Shellfish Harvest Areas in Cardigan, Carmarthen and Swansea Bays

South West Wales Local Action Group and Local Action Plan

Version 7 **April 2016**

CONTENTS

1. INTRODUCTION

This document is derived broadly from the Food Standards Agency (FSA) documents:

- 'Proposals to Improve Classification arrangements for Designated Shellfish Harvesting Areas in England and Wales' - August 2004;
- 'Long Term Classification of Designated Shellfish Harvesting Areas in England and Wales - Guidance on Local Action Groups and Local Action Plans' - March 2006; and

  'Protocol on the use of FBO own sampling results in the official control programme for microbiological monitoring of classified LBM production areas in England & Wales' - July 2012
- Actions required following an FVO audit of UK official controls of producing & marketing live bivalve molluscs - April 2012.

The South West Wales Local Action Group comprises officers representing the coastal Local Authorities of Ceredigion, Pembrokeshire, Carmarthen and Swansea together with the Swansea Bay Port Health Authority and other regulatory bodies and interested organisations. Stakeholders are listed in Section 6.

Background

European legislation since 1991 requires Member States across the EU to operate a programme for monitoring and classifying their shellfish harvesting areas. In the UK this was first fully achieved in 1993 and continues to be reviewed on an annual basis. Although hygiene legislation has recently undergone major structural change, the requirement and criteria for a classification programme has not changed greatly. The new consolidated Regulations on hygiene legislation for foodstuffs came into effect in the UK on 1 January 2006. In 2002, with the existing and proposed new hygiene legislation in mind, the FSA reviewed the way shellfish classification in England and Wales was achieved. One issue that emerged was a system for long-term classification (LTC) of shellfish beds to replace the yearly approach. In August 2004 a fully developed proposal was sent out for consultation in England and Wales. Unlike the previous programme the new regime includes a system of 'Action States' to facilitate a more risk-managed approach when high contamination results occur. Additionally it was observed that LTC would provide the shellfish industry with a more stable approach to maintaining and setting classification levels.

LTC was implemented in England and Wales in May 2006 and following the FSA guidance document, the relevant Local Authorities (LAs) agreed to form the **South West Wales Local Action Group** on 5th July 2006. A draft **Local Action Plan** was also produced on the same date.

2. ACRONYMS & ABBREVIATIONS

CEFAS	-	Centre for Environment, Fisheries and Aquaculture Science
NRW	-	Natural Resources Wales
FSA	-	Food Standards Agency
FBO	-	Food Business Operator
FVO	-	Food & Veterinary Office of the European Union
GPS	-	Global Positioning System
LA	-	Local Authority
LBM	-	Live Bivalve Molluscs
LEAD LA	-	Lead Local Authority (for incident co-ordination)
LAP	-	South West Wales Local Action Plan
LTC	-	Long Term Classification
PHW		Public Health Wales
PHWMC	-	Public Health Wales Microbiology Carmarthenshire
RMP		Recommended Monitoring Point
SWWLAG	-	South West Wales Local Action Group
WGFU	-	Welsh Government Fisheries Unit

3. LONG TERM CLASSIFICATION

Shellfish harvest areas in Swansea, Carmarthen and Cardigan Bays

The LTC system is designed as the first stage of an on-going process, initially applying to Class B harvesting beds with 5 years worth of compliance data.

LTC is beneficial for protecting public health, and affords industry the increased stability they have been seeking.

All Class A and Class C beds and those ineligible Class B beds will continue to be classified on an annual basis and be regarded as temporary within the LTC programme. LTC incorporates a graduated, rapid response facility when E.coli levels exceed pre-defined trigger levels. Section 5 details the three tiers of response to be implemented, depending on the level of the sampling result. These range from minor investigation to more extensive formal investigations and ultimately to a full 'Action State' where investigations will be accompanied by official temporary downgrade or closure of the affected harvesting area, due to the potential increased risk to public health.

4. ROLE OF SOUTH WEST WALES LOCAL ACTION GROUP (SWWLAG)

4.1 SWWLAG Membership

CEFAS		
FSA		
Natural Resources Wales		
Local Authorities	-	Ceredigion County Council Pembrokeshire County Council Carmarthenshire County Council, City and County of Swansea, and Swansea Bay Port Health Authority
Marine Fisheries Agency		
Testing Lab	-	Public Health Wales Microbiology Carmarthenshire, West Wales General Hospital
Water Authority	-	Dwr Cymru
Welsh Government Fisheries Unit	-	Formerly the South Wales Sea Fishery Committee
Local Industry	-	Represented by those bodies and individuals listed in Section 6

4.2 Management system

With the introduction of the tiered system of investigations and associated public health control measures, it is necessary to have in place a management mechanism to ensure that information flows freely between stakeholders, and access to relevant local expertise is provided.

Under the second and third tiers of response, SWWLAG will be involved and will assist Lead LAs in the investigation of unusually high E.coli results, as well as fulfilling a primary function to act as a conduit for effective and timely information exchange and data contribution.

4.3 LAP development

SWWLAG is responsible for developing the LAP and laying down investigation procedures. It is also involved in activities such as gathering data pertinent to local factors or conditions that may affect test results. The following matters, detailed in Appendix F to the LAP, will be updated as necessary by relevant SWWLAG members as background information relevant to any pollution incident, which may arise.

- Geographical area covered by SWWLAG
- Identification of Harvest Beds
- Regulated seasonality
- Pollution sources
- Position and type of rainguages
- Other factors potentially affecting harvest bed integrity

4.4 Information exchange

In situations where the specified level of E.coli has been exceeded and investigation of high results is required, a conduit for timely information exchange and data contribution is essential when making decisions and applying appropriate health measures. SWWLAG with the comprehensively defined LAP will provide the required information, in a manageable and practical way.

Electronic exchange of information will have minimal impact in relation to resources while providing maximum information and co-ordinated expertise in considering the potential public health risks following high E. coli results in the local shellfish beds. Email addresses specifically dealing with LTC investigation matters under the tiered system are included in Section 6.

5.0 INVESTIGATION

5.1 Trigger values for the Action State are:

Class **A** - 230 + E.coli / 100g of flesh.

Class **B** - 18000 + E.coli / 100g of flesh.

Class **C** - 46000 + E.coli / 100g of flesh.

Routine official control shellfish samples, collected by authorised sampling officers and taken from the identified RMP, will determine the presence of E. coli to within the above parameters. A suitable GPS will be used for establishing the location and recording the geographical coordinates on sample submission forms in accord with sampling protocols. Should samples, analysed by PHWMC, identify the presence of 18000+ E. coli then a more detailed examination will be undertaken of subsequent samples to determine the precise number of organisms present as part of the third tier investigation and the Lead LA will advise the PHWMC as an aide-memoir for subsequent analyses. Where routine / additional sampling of flesh and/or water cannot be met then the LA will advise FSA, Cardiff and CEFAS. The local industry should be advised where sampling cannot be undertaken, if harvesting is taking place, to ensure end product testing and food management controls are amended accordingly.

Harvesters may supplement the official control monitor programme in accordance with the protocol agreed between the Shellfish Association of Great Britain, the FSA and the LA.

5.2 First Tier - Initial investigations

5.2.1 A sample from a **Class B** bed giving a result between 4600 and 10000 E.coli per 100g of flesh will trigger the first tier of investigations.

5.2.2 Verification of the result followed by a statistical assessment to determine whether a significant change in the general level of contamination has occurred will be required. CEFAS is responsible for carrying out any statistical analyses (Geo mean data). The LA with responsibility for the

harvest bed in question (ie Lead LA) and the NRW will carry out the investigation into the cause of the high results and copy the FSA and CEFAS into this correspondence.

5.2.3 No assistance from SWWLAG will be necessary.

5.2.4 Should CEFAS consider that the underlying quality of water has changed, further action may be considered to ensure that public health is protected.

However, under this level of investigation closure or downgrading or increased sampling would not be expected although the results would be taken into account when assessing the underlying long-term quality of the water.

5.3 Second Tier - Formal Investigations

5.3.1 A sample from a **Class B** bed giving a result between 10000 and 18000 E.coli per 100g of flesh will trigger the second tier of investigations.

5.3.2 A formal investigation to identify the cause of the contamination would be initiated, as above, together with assistance from SWWLAG under its LAP.

CEFAS will again carry out a statistical analysis to determine if underlying change in water quality had occurred.

5.3.3 This tier does not trigger an action state (see tier three) but the Lead LA will still be required to decide what control measures are needed. Again, it is unlikely that these measures will involve closures or downgrades, or an increase in sampling. The move to an action state may be considered if the cause of contamination could result in an increased risk to public health. The LA will copy the FSA & CEFAS into this action taken.

5.3.4 Depending on the outcome of the investigation and statistical analysis, the result would be taken into account when assessing the underlying long-term quality of the water.

5.3.5 Under this tier the Lead LA will notify SWWLAG.
A template message is attached in Appendix D.

5.4 Third Tier – Formal investigations leading to an Action State.

5.4.1 Action states will apply to all beds (A, B & C) regardless of whether they are under LTC or the existing annual classification system.

5.4.2 A sample exceeding the threshold values listed under 5.1 would trigger the third tier of investigation.

5.4.3 Under this tier the Lead LA will notify SWWLAG of the incident and activate an Action State.

A template message is attached in Appendix E.

5.4.4 Once an action state has been activated, the Lead LA will be responsible for putting in place appropriate short-term measures to protect public health (i.e. Temporary Prohibition Order (TPO), temporary downgrade or closure). The Notice will be copied to FSA Wales as well as the Group.

5.4.5 SWWLAG will implement the LAP to assist providing appropriate control measures. Unlike the previous tiered response closures and downgrades may be applied and extra sampling will be carried out to monitor and determine the cause of the high results.

Control measures put in place by the Lead LA will continue while investigations into the cause are carried out.

5.4.6 An action state can last for a maximum of 3 months, after which normal monitoring will be used to assess the status of the bed. This will be the only sampling undertaken. Should results remain high, the bed will not be open for fishing.

As soon as levels of E. coli fall below legal limits, the bed will be opened and fishing allowed to recommence.

In extreme cases beds may lose their long-term status prior to the annual review, but normally LTC beds will be statistically assessed to establish whether there is a downward trend in water quality.

6. CONTACTS - Communication and Notification.

ORGANISATION	CONTACT	E MAIL ADDRESS	TEL / FAX NOS.
LOCAL AUTHORITIES:			
Ceredigion County Council	Carwen Evans Heddwyn Evans	Carwen.evans@ceredigion.gov.uk Heddwyn.evans@ceredigion.gov.uk	Tel: 01545 572 110 Fax: 01545 572 380
Carmarthenshire County Council	Mark Liley Sue Watts	MLiley@carmarthenshire.gov.uk SEWatts@carmarthenshire.gov.uk	Tel: 01554 742 351 Tel: 01554 742 250 Fax: 01554 742 115
City & County of Swansea	Keith James Darren Beynon	Keith.James@swansea.gov.uk Darren.beynon@swansea.gov.uk	Tel: 01792 635 640 Tel: 01792 635 600 Fax: 01792 648 079 OOH: 01792 636 000
Pembrokeshire County Council	Carwyn Thomas Gary Tawn Victor Felstead	porthealth@pembrokshire.gov.uk	Tel: 01437 776 390 Fax: 01437 776 391 OOH: 0845 601 5522
Swansea Bay Port Health Authority	Gill Morgan Seren Linton	Swansea-bay@cieh.org.uk	Tel: 01792 653 523 Fax: 01792 641 718 OOH: 07788295724
OTHER REGULATORY BODIES / ORGANISATIONS:			
Carmarthen Public Health Laboratory	Sharon Williams Gary Williams Andy Keen	Sharon.williams14@wales.nhs.uk Gary.williams@nphs.wales.nhs.uk Andy.Keen@nphs.wales.nhs.uk	Tel: 01267 237 271 Fax: 01267 238 440
CEFAS	Andy Younger Sally Hart	Andrew.Younger@CEFAS.co.uk FSQ@CEFAS.co.uk Sally.hart@cefas.co.uk	Tel: 01305 206 695 Fax: 01305 206 601 Cefas: 01305 206600 Tel: 01305 206 655
Dwr Cymru	Fergus O'Brien Mathew Griffiths	Fergus.O'Brien@dwrcymru.com Mathew.Griffiths@dwrcymru.com	Tel: 01792 511 828 Fax: 01792 872 604 OOH: 0800 0520 130
Natural Resources Wales	Martin Stephens David Tavner (Fishery Officer) Stuart Thomas	Martin.Stephens@cyfoethnaturiolcymru.gov.uk David.Tavner@cyfoethnaturiolcymru.gov.uk Stuart.Thomas@cyfoethnaturiolcymru.gov.uk	Tel: 01792 325 633 Fax: 01792 325 511 OOH: 0800 807 060 Tel: 01792 325 628 Fax: 01792 325 511 Mob: 07766 498 428
Food Standards Agency	Jayne Griffiths (Policy) Hannah Evans (Enforcement) **If bed closure cc** Rob Phillips **Food fraud & incident Team**	Jayne.griffiths@foodstandards.gsi.gov.uk Hannah.Evans@foodstandards.gsi.gov.uk Wales.foodincidents@foodstandards.gsi.gov.uk Robertph@ceredigion.gov.uk	Tel: 02920 678 908 Tel: 02920 678 926 Fax: 02920 678 918 Tel: 02920 678 961 OOH: 0778 996 573 01545 574 118
Welsh Government Marine & Fisheries Division Agriculture, Food & Marine (AFM)	Stuart Evans Phil Coates Mark Stafford	Stuart.evans@wales.gsi.gov.uk Phil.coates@wales.gsi.gov.uk Mark.stafford@wales.gsi.gov.uk	Tel: 0300 790 4503 Tel: 0300 790 2437 Tel: 0300 790 4577 Fax: 01792 224 583
	Andrew Lewis Sea Fisheries Legislation Manager	Andrew.lewis8@wales.gsi.gov.uk.	Tel: 0300 062 2179
	Barrie John Senior Fishery Officer	Barrie.jon@wales.gsi.gov.uk	Tel: 01646 696 016 Mob: 07767 694 442

INDUSTRY REPRESENTATIVES:

ORGANISATION	CONTACT	E MAIL ADDRESS	TEL / FAX NOS.
Thomas Shellfish Ltd.	Diane Thomas / Melony Nichols	Melonynicols@btinternet.com	Tel: 01792 391 584 Fax: 01792 391 584 Mob: 07811 937 656
Gower Coast Seafood	Jeff Williams Spencer Williams	72 Pencaerfenni Lane, Crofty SA4 3SW	Tel: 01792 850 796
Parsons	Richard Parsons Colin Macdonald	Richard@parsonspickles.co.uk Colin@parsonspickles.co.uk	Tel: 01554 833 351
Penclawdd Shellfish Processors	Mark Swistun	Unit 28 Crofty Ind. Estate, Swansea SA4 3RS	Tel: 01792 851 678 Mob: 07885 256 744
Penclawdd Shellfish Association	Mrs. Mainwaring	31 Nurses Corner, Penclawdd, Swansea	Tel: 01792 850 796
Seafood Company Wales	Glyn Hyndman	Unit 11C, Pontardulais Industrial Estate Tyn y Bonau Rd. Pontardulais SA4 8SG glynhyndman@aol.com	Tel: 01554 770979 Mob: 0797 055 8510
Selwyns Seafoods	Ashley Jones	Selwynsltd@btconnect.com	Tel: 01792 850 033 Fax: 01792 851 946 Mob: 07977 076 220
South West Wales Fishing Community Ltd	Greg Phillpott Marion Warlow Glyn Jones	Greg@swwfc.org.uk Marion@swwfc.org.uk Glyn@swwfc.org.uk	Tel: 01646 697 992 Tel: 01646 697 992 Tel: 01554 833 991
Swansea Oysters Ltd.	Phil Wisby	65 Westcross Avenue, Swansea SA3 5TX	Tel: 01792 404 908 Mob: 07828 328 788
Salacia Marine	Dr. Andy Woolmer	91 New Rd. Ynysmeudy, Potardawe, Swansea SA8 4PP	Tel: 01792 863 436 Mob: 07828 195 696

OTHER INTERESTED ORGANISATIONS: (not members of SWWLAG)

FSA London	Beverley Kuster	Beverley.kuster@foodstandards.gsi.gov.uk	Tel: 0207 276 8101
Welsh Government	Chris Brereton CEHO	Chris.Brereton@Wales.gsi.gov.uk	Tel: 02920 825 281 Fax: 02920 823 982
Gangmasters Licensing Authority	Ian Livsey (Chief Executive)	PO Box 10272 Nottingham NG2 9PB Ian.livsey@gla.gsi.gov.uk	Tel: 0115 959 7077 Fax: 0115 900 8943 Mob 07970 478 242 Web: www.gla.defra.gov.uk
North Wales Shellfish Liaison Committee (Chairman & Secretary)		Colin Griffiths Colin.griffiths@conwy.gov.uk	Tel: 01492 575 283
Dyfi Estuary border with NWSLC – contact		Gwenanowen@gwynedd.gov.uk	Tel: 01341 424472
South West Wales Shellfish Liaison Cttee:		**Chairman: Darren Beynon** **Secretary: Keith James**	**City & County of Swansea** As above

7. DOCUMENT REVIEW

7.1 Review criteria

Annual reviews of this document will be made at the first meeting of the South West Wales Shellfish Liaison Committee held after the annual Classification Review of Harvest Beds undertaken by CEFAS / FSA details of which are normally available in September.

Other reviews will take place in response to other relevant factors affecting content of the document such as legislative changes, updated contact detail, harvest bed identification etc and co-ordinated by Swansea Bay Port Health Authority.

7.2 Tracked document changes

DATE	VERSION	TYPE OF REVIEW / CHANGE	DETAIL
July 2006	**1**	Draft - following a meeting of the South West Wales Shellfish Liaison Committee on 5th July	Initial document taken from the template offered by the FSA / CEFAS
September 2006	**1**	Contact details	Included following agreement of draft between members of the South West Wales Shellfish Liaison Committee
December 2006	**2**	Draft - following meeting of the South West Wales Shellfish Liaison Committee on 13th December	1. Ceredigion County Council added to membership 2. Draft inclusions added following comments received from CEFAS and FSA 3. Additions made to contact list
January 2007	**3**	Draft – following comments by CEFAS & FSA	Text changes to paras: 5.1, 5.4.1 & 5.4.2
24th January 2007	**4**	Agreed version at Inaugural meeting of SWWLAG	1. Inclusion of review mechanism 2. Additions made to contact list 3. Alterations to Appendix F
March 2008	**5**	First annual review	1. Sect 6 - Contact detail amendments 2. A3 - Appendix text change to accord with 5.1 3. F4 - Rainguage detail inclusion 4. F5 - Declassification of Swansea Oyster bed 5. F6 - Inclusion of Pollution Reduction Plans
March 2009	**5** update	Annual review	1. F5 – Swansea Oyster Bed reclassified 2. Sect 6 - Contact detail amendments
Sept / Oct 2010	**5** update	Annual review Contacts	1. Sect 6 - Contact detail amendments
January 2011	**5** update	FSA contact detail change	1. Sect 6 - Contact detail amendments
March 2011	**5** update	FSA & Dwr Cymru contact detail change	1. Sect 6 - Contact detail amendments
Oct & Nov 2011	**5** update	Various contact detail change	1. Sect 6 - Contact detail amendments
October 2013	**6**	Annual Review	1. Sect 6 - Contact detail amendments 2. Classification maps updated 3. Biotoxins added 4. Actions required post FVO audit 2012 included
April 2016	**7**	Membership review	1. Sect 6 - Contact detail amendments

APPENDIX A

Long–Term Classification of Shellfish Harvesting Beds in England and Wales

LOCAL ACTION PLAN COVERING SOUTH WEST WALES

INTRODUCTION

This Local Action Plan clarifies the process of data collection and identifies what control measures are to be put in place or removed when an 'Action State' occurs. The LAP is tailored to specific local needs so as to enhance existing measures of public health protection. All members of SWWLAG will therefore be involved in the development of the LAP, and be aware of its function and scope within the three tiers of investigation.

LAs will not need to delay or improvise the control measures required should high results occur. Swift implementation of the LAP actions is of prime importance for the protection of public health. The FSA have requested LAs to open a dedicated mailbox for LTC where all pieces of communication will be accessible by all LAG members. SWWLAG has therefore agreed that electronic communication will form the basis of liaison between its members - see Section 6.

The use of standard documents in notifying the occurrence of a contamination event and the type of control measures to be implemented will be used - see Appendices D & E.

All members of SWWLAG will be notified:
- That the plan has become operational;
- Details of the conditions; and
- Which parts of the plan are to be followed.

A1. SCOPE OF PLAN

This LAP has been agreed with the FSA and CEFAS and is ready for use prior to contamination events occurring and covers all monitoring points and beds over which the LAs above have responsibility. The plan will be brought into operation immediately a third tier state is triggered. The Lead LA will undertake the co-ordinating role whilst the plan allows for shared responsibilities with other Authorities.

This plan covers the following shellfish harvesting areas:
- Cardigan Bay
- Milford Haven Estuary
- Three Rivers Estuary
- Carmarthen Bay
- Burry Inlet
- South Gower Bays — Worms Head to Mumbles Head
- Swansea Bay — Mumbles Head to Nash Point (inc Queens Dock, Swansea)

Species fished from this area are:

- Cardium edule	(Cockles)	-	Razor
- Mytilus edulis	(Mussels)	-	Clams
- Ostrea edulis	(Oysters)	-	Scallops

Official controls at fish auctions, dispatch centres and processing establishments, on Pectinidae harvested outside classified production areas will be undertaken by LAs to ensure the FBOs checks on marketed scallops is sufficiently robust.

A2. CONDITIONS FOR OPERATION OF THE PLAN

First Tier - Initial investigations

A sample from a Class **B** bed giving a result between 4600 and 10000 E.coli per 100g of flesh will trigger the first tier of investigations.

Verification of the result followed by a statistical assessment to determine whether a significant change in the general level of contamination has occurred will be required. CEFAS is responsible for carrying out any statistical analyses. The Lead LA with responsibility for the harvest bed in question, and the EA, will carry out the investigation into the cause of the high results. The Lead LA will copy outcome to the FSA, CEFAS, PHW and the NRW.

No assistance from SWWLAG will be necessary - see Section 5.2 above.

A3 This plan will come into operation as follows:

a) The Lead LA will notify SWWLAG of all results over 10000 E. coli per 100g of flesh.

b) Where levels of E.coli are found to exceed 18000 per 100g of flesh an 'Action State' will be declared.

The LAP will facilitate swift actions by fully detailing methods and scope of communication. Section 6 details the regulatory contacts who should receive information, gleaned by investigation, external to the LAG.

A3. ACTION STATE

Please also refer to Appendix C. Routine shellfish samples, analysed by PHWMC, will determine the presence of E. coli within the above parameters. Should analysis identify the presence of 18000+ E. coli, then a more detailed examination will be undertaken of subsequent samples to determine the precise number of organisms present as part of the third tier investigation. The Lead LA will advise SWWLAG, members including PHW & PHWMC that an 'Action State' has been declared.

A3.1 An 'Action State' will involve:

- Prompt short term control measures by the Lead LA to ensure immediate public health protection when trigger values are exceeded
- Investigation to identify the cause (SWWLAG and CEFAS)
- Extra sampling to monitor the level of contamination, to assess whether the underlying long-term quality of the water has changed and to aid decision-making.

A3.2 Short Term Public Health Control Measures

a) Once an action state has been initiated, decisions on the most appropriate short term control measures to be applied will be decided by the Lead LA, after consultation with the FSA. Consideration will also be given to any action required in relation to the product already in distribution.

b) If a temporary downgrade were considered necessary, the FSA will notify the Lead LA who in turn will notify all other interested parties via SWWLAG. In the case of beds downgraded from A to B all shellfish from the affected area will be required to undergo depuration for the specified period and meet the end product standard of below 230 E. coli/100g of flesh before being placed on the market.

c) The Lead LA will be advised by the FSA if a temporary closure is required.

d) Measures will be lifted once action state sampling has shown that the E. coli levels have returned below the legal limits for the classification

A3.3 Investigations

Once the short-term measures are in place, an investigation into the cause of the abnormal result will be initiated. These investigations, instigated by CEFAS, will be led by the Lead LA and involve SWWLAG.

Exceptional events leading to abnormal results include a 1 in 5 year storm event; major sewage treatment works failure (since rectified); other exceptional pollution event (eg slurry spill); or failure to comply with sampling protocol.

A3.4 Sampling Arrangements

A3.4.1 The short-term public health measures (see para A3.2) will be implemented by the Lead LA immediately after notification of a result exceeding the action state trigger value. With these measures in place, extra samples will then be taken at designated intervals by the Lead LA to monitor the E. coli levels and provide data to help decide when to lift the action state control measures.

A3.4.2 2 clear samples (i.e. within the classification threshold for the bed concerned) taken 7 days apart, will be required before control measures are lifted. This interval has been set in recognition of the different clearance rates between E. coli, and viruses.

CEFAS has advised that there is currently insufficient information available to recommend a shorter interval between sampling without potentially exposing the consumer to a significant risk. However, the proposed minimum closure period will be reviewed in the light of experience backed up by relevant research and development work.

A3.4.3 The first test following a high result will be taken no later than seven days after the original high result sample. If this sample shows a result complying with the values set for the classification then a further sample would be taken seven days later.

Temporary measures will be lifted if the results comply with the classification value provided there were no other implications for public health protection. If results are unsatisfactory then the action state will continue to apply until data from subsequent monthly sampling, up to a maximum period of three months, demonstrated that E. coli levels met the criteria.

If results do not show compliance with the classification values by the end of the three-month period then an underlying trend may exist and a decision will need to be made on the status of the classification. In reaching this decision, historical data, local information and advice on sewage outflows will be taken into consideration.

A3.4.4 Any extra samples taken, as part of the action state investigations will not be included in future classification assessments (temporary or LTC) because they would skew the results and not give a true reflection of the water quality over the classification assessment period. However all of the results from the routine monthly samples would be taken into account when assessing the ongoing status of temporary or LTC areas (with the exception of those clearly associated with an exceptional event).

APPENDIX B

Procedures for Second Tier Investigation.

1. Local Authority receives notification from the laboratory that the sample result shows E.coli levels are between 10000 and 18000 per 100g flesh.

2. SWWLAG notified, by the Lead LA that the procedures for a second tier investigation are to be implemented.

Where appropriate, CEFAS to advise SWWLAG on statistical assessment of water quality.

3. SWWLAG informed, by the Lead LA that an investigation is to be carried out.

Details of affected area including results sent to members.

4. Lead LA to consider any further available information from SWWLAG members to help with investigation and to request further assistance if necessary.

5. After 7 days Lead LA to consider whether the cause poses an increased risk to public health.

Temporary downgrade or closure of affected area not to be considered until investigation indicates whether there is a potential risk to public health.

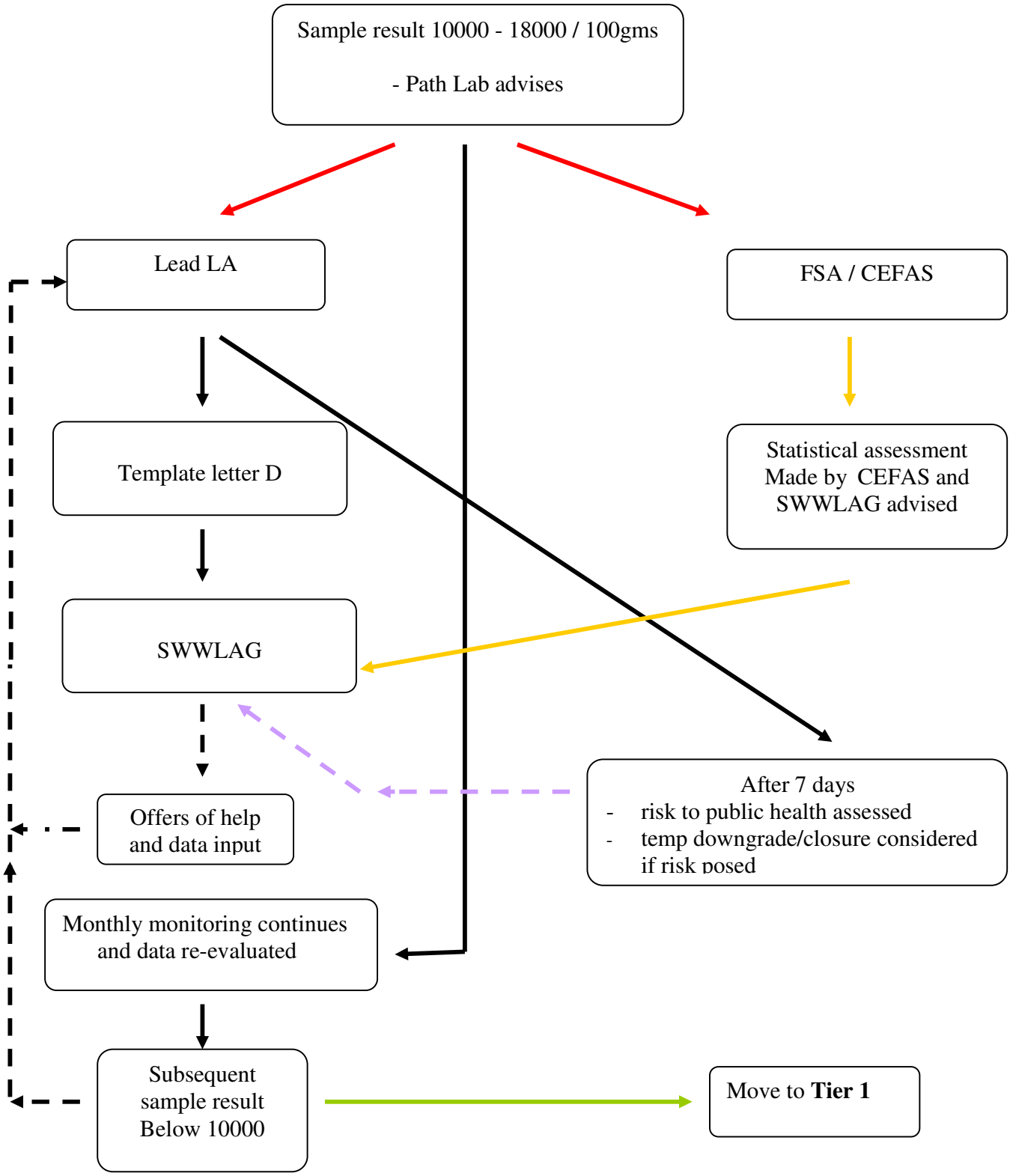
6. SWWLAG notified of any decisions and analysis made.

7. Standard monthly monitoring to continue and data to be re-evaluated.

8. If contamination levels drop below 10000 E.coli per 100g flesh then move to Tier 1 investigation.

9. SWWLAG to be kept informed, by the Lead LA, NRW, FSA or CEFAS as appropriate of any change of status and investigative findings.

FLOW CHART - 2ND TIER INVESTIGATION



APPENDIX C.1

Procedures for Third Tier Investigation and Action State:

1 E Coli

1.1 Lead LA
a) Receives notification from PHWMC that a sample result shows E.coli levels above 18000 per 100g flesh;

1.2. SWWLAG notified, by the Lead LA, that the procedures for a third tier investigation and 'Action State' has been implemented.

Lead LA also to notify Public Health Wales and the FSA of the third tier investigation and 'Action State'

CEFAS to advise on statistical assessment of water quality.

1.3. SWWLAG informed, by the Lead LA, of investigation and control measures to be carried out.
See Appendix A point A3

Details of affected area, including results and short-term measures, to be sent to SWWLAG members. These should include temporary downgrade or closure measures and Closure Notice if issued. SWWLAG to assist in contacting stakeholders including the trade to notify of controls.

If the bed is closed then the FSA Wales Food Incidents Team are to be notified
- see Section 6 contact detail.

1.4. Lead LA to consider any further available information from SWWLAG members to help with investigation and to request further assistance in contacting stakeholders.

Any messages fed in by members should be by the dedicated email address and should be sent to all members of SWWLAG.

1.5. SWWLAG notified of any decisions and analysis made to establish cause.
See Appendix A point A4

1.6. Additional sampling dates to be identified and notified to SWWLAG by the Lead LA in consultation with the microbiological laboratory.

1.7. Standard monthly monitoring to continue in conjunction with additional sampling to determine cause of increased levels.

Data to be re-evaluated until levels become acceptable and bed can be opened.

1.8. If contamination levels drop between 10000 and 18000 E.coli per 100g flesh for two consecutive weeks, then a move to second tier of investigation to be considered.

Change of status to be discussed with SWWLAG and beds opened if agreement with SWWLAG reached.

The Lead LA has final responsibility for lifting any restrictions in place and for lifting the 'Action State'.

1.9. SWWLAG to be kept informed, by the Lead LA, NRW, FSA or CEFAS as appropriate of any change of status and investigative findings.

APPENDIX C.2

Procedures for Third Tier Investigation and Action State:

2 Biotoxins

2.1. Lead LA

a) Receives notification from Cefas that a sample result shows that biotoxin levels are above:

i. Paralytic Shellfish Poisoning (PSP) - 80µg / 100g

ii. Amnesic Shellfish Poisoning (ASP) - 20µg / 100g

iii. Diarrhetic Shellfish Poisoning (DSP) - present

2.2. SWWLAG notified, by the Lead LA, that the procedures for a third tier investigation and 'Action State' has been implemented together with details of the closure measures taken including the Closure Notice issued. SWWLAG to assist in contacting stakeholders including the trade to notify of controls.

