Scottish Sanitary Survey Project

Restricted Sanitary Survey Report

Vallay

UB 490

May 2010

Cefas

Food Standards Agency
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Buidheann Inbhe-Bìdhe

Report Distribution – Vallay

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* Distribution of both draft and final reports to relevant agency personnel is undertaken by FSAS.

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1. Area Overview

The harvesting area at Vallay lies between the islands of North Uist and Vallay (Bhalaigh) in North Uist, which is located in the Outer Hebrides (see Figure 1.1). It is an area of intertidal sands called Tràigh Bhalaigh. The area is approximately 3.2 km by 3 km at its widest points. A restricted sanitary survey at Vallay was conducted in response to receipt of an application to classify the area for commercial harvest of common cockles (*Cerostoderma edule*.).

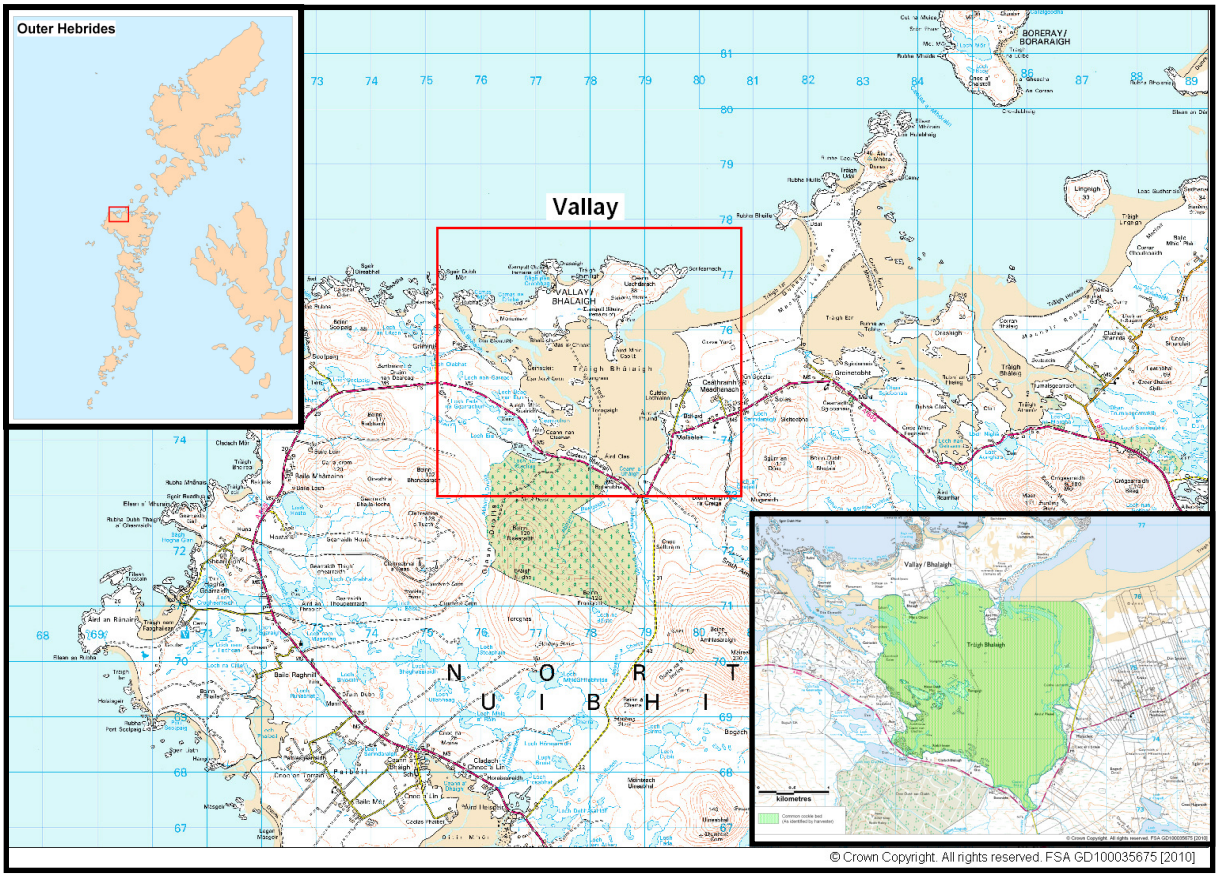

Figure 1.1 Location of Vallay (Traigh Bhalaigh)

1.1 Land Use

This area was not included in the Land Cover 2000 data. Observations made during the shoreline survey indicated that the land surrounding Vallay was mainly croft land primarily used for grazing sheep and some cattle, with some dunes and an area of coniferous woodland on the south west coastline.

1.2 Human Population

Population data relating to the 2001 census was obtained from the General Records Office for Scotland for the area surrounding Vallay. Figure 1.2 shows the human population figures by census output area. The populations within each output area are not evenly distributed, so care must be exercised in interpreting the numbers presented. On the northern shoreline of North Uist there are several small settlements scattered along the main road and on the shore east of Vallay, these have been labelled in Figure 1.2. Discharge consents received from the Scottish

Environment Protection Agency (SEPA) indicate that these smaller settlements could be a significant source of contamination to the cockle bed (see Section 3). There is a range of tourist accommodation throughout North Uist, suggesting there is likely to be a seasonal increase in human population during the summer months.

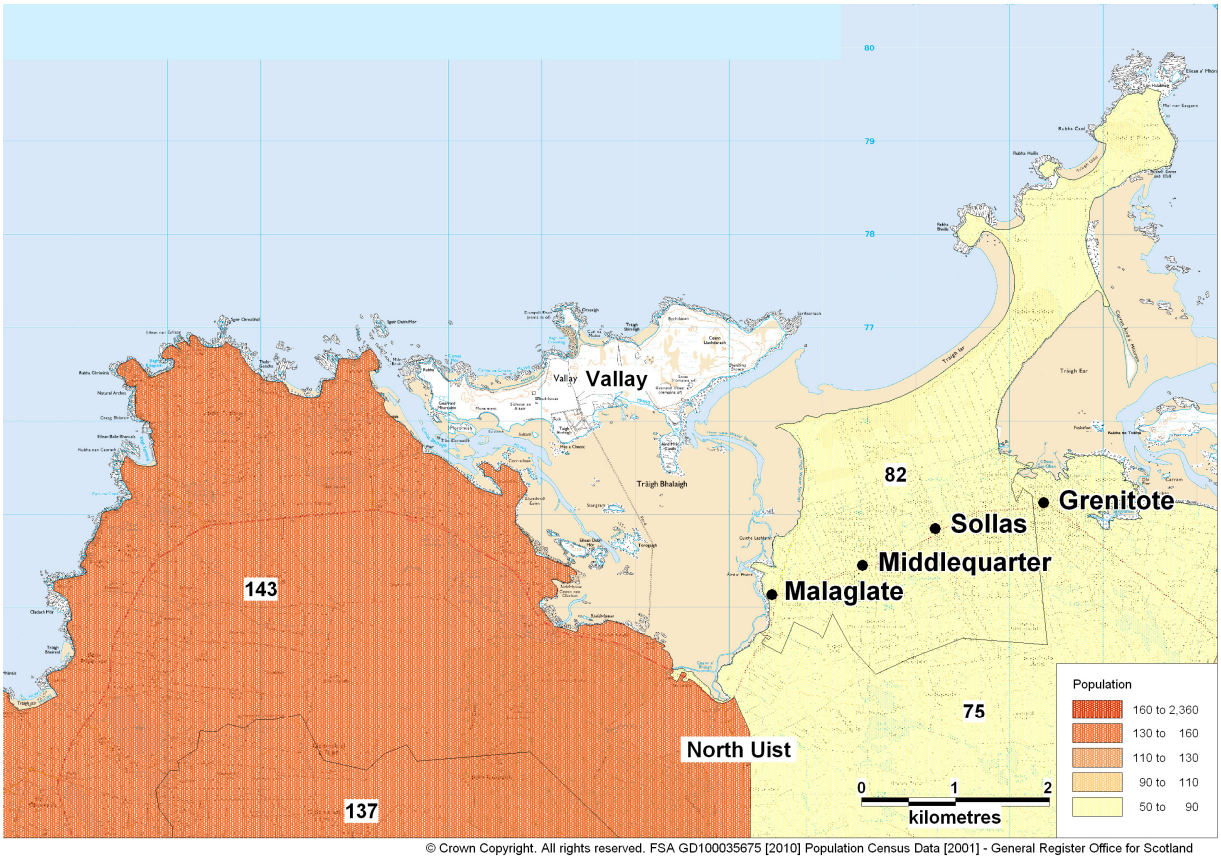

Figure 1.2 Human population surrounding Vallay

2. Fishery

The fishery at Vallay (UB 490 847 04) is comprised of a wild common cockle (*Cerostoderma edule*) bed identified as Traigh Bhalaigh Site 2.

The cockle bed was identified by the harvester on the classification application form as the beach at Tràigh Bhalaigh (Vallay) centred around NF 780 750.

On the 25th January 2010 a regulation (OPSI online, 2010) was put in place by the Scottish Government called The Inshore Fishing (Prohibition of Fishing for Cockles) (Western Isles) (Scotland) Order No.444. This order prohibits fishing for cockles less than 30mm in size within inshore areas throughout the Western Isles, which includes North Uist.

There is currently no representative monitoring point (RMP) assigned to this area. The cockle bed at Vallay does not lie within a designated shellfish growing water.

The boundaries of the common cockle bed, as indicated by the harvester, are mapped in Figure 2.1. The cockles will be hand raked and harvesting is planned to take place throughout the year.

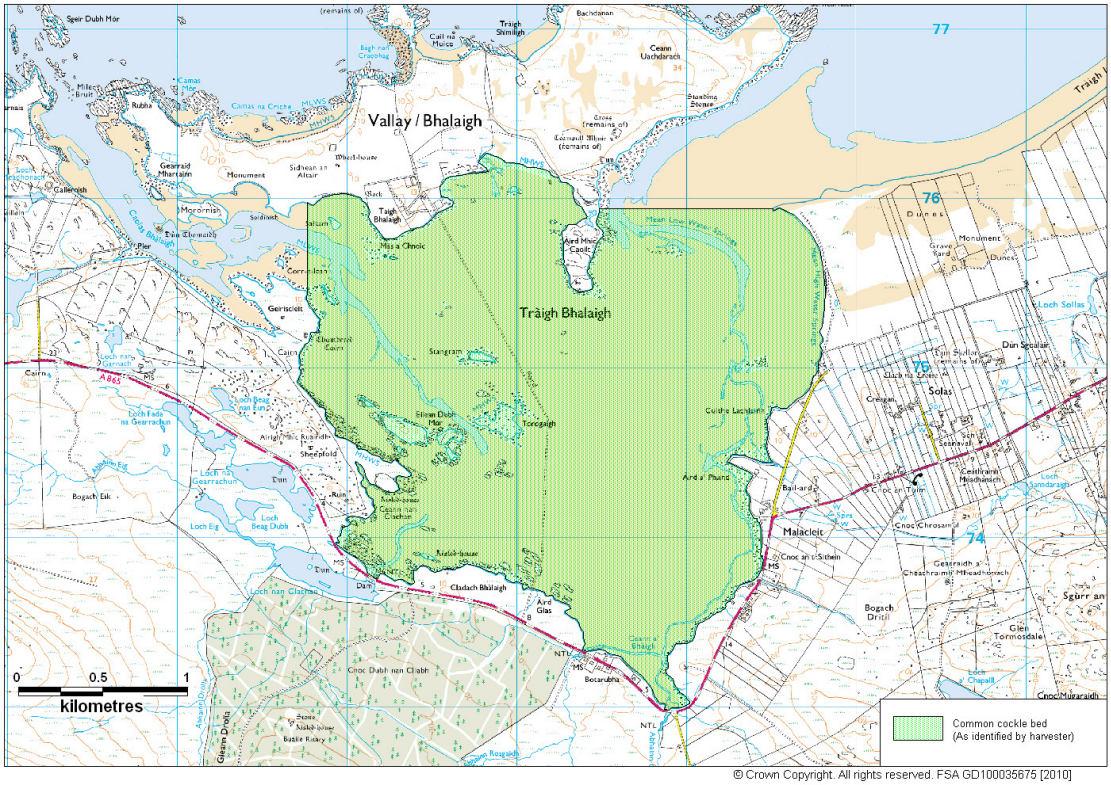

Figure 2.1 Vallay fishery

3. Sewage Discharges

A large number of discharge consents were provided by SEPA for the area surrounding the Vallay cockle bed. The majority of these discharge consents were identified as sewage (private) primary or sewage (public) primary discharges (i.e. septic tanks) discharging to soakaway. In Figure 3.1 the discharge consents have been thematically mapped to identify those discharging to watercourses or the sea, soakaways within 400 m of MHWS and soakaways >400 m from MHWS. Details of those not discharging to soakaway are listed in Table 3.1. Those discharging to soakaway are listed in Appendix 4. At the time of writing this report, SEPA had not provided data concerning the consented/design population equivalent (PE) or the consented flow m^3/day for any of the discharge consents. In data provided previously be SEPA for other areas, most septic tanks associated with individual dwellings had a PE of 5.

Table 3.1 SEPA discharge consents – septic tank discharges to watercourses or the sea

Consent No.	NGR of discharge	Discharge Type	Discharges to
CAR/R/1042775	NF 78381 73310	Sewage (Private) Primary	Abhain Roseaidh, Claddach Valley
CAR/R/1059504	NF 79487 74120	Sewage (Private) Primary	Unnamed watercourse, Malaglate
CAR/R/1059792	NF 79495 73735	Sewage (Private) Primary	Unnamed watercourse
CAR/R/1055933	NF 80351 74622	Sewage (Private) Primary	Unnamed tributary of Sound of Harris
CAR/L/1002336	NF 81358 74999	Sewage (Public) Primary	Unnamed watercourse, Solas

No community septic tank discharges were identified by Scottish Water for the area.

No septic tanks or sewage outfall pipes were observed during the shoreline survey in the area.

Despite the relatively low population density as a whole, there are quite a large number of sewage discharges in the area, although most serve individual dwellings. A number of those that discharge into, or near, the coastline, may cause localised deterioration in water quality. All the discharges are located on the south/south east side of the Vallay cockle bed and these would be expected to provide a significant potential source of contamination to this side of the shellfishery.

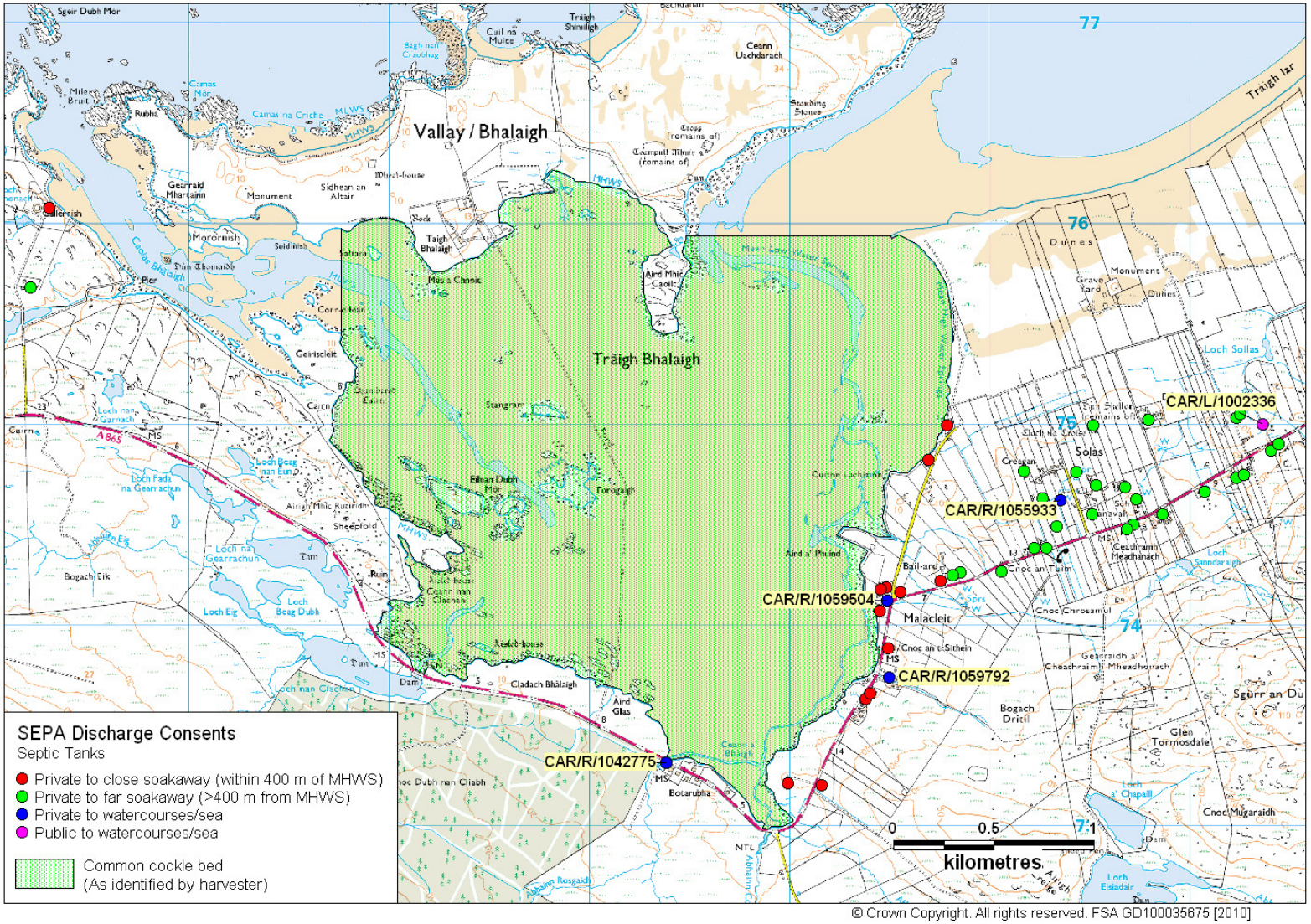

Figure 3.1 Sewage discharges at Vallay

4. Animals

4.1 Livestock

Both sheep and cattle are raised through crofting on North Uist (Encyclopaedia Britannica online, 2010). Livestock are raised on communal grazing areas. An agricultural show, including livestock, is held in Hosta, (approximately 6 km south west of the shellfish bed) on the island in late July/early August each year.

The only significant source of information concerning livestock numbers in the vicinity of the fishery was available from the shoreline survey (see Figure 4.1). The shoreline survey relates to the time of the site visits on the 14th April 2010, and so these counts may not represent all livestock in the area as they depend on the point of view of the observer and some animals may have been obscured by the terrain. The area surveyed was a selected stretch from Loch nan Clachan in the west round to Solas in the north east. This was to concentrate on the area with the majority of any relevant discharges and fresh water inputs. It is therefore possible that livestock were present in areas that were not surveyed. As a result the observations made on the day of the shoreline survey will not represent the true variation in distribution of livestock in the area.

On the eastern shoreline of the cockle bed, close to Malacleit a small farm and 50 sheep were observed. Slightly further north of Malacleit an additional 30 sheep were observed. From the intertidal zone, approximately 40 cattle were observed on the island of Vallay. No other livestock was observed at the time of the shoreline survey.

On the basis of these observations, the risk of contamination of the shellfishery from livestock sources will be greatest south of the island of Vallay and on the east side of the cockle bed, adjacent to Malacleit.

Livestock numbers in the area as a whole are likely to be at their highest during the summer months when lambs and calves are present. During the warmer months livestock may access streams to drink and cool off more frequently, leading to higher levels of faecal contamination in freshwater streams and the cockle bed itself.

4.2 Wildlife

During the shoreline survey gulls, oyster catchers, waders geese and other seabirds were observed on and around the Vallay cockle bed (see Figure 4.1). These seabirds were mainly observed at the north end of the cockle bed near the island on Vallay and along the southern end of the cockle bed. No other wildlife was observed at the time of the shoreline survey. However, it is likely that other seabirds may be present in the area. The distribution and numbers of additional species was not investigated. On the basis of the shoreline survey observations, the risk of contamination of the shellfishery from wild birds will be greatest at the far northern and southern end of the cockle bed. However, this does not provide information as to whether this difference in bird density applies more generally than just at the time of the survey.

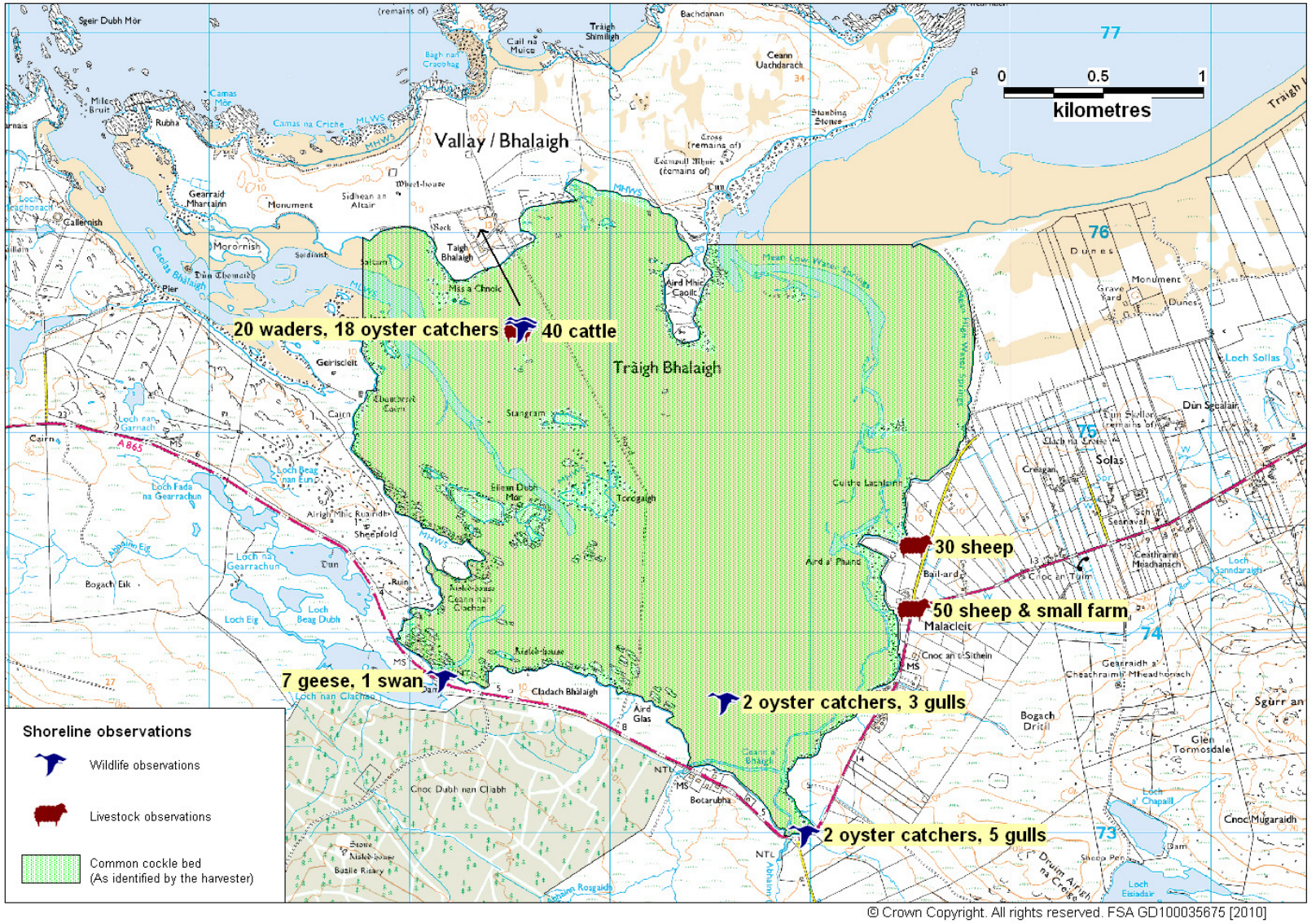

Figure 4.1 Livestock and wildlife present at Vallay during the shoreline survey

5. Rainfall

The nearest weather station is located at North Uist: Clachan na Luib which is approximately 9.5 km south east of Vallay. Daily rainfall values were purchased from the Meteorological Office for the period 01/01/2003 to 30/09/2007 inclusive for the North Uist: Clachan na Luib weather station. For this period of 1664 days, total daily rainfall was not recorded for 260 days, including the entire months of July 2003, June 2004, October and December 2005, March and April 2006, and February 2007.

Rainfall data were supplied to Cefas/FSAS by the Meteorological Office under licence. Unless otherwise identified, the content of this section (e.g. graphs) is based on further analysis of this data undertaken by Cefas.

High rainfall and storm events are commonly associated with increased faecal contamination of coastal waters through surface water run-off from land where livestock or other animals are present, and through sewer and wastewater treatment plant overflows (Mallin et al. 2001, Lee and Morgan 2003).

The influence of rainfall on microbiological quality will depend on factors such as local geology, topography, land use and sewerage infrastructure.

5.1 Rainfall at North Uist

Due to the missing data it is not appropriate to present total rainfall at North Uist by year or month. Instead, Figures 5.1 and 5.2 summarise the pattern of rainfall recorded at North Uist. The box and whisker plots present the distribution of individual daily rainfall values (observations) by year (Figure 5.1) or by month (Figure 5.2). The grey box represents the middle 50% of the observations, with the median noted by a line within the box. The whiskers extend to the largest or smallest observations up to 1.5 times the box height above or below the box. Individual observations falling outside the box and whiskers are represented by the symbol '*'.

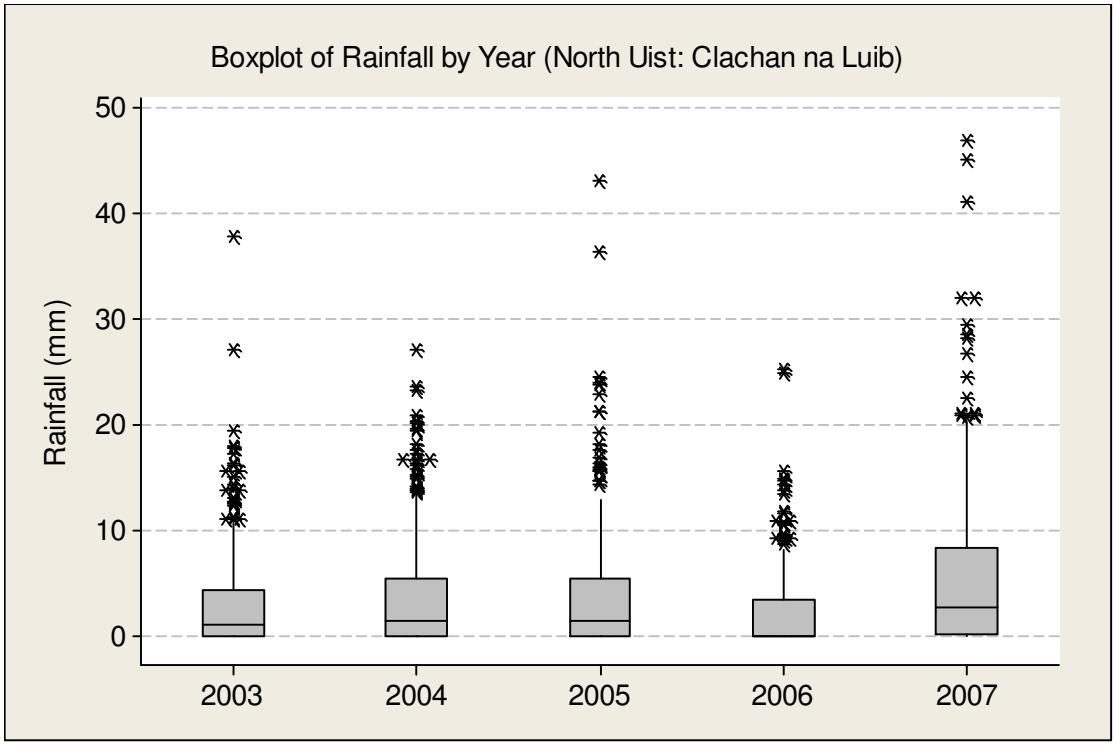

Figure 5.1 Boxplot of daily rainfall at North Uist by year

Figure 5.1 shows that there was considerable variation in the median daily rainfall from year to year. Overall, 2006 saw the lowest median rainfall, of 0mm. The highest individual rainfall events occurred in 2005 and 2007, with 2007 being wetter overall.

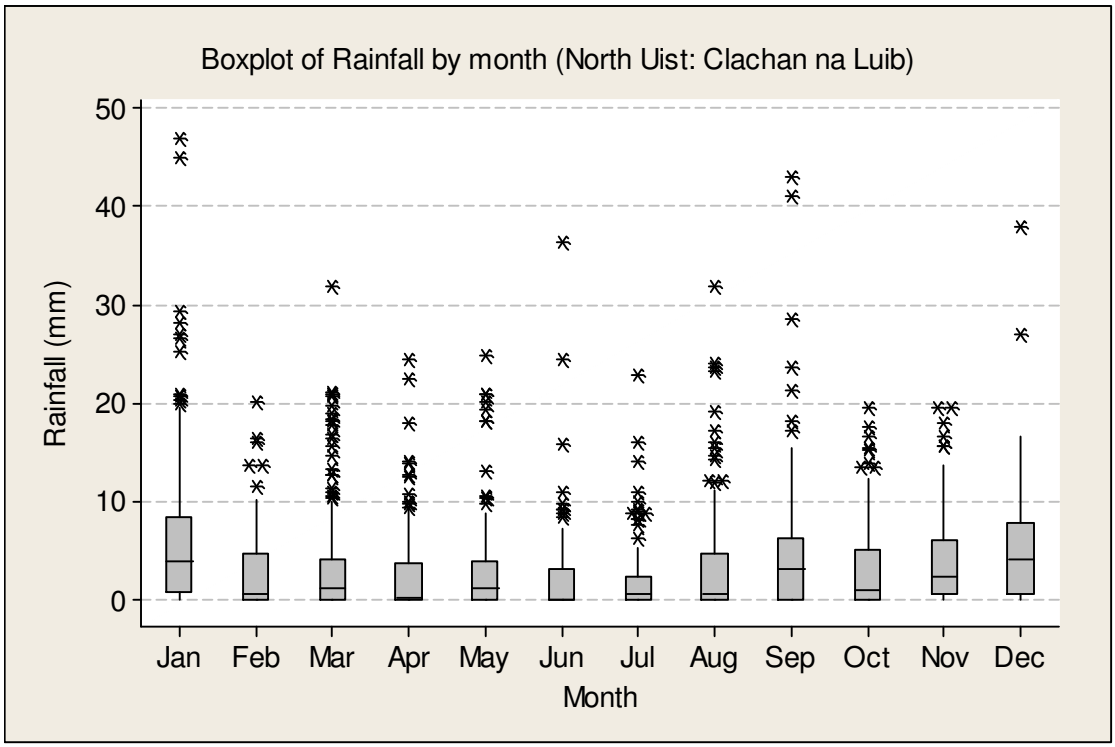

Figure 5.2 Boxplot of daily rainfall values at North Uist by month

The wettest months were September to January but high individual rainfall events occurred throughout the year, although not in all individual months. For the period considered here (2003 – 2007), 36% of days for which records were available experienced no rainfall while 47% of days experienced rainfall of 1mm or less. Although the mean rainfall was 4 mm per day, there were 8 occasions where daily rainfall exceeded 30mm. The highest daily rainfall recorded (47mm) fell in January 2007.

Periods of increased rainfall are generally associated with higher levels of contaminated surface water runoff. Marked changes in the level of rainfall may also cause significant wash off of accumulated material, especially after preceding dry periods.

6. River Flow

There is no river gauging station in the vicinity of Vallay. During the shoreline survey walk, seven fresh water streams were observed discharging into the cockle bed. The Ordnance Survey map indicates that there are potentially 9-10 fresh water streams in total discharging into the area in which the fishery is located. None of the streams observed had measurable flow at the time of the shoreline survey. The streams sampled are listed in Table 6.1 and mapped in Figure 6.1. There were showers of hail, sleet and snow on the day of the shoreline survey (Tuesday 11th May), on which the water samples were collected and there had been a few rain showers in the previous week.

Table 6.1 Stream flow and *E. coli* concentrations – Vallay

No.	Grid Ref	Description	Width (m)	Depth (m)	Measured Flow (m/s)	*E. coli* (cfu/ 100 ml)
1	NF 77149 73752	Stream	15	0.05 – 0.20	Rocky, not able to measure flow	30
2	NF 78406 73312	Abhainn Rosagaidh	15.8	0.02 – 0.12	Virtually no flow	3900
3	NF 78900 72968	Abhainn Ceann a Bhalaigh	6.7	0.01 – 0.03	NA	220
4	NF 79432 73751	Stream	0.95	0.02 – 0.15	Rocky, not able to measure flow	140
5	NF 79516 74103	Culvert	NA	NA	NA	310
6	NF 79573 74397	Stream	3.9	0.03 – 0.05	Rocky, not able to measure flow	70
7	NF 79729 74868	Stream	1.1	0.01 – 0.12	Rocky, not able to measure flow	270

All of the fresh water streams sampled discharged directly onto the cockle bed. The majority of the streams (five out of seven) were located along the eastern shoreline and the remaining two on the south western shoreline of the cockle bed. The streams discharging into the eastern shoreline of the cockle bed had fresh water results varying from 70 to 310 *E. coli* cfu/100 ml. The highest result of 3900 *E. coli* cfu/100 ml was taken from the stream discharging into the southern side of the cockle bed close to Bocarubha. The stream located furthest west had the lowest result of 30 *E. coli* cfu/100 ml. These results indicate that *E. coli* contamination of the fresh watercourses was therefore relatively low on the day of the survey, with the exception of the stream next to Bocarubha, which would be expected to have a significant impact on the shellfishery. It would be expected that levels of faecal contamination in all of the streams would increase significantly after greater periods of rainfall. However, these samples represented conditions at one point in time only and contamination levels present in the identified watercourses could vary considerably from these values.

Figure 6.1. Location of streams and fresh water samples at Vallay

7. Historical *E. coli* Monitoring Data

There is no historical *E. coli* monitoring data available for Vallay.

8. Bathymetry and Hydrodynamics

Figure 8.1 Vallay and the surrounding area

The Ordnance Survey map shows that much of the area is intertidal with shallow subtidal channels that enter the cockle bed from either side of the island of Vallay (see Figure 8.1). This area is shown as a drying area on Admiralty charts. Depths do not exceed 2 m in the intertidal area. Beyond the island of Vallay, depths increase to up to 200 m. The Vallay cockle bed is sheltered by the island of Vallay and North Uist. Beyond the island of Vallay the water is totally exposed and open.

8.1 Tidal curve and description

The two tidal curves below are for the port of Scolpaig, the nearest secondary port. Scolpaig is located approximately 4.8 km west along the coastline of the fishery at Scolpaig Bay. The tidal curves were output from UKHO TotalTide. The first is for seven days beginning 00.00 GMT on 8th April 2010. The second is for seven days beginning 00.00 GMT on 15th April 2010 and covering the date of the first part of the shoreline survey. Together they show the predicted tidal heights over high/low water for a full neap/spring tidal cycle.

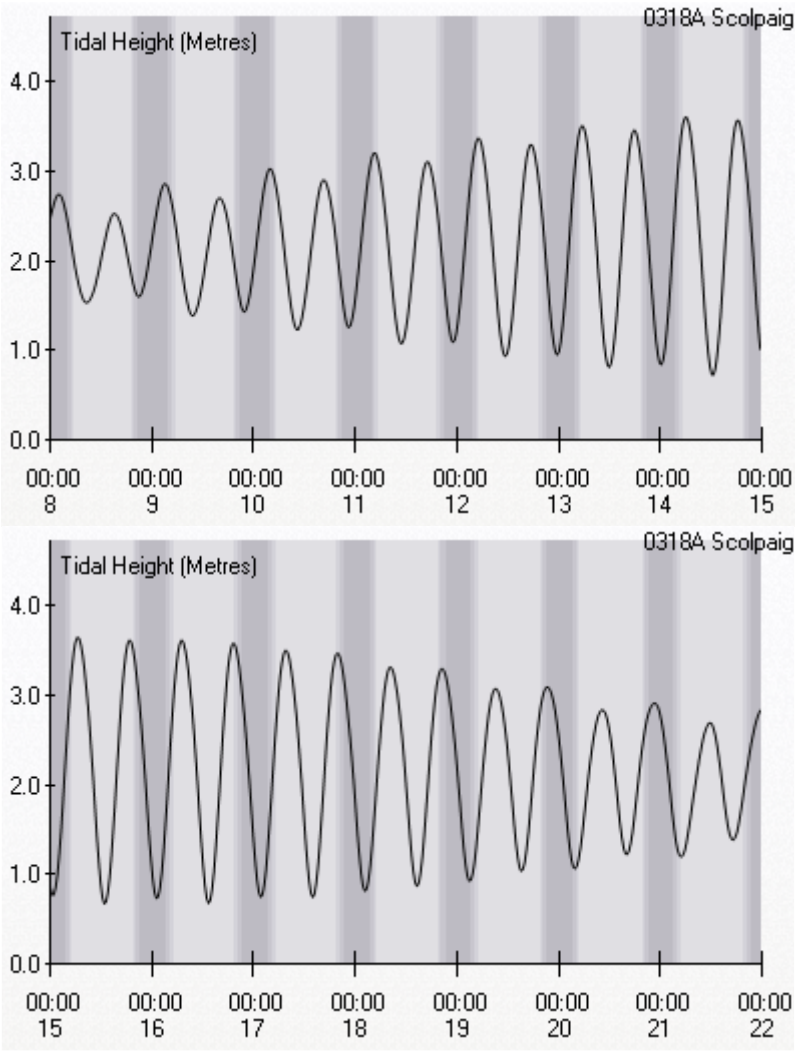

Figure 8.2 Tidal curves for Scolpaig

The following is the UKHO summary description for Scolpaig:

The tide type is Semi-Diurnal.

MHWS	4.5 m
MHWN	3.8 m
MLWN	1.5 m
MLWS	0.7 m

Predicted heights are in metres above chart datum. The tidal range at spring tide is therefore approximately 3.0 m and at neap tide 3.1 m.

8.2 Currents

On the flood tide, water will enter through the main channels located on either side of the island of Vallay and flood over the intertidal areas from the shallow channels. The reverse will occur on the ebb tide. The incoming tide will flow

around Vallay, with a larger proportion of flow curving round the east side of the island. Current speeds are likely to be higher around the west side of Vallay, where the channel is more constricted.

8.3 Conclusions

Contamination arising within the area will be taken across the sands on the ebb tide, principally towards the east side of Vallay. Contamination from the source on the east side of the area will be taken towards the south-eastern corner on the flood tide. Due to the shallow nature of the area, dilution will be low. As the area largely dries at low tide, little contamination will remain in the area from one tide to another.

9. Shoreline Survey Overview

A restricted shoreline survey of the eastern and southwestern shoreline at Vallay was undertaken by staff from Comhairle nan Eilean Siar Council on the 14th April and 11th May 2010.

No septic tanks or sewage outfall pipes were observed during the shoreline survey.

Sub-surface seawater samples were taken from the eastern, western and southern points of the cockle bed. All of the samples returned results of <10 *E. coli* cfu/100ml.

Freshwater samples were taken at any streams or burns observed to be flowing at the time. The majority of the streams were located on the eastern shoreline and the remaining on the south western shoreline of the cockle bed. The streams discharging into the eastern shoreline of the cockle bed had fresh water results varying from 70 to 310 *E. coli* cfu/100 ml. The highest result of 3900 *E. coli* cfu/100 ml was taken from the stream discharging onto the southern side of the cockle bed close to Bocarubha. The stream located furthest west had the lowest result of 30 *E. coli* cfu/100 ml.

During the shoreline survey three common cockle samples were collected from eastern, western and southern parts of the cockle bed. The samples taken from the eastern and western sides of the cockle bed both had results of 490 *E. coli* MPN/100 g and the other sample taken towards the southern end of the cockle bed had a lower result of 70 *E. coli* MPN/100 g.

Aside from the stream located at Bocarubha, the shellfish sample results taken from the eastern and western sides of the cockle bed indicated higher levels of faecal contamination were entering the sea in this area than found in the stream freshwater samples.

On the eastern shoreline of the cockle bed, close to Malacleit a small farm and 50 sheep were observed. Slightly further north of Malacleit an additional 30 sheep were observed. Approximately 40 cattle were observed on the island of Vallay. In addition to livestock certain wildlife including gulls, oyster catchers, geese, waders and other seabirds were also observed.

A map is provided in Figure 9.1 that shows the relative locations of the most significant findings of the shoreline survey. These findings only represent the selected area surveyed on the day of the shoreline survey and not the entire shoreline surrounding the area in which the fishery is located.

In summary, identified sources of potentially significant contamination were:

- Freshwater streams flowing into the east and south-southwest sides of the cockle bed
- Livestock grazing on the eastern shoreline and island of Vallay

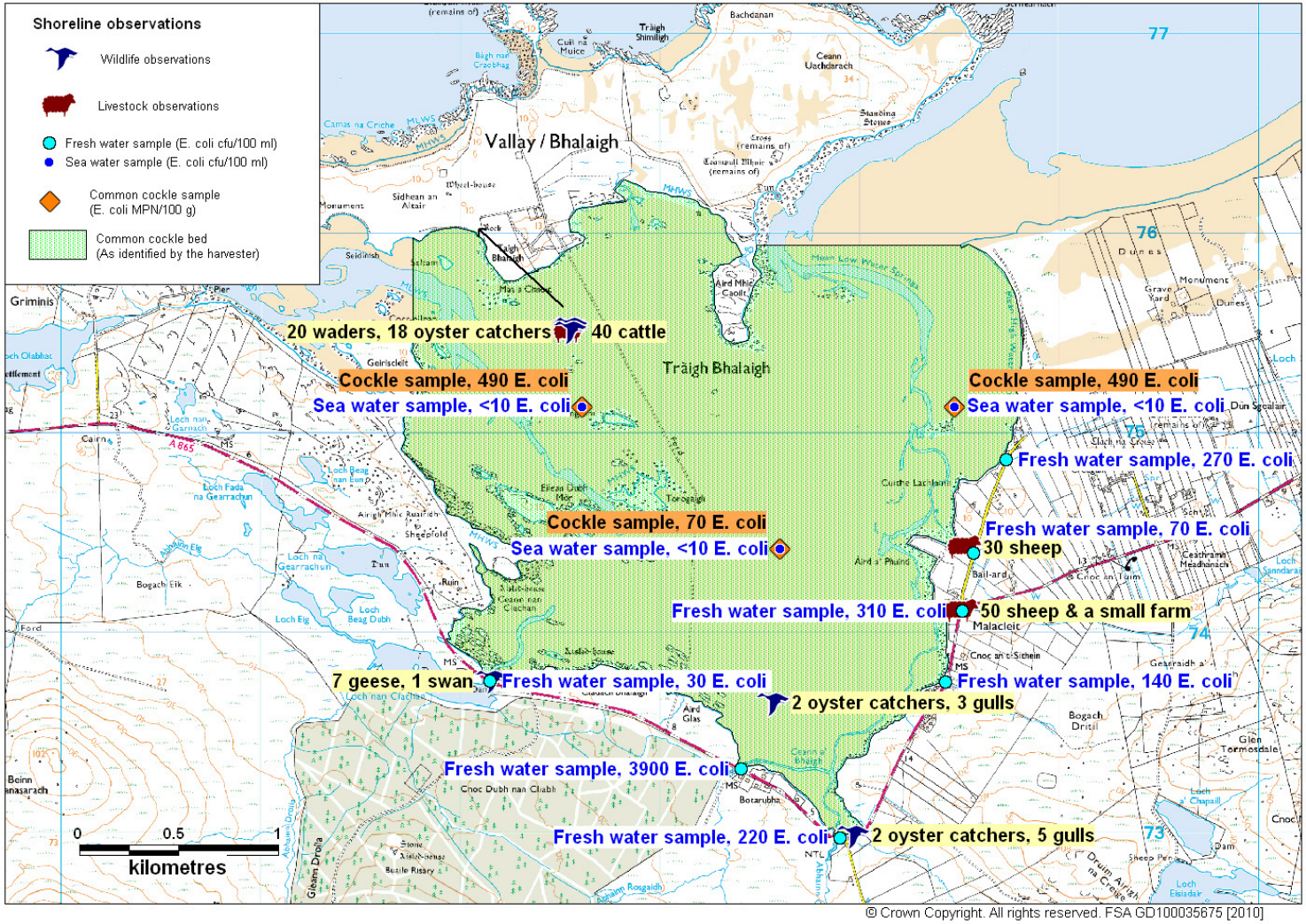

Figure 9.1 Summary of shoreline observations

10. Overall Assessment

Fishery

The cockle bed was identified by the harvester on the classification application form as the beach at Tràigh Bhalaigh (Vallay) centred around NF 780 750. The cockles will be hand raked and harvesting is expected to take place throughout the year.

Human sewage inputs

A large number of discharge consents were provided by SEPA for the area surrounding the Vallay cockle bed. The majority of these discharge consents are soakaways, 12 of which are within 400 m of the shoreline and could therefore have the potential to impact the fishery. There are also 5 private septic tank discharges to the sea. All the discharges are located on the south/south east side of the Vallay cockle bed. None of these were confirmed during the shoreline survey. The location of the septic tanks and soakaways match the distribution of the population on the surrounding south/south east side of Vallay.

Any impact from sewage inputs will be likely to be greatest at the south, south east side of the cockle bed, as this is where a significant number of the private septic tank discharges are located. Overall the discharges would be expected to provide a significant potential source of contamination to this side of the shellfishery.

Agricultural inputs

During the shoreline survey, on the eastern shoreline of the cockle bed, close to Malacleit, a small farm and 50 sheep were observed. Slightly further north of Malacleit an additional 30 sheep were observed. From the intertidal zone, approximately 40 cattle were observed on the island of Vallay. No other livestock was observed at the time of the shoreline survey. Often the sheep and cattle were close and/or had access to the shoreline and were close to fresh watercourses. Therefore, agricultural sources may be a significant source of contamination to the area. On the basis of these observations, the risk of contamination of the shellfishery from livestock sources will be greatest south of the island of Vallay and on the east side of the cockle bed, adjacent to Malacleit.

Wildlife inputs

During the shoreline survey gulls, oyster catchers, waders, geese and other seabirds were observed on and around the Vallay cockle bed. These seabirds were mainly observed at the north end of the cockle bed near the island on Vallay and along the southern end of the cockle bed. The distribution and numbers of additional species was not investigated. On the basis of the shoreline survey observations, the risk of contamination of the shellfishery from wild birds will be greatest at the far northern and southern end of the cockle bed. However, this does not provide information as to whether this difference in bird density applies more generally than just at the time of the survey.

Rainfall

Rainfall patterns at North Uist: Clachan na Luib (the nearest rainfall station) show that seasonal variation in rainfall levels occurs and the wettest months were August to January. An increase in rainfall following a dry period may be expected to wash a flush of bacteria from the surrounding land into the production area. The highest risk of this type of event is during July and August, when lower average daily rainfall and extreme daily rainfall events are most likely to occur. The impact of rainfall events is likely to be most acute nearest where the streams enter the shellfish bed.

Rivers and streams

During the shoreline survