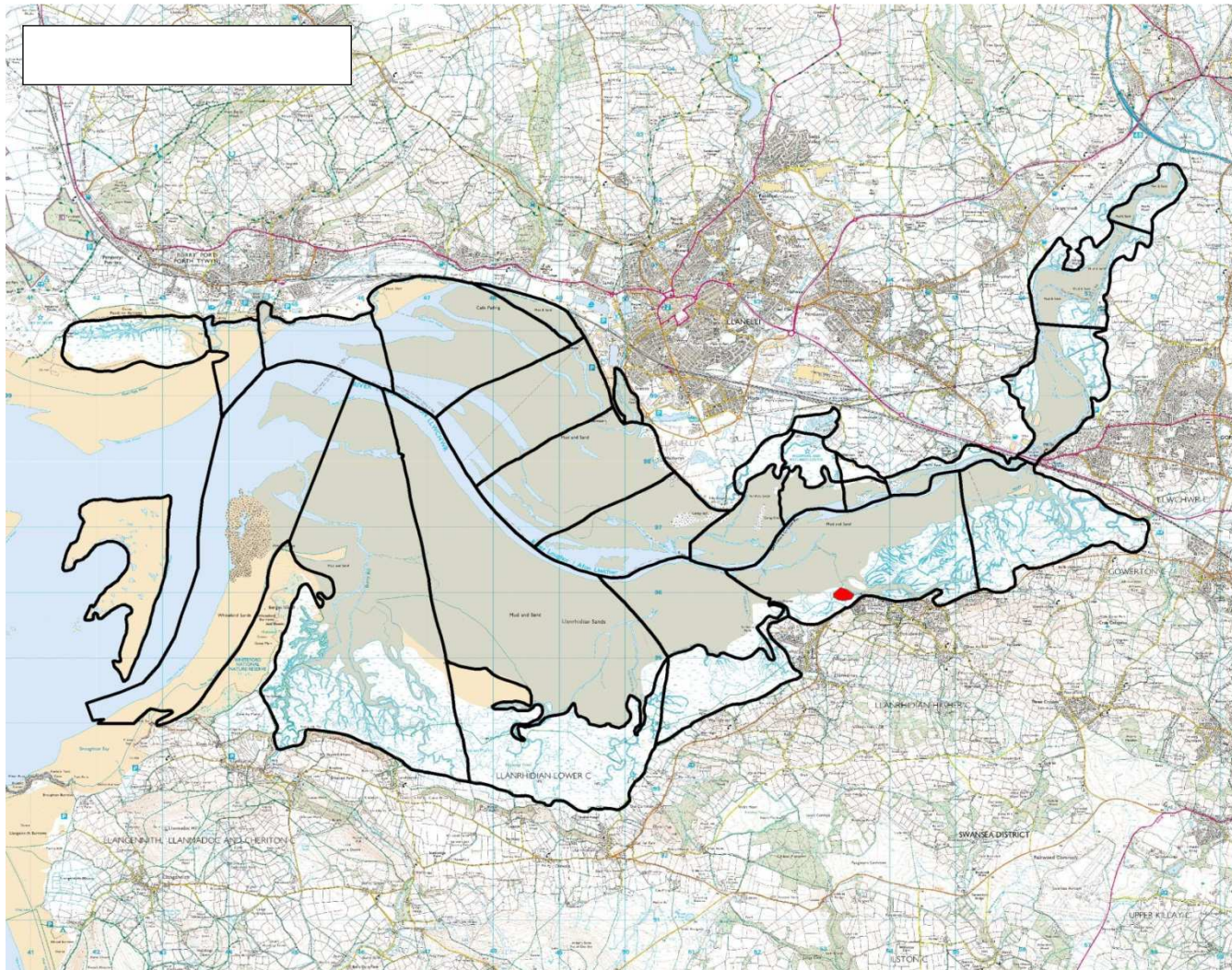


Figure 5.2.10 Distribution of feeding and roosting Knot in the Burry Inlet in January 2014.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

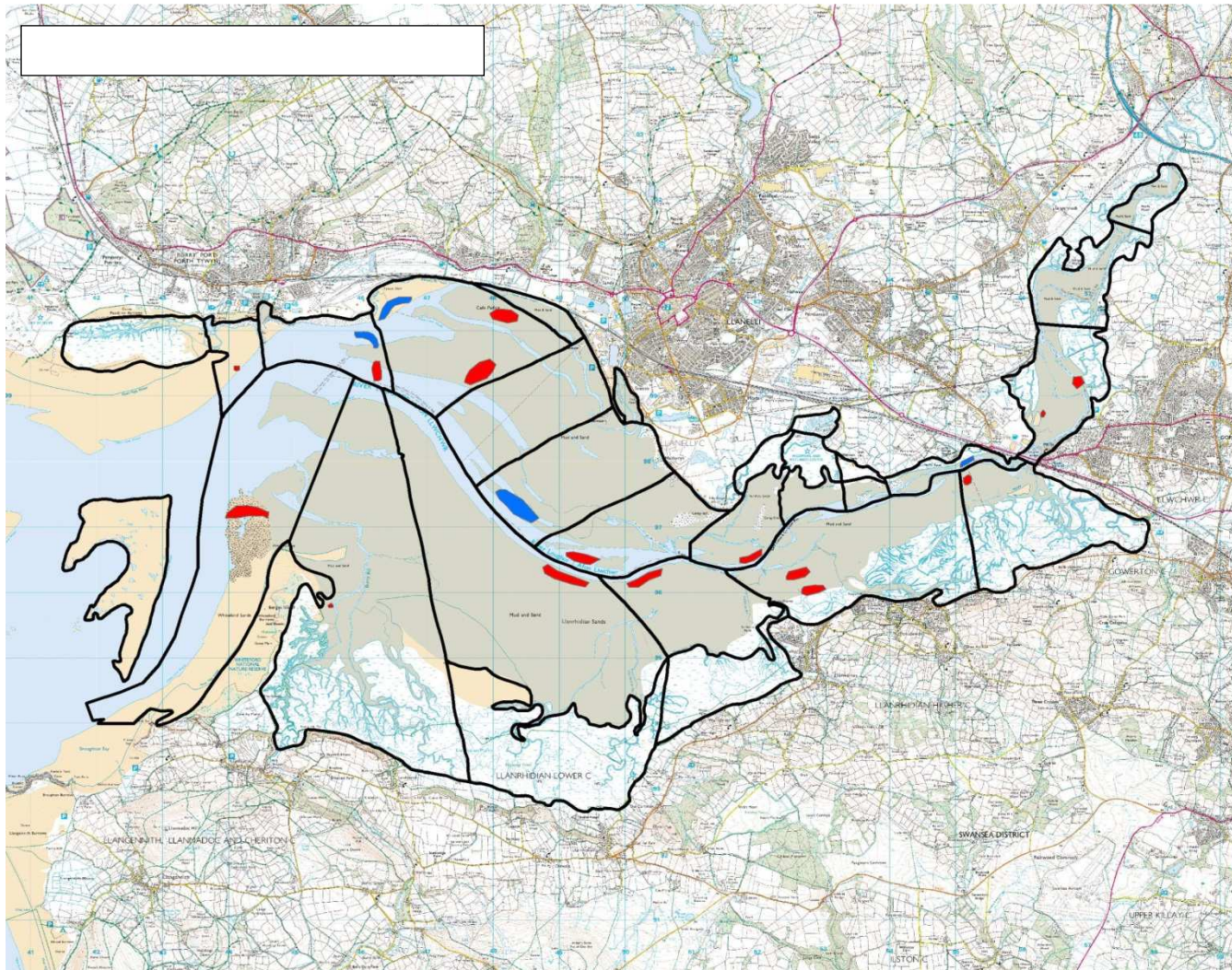


Figure 5.2.11 Distribution of feeding and roosting Oystercatcher in the Burry Inlet in February 2014.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

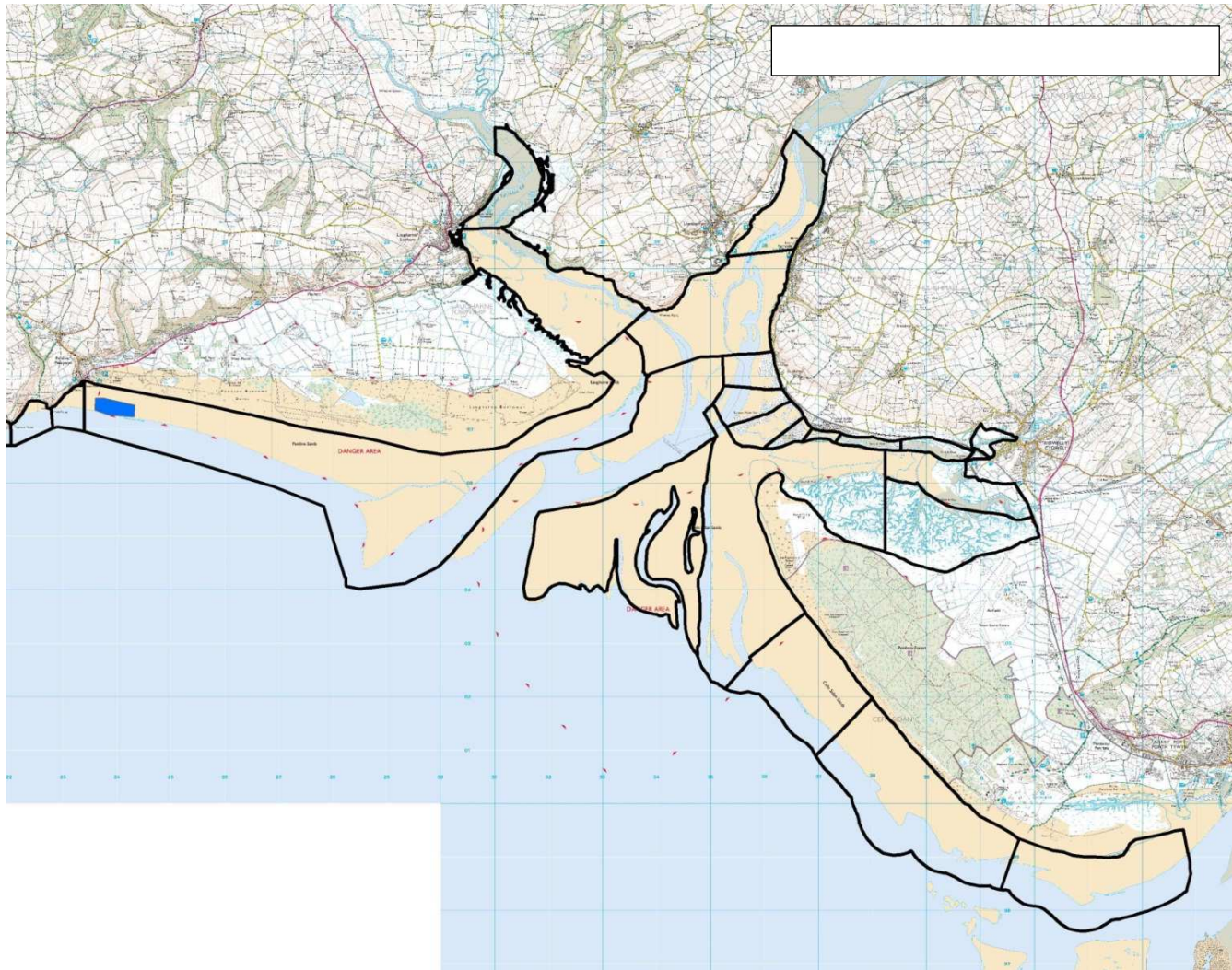


Figure 5.2.12 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary in February 2014. Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

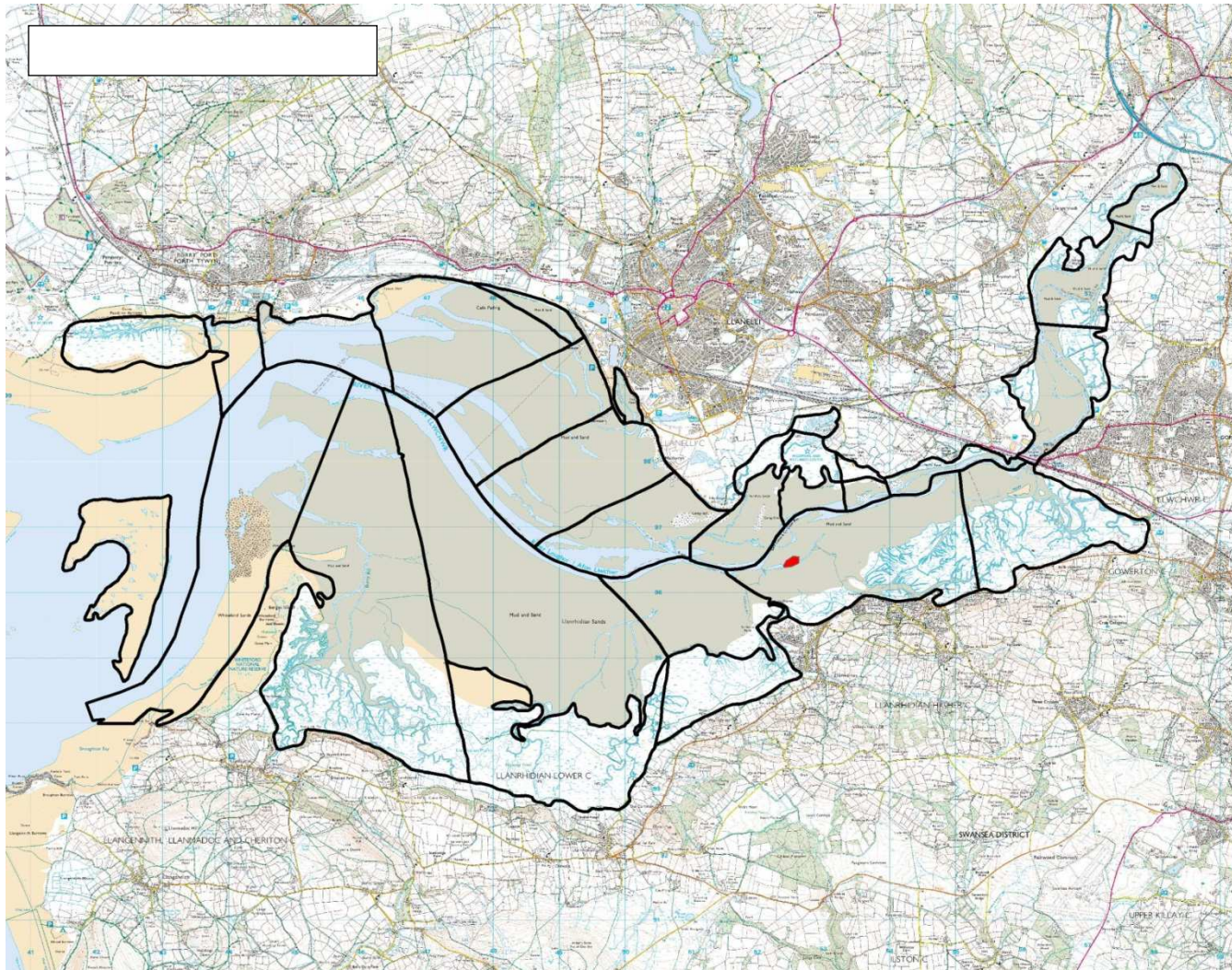


Figure 5.2.13 Distribution of feeding and roosting Knot in the Burry Inlet in February 2014.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

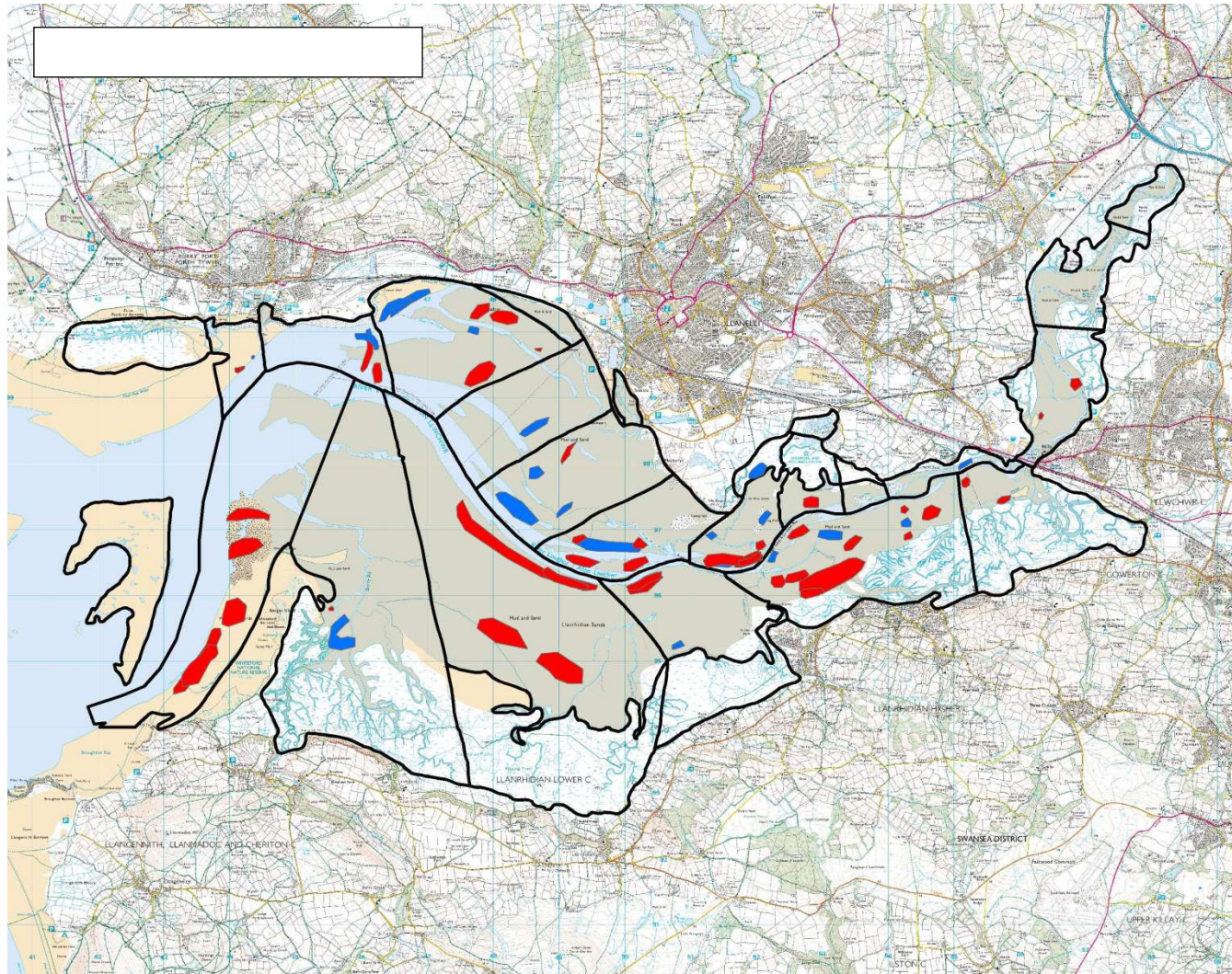


Figure 5.2.14 Distribution of feeding and roosting Oystercatcher in the Burry Inlet during the winter 2013/2014. Red = feeding, and blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

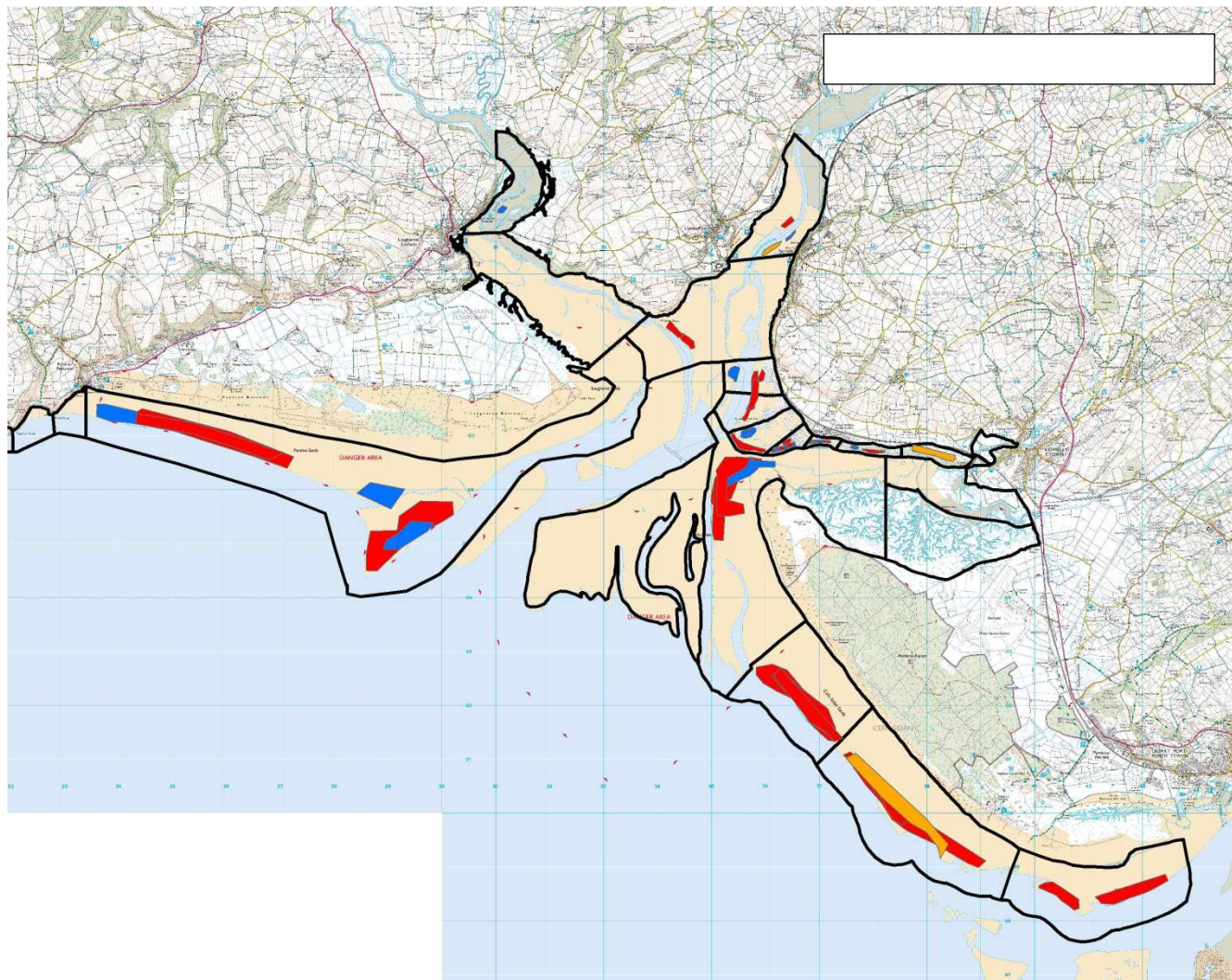


Figure 5.2.15 Distribution of feeding and roosting Oystercatcher on the Pembrey Coast and in the Three Rivers Estuary during the winter 2013/2014.

Red = feeding, orange = mixed feeding and roosting flock, blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

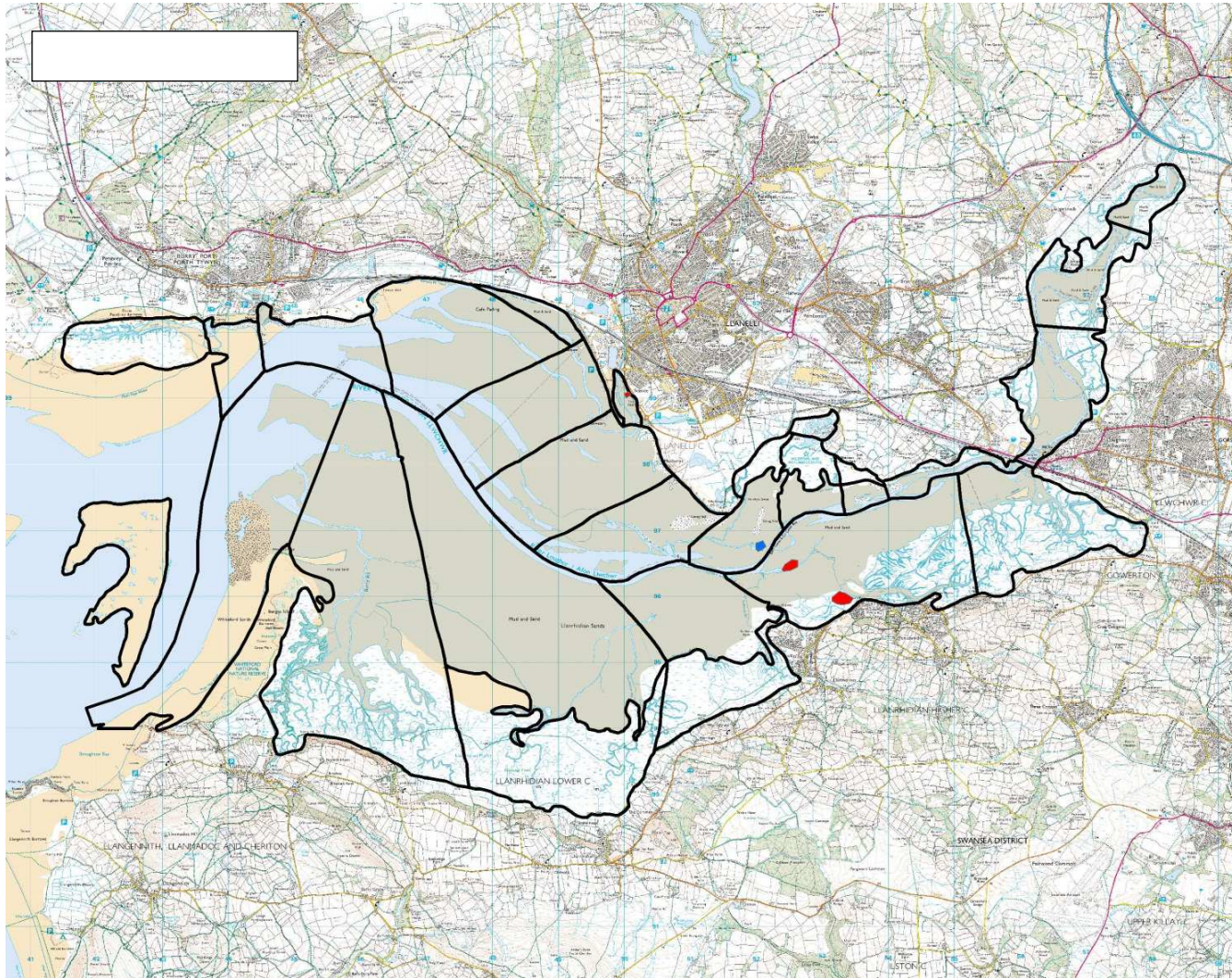


Figure 5.2.16 Distribution of feeding and roosting Knot in the Burry Inlet during the winter 2013/2014. Red = feeding, and blue = roosting; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

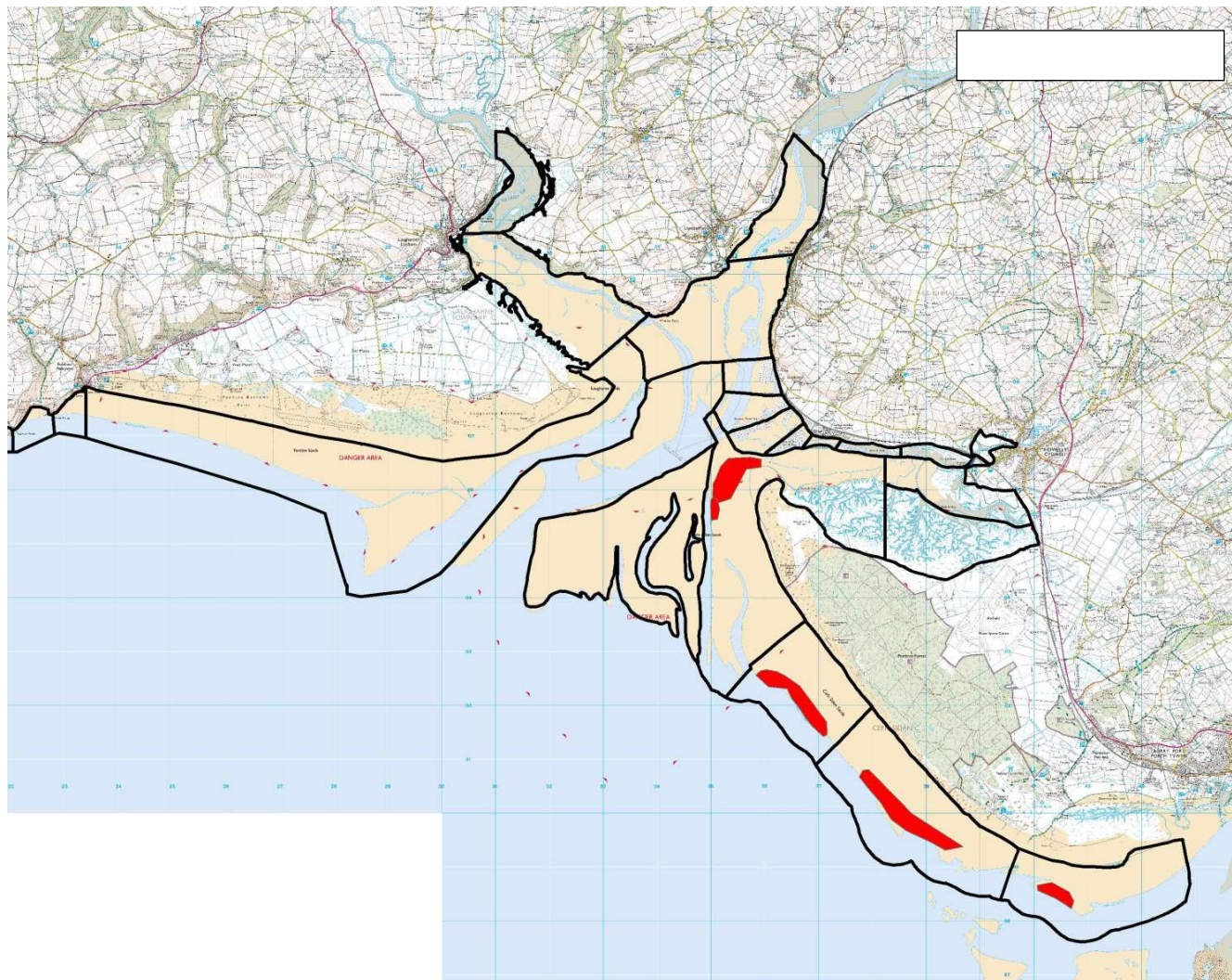


Figure 5.2.17 Distribution of feeding and roosting Knot on the Pembrey Coast and in the Three Rivers Estuary during the winter 2013/2014. Red = feeding; ©Crown Copyright. All rights reserved. Licence Number: 100021787.

5.4. Proportions of birds recorded feeding and roosting

The tables below show the totals and proportions of Oystercatcher and Knot feeding and roosting in the Burry Inlet and on the Pembrey Coast and Three Rivers Estuary in the winter of 2013/14. Winter means are provided in Tables 5.4.5-5.4.6 and 5.4.11-5.4.12 respectively.

Table 5.4.1. Number of Oystercatcher feeding and roosting in November 2013.

Site	Section	Feeding	Roosting	Total
Burry Inlet	DB003	0	7	7
Burry Inlet	DB004	258	1,392	1,650
Burry Inlet	DB006	0	560	560
Burry Inlet	DB009	35	860	895
Burry Inlet	DB012	1	2	3
Burry Inlet	DB013	46	31	77
Burry Inlet	DB016	0	27	27
Burry Inlet	DB019	0	500	500
Burry Inlet	DB019	41	33	74
Burry Inlet	DB020	1,100	2,120	3,220
Burry Inlet	DB029	3,470	0	3,470
Burry Inlet	DB030	56	377	433
Burry Inlet	DB099	51	12	63
Pembrey Coast and the Three Rivers	DJ001	8	0	8
Pembrey Coast and the Three Rivers	DJ002	1,068	0	1,068
Pembrey Coast and the Three Rivers	DJ003	1,057	0	1,057
Pembrey Coast and the Three Rivers	DJ004	198	0	198
Pembrey Coast and the Three Rivers	DJ007	22	210	232
Pembrey Coast and the Three Rivers	DJ010	9	68	77
Pembrey Coast and the Three Rivers	DJ011	12	320	332
Pembrey Coast and the Three Rivers	DJ012	35	520	555
Pembrey Coast and the Three Rivers	DJ013	170	1,150	1,320
Pembrey Coast and the Three Rivers	DJ015	170	600	770
Pembrey Coast and the Three Rivers	DJ021	22	18	40
Pembrey Coast and the Three Rivers	DJ022	11	0	11
Pembrey Coast and the Three Rivers	DJ023	0	4	4
Pembrey Coast and the Three Rivers	DJ025	300	120	420
Burry Inlet	TOTAL	5,058	5,921	10,979
Pembrey Coast and the Three Rivers	TOTAL	3,082	3,010	6,092
	OVERALL	8,140	8,931	17,071
	PROPORTIONS	48%	52%	

Table 5.4.2. Number of Oystercatcher feeding and roosting in December 2013.

Site	Section	Feeding	Roosting	Total
Burry Inlet	DB004	860	0	860
Burry Inlet	DB005	7	0	7
Burry Inlet	DB006	660	0	660
Burry Inlet	DB009	740	0	740
Burry Inlet	DB019	250	0	250
Burry Inlet	DB021	0	240	240
Burry Inlet	DB029	2,040	0	2,040
Burry Inlet	DB032	28	0	28
Burry Inlet	DB034	0	760	760
Pembrey Coast and the Three Rivers	DJ001	206	0	206
Pembrey Coast and the Three Rivers	DJ002	719	0	719
Pembrey Coast and the Three Rivers	DJ003	883	0	883
Pembrey Coast and the Three Rivers	DJ004	170	980	1,150
Pembrey Coast and the Three Rivers	DJ008	5	43	48
Pembrey Coast and the Three Rivers	DJ011	5	0	5
Pembrey Coast and the Three Rivers	DJ012	30	0	30
Pembrey Coast and the Three Rivers	DJ013	52	0	52
Pembrey Coast and the Three Rivers	DJ015	15	0	15
Pembrey Coast and the Three Rivers	DJ021	0	22	22
Pembrey Coast and the Three Rivers	DJ022	13	0	13
Pembrey Coast and the Three Rivers	DJ025	456	223	679
Burry Inlet	TOTAL	4,585	1,000	5,585
Pembrey Coast and the Three Rivers	TOTAL	2,554	1,268	3,822
	OVERALL	7,139	2,268	9,407
	PROPORTIONS	76%	24%	

Table 5.4.3. Number of Oystercatcher feeding and roosting in January 2014.

Site	Section	Feeding	Roosting	Total
Burry Inlet	DB003	13	0	13
Burry Inlet	DB004	810	760	1,570
Burry Inlet	DB007	0	10	10
Burry Inlet	DB009	980	0	980
Burry Inlet	DB019	20	0	20
Burry Inlet	DB020	540	0	540
Burry Inlet	DB027	20	50	70
Burry Inlet	DB029	1,450	0	1,450
Pembrey Coast and the Three Rivers	DJ001	261	0	261
Pembrey Coast and the Three Rivers	DJ002	514	297	811
Pembrey Coast and the Three Rivers	DJ003	765	0	765
Pembrey Coast and the Three Rivers	DJ004	840	110	950
Pembrey Coast and the Three Rivers	DJ007	19	230	249
Pembrey Coast and the Three Rivers	DJ008	0	2	2
Pembrey Coast and the Three Rivers	DJ010	0	23	23
Pembrey Coast and the Three Rivers	DJ011	4	7	11
Pembrey Coast and the Three Rivers	DJ012	210	115	325
Pembrey Coast and the Three Rivers	DJ013	340	95	435
Pembrey Coast and the Three Rivers	DJ015	120	70	190
Pembrey Coast and the Three Rivers	DJ021	14	0	14
Pembrey Coast and the Three Rivers	DJ025	105	43	148
Burry Inlet	TOTAL	3,833	820	4,653
Pembrey Coast and the Three Rivers	TOTAL	3,192	992	4,184
	OVERALL	7,025	1,812	8,837
	PROPORTIONS	79%	21%	

Table 5.4.4. Number of Oystercatcher feeding and roosting in February 2014.

Site	Section	Feeding	Roosting	Total
Burry Inlet	DB003	7	0	7
Burry Inlet	DB004	520	0	520
Burry Inlet	DB005	140	0	140
Burry Inlet	DB006	2,290	0	2,290
Burry Inlet	DB009	330	0	330
Burry Inlet	DB012	2	0	2
Burry Inlet	DB013	53	21	74
Burry Inlet	DB019	120	0	120
Burry Inlet	DB020	310	0	310
Burry Inlet	DB027	0	100	100
Burry Inlet	DB029	1,600	0	1,600
Burry Inlet	DB030	42	290	332
Burry Inlet	DB034	22	0	22
Burry Inlet	DB099	0	2,620	2,620
Pembrey Coast and the Three Rivers	DJ025	0	423	423
Burry Inlet	TOTAL	5,436	3,031	8,467
Pembrey Coast and the Three Rivers	TOTAL	4,909	3,454	8,363
	OVERALL	10,345	6,485	16,830
	PROPORTIONS	61%	39%	

Table 5.4.5. Average number of Oystercatcher feeding and roosting in Burry Inlet across the winter 2013/14.

Site	Sector	Average		
		Feeding	Roosting	Total
Burry Inlet	DB001	0	0	0
Burry Inlet	DB002	0	0	0
Burry Inlet	DB003	5	2	9
Burry Inlet	DB004	612	538	1,150
Burry Inlet	DB005	49	0	49
Burry Inlet	DB006	738	140	878
Burry Inlet	DB007	0	3	3
Burry Inlet	DB008	0	0	0
Burry Inlet	DB009	521	215	736
Burry Inlet	DB011	0	0	0
Burry Inlet	DB012	2	1	3
Burry Inlet	DB013	50	26	76
Burry Inlet	DB016	0	14	14
Burry Inlet	DB019	108	133	241
Burry Inlet	DB020	488	530	1,018
Burry Inlet	DB021	0	240	240
Burry Inlet	DB027	7	50	57
Burry Inlet	DB029	2,140	0	2,140
Burry Inlet	DB030	49	334	383
Burry Inlet	DB032	14	0	14
Burry Inlet	DB033	0	0	0
Burry Inlet	DB034	6	190	196
Burry Inlet	DB099	26	1316	1342
	TOTAL:	4,815	3,732	8,549

Table 5.4.6. Average number of Oystercatcher feeding and roosting on the Pembrey Coast and in the Three Rivers Estuary across the winter 2013/14.

Site	Sector	Average		
		Feeding	Roosting	Total
Pembrey Coast and the Three Rivers	DJ001	158	0	158
Pembrey Coast and the Three Rivers	DJ002	767	99	866
Pembrey Coast and the Three Rivers	DJ003	902	0	902
Pembrey Coast and the Three Rivers	DJ004	403	363	766
Pembrey Coast and the Three Rivers	DJ007	14	147	161
Pembrey Coast and the Three Rivers	DJ008	2	15	17
Pembrey Coast and the Three Rivers	DJ010	3	30	33
Pembrey Coast and the Three Rivers	DJ011	7	109	116
Pembrey Coast and the Three Rivers	DJ012	92	212	303
Pembrey Coast and the Three Rivers	DJ013	187	415	602
Pembrey Coast and the Three Rivers	DJ015	102	223	325
Pembrey Coast and the Three Rivers	DJ021	9	10	19
Pembrey Coast and the Three Rivers	DJ022	6	0	6
Pembrey Coast and the Three Rivers	DJ023	0	1	1
Pembrey Coast and the Three Rivers	DJ024	0	0	0
Pembrey Coast and the Three Rivers	DJ025	215	202	418
	TOTAL:	2,867	1,826	4,693

Table 5.4.7. Number of Knot feeding and roosting in November 2013.

Site	Section	Feeding	Roosting	Total
Burry Inlet	DB020	250	0	250
Burry Inlet	DB099	1	0	1
Pembrey Coast and the Three Rivers	DJ001	85	0	85
Pembrey Coast and the Three Rivers	DJ002	566	0	566
Pembrey Coast and the Three Rivers	DJ003	205	0	205
Pembrey Coast and the Three Rivers	DJ004	260	0	260
Pembrey Coast and the Three Rivers	DJ008	0	40	40
Burry Inlet	TOTAL	251	0	251
Pembrey Coast and the Three Rivers	TOTAL	1,116	40	1,156
	OVERALL	1,367	40	1,407
	PROPORTIONS	97%	3%	

Table 5.4.8. Number of Knot feeding and roosting in December 2013.

Site	Section	Feeding	Roosting	Total
Pembrey Coast and the Three Rivers	DJ004	110	0	110
Burry Inlet	TOTAL	0	0	0
Pembrey Coast and the Three Rivers	TOTAL	0	0	0
	OVERALL	110	0	110
	PROPORTIONS	100%	0%	

Table 5.4.9. Number of Knot feeding and roosting in January 2014.

Site	Section	Feeding	Roosting	Total
Burry Inlet	DB004	94	0	94
Burry Inlet	TOTAL	94	0	94
Pembrey Coast and the Three Rivers	TOTAL	0	0	0
	OVERALL	94	0	94
	PROPORTIONS	100%	0%	

Table 5.4.10. Number of Knot feeding and roosting in February 2014.

Site	Section	Feeding	Roosting	Total
Burry Inlet	DB004	82	0	82
Burry Inlet	TOTAL	82	0	82
Pembrey Coast and the Three Rivers	TOTAL	0	0	0
	OVERALL	82	0	82
	PROPORTIONS	100%	0%	

Table 5.4.11. Average number of Knot feeding and roosting in Burry Inlet across the winter 2013/14.

Site	Sector	Average		
		Feeding	Roosting	Total
Burry Inlet	DB001	0	0	0
Burry Inlet	DB002	0	0	0
Burry Inlet	DB003	0	0	0
Burry Inlet	DB004	44	0	44
Burry Inlet	DB005	0	0	0
Burry Inlet	DB006	0	0	0
Burry Inlet	DB007	0	0	0
Burry Inlet	DB008	0	0	0
Burry Inlet	DB009	0	0	0
Burry Inlet	DB011	0	0	0
Burry Inlet	DB012	0	0	0
Burry Inlet	DB013	0	0	0
Burry Inlet	DB016	0	0	0
Burry Inlet	DB019	0	0	0
Burry Inlet	DB020	63	0	63
Burry Inlet	DB021	0	0	0
Burry Inlet	DB027	0	0	0
Burry Inlet	DB029	0	0	0
Burry Inlet	DB030	0	0	0
Burry Inlet	DB032	0	0	0
Burry Inlet	DB033	0	0	0
Burry Inlet	DB034	0	0	0
Burry Inlet	DB099	1	0	1
	TOTAL:	108	0	108

*400 Knot were seen in flight only in Burry Inlet in February but these birds have not been included in the figures.

Table 5.4.12. Average number of Knot feeding and roosting on the Pembrey Coast and in the Three Rivers Estuary across the winter 2013/14.

Site	Sector	Average		
		Feeding	Roosting	Total
Pembrey Coast and the Three Rivers	DJ001	28	0	28
Pembrey Coast and the Three Rivers	DJ002	189	0	189
Pembrey Coast and the Three Rivers	DJ003	68	0	68
Pembrey Coast and the Three Rivers	DJ004	123	0	123
Pembrey Coast and the Three Rivers	DJ007	0	0	0
Pembrey Coast and the Three Rivers	DJ008	0	13	13
Pembrey Coast and the Three Rivers	DJ010	0	0	0
Pembrey Coast and the Three Rivers	DJ011	0	0	0
Pembrey Coast and the Three Rivers	DJ012	0	0	0
Pembrey Coast and the Three Rivers	DJ013	0	0	0
Pembrey Coast and the Three Rivers	DJ015	0	0	0
Pembrey Coast and the Three Rivers	DJ021	0	0	0
Pembrey Coast and the Three Rivers	DJ022	0	0	0
Pembrey Coast and the Three Rivers	DJ023	0	0	0
Pembrey Coast and the Three Rivers	DJ024	0	0	0
Pembrey Coast and the Three Rivers	DJ025	0	0	0
	TOTAL:	408	13	421

6. References

Banks, A.N., Maclean, I.M.D., Collier, M.P., Hainsworth, I., Howells, R.J. & Hughes, D.S. 2007. *Monitoring bird distribution and behaviour on the Carmarthen Bay & Estuaries SAC at low tide*. BTO Research Report No. 467 to the Countryside Council for Wales. BTO, Thetford.

Burton, N.H.K., Calbrade, N.A., Howells, R.J., Hughes, D.S. & Jenks, P. 2009. *Monitoring Bird Distribution and Behaviour on the Carmarthen Bay & Estuaries SAC at Low Tide in Winter 2008/09*. CCW Contract Science Report No: 880, 63pp, CCW/BTO.

Burton, N.H.K., Calbrade, N.A., Collier, M.P., Hainsworth, I., Howells, R.J. & Hughes, D.S. 2008. *Monitoring bird distribution and behaviour on the Carmarthen Bay & Estuaries SAC at low tide in winter 2007/08*. CCW Contract Science Report No: 837, 73pp, CCW/BTO.

Burton, N.H.K., Calbrade, N.A., Cook, A.S.C.P., Howells, R.J., Hughes, D.S. & Jenks, P. 2010. *Monitoring Bird Distribution and Behaviour on the Carmarthen Bay & Estuaries SAC at Low Tide in Winter 2009/10*. CCW Contract Science Report No: 935, 74pp, CCW/BTO.

Calbrade, N.A., Burton, N.H.K., Bray, J., Flannagan, A., Howells, R.J., Hughes, D.S. & Jenks, P. 2012. *Monitoring Waterbird Distributions and the Feeding Activity of Oystercatcher and Knot in the Burry Inlet SPA and Carmarthen Bay SAC – The winter of 2011/12*. CCW Contract Science Report No: 998, 44pp, CCW/BTO.

Calbrade, N.A., Burton, N.H.K., Flannagan, A., Howells, R.J. & Hughes, D.S. 2013. *Monitoring Waterbird Distributions and the Feeding Activity of Oystercatcher and Knot in the Burry Inlet SPA and Carmarthen Bay SAC – The winter of 2012/13*. CCW Contract Science Report No: 1031, 48pp, CCW/BTO.

7. Acknowledgements

Thanks are due to everyone involved with organising and undertaking the counts, including the authors. Thanks to Matty Murphy at NRW for project advice and assistance.

Maps were reproduced from the Ordnance Survey map with the permission of the controller of HMSO. ©Crown Copyright. All rights reserved. Licence Number: 100021787

8. Appendices

Appendix 1: Coverage of the Burry Inlet, Pembrey Coast, Three Rivers Estuary and western sections of Carmarthen Bay

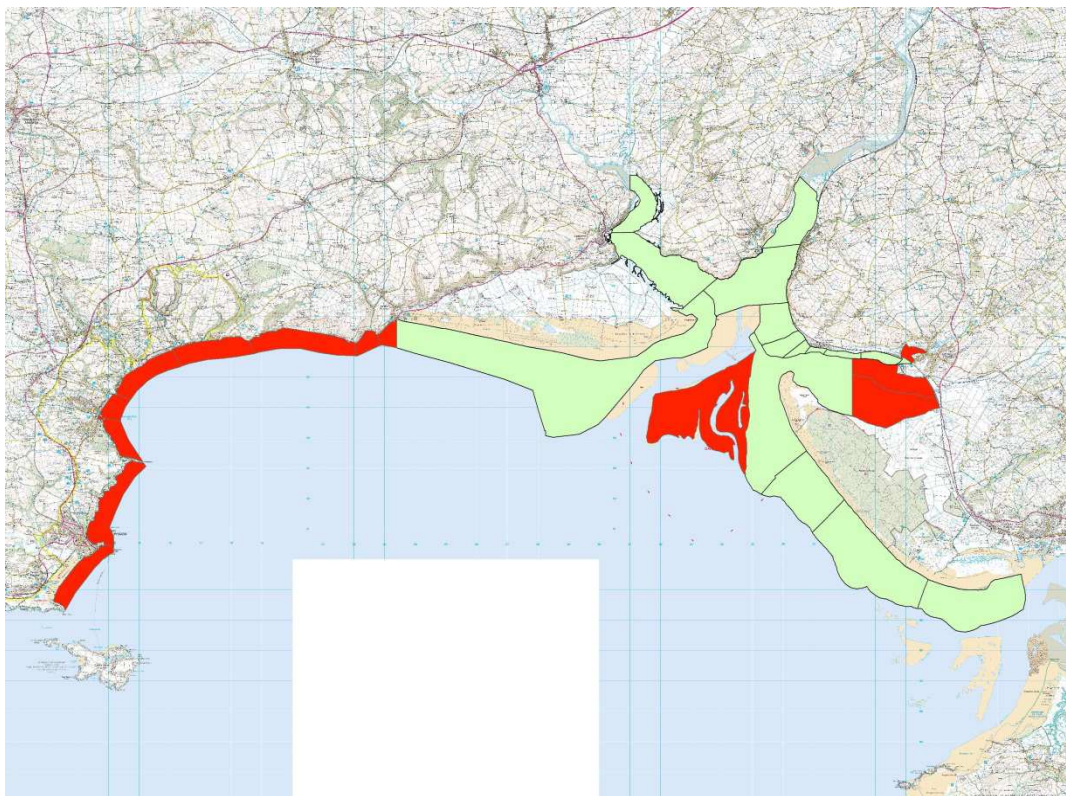
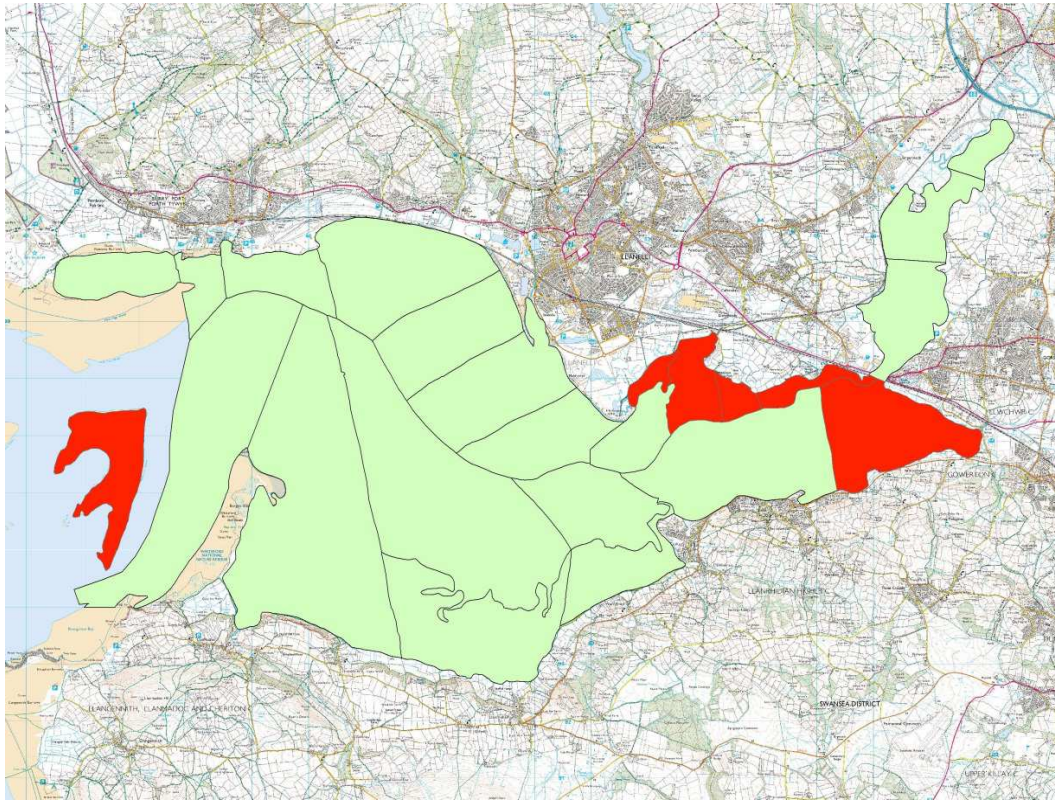


Figure A1.1 Coverage in November 2013. Green=covered, red=not covered.

©Crown Copyright. All rights reserved. Licence Number: 100021787.

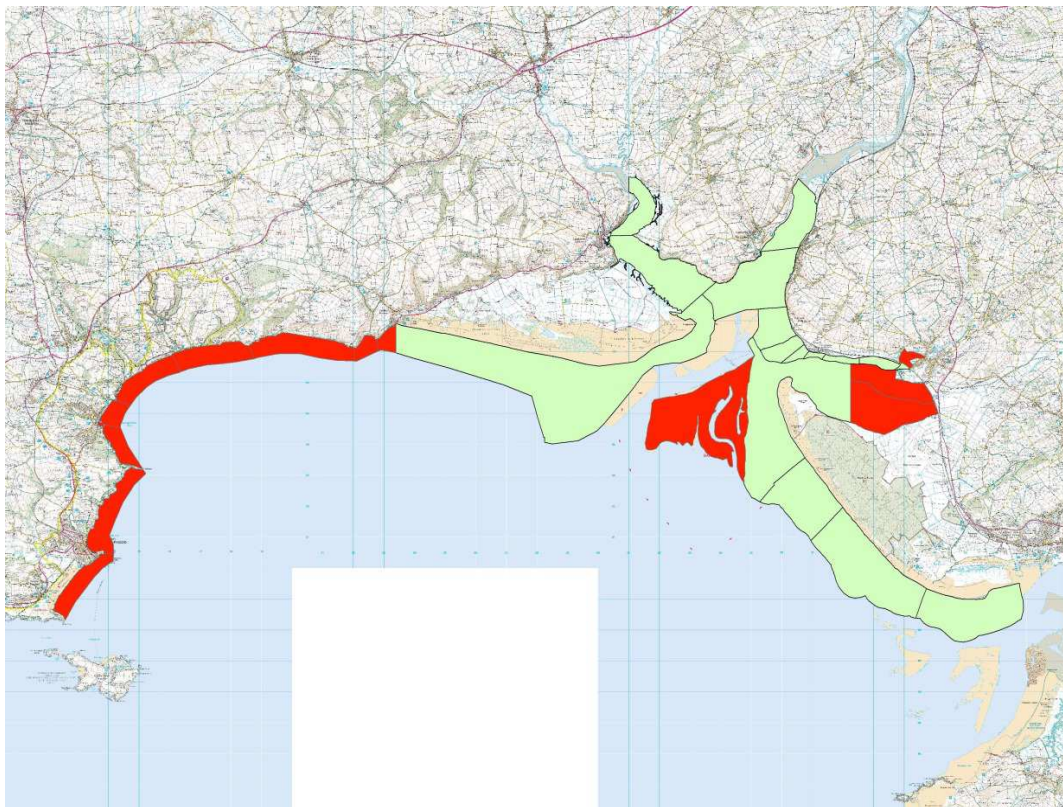
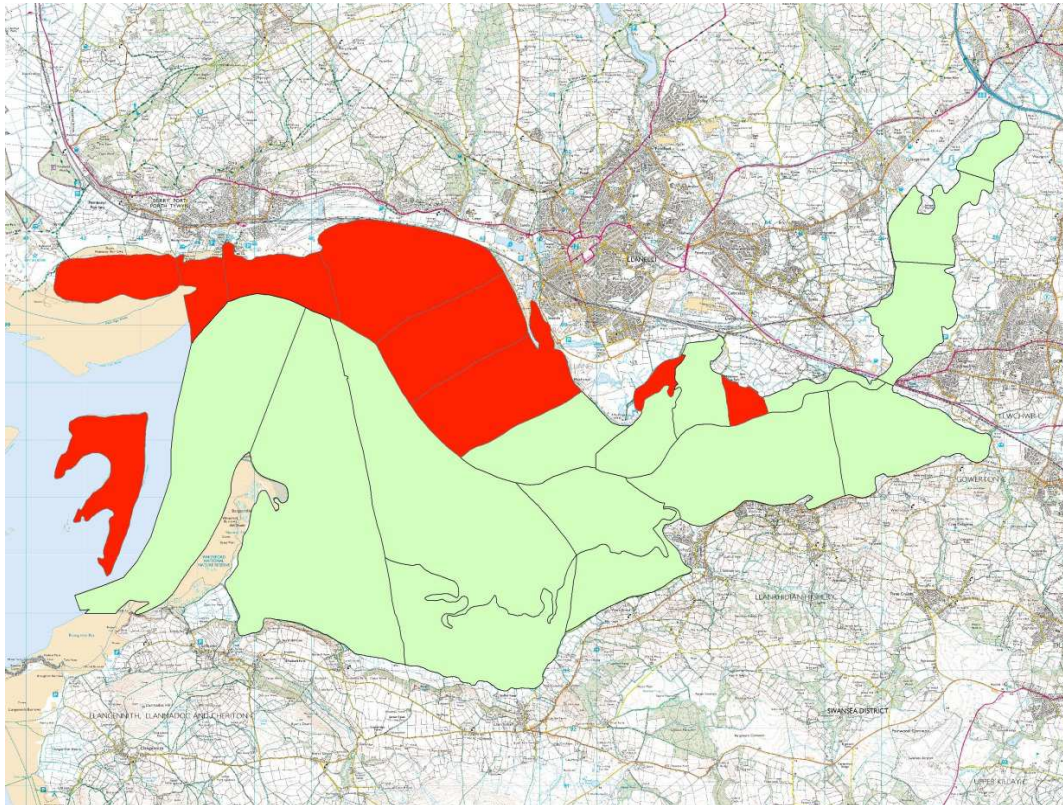


Figure A1.3 Coverage in January 2014. Green=covered, red=not covered.
 ©Crown Copyright. All rights reserved. Licence Number: 100021787.

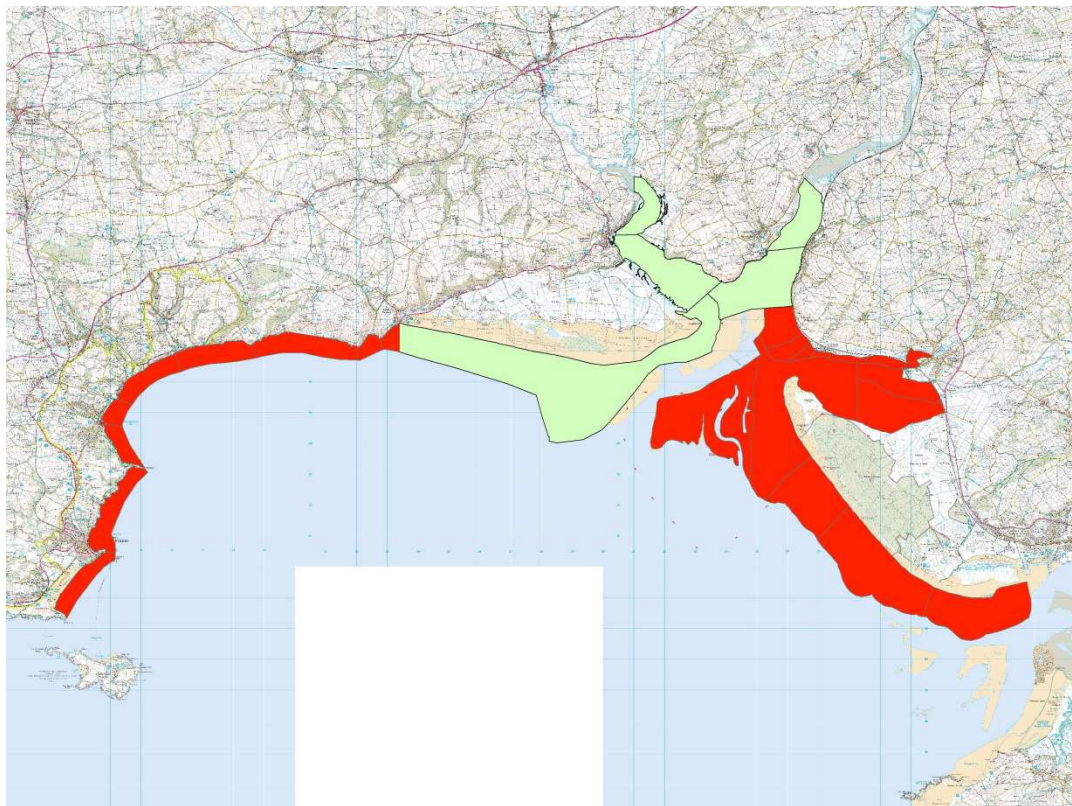
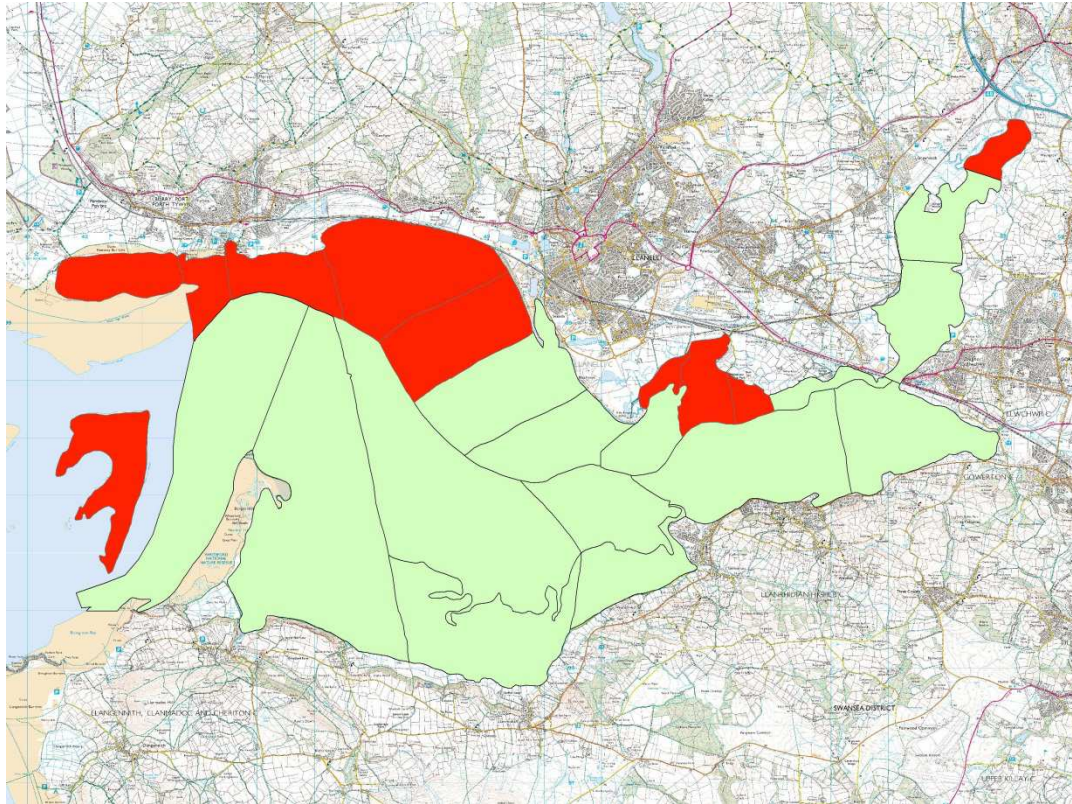


Figure A1.4 Coverage in February 2014. Green=covered, red=not covered.

©Crown Copyright. All rights reserved. Licence Number: 100021787.

Data Archive Appendix

Data outputs associated with this project are archived as project 447, media 1488 on server-based storage at Natural Resources Wales.

The data archive contains:

[A] The final report in Microsoft Word and Adobe PDF formats.

[B] A series of GIS layers on which the maps in the report are based

Metadata for this project is publicly accessible through Natural Resources Wales' Library Catalogue <http://194.83.155.90/olibcqi> by searching 'Dataset Titles'. The metadata is held as record no [115678](#).



**Cyfoeth
Naturiol**
Cymru
**Natural
Resources**
Wales

Published by:
Natural Resources Wales
Maes y Ffynnon
Bangor
Gwynedd
LL57 2DW

© Natural Resources Wales 2014

All rights reserved. This document may be reproduced with prior permission of
Natural Resources Wales

Further copies of this report are available from:

Email: library@cyfoethnaturiolcymru.gov.uk