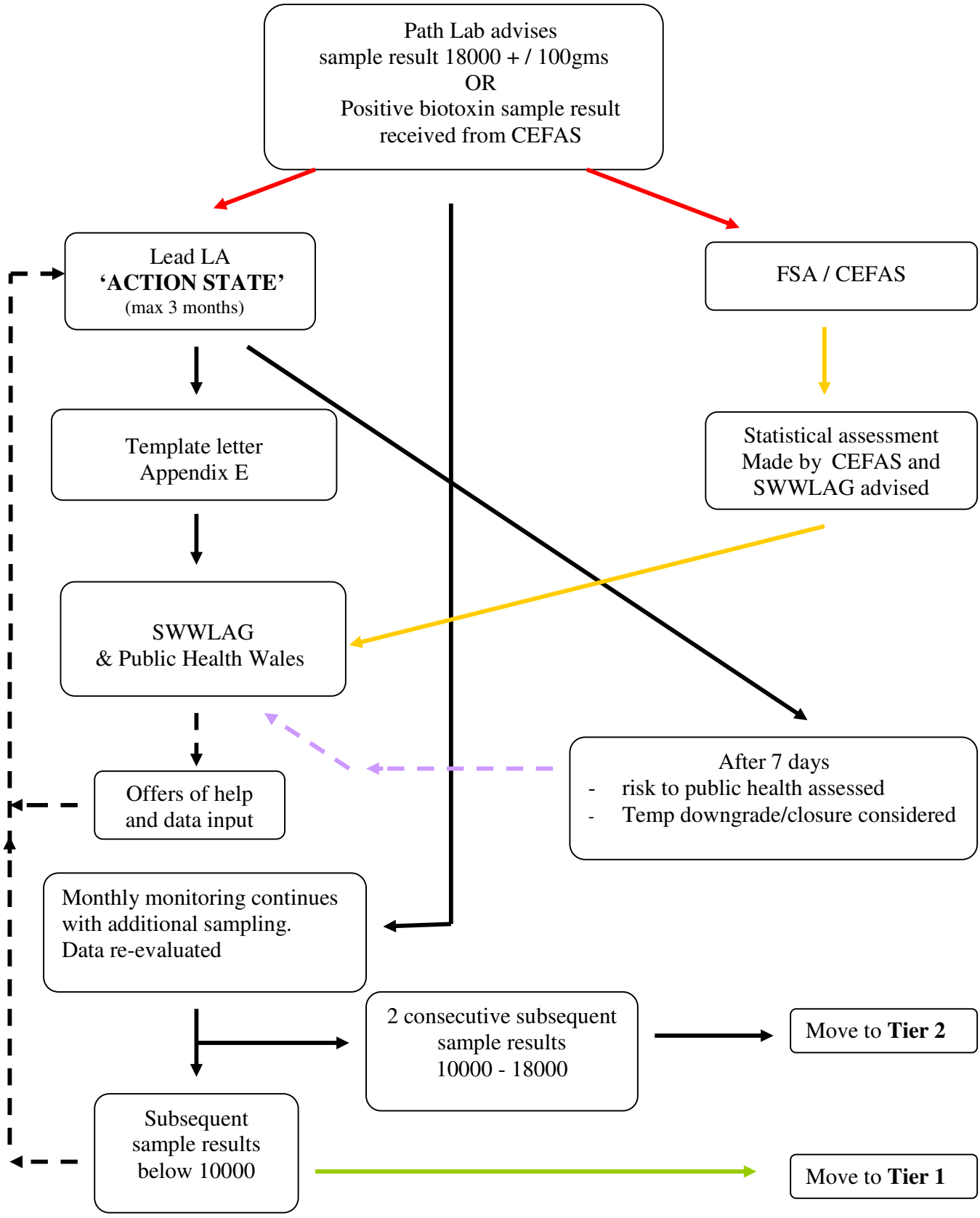
Lead LA also to notify Public Health Wales and the FSA of the third tier investigation and 'Action State'

2.3. Lead LA, in consultation with Cefas, to identify additional sampling dates (within 7 days).

2.4. Standard monitoring to continue in conjunction with additional sampling.
Data to be re-evaluated until levels become acceptable and the bed can be re-opened.

2.5. If for 2 consecutive weeks the biotoxin results do not exceed the permitted levels, then a change of status to be discussed by the Lead LA with SWWLAG and beds opened if agreed.

FLOW CHART - 3RD TIER INVESTIGATION



APPENDIX D

Template of Standard Notification Message for Second Tier Result.

Standard notification of an event and activation of Local Action Plan will take the form of the following template using the letter heading of the Lead LA:

To all members of the South West Wales Local Action Group Date: / / 20

Dear Member

We have received notification that the level of E.coli for the classification sample for **[Shellfish Bed(s)**, is **[numerical level].**

As co-ordinating authority for SWWLAG, this message is notification that the Local Action Plan for our group has been activated.

In accordance with the plan we would refer members to the Appendix B procedures **for Second Tier actions** and request any information relating to the affected area and offers of further assistance should an investigation into the increased contamination be initiated.

Our initial response will be to **[MEASURES TO BE TAKEN]** the shellfish beds in question and to assess, in conjunction with the FSA and CEFAS, the overall water quality of the shellfish area.

Additional sampling to the monthly monitoring programme will (not) be required but any data from stakeholders will be considered in our future assessment of the incident.

We will inform SWWLAG as soon as possible on any developments.

Many thanks for any assistance or comment you wish to offer.

APPENDIX E.1

Template of Standard Notification Message for Third Tier Result.

1. E.Coli

Standard notification of an event and activation of Local Action Plan will take the form of the following template using the letter heading of the Lead LA:

To all members of the South West Wales Local Action Group Date: / / 20

Dear Member

We have received notification that the level of E.coli for the classification sample for **[Shellfish Bed(s)**, is **[numerical level].**

As co-ordinating authority for the SWWLAG, this message is notification that the Local Action Plan for our group has been activated.

In accordance with the plan we would refer members to the Appendix C procedures **for Third Tier actions** and request any information relating to the affected area and any further assistance available for carrying out an investigation into the increased contamination.

Our initial response will be to **[MEASURES TO BE TAKEN]** the shellfish beds in question and to assess, in conjunction with the FSA and CEFAS, the overall water quality of the shellfish area.

Additional sampling to the monthly monitoring programme will (not) be required but any data from stakeholders will be considered in our future assessment of the incident.

We will inform the SWWLAG as soon as possible on any developments.

Many thanks for any assistance or comment you wish to offer.

APPENDIX E.2

Template of Standard Notification Message for Third Tier Result.

2. Biotoxins

To all members of the South West Wales Local Action Group Date: / / 20

Dear Member

We have received notification that the level of **[**ASP/DSP/PSP**]** in a sample taken of **[Shellfish species]**, on **[date]** is **[numerical level]** for **[Shellfish Bed(s) ID:].**

As co-ordinating authority for the SWWLAG, this message is notification that the Local Action Plan for our group has been activated.

In accordance with the plan we would refer members to the Appendix C procedures **for Third Tier actions** and would advise that our initial response will be to **[MEASURES TO BE TAKEN]** the shellfish beds in question and to assess, in conjunction with the FSA and CEFAS, the overall water quality of the shellfish area.

Additional sampling to the monthly monitoring programme will be required until 2 consecutive negative results are received.

No other action is required of you and we will inform the SWWLAG as soon as possible on any developments.

Many thanks for any assistance or comment you wish to offer.

APPENDIX F

Template of Standard Notification Message for Potential Downgrade - Non LTC Bed.

To all members of the South West Wales Local Action Group Date: / / 20

Dear Member

We have received notification that the level of E.coli per 100g for the classification sample taken on **[date]** for **[Shellfish Bed(s) ID]**, is **[numerical level].**

As co-ordinating authority for the SWWLAG, this message is notification that this bed is subject to a potential downgrade in accordance with the Plan.

As there has been: (* *delete as appropriate*)

*	1 result	> 1000	for a Class **A** Bed in the same review year
*	2 results	> 230 but < 1000	for a Class **A** Bed in the same review year
*	3 results	> 4600	for a Class **B** Bed in the same review year
*	2 result	> 18000	for a Class **B** Bed in the same review year
*	1 result	> 46000	for a Class **B** Bed in the same review year
*	2 result	> 4600	for a Class **C** Bed in the same review year

We will inform the SWWLAG as soon as possible on any developments.

Many thanks for any assistance or comment you wish to offer.

APPENDIX G

Template of Standard Notification Message for Fishing in Unclassified Area.

To all members of the South West Wales Local Action Group Date: / / 20

Dear Member

We have a report of fishing for **[Shellfish species]**, on **[date]** at **[Shellfish Bed(s) ID:].**

Our initial response will be to **[MEASURES TO BE TAKEN]**

If you become aware that **[Shellfish species]** are being landed or received by merchants / trade please notify this Authority.

We will inform the SWWLAG as soon as possible on any developments.

Many thanks for any assistance or comment you wish to offer.

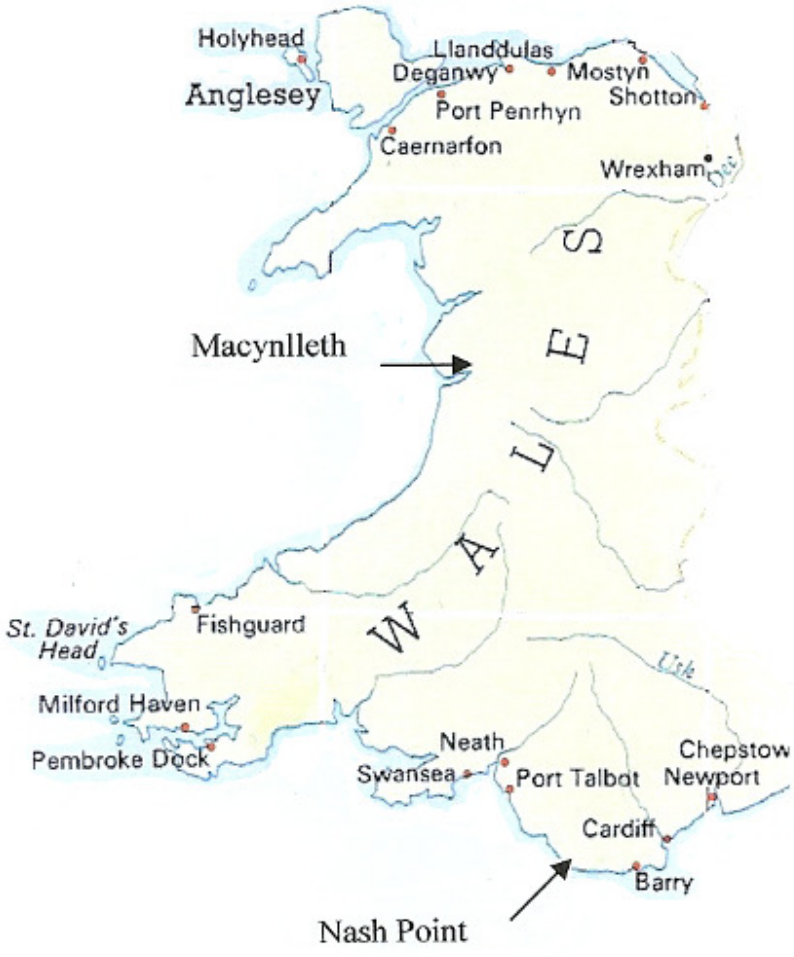
APPENDIX H

Background information of relevance to potential pollution incidents

H1

GEOGRAPHICAL AREA COVERED BY THE

SOUTH WEST WALES LOCAL ACTION GROUP:



BOUNDARIES: **EAST -** **NASH POINT, PORTHCAWL**
WEST - **DYFI ESTUARY (MACYNLLETH)**

H2 REGULATED SEASONALITY

At a meeting on 6th November 2012 it was agreed that the Welsh Government will advise SWWLAG and in particular the Lead LA of harvest bed closure / opening dates to enhance the enforcement capabilities regarding illegal gathering.

H3 POTENTIAL FACTORS AFFECTING HARVEST BED INTEGRITY

Local Authority representatives will research details of any forthcoming regattas etc scheduled within their respective districts. Such information will be included in this Appendix as appropriate.

H4 POSITION AND TYPE OF RELEVANT RAINGUAGES

The following table identifies met office registered tipping bucket rainguages sites. If a failure occurs, the Environment Agency would refer to sites further upstream in the relevant catchment areas.

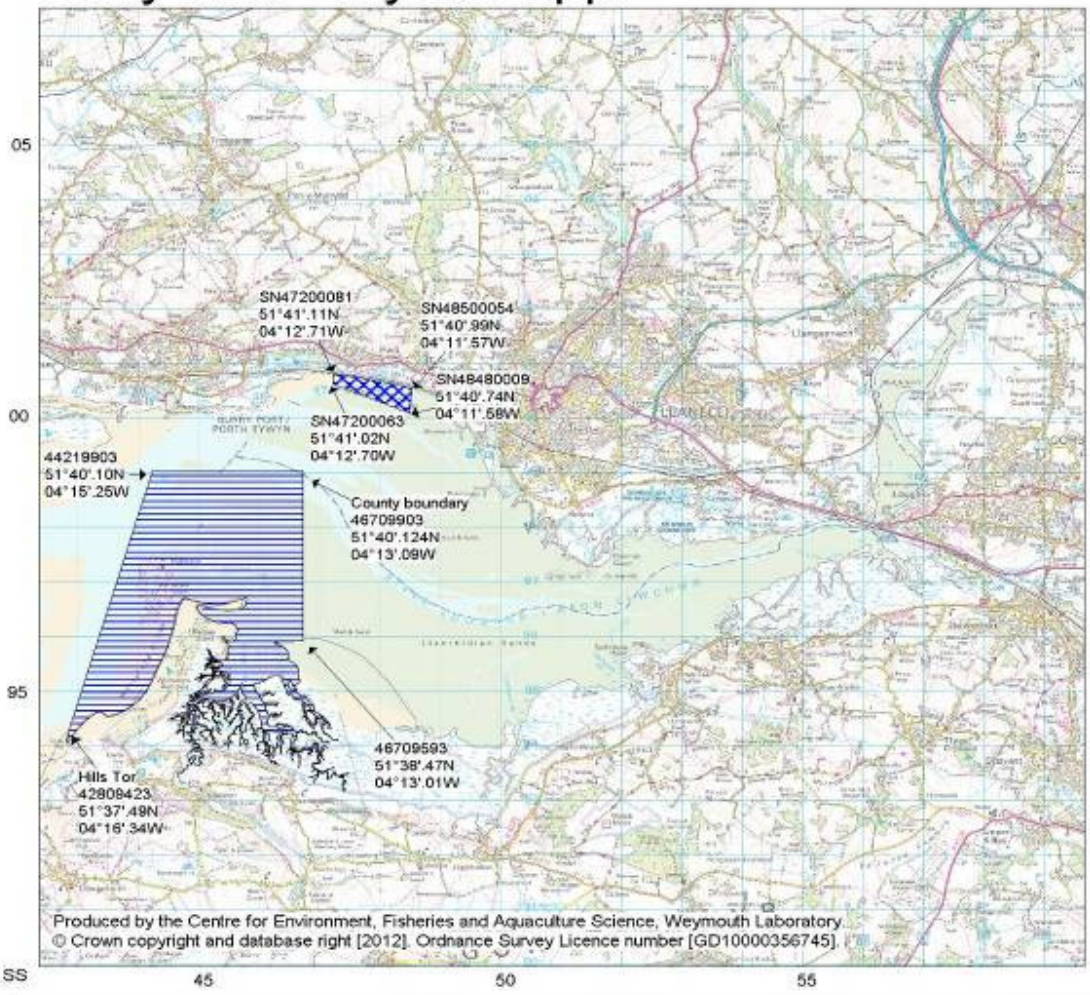
Rain gauge	Met Office Number	NGR
SCHWYLL P.S.	058R0107	SS 8852476982
PENCOED	058R0410	SS 9675581935
RESOLVEN	058R0411	SN 8242002609
MARGAM PARK	058R0408	SS 8092285493
UPPER LLIW	059R0125	SS 6620905831
SOUTHGATE STW	059R0596	SS 5565487752
VICTORIA PARK	059R0129	SS 6423792223
PITTON STW	059R0654	SS 4283587666
NANTYMAEN	060R0168	SN 7618458402
TONN	060R0172	SN 6467035291
St CLEARS	060R0189	SN 2829117851
RHYDARGAEAU	060R0248	SN 4468926087
BRODERI	060R0591	SN 55592651
PENDINE STW	060R0652	SN 2319108926
KIDWELLY STW	060R0653	SN 3990806255
ORIELTON	061R0195	SR 9531199110
DALE	061R0210	SM 8230005162
ST FLORENCE	061R0417	SN 0854000097
ST DAVIDS	061R0418	SM 7420924587
NEWGALE	061R0649	SM 85622222259
TENBY STW	061R0650	SN 1148600877
PENTLEPOIR SRV	061R0651	SN 1189005903
CELLAN	062R0222	SN 6081048979
RHYDLEWIS	062R0389	SN 3461147292
SARON	062R0440	SN 3745237605
PWLLPEIRAN	063R0385	SN 7729574925
FRONGOCH	063R0441	SN 6052982503
CWM RHEIDOL	063R0481	SN 7082079261
ABERPORTH STW	063R0533	SN 5863633799
LLANINA STW	063R0647	SN 4038459389
LLANTWIT MAJOR STW	058R0643	SS 9537169477
LLANFYRNACH DL	060R0264W	SN 2196331037
PONTRHYDFENDIGAID	062R0422W	SN 7280566758
BOLTON HILL	061R0262W	SM 9188611214

H5 IDENTIFICATION OF HARVEST BEDS

The following maps identify the classified harvest beds in the area covered by SWWLAG. RMPs agreed between individual LAs and CEFAS will be provided by CEFAS.

Burry Inlet - Mytilus spp.

Scale - 1:100000



Classification Zones: Class A | Class B | Class C | Prohibited | LT Class B

Classification of Bivalve Mollusc Production Areas: Effective from 1 September 2012

The areas delineated above are those classified as bivalve mollusc production areas under EU Regulation 854/2004.

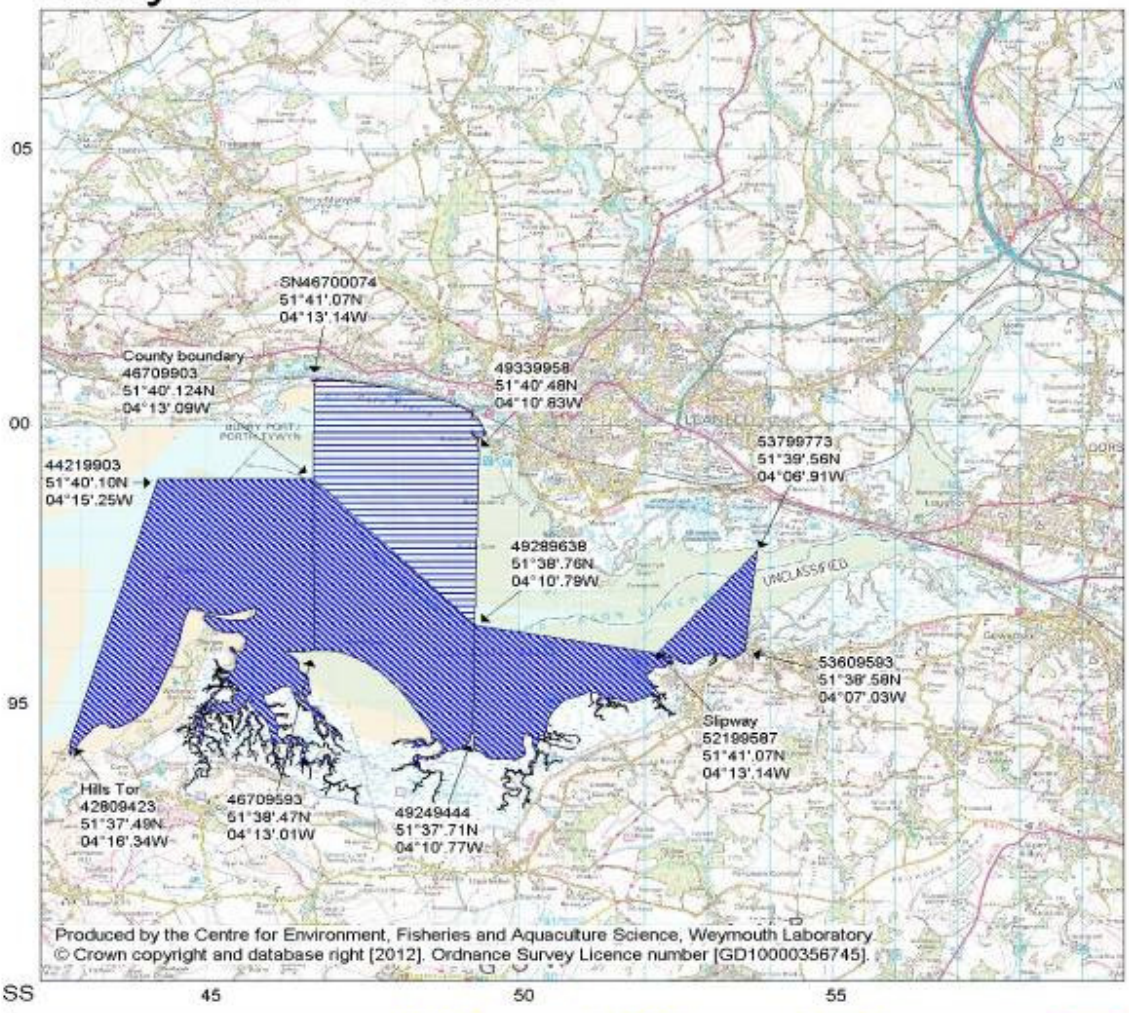
Further details on the classified species and the areas may be obtained from the responsible Food Authority. Enquiries regarding the maps should be directed to: Shellfish Microbiology, CEFAS Weymouth Laboratory, Barrack Road, The Nothe, Weymouth, Dorset DT4 8UB.
(Tel: 01305 206600 Fax: 01305 206601)

N.B. Lat/Longs quoted are WGS84
Separate map available for C. edule at Burry Inlet

Food Authority: Carmarthen County Council (Burry Inlet - Northside)
Swansea City & County Council (Burry Inlet - Southside)

Burry Inlet - C. edule

Scale - 1:100000



Classification Zones: Class A | Class B | Class C | Prohibited | LT Class B

Classification of Bivalve Mollusc Production Areas: Effective from 1 September 2012

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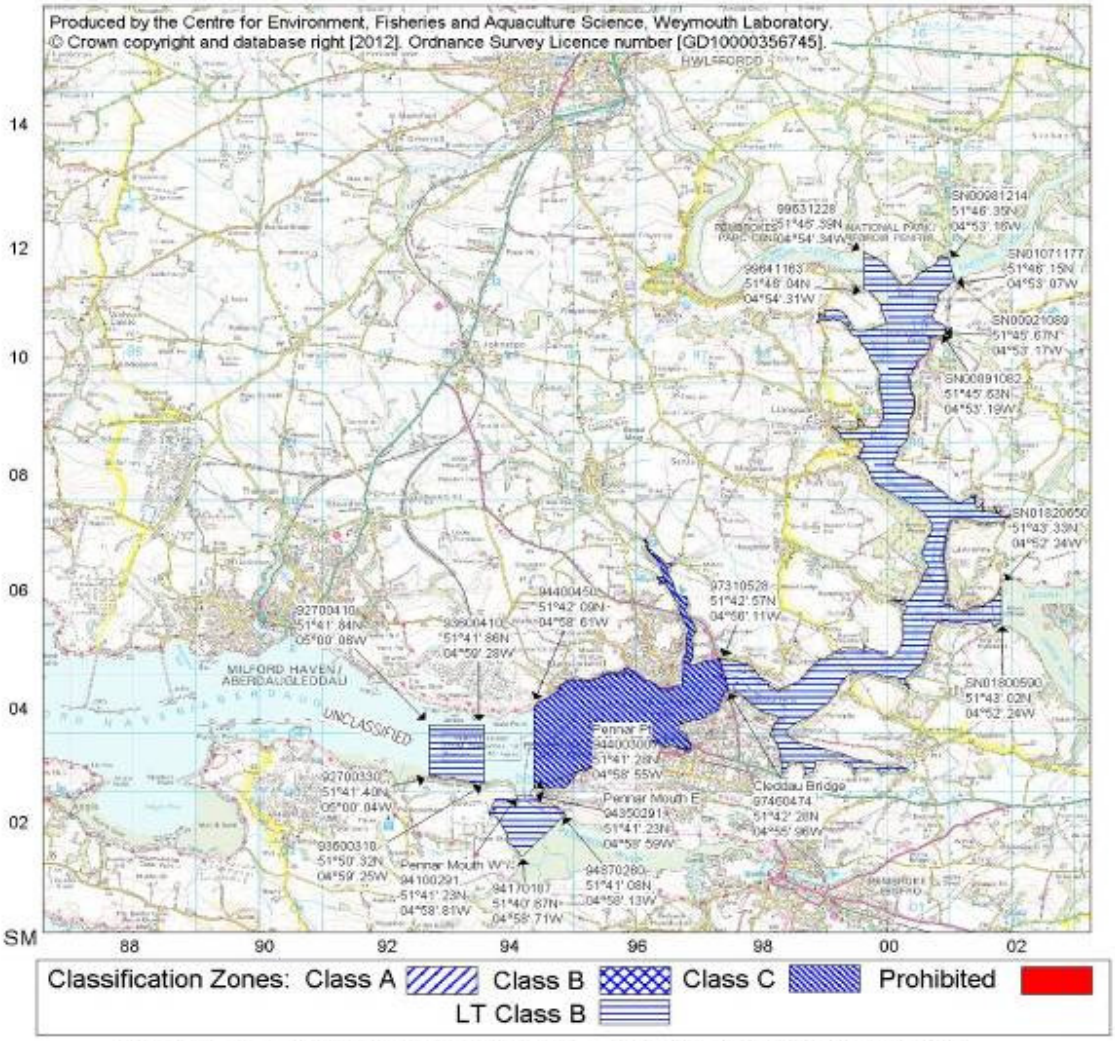
N.B. Lat/Longs quoted are WGS84
Separate map available for Mytilus spp. at Burry Inlet

Food Authority: Carmarthen County Council (Burry Inlet - Northside)
Swansea City & County Council (Burry Inlet - Southside)

Milford Haven - O. edulis

Scale - 1:100000



Classification of Bivalve Mollusc Production Areas: Effective from 1 September 2012

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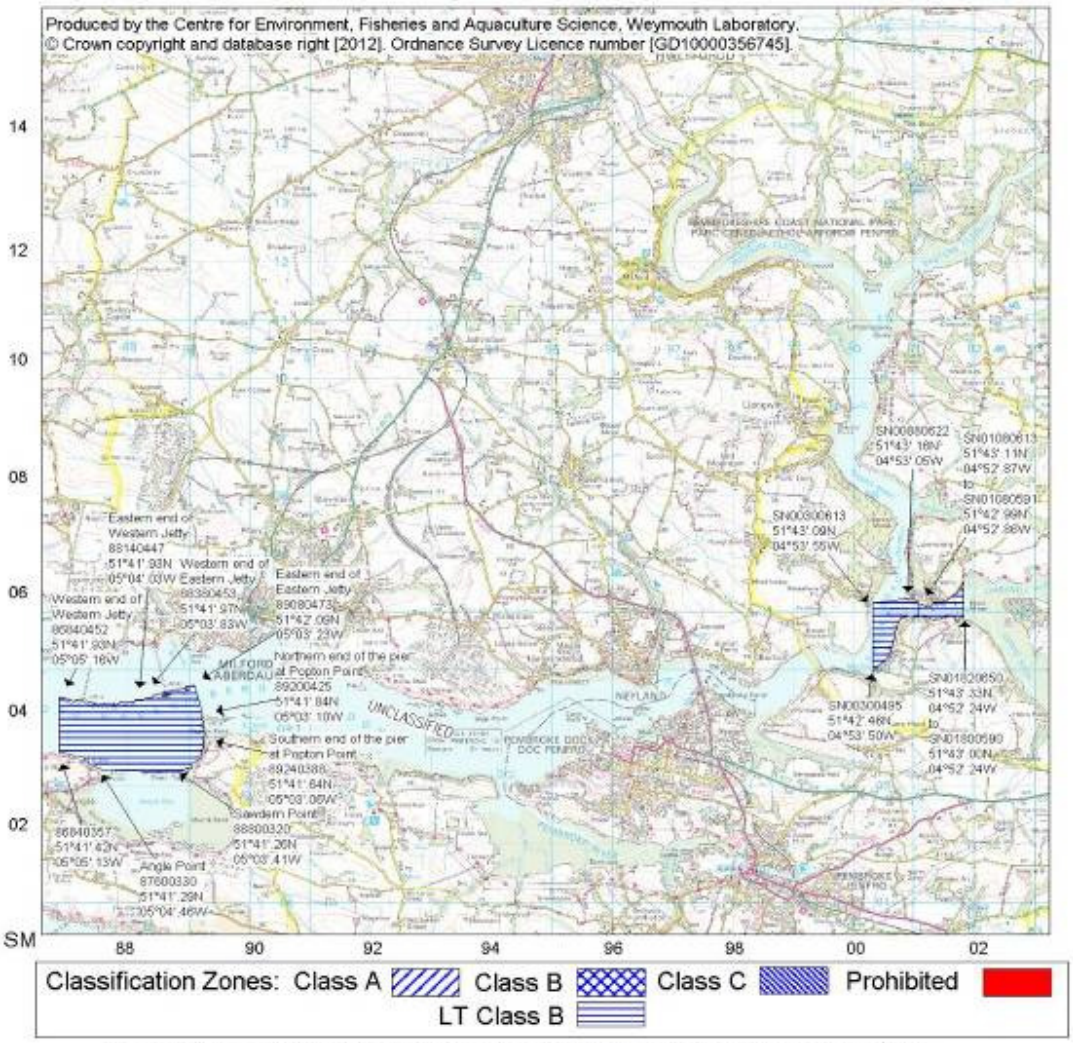
N.B. Lat/Longs quoted are WGS84
Separate map available for Mytilus spp. at Milford Haven

Food Authority: Pembrokeshire County Council

Milford Haven - Mytilus spp.

Scale - 1:100000



Classification of Bivalve Mollusc Production Areas: Effective from 1 September 2012

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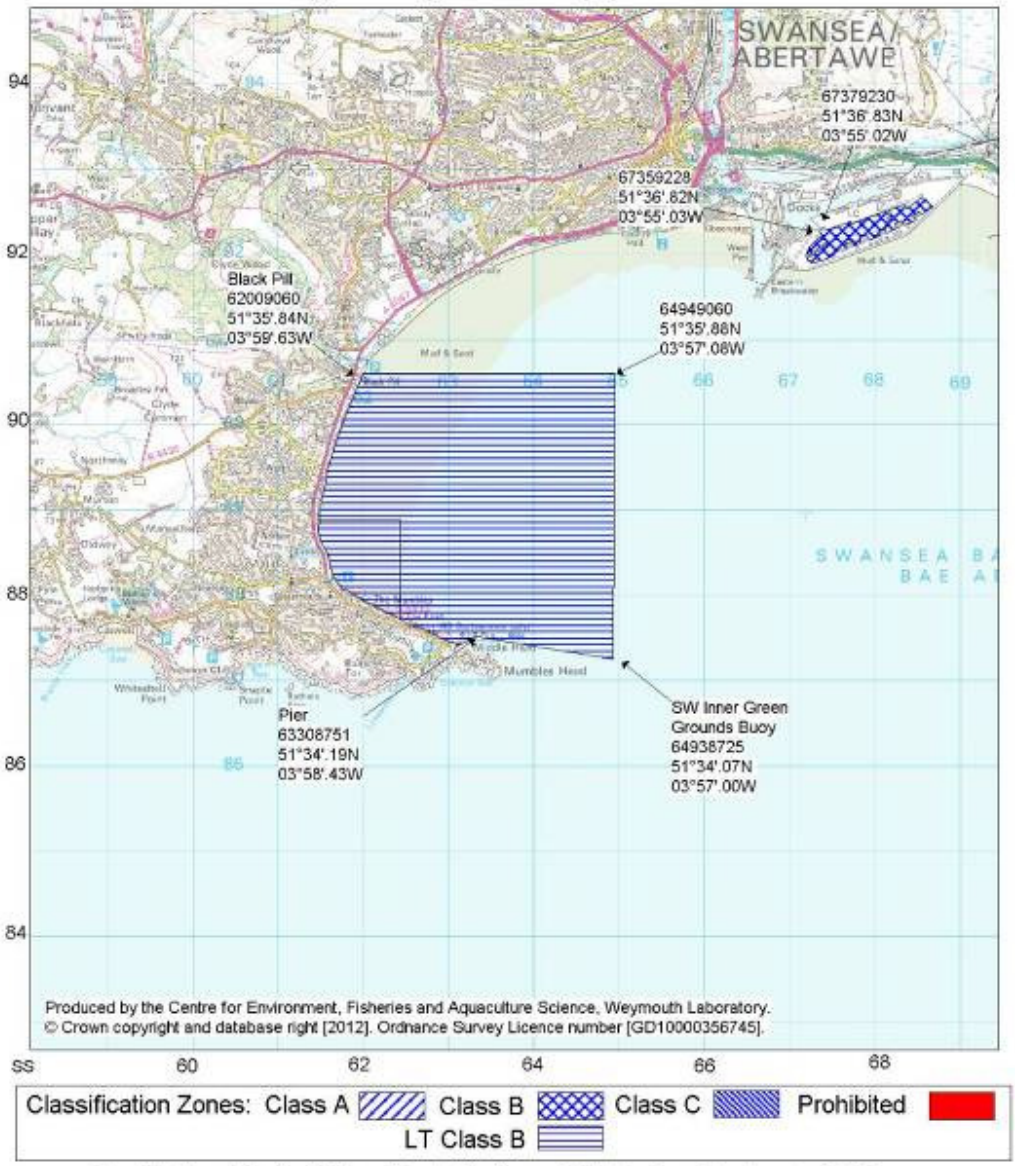
(Tel: 01305 206600 Fax: 01305 206601)

N.B. Lat/Longs quoted are WGS84
Separate map available for O. edulis at Milford Haven

Food Authority: Pembrokeshire County Council

Swansea Bay - Mytilus spp

Scale - 1:70000



Classification of Bivalve Mollusc Production Areas: Effective from 1 September 2012

The areas delineated above are those classified as bivalve mollusc production areas under EU Regulation 854/2004.

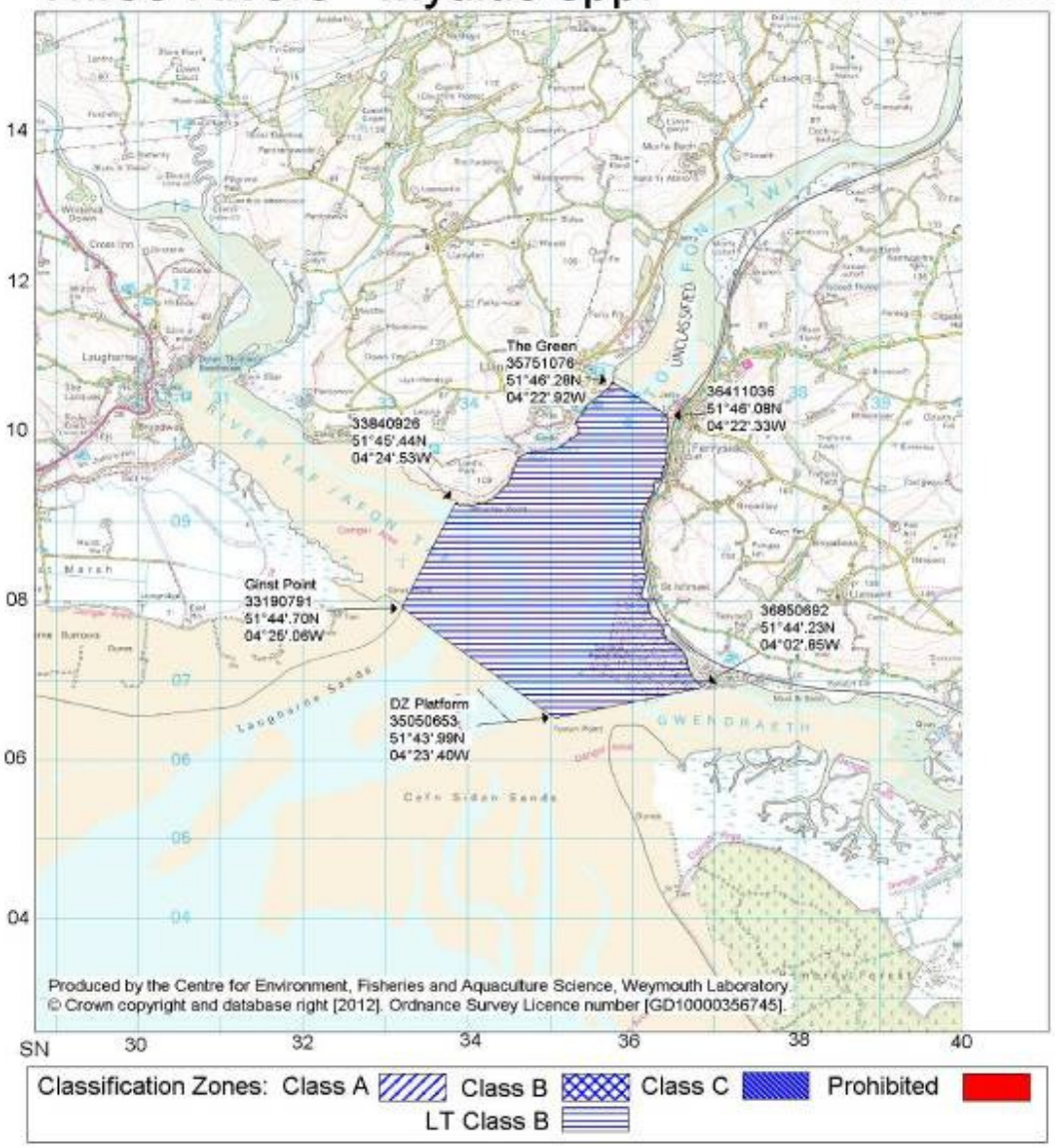
Further details on the classified species and the areas may be obtained from the responsible Food Authority. Enquiries regarding the maps should be directed to: Shellfish Microbiology, CEFAS Weymouth Laboratory, Barrack Road, The Nothe, Weymouth, Dorset DT4 8UB.
(Tel: 01305 206600 Fax: 01305 206601)

N.B. Lat/Longs quoted are WGS84
Separate map available for O. edulis at Swansea Bay

Food Authorities: Swansea City & County Council Swansea Bay Port Health Authority

Three Rivers - Mytilus spp.

Scale - 1:75000



Classification of Bivalve Mollusc Production Areas: Effective from 1 September 2012

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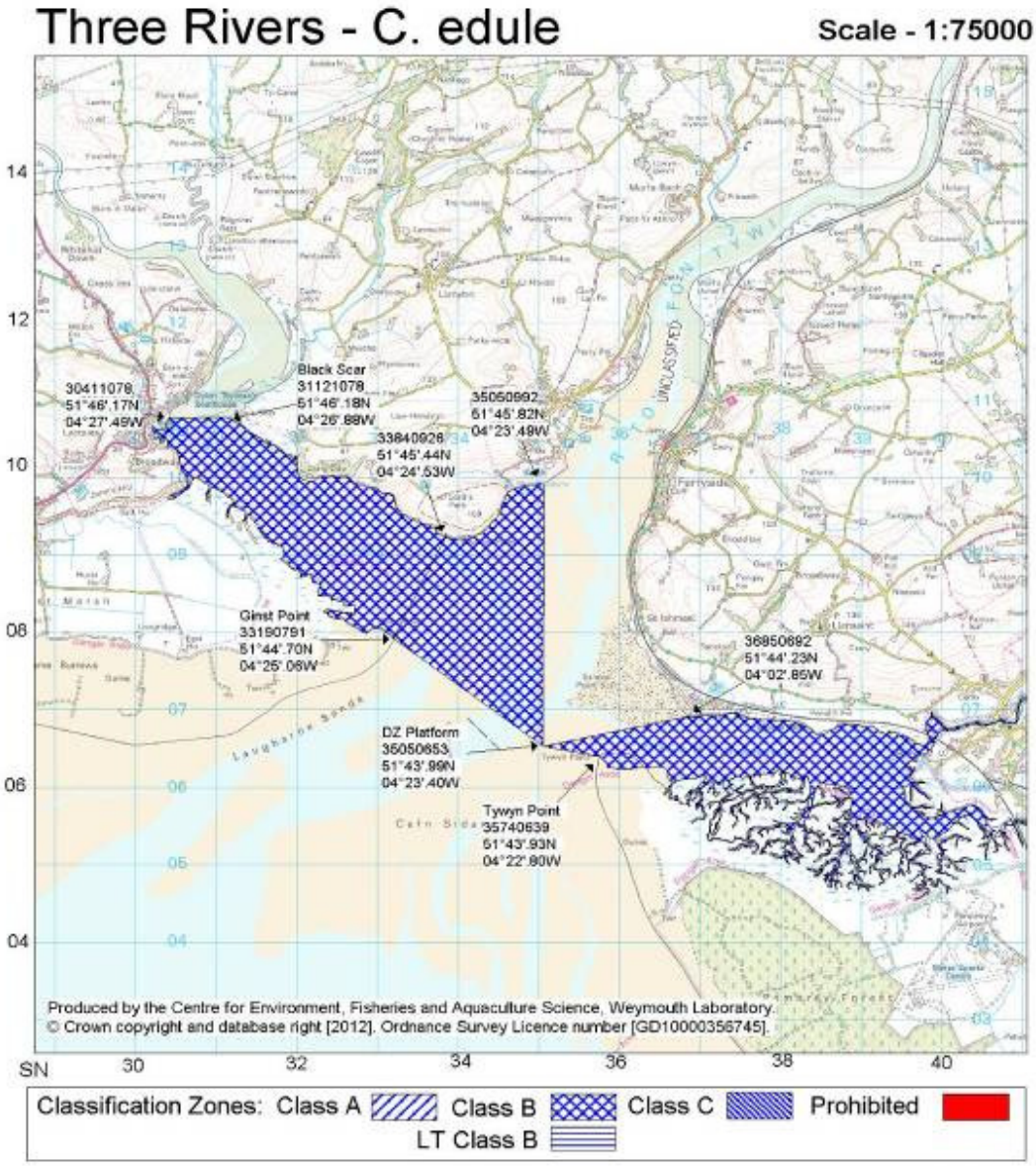
(Tel: 01305 206600 Fax: 01305 206601)

N.B. Lat/Longs quoted are WGS84
Seperate map available for C. edule at Three Rivers

Food Authority: Carmarthenshire County Council



Classification of Bivalve Mollusc Production Areas: Effective from 1 September 2012

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(Tel: 01305 206600 Fax: 01305 206601)

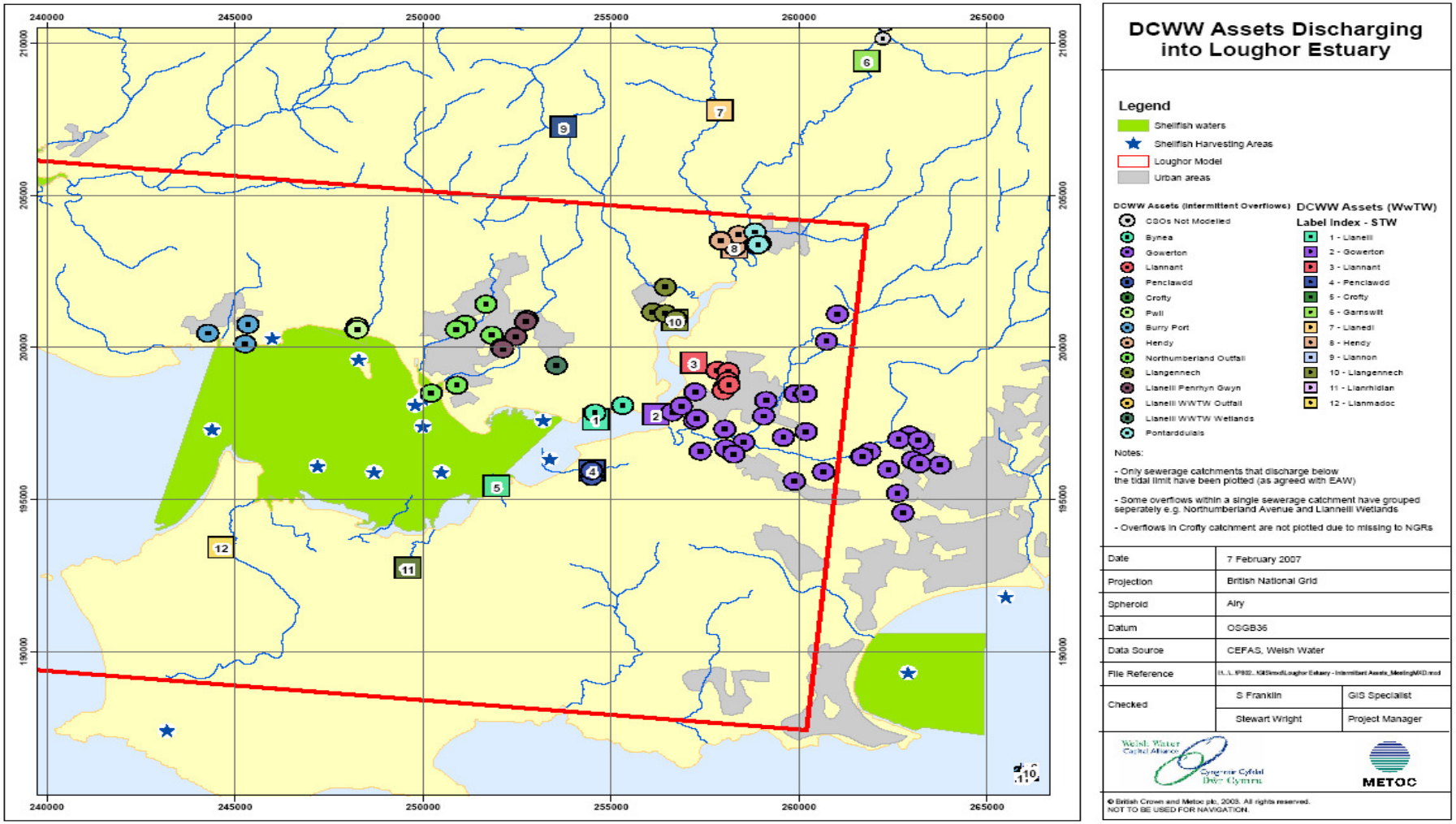
N.B. Lat/Longs quoted are WGS84
Seperate map available for Mytilus spp. at Three Rivers

Food Authority: Carmarthenshire County Council

H6 POTENTIAL POLLUTION SOURCES

H 6.1

The following map, provided by Dwr Cymru, indicates discharges entering the Burry Estuary.



H 6.2 Pollution Reduction Plans

DIRECTIVE (2006/113/EC) ON THE QUALITY REQUIRED OF SHELLFISH WATERS

ARTICLE 5 PROGRAMME

1. INTRODUCTION

This Programme has been drawn up by the Environment Agency in accordance with paragraph 6 of The Surface Waters (Shellfish) Directions 1997, for the purposes of giving effect to Article 5 of the Shellfish Waters Directive 2006/113/EC.

Article 5 requires the establishment of 'programmes in order to reduce pollution and to ensure that designated waters conform, within six years following designation in accordance with Article 4, to both the values set by the member states in accordance with Article 3 and the comments contained in columns G and I of the Annex'.

The Programme shows the state of the catchment with respect to the Shellfish Waters Directive standards. It examines and explains the causes of any failures to meet those standards. The programme describes what actions are being taken to maintain and improve water quality in this catchment, ensure compliance with the mandatory standards of the Shellfish Waters Directive, and endeavour to observe the guideline standards.

This plan is subject to annual review to establish progress and to periodic updating as circumstances change.

December 2009

The following plans, provided by the Environment Agency, detail pollution reduction strategies for the following shellfish harvest areas at Porthcawl, Swansea Bay (East, South and West), Burry Inlet (North and South, Gwendraeth, Milford Haven (Cleddau and Carew), Tywi and Taf.

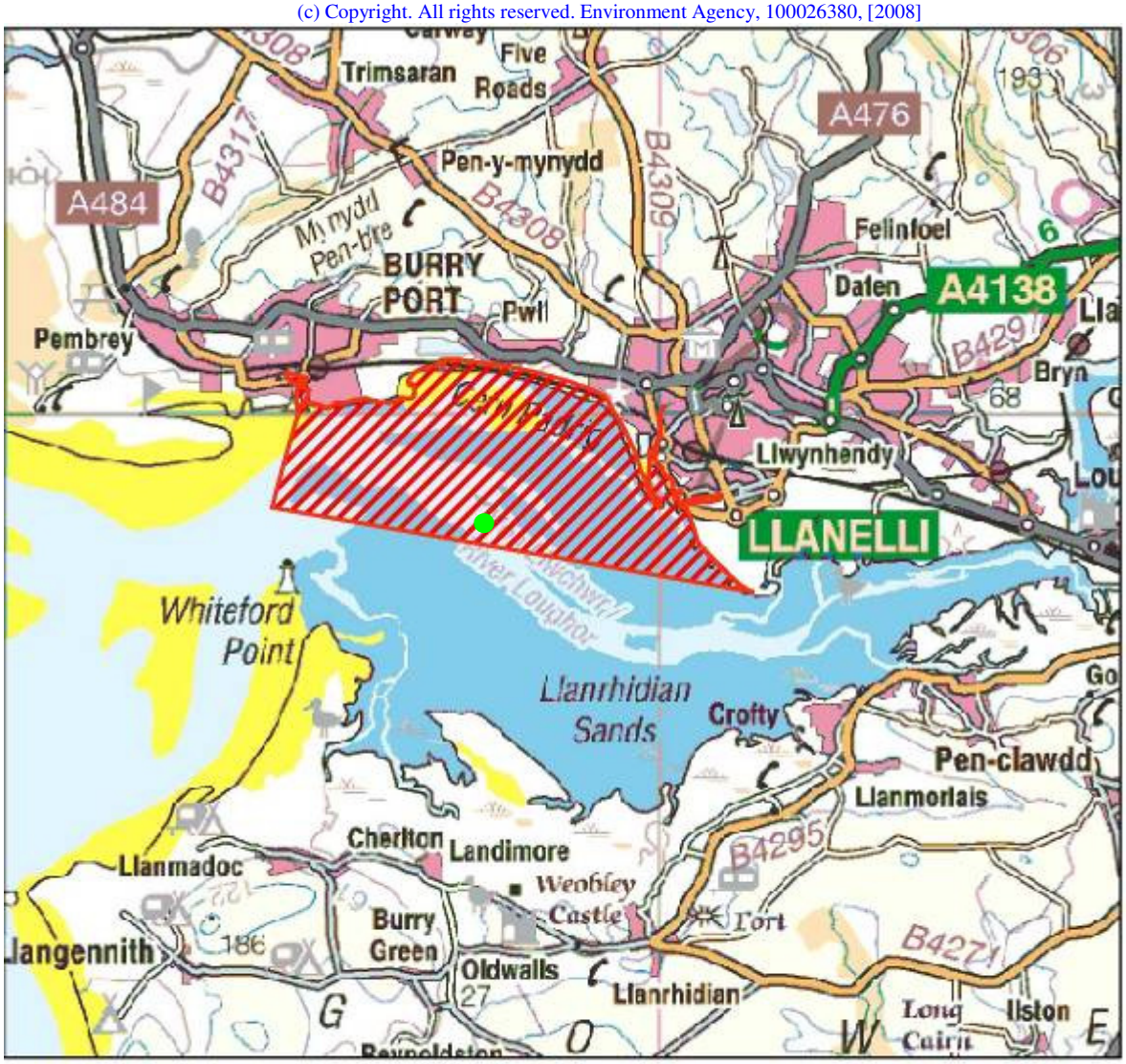
Please note that the introduction above is Point 1 to each of the following plans.

A. Burry Inlet (North)

2. MAP & DESIGNATION DETAILS

Environment Agency Region:	Wales
Environment Agency Area:	South West (Wales)
Shellfish Water:	Burry Inlet (North)
Catchment:	Loughor
Designated:	1999
Designation Number	86
Sampling point location	SS 4720098500 (51° 39”52.02’ N 4° 12”38.75’ W)

Figure 1 Burry Inlet (North) Shellfish Water



Key

3. DESCRIPTION

3.1 Species Present

Common edible cockle *(Cardium edule).*
Mussels *(Mytilus spp.)*

3.2 Location and Geography

The Burry Inlet (North) forms the northern part of the Loughor estuary, which is situated between the north coast of the Gower and the south eastern coast of Carmarthenshire. The designated Shellfish Water area is north of the River Loughor channel, between Llanelli and Burry Port. This Shellfish Water is adjacent to Burry Inlet (South) Shellfish Water. The inlet is generally shallow and much of it dries out at low water. The tidal range is 7m. The sea bed consists of fine sand with some broken shells.

3.3 Land Use Pressures

The Loughor catchment is predominantly rural and agricultural, however there is a large urban and industrial area of development at Llanelli, and at Burry Port to a lesser extent. The Millennium Coastal Park at Llanelli is a popular tourist destination. Major development at Llanelli Waterside is planned, and will include commercial, leisure/tourism, residential and educational premises as well as manufacturing and processing industries.

3.4 Discharges to the Estuary

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Burry Inlet (North) Shellfish Water

Discharge	Consented Dry Weather Flow (DWF) (l/s)	Location	Reference to action taken
Gowerton STW	265.9	Direct to Loughor Estuary	Section 5 Table 3
Garnswllt STW	151.9	Indirect to Loughor Estuary	Section 5 Table 3
Llanelli STW	131.1	Direct to Loughor Estuary	Section 5 Table 3
Llannant STW	49.9	Direct to Loughor Estuary	Section 5 Table 3

STW – Sewage Treatment Works

There are also a number of smaller DCWW discharges into the Burry Inlet catchment, for example Llanrhidian STW, and a number of private discharges, for example the Wildfowl and Wetland Centre.
There are also a large number of major intermittent discharges that have the potential to influence the Shellfish Water. These include Northumberland Combined Sewer Overflow (CSO), and Gowerton STW and Llanelli STW storm tanks.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Burry Inlet (North) Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 to 2008).

4.2 Compliance with Guideline Standards

During the past 5 years (2004 to 2008) the Burry Inlet (North) Shellfish Water has achieved guideline compliance with the standards for salinity and dissolved oxygen . The local authority collects cockle samples for flesh analysis from commercially active beds. The sample points for collecting cockle flesh within Burry Inlet (North) have not been at commercially active locations therefore no recent data has been available to determine if the guideline standard for Faecal coliforms has been met. We are working to rectify this data shortfall (see Table 3, action 71).

Table 3 – Results of Compliance tests of Shellfish Water										
	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5. ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
53	Garnswllt STW	Upgrade of works to Tertiary Treatment	2003	Completed
55	Penclawdd STW	Works decommissioned. Now pumped to Gowerton STW	2004	Completed
56	Crofty STW	Works decommissioned. Now pumped to Gowerton STW	2004	Completed
57	Burry Port SPS	6mm screens installed. Storm designed to less than 10 spills	2004	Completed
51	New Llanelli STW	New Llanelli STW Secondary treatment with Ultra Violet (UV) disinfection	2005	Completed
52	Llannant STW	Secondary treatment with UV disinfection. Storm flows not impacting on Shellfish Waters	2005	Completed
54	Hendy STW	Works decommissioned. Now pumped to Llannant STW	2005	Completed
58	Gowerton STW	Secondary treatment with UV disinfection.	2005	Completed
62	Pwll STW	Pwll SPS reduced spill	2006	Completed

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
		frequency, and the introduction of screening.		
64	River Gwili	Inland on the River Gwili, three stretches have been identified as failing their river quality objectives. Action is to carry out investigations to identify any sources of pollution.	2007	Completed. River investigations and some monitoring have been carried out. This work identified some sources of pollution, which have been dealt with. In addition major improvements have been completed at Crosshands STW and further improvements have been carried out at Cwmtawel STW and the sewage pumping stations serving Crosshands Business Park.
68	Lliw catchment pollution prevention	The Lliw River enters the Loughor estuary a short distance upstream of the designated Shellfish Water. Action: Carry out pollution prevention visits in the Lliw Catchment area to identify any pollution sources.	2007	Completed. Three industrial estates within the Lliw catchment have received pollution prevention visits. Several potential sources of diffuse pollution, including farms, were identified and all premises have been given guidance on pollution prevention. We will monitor the success of our advice.
71	Collect flesh samples	Ensure programme in place to collect sufficient shellfish samples to assess guideline compliance of Burry Inlet North shellfish waters	2008	Completed The Agency now has a contract with CEFAS (from April 2008) who will be responsible for ensuring that the required sampling programme is implemented as far as is practicable.
86	Groundwater inspections	Carry out Groundwater Authorisation inspections to assess if used sheep dip is disposed of correctly.	2010	To be completed by end March 2010 Planned inspections for North Gower farms. Pollution prevention advice is an integral part of these farm visits.
61	Northumberland Outfall & Llanelli Storm Tanks	Develop and implement scheme to reduce microbial and aesthetic impact of storm spills.	2010	Work is underway to complete design of appropriate schemes for each asset by the end of March 2010 – likely to include elements of enhanced storm storage and UV disinfection of storm flows.
69	Water Quality model Loughor Estuary	Develop a water quality model in the Loughor Estuary that can be used to assess diffuse pollution impacts on the estuary.	2009 - ongoing	Ongoing Cardiff University College (UC) is developing this model and this work is ongoing. This work is linked to review of consents under the Habitats Directive. Sampling data was collected between August 2007 and July 2008. Cardiff UC will review the data and produce an interim report in Autumn 2008.
66	Misconnection from an industrial estate	Identify misconnections from Dafen Industrial Estate	2010	Ongoing Work has been carried out to investigate diffuse pollution impacts on the Bathing Waters at Llanelli beach. High bacteria

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
				levels have been found on the River Dafen which drains into Llanelli beach. We suspect this is due to misconnections from the industrial estate and we are working with Carmarthenshire County Council Environmental Health Department to resolve these
67	Pembrey Beach	We believe that there maybe a diffuse pollution impact on Pembrey beach from grazing animals on the South shore of the Loughor Estuary - Spring tides "lifting" faecal matter and depositing it elsewhere. We will investigate this potential impact.	2011	Ongoing Investigative water quality samples have been taken in 2009 at a number of freshwater inputs into the Burry Inlet Area. Samples were taken during and after the bathing water season, in wet and dry weather conditions. The results from these samples will target further work in specific catchments during 2010. unding is being sought to carry out a modelling study of potential inputs and their movements within the Burry Inlet Area.
86a	Investigations into mass cockle deaths	Identify cause(s) of mass cockle mortalities in the Burry Inlet	2010	Ongoing Initial research study led by Bangor University has been carried out which has not identified the cause(s) of these mass mortalities. This study along with additional monitoring carried out during mass mortalities in Summer 2008, has been used to develop a proposal for a programme of work to identify the cause(s) of these mortalities. This proposal will be reviewed by the Welsh Assembly Government (WAG) who have asked the Environment Agency to lead and co-ordinate the investigations on their behalf. Targeted investigative monitoring was undertaken in 2009 before the mass cockle mortality began in June. Further funding has been secured to enable analysis and reporting to be completed. A draft interim report is being prepared for publication in Jan 2010. A solar powered monitoring buoy is to be deployed in early 2010 to monitor a range of parameters to help fill some of the monitoring gaps associated with previous spot monitoring programmes.

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Burry Inlet (North) Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008).

The Environment Agency reviews its monitoring data annually. We try to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures. River stretches that have failed a statutory requirement are prioritised, and this information is then used to target the resource allocated annually to the Environment Agency's diffuse pollution project. This is funded by WAG.

5.2 Remedial action to prevent guideline failures

During the past 5 years (2004 to 2008) the Burry Inlet (North) Shellfish Water achieved guideline compliance with the standards for salinity and dissolved oxygen in all years. Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from CSO outfalls and sewage discharges have all been identified as having the potential to cause failure of guideline standards.

Significant point source discharges have received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality. Remedial action has been undertaken to counter the potential sources of pollution considered most likely to contribute to failure of the guideline standards of the Shellfish Directive.

To this end, an improvement programme of work will be completed in 2010 by Dwr Cymru Welsh Water. A number of significant sewage discharges were upgraded along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. This builds upon improvements completed in previous AMP periods prior to 2000 and 2000-2005. The general project aims to ensure compliance with the mandatory standards and endeavours to observe compliance with the guideline parameters for EU Directives. This programme of work is outlined in Table 3, actions 51-58 and 62.

A large number of intermittent improvements have taken place in this catchment that have significantly reduced Faecal coliform loadings to the Shellfish Water. For example the significant intermittent discharge at Gowerton STW (settled storm) and also storm discharges at Pwll, Ashburnham and Burry Port Sewage Pumping Stations.

These improvements will all have an impact on Faecal coliform concentrations in the Shellfish Water.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In figures 2 and 3 below, the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the period 2001 - 2008.

Figure 2 Faecal coliforms in Water for the Burry Inlet (North) Shellfish Water, 2001 to 2008

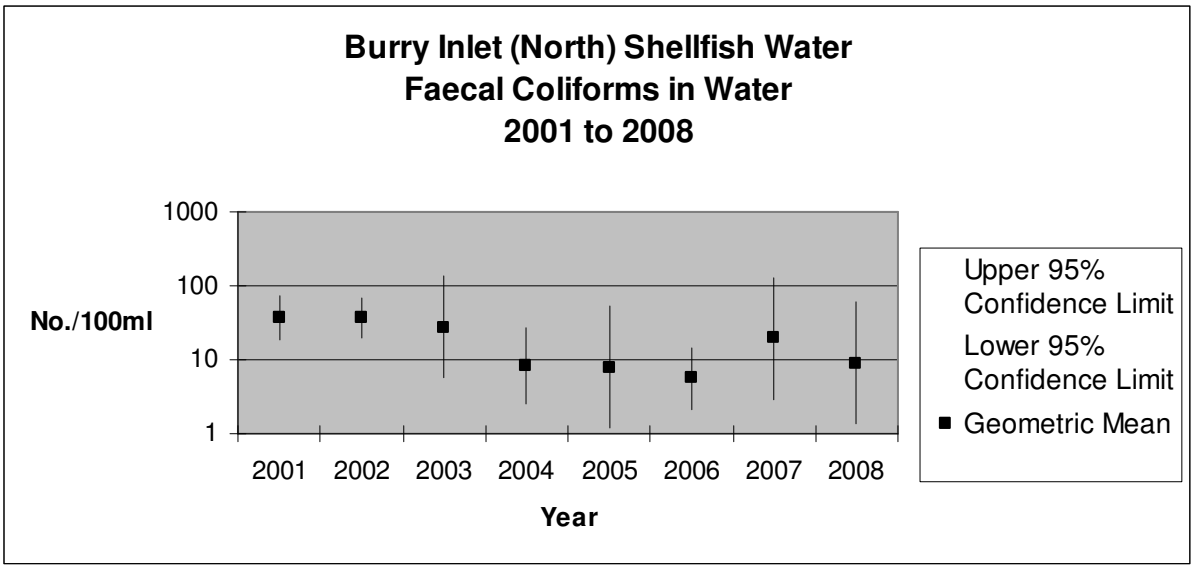
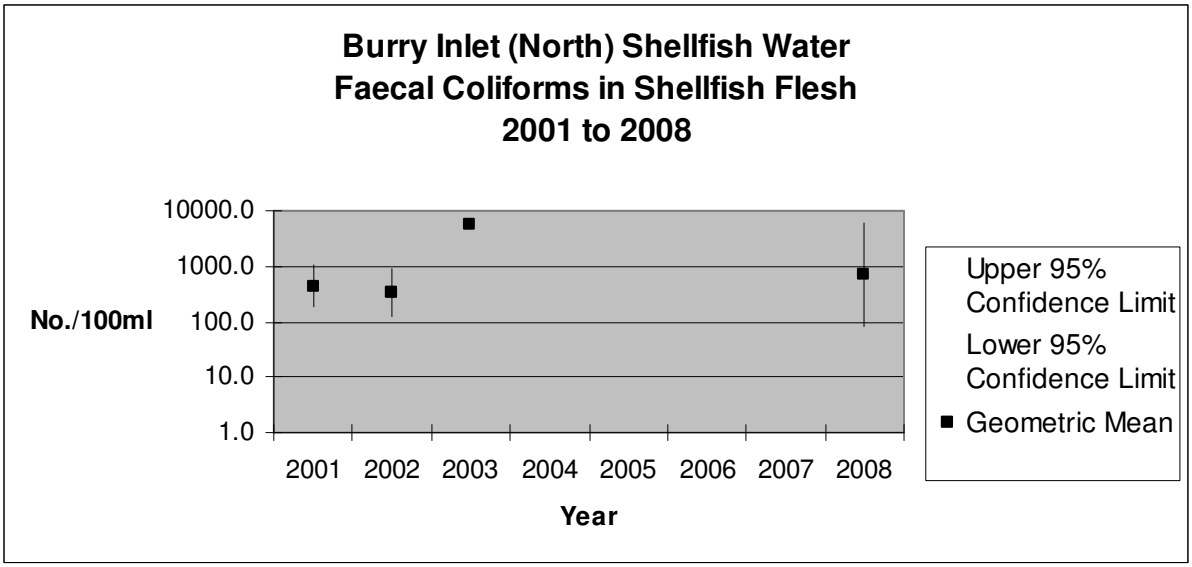


Figure 3 Faecal coliforms in Shellfish Flesh for the Burry Inlet (North) Shellfish Water, 2001 to 2008



Confidence limits (shown on the figure) have been calculated for each result. They highlight the wide variability in the sample results.
The Bury Inlet samples for faecal coliforms in the water column show a larger variance in the confidence limits in more recent wetter years. It is possible that this reflects the greater frequency of exceptional rainfall events in the wetter summers of 2007 and 2008.
Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

Possible remaining sources of Faecal coliform pollution have been identified as:

- Issues with the rising main pump away scheme from Pwll, Llanelli and Burry Port, with spills occurring at Northumberland PS, see section 7.1
- Leakage from private sewers or unauthorised connection to stormwater drainage, see section 7.2
- Diffuse pollution runoff from agricultural land into the tributaries of the River Loughor, see section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

There have been issues associated with the rising main pump away scheme from Pwll, Llanelli and Burry Port, with spills occurring at the Northumberland Outfall. These issues will be addressed as part of the Northumberland Outfall and Llanelli STW Storm Tank improvements (see Table 3, action 61).
Further inland three stretches of the River Gwili have been identified as failing their objectives due to point source pollution and work has taken place on these stretches (see Table 3, action 64).

7.2 Further action to characterise and address diffuse sources of pollution

Burry Inlet North is contiguous with Burry Inlet South. Project work aimed at reducing diffuse pollution in the southern area is therefore likely to impact on the northern section of the Loughor estuary.
Work has been carried out in 2007 to investigate diffuse pollution impacts on the Bathing Waters at Llanelli beach and Pembrey beach. High bacteria levels have been found on the River Dafen and may potentially affect Llanelli beach. They were found to occur as a result of a misconnection from an industrial estate and this will be resolved in conjunction with Carmarthenshire County Council as soon as possible. We believe that the water quality at Pembrey beach is affected by faeces from grazing animals on the opposite side of the estuary and we will investigate this further. See Table 3, actions 66 and 67.

Pollution prevention work has taken place in the Lliw Catchment (Table 3, action 68) and the Environment Agency continues to monitor this area. This also includes Fforestfach Industrial Estate in the River Llan catchment.
Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing (Table 3, action 86).

Cardiff University College is developing a water quality model of the Loughor Estuary (see Table 3, action 69). This model will be used to assist in targeting work to address diffuse pollution issues in the Burry Inlet.

The diffuse pollution work carried out in this area is expected to contribute to improved water quality.

Mass Cockle Mortalities on the Burry Inlet and Three Rivers Estuaries

Over the last few years the Burry Inlet and Three Rivers estuaries have experienced larger than expected cockle mortalities. A project group of key organisations was set up in Autumn 2007 to investigate the issue and commissioned a research study led by Bangor University into the possible causes of the mortalities. The study involved reviewing a lot of data, monitoring results and scientific literature. It looked at issues related to the health of the cockles as well as the wider environment in the estuary. This study has not identified the cause(s) of these mass mortalities.

This study along with additional monitoring carried out during mass mortalities in summer 2008, has been used to develop a proposal in autumn 2008 for a programme of work to identify the cause(s) of these mortalities. This proposal will be reviewed by Welsh Assembly Government who has asked the Environment Agency to lead and co-ordinate these investigations on their behalf (see Table 3, action 86a).

7.3 Future collection of shellfish samples

We will be working with CEFAS (The Centre for Environment, Fisheries and Aquaculture Science) to ensure that shellfish flesh data will be available at this site.

8. SUMMARY

The Shellfish Water has been compliant with all mandatory standards and passed the guideline standard for salinity and dissolved oxygen during the past 5 years (2004 to 2008).

The most significant point source and intermittent discharges have already received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality. Further action is planned.

Sources of diffuse pollution in the catchment are continually being identified and remedial actions put in place. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to compliance with the Faecal coliform guideline standard of the Shellfish Water Directive.

B. Burry Inlet (South)

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Burry Inlet (South)

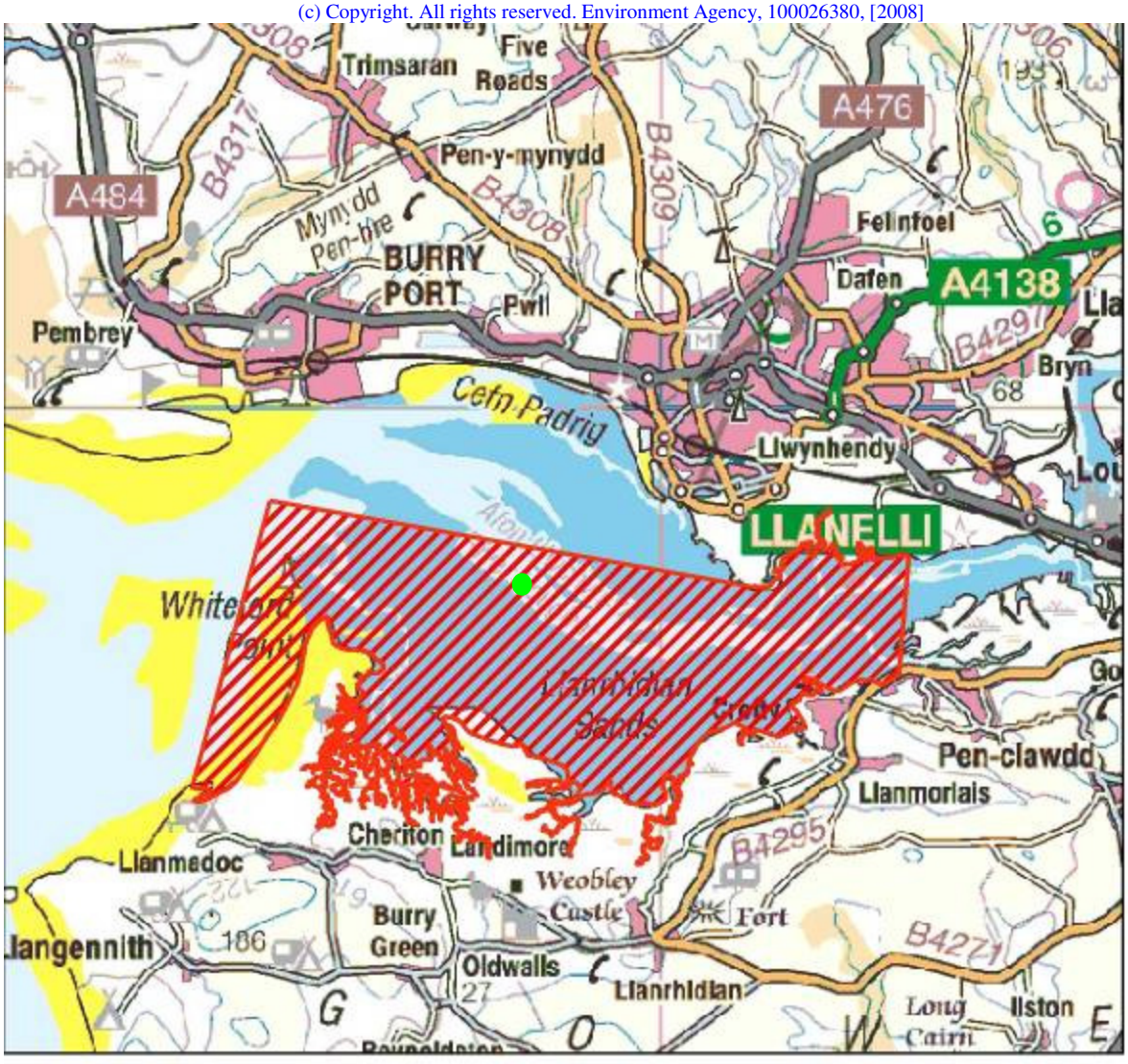
Catchment: Loughor

Designated: 1999

Designation Number 87

Sampling point location: SS 4800097300 (51° 39”13.99’ N 04° 11”55.27’ W)

Figure 1 Burry Inlet (South) Shellfish Water



Key

3. DESCRIPTION

3.1 Species Present

Common edible cockles *(Cardium edule)*
Mussels (*Mytilus spp.)*.

3.2 Location and Geography
The Burry Inlet (South) forms the southern part of the Loughor estuary, which is situated between the northern coast of The Gower and the south eastern coast of Carmarthenshire. This Shellfish Water is adjacent to Burry Inlet (North) Shellfish Water. The Loughor estuary is a shallow inlet consisting of mobile sands and mud flats and much of the area is dry at low water. The spring tidal range is 7m. There are extensive salt marshes on the southern edge of the estuary.

3.3 Land Use Pressures
The Loughor catchment is predominantly rural, with agriculture being the main industry inland. Land use around the southern side of the estuary is a mixture of agriculture and small urban developments. However, to the north and east are areas of heavy industry and dense population. Two major tributaries that enter the estuary below the tidal limit are the Llan and Lliw rivers. Both flow through developed industrial areas in their lower reaches. The Gower peninsula is an important destination for tourists due to its beautiful beaches and status as an Area of Outstanding Natural Beauty. Pressures created by the large seasonal population may result in temporary increases in the risk of pollution to the Loughor estuary. The catchment is also thought to be at risk from diffuse water pollution from agriculture.

3.4 Discharges to the Estuary
There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Burry Inlet (South) Shellfish Water

Discharge	Consented Dry Weather Flow (DWF) (l/s)	Location	Reference to action taken
Gowerton STW	265.9	Direct to Loughor Estuary	Section 5 Table 3
Garnswllt STW	151.9	Indirect to Loughor Estuary	Section 5 Table 3
Llanelli STW	131.1	Direct to Loughor Estuary	Section 5 Table 3
Llannant STW	49.9	Direct to Loughor Estuary	Section 5 Table 3

STW – Sewage Treatment Works
There are a number of smaller DCWW discharges into the Burry Inlet catchment, for example Llanrhidian STW, and a number of private discharges, for example the Wildfowl and Wetland Centre.

There are also a large number of major intermittent discharges that have the potential to influence the Shellfish Water. This includes Northumberland Combined Sewer Overflow (CSO), and Gowerton STW and Llanelli STW storm tanks.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards
The Burry Inlet (South) Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 -2008).

4.2 Compliance with Guideline Standards
The Burry Inlet (South) Shellfish Water complied with the guideline standards for dissolved oxygen and salinity in each of the last 5 years (2004-2008) and complied with the guideline standard for Faecal coliforms in 2003. The local authority collects cockle samples for flesh analysis from commercially active beds. The sample points for collecting cockle flesh within Burry Inlet (South) were not commercially active in 2007 therefore no data was available to determine if the guideline standard for Faecal coliforms had been met. We are working to rectify this data shortfall (see Table 3, action 71).

Table 3 – Results of Compliance tests of Shellfish Water										
	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5. ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
74	Garnswllt STW	Upgrade of works to Tertiary Treatment	2003	Completed
76	Penclawdd STW	Works decommissioned. Now pumped to Gowerton STW	2004	Completed
77	Crofty STW	Works decommissioned. Now pumped to Gowerton STW	2004	Completed
87a	Burry Port SPS	6mm screens installed. Storm designed to less than 10 spills	2004	Completed
72	New Llanelli STW	New Llanelli STW Secondary treatment with Ultra Violet (UV) disinfection	2005	Completed
73	Llannant STW	Secondary treatment with UV disinfection. Storm flows not impacting on Shellfish Waters	2005	Completed
75	Hendy STW	Works decommissioned. Now pumped to Llannant STW	2005	Completed
78	Gowerton STW	Secondary treatment with UV disinfection.	2005	Completed
81	Pwll STW	Pwll SPS reduced spill	2006	Completed

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
		frequency, and the introduction of screening.		
80	Northumberland Outfall & Llanelli Storm Tanks	Develop and implement scheme to reduce microbial and aesthetic impact of storm spills.	2010	Work is underway to complete design of appropriate schemes for each asset the end of March 2010 – likely to include elements of enhanced storm storage and UV disinfection of storm flows.
82	River Gwili	Inland on the River Gwili, three stretches have been identified as failing their river quality objectives. Action is to carry out investigations to identify any sources of pollution.	2007	Completed. River investigations and some monitoring have been carried out. This work identified some sources of pollution, which have been dealt with. In addition major improvements have been completed at Crosshands STW and further improvements have been carried out at Cwmtawel STW and the sewage pumping stations serving Crosshands Business Park.
87	Lliw catchment pollution prevention	The Lliw River enters the Loughor estuary a short distance upstream of the designated Shellfish Water. Action: Carry out pollution prevention visits in the Lliw Catchment area to identify any pollution sources.	2007	Completed. Three industrial estates within the Lliw catchment have received pollution prevention visits. Several potential sources of diffuse pollution, including farms, were identified and all premises have been given guidance on pollution prevention. We will monitor the success of our advice.
86	Groundwater inspections	Carry out Groundwater Authorisation inspections to assess if used sheep dip is disposed of correctly	2010	To be completed by end March 2010 Planned inspections for North Gower farms. Pollution prevention advice is an integral part of these farm visits.
1518	Water Quality model Loughor Estuary	Develop a water quality model in the Loughor Estuary that can be used to assess diffuse pollution impacts on the estuary.	2010	Ongoing Cardiff University College (UC) is developing this model and this work is ongoing. This work is linked to review of consents under the Habitats Directive. Sampling data was collected between August 2007 and July 2008. Cardiff UC will review the data and produce an interim report by February 2010
84	Misconnection from an industrial estate	Identify misconnections from Dafen Industrial Estate	2010	Ongoing Work has been carried out to investigate diffuse pollution impacts on the Bathing Waters at Llanelli beach. High bacteria levels have been found on the River Dafen which drains into Llanelli beach. We suspect this is due to misconnections from the industrial estate and we are working with Carmarthenshire County

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
				Council Environmental Health Department to resolve these.
85	Pembrey Beach	We believe that there maybe a diffuse pollution impact on Pembrey beach from grazing animals on the South shore of the Loughor Estuary - Spring tides "lifting" faecal matter and depositing it elsewhere. We will investigate this potential impact.	2011	Ongoing The North Gower Coastline is being walked by environment officers. Rivers, Streams and other discharges into the estuary are being systematically inspected and sampled. Observations regarding land use and agricultural practices are also being recorded. Report due March 2010.
87b	Collect flesh samples	Ensure programme in place to collect sufficient shellfish samples to assess guideline compliance of Burry Inlet South shellfish waters	2008	Completed The Agency now has a contract with CEFAS (from April 2008) who will be responsible for ensuring that the required sampling programme is implemented as far as is practicable.
87c	Investigations into mass cockle deaths	Identify cause(s) of mass cockle mortalities in the Burry Inlet	2010	Ongoing Initial research study led by Bangor University has been carried out which has not identified the cause(s) of these mass mortalities. This study along with additional monitoring carried out during mass mortalities in Summer 2008, has been used to develop a proposal for a programme of work to identify the cause(s) of these mortalities. This proposal will be reviewed by the Welsh Assembly Government (WAG) who have asked the Environment Agency to lead and co-ordinate the investigations on their behalf. Targeted investigative monitoring was undertaken in 2009 before the mass cockle mortality began in June. Further funding has been secured to enable analysis and reporting to be completed. A draft interim report is being prepared for publication in Jan 2010. A solar powered monitoring buoy is to be deployed in early 2010 to monitor a range of parameters to help fill some of the monitoring gaps associated with previous spot monitoring programmes.

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Burry Inlet (South) Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004-2008)

The Environment Agency reviews its monitoring data annually. We try to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures. River stretches that have failed a statutory requirement are prioritised, and this information is then used to target the resource allocated annually to the Environment Agency's diffuse pollution project. This is funded by the WAG.

5.2 Remedial action to prevent guideline failures

This Shellfish Water met the guideline standard for Faecal coliforms in shellfish flesh in 2003. Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from CSO outfalls and sewage discharges have all been identified as having the potential to cause failure of guideline standards.

Significant point source discharges have received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality. Remedial action has been undertaken to counter the potential sources of pollution considered most likely to contribute to failure of the guideline standards of the Shellfish Directive.

To this end, an improvement programme of work will be completed by 2010 by the local water company, DCWW. A number of significant sewage discharges were upgraded along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. This builds upon improvements completed in previous AMP periods prior to 2000 and 2000-2005. The general project aims to ensure compliance with the mandatory standards and endeavours to observe compliance with the guideline parameters for EU Directives. This programme of work is outlined in Table 3, actions 72 - 77.

Note that a large number of intermittent improvements have taken place in this catchment as well, that has significantly reduced Faecal coliform loadings to the Shellfish Water. For example the significant intermittent discharge at Gowerton STW (settled storm) and also storm discharges at Pwll, Ashburnham and Burry Port Sewage Pumping Stations (see Table 3, actions 81 and 87a).

These improvements will all have an impact on Faecal coliform concentrations in the Shellfish Water.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In figures 2 and 3 below, the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the period 2001 - 2008.

Figure 2 Faecal coliforms in Water for the Burry Inlet (South) Shellfish Water, 2001 to 2008

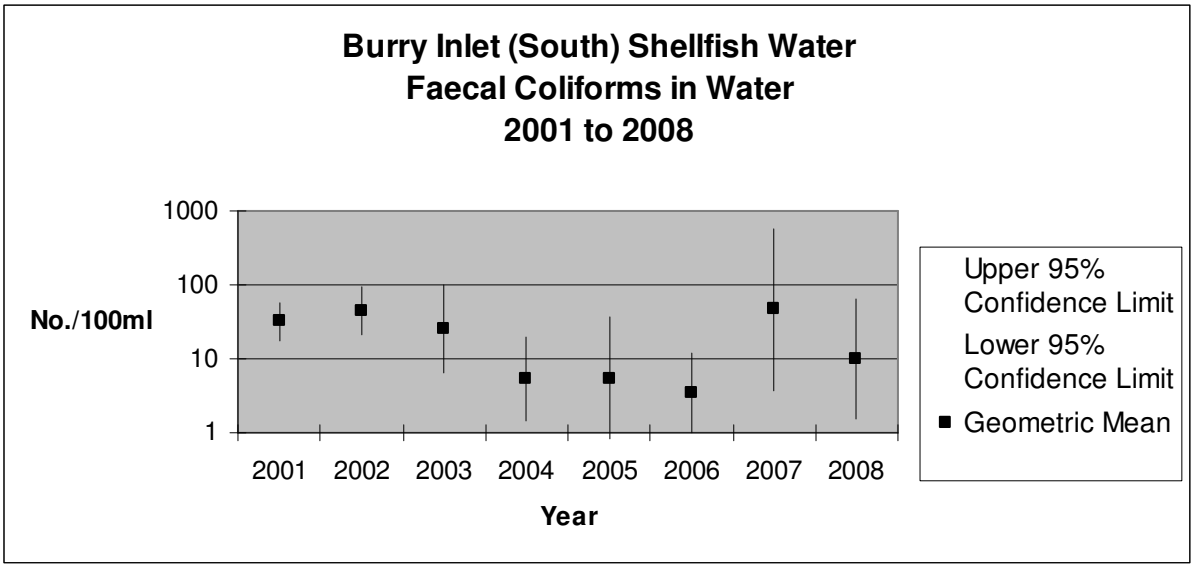
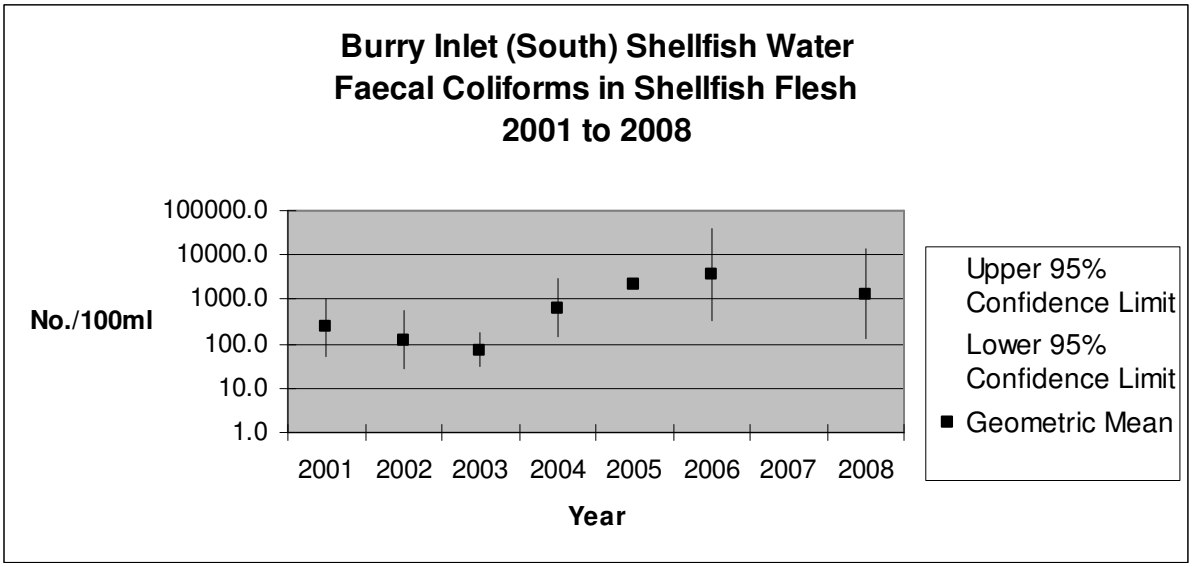


Figure 3 Faecal coliforms in Shellfish Flesh for the Burry Inlet (South) Shellfish Water, 2001 to 2008



Confidence limits (shown on the figures) have been calculated for each result. They highlight the wide variability in the sample results. The Bury Inlet samples for faecal coliforms in the water column show a larger variance in the confidence limits in more recent wetter years. It is possible that this reflects the greater frequency of exceptional rainfall events in the wetter summers of 2007 and 2008.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

Despite remedial action to reduce pollution from significant discharges, the Shellfish Water does not yet achieve the guideline standards for Faecal coliforms in shellfish flesh.

Possible remaining sources of faecal coliform pollution have been identified as:

- Problems with the pump away scheme from Llanelli, Pwll and Burry Port have resulted in higher frequency storm discharges at Northumberland PS, see section 7.1.
- Leakage from private sewers or unauthorised connection to stormwater drainage, see section 7.2
- Diffuse pollution runoff from agricultural land into the tributaries of the River Loughor, see section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

There have been issues associated with the rising main pump away scheme from Pwll, Llanelli and Burry Port, with spills occurring at the Northumberland Outfall. These issues will be addressed as part of the Northumberland Outfall and Llanelli STW Storm Tank improvements (see Table 3, action 80).
Further inland three stretches of the River Gwili have been identified as failing their objectives due to point source pollution, and work has taken place on these stretches (see Table 3, action 82).

7.2 Further action to characterise and address diffuse sources of pollution

Burry Inlet South is contiguous with Burry Inlet North. Project work aimed at reducing diffuse pollution in the northern area is therefore likely to impact on the southern section of the Loughor estuary.

Work has been carried out to investigate diffuse pollution impacts on the Bathing Waters at Llanelli beach and Pembrey beach. High bacteria levels have been found on the River Dafen and may potentially affect Llanelli beach. They occur as a result of a misconnection from an industrial estate and this will be resolved in conjunction with Carmarthenshire County Council as soon as possible. We believe that the water quality at Pembrey beach (adjacent to Burry Inlet (North) Shellfish Water) is affected by faeces from grazing animals on the opposite side of the estuary and we will investigate this further. See Table 3, actions 84 & 85).

Pollution prevention work has taken place in the Lliw Catchment (see Table 3, action 87) and the Environment Agency continues to monitor this area. This also includes Fforestfach Industrial Estate in the River Llan catchment.

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing.

Cardiff UC is developing a water quality model of the Loughor Estuary (see Table 3, action 1518). This model will be used to assist in targeting work to address diffuse pollution issues in the Burry Inlet.

The diffuse pollution work carried out in this area is expected to contribute to improved water quality.

Mass Cockle Mortalities on the Burry Inlet and Three Rivers Estuaries

Over the last few years the Burry Inlet and Three Rivers estuaries has experienced larger than expected cockle mortalities. A project group of key organisations was set up in Autumn 2007 to investigate the issue and commissioned a research study led by Bangor University into the possible causes of the mortalities. The study involved reviewing a lot of data, monitoring results and scientific literature. It looked at issues related to the health of the cockles as well as the wider environment in the estuary. This study has not identified the cause(s) of these mass mortalities.

This study along with additional monitoring carried out during mass mortalities in Summer 2008, has been used to develop a proposal in Autumn 2008 for a programme of work to identify the cause(s) of these mortalities. This proposal will be reviewed by Welsh Assembly Government who has asked the Environment Agency to lead and co-ordinate these investigations on their behalf (Table 3, action 87c).

7.3 Future collection of shellfish samples

We will be working with CEFAS (The Centre for Environment, Fisheries and Aquaculture Science) to ensure that shellfish flesh data will be available at this site.

8. SUMMARY

The Burry Inlet (South) Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 - 2008). No data was available in 2007 to determine if the guideline standard for Faecal coliforms has been met.

The most significant point source and intermittent discharges have already received priority treatment on the grounds that this was considered most likely to provide the greatest immediate improvements in water quality. Further action is planned.

Sources of diffuse pollution in the catchment are continually being identified and remedial actions put in place. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to compliance with the Faecal coliform guideline standard of the Shellfish Water Directive.

C. Gwendraeth

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Gwendraeth

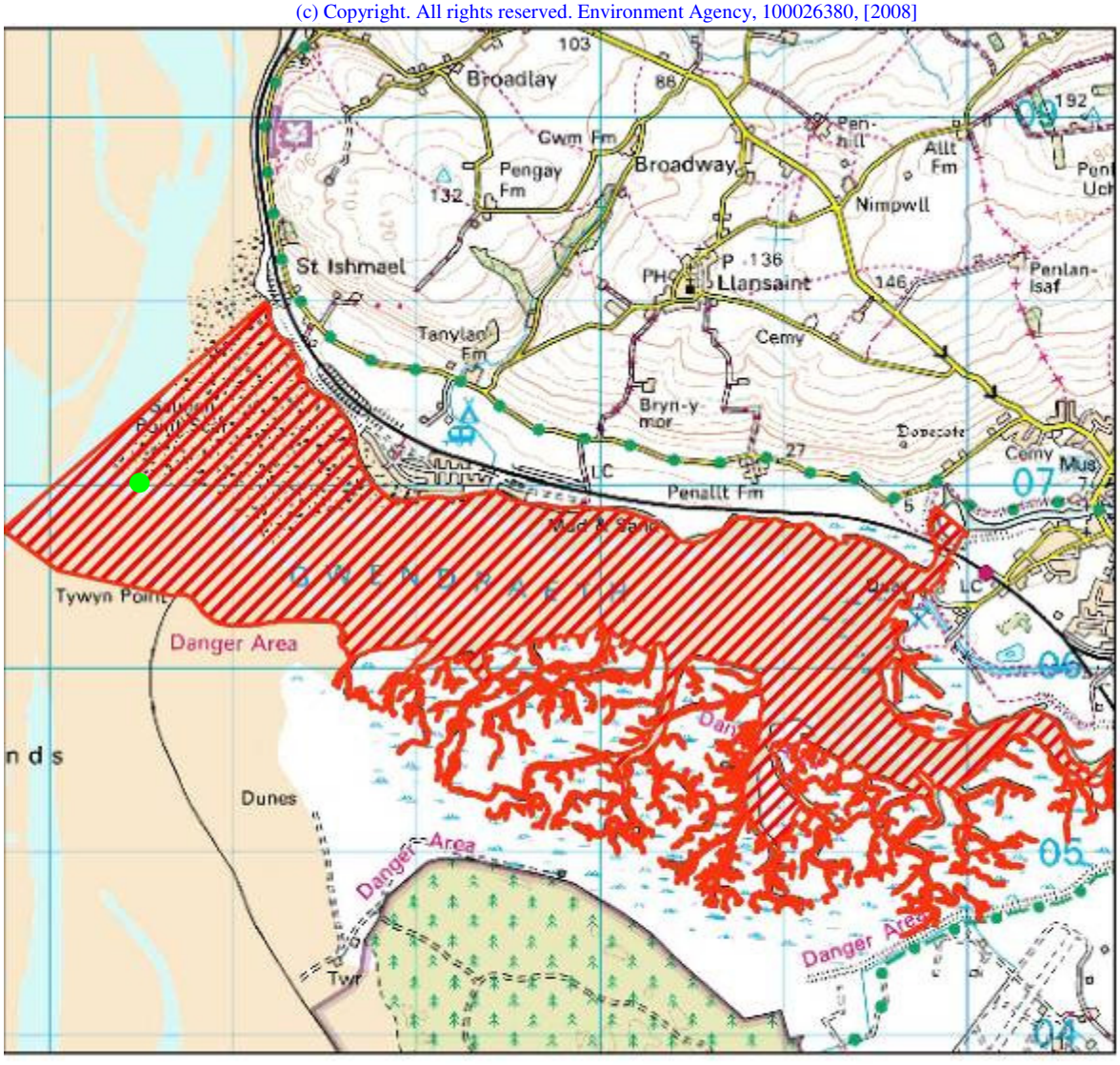
Catchment: Gwendraeth Fach, Gwendraeth Fawr

Designated: 1999

Designation Number 90

Sampling point location: SN3547907029 (51° 44”13.41’ N 4° 23”1.59’ W)

Figure 1 Gwendraeth Shellfish Water



Key

3. DESCRIPTION

3.1 Species Present

Mussels (*Mytilus spp.*).
Common edible cockles *(Cardium edule).*

3.2 Location and Geography

The Gwendraeth Estuary forms the eastern branch of the Three Rivers Estuary situated on the south western coast of Carmarthenshire. There are two adjacent Shellfish Waters: Tywi and Taf. It is a relatively small and shallow inlet fed by the Gwendraeth Fach and Fawr rivers, which are shallow and fairly slow flowing. The bed of much of the designated Shellfish Water is generally stony, forming mobile channels. Maximum channel depth at low water is 5m. The southern edge of the Estuary is bordered by a large area of flat marshland heavily intersected with channels (see Figure 1).

3.3 Land Use Pressures

Historically the Gwendraeth catchments comprised the Carmarthenshire section of the South Wales coalfield and were highly industrialised. Since the decline in coal mining, agriculture is the predominant land use with some former opencast mining areas having been restored to large areas of improved grassland. Therefore the Shellfish Water is considered to be at some risk from diffuse pollution from agriculture. Most of the area is fairly rural however there are several larger urban areas along the Gwendraeth Fawr supporting light industry and retail areas. Tourism is not a major factor in this area.

3.4 Discharges to the Estuary

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Gwendraeth Shellfish Water

Discharge	Consented Dry Weather Flow (l/s)	Location	Reference to action taken
Kidwelly STW	77	Direct to Gwendraeth Estuary	Section 5 Table 3
Llansaint STW	1.1	Indirect to Gwendraeth Estuary	Section 5 Table 3
Parc y Splotts STW	81.0	Direct to Tywi Estuary	Section 5 Table 3
Pontyates STW	13.1	Indirect to Gwendraeth Estuary	Section 5 Table 3
Llangynderyn STW	1.5	Indirect to Gwendraeth Estuary	Section 5 Table 3
Llanddarog STW	2.3	Indirect to Gwendraeth Estuary	Section 5 Table 3
Four Roads STW	0.3	Indirect to Gwendraeth Estuary	Section 5 Table 3
Pontyberem STW	59.7	Indirect to Gwendraeth Estuary	Section 5 Table 3
Carway STW	1.1	Indirect to Gwendraeth Estuary	Section 5 Table 3
Pembrey STW	4.3	Direct to Gwendraeth Estuary	Section 5 Table 3
Trimsaran STW	27	Indirect to Gwendraeth Estuary	Section 5 Table 3

STW – Sewage Treatment Works

There are a number of private discharges into the Three Rivers estuaries including the Mekatek industrial discharge in Carmarthen.

There are a large number of major intermittent discharges that have the potential to influence the Shellfish Water, for example Tycoch sewage pumping station in Kidwelly.

4. STATEMENT OF COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

In the last 5 years (2004 to 2008), Gwendraeth Shellfish Water was compliant with the mandatory standards.

4.2 Compliance with Guideline Standards

In the last 5 years (2004 to 2008), Gwendraeth Shellfish Water met the guideline standard for dissolved oxygen and salinity in all years and met the Faecal coliforms standard in 2004.

Table 3 – Results of Compliance tests of Shellfish Water										
	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(Yes)		(No)		(No)		(No)		(No)
Overall compliance		G Pass	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
345	Kidwelly STW	Improved storm storage (350m3) provided at Tycoch SPS	2005	Completed
348	Gwendraeth Fach	The Gwendraeth Fach has been identified as a catchment requiring investigation to help tackle diffuse source pollution. A campaign is being carried out that includes river walks and follow up visits at sites identified as potential sources of pollution. Groundwater Authorisation inspections have also been carried out within the catchment. The diffuse pollution work we are carrying out is expected to lead to an improvement in water quality.	Ongoing	Ongoing work River walks were carried out in 2007resulting in stretches of river being identified as key areas for further work. Pollution prevention visits to farms in these key areas have been carried out. Nutrient and bacterial samples were collected in 2009 from thoughout the Gwendraeth Fawr and Fach catchments in order to help target diffuse pollution inputs into the systems. The results from these samples will direct work to be carried out in 2010. SIMCAT modelling is to be carried out in 2009/10 in both catchments to look at

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
				the contributions made by STW inputs into the systems.
347	Three Rivers Feasibility Study	Where modelling indicates that there may be a risk of failure to achieve Shellfish Water standards, we will undertake a Feasibility Study modelling inputs to the Shellfish Waters. Assets are likely to include: Llansaint STW, Brickyard PS, Pontyates STW, Llanybri STW, Llangynderyn STW, Llanddarog STW, Four Roads STW, Pontyberem STW, Carway STW, Pembrey STW, Parc y Splotts STW, Pany yr Athro STW, Llanstephan STW. The study should seek to find a practical way to improve the Shellfish Water in the most effective way.	2009	DCWW reported progress on the Three Rivers AMP4 feasibility study & options in Autumn 2009. Any required improvements will be forwarded into the AMP4 Change Protocol.
346	Intermittents Gwendraeth	AMP4 Improvements Gwendraeth	2010	There are 2 intermittent discharges in the Gwendraeth river catchment listed in AMP4 for improvements . These will be completed by 2010.
90a	Investigations into mass cockle deaths	Identify cause(s) of mass cockle mortalities in the Three Rivers Estuary	2010	Ongoing Initial research study led by Bangor University has been carried out which has not identified the cause(s) of these mass mortalities.

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Gwendraeth Shellfish Water has been compliant with all mandatory standards during the past 5 years (2004 to 2008).

The Environment Agency reviews its monitoring data annually. We try to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures. River stretches that have failed a statutory requirement are prioritised, and this information is then used to target the resource allocated annually to the Environment Agency's diffuse pollution project. This is funded by the Welsh Assembly Government.

5.2 Remedial action to prevent guideline failures

This Shellfish Water met the guideline standard for Faecal coliforms in shellfish flesh in 2004.

Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 2010 to upgrade a significant sewage discharge along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. See Table 3, action 345 and 346.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF REMEDIAL WORK UNDERTAKEN

In figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal coliforms in Water for the Gwendraeth Shellfish Water, 2001 to 2008

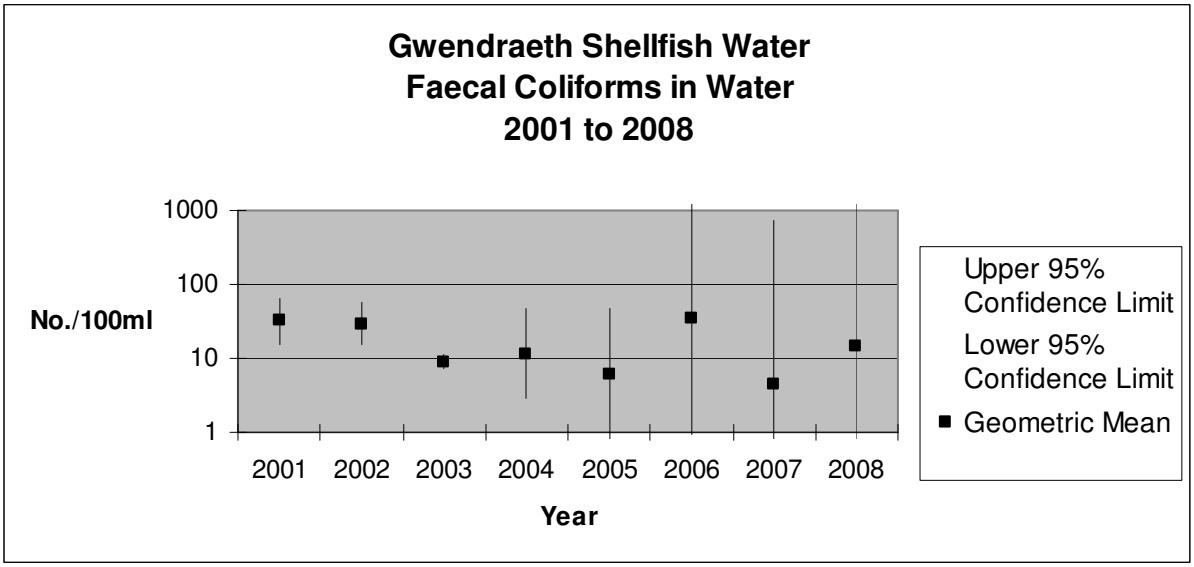
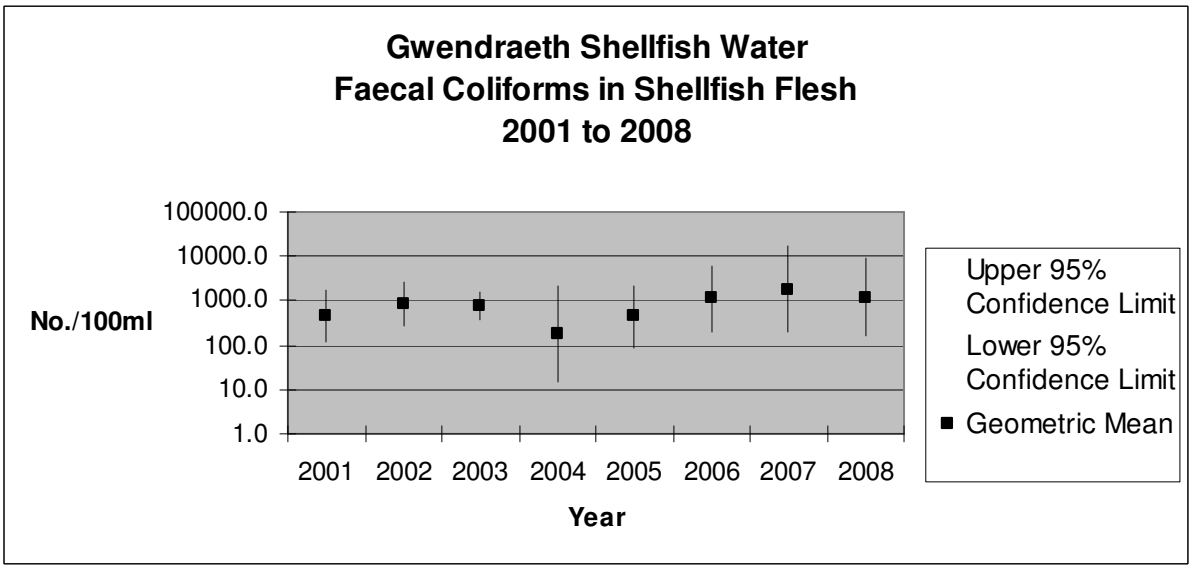


Figure 3 Faecal coliforms in Shellfish Flesh for the Gwendraeth Shellfish Water, 2001 to 2008



Confidence limits (shown on the figures) have been calculated for each result. They highlight the wide variability in the sample results.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

Possible remaining sources of Faecal coliform pollution have been identified as:

- Discharges from the sewerage infrastructure as listed in section 7.1;
- Diffuse pollution from agricultural land into the tributaries of the Gwendraeth as described in section 7.2

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Within the AMP3 water company programme (2000-2005) coastal models were built in order to identify where investment would lead to water quality improvements. The use of these coastal models is continuing within the current water company programme (2005-2010) to investigate where further improvements might be required (Table 3, action 347).

We will use the 'Change Protocol' if further improvement schemes are required, as soon as it is reasonable to do so. The improvement schemes might include adding ultraviolet disinfection to continuous discharges and/or increasing the volume of storage to limit the spill frequency for unsatisfactory intermittent discharges. The aim of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard.

7.2 Further action to characterise and address diffuse sources of pollution

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing.

Further to several farm slurry pollution incidents within the catchment in 2007, diffuse pollution work is being undertaken on the Cywyn, Cwmfelinboeth and upper Taf catchments. This includes river walks, biological survey and pollution prevention visits.

Guideline failures at nearby Pendine Beach (a designated bathing water) also prompted investigation work in 2007 to look at possible pollution sources. The spreading to land of sewage sludge and sewer misconnections was identified as potential sources of bacteria in the area. As a result of work carried out spreading locations in the area have been altered. Work in this location is scheduled to continue in 2008.

Stretches on the Gwendraeth Fach and Gwendraeth Fawr rivers have been identified through the diffuse pollution database as requiring investigation. Work was started in the upper Gwendraeth Fach catchment in March 2007 (Table 3, action 348). This included biological assessment of the river in order to target pollution prevention follow up visits. This work continued throughout 2008. A programme of works has been drawn up for the Gwendraeth Fawr catchment. This was implemented in 2008 through the diffuse pollution programme. Additional work will also be carried out in the Ferryside stream catchment to secure improvements at sites already identified. A drop in quality in the Taf catchment has also been identified. Investigation into this will be carried out during the 2009 work programme.

The diffuse pollution work carried out is expected to lead to improved water quality in the Three Rivers Estuary.

Mass Cockle Mortalities on the Burry Inlet and Three Rivers Estuaries

Over the last few years the Burry Inlet and Three Rivers estuaries have experienced larger than expected cockle mortalities. A project group of key organisations was set up in Autumn 2007 to investigate the issue and commissioned a research study led by Bangor University into the possible causes of the mortalities. The study involved reviewing a lot of data, monitoring results and scientific literature. It looked at issues related to the health of the cockles as well as the wider environment in the estuary. This study has not identified the cause(s) of these mass mortalities.

This study along with additional monitoring carried out during mass mortalities in Summer 2008, has been used to develop a proposal in Autumn 2008 for a programme of work to identify the cause(s) of these mortalities. This proposal will be reviewed by Welsh Assembly Government who has asked the Environment Agency to lead and co-ordinate these investigations on their behalf (Table 3, action 90a).

8. SUMMARY

Gwendraeth Shellfish Water met the guideline standard for Faecal coliforms in 2004 and met all the mandatory standards during the last 5 years (2004 to 2008). It was compliant with all other guideline standards in the last 5 years (2004 to 2008).

The most significant discharges have already received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality.

Further improvement work to other point source discharges will be determined from of the Three Rivers Feasibility Study made available in the Autumn of 2009.

Sources of diffuse pollution in the catchments are continually being identified and remedial actions put in place. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to compliance with the Faecal coliform guideline standard of the Directive.

D. Milford Haven (Carew)

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Milford Haven Carew

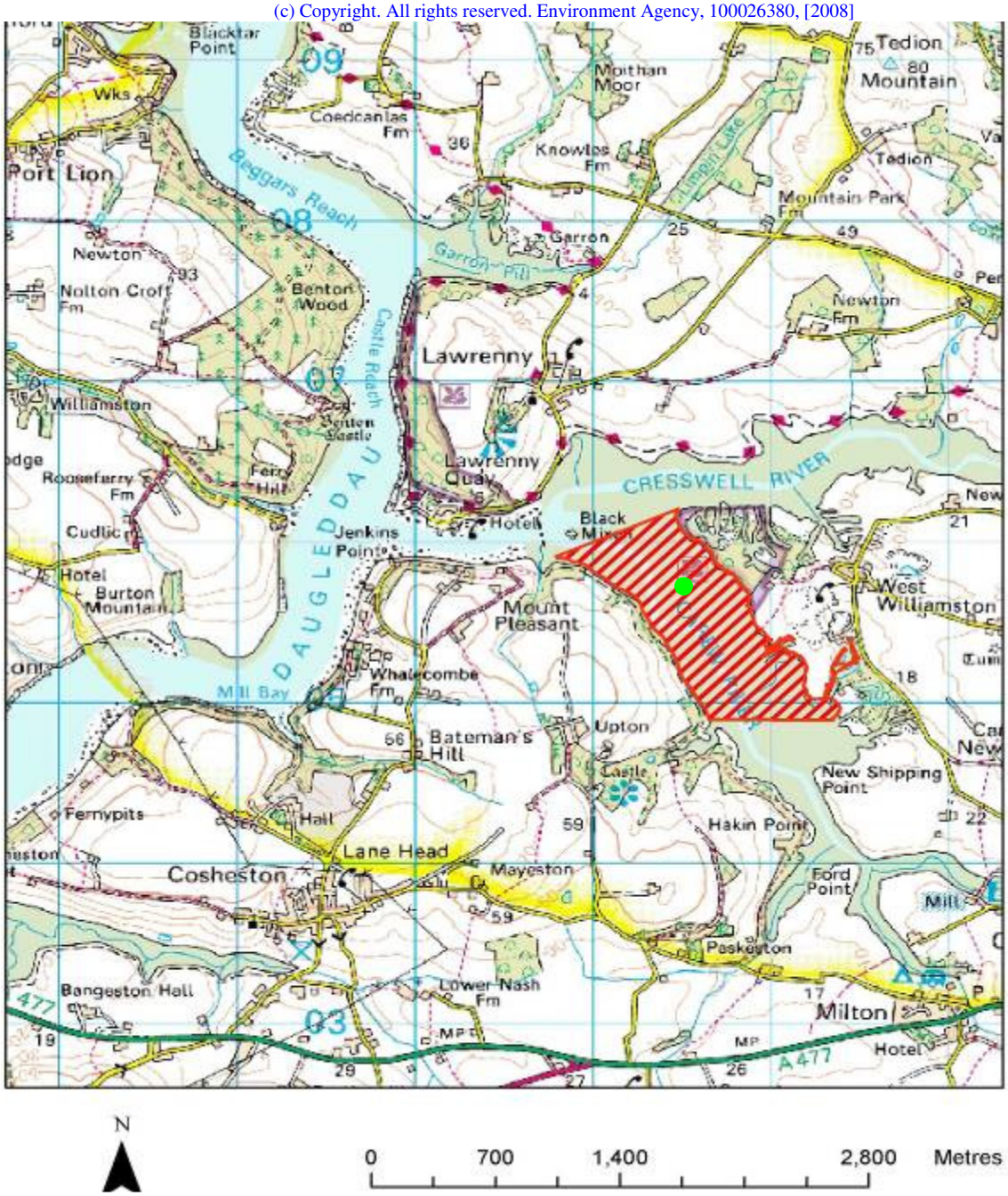
Catchment: Carew and Cresswell Rivers

Designated: 1999

Designation Number 91

Sampling point location SN 0225005750 (51° 42”55.93’ N 4° 51”50.56’ W)

Figure 1 Milford Haven Carew Shellfish Water



3. DESCRIPTION

3.1 Species Present

Oysters *(Ostrea edulis)*
Mussels *(Mytilus spp.)*

3.2 Location and Geography

The Carew Estuary is a relatively small and shallow inlet, situated on the eastern side of the Daugleddau/Milford Haven waterway. The Carew Estuary is likely to be influenced by the neighbouring Cresswell Estuary, both of which merge before entering the Daugleddau. The bed for much of area consists of mud and the maximum water depth in the channels is 5 metres at low water. The estuary is part of the Pembrokeshire Marine Special Area of Conservation.

3.3 Land Use Pressures

Land use around the Estuary is predominantly rural, with smallish areas of urban development at Carew and Milton.

Most of the Carew and Cresswell catchments drain from predominantly agricultural areas, mainly intensive or organic dairy farming, interspersed with small urban settlements. The catchments, including the estuaries, are thought to be at risk from diffuse water pollution from agriculture.

3.4 Discharges to the Estuary

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed as follows:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Milford Haven Carew Shellfish Water

Discharge	Consented Dry Weather Flow (l/s)	Location	Reference to action taken
Neyland STW	14.7	Direct to Milford Haven	Section 5 Table 3
Narberth West STW	12.7	Indirect to Milford Haven	Section 5 Table 3
Dale STW	2.0	Direct to Milford Haven	Section 5 Table 3
Uzmaston STW	0.1	Direct to Milford Haven	Section 5 Table 3
Templeton STW	2.3	Indirect to Milford Haven	Section 5 Table 3
Carew/Milton STWs	2.8	Indirect to Milford Haven	Section 5 Table 3
Narberth West STW Settled	4.1	Indirect to Milford Haven	Section 5 Table 3
Hook STW	2.5	Direct to Milford Haven	Section 5 Table 3
Johnston STW	2.5	Indirect to Milford Haven	Section 5 Table 3
Merlins Bridge STW	59.4	Direct to Milford Haven	Section 5 Table 3
Waterston STW	0.5	Indirect to Milford Haven	Section 5 Table 3
Cosheston STW	0.9	Direct to Milford Haven	Section 5 Table 3
Llangwm STW	2.0	Direct to Milford Haven	Section 5 Table 3
Lamphey STW	0.9	Indirect to Milford Haven	Section 5 Table 3
Herbrandston STW	1.4	Direct to Milford Haven	Section 5 Table 3
Langdon STW	9.8	Indirect to Milford Haven	Section 5 Table 3
St. Ishmaels STW	0.9	Indirect to Milford Haven	Section 5 Table 3
Camrose STW	0.3	Indirect to Milford Haven	Section 5 Table 3
Ambleston STW	0.3	Indirect to Milford Haven	Section 5 Table 3
Rosemarket STW	1.4	Indirect to Milford Haven	Section 5 Table 3

STW – Sewage Treatment Works

There are a number of private discharges into the Milford Haven Waterway. These include Pennar Point, a private STW serving a residential area, and the proposed Bluestone project, a large holiday camp in Pembrokeshire National Park.
There are also a large number of major intermittent discharges that have the potential to influence the Shellfish Water.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Milford Haven Carew Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 to 2008).

4.2 Compliance with Guideline Standards

The Milford Haven Cleddau Shellfish Water met the guideline standards for salinity during the past 5 years and dissolved oxygen in every year except 2007. The local authority collects shellfish samples for flesh analysis from commercially active beds. The Shellfish Water is not currently commercially active therefore no recent data is available to determine if the guideline standard for Faecal coliforms has been met. We are working to rectify this data shortfall (see section 7.3).

Table 3 – Results of Compliance tests of Shellfish Water

	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(No)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
584	Cresswell catchment study	In November 2004 a full catchment survey was carried out in the Cresswell Catchment. The Cresswell and Carew Rivers merge at the mouth of the Carew estuary, before entering the Daugleddau. The survey looked at reducing point source and diffuse pollution from all significant premises, which all received visits, and could contribute to improved water quality.	2004	Completed. There have been some follow up visits since 2004.
582	Neyland STW	Secondary Treatment	2005	Completed
586	Coastal Models	Within the AMP3 water company programme (2000-2005) coastal models were built in order to identify where investment would lead to water quality improvements. The use of these coastal models is continuing within the current water company programme (2005-2010), to investigate where further improvements might be required	2005	Completed
91a	Deepford Brook priority CSF	The Deepford Brook is a sub-catchment of the Eastern Cleddau, and is currently a Catchment Sensitive Farming (CSF) priority catchment. The CSF project involves working in partnership with farmers to tackle agricultural diffuse pollution. It focuses on trialling a number of methods designed to reduce diffuse sources of faecal and other pollutants and on assessing their effectiveness through monitoring. These include methods of outdoor livestock management, changes to land drainage, pumping and watercourses, and modifications to farm structures and storage facilities. The CSF project also involves targeting areas that are vulnerable to nutrient and/or sediment loss.	2008	Completed. The practical element of the project has been done and the project appraisal is underway. The Welsh Assembly Government funded EA Wales Catchment Initiative has prompted similar work on the Cartlett Brook which drains into the Eastern Cleddau.
585	Cleddau Feasibility Study & Options Development	Where modelling indicates that there may be a risk of failure to achieve Shellfish Water standards, we will undertake a Feasibility Study modelling inputs to the Shellfish Waters. Assets are likely to include: • Narberth West STW • Dale STW • Uzmaston STW • Templeton STW • Carew/Milton STWs • Narberth West STW Settled • Hook STW • Johnston STW • Merlins Bridge STW • Waterston STW • Cosheston STW • Llangwm STW • Lamphey STW • Herbrandston STW • Langdon STW • St. Ishmaels STW • Camrose STW • Ambleston STW • Rosemarket STW. The study should seek to find a practical way to improve the environmental outcome in the most effective way.	2009	DCWW submitted a report on the Milford Haven AMP4 feasibility study & options in Autumn 2009. Any required improvements will be forwarded into the AMP4 Change Protocol.
587	Groundwater Authorisation inspections	Groundwater Authorisation inspections have been carried out within the catchment. This includes cross compliance visits with Rural Inspectorate. Pollution prevention is an integral part of these farm visits.	ongoing	Routine groundwater authorisation inspections carried out and pollution advice given. Yearly ongoing work.
588	CEFAS	We will be working with CEFAS (The Centre for Environment, Fisheries and Aquaculture Science) to ensure that shellfish flesh data will be available at this	ongoing	The Agency is in discussions with CEFAS to determine who will be responsible for ensuring

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
		site.		that the required sampling programme is implemented as far as is practicable.
583	Intermittent discharges	A large number of improvements to intermittent discharges have taken place in this catchment as well, that has significantly reduced bacteria loadings to the Shellfish Water. This includes the Haverfordwest CSO scheme in AMP2 and AMP3.	2010	There are a number of intermittent assets to be improved in AMP4 by 2010. For example, 5 intermittents are listed for Milford Haven town due for completion in 2009.

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Milford Haven Carew Shellfish Water has been compliant with all mandatory standards during the past 5 years (2004 to 2008). The Agency reviews its monitoring data annually. We try to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures.

5.2 Remedial action to prevent guideline failures

The Shellfish Water passed the guideline standard for salinity all years between 2004 -2008 and four out of the last 5 years for dissolved oxygen. No flesh data has been available the last 5 years to assess compliance with the Faecal coliform standard.

Diffuse water pollution from agriculture and discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standards.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 20010 to upgrade a significant sewage discharge along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. This includes improvements scheduled for completion in 2010. See Table 3, actions 582 and 583.

In November 2004 a full catchment survey was carried out in the Cresswell Catchment and looked at reducing point source and diffuse pollution from all significant premises. See Table 3, action 584.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In figure 2 below the level of Faecal coliforms in the water column is shown for the period 2001 to 2007.

Figure 2 Faecal coliforms in Water for the Milford Haven Carew Shellfish Water, 2001 to 2008

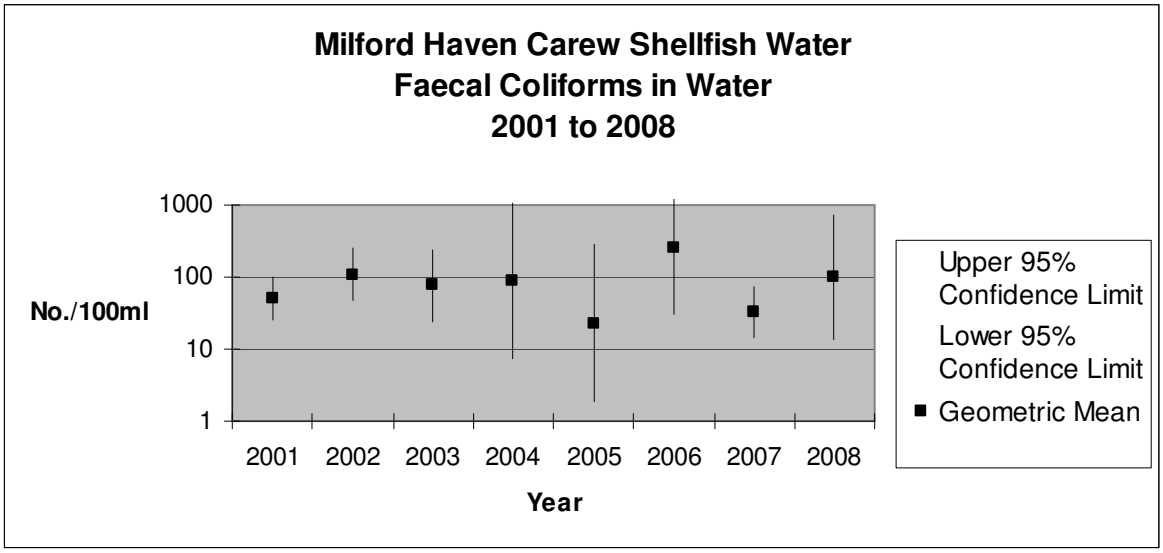
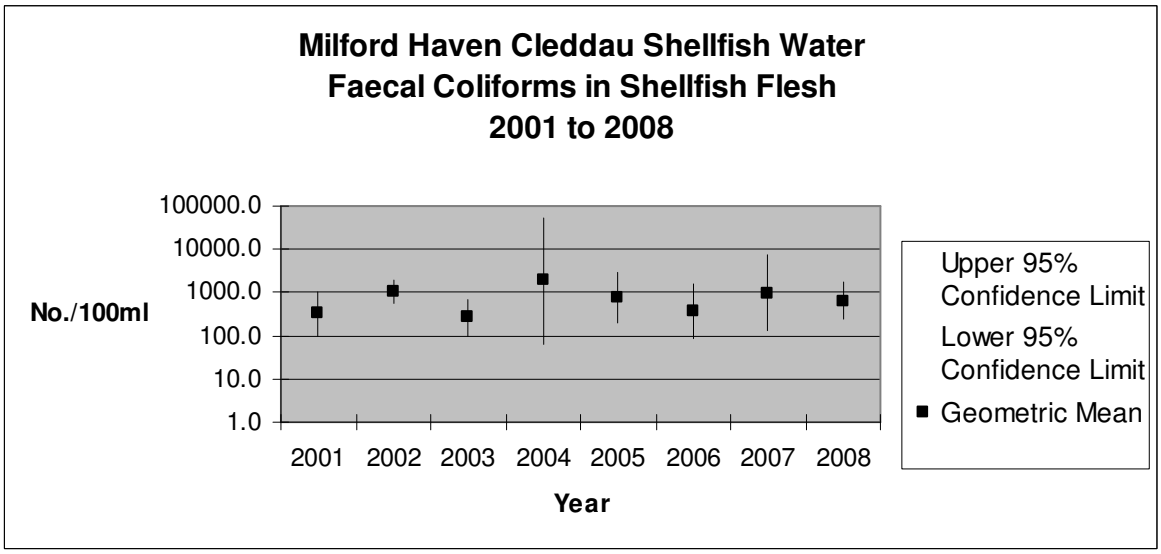


Figure 3 Faecal coliforms in Shellfish Flesh for the Milford Haven Carew Shellfish Water, 2001 to 2008



The confidence limits (shown on the figure) have been calculated for each result. They highlight the wide variability in the sample results.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in Faecal Coliforms in water. We can only state whether or not guideline standards are being/have been met. The Shellfish Water is not commercially active therefore no recent data is available for Faecal Coliforms in flesh.

Possible remaining sources of Faecal coliform pollution have been identified as:

- Discharges from sewerage infrastructure as listed in section 7.1;
- Diffuse pollution runoff from agricultural land into the tributaries of the Milford Haven, see section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Within the AMP3 water company programme (2000-2005) coastal models were built in order to identify where investment would lead to water quality improvements. The use of these coastal models is continuing within the current water company programme (2005-2010) to investigate where further improvements might be required (Table 3, actions 585 and 586).

The improvement schemes might include adding ultraviolet disinfection to continuous discharges and/or increasing the volume of storage to limit the spill frequency for unsatisfactory intermittent discharges. The aim of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard.

7.2 Further action to characterise and address diffuse sources of pollution

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing (Table 3, action 587).

The Deepford Brook is a sub-catchment of the Eastern Cleddau, and is currently a Catchment Sensitive Farming (CSF) priority catchment. Work continues on this project; see Table 3, action 91a.

Within the targeted area the delivery of farmer workshops, farm walks and one to one farm visits is planned. The key messages for delivery will be best practice, manure as a resource, nutrient cycling and loss, and soil loss and compaction. Nutrient, manure and soil management plans will be encouraged and implemented throughout the targeted areas.

The diffuse pollution work carried out is expected to lead to improved Shellfish Water quality. This includes producing action plans for the Syfynwy and Creswell catchments by March 2009, as these stretches have nutrient issues associated with them.

7.3 Future collection of shellfish samples

We will be working with CEFAS (The Centre for Environment, Fisheries and Aquaculture Science) to ensure that shellfish flesh data will be available at this site (Table 3, action 588).

8. SUMMARY

The Milford Haven Carew Shellfish Water has been compliant with all mandatory standards during the past 5 years (2004 to 2008). The Milford Haven Carew Shellfish Water met the guideline standards for salinity during the past 5 years and dissolved oxygen in four out of the last five years. The local authority collects shellfish samples for flesh analysis from commercially active beds. The Shellfish Water is not commercially active therefore no recent data is available to determine if the guideline standard for Faecal coliforms has been met.

The most significant point source discharges have already received priority treatment on the grounds that this was considered most likely to provide the greatest immediate improvements in water quality. Work is still underway on improving intermittent discharges.

Further improvement work to other point source discharges may be required. These actions will be determined from the Milford Haven Feasibility Study submitted in Autumn 2009.

Diffuse pollution is considered to be an issue in the catchment and in stretches where this is thought to be an issue, action plans are being developed. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to

E. Milford Haven (Cleddau)

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Milford Haven Cleddau

Catchment: Eastern and Western Cleddau

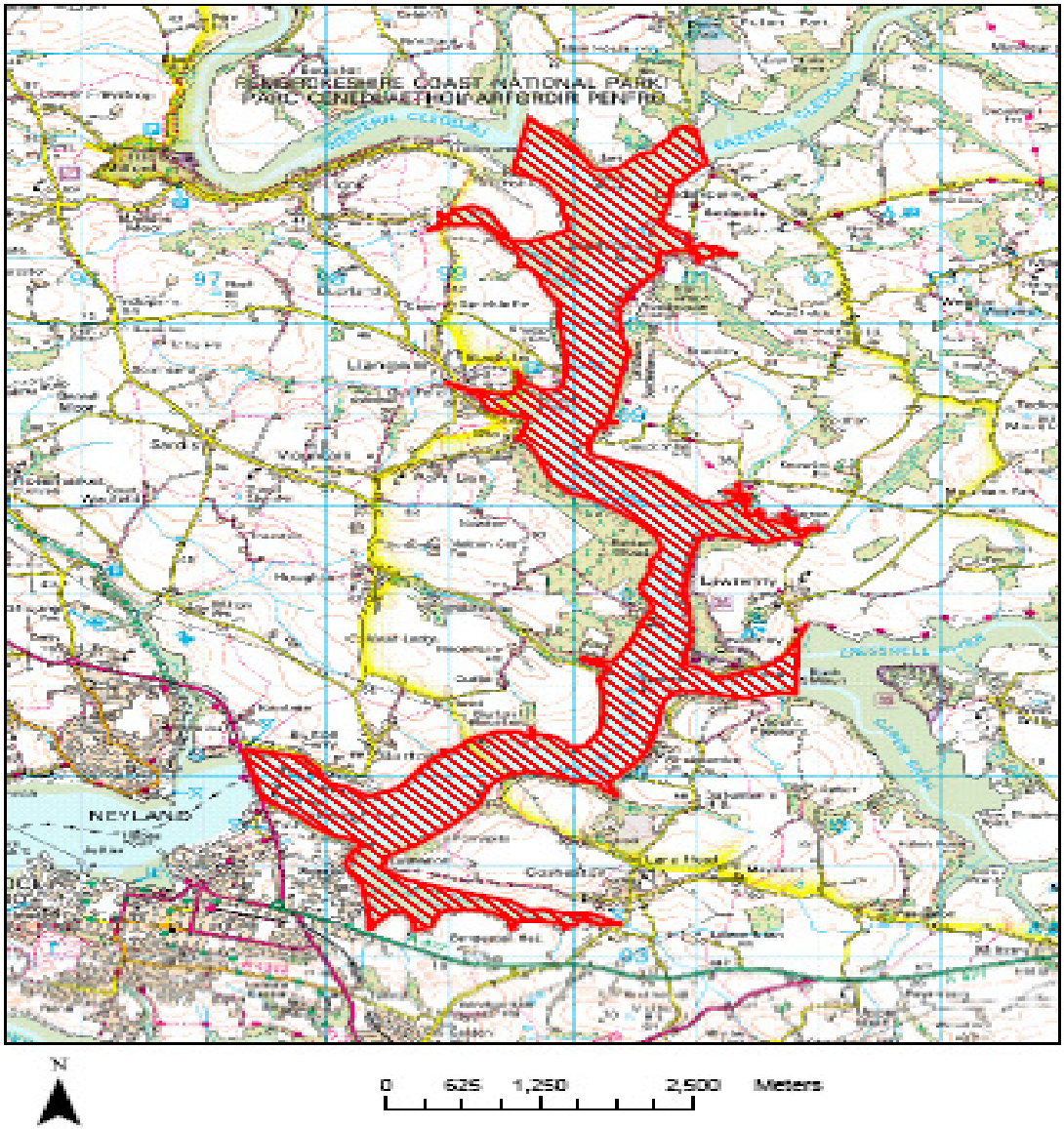
Designated: 1999

Designation Number 92

Sampling point location: SM 9750004900 (51° 42.35' N 04° 55.87' W)

Figure 1

Milford Haven (Cleddau) Shellfish Water



3. DESCRIPTION

3.1 Species Present

Oysters *(Ostrea edulis)*
Mussels *(Mytilus spp.)*

3.2 Location and Geography

The Cleddau Shellfish Water is a long, narrow stretch of estuarine water (approx 8km x 400m) in Pembrokeshire, approximately 14km inland from the mouth of the Milford Haven. The designated area is located where the Eastern and Western Cleddau rivers join below their tidal limits, to form the Daugleddau, an important tidal reach of ecological value, and is a Special Area of Conservation. Further downstream the Daugleddau broadens into the Milford Haven, a large deep natural harbour. It is adjacent to the Carew Shellfish Water.
Water depth at low tide is 13m, the tidal range is 7m. The seabed consists of a combination of rock, mud, shells and gravel.

3.3 Land Use Pressures

The catchment is predominantly rural. Agriculture, mostly intensive dairy farming, is the main land use. Tourism is also important, with the population increasing twofold during the peak season. Urban development and the oil industry are concentrated around the Milford Haven Waterway, which has also recently become a major centre for the importation and storage of liquefied natural gas. Parts of the catchment are thought to be at risk from diffuse pollution from agriculture.

3.4 Discharges to the Estuary

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water, these are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Milford Haven Cleddau Shellfish Water

Discharge	Consented Dry Weather Flow (l/s)	Location	Reference to action taken
Neyland STW	14.7	Direct to Milford Haven	Section 5 Table 3
Merlins Bridge STW	59.4	Direct to Milford Haven	Section 5 Table 3
Narberth West STW	12.7	Indirect to Milford Haven	Section 5 Table 3
Dale STW	2.0	Direct to Milford Haven	Section 5 Table 3
Uzmaston STW	0.1	Direct to Milford Haven	Section 5 Table 3
Templeton STW	2.3	Indirect to Milford Haven	Section 5 Table 3
Carew/Milton STWs	2.8	Indirect to Milford Haven	Section 5 Table 3
Narberth West STW Settled	4.1	Indirect to Milford Haven	Section 5 Table 3
Hook STW		Direct to Milford Haven	Section 5 Table 3
Johnston STW	2.5	Indirect to M	Section 5 Table 3
Waterston STW	0.5	Indirect to Milford Haven	Section 5 Table 3
Cosheston STW	0.9	Direct to Milford Haven	Section 5 Table 3
Llangwm STW	2.0	Direct to Milford Haven	Section 5 Table 3
Lamphey STW	0.9	Indirect to Milford Haven	Section 5 Table 3
Herbrandston STW	1.4	Direct to Milford Haven	Section 5 Table 3
Langdon STW	9.8	Indirect to Milford Haven	Section 5 Table 3
St. Ishmaels STW	0.9	Indirect to Milford Haven	Section 5 Table 3
Camrose STW	0.3	Indirect to Milford Haven	Section 5 Table 3
Ambleston STW	0.3	Indirect to Milford Haven	Section 5 Table 3
Rosemarket STW	1.4	Indirect to Milford Haven	Section 5 Table 3

Shellfish Water sample point
Designated Shellfish Water

STW – Sewage Treatment Works

There are a number of private discharges into the Milford Haven Waterway. These include Pennar Point, a private STW serving a residential area, and the proposed Bluestone project, a large holiday camp in Pembrokeshire National Park. There are also a large number of major intermittent discharges that have the potential to influence the Shellfish Water.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2003 to 2007 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Milford Haven Cleddau Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 – 2008).

4.2 Compliance with Guideline Standards

The Milford Haven Cleddau Shellfish Water met the guideline standards for dissolved oxygen in all of the past 5 years (2004-2008) and for salinity for 4 out of 5 years. The Shellfish Water has not yet achieved the guideline standard for Faecal coliforms.

Table 3 – Results of Compliance tests of Shellfish Water

	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(No)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

I Pass = All Imperative / Mandatory Standards are met
G Pass = All Guideline Standards are met

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
592	Cresswell catchment	In November 2004 a full catchment survey was carried out in the Cresswell catchment which enters the Daugleddau / Milford Haven Waterway. This looked at reducing point source and diffuse pollution from all significant premises.	2004	Completed. There have been some follow up visits since 2004.
589	Merlins Bridge STW	Secondary Treatment and UV Disinfection	2005	Completed
590	Neyland STW	Secondary Treatment.	2005	Completed
593	Coastal Models	Within the AMP3 water company programme (2000-2005) coastal models were built in order to identify where investment would lead to water quality improvements. The use of these coastal models is continuing within the current water company programme (2005-2010) to investigate where further improvements might be required	2005	Completed
594	Cleddau Feasibility Study & Options Development	Where modelling indicates that there may be a risk of failure to achieve Shellfish Water standards, we will undertake a Feasibility Study by modelling inputs to the Shellfish Waters. Assets are likely to include: • Narberth West STW • Dale STW • Uzmaston STW • Templeton STW • Carew/Milton STWs • Narberth West STW Settled • Hook STW • Johnston STW • Waterston STW • Cosheston STW • Llangwm STW • Lamphey WWTW • Herbrandston WWTW • Langdon WWTW • St. Ishmaels STW • Camrose STW • Ambleston STW • Rosemarket STW. The study should seek to find a practical way to improve the environmental outcome in the most effective way.	2009	DCWW reported progress on the Milford Haven AMP4 feasibility study & options in Autumn 2009. Any required improvements will be forwarded into the AMP4 Change Protocol
595	Deepford Brook priority CSF	The Deepford Brook is a sub-catchment of the Eastern Cleddau, and is currently a Catchment Sensitive Farming (CSF) priority catchment. The CSF project involves working in partnership with farmers to tackle agricultural diffuse pollution. It focuses on trialling a number of methods designed to reduce diffuse sources of faecal and other pollutants and on assessing their effectiveness through monitoring. These include methods of outdoor livestock management, changes to land drainage, pumping and watercourses, and modifications to farm structures and storage facilities. The CSF project also involves targeting areas that are vulnerable to nutrient and/or sediment loss.	2008	Completed. The practical element of the project has been done and the project appraisal is underway. The Welsh Assembly Government funded EA Wales Catchment Initiative has prompted similar work on the Cartlett Brook which drains into the Eastern Cleddau.
596	Groundwater Authorisation inspections	Groundwater Authorisation inspections have been carried out within the catchment. This includes cross compliance visits with Rural Inspectorate. Pollution prevention is an integral part of these farm visits.	ongoing	Routine groundwater authorisation inspections carried out and pollution advice given. Yearly ongoing work.
591	Intermittent Discharges	A large number of improvements to intermittent discharges have taken place in this catchment as	2010	There are a number of intermittent assets to be

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
		well, that has significantly reduced bacteria loadings to the Shellfish Water. This includes the Haverfordwest CSO scheme in AMP2 and AMP3.		improved in AMP4 by 2010. For example, 5 intermittents are listed for Milford Haven town due for completion in 2009.

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Milford Haven Cleddau Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 – 2008).

The Environment Agency reviews its monitoring data annually. We try to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures.

5.2 Remedial action to prevent guideline failures

The Milford Haven Cleddau Shellfish Water met the guideline standards for dissolved oxygen in all of the past 5 years (2004-2008) and for salinity for 4 out of 5 years. The Shellfish Water has not yet achieved the guideline standard for faecal coliforms. Diffuse water pollution from agriculture and discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 2010 to upgrade two significant sewage discharges along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. This includes improvements scheduled for completion by 2010. See Table 3, actions 589, 590 and 591.

In November 2004 a full catchment survey was carried out in the Cresswell catchment which enters the Daugleddau / Milford Haven Waterway. This looked at reducing point source and diffuse pollution from all significant premises. See Table 3, action 592.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal coliforms in Water for the Milford Haven Cleddau Shellfish Water, 2001 to 2008

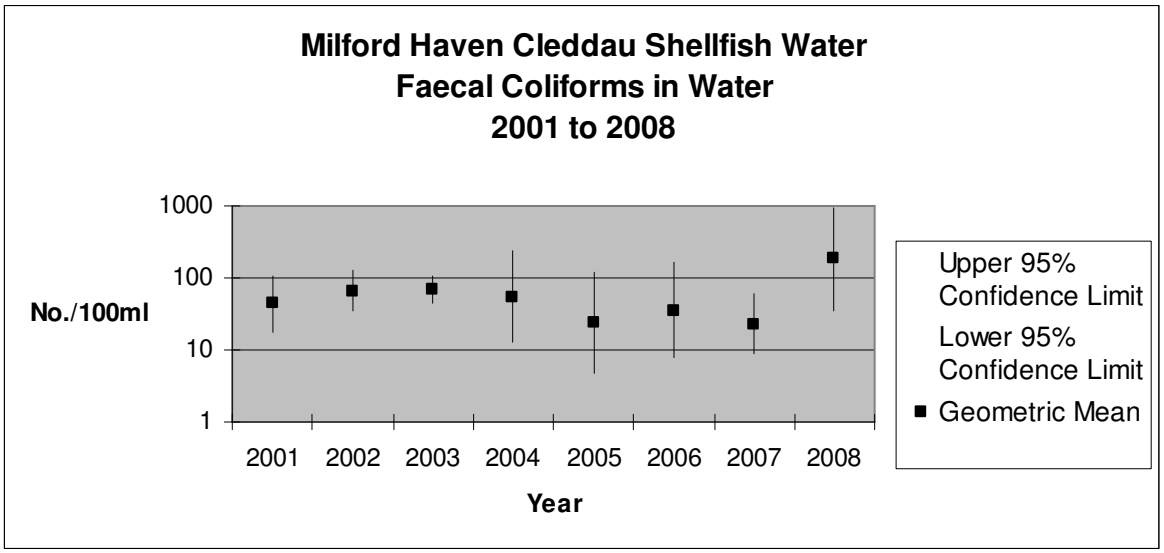
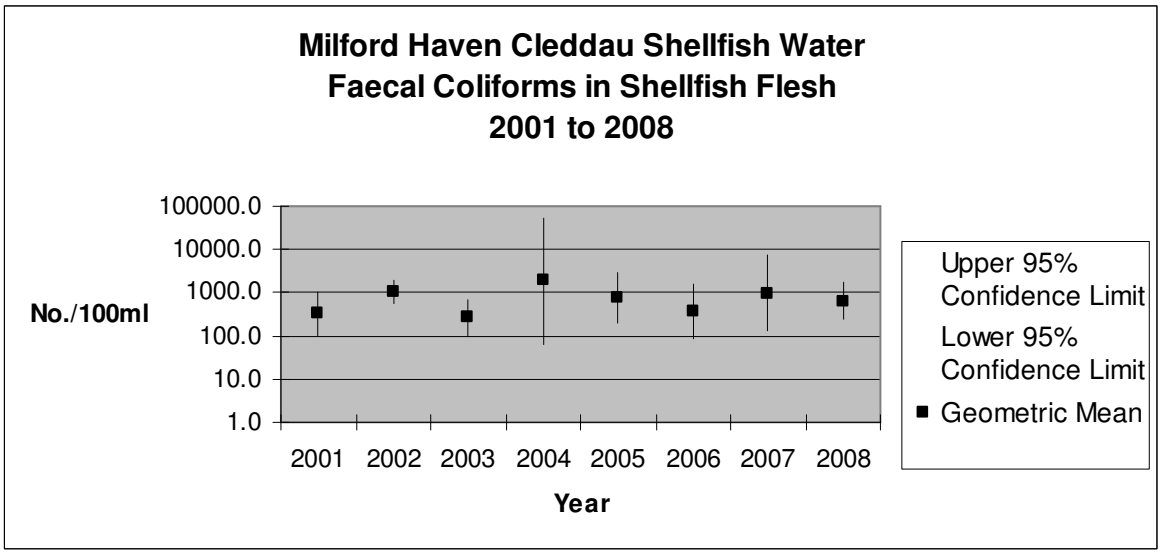


Figure 3 Faecal coliforms in Shellfish Flesh for the Milford Haven Cleddau Shellfish Water, 2001 to 2008



Confidence limits (shown on the figures) have been calculated for each result. They highlight the wide variability in the sample results.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

The geometric mean level of Faecal coliforms observed in the water column has fallen slightly following remedial work undertaken in 2005 (Table 3).

Possible remaining sources of Faecal coliform pollution have been identified as:

- Discharges from sewerage infrastructure as listed in section 7.1;
- Diffuse pollution runoff from agricultural land into the tributaries of the Milford Haven, as described in section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Within the AMP3 water company programme (2000-2005) coastal models were built in order to identify where investment would lead to water quality improvements. The use of these coastal models is continuing within the current water company programme (2005-2010) to investigate where further improvements might be required (Table 3, actions 593 and 594).

The improvement schemes might include adding ultraviolet disinfection to continuous discharges and/or increasing the volume of storage to limit the spill frequency for unsatisfactory intermittent discharges. The aim of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard.

7.2 Further action to characterise and address diffuse sources of pollution

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing Table 3, action 596).

The Deepford Brook is a sub-catchment of the Eastern Cleddau, and is currently a Catchment Sensitive Farming (CSF) priority catchment. Work continues on this project, see Table 3, action 595.

Within the targeted area the delivery of farmer workshops, farm walks and one to one farm visits is planned. The key messages for delivery will be best practice, manure as a resource, nutrient cycling and loss, and soil loss and compaction. Nutrient, manure and soil management plans will be encouraged and implemented throughout the targeted areas.

The diffuse pollution work carried out is expected to lead to improved Shellfish Water quality. This includes producing actions action plans for the Syfynwy and Creswell catchments by March 2009, as these stretches have nutrient issues associated with them.

8. SUMMARY

The Milford Haven Cleddau Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 – 2008), and met the guideline standards for dissolved oxygen in all of the past 5 years (2004 - 2008) and for salinity for 4 out of 5 years.

The most significant point source and intermittent discharges have already received priority treatment on the grounds that this was considered most likely to provide the greatest immediate improvements in water quality.

Further improvement work to other point source discharges may result from the Milford Haven Feasibility Study submitted in Autumn 2009.

Diffuse pollution is considered to be an issue in the catchment and in stretches where this is thought to be an issue, action plans are being developed. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to compliance with the Faecal coliform guideline standard of the Directive.

F. Porthcawl

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Porthcawl

Catchment: Ogmore and Ewenny.

Designated: 1999

Designation Number 82

Sampling point location SS8300073000 (51° 26”37.94’ N 3° 41”5.68’ W)

Figure 1 *Porthcawl Shellfish Water*

3. DESCRIPTION

3.1 Species Present

Mussels *(Mytilus spp.)*

3.2 Location and Geography

The Porthcawl designated Shellfish Water is a body of sea water extending from Porthcawl, across the mouth of the River Ogmore, to Southerndown. It extends southwards for approximately 7km, and includes the Tusker Rock. The water is deep (11m at Low Water), the spring tidal range is 9m and the sea bed consists of a mixture of medium sand, pebbles and shells.

3.3 Land Use Pressures

Land use is a mixture of agriculture, urban and industrial development. The lower reaches of the Ogmore and Ewenny flow through densely populated areas with many manufacturing companies near Bridgend. Porthcawl is a fairly large area of urban development, and is a popular tourist destination. Inland of the heavily developed lower reaches, land use is rural agriculture with urban settlements.

3.4 Discharges to the Shellfish Water

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below.

Table 1 Major DCWW continuous discharges with a significant or potentially significant impact on the Porthcawl Shellfish Water

Discharge	Consented Dry Weather Flow (DWF) (m3/d)	LOCATION	Reference to action taken
Lletty Brongu STW	9052	Indirect	Section 5 Table 3
Penybont STW	89856	Direct	Section 5 Table 3

STW – Sewage Treatment Works

There are a large number of major intermittent discharges that have the potential to influence the Shellfish Water.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this Shellfish Water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Porthcawl Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008).

4.2 Compliance with Guideline Standards

During the past 5 years (2004 – 2008), the Porthcawl Shellfish Water met the guideline standards for dissolved oxygen and salinity but is yet to achieved the guideline standard for Faecal coliforms. The Shellfish Water was not used commercially in 2006/7, therefore no recent data has been available to determine if the guideline standard for Faecal coliforms has been met. We are working to rectify this data shortfall.

Table 3 – Results of Compliance tests of Shellfish Water										
	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
820	Lletty Brongu STW	Secondary treatment	1999	Completed
821	Penybont STW	Secondary treatment with UV disinfection	2005	Completed
823	Water Column Study	The Environment Agency contributed to the DEFRA UKWIR report Impact of Intermittent Discharges on the Microbiological Quality of Shellfish Defra R&D Project WT0708 UKWIR project WW18a October 2006. The Agency shall adjust sampling or carry out further research following assessment of this report.	ongoing	This (and subsequent studies) showed that there was insufficient data to draw any conclusions on a relationship between shellfish flesh and water column and because of the complex nature of saline environments there is not a general rule that relates these two data sets. Further work has been proposed to develop a water column standard that will prevent deterioration and where necessary reduce pollution. If accepted this standard will be used in setting discharge consents and making decisions to reduce

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
				pollution from significant diffuse sources.
825	Industrial estates in Llandow	Pollution prevention work undertaken in this area tends to be focussed towards addressing diffuse inputs from industrial estates. A pollution prevention campaign took place in 2007 on small industrial estates in Llandow to minimise inputs that have a detrimental effect on water quality.	2008	Completed. Visits and report done. Some serious areas of concern regarding chemical storage have been dealt with. Work also undertaken on Bridgend Industrial Estate in 2007-08 - all sites visited and follow up work has been done. Problems found with a Foul sewer in the vicinity of a creamery is now being addressed via PPC team
826	River Alun	The Agency is to target the River Alun, a tributary for the River Ogmore, for diffuse agricultural inputs	ongoing	Ongoing work, part of the Diffuse Pollution Project. This has been incorporated into the Water Framework Directive (WFD) waterbody action plan for the Alun catchment. Further to the agricultural diffuse pollution in this catchment, sewerage assets will also be monitored.
824	Private STW	The Agency has also been working closely with the owners of a small private STW that serves an industrial estate to improve the quality of it's effluent	ongoing	1. The owners are now monitor flow and the Agency is monitoring sanitary determinands; oils grease and other chemicals highlighted from a pollution inventory of the two estates. 2 A report is due from an engineering company for a new effluent design to accommodate this discharge to standards we may put in the consent. Basically once we have the results, we'll be able to draft a consent with stepped deadlines.
822	Intermittent discharges	Note that a large number of improvements to intermittent discharges have taken place in this catchment as well, that have significantly reduced bacteria loadings to the Shellfish Water. This includes the Penybont (Ogmore) STW sewerage scheme in AMP2 and 3 that included improvements to Porthcawl intermittents.	2010	Improvements to intermittents in the Penybont STW catchment have continued into AMP4 and are due for completion in 2010. There are approx. 10 intermittent discharges in the Penybont STW sewerage catchment listed for improvement in AMP4.

5.1 Remedial action to prevent mandatory failures

The Porthcawl Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008).

The Agency reviews its monitoring data annually. We seek to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures.

5.2 Remedial action to prevent guideline failures

During the past 5 years (2004 – 2008), the Porthcawl Shellfish Water met the guideline standards for dissolved oxygen and salinity but has yet to achieve the standard for Faecal coliforms.

Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard in Shellfish Flesh.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by Dwr Cymru Welsh Water (DCWW) in 2010 to upgrade two significant sewage discharges along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. See Table 3, action 820 - 821.

A large number of intermittent discharges have been improved in this catchment and this work is continuing. These and other improvements will all have had some impact on Faecal coliform concentrations in the Shellfish Water, see Table 3, action 822.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS UNDERTAKEN

In Figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal Coliforms in Water for the Porthcawl Shellfish Water, 2001 to 2008

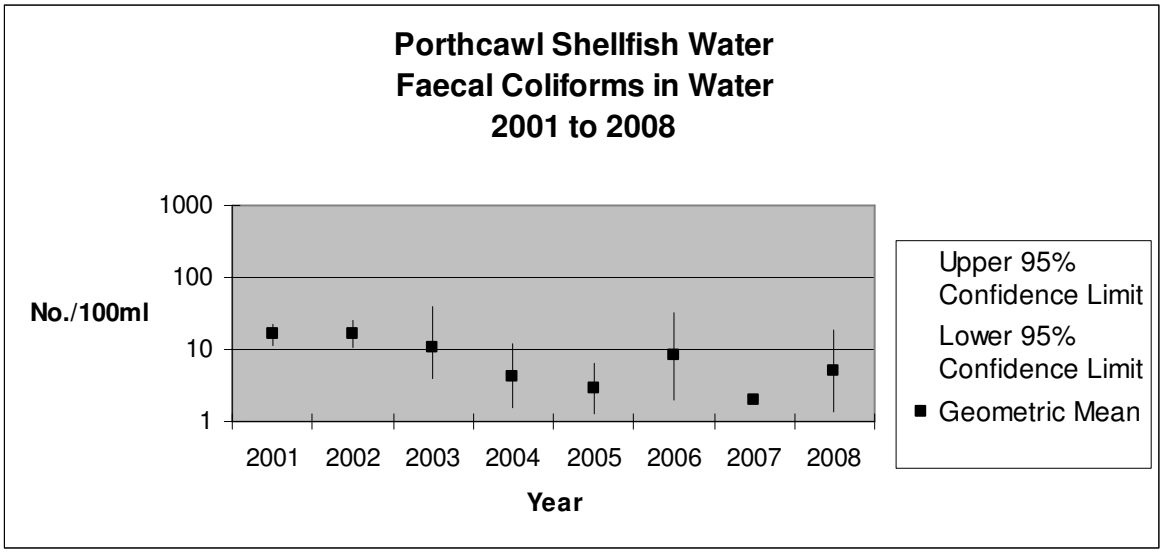
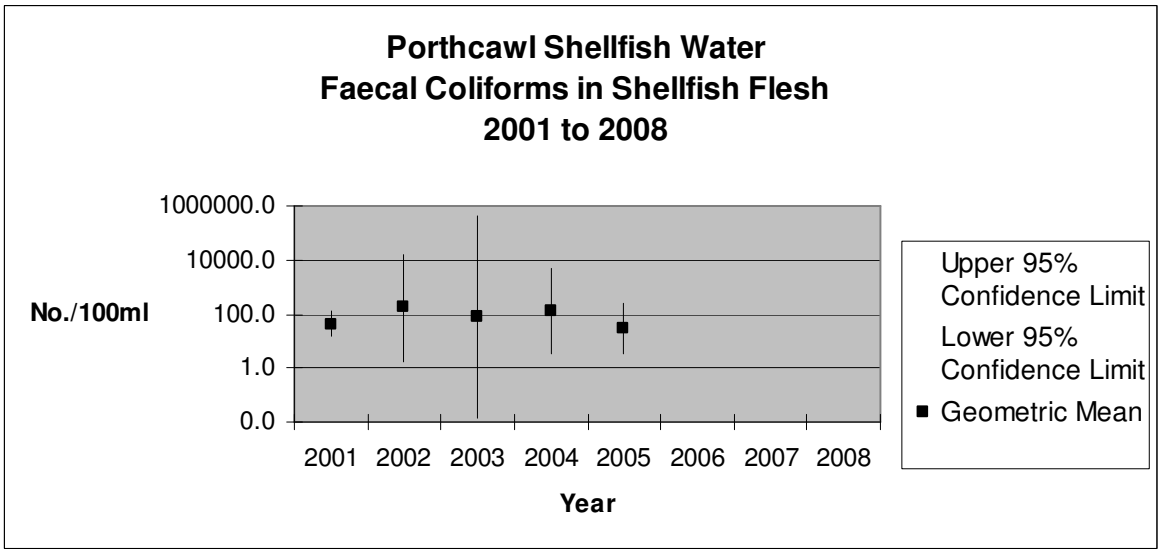


Figure 3 Faecal Coliforms in Shellfish Flesh for the Porthcawl Shellfish Water, 2001 to 2008



Confidence limits (shown on the figures) have been calculated for each result. They highlight the wide variability in the sample results.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

The geometric mean level of Faecal coliforms observed in the water column appears to demonstrate a reduction (apart from 2006). However, the Shellfish Water does not yet achieve the guideline standards for Faecal coliforms in shellfish flesh.

Possible remaining sources of Faecal coliform pollution have been identified as:

- Minor sewage discharges discussed in section 5 and 7.1;
- Leakage from private sewers or unauthorised connection of private sewers to stormwater drainage as listed in section 7.2;
- Diffuse pollution runoff from agricultural land into the tributaries of the River Ogmore, as described in section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

We are currently investigating the relationship between the levels of Faecal coliforms in the water column and levels in shellfish flesh (see Table 3, action 823).

We have also been working closely with owners of a small private STW that serves an industrial estate to improve the quality of its effluent. (Table 3, action 824). This work is ongoing.

7.2 Further action to characterise and address diffuse sources of pollution

Pollution prevention work undertaken in this area tends to be focussed towards addressing diffuse inputs from industrial estates and agricultural inputs to the River Alun. See Table 3, action 825 and 826. Further investigations could arise from this work.

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing.

Further remedial action to tackle diffuse water pollution might include: changes to the methods of outdoor livestock management, changes to land drainage practices and modifications of farm structures and storage facilities. The aim of this action will be to reduce faecal coliform concentrations in the Shellfish Water to meet the guideline standard. See Table 3, action 826.

8. SUMMARY

The Porthcawl Shellfish Water has been compliant with all mandatory and most guideline standards for the past 5 years (2004 – 2008).

The most significant point source and intermittent discharges have already received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality.

An action plan for point source discharges will be developed from an investigation into the relationship between the levels of Faecal coliforms in the water column and levels in shellfish flesh.

Diffuse pollution sources in the catchment have been identified and remedial action is underway. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to compliance with the Faecal coliform guideline standard of the Directive.

G. Swansea Bay (East)

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Swansea Bay (East)

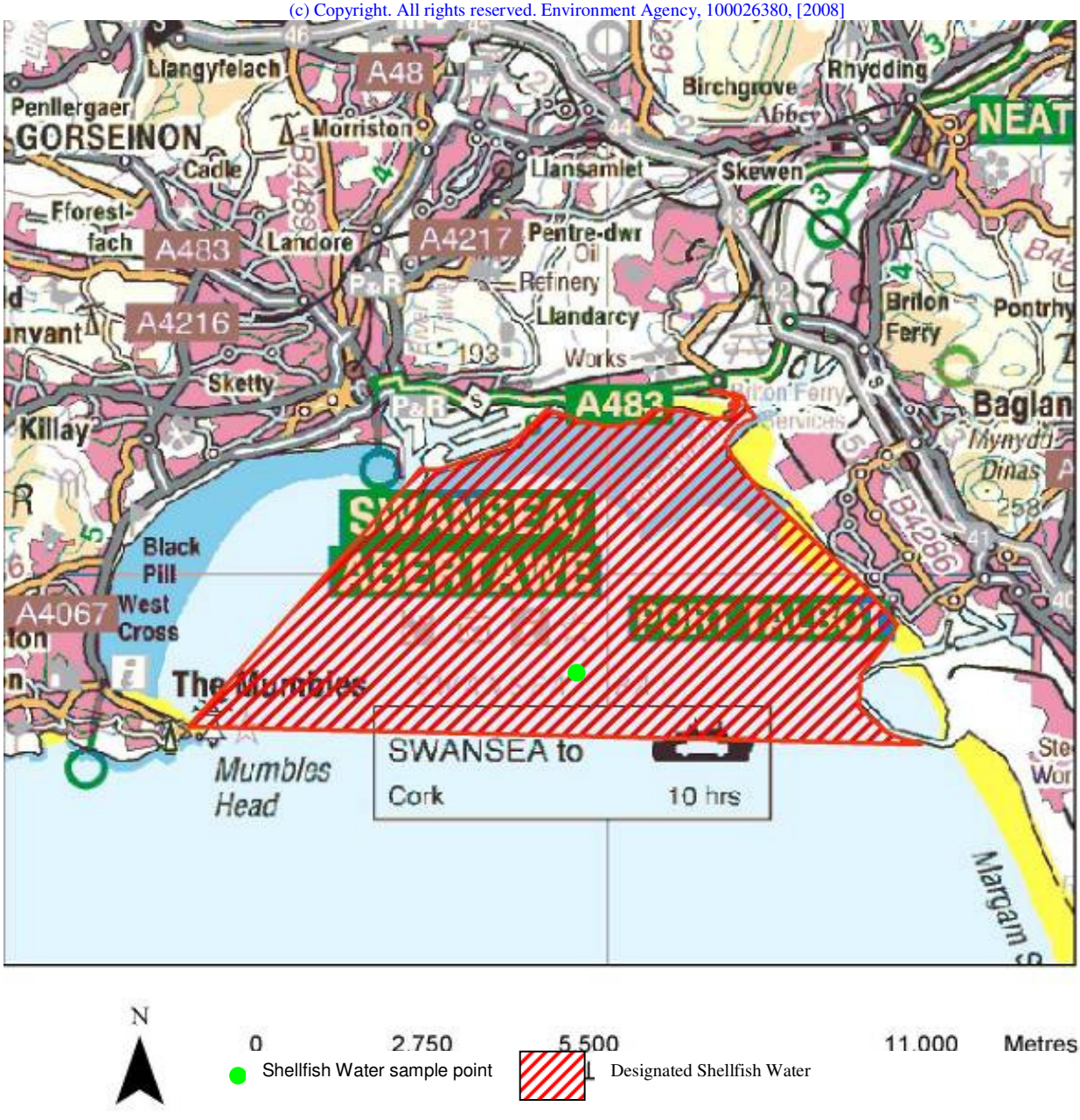
Catchment: Tawe, Neath, Afan

Designated: 1999

Designation Number 83

Sampling point location: SS7035088041 (51° 34”34.58’ N 3° 52”20.53’ W)

Figure 1 Swansea Bay (East) Shellfish Water



3. DESCRIPTION

3.1 Species Present

Oysters *(Ostrea edulis) and* Mussels (*Mytilus spp).*

3.2 Location and Geography

This designated area covers the central and eastern parts of Swansea Bay, stretching from the mouth of the Tawe to Mumbles Head and across to the north end of Margam Sands. The water is moderately deep (8m at Low Water) and the seabed is mostly mud with some fine sand. There are two other Shellfish Waters in Swansea Bay: Swansea Bay (South) and Swansea Bay (West).

3.3 Land Use Pressures

The upper reaches of the rivers entering this section of Swansea Bay tend to be rural, agricultural areas (that include widespread forestry) interspersed with small settlements. The lower reaches and the coastal strip around the bay are densely populated and support heavy industry. Port Talbot Docks supports Corus steel works and is a busy centre for shipping. Ongoing development at Swansea Waterfront will eventually include commercial, leisure/tourism, residential and educational premises.

3.4 Discharges to Swansea Bay Shellfish Waters

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Swansea Bay (East) Shellfish Water

Discharge	Consented Dry Weather Flow (DWF) (m3/d)	Location	Reference to action taken
Afan STW	50716	Direct to Swansea Bay	Section 5 Table 3
Swansea STW	56592	Direct to Swansea Bay	Section 5 Table 3
Ystradgynlais STW	3785	Indirect to Swansea Bay	Section 5 Table 3
Trebanos STW	6290	Indirect to Swansea Bay	Section 5 Table 3

STW – Sewage Treatment Works

There are a large number of intermittent discharges to Swansea Bay that have the potential to influence the Shellfish Water, for example Neath Abbey sewage pumping station.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Swansea Bay East Shellfish Water has been compliant with all mandatory standards during the past 5 years (2004 – 2008).

4.2 Compliance with Guideline Standards

The Shellfish Water is not currently used commercially therefore no recent data has been available to determine if the guideline standard for Faecal coliforms has been met. We are working to rectify this data shortfall. The Shellfish Water passed the guideline standard for salinity 2004 - 2008 and dissolved oxygen all years except 2004.

Table 3 – Results of Compliance tests of Shellfish Water										
	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(No)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
1066	Swansea STW	Secondary treatment and UV disinfection	1999	Completed
1065	Afan STW	Secondary treatment	2002	Completed
1067	Ystradgynlais STW	Secondary treatment and P stripping installed	2003	Completed
1068	Trebanos STW	Secondary treatment and P stripping installed	2003	Completed
1073	Clyne Catchment Survey	The River Clyne is thought to be one of the major inputs of Faecal indicator bacteria into Swansea Bay. Following a Bathing Water failure in 2005, an investigation was undertaken in the Clyne catchment that included additional sampling at 27 locations. This was followed up by a more comprehensive survey in order to prioritise discharges for improvement and to target diffuse pollution prevention activities. The survey consisted of twelve sampling and	2005	Completed

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
		flow gauging runs carried out over a period of several months. The survey concluded that sources of Faecal indicator organisms appear to be mainly diffuse throughout the study catchment area, but highlighted two point sources and also sub-catchments with relatively high Faecal indicator organism yields. Appropriate follow-up action is to be undertaken as soon as possible which should lead to an improvement in water quality.		
1070	Model Swansea Bay	Dwr Cymru Welsh Water (DCWW) in April 2007 completed a Water Quality Model for Swansea Bay.	2008	Completed. The Model has been built and signed off July 2007. The investigation is tied up with the AMP4 Knab Rock cost effectiveness study. DCWW are using the model to identify WQ issues in Swansea Bay
1071	Afan Neath investigation	Investigative work on the Afan and Neath rivers further to Bathing Water Imperative failure at Aberavon beach 2006.	2008	Completed. Imperative fail follow up investigations done. Local Environment Management Team are keeping a watching brief on the bathing water including liaison with DCWW on outputs from the Swansea Bay Model (see action 1070). This will help identify potential sources of pollution that could impact on Shellfish Water Guideline compliance
1069	Intermittent discharges Swansea	A large number of improvements to intermittent discharges have taken place in this catchment in AMP2 and 3 that have significantly reduced bacteria loadings to the Shellfish Water. This includes the Swansea Bay, Nant y Fendrod and Afan schemes.	2010	There are further AMP intermittents assets to be improved in the Swansea Bay catchment by 2010. Approx 40 intermittents in the Swansea and Afan sewerage catchment are listed for improvement in AMP4

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Swansea Bay East Shellfish Water has been compliant with all mandatory standards during the past 5 years (2004 – 2008). The Agency reviews its monitoring data annually. We seek to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures.

5.2 Remedial action to prevent guideline failures

The Shellfish Water is not currently used commercially therefore no recent data has been available to determine if the guideline standard for Faecal coliforms has been met. The Shellfish Water passed the guideline standard for salinity 2004 - 2008 and dissolved oxygen all years except 2004.

Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 2010 to upgrade four significant sewage discharges along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality.

See Table 3, action 1065 - 1068. Work completed in the 2000-2005 period included the construction of Swansea and Afan STWs, replacing crude outfalls at Mumbles Head and Baglan. Remedial action has been undertaken to counter the potential sources of pollution considered most likely to cause failure of the guideline standards of the Shellfish Directive.

A large number of intermittent discharges have been improved in this catchment and this work is continuing. This has significantly reduced bacteria loadings to the Shellfish Water (see table 3, action 1069).

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal coliforms in Water for the Swansea Bay (East) Shellfish Water, 2001 to 2008

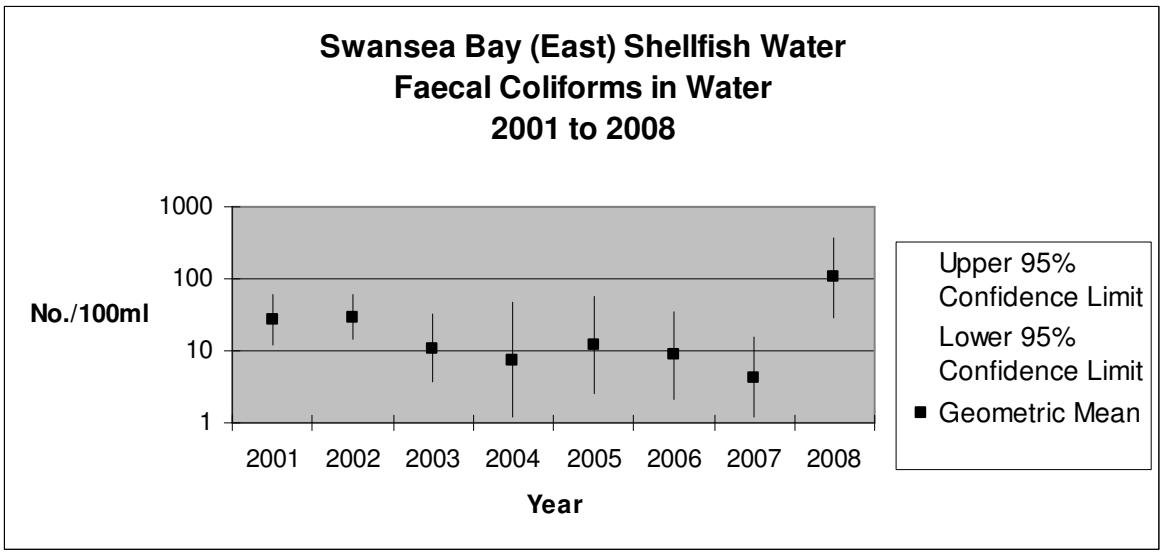
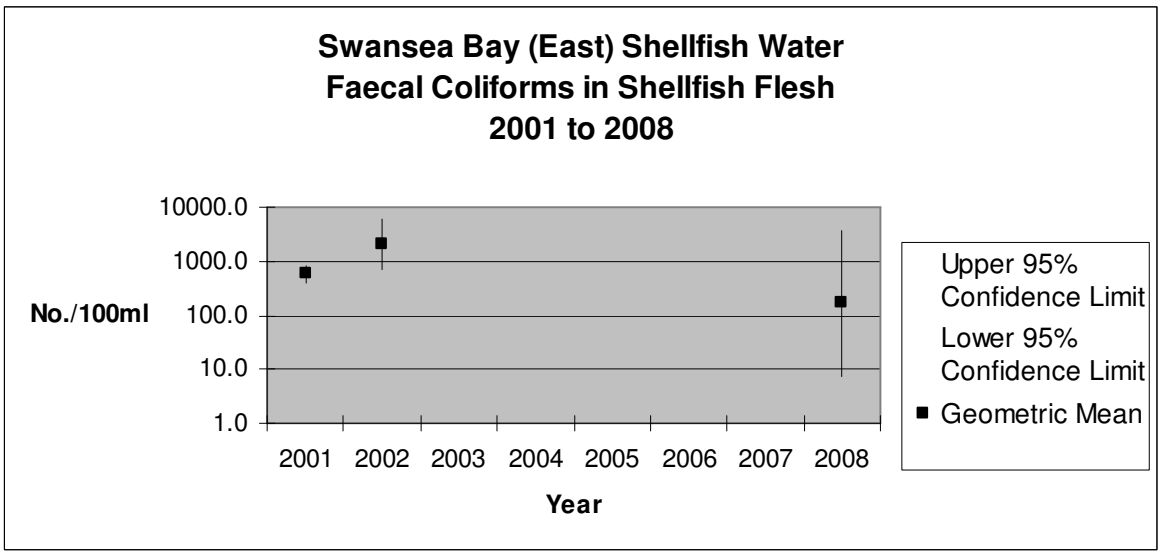


Figure 3 Faecal coliforms in Shellfish Flesh for the Swansea Bay (East) Shellfish Water, 2001 to 2008



Confidence limits have been calculated and are shown on the figure. They highlight the wide variability in the sample results for Shellfish Waters.

The Shellfish Water is not currently used commercially which has made it difficult for us to obtain data on Faecal coliform levels in shellfish flesh. We are working with the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) to ensure that in future shellfish flesh data will be available from sites where commercial shellfish harvesting has stopped.

Possible remaining sources of Faecal coliform pollution have been identified as:

- Intermittent and point source discharges;
- Leakage from private sewers or unauthorised connection of private sewers to stormwater drainage;
- Minor discharges from sewerage infrastructure as listed in section 7.2;
- Diffuse pollution runoff from agricultural land into the tributaries of the Rivers Tawe, Afan and Neath, as described in section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Mandatory standards are consistently met in this Shellfish Water and Faecal coliform concentrations in the water column are low. Swansea Bay (East) shellfish beds are not being commercially harvested at the moment.
DCWW completed a Water Quality Model for Swansea Bay that was signed off in July 2007 (Table 3, action 1070). They are using this to identify sources of pollution into Swansea Bay. We will closely look at this in relation to any implications regarding compliance with mandatory and guideline standards.

7.2 Further action to characterise and address diffuse sources of pollution

The River Clyne is thought to be one of the major inputs of Faecal indicator bacteria into Swansea Bay. Following a Bathing Water failure in 2005 an investigation was undertaken in the Clyne catchment that included additional sampling at 27 locations. See Table 3, action 1073. Appropriate follow-up action is to be undertaken as soon as possible which should lead to an improvement in water quality.

Diffuse pollution work is already being carried out on the Neath and Kenfig river catchments including the rivers Camnant and Dulais. This initially has involved sampling at strategic points with follow-up work. Whilst this does not specifically address bacterial inputs, focus on the catchment may well highlight other sources of diffuse pollution.
Investigative work on the Afan and Neath rivers further to Bathing Water failures at Aberafan is complete (see Table 3, action 1071) but the local Environment Team are keeping a watching brief on the bathing water. This could flag further investigation and actions.

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing.

A group addressing water quality issues in Swansea Bay, including diffuse pollution, has been set up between the Environment Agency, DCWW and the local authority. It is hoped that the pooling of resources and information, and working together, will help progress water quality issues. One of the tasks to be undertaken by this group is a drainage survey in Limeslade. This is intended to identify mis-connections that could be affecting water quality. It will also progress the work done, and problems identified by the Environment Agency, on the River Clyne. One of the aims of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard.

The various aspects of this diffuse pollution work are expected to lead to improved Shellfish Water quality.

8. SUMMARY

The Swansea Bay East Shellfish Water has been compliant with all mandatory standards during the past 5 years (2004 – 2008). The Shellfish Water passed the guideline standard for salinity 2004 - 2008 and dissolved oxygen all years except 2004.

The Shellfish Water is not currently used commercially which has made it difficult to obtain data on Faecal coliform levels in shellfish flesh. The levels of Faecal coliforms in the water column are consistently low. We are working with the Centre for Environment, Fisheries and Aquaculture Science to ensure that shellfish flesh data will be available as soon as possible from this Shellfish Water.

The most significant point source and intermittent discharges have already received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, for example the Mumbles Head crude sewage outfall.

A group addressing water quality issues in Swansea Bay has been set up between the Environment Agency, DCWW and the local authority. It is hoped that the pooling of resources and information, and working together, will help progress water quality issues.

Diffuse pollution sources in the catchment have been identified and remedial action is underway.

H. Swansea Bay (South)

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Swansea Bay (South)

Catchment: Tawe, Neath, Afan

Designated: 1999

Designation Number 85

Sampling point location: SS6300080000 (51° 30”8.23’ N 3° 58”30.86’ W)

Figure 1 Swansea Bay (South) Shellfish Water

3. DESCRIPTION

3.1 Species Present

Mussels *(Mytilus spp.)*

3.2 Location and Geography

This designated area is situated south of the Swansea Bay water body. It extends from the north end of Margam sands to Mumbles Head and approximately 8km south of Mumbles Head. It is an area of deep water (depth at low water 20m) and the seabed consists of fine and medium sand, shells and gravel. The spring tidal range is 8m. There are two other Shellfish Waters in Swansea Bay: Swansea Bay (East) and Swansea Bay (West).

3.3 Land Use Pressures

Apart from a short stretch of the south Gower coast, the designated area has virtually no land adjacent to it. It is likely to be influenced by the inner Swansea Bay which is affected by the Tawe, Neath and Afan catchments. These catchments are densely populated in their lower reaches and the coastal strip east of Swansea supports heavy industry. The upper reaches of these catchments are rural with widespread forestry. The short stretch of the Gower coast beside the Shellfish Water has mostly urban development.

3.4 Discharges to Swansea Bay Shellfish Waters

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Swansea Bay (South) Shellfish Water

Discharge	Consented Dry Weather Flow (DWF) (m3/d)	Location	Reference to action taken
Afan STW	50716	Direct to Swansea Bay	Section 5 Table 3
Swansea STW	56592	Direct to Swansea Bay	Section 5 Table 3
Ystradgynlais STW	3785	Indirect to Swansea Bay	Section 5 Table 3
Trebanos STW	6290	Indirect to Swansea Bay	Section 5 Table 3

STW – Sewage Treatment Works

There are a large number of intermittent discharges to Swansea Bay that have the potential to influence the Shellfish Water, for example Neath Abbey sewage pumping station

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Swansea Bay (South) Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008).

4.2 Compliance with Guideline Standards

The Swansea Bay (South) Shellfish Water has not yet achieved compliance with the Faecal coliform standard. All other guideline standards were met for the past 5 years (2004 – 2008).

Table 3 – Results of Compliance tests of Shellfish Water

	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
1901	Swansea STW	Secondary treatment and UV disinfection	1999	Completed
1902	Afan STW	Secondary treatment	2002	Completed
1900	Ystradgynlais STW	Secondary treatment and P stripping installed	2003	Completed
1899	Trebanos STW	Secondary treatment and P stripping installed	2003	Completed
1073	Clyne Catchment Survey	The River Clyne is thought to be one of the major inputs of Faecal indicator bacteria into Swansea Bay. Following a Bathing Water failure in 2005 an investigation was undertaken in the Clyne catchment that included additional sampling at 27 locations. This was followed up by a more comprehensive survey in order to prioritise discharges for improvement and to target diffuse pollution prevention activities. The survey consisted of twelve sampling and	2005	Completed

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
		flow gauging runs carried out over a period of several months. The survey concluded that sources of Faecal indicator organisms appear to be mainly diffuse throughout the study catchment area, but highlighted two point sources and also sub-catchments with relatively high Faecal indicator organism yields. Appropriate follow-up action is to be undertaken as soon as possible which should lead to an improvement in water quality.		
1896	Afan Neath investigation	Investigative work on the Afan and Neath rivers further to Bathing Water Imperative failure at Aberavon beach 2006.	2008	Completed. Imperative fail follow up investigations done. Local Environment Management Team are keeping a watching brief on the bathing water including liaison with DCWW on outputs from the Swansea Bay Model (see action 1070). This will help identify potential sources of pollution that could impact on Shellfish Water Guideline compliance
1897	Model Swansea Bay	DCWW in April 2007 completed a Water Quality Model for Swansea Bay.	2008	Completed. The Model has been built and signed off July 2007. The investigation is tied up with the AMP4 Knab Rock cost effectiveness study. DCWW are using the model to identify WQ issues in Swansea Bay
1898	Intermittent discharges Swansea	A large number of improvements to intermittent discharges have taken place in this catchment in AMP2 and 3 that have significantly reduced bacteria loadings to the Shellfish Water. This includes the Swansea Bay, Nant y Fendrod and Afan schemes.	2010	There are further AMP intermittents assets to be improved in the Swansea Bay catchment by 2010. Approx 40 intermittents in the Swansea and Afan sewerage catchment are listed for improvement in AMP4

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Swansea Bay (South) Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008).

The Agency reviews its monitoring data annually. We seek to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures.

5.2 Remedial action to prevent guideline failures

The Swansea Bay (South) Shellfish Water has not yet achieved compliance with the Faecal coliform standard. All other guideline standards were met for the past 5 years (2004 – 2008). Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard.

Significant point source discharges have received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 2010 to upgrade four significant sewage discharges along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality.

See Table 3, action 1899 - 1902. Work completed in the 2000-2005 period included the construction of Swansea and Afan STWs, replacing crude outfalls at Mumbles Head and Baglan. Remedial action has been undertaken to counter the potential sources of pollution considered most likely to cause failure of the guideline standards of the Shellfish Directive.

A large number of intermittent discharges have been improved in this catchment and this work is continuing. This has significantly reduced bacteria loadings to the Shellfish Water (see table 3, action 1898).

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal coliforms in Water for the Swansea Bay (South) Shellfish Water, 2001 to 2008

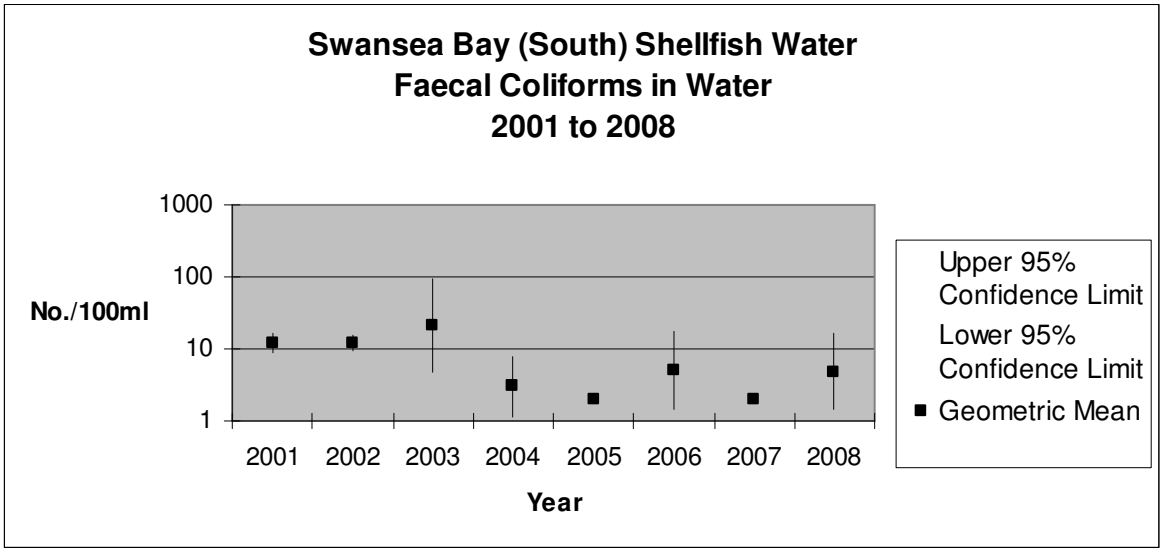
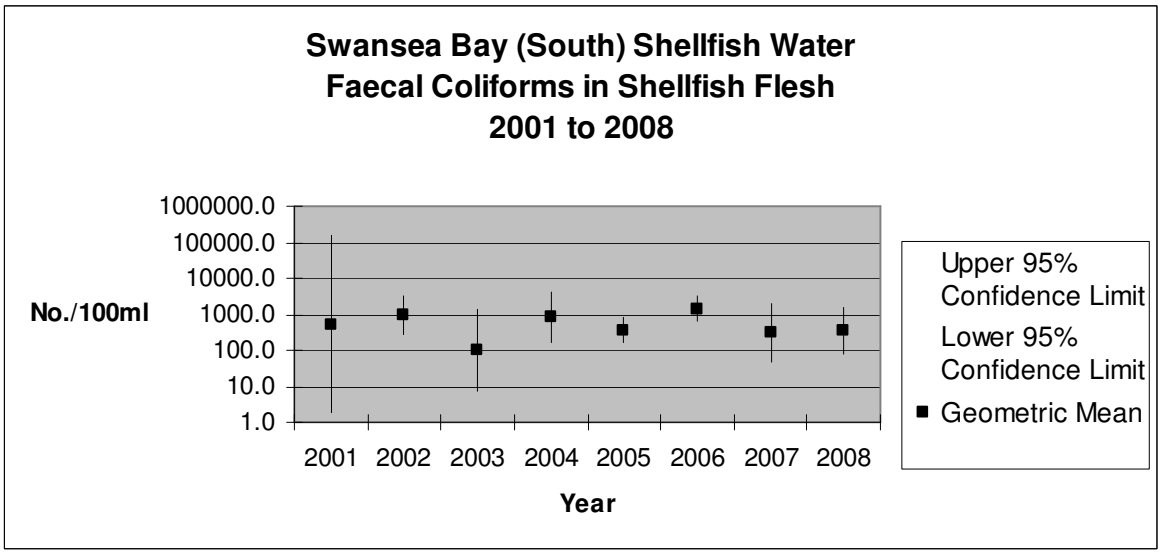


Figure 3 Faecal coliforms in Shellfish Flesh for the Swansea Bay (South) Shellfish Water, 2001 to 2008



Confidence limits have been calculated and are shown on the figures. They highlight the wide variability in the sample results for Shellfish Waters.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

Despite action to reduce pollution from significant discharges, the Shellfish Water does not yet achieve the guideline standards for Faecal coliforms in shellfish flesh.

Possible remaining sources of Faecal coliform pollution have been identified as:

- Leakage from private sewers or unauthorised connection of private sewers to stormwater drainage;
- Minor discharges from sewerage infrastructure.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Mandatory standards are consistently met in this Shellfish Water and Faecal coliform concentrations in the water column are low.

DCWW completed a Water Quality Model for Swansea Bay that was signed off in July 2007 (Table 3, action 1897). They are using this to identify sources of pollution into Swansea Bay. We will closely look at this in relation to any implications regarding compliance with mandatory and guideline standards.

7.2 Further action to characterise and address diffuse sources of pollution

Water quality in this designated area is possibly influenced by the other two designated Shellfish Waters within Swansea Bay (East and West).

The River Clyne is thought to be one of the major inputs of Faecal indicator bacteria into Swansea Bay. Following a Bathing Water failure in 2005 an investigation was undertaken in the Clyne catchment that included additional sampling at 27 locations. See Table 3, action 1073. Appropriate follow-up action is to be undertaken as soon as possible which should lead to an improvement in water quality.

Diffuse pollution work is already being carried out on the Neath and Kenfig river catchments including the rivers Camnant and Dulais. This initially has involved sampling at strategic points with follow-up work. Whilst this does not specifically address bacterial inputs, focus on the catchment may well highlight other sources of diffuse pollution.

Following Bathing Water failures at Aberafan investigations have taken place on the rivers Afan and Neath (see Table 3, action 1896). The local Environment Team are keeping a watching brief on the bathing water. This could flag further investigation and actions.

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing.

A group addressing water quality issues in Swansea Bay, including diffuse pollution, has been set up between the Environment Agency, DCWW and the local authority. It is hoped that the pooling of resources and information, and working together, will help progress water quality issues. One of the tasks to be undertaken by this group is a drainage survey in Limeslade. This is intended to identify mis-connections that could be affecting water quality. It will also progress the work done, and problems identified by the Environment Agency, on the River Clyne. One of the aims of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard

The various aspects of this diffuse pollution work are expected to lead to improved Shellfish Water quality.

8. SUMMARY

The Swansea Bay (South) Shellfish Water has been compliant with all mandatory standards but has not yet achieved compliance with the Faecal coliform guideline standard. All other guideline standards were met for the past 5 years (2004 – 2008).

The most significant point source and intermittent discharges have already received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, for example the Mumbles Head crude sewage outfall.

A group addressing water quality issues in Swansea Bay has been set up between the Environment Agency, DCWW and the local authority. It is hoped that the pooling of resources and information, and working together, will help progress water quality issues.

Diffuse pollution sources in the catchment have been identified and remedial action is underway.

I. Swansea Bay (West)

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Swansea Bay (West)

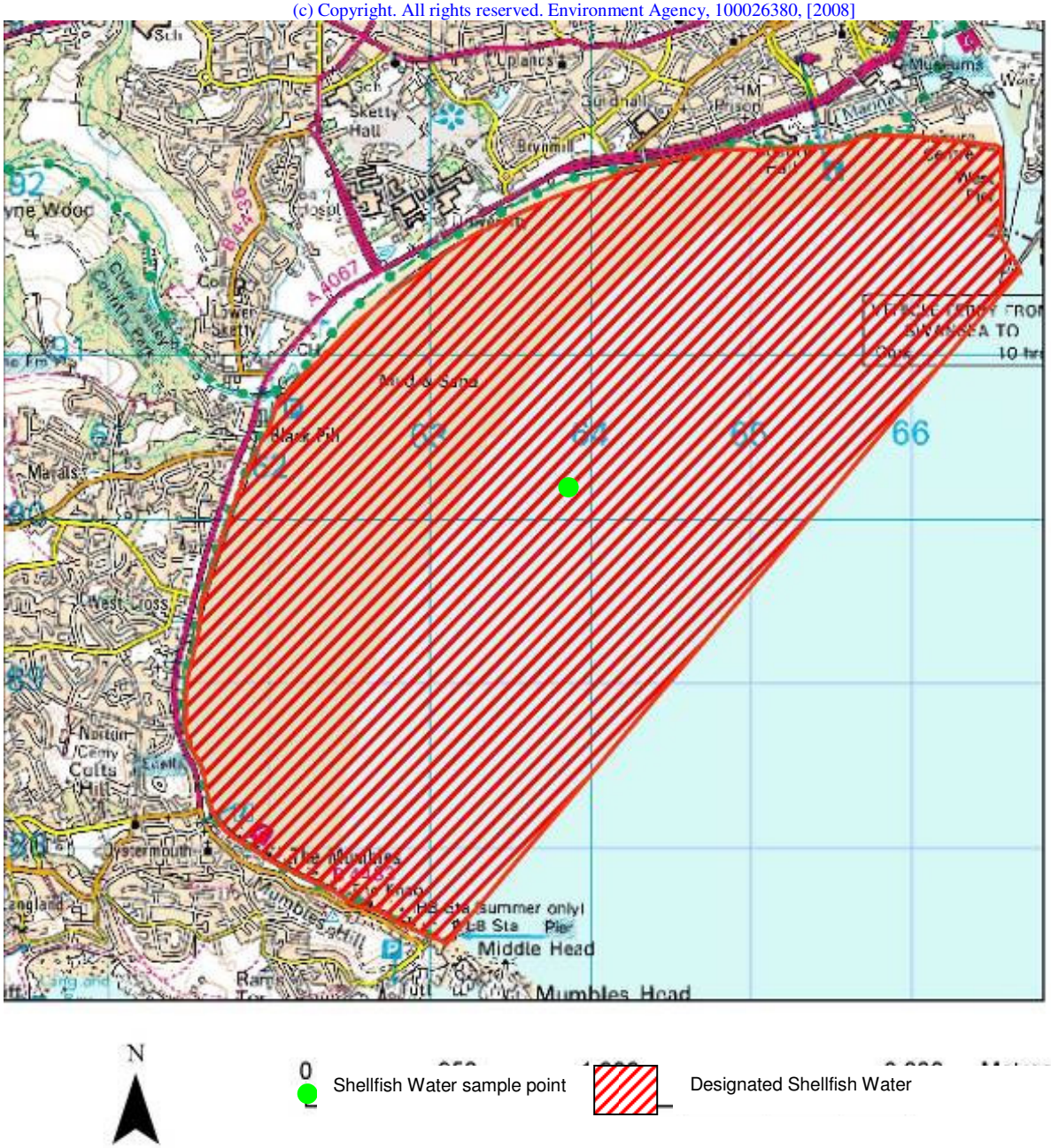
Catchment: Tawe

Designated: 1999

Designation Number 84

Sampling point location: SS6400090000 (51° 35”32.6’ N 3° 57”52.95’ W)

Figure 1 Swansea Bay (West) Shellfish Water



3. DESCRIPTION

3.1 Species Present

Mussels *(Mytilus spp.)*

3.2 Location and Geography

The Swansea Bay West designated area is relatively small, situated on the western side of Swansea Bay, between Mumbles Head and the mouth of the Tawe. The area consists of gently shelving mud and sand with a low water depth of approximately 1m, much of it is dry at low water. The only significant tributary to enter the designated area is the Clyne River. There are two other Shellfish Waters in Swansea Bay: Swansea Bay (South) and Swansea Bay (East).

3.3 Land Use Pressures

The upper reaches of the Tawe are predominantly rural supporting non-intensive agriculture with some forestry. The middle and lower reaches flow through urban and industrial development concentrated around Swansea. The shoreline of the bay is also heavily populated. Major development is planned for Swansea Waterfront and will include commercial, leisure/tourism, residential and educational premises.

3.4 Discharges to the Shellfish Water

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Swansea Bay (West) Shellfish Water

Discharge	Consented Dry Weather Flow (DWF) (m3/d)	Location	Reference to action taken
Afan STW	50716	Direct to Swansea Bay	Section 5 Table 3
Swansea STW	56592	Direct to Swansea Bay	Section 5 Table 3
Ystradgynlais STW	3785	Indirect to Swansea Bay	Section 5 Table 3
Trebanos STW	6290	Indirect to Swansea Bay	Section 5 Table 3

STW – Sewage Treatment Works

There are a large number of intermittent discharges to Swansea Bay that have the potential to influence the Shellfish Water, for example Neath Abbey sewage pumping station

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2004 to 2008 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Swansea Bay (West) Shellfish Water has mainly been compliant with all mandatory standards for 5 years (2004 – 2008).

4.2 Compliance with Guideline Standards

During the past 5 years (2004 – 2008), the Swansea Bay (West) Shellfish Water met the guideline standards throughout for salinity and dissolved oxygen. The Shellfish Water has not yet met the guideline standard for Faecal coliforms.

Table 3 – Results of Compliance tests of Shellfish Water										
	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
1894	Swansea STW	Secondary treatment and UV disinfection	1999	Completed
1895	Afan STW	Secondary treatment	2002	Completed
1893	Ystradgynlais STW	Secondary treatment and P stripping installed	2003	Completed
1892	Trebanos STW	Secondary treatment and P stripping installed	2003	Completed
1073	Clyne Catchment Survey	The River Clyne is thought to be one of the major inputs of Faecal indicator bacteria into Swansea Bay. Following a Bathing Water failure in 2005 an investigation was undertaken in the Clyne catchment that included additional sampling at 27 locations. This was followed up by a more comprehensive survey in order to prioritise discharges for improvement and to target diffuse pollution prevention activities. The survey consisted of twelve sampling and	2005	Completed

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
		flow gauging runs carried out over a period of several months. The survey concluded that sources of Faecal indicator organisms appear to be mainly diffuse throughout the study catchment area, but highlighted two point sources and also sub-catchments with relatively high Faecal indicator organism yields. Appropriate follow-up action is to be undertaken as soon as possible which should lead to an improvement in water quality.		
1889	Afan Neath investigation	Investigative work on the Afan and Neath rivers further to Bathing Water Imperative failure at Aberavon beach 2006.	2008	Completed. Imperative fail follow up investigations done. Local Environment Management Team are keeping a watching brief on the bathing water including liaison with DCWW on outputs from the Swansea Bay Model (see action 1070). This will help identify potential sources of pollution that could impact on Shellfish Water Guideline compliance
1890	Model Swansea Bay	DCWW have in April 2007 completed a Water Quality Model for Swansea Bay.	2008	Completed. The Model has been built and signed off July 2007. The investigation is tied up with the AMP4 Knab Rock cost effectiveness study. DCWW are using the model to identify WQ issues in Swansea Bay
1891	Intermittent discharges Swansea	A large number of improvements to intermittent discharges have taken place in this catchment in AMP2 and 3 that have significantly reduced bacteria loadings to the Shellfish Water. This includes the Swansea Bay, Nant y Fendrod and Afan schemes.	2010	There are further AMP intermittents assets to be improved in the Swansea Bay catchment by 2010. Approx 40 intermittents in the Swansea and Afan sewerage catchment are listed for improvement in AMP4

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Swansea Bay (West) Shellfish Water has been compliant with all mandatory standards for the last 5 years (2004 – 2008), apart from copper.

The failure of the mandatory standard for copper in 2003 is thought to have been a one-off occurrence. No pollution sources have been identified that have the potential to cause repeated failures of mandatory standards over the long term.

The Agency reviews its monitoring data annually. We seek to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures.

5.2 Remedial action to prevent guideline failures

The Swansea Bay (West) Shellfish Water has not yet achieved compliance with the Faecal coliform standard. During the past 5 years (2004 – 2008), the Shellfish Water met the guideline standards throughout for salinity and dissolved oxygen. Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 2010 to upgrade four significant sewage discharges along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. See Table 3, action 1892 – 1895. Work completed in the 2000-2005 period included the construction of Swansea and Afan STWs, replacing crude outfalls at Mumbles Head and Baglan. Remedial action has been undertaken to counter the potential sources of pollution considered most likely to cause failure of the guideline standards of the Shellfish Directive.

A large number of intermittent discharges have been improved in this catchment and this work is continuing. This has significantly reduced bacteria loadings to the Shellfish Water (see table 3, action 1891).

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In Figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal coliforms in Water for the Swansea Bay (West) Shellfish Water, 2001 to 2008

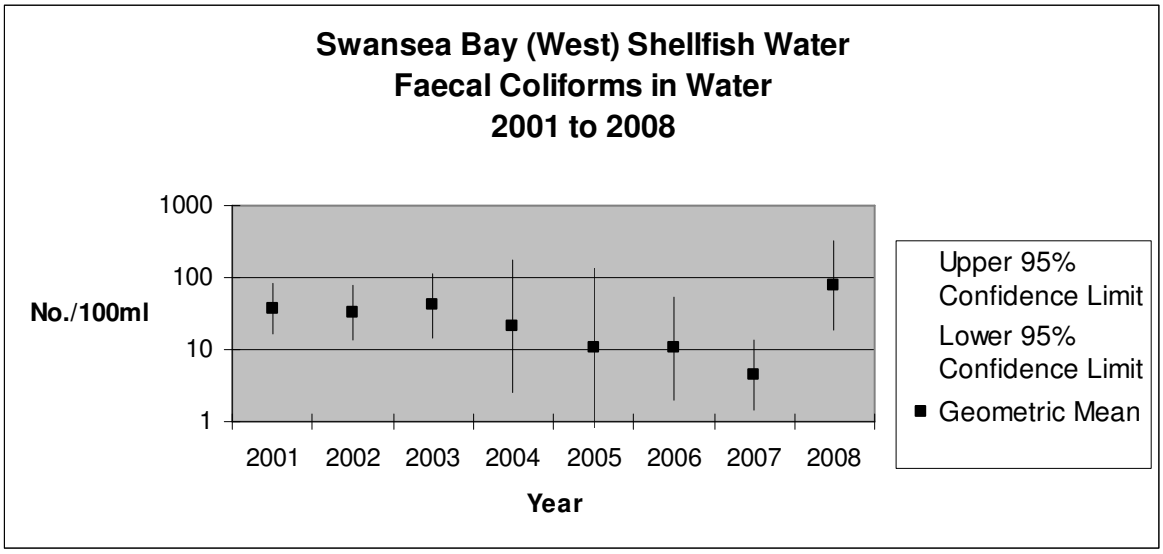
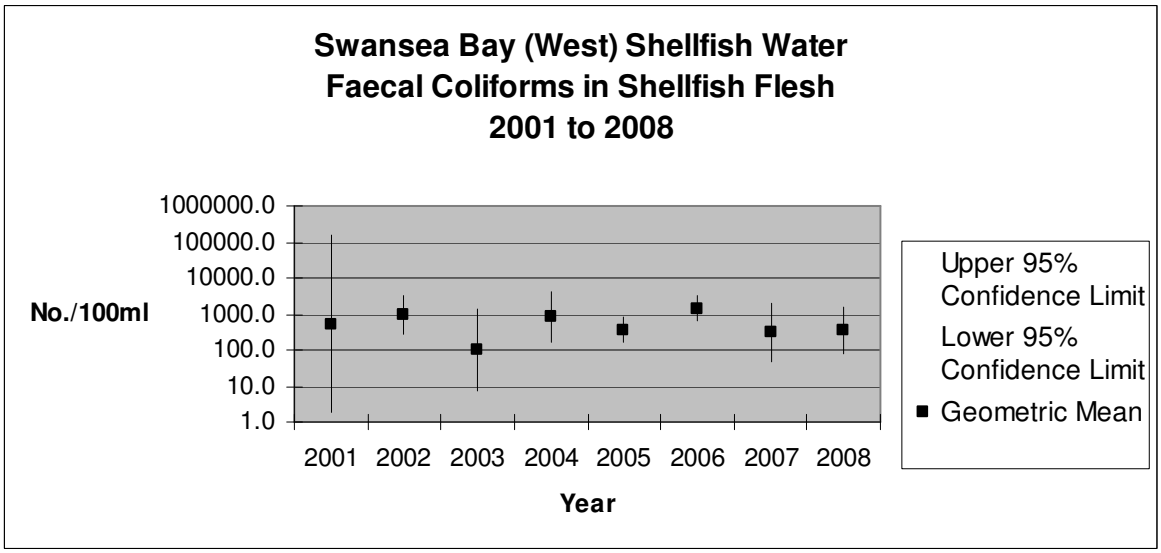


Figure 3 Faecal coliforms in Shellfish Flesh for the Swansea Bay (West) Shellfish Water, 2001 to 2008



Confidence limits have been calculated and are shown on the figures. They highlight the wide variability in the sample results for Shellfish Waters.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

Despite action to reduce pollution from significant discharges, the Shellfish Water does not yet achieve the guideline standards for Faecal coliforms in shellfish flesh.

Possible remaining sources of Faecal coliform pollution have been identified as:

- Unauthorised connection of private sewers to stormwater drainage
- Minor discharges from sewerage infrastructure as listed in section 7.2;
- Diffuse pollution runoff from agricultural land into the tributaries of the River Tawe, Clyne, Neath and Afan, as described in section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Mandatory standards are consistently met in this Shellfish Water and Faecal coliform concentrations in the water column are low.

DCWW completed a Water Quality Model for Swansea Bay that was signed off in July 2007 (Table 3, action 1890). They are using this to identify sources of pollution into Swansea Bay. We will closely look at this in relation to any implications regarding compliance with mandatory and guideline standards.

7.2 Further action to characterise and address diffuse sources of pollution

The River Clyne is thought to be one of the major inputs of Faecal indicator bacteria into Swansea Bay. Following a Bathing Water failure in 2005 an investigation was undertaken in the Clyne catchment that included additional sampling at 27 locations. See Table 3, action 1073. Appropriate follow-up action is to be undertaken as soon as possible which should lead to an improvement in water quality.

Diffuse pollution work is already being carried out on the Neath and Kenfig river catchments including the rivers Camnant and Dulais. This initially has involved sampling at strategic points with follow-up work. Whilst this does not specifically address bacterial inputs, focus on the catchment may well highlight other sources of diffuse pollution.
Following Bathing Water failures at Aberafan investigations have taken place on the rivers Afan and Neath (see Table 3, action 1889). The local Environment Team are keeping a watching brief on the bathing water. This could flag further investigation and actions.

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing.
A group addressing water quality issues in Swansea Bay, including diffuse pollution, has been set up between the Environment Agency, DCWW and the local authority. It is hoped that the pooling of resources and information, and working together, will help progress water quality issues. One of the tasks to be undertaken by this group is a drainage survey in Limeslade. This is intended to identify mis-connections that could be affecting water quality. It will also progress the work done, and problems identified by the Environment Agency, on the River Clyne. One of the aims of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard

The various aspects of this diffuse pollution work are expected to lead to improved Shellfish Water quality.

8. SUMMARY

The Swansea Bay (West) Shellfish Water has been compliant with all mandatory standards for all but one of the past 5 years (2004 – 2008). The Shellfish Water failed to achieve compliance with the Faecal coliform flesh standard, but during the past 5 years (2004 – 2008), the Swansea Bay (West) Shellfish Water met the guideline standards throughout for salinity and dissolved oxygen.

The most significant point source continuous and intermittent discharges have already received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, for example the Mumbles Head crude sewage outfall.

A group addressing water quality issues in Swansea Bay has been set up between the Environment Agency, DCWW and the local authority. It is hoped that the pooling of resources and information, and working together, will help progress water quality issues.

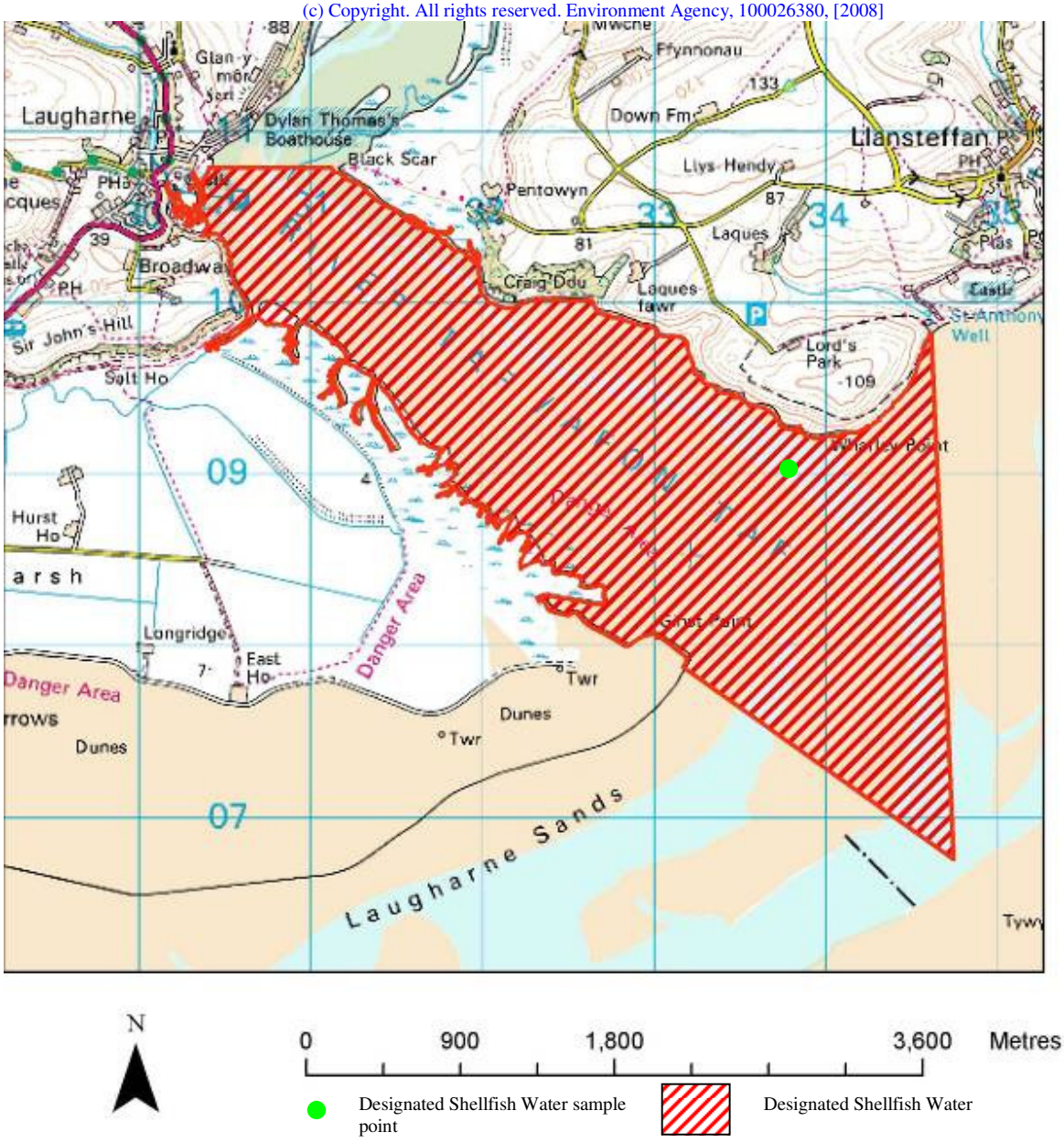
Diffuse pollution sources in the catchment have been identified and remedial action is underway.

J. Taf

2. MAP & DESIGNATION DETAILS

Environment Agency Region:	Wales
Environment Agency Area:	South West (Wales)
Shellfish Water:	Taf
Catchment:	Taf, Afon Dewi Fawr, Afon Cywyn and Afon Cynin
Designated:	1999
Designation Number	88
Sampling point location:	SN3375009000 (51° 45”17.84’ N 4° 24” 36.27’ W)

Figure 1 Taf Shellfish Water



3. DESCRIPTION

3.1 Species Present

Cockles *(Cardium edule).*

3.2 Location and Geography

The Taf estuary is a relatively small and shallow inlet, situated on the south west coast of Carmarthenshire. The main rivers within the Taf catchment are the Cynin, Dewi Fawr and Cywyn that join the Taf in its tidal reaches. At its mouth, the estuary merges with the Tywi and Gwendraeth estuaries to form the Three Rivers Estuary. The bed of the designated shellfish area is generally stony. Maximum water depth in the mobile channels is 5m at low water.

3.3 Land Use Pressures

The catchment is predominantly rural, agricultural land interspersed with small urban settlements. Sheep farms are found in the upper catchment, mixed dairy and livestock farming in the middle reaches and intensive dairy farms on the flatter lower reaches. Although some larger dairy units are intensifying there is an increasing move towards agri-environment schemes that promote changes from modern farming practices to more traditional practices and habitat creation. Such schemes discourage the intensive drainage of agricultural land and encourage the creation of wetlands and protective corridors alongside watercourses. This decreases the risk of diffuse pollution from agricultural run-off. The area is recognised as having high landscape value and the tidal reaches of the Taf are a designated SSSI (Site of Special Scientific Interest), and also form part of the Carmarthen Bay Special Area for Conservation (SAC). Tourism is of economic importance in the area, with Laugharne being a popular destination during the summer months.

3.4 Discharges to the Estuary

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water. These are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Taf Shellfish Water

Discharge	Consented Dry Weather Flow (DWF) (m3/d)	Location	Reference to action taken
Llanboidy STW	65	Indirect to Taf Estuary	Section 5 Table 3
Bancyfelin STW	142	Indirect to Taf Estuary	Section 5 Table 3
Llanfyrnach STW	57	Indirect to Taf Estuary	Section 5 Table 3
Whitland STW	522	Indirect to Taf Estuary	Section 5 Table 3
Laugharne STW	320	Direct to Taf Estuary	Section 5 Table 3
Tavernspite STW	80	Indirect to Taf Estuary	Section 5 Table 3
Meidrim STW	111	Indirect to Taf Estuary	Section 5 Table 3
St Clears STW	987	Direct to Taf Estuary	Section 5 Table 3
Parc y Splotts STW	7000	Indirect to Taf Estuary	Section 5 Table 3

STW – Sewage Treatment Works

There are a number of private discharges into the Three Rivers estuaries including the Mekatek industrial discharge in Carmarthen.

There are a large number of intermittent discharges to the Shellfish Water that have the potential to influence this Shellfish Water.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2001 to 2007 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Taf Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008).

4.2 Compliance with Guideline Standards

During the past 5 years (2004 – 2008) the Taf Shellfish Water has met the guideline standards except salinity in 2007.

Table 3 – Results of Compliance tests of Shellfish Water

	Compliance year									
Parameter	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(No)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
1078	Bancyfelin STW	Secondary treatment	pre 1994	Completed
1082	Tavernspite STW	Secondary treatment and reed bed	pre 1994	Completed
1083	Meidrim STW	Secondary treatment	pre 1994	Completed
1081	Laugharne STW	Secondary treatment and UV disinfection	1997	Completed
1077	Llanboidy STW	Secondary treatment	2003	Completed
1079	Llanfyrnach STW	Secondary treatment	2004	Completed
1080	Whitland STW	Secondary treatment	2005	Completed
1084	St Clears STW	Secondary treatment	2005	Completed
1088	Cywyn catchment	Further to several farm slurry pollution incidents within the catchment, diffuse pollution work is being undertaken on the Cywyn catchment. This includes river walks,	2008	Completed Diffuse pollution work in the Cwmfelinboeth catchment, a tributary of

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
	Pendine Pill	pollution prevention visits and monitoring. Guideline failures at nearby Pendine (a designated bathing water) have also prompted investigation work to look at possible pollution sources. Catchment Investigations	2010	the Taf, has been completed consisting of pollution prevention visits to farms. These were carried out in response to reports of pollution incidents affecting the catchment. A survey of the catchment was carried out, looking at the consented discharges and other potential sources of pollution. Biological and water quality samples were taken at each site. These informed targeted farm visits in the area. Routine bacterial samples were taken from Pendine Pill, throughout the bathing season. Further work will be carried out in the catchment in 2010.
1086	Three Rivers Feasibility Study	Where modelling indicates that there may be a risk of failure to achieve Shellfish Water standards, we will undertake a Feasibility Study modelling inputs to the Shellfish Waters. Assets are likely to include: Llansaint STW, Brickyard PS, Pontyates STW, Llanybri STW, Llangynderyn STW, Llanddarog STW, Four Roads STW, Pontyberem STW, Carway STW, Pembrey STW, Parc y Splotts STW, Pant yr Athro STW, and Llanstephan STW. The study should seek to find a practical way to improve the Shellfish Water in the most effective way.	2008	DCWW reported progress on the Three Rivers AMP4 feasibility study & options in Autumn 2009. Any required improvements will be forwarded into the AMP4 Change Protocol.
1087	Frequent sampling	This Shellfish Water is also being sampled more frequently than is required by the Shellfish Water Directive, under a programme begun since designation in 1999 and scheduled to last for up to three years, to provide information about the need for additional water quality improvement measures not included above.	Ongoing	Ongoing
88a	Investigations into mass cockle deaths	Identify cause(s) of mass cockle mortalities in the Three Rivers Estuary	2010	Ongoing Initial research study led by Bangor University has been carried out which has not identified the cause(s) of these mass mortalities.
1085	Intermittents Taf	AMP4 Improvements	2008	Completed There were two intermittent discharges listed for improvements in AMP4. These were completed in 2007 and 2008.

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Taf Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008).

The Environment Agency reviews its monitoring data annually. We try to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures. River stretches that have failed a statutory requirement are prioritised, and this information is then used to target the resource allocated annually to the Environment Agency's diffuse pollution project. This is funded by the Welsh Assembly Government.

5.2 Remedial action to prevent guideline failures

The Taf Shellfish Water passed the guideline standard for Faecal coliforms in 2003. During the past 5 years (2004 – 2008) the Shellfish Water has met the other guideline standards except salinity in 2007. Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 2010 to upgrade significant sewage discharges along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. See Table 3, action 1077 -1085.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF ACTIONS COMPLETED

In figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal coliforms in Water for the Taf Shellfish Water, 2001 to 2008

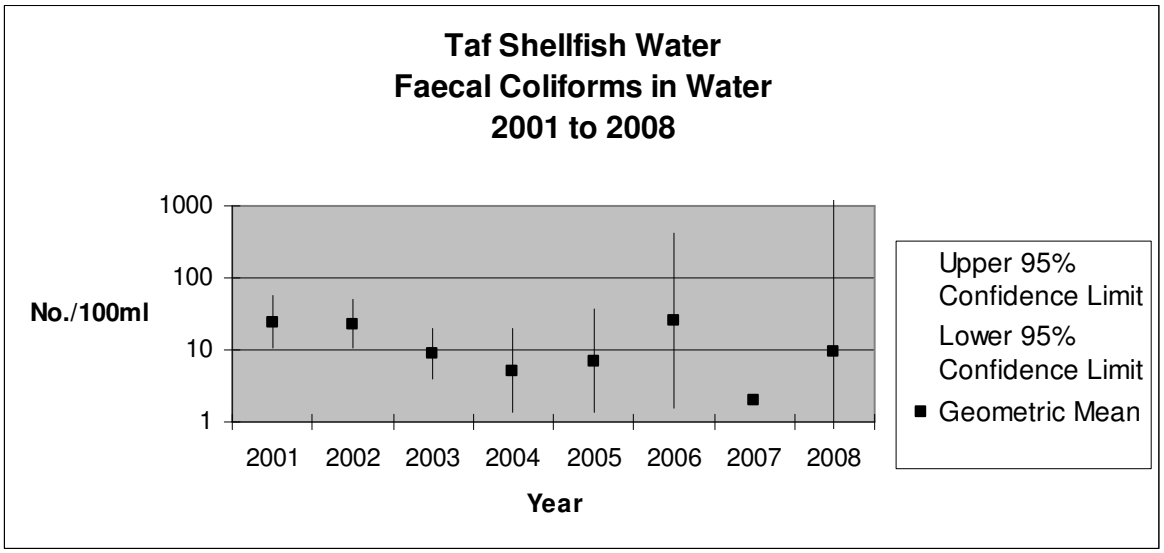
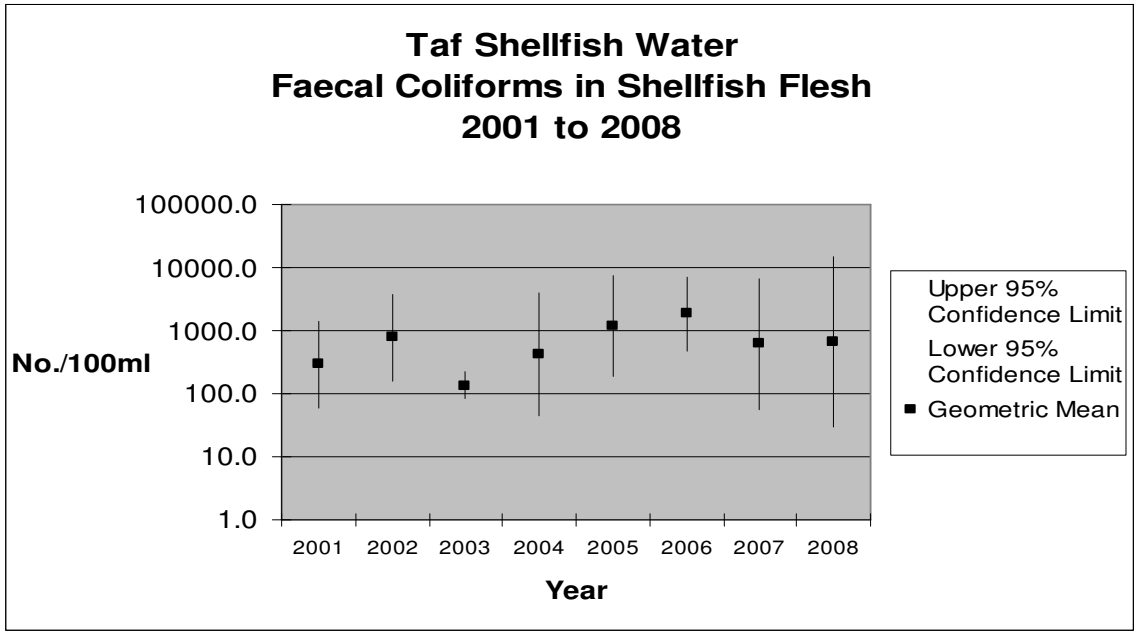


Figure 3 Faecal coliforms in Shellfish Flesh for the Taf Shellfish Water, 2001 to 2008



Confidence limits (shown on the figures) have been calculated for each result. They highlight the wide variability in the sample results.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards have been met.

Despite remedial action to reduce pollution from significant point source discharges, the Shellfish Water does not yet achieve the guideline standards for Faecal coliforms in shellfish flesh.

Possible remaining sources of Faecal coliform pollution have been identified as:

- discharges from the sewerage infrastructure as listed in section 7.1;
- land spreading of sewage sludge and misconnections from private sewers to stormwater drains discussed in section 7.2;
- Diffuse pollution runoff from agricultural land as described in section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Within the AMP3 water company programme (2000-2005) coastal models were built in order to identify where investment would lead to water quality improvements. The use of these coastal models is continuing within the current water company programme (2005-2010) to investigate where further improvements might be required (Table 3, action 1086).

The improvement schemes might include adding ultraviolet disinfection to continuous discharges and/or increasing the volume of storage to limit the spill frequency for unsatisfactory intermittent discharges. The aim of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard.

This Shellfish Water is also being sampled more frequently than is required by the Shellfish Water Directive, under a programme begun since designation in 1999 and scheduled to last for up to three years, to provide information about the need for additional water quality improvement measures not included above (Table 3, action 1087).

7.2 Further action to characterise and address diffuse sources of pollution

Further to several farm slurry pollution incidents within the catchment in 2007, diffuse pollution work was undertaken on the Cywyn, Cwmfelinboeth and upper Taf catchments . This includes river walks, biological survey and pollution prevention visits (Table 3, action 1088).

Guideline failures at nearby Pendine Beach (a designated bathing water) also prompted investigation work in 2007 to look at possible pollution sources. The spreading to land of sewage sludge and sewer misconnections was identified as a potential source of bacteria in the area. As a result of the investigation spreading locations in the area have been altered. Work in this location was continued in 2008.

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing.

Stretches on the Gwendraeth Fach and Gwendraeth Fawr rivers have been identified through the diffuse pollution database as requiring investigation. Work was started in the upper Gwendraeth Fach catchment in March 2007. This included biological assessment of the river in order to target pollution prevention follow up visits. The work continued throughout 2008. A programme of works has been drawn up for the Gwendraeth Fawr catchment. This was implemented in 2008 through the diffuse pollution programme. Additional work will also be carried out in the Ferryside stream catchment to secure improvements at sites already identified. A drop in quality in the Taf catchment has also been identified, investigation into this was carried out during the 2009 work programme.

The diffuse pollution work carried out is expected to lead to improved water quality in the Three Rivers Estuary.

Mass Cockle Mortalities on the Burry Inlet and Three Rivers Estuaries

Over the last few years the Burry Inlet and Three Rivers estuaries have experienced larger than expected cockle mortalities. A project group of key organisations was set up in Autumn 2007 to investigate the issue and commissioned a research study led by Bangor University into the possible causes of the mortalities. The study involved reviewing large data sets, monitoring results and scientific literature. It looked at issues related to the health of the cockles as well as the wider environment in the estuary. This study has not identified the cause(s) of these mass mortalities.

This study along with additional monitoring carried out during mass mortalities in Summer 2008, has been used to develop a proposal, in Autumn 2008, for a programme of work to identify the cause(s) of these mortalities. This proposal will be reviewed by Welsh Assembly Government who has asked the Environment Agency to lead and co-ordinate these investigations on their behalf (Table 3, action 88a).

8. SUMMARY

The Taf Shellfish Water has been compliant with all mandatory standards for the past 5 years (2004 – 2008). The Shellfish Water passed the guideline standards for dissolved oxygen in for the past 5 years (2004 – 2008), and salinity during 4 out of the last 5 years. The water achieved guideline compliance with the Faecal coliform standard in 2003.

The most significant point source continuous and intermittent discharges have already received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality.

Further improvement work to other point source discharges may be required as a result of the Three Rivers Feasibility Study submitted in Autumn 2009.

Sources of diffuse pollution in the catchment are continually being identified and remedial actions put in place. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to compliance with the Faecal coliform guideline standard of the Directive.

K. Tywi

2. MAP & DESIGNATION DETAILS

Environment Agency Region: Wales

Environment Agency Area: South West (Wales)

Shellfish Water: Tywi

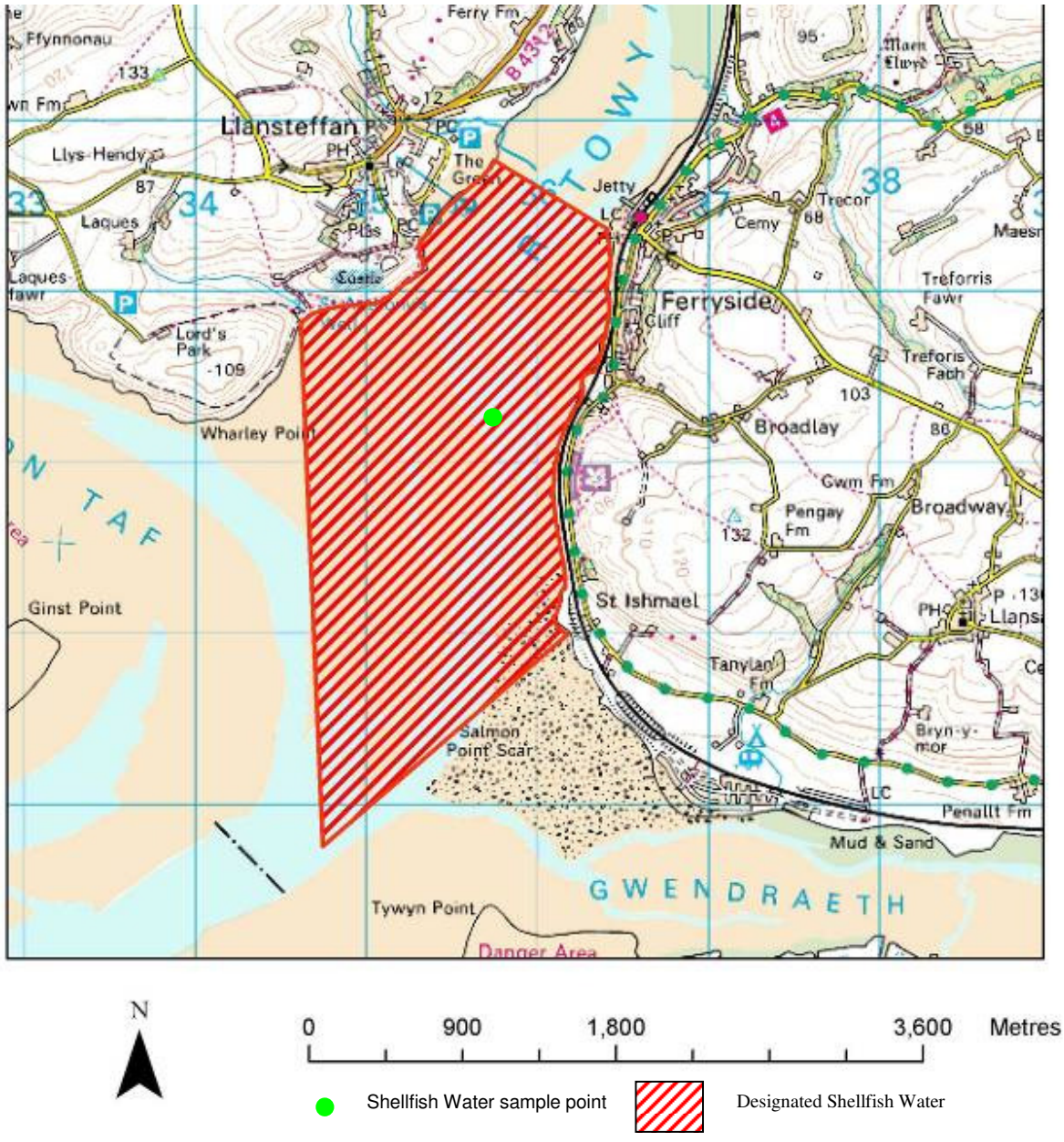
Catchment: Tywi

Designated: 1999

Designation Number 89

Sampling point location SN3570009350 (51° 45”29.16’ N 4° 24”36.88’ W)

Figure 1 Tywi Shellfish Water



3. DESCRIPTION

3.1 Species Present

Cockles *(Cardium edule)*
Mussels *(Mytilus spp.)*

3.2 Location and Geography

The Tywi estuary is the central, and largest, of the three estuaries which form the Three Rivers estuary on the south western coast of Carmarthenshire. There are two adjacent Shellfish Waters: Gwendraeth and Taf. The bed of much of the designated shellfish area is generally stony and mobile. Maximum channel depth at low water is 5m. Spring tidal range is 7m.

3.3 Land Use Pressures

The catchment is predominantly rural, agricultural land interspersed with small urban settlements. Sheep farms are found in the upper catchment, mixed dairy and livestock farming in the middle reaches and intensive dairy farms on the flatter lower reaches. Although some larger dairy units are intensifying there is an increasing move towards agri-environment schemes that promote changes from modern farming practices to more traditional practices and habitat creation. Such schemes discourage the intensive drainage of agricultural land and encourage the creation of wetlands and protective corridors alongside watercourses. This decreases the risk of diffuse pollution from agricultural run-off. The area is recognised as having high landscape value and the tidal reaches of the Tywi are a designated SSSI, and also form part of the Carmarthen Bay SAC. Tourism is of economic importance in the area, with Llanstephan being a popular destination during the summer months.

There is limited urban growth in this area but Carmarthen (the main town on the Tywi upstream of the designated Shellfish Water) has been identified as a major growth centre in the Unitary Development Plan.

3.4 Discharges to the Estuary

There are a number of Dwr Cymru Welsh Water (DCWW) continuous discharges that have the potential to influence the Shellfish Water, these are listed in Table 1 below:

Table 1 Continuous DCWW discharges with a significant or potentially significant impact on the Tywi Shellfish Water

Discharge	Consented Dry Weather Flow (l/s)	Location	Reference to action taken
Ferryside STW	3.6	Indirect to Tywi Estuary	Section 5 Table 3
Parc y Splotts STW	81.0	Direct to Tywi Estuary	Section 5 Table 3
Kidwelly WWTW	77	Indirect to Tywi Estuary	Section 5Table 3
Llanybri STW	0.3	Indirect to Tywi Estuary	Section 5Table 3
Pantyrathro STW	1.3	Direct to Tywi Estuary	Section 5Table 3
Llanstephan STW	1.1	Direct to Tywi Estuary	Section 5Table 3

STW – Sewage Treatment Works

There are a number of private discharges into the Three Rivers estuaries including the Mekatek industrial discharge in Carmarthen.

There are a large number of major intermittent discharges that have the potential to influence the Shellfish Water, for example Brickyard Lane Pumping Station in Carmarthen.

4. COMPLIANCE WITH THE SHELLFISH WATERS DIRECTIVE

The compliance history for this water for the period 2001 to 2007 is summarised in Table 2.

4.1 Compliance with Mandatory Standards

The Tywi Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 to 2008).

4.2 Compliance with Guideline Standards

The Tywi Shellfish Water complied with the guideline standards for dissolved oxygen in all of the last 5 years (2004 to 2008), and for salinity in 2004 and 2007. The Shellfish Water has not yet met the guideline standard for Faecal coliforms.

Table 3 – Results of Compliance tests of Shellfish Water

Parameter	Compliance year									
	2004		2005		2006		2007		2008	
	M (G)		M (G)		M (G)		M (G)		M (G)	
Determinand_Name	I_2004	G_2004	I_2005	G_2005	I_2006	G_2006	I_2007	G_2007	I_2008	G_2008
pH	Yes		Yes		Yes		Yes		Yes	
Salinity	Yes	(Yes)	Yes	(No)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Dissolved Oxygen	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)	Yes	(Yes)
Hydrocarbons	Yes		Yes		Yes		Yes		Yes	
Lindane	Yes		Yes		Yes		Yes		Yes	
Dieldrin	Yes		Yes		Yes		Yes		Yes	
DDT	Yes		Yes		Yes		Yes		Yes	
Parathion	Yes		Yes		Yes		Yes		Yes	
Silver	Yes		Yes		Yes		Yes		Yes	
Arsenic	Yes		Yes		Yes		Yes		Yes	
Cadmium	Yes		Yes		Yes		Yes		Yes	
Chromium	Yes		Yes		Yes		Yes		Yes	
Copper	Yes		Yes		Yes		Yes		Yes	
Mercury	Yes		Yes		Yes		Yes		Yes	
Nickel	Yes		Yes		Yes		Yes		Yes	
Lead	Yes		Yes		Yes		Yes		Yes	
Zinc	Yes		Yes		Yes		Yes		Yes	
Faecal coliforms in flesh		(No)		(No)		(No)		(No)		(No)
Overall compliance	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail	M Pass	G Fail

5 . ACTIONS TO PROTECT OR IMPROVE WATER QUALITY

This table lists all actions already taken or proposed for protection of the current water quality or, where necessary, improvement of compliance with Shellfish Waters requirements.

Table 3 Actions Table for PRPs

Action Code	Action Name	Description of action	Completion year	Progress
1294	Ferryside STW	Improved storm storage (250m3) provided	2005	Completed
1295	Parc y Splotts STW	Improved storm handling facilities	2005	Completed
1296	Kidwelly STW	Improved storm storage (350m3) provided at Tycoch SPS	2005	Completed
1299	Increased Sampling frequency	This Shellfish Water is also being sampled more frequently than is required by the Shellfish Water Directive, under a programme begun since designation in 1999 and scheduled to last for up to three years, to provide information about the need for additional water quality improvement measures not included above.	Ongoing	Ongoing
1300	Ground Water Inspections	Groundwater Authorisation inspections have taken place in this catchment. Pollution prevention is an integral part of these farm visits. The Gwendraeth Fach catchment has	ongoing	Routine groundwater authorisation inspections carried out and pollution advice given. Yearly ongoing work.

Table 3 Actions Table for PRPs				
Action Code	**Action Name**	**Description of action**	**Completion year**	**Progress**
		been identified as a catchment requiring an investigation into the sources of diffuse pollution. A campaign is being carried out in March 2007 that includes river walks and follow up visits at sites identified as potential sources of pollution		
1572	Three Rivers Feasibility Study	Where modelling indicates that there may be a risk of failure to achieve Shellfish Water standards, we will undertake a Feasibility Study modelling inputs to the Shellfish Waters. Assets are likely to include: Llansaint STW, Brickyard PS, Pontyates STW, Llanybri STW, Llangynderyn STW, Llanddarog STW, Four Roads STW, Pontyberem STW, Carway STW, Pembrey STW, Parc y Splotts STW, Pany yr Athro STW, Llanstephan STW. The study should seek to find a practical way to improve the Shellfish Water in the most effective way.	2009	DCWW reported progress on the Three Rivers AMP4 feasibility study & options in Autumn 2009. Any required improvements will be forwarded into the AMP4 Change Protocol.
1297	Intermittents improvements Tywi	AMP4 Improvements	2010	There are a still a number of intermittent discharges, including STWs, high up the catchment that will be improved by the end of AMP4 in 2010. For example, 2 intermittents in the Ffairfach sewerage catchment were completed by 2007
89a	Investigations into mass cockle deaths	Identify cause(s) of mass cockle mortalities in the Three Rivers Estuary	2010	Ongoing Initial research study led by Bangor University has been carried out which has not identified the cause(s) of these mass mortalities.

The proposed actions are also included within the West Wales River Basin Management Plan either as specific or generic actions. Please see http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/westernwales/Intro.aspx

5.1 Remedial action to prevent mandatory failures

The Tywi Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 – 2008).

The Environment Agency reviews its monitoring data annually. We try to identify sources of pollution that may lead to the failure of mandatory standards. This contributes to future measures to safeguard against such failures. River stretches that have failed a statutory requirement are prioritised, and this information is then used to target the resource allocated annually to the Environment Agency's diffuse pollution project. This is funded by the Welsh Assembly Government.

5.2 Remedial action to prevent guideline failures

The Tywi Shellfish Water complied with the guideline standards for dissolved oxygen in all of the last 5 years (2004 to 2008), and for salinity in 2004 and 2006-2008. The Shellfish Water has not yet met the guideline standard for Faecal coliforms. Diffuse water pollution from agriculture, diffuse pollution from industry and urban land use, discharges from Combined Sewer Overflow (CSO) outfalls and sewage discharges have all been identified as having the potential to cause failure of the guideline standard.

Significant point source discharges received priority treatment on the grounds that these were considered most likely to provide the greatest immediate improvements in water quality, through a reduction in Faecal coliform numbers. A programme of work will be completed by DCWW in 2010 to upgrade two significant sewage discharges along with a number of less significant discharges at which upgrades were also identified as being potentially beneficial to water quality. See Table 3, actions 1294-7.

6. REVIEW OF MONITORING DATA AND ASSESSMENT OF IMPACT OF COMPLETED ACTIONS

In figures 2 and 3 below the levels of Faecal coliforms in both the water column and shellfish flesh are shown for the periods 2001 to 2008.

Figure 2 Faecal coliforms in Water for the Tywi Shellfish Water, 2001 to 2008

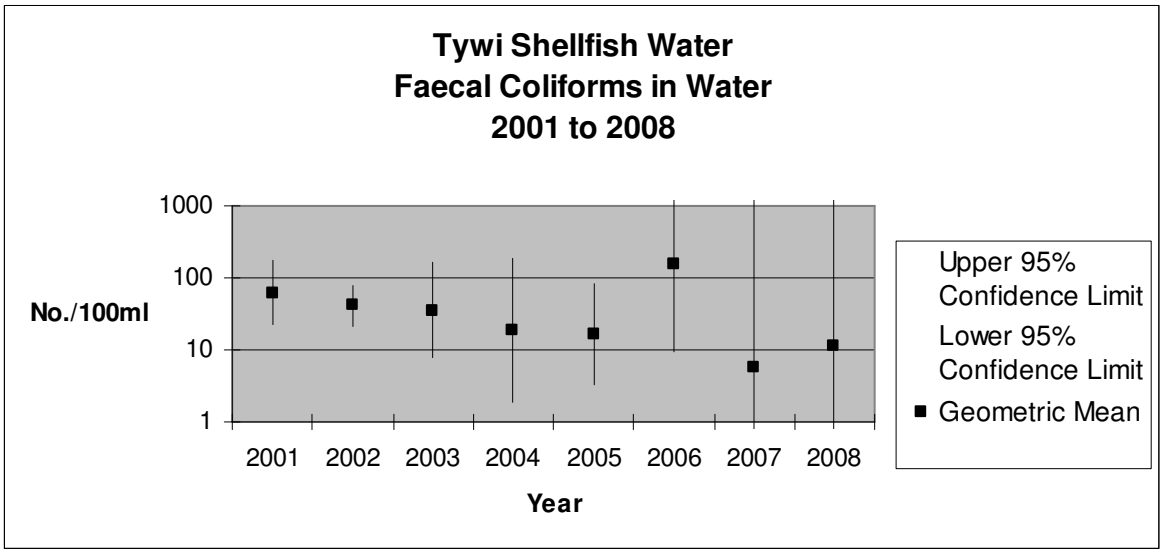
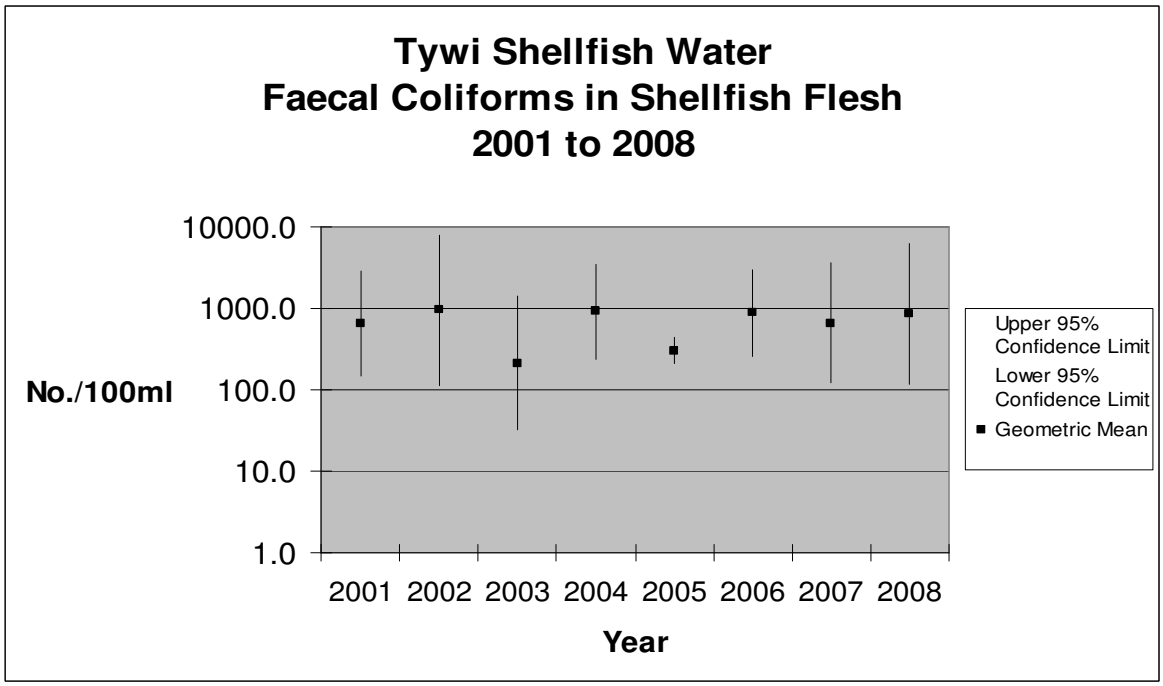


Figure 3 Faecal coliforms in Shellfish Flesh for the Tywi Shellfish Water, 2001 to 2008



Confidence limits (shown on the figures) have been calculated for each result. They highlight the wide variability in the sample results.

Due to the small size of data sets we cannot draw much in the way of conclusions from any apparent trends in shellfish quality. We can only state whether or not guideline standards are being/have been met.

Possible remaining sources of faecal coliform pollution have been identified as:

- Minor discharges from sewerage infrastructure as listed in section 7.1;
- Diffuse pollution runoff from agricultural land into the tributaries of the River Twyi,Taf and Gwendraeth, as described in section 7.2.

7. NEXT STEPS

7.1 Further action to characterise and address point sources of pollution

Within the AMP3 water company programme (2000-2005) coastal models were built in order to identify where investment would lead to water quality improvements. The use of these coastal models is continuing within the current water company programme (2005-2010) to investigate where further improvements might be required (Table 3, action 1572).
We will use the 'Change Protocol' if further improvement schemes are required, as soon as it is reasonable to do so. The improvement schemes might include adding ultraviolet disinfection to continuous discharges and/or increasing the volume of storage to limit the spill frequency for unsatisfactory intermittent discharges. The aim of this action will be to reduce Faecal coliform concentrations in the Shellfish Water to meet the guideline standard.
This Shellfish Water is also being sampled more frequently than is required by the Shellfish Water Directive, under a programme begun since designation in 1999 and scheduled to last for up to three years, to provide information about the need for additional water quality improvement measures not included above (Table 3, action 1299).

7.2 Further action to characterise and address diffuse sources of pollution

Groundwater Authorisation inspections have also been carried out within the catchment and pollution prevention is an integral part of these farm visits. Such inspections are routine and are ongoing. Also see Table 3, action 1300.

Further to several farm slurry pollution incidents within the catchment in 2007, diffuse pollution work was undertaken on the Cywyn, Cwmfelinboeth and upper Taf catchments. This includes river walks, biological survey and pollution prevention visits.

Guideline failures at nearby Pendine Beach (a designated bathing water) also prompted investigation work in 2007 to look at possible pollution sources. The spreading to land of sewage sludge and sewer misconnections was identified as potential sources of bacteria in the area. As a result of this work spreading locations in the area have been altered. Work in this continued in 2008.

Stretches on the Gwendraeth Fach and Gwendraeth Fawr rivers have been identified through the diffuse pollution database as requiring investigation. Work was started in the upper Gwendraeth Fach catchment in March 2007. This included biological assessment of the river in order to target pollution prevention follow up visits. This work continued throughout 2008. A programme of works has been drawn up for the Gwendraeth Fawr catchment. This was implemented in 2008 through the diffuse pollution programme. Additional work will also be carried out in the Ferryside stream catchment to secure improvements at sites already identified. A drop in quality in the Taf catchment has also been identified; investigation into this was carried out during the 2009 work programme.

The diffuse pollution work carried out is expected to lead to improved water quality in the Three Rivers Estuary.

Mass Cockle Mortalities on the Burry Inlet and Three Rivers Estuaries

Over the last few years the Burry Inlet and Three Rivers estuaries have experienced larger than expected cockle mortalities. A project group of key organisations was set up in Autumn 2007 to investigate the issue and commissioned a research study led by Bangor University into the possible causes of the mortalities. The study involved reviewing a lot of data, monitoring results and scientific literature. It looked at issues related to the health of the cockles as well as the wider environment in the estuary. This study has not identified the cause(s) of these mass mortalities.

This study along with additional monitoring carried out during mass mortalities in Summer 2008 has been used to develop a proposal in Autumn 2008 for a programme of work to identify the cause(s) of these mortalities. This proposal will be reviewed by the Welsh Assembly Government who has asked the Environment Agency to lead and co-ordinate these investigations on their behalf (Table 3, action 89a).

8. SUMMARY

The Tywi Shellfish Water has been compliant with all mandatory standards for all of the past 5 years (2004 – 2008). The Tywi Shellfish Water has not yet met the guideline standard for Faecal coliforms.

The most significant point source and intermittent discharges have already received priority treatment on the grounds that this was considered most likely to provide the greatest immediate improvements in water quality.

Further improvement work to other point source discharges may be required as a result of the Three Rivers Feasibility Study submitted in Autumn 2009.

Sources of diffuse pollution in the catchment are continually being identified and remedial actions put in place. The aim is to counter potential sources of diffuse pollution, which is considered the most likely risk to compliance with the Faecal coliform guideline standard of the Directive.

Appendix I

Information leaflet for gatherers

Failure to comply with these requirements

If a batch of live shellfish is not accompanied by a completed registration document, food authorities are empowered to seize them and seek an order for their destruction through the Court. Further charges can also be brought against the gatherer.

A person found guilty of an offence under these regulations can be subject to a fine, and/or imprisonment of up to two years.

Further information and advice

Food Standards Agency website
www.food.gov.uk

FSA Wales contact tel: 02920 678 926

Your local authority members of the

South West Wales Shellfish Liaison Group include:

Ceredigion
Tel: 01545 572 110

Pembrokeshire
Tel: 01437 776 390

Carmarthenshire
Tel: 01554 742 351

City & County of Swansea
Tel: 01792 635 640

Swansea Bay Port Health Authority
Tel: 01792 653 523

Produced by
The South West Wales
Shellfish Liaison Group

Shellfish

Information for commercial gatherers and merchants

Introduction

This leaflet deals with the your duties when gathering, handling and selling live bivalve molluscs, e.g. clams, cockles, mussels, oysters, etc. The commercial production and sale of these is strictly controlled as they have the potential to cause serious illness due to the way in which they feed.

The consumption of contaminated shellfish can cause illness with a range of symptoms from vomiting and diarrhoea to partial paralysis and even death. Live bivalve molluscs are filter feeders therefore any contaminants in the water such as E.coli, viruses and algal toxins can be retained in their flesh. It is critical that gatherers and merchants comply with the shellfish legislation to prevent food poisoning occurring.

Legislation

EC Regulations 853/2004 and 854/2004 set out criteria relating to the commercial production and sale of live bivalve molluscs from classified production areas. These regulations are law in the UK and are implemented by means of the Food Hygiene (Wales) Regulations 2006.

Classification

Local Authorities carry out monthly bacteriological sampling of production areas. The results are used, by the Food Standards Agency, to classify these areas according to the E. coli levels in the shellfish sampled.

The classification determines the areas where shellfish can be collected from and how the shellfish have to be treated, after harvesting, to ensure they are safe to eat.

Classification categories

- **A class** - bivalve molluscs can be harvested for direct human consumption.
- **B class** - bivalve molluscs can be marketed for human consumption after purification in an approved plant or after relaying in an approved class A relaying area or after being subjected to an EC approved heat treatment process.
- **C class** - bivalve molluscs can be marketed for human consumption only after relaying for at least two months in an approved relaying area followed, where necessary, by treatment in a purification centre, or after an EC approved heat treatment process.
- **Prohibited areas** - bivalve molluscs must not be subject to production or be collected.
- **Unclassified areas** - bivalve molluscs must not be subject to production or be collected.

Registration documents

Registration documents are an important link in a chain of public health control measures designed to ensure that shellfish placed on the market are safe to eat. It is therefore essential that the origin of the shellfish is known and that this traceability is maintained from harvesting to final sale.

Registration documents are required for all batches of live bivalve molluscs. They are available free of charge on request from your local Environmental Health Department. They are serially numbered and must not be photocopied. A new document must be used for each batch.

The completed registration document must accompany each batch at all times during transport from the production area to the place of destination, e.g. purification centre, dispatch centre, relaying area, processing plant. All relevant sections must be completed legibly and indelibly.

It is important that Part 2 of the registration document is completed by the person receiving the shellfish and that both they and the gatherer keep a copy for 12 months.

However, if a batch is split, then a copy of the original Registration Document is permitted and must accompany each sub batch together with the full name and address of the person splitting the batch.