

# INTERIM REVIEW OF THE SANITARY SURVEY REPORT FOR INNER DUNDRUM BAY

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Cefas Weymouth Laboratory,  
Barrack Road, The Nothe,  
Weymouth, Dorset, DT4 8UB, UK  
Telephone: +44 (0) 1305 206600  
Fax: +44 (0) 1305 206601  
E-mail: [fsq@cefas.co.uk](mailto:fsq@cefas.co.uk)  
Website: <http://www.cefas.defra.gov.uk>

## Scope

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A Sanitary Survey of Dundrum Bay was previously undertaken by AQUAFAC International Services Ltd on behalf of the Food Standards Agency in Northern Ireland (FSA in NI). That report was published in 2012 (<http://www.food.gov.uk/multimedia/pdfs/dundrum-survey.pdf>).

This interim review of the 2012 Sanitary Survey report has been undertaken in light of a number of *E. coli* monitoring results exceeding 4600 *E. coli* MPN/100 g at the Inner South Mussel Bed and:

- The outcome of a subsequent investigation undertaken by FSA in NI
- Information received from Northern Ireland Environment Agency (NIEA) and DOE (DOE) Marine Division during 2012/13 further to those investigations
- A report prepared by Cefas for FSA in NI to summarize the investigations and further information

The review consists of a presentation of the main findings of the sanitary survey report with respect to the identified sources of pollution, together with additional information relating to those sources that has been acquired since the report was published. It is not intended to present detailed information relating to pollution sources that were identified in the 2012 sanitary survey report. This review should be read in conjunction with that report which also contains maps that will enable the information presented here to be placed in a geographical context.

FSA in NI identified that the interim review was intended to document the investigations undertaken, further information received, and actions instigated in 2012/13. A full review of the 2012 sanitary survey report was considered. However, as further exceedances of 4600 *E. coli* MPN/100 g had not been seen since the implementation of the first phase of short-term remedial measures on the sewerage/sewage treatment system, and NIEA/DOE had identified that further major improvement works were planned, it was decided that a full review should only be undertaken once those works had been completed.

# Review

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The expert assessment section from the original sanitary survey report is included at Appendix 1. This does not consider the major contaminating sources in detail and therefore it is not possible to review the more recently obtained information and data in association with that section. Instead, the more recent information and data will be principally compared to relevant parts of the main body of the report.

## Shellfishery

### Sanitary survey report

The sanitary survey report identified two licensed shellfish harvesting sites in Inner Dundrum Bay, the larger one to the north-east of the central channel (Inner North) which was used for the cultivation of *Crassostrea gigas* (Pacific oysters) in poches on trestles using seed from hatcheries. The smaller area, to the south-west of the central channel (Inner South) was used for the bottom culture of *Mytilus edulis* (mussels) from seed transferred from wild beds. It also noted that the area at Inner East was classified for wild cockles up to 2008. The location and extent of the licensed areas are shown in Figure 2.2 of the report.

### Additional information

The two areas of Inner North and Inner South continue to be in use and classified for oysters and mussels respectively. In addition, and further to the anticipated downgrade to the classification status at Inner South (see below), the harvester identified in February 2013 that he wished to shift part of his stock to Inner North, placing them both on the sea bed and in oyster bags on trestles. FSA in NI therefore started classification monitoring for mussels in that area (previously only Pacific oysters were monitored there) and subsequently classified this site as a provisional B for mussels.

## Classification status

### Sanitary survey report

The sanitary survey report included a table of the classifications for Inner North Oysters, Inner South Mussels and Inner East Cockles from 2003 to 2012. The classifications for that period, and for 2013, are shown combined in Table 1.

### Additional information

The classification at Inner South mussels was B up to and including 2011. An increased incidence of results greater than 4600 *E. coli* MPN/ 100 g was seen from 2009 on and this led to a seasonal classification being introduced for Dec 2012 - April 2013. A subsequent agreement on notification of significant sewage spill events, and associated management actions, together with the institution of fortnightly *E. coli* monitoring with ongoing review of the data, resulted in the classification of the bed being reverted to class B from June 2013.

The oysters at the Inner North bed have been consistently classified as B during this period.

Table 1. Classification status of the shellfish beds in Dundrum Bay from 2007 to 2013

Bed	Species	Year										
		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Inner North	Oysters	B	B	A	A	B	B	B	B	B	B	B
Inner North	Mussels	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	B <sup>1</sup>
Inner South	Mussels	B	B	B	B	B	B	B	B	B	B <sup>3</sup>	B
Inner East	Cockles	B	A	A	A	B	B <sup>1</sup>	NC	NC	NC	NC	NC

Notes: <sup>1</sup>Provisional classification

<sup>2</sup>NC=Not Classified

<sup>3</sup>Seasonal classification: Dec 2012 - April 2013

## Temporal and geographical patterns of classification sampling results

### Sanitary survey report

The report presented the *E. coli* results from the classification monitoring programme from January 2005 to February 2012 for the mussels at Inner South and the oysters at Inner North, and for the period from January 2005 to October 2007 for the cockles at Inner East. It was commented that seasonal differences in *E. coli* results were seen in both mussels and oysters.

### Additional information

Cefas has undertaken a number of assessments of the *E. coli* data for the mussels at Inner South on behalf of FSANI in response to the high results seen since 2009. One, undertaken in October 2012, identified that, although a statistically significant difference was not found between seasons for the *E. coli* data, all of the results greater than 4600 *E. coli* MPN/100 g had occurred during the period June to October inclusive. On this basis, Cefas identified that a seasonal classification could be considered. In November 2012, Cefas undertook a further analysis of the *E. coli* data with respect to rainfall. A statistically significant association was found between *E. coli* in the mussels and rainfall over the day prior to sampling (Spearman's rank correlation,  $\rho=0.397$ ,  $p=0.011$ ).

The *E. coli* monitoring data for Inner South Mussels and Inner North Oysters is presented here for the period January 2007 to October 2013 inclusive. All data is shown, including the results of investigative samples and those deemed void by FSANI: however, the latter two groups have been identified separately on the graphs. Official control monitoring of mussels at Inner North was only started at the beginning of April 2013, in response to a proposal by the harvester to change his

practices due to the impending downgrade in classification of the Inner South bed from May 2013 (i.e. seasonal classification). The data from April to October 2013 inclusive is shown. The individual results for the three sets of data are presented in Figures 1, 2 and 3.

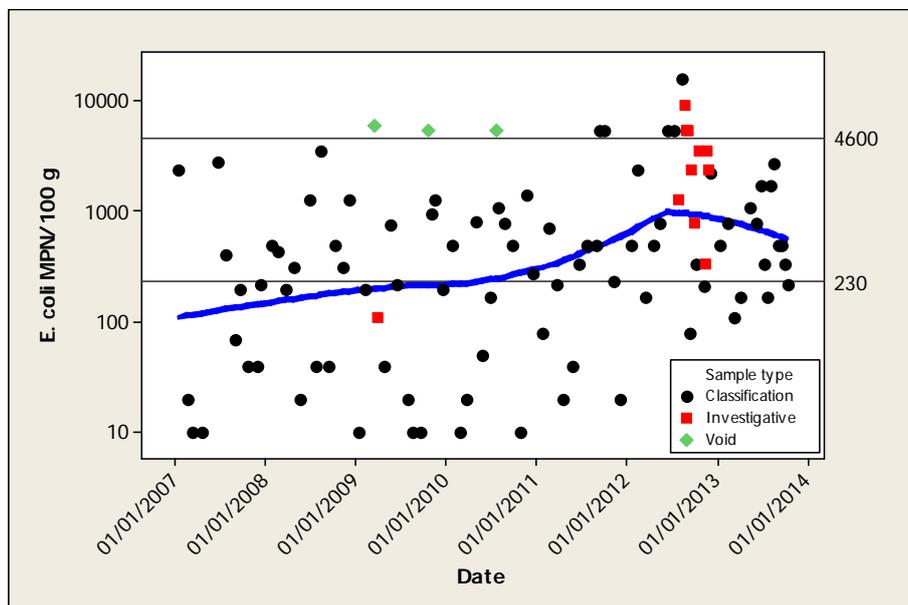


Figure 1. Inner South Mussels: *E. coli* monitoring data Jan 2007 to October 2013

One sample from Inner South Mussels, taken 20 October 2009, was declared void due to non-compliance with the sampling protocol. The other two samples shown as void in Figure 1 were determined as such on the basis of potential environmental factors. No result greater than 4600 *E. coli* MPN/100 g has been seen in the monitoring since 5 September 2012. Since the beginning of June 2013, monitoring has been undertaken routinely on a fortnightly basis in support of the maintenance of the classification as B.

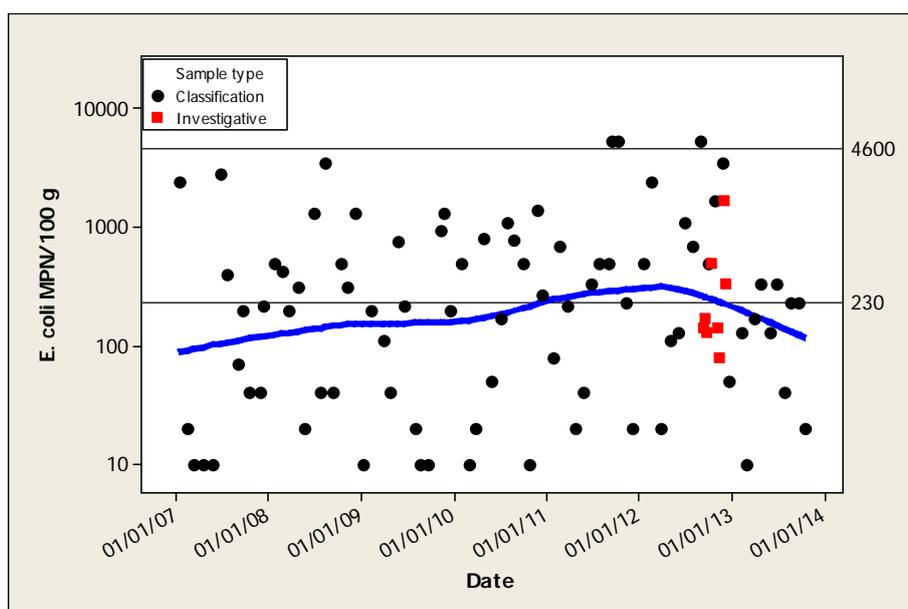


Figure 2. Inner North Oysters: *E. coli* monitoring data Jan 2007 to October 2013

A number of investigative samples were taken at Inner North Oysters during the second half of 2012, due to the problems that had been seen at Inner South Mussels. Only three results greater than 4600 *E. coli* MPN/ 100 g have been seen in the *E. coli* monitoring at this site since the beginning of 2007: one in 2011 and one in 2012. Thus, although at a lower frequency than at Inner South mussels, they occurred during the same time frame and may reflect a common cause (high results were also seen in the mussels on all three occasions). No results greater than 4600 *E. coli* MPN/ 100g have been seen at this site since 28 August 2013.

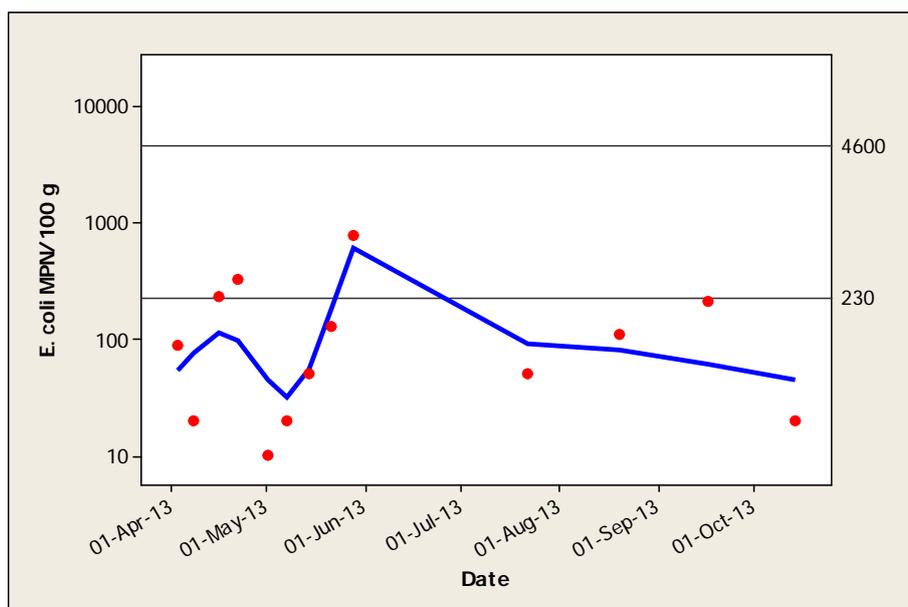


Figure 3. Inner North Mussels: *E. coli* classification data April to October 2013

Mussels have been monitored at the Inner North site since April 2013 in support of its use as an alternative source given the problems that had been seen at the Inner South site. All results so far have been less than 1000 *E. coli* MPN/ 100 g. This site has been awarded a provisional B classification for mussels.

## Human sewage impacts

### Sanitary survey report

The sanitary survey report identified that:

*“There are 15 Waste Water Treatment Works (WWTWs) within the Dundrum Bay catchment area which discharge into Dundrum Bay or into a tributary of the Bay. Figure 4.6 shows the locations of these WWTWs and the locations of their continuous sewage discharge pipes and Table 4.2 gives the coordinates. Three of these WWTWs have septic tanks not continuous discharges associated with them (Foffanybane WWTW, Burren Road WWTW and Moneyscalp WWTW and these are dealt with in Section 4.1.3.2 Rainfall Dependent Sewage Discharges. One of the WWTW discharge directly into Inner Dundrum Bay (Dundrum WWTW), 2 discharge directly into Outer Dundrum Bay (Newcastle WWTW and Ballykinler) and 7*

*discharge into rivers/streams which ultimately discharge into Inner Dundrum Bay. The p.e. (population equivalent) of Dundrum WWTW is 2,613.*

*In addition, there are 30 Waste Water Pumping Stations (WWPSs) and 22 Sewage Pumping Stations (SPS) located within the catchment area. The locations of these pumping stations can be seen in Figure 4.7 and Table 4.3 gives their coordinates. These pumping stations have discharges associated with them.”*

With respect to rainfall-dependent sewage discharges, the sanitary survey report identified that:

*“There are 28 combined sewer overflows and 3 septic tanks in the Dundrum Bay Catchment Area. Of these, 5 flow directly into Inner Dundrum Bay.”*

No information on emergency overflows to the sewerage system was made available to the authors of the report. Two industrial discharges were also identified within the report, one being related to Dundrum Bay Oyster Fishery and the other to CES Quarry Products Ltd.

The expert assessment section of the sanitary survey report concluded that: *“The main pollution sources in the harbour area arise from point source discharges from sewers in the town.”* No assessment was given of relative impact on the two harvesting areas (Inner Bay North and Inner Bay South) or across these two areas.

#### **Additional information**

Dundrum WWTW comprises a membrane bioreactor (MBR) that discharges within the production area and within 70 m of the edge of the Inner South licensed fishery area. NIEA identified that it considers that the works currently complies with its numerical consent but is overloaded with respect to its connected population equivalent (p.e.). It was designed for a p.e. of 1951 but the current p.e. connected is 2613 (reached in 2009). NIEA has identified that the type of plant is not capable of dealing with this excess p.e. and that discussions are to be undertaken between NIEA and Northern Ireland Water (NIW) to identify possible future solutions. It is anticipated that it will take up to three years to progress any agreed solution.

NIEA undertook investigations of the sewerage systems in the area and identified a number of misconnections together with a problem associated with a surface water drain adjacent to Flynn’s pumping station (located within 250 m of the Inner South licensed fishery area). It considered that the significant discharges from the storm tanks serving Dundrum WWTW potentially contributed to the downgrade in classification of the mussel bed.

Some short-term remedial measures were identified to alleviate the potential impacts. Those identified as being completed by May 2013 included:

- Substantial blockage removed from sewer line at Delinvilla Lane and sewer line desilted to outfall.

- CCTV work complete
- Cross connections identified and rectified.
- Increase in frequency of screen cleaning at wastewater treatment works has been introduced beyond the manufacturer's recommendations.
- Calibration and external verification of flow meters within WWTW

Two further short-term measures had still to be completed at that point:

- Conversion of the existing primary settlement tank to a blind storm tank (There is currently no blind tank facility at the WWTW to capture the first flush dirty load at the onset of a storm). This conversion will provide an additional 2 hours storage at design flow rates prior to overflow.
- Minor pipework alterations to improve returned process liquors.

These were expected to be completed by August 2013 but confirmation of this has not yet been received.

An upgrade to the Dundrum sewerage network is scheduled for 2014/15. NIEA has identified that this will involve the closure of Main Street Combined Sewer overflow, an upgrade to the sewer system in Main Street, the provision of a storage tank nearby Flynn's Waste Water Pumping Station and a new CSO chamber with screening. In addition, NIEA has asked NIW to install monitors on all of the CSOs and pumping stations in the vicinity of the shellfish water. The intent is that summary data on spills greater than 50 m<sup>3</sup> will be passed to NIEA on a monthly basis. A protocol was developed in order to ensure communication between interested parties in the event of NIW staff identify discharges of effluent from Waste Water Treatment Works, pumping stations or other NIW asset likely to impact on Dundrum Shellfish Water. Under the protocol, NIW will inform NIEA who in turn will inform:

- DOE Marine Division
- Down District Council
- FSA in NI
- The shellfish harvester

The protocol has been actioned on at least one occasion: on 4/11/13 notification was received of a discharge from a combined sewer overflow at main street Dundrum that was thought to be caused by a blockage. Notification was received the following day that the discharge had been stopped during the night.

## **Shipping and boats**

### **Sanitary survey report**

The sanitary survey report identified that there is no harbour in Inner Dundrum Bay but that there is a quay wall where small boats moor up. It identified that more

significant facilities are located at Newcastle in the Outer Bay. The conclusion was that pollution from shipping would be insignificant compared with land-based point sources.

#### **Additional information**

No additional information has been received and none was found in an Internet search.

### **Agricultural impacts**

#### **Sanitary survey report**

The report identified that agricultural land-use comprised approximately 68% of the catchment area, with forestry contributing an additional 4%. In terms of animal numbers, the assessment was based on the 2010 agricultural census: sheep predominated over cattle with significant numbers of pigs also being present. Some areas in the catchment contained large numbers of poultry. The agricultural census areas with the largest numbers of animals were: Dunmore, Ballyward, Tollymore and Killough. Murlough had the highest number of poultry. The report also commented on the association between such sources and faecal pollution of water bodies.

#### **Additional information**

Agricultural census maps currently available on the DARDNI website relate to the results of the 2006 census (<http://www.dardni.gov.uk/index/statistics/crops-livestock-and-labour-numbers/statistics-maps.htm>). The 2012 agricultural census summary is available on the DARDNI website but this is only given to rural district level and cannot be directly compared with the more detailed breakdown given in the sanitary survey report.

([http://www.dardni.gov.uk/census\\_2012\\_13.179\\_the\\_agricultural\\_census\\_in\\_ni\\_2012\\_final.pdf](http://www.dardni.gov.uk/census_2012_13.179_the_agricultural_census_in_ni_2012_final.pdf)) .

The NIEA 2012 catchment investigations identified two farm middens close to watercourses that were subsequently moved by the farmers. This would have removed potential, but not necessarily active, sources of pollution.

Overall, in the absence of more detailed recent data, it is assumed that agricultural sources will have remained at the same level as given in the sanitary survey report. These sources will largely impact at the shellfish beds via the watercourses and will contribute a proportion of the faecal coliform concentrations, and loadings, observed in those watercourses.

### **Wildlife impacts**

#### **Sanitary survey report**

The sanitary survey report identified that Dundrum Bay is frequented by large numbers of water birds. Quoted numbers ranged up to over 13,500. It was, however,

concluded that the impact of these would be low compared with land-based discharges.

Although the sanitary survey report identified that the presence of wildlife was recorded during the shoreline survey, no information was given on wildlife-associated observations.

#### **Additional information**

No additional information has been received and no additional data on wild bird and animal numbers was found in an Internet search.

### **Seasonal variation**

#### **Sanitary survey report**

The report identified that: “Bird populations in the Dundrum Bay area are typically higher in early winter and late spring due to migratory events and they are typically higher in mid winter than spring and summer as the local birds tend to move off-site in the summer months to breed. Therefore, it is highly probable that the contribution made by wildfowl to pollution levels in Dundrum Bay is higher in the winter months.”.

The sanitary survey report also identified that there was a significant association between *E. coli* results in both oysters and mussels and season.

#### **Additional information**

As described earlier, statistical analyses undertaken by Cefas in October 2012 did not show a statistically significant association between the *E. coli* results in the mussels at Inner South and season, but did identify that all of the results greater than 4600 *E. coli* MPN/100 g had occurred during the period June to October inclusive.

### **Rivers and streams**

#### **Sanitary survey report**

The report identified that three rivers flow into Inner Dundrum Bay:

- the Blackstaff River flows into the north-eastern part
- the Carrigs and Moneycarragh Rivers flow into the south-western part of the Inner bay, west of the Downshire Bridge

It also identified that two other unnamed streams flow into the Inner Bay, one in the northern section close to the Blackstaff and one in the southern section close to the Moneycarragh. Approximately 14 other rivers/streams were stated to flow into Outer Dundrum Bay. No flow or volume data was available to the authors for the rivers in the Dundrum Bay catchment area. The conclusion was that, given the small area and shallow nature of the Inner Bay, the freshwater input was significant.

#### **Additional information**

The Drumaroad WWTW discharges into a tributary of the Moneycarragh River while the Maghera WWTW discharges into the Carrigs River. These two rivers drain into

the south-eastern part of the bay that also contains the discharge point of the Dundrum WWTW: the mussel bed lies in the outer section of this part of the bay. Flow over the mussel bed on the ebb tide is largely freshwater. NIEA undertook catchment surveys which included sampling of a number of watercourses. Faecal coliform concentrations in these ranged from 160 to 19000/100 ml. Results for three watercourses that enter the south-western part of the bay, as well as the Blackstaff and Ardilea Rivers, are shown in Table 2.

Table 2. Faecal coliform results (per 100 ml) from watercourse sampling undertaken during NIEA catchment investigations in 2012

	25/07/2012	30/07/2012	31/07/12	22/08/2012	18/09/2012
Moneycarragh River	4800	970	820	2000	400
Carrigs River	12000	160	2700		3200
Unnamed watercourse	4200	300	710		220
Blackstaff	1600	1000	19000		610
Ardilea River	13000	740	1400		1200

No flow data for these watercourses was available from the National River Flow Archive maintained by the Centre for Ecology & Hydrology. Flow data would be needed to convert faecal coliform concentrations into loadings.

## Movement of contaminants

### Sanitary survey report

The sanitary survey report identified that no models were available for Dundrum Bay. With respect to bathymetry, it identified that:

*“The waters in Inner Dundrum Bay reach a maximum depth of 2m along the entrance channel into the bay. The remainder of the inner bay is intertidal, including the area to the west of the Downshire Bridge. Outer Dundrum Bay is relatively shallow with depths descending gradually from the intertidal zone out to 20 to 30m.”. With respect to currents, it stated: “With the exception of the entrance channel, Inner Dundrum Bay is intertidal and as a result there is a complete exchange of water twice a day. As expected, water floods in from the south through the entrance channel, where tidal flows can reach approximately 1.5m/s on both the flood and ebb tide (CAAN, 2011). The tide flows beneath the Downshire Bridge at rates of up to 3m/s between its stanchions (CAAN, 2011). With the exception of the entrance to Dundrum Inner Bay, tides are weak.”.*

### Additional information

Dundrum Bay (Murlough SAC) and the south-east Mourne Coast is to be the subject of a new hydrographic survey by AFBI as part of an EU co-funded Ireland, Northern Ireland and Scotland Hydrographic Survey project (INIS Hydro; <http://www.inis-hydro.eu/>). Data from this project is not available at the present time but should

contribute to a re-assessment of the hydrography of the area at the time of a full review of the sanitary survey.

In addition, it is anticipated that any future upgrade to the sewage treatment and discharge provisions for the area would be supported by hydrodynamic modelling undertaken by NIW (or on their behalf) and audited by WRC. The intent would be to model predicted microbial concentrations across the bay. A full review of the sanitary survey should take account of any accessible outputs from such modelling.

## **Shellfish Waters Directive faecal coliform results**

### **Sanitary survey report**

The report considered faecal coliform results from water testing undertaken by NIEA at three sites within the Dundrum Bay designated shellfish water from 2005 to 2009. The results were compared against a target value of 300 faecal coliforms per 100 ml water (the guideline value within the Shellfish Waters Directive relates to faecal coliforms in shellfish flesh and intervalvular fluid whereas the water value is derived from a design standard intended to be equivalent to class B under the hygiene legislation). The report stated that all samples complied with the target value at the three sites with a maximum result of 61 faecal coliforms per 100 ml. Highest results at the different sites were seen during different seasons.

### **Additional information**

Cefas was provided with the results of water testing undertaken at the three sites by DOE Marine Division (and previously NIEA) from 2007 to 2012. These results are presented in Figure 4. The locations of the sampling points are shown in Figure 5.1 of the sanitary survey report. There were nineteen results from each site. Presumptive faecal coliform concentrations ranged from <1/100 ml to 3200/100 ml. Two results at each of sites IDB1 and IDB3 and one result at site IDB32 exceeded 300 faecal coliforms per 100 ml. Average levels at IDB1 were significantly higher than those at IDB2: IDB1 is in the vicinity of the Inner South Mussel Bed.

In March 2013, Cefas undertook an assessment of compliance with the SWD guideline value in shellfish flesh and intervalvular fluid using the FSA in NI *E. coli* data from Inner South Mussels for the previous 3 years. For the assessment, faecal coliform and *E. coli* values were considered equivalent (this had previously been shown to be an acceptable assumption using a large dataset). The assessment yielded the following:

2010 50% compliance  
2011 50% compliance  
2012 25% compliance

as opposed to the 75% requirement in the Directive.

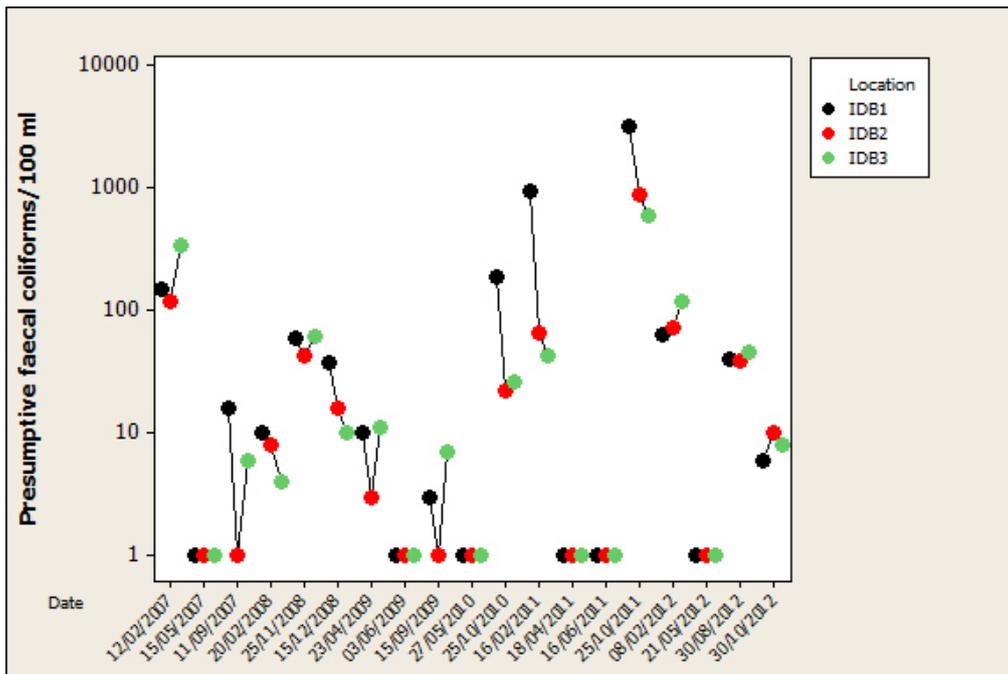


Figure 4. DOE Marine Division/NIEA water monitoring results.

## Conclusions

The principal identified sources of faecal pollution to the inner bay and the fishery continue to be the continuous and intermittent discharges located within the bay itself together with sewage discharges and agricultural sources that impact via the watercourses which enter the inner bay.

Information received from NIEA indicated a number of problems relating to the sewerage system, and the Dundrum WWTW that could have contributed to the high *E. coli* results in the mussels from 2009 on. A number of these sources have been addressed and no further high *E. coli* results (>4600 *E. coli*/100 g) have been seen in either the mussels or oysters since autumn 2012. However, the shellfish beds are still in close proximity to a number of sources of sewage pollution and the proposed further improvements to the sewerage system and sewage treatment in the area would provide further protection for water quality over the beds. The monitoring results should therefore be kept under review while those works are progressed and a substantive review of the sanitary survey should be undertaken once the improvements have been implemented.

**Appendix 1.**  
**March 2012 Sanitary Survey Report:**  
**Expert Assessment of the Effect of Contamination on Shellfish**

## 6. Expert Assessment of the Effect of Contamination on Shellfish

Dundrum Bay is located within a predominately rural catchment, mostly used for agricultural purposes. Dundrum town is the largest population centre on the shores of Inner Dundrum Bay and the population does not increase significantly due to tourist numbers. The quay in Dundrum village is used by a small number of local boats. The main pollution sources in the harbour area arise from point source discharges from sewers in the town. There are three main rivers flowing into Inner Dundrum Bay, with 2 smaller streams and numerous drains and runoff also entering the Inner Bay area.

Sewage has been known to lead to deterioration of water quality, alter floral and faunal assemblages near large outfalls and has been responsible for disease outbreaks attributed to faecal coliforms (Clarke, 2001). Faecal coliforms entering the marine environment from industrial discharges, wastewater and sewage discharges, contaminated freshwater input, agricultural run-off, wild fowl and shipping discharges can accumulate in bivalves that filter organic matter from the water column to feed. Varying levels of faecal coliforms in bivalve flesh determine the classification of shellfish harvesting waters. Dundrum Bay has been historically been categorised as a B classification for mussels and predominantly B for oysters.

No interannual trends were identified from the historical shellfish data i.e. no significant variation in *E. coli* levels was evident since 2005, however seasonal differences were observed between spring and summer and spring and autumn for oysters and between spring and summer for mussels. These differences have been linked to variations in rainfall levels during the different seasons. Depending on local hydrographic conditions, the fate of contaminants can vary from place to place. In Dundrum Bay the following summaries the fate of contaminants.

Inner Dundrum Bay is a shallow sheltered bay area; it is almost entirely intertidal with the exception of the entrance channel. As a result there is a complete exchange of water twice a day. The hydrodynamics of the Inner Bay involve the simple flooding of water into the bay on the rising tide and the subsequent ebbing out of water into the Outer Bay area on the falling tide. In addition, there is a relatively high level of freshwater flowing into the Inner Bay. Currents within the Inner bay are weak, with the exception of the entrance channel where where tidal flows can reach approximately 1.5m/s on both the flood and ebb tide. In addition, strong flows of up to 3m/s occur between its stanchions of the Downshire Bridge.

The intertidal nature of the Inner Bay allows for the complete water exchange twice a day, the result of this

is as follows: the contaminants flowing into the Inner Bay from the rivers and streams get redistributed around the Inner Bay on the flooding tide and the flooding tide can bring in contaminants from the Outer Bay area, however latter is believed to be negligible given the fact that excellent bathing water quality at Murlough is not impacted upon by the poor bathing water quality in the neighbouring Newcastle area. It is believed the contamination levels in the Inner Bay are a direct result of the freshwater input and point sources entering the Inner Bay. In addition, the freshwater input can result in the localised decrease in salinity and increase in turbidity levels, however giving the tidal nature of the area these variations are temporary localised and small scale. Given the sheltered tidal nature of the Inner Bay, wind has a negligible influence on water movements and the distribution of contaminants. This all explains why for the past 10 years Dundrum Bay has predominantly been classified as a B area, which means that the shellfish must be subject to purification, relaying or cooked by an approved method.

As a result of this, Inner Dundrum Bay has been classified as one Production Area with an RMP for oysters and an RMP for mussels. Further details on the Production Area and the sampling sites can be seen in Section 7 Sampling Plan. This sampling plan is designed to properly reflect the control of the likely risk of pathogen contamination on the shellfish and will ensure that effective monitoring is carried out with respect to the potential polluting impacts and that public health is prioritised.