

From: Dara White <dwhite@water.ie>
Sent: 25 April 2019 12:29
To: Ronan Kane
Subject: FW: Confidential - Ecoli levels in discharge
Attachments: 20190315_Statistical Analysis of predicted Ecoli concentrations_ver2.docx

Importance: High

NIB

From: O'Keeffe, Ciaran [mailto:Ciaran.OKeeffe@jacobs.com]
Sent: 15 March 2019 14:25
To: Dara White <dwhite@water.ie>
Subject: Confidential - Ecoli levels in discharge
Importance: High

Razor clam = other Species

Dara,

As discussed

IF THIS IS ACCURATE could
 end all razor clam
 exports to china!
 -see Peter Kielly SEPA comment.

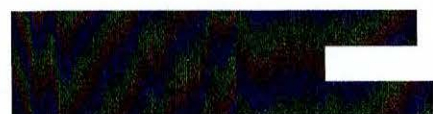
From: Alan Berry <alan@marcon.ie>
Sent: 15 March 2019 11:19
To: O'Keeffe, Ciaran <Ciaran.OKeeffe@jacobs.com>
Cc: McGlynn, Stephanie <Stephanie.McGlynn@jacobs.com>
Subject: [EXTERNAL] Re: FW: Shellfish expert [ALG-MAIN.FID2334887]
Importance: High

→ They had this info
 But did not give to
 ABP or in Spector
 to my knowledge - Did
 not make public. check with
 Cathys!

Ciaran,

Updated version of document, containing additional comparison against Oysters and Mussels.

 Alan Berry
 Managing Director
 MarCon Computations International



MarCon Computations International is a registered business name of Global Earth and Ocean Modelling Solutions Limited.
 Company registration details for Global Earth and Ocean Modelling Solutions Limited:
 Registered Number: 425721
 Registered Office: Cahergal, Tuam, Co. Galway.

On 2019-03-15 10:34, Alan Berry wrote:

Ciaran,

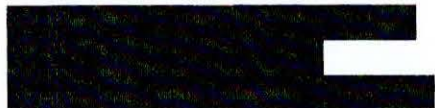
Find attached.

Not good.

Statistical Analysis of predicted Concentrations is not good!

Alan Berry

Managing Director
MarCon Computations International



MarCon Computations International is a registered business name of Global Earth and Ocean Modelling Solutions Limited.

Company registration details for Global Earth and Ocean Modelling Solutions Limited:

Registered Number: 425721

Registered Office: Cahergal, Tuam, Co. Galway.

On 2019-03-14 08:25, O'Keeffe, Ciaran wrote:

Alan,

See email below from ALG which is raising two questions that FCC are concerned about. We have a meeting with FCC this afternoon to discuss these concerns. In light of the memo from our shellfish expert that Sarah circulated yesterday do we have a problem with our assessment? Could you give me a call to discuss please.

Regards

Ciarán

From: Alison Fanagan <afanagan@algoodbody.com>

Sent: 13 March 2019 08:47

To: O'Keeffe, Ciaran <Ciaran.OKeeffe@jacobs.com>

Cc: Noeleen McHenry (<nmchenry@water.ie> <nmchenry@water.ie>; Olwyn James (<ojames@water.ie> <ojames@water.ie>; Kristen Read (<kread@algoodbody.com> <kread@algoodbody.com>; Brendan Curran (<bcurran@algoodbody.com> <bcurran@algoodbody.com>; Chris Stynes (<cstynes@algoodbody.com> <cstynes@algoodbody.com>

Subject: [EXTERNAL] RE: Shellfish expert [ALG-MAIN.FID2334887]

Importance: High



[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Alison Fanagan | Consultant

A&L Goodbody

[REDACTED]

IFSC, 25-28 North Wall Quay, Dublin 1, D01 H104 | www.algoodbody.com

From: O'Keeffe, Ciaran [<mailto:Ciaran.OKeeffe@jacobs.com>]
Sent: 13 March 2019 08:30
To: Alison Fanagan
Subject: RE: Shellfish expert [ALG-MAIN.FID2334887]

Expecting a memo from her today with phone call to follow.

From: Alison Fanagan <afanagan@algoodbody.com>
Sent: 13 March 2019 08:29
To: O'Keeffe, Ciaran <Ciaran.OKeeffe@jacobs.com>
Subject: [EXTERNAL] Shellfish expert [ALG-MAIN.FID2334887]

Hi Ciaran

How are you getting on with this expert, is he or she on board yet?

Regards

Alison Fanagan | Consultant

A&L Goodbody

[REDACTED]

IFSC, 25-28 North Wall Quay, Dublin 1, D01 H104 | www.algoodbody.com

The information contained in this email transmission is confidential and may be privileged. If you are not the intended recipient, any use, dissemination, distribution, publication, or copying of the information contained in this email is strictly prohibited. If you have received this email in error, please immediately notify us by telephone at +353 1 649 2000 and delete the email from your system. Thank you for your co-operation.

A&L Goodbody accepts no responsibility for changes to or interception of this email after it was sent or for any damage to the recipient's systems or data caused by this message or its attachments. Please also note that messages to or from A&L Goodbody may be monitored to ensure compliance with the firm's policies and standards and to protect our business.

A list of A&L Goodbody Partners is available at www.algoodbody.com

NOTICE - This communication may contain confidential and privileged information that is for the sole use of the intended recipient. Any viewing, copying or distribution of, or reliance on this message by unintended recipients is strictly prohibited. If you have received this message in error, please notify us immediately by replying to the message and deleting it from your computer.

Jacobs Engineering Ireland Limited
Merrion House, Merrion Road, Dublin 4, Ireland
Registered in Ireland under number 111945

The information contained in this email transmission is confidential and may be privileged. If you are not the intended recipient, any use, dissemination, distribution, publication, or copying of the information contained in this email is strictly prohibited. If you have received this email in error, please immediately notify us by telephone at +353 1 649 2000 and delete the email from your system. Thank you for your co-operation.

A&L Goodbody accepts no responsibility for changes to or interception of this email after it was sent or for any damage to the recipient's systems or data caused by this message or its attachments. Please also note that messages to or from A&L Goodbody may be monitored to ensure compliance with the firm's policies and standards and to protect our business.

A list of A&L Goodbody Partners is available at www.algoodbody.com

NOTICE - This communication may contain confidential and privileged information that is for the sole use of the intended recipient. Any viewing, copying or distribution of, or reliance on this message by unintended recipients is strictly prohibited. If you have received this message in error, please notify us immediately by replying to the message and deleting it from your computer.

Jacobs Engineering Ireland Limited
Merrion House, Merrion Road, Dublin 4, Ireland
Registered in Ireland under number 111945

NOTICE - This communication may contain confidential and privileged information that is for the sole use of the intended recipient. Any viewing, copying or distribution of, or reliance on this message by unintended recipients is strictly prohibited. If you have received this message in error, please notify us immediately by replying to the message and deleting it from your computer.

Statistical Analysis of predicted Ecoli concentrations

Statistical analysis has been undertaken on the concentrations of e.coli predicted by the model at the designated Malahide Shellfish Waters sampling point at 53° 27.394'N, 6° 4.457'W for each of the model scenarios executed to date.

Only the 39k scenarios meet the CEFAS suggested indicative water standards required to achieve shellfish flesh standard of 230 E.coli mpn/100g, and then only for Oysters and partially for Mussel species. There is no comparable data for Razor Clams available.

The scenario designations and descriptions of each scenario are:

ADF 39k NoWind

GDD outfall at constant Average Daily Flow rate (1.63m³/s) discharging 39,105 cfu/100ml ecoli.
No wind field specified to the model.

FFT 39k NoWind

GDD outfall at constant Flow to Full Treatment rate (3.78m³/s) discharging 39,105 cfu/100ml ecoli.
No wind field specified to the model.

PF 39k NoWind

GDD outfall at constant Average Daily Flow rate (1.63m³/s) discharging 39,105 cfu/100ml ecoli, increasing to 100,000 cfu/100ml for 3 days from 26/05 to 29/05.
No wind field specified to the model.

ADF 150k F8

GDD outfall at constant Average Daily Flow rate (1.63m³/s) discharging 150,000 cfu/100ml ecoli.
Constant Force 8 onshore wind defined to model for duration of simulation

FFT 150k F8

GDD outfall at constant Flow to Full Treatment rate (3.78m³/s) discharging 150,000 cfu/100ml ecoli.
Constant Force 8 onshore wind defined to model for duration of simulation

PF 150k F8

GDD outfall at constant Average Daily Flow rate (1.63m³/s) discharging 150,000 cfu/100ml ecoli, increasing to 750,000 cfu/100ml for 3 days from 26/05 to 29/05.
No wind field specified to the model.

ADF 300k NoWind

GDD outfall at constant Average Daily Flow rate (1.63m³/s) discharging 300,000 cfu/100ml ecoli.
No wind field specified to the model.

FFT 300k NoWind

GDD outfall at constant Flow to Full Treatment rate (3.78m³/s) discharging 300,000 cfu/100ml ecoli.
No wind field specified to the model.

The statistical analysis of the data consisted of calculating both the geometric mean and the 90 percentile value of the predicted e.coli concentration in the near bed water column.

The results of the analysis are presented with reference to *Table 6: Indicative water standards required to achieve shellfish flesh standard of 230 E.coli mpn/100g* in "Impact of chronic microbial

pollution on shellfish". Project WT093. Cefas/CREH report to DEFRA. 88 pp., Cefas, 2013 for Oysters, Mussels, Cockles and All Species. The results are presented below in Tables 1 and 2 respectively.

Malahide Shellfish Monitoring Point		
Scenario	Geometric Mean	90%ile
Oysters	7	52
ADF_39k_NoWind	2.06	12.06
FFT_39k_NoWind	3.87	27.67
PF_39k_NoWind	4.18	31.74
ADF_150k_F8	7.55	45.46
FFT_150k_F8	16.33	105.15
PF_150k_F8	8.85	53.61
ADF_300k_NoWind	10.74	91.26
FFT_300k_NoWind	23.55	211.46

Malahide Shellfish Monitoring Point		
Scenario	Geometric Mean	90%ile
Cockles	0.12	1.2
ADF_39k_NoWind	2.06	12.06
FFT_39k_NoWind	3.87	27.67
PF_39k_NoWind	4.18	31.74
ADF_150k_F8	7.55	45.46
FFT_150k_F8	16.33	105.15
PF_150k_F8	8.85	53.61
ADF_300k_NoWind	10.74	91.26
FFT_300k_NoWind	23.55	211.46

Malahide Shellfish Monitoring Point		
Scenario	Geometric Mean	90%ile
Mussels	5.5	20
ADF_39k_NoWind	2.06	12.06
FFT_39k_NoWind	3.87	27.67
PF_39k_NoWind	4.18	31.74
ADF_150k_F8	7.55	45.46
FFT_150k_F8	16.33	105.15
PF_150k_F8	8.85	53.61
ADF_300k_NoWind	10.74	91.26
FFT_300k_NoWind	23.55	211.46

Malahide Shellfish Monitoring Point		
Scenario	Geometric Mean	90%ile
All Species	1.4	20
ADF_39k_NoWind	2.06	12.06
FFT_39k_NoWind	3.87	27.67
ADF_150k_F8	7.55	45.46
FFT_150k_F8	16.33	105.15
PF_150k_F8	8.85	53.61
ADF_300k_NoWind	10.74	91.26
FFT_300k_NoWind	23.55	211.46

Table 1: Results of statistical analysis of model predictions compared against Oysters, Mussels, Cockles and All Species indicative water standard.

The model predictions for each scenario were also extracted at five (5) points along the southern boundary (South_1 to South 5) of the designated Malahide Shellfishery and statistical analysis of the results undertaken. These are presented in the following tables. Scenarios designated as "PF" are Process Failure scenarios. "SMP" in the tables denotes Shellfish Monitoring Point (as presented above). No scenario analysed meets the CEFAS suggested indicative water standards required to achieve shellfish flesh standard of 230 E.coli mpn/100g

This was to my knowledge never presented to the Board. Questions need to be asked.

Results/ Figures along closest Designated Shellfish area to GDD outfall very different to Malahide monitoring point.

ADF_39k_NoWind							
	All Species	SMP	South_1	South_2	South_3	South_4	South_5
Geometric Mean	1.4	2.06	1.65	3.28	4.44	8.48	2.25
90%ile	20	12.06	2.98	4.70	7.38	18.40	3.98

FFT_39k_NoWind							
	All Species	SMP	South_1	South_2	South_3	South_4	South_5
Geometric Mean	1.4	3.87	3.54	7.09	9.63	18.81	4.85
90%ile	20	27.67	6.37	10.54	16.39	41.30	8.68

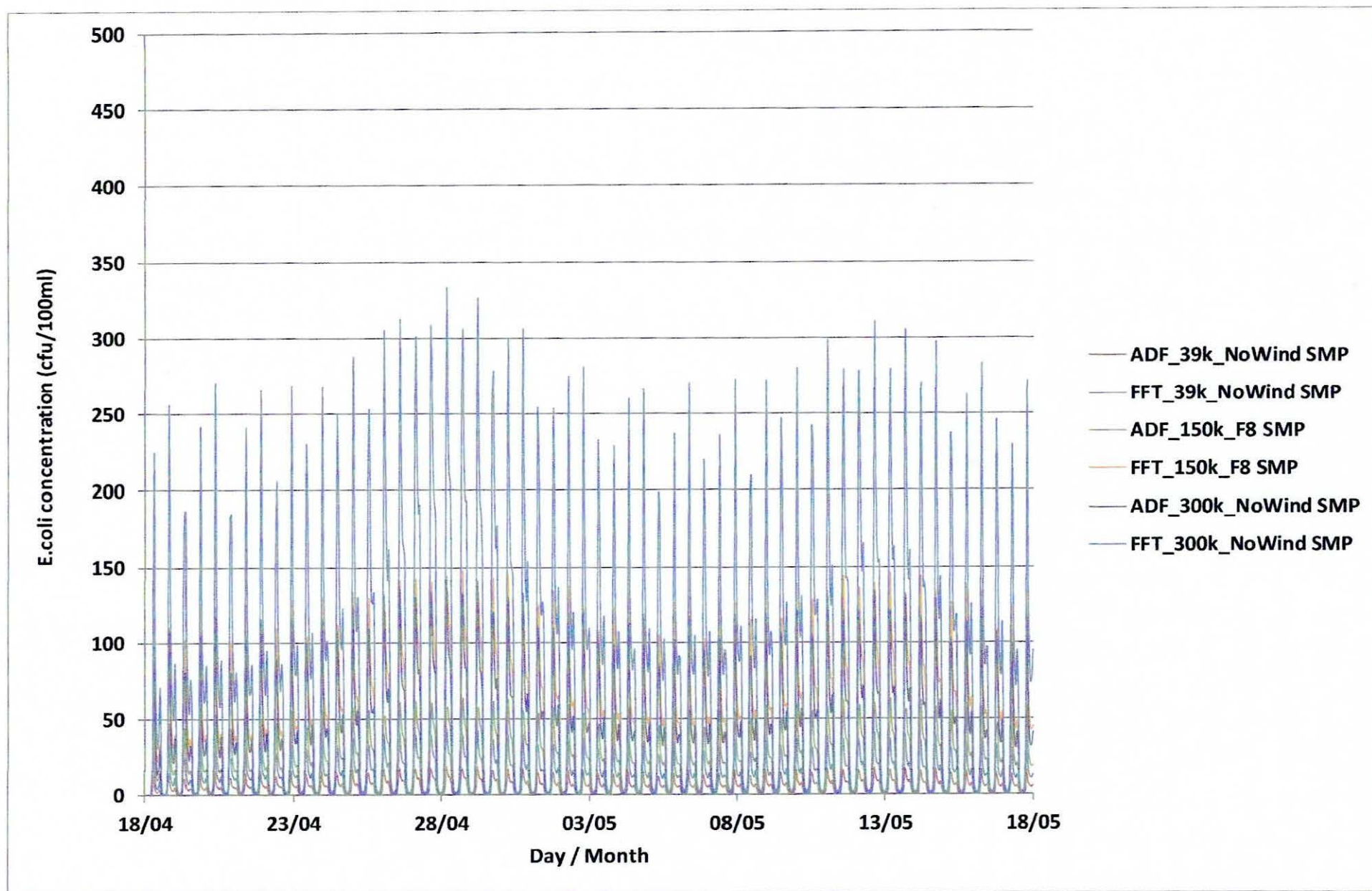
ADF_150k_F8							
	All Species	SMP	South_1	South_2	South_3	South_4	South_5
Geometric Mean	1.4	7.55	5.70	8.44	11.95	19.72	7.79
90%ile	20	45.46	9.13	14.61	18.15	33.92	16.22

FFT_150k_F8							
	All Species	SMP	South_1	South_2	South_3	South_4	South_5
Geometric Mean	1.4	16.33	12.89	18.93	26.94	45.04	17.70
90%ile	20	105.15	20.98	33.70	41.80	78.39	37.45

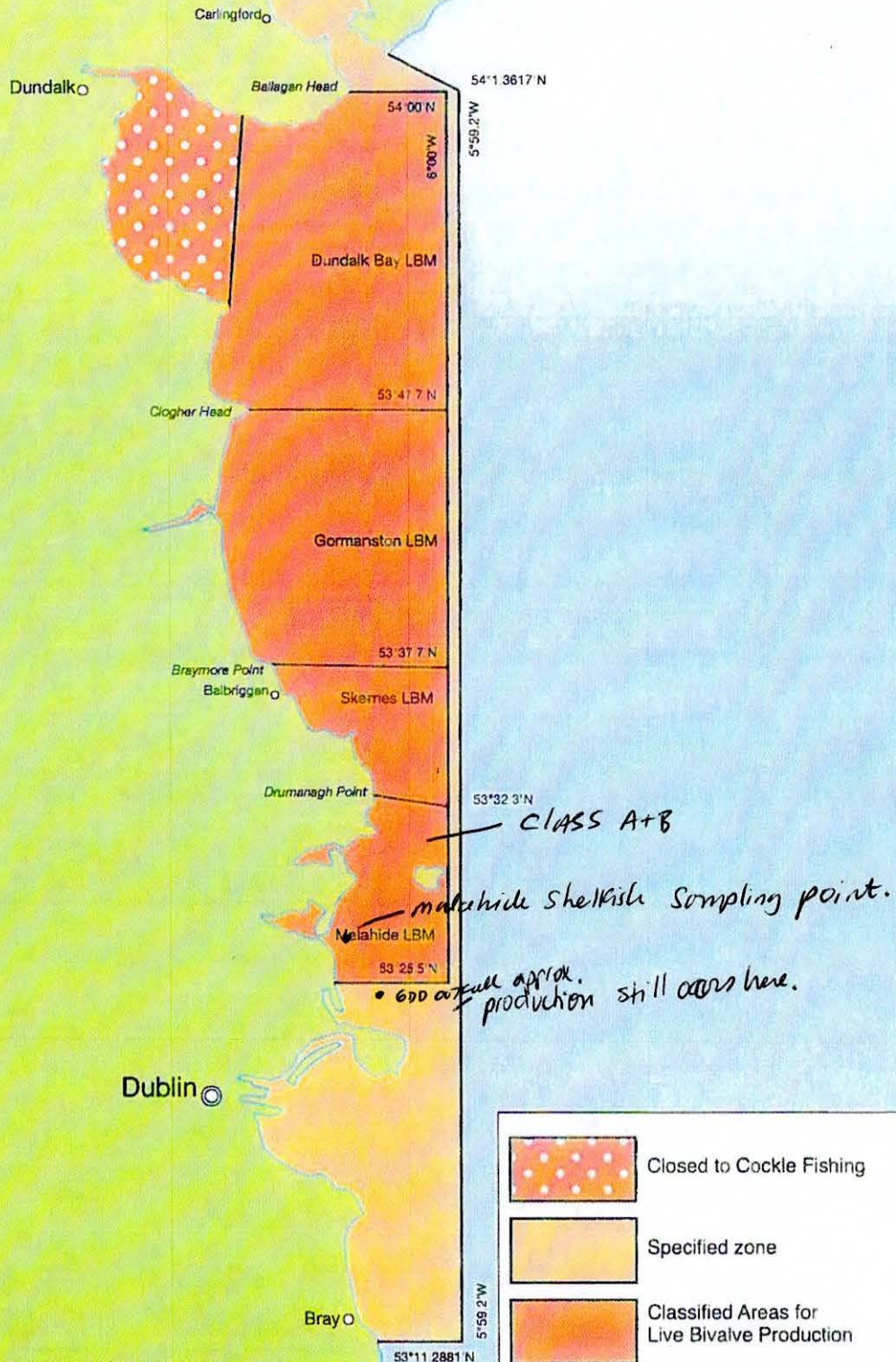
ADF_300k_NoWind							
	All Species	SMP	South_1	South_2	South_3	South_4	South_5
Geometric Mean	1.4	10.74	11.03	21.89	28.43	58.15	13.58
90%ile	20	91.26	19.73	33.87	50.92	122.81	26.56

FFT_300k_NoWind							
	All Species	SMP	South_1	South_2	South_3	South_4	South_5
Geometric Mean	1.4	23.55	25.16	50.03	64.96	133.53	30.99
90%ile	20	211.46	45.42	78.06	117.41	282.76	61.40

The concentrations of e.coli predicted by the model near the seabed, over the course of each simulation, at the designated Malahide Shellfish Waters sampling point at 53° 27.394'N, 6° 4.457'W are presented in the figure below.



Razor Clam Conservation Areas - North Irish Sea



This map does not purport to be a legal interpretation.
Please refer to national legislation for full details.

STK MAP COPY
ADD to IW Report

~~Ireland's eye?~~ Malahide
Sampling
Point

14:33 ✓



That position is 1.74 miles east of the malahide inlet ,I highlighted it with three red balls,the depth of water is around 6 metres deep, hope that helps you out in some way

14:35

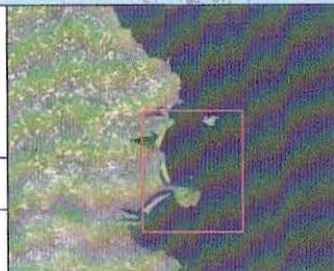




Greater Dublin Drainage

Greater Dublin Drainage (GDD) Project

Drawing Title: Figures 9.5 Inshore Shellfish Grounds along the Fingal Coast



Rev	Date	Purpose of Revision	Drawn	Checked	Rev'd	App'd
2	19/10/17	FINAL	KT	RW		
1	26/10/16	FINAL	KT	RW		
0	05/04/16	Draft	KT	RW		

Copyright © Ordnance Survey Ireland.
Licence number 3/3/34 Irish Water.
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), Mapbox, Swatch, © OpenStreetMap contributors, and the GIS User Community



JACOBS

TOBIN

Drawing Status	DRAFT
Scale (1:1)	1:50,000
Drawing No.	32102902-EIAR-905

Sea but great
ing effort between
of Man to the
dance with the

dredges generally remove the top 10cm of sediment; razor shells live much deeper and specialised dredges have been developed which dig down 60cm or more.

There are reported to be up to 6 vessels (9 to 10m long) which use vacuums to suck up razor shells in 5m or less of water. Newspaper articles from around 2006 indicate that there was conflict surrounding the razor fishery and occasional unlicensed vessels. Councillors made calls to have fishing banned off Velvet Strand as it was causing serious environmental damage to the beach, with the unwanted species caught up in the dredging process being washed up on the beach. During the site visit in March 2011 six boats were observed offshore of the Velvet Strand between Lambay Island and Irelands Eye. Two were actively fishing and four were at anchor.



Photo 3.7 Fishing off Velvet Strand

3.5.2 Spawning Grounds and Nurseries

Spawning and nursery areas are important, as large groups of fish will gather to co-ordinate spawning at certain times of the year. In terms of nurseries, juvenile fish are vulnerable to predators and harsh conditions in the open water. As such it is usual for juvenile fish to stay in sheltered nursery grounds which provide an abundance of food. At nursery and spawning grounds, fish aggregate in large numbers and so are particularly vulnerable to disturbance.

The Energy and Department of Climate Change Offshore SEA (2009) baseline appendices identifies the spawning and nursery grounds for 13 key commercial fish species including Nephrops (a shellfish) around the UK and Irish coast. The areas indicated are broad in their overview and are identified as areas where spawning may occur. Table 3.5 below summarises the species which are may spawn or have nurseries offshore of Portmarnock. The extent of the overall spawning/nursery ground is also given.

Table 3.5 Summary of Fish Spawning and Nursery Grounds off Portmarnock

Fish Species	Spawning - Extent of Grounds	Spawning season	Nursery
Sprat	The entire Irish Sea and around the UK coastal waters as a whole.	May and August	N/A
Cod	Coastal area from Newcastle in north to Dublin	January to April	Just south of Belfast to Wicklow in South.
Plaice	Coastal area from Newcastle in north to Dublin.	January to March	Coastal area from Newcastle in north to Dublin.
Sole	Coastal area from approx. Dundalk to Dublin.	March to May	N/A
Nephrops	From northern Scotland to approx 20 miles south of Dublin.	Eggs hatch spring or summer	From northern Scotland to approx 20 miles south of Dublin.
Lemon Sole	From Newcastle in north to around southern tip Ireland.	April to September	From Newcastle in north to around southern tip Ireland.
Whiting	Newcastle in north to Dublin.	February to June	Newcastle in north to Dublin.
Haddock	N/A	February to May	Belfast to approx 20 miles south of Dublin.
Herring	N/A	Varied depending on species.	Newcastle in north to just north of Dublin.

As can be seen the waters off the east coast of Ireland are important in terms of fish spawning grounds and nurseries. There are a number of key fish species which have the proposed landfill point as the southern extent of their grounds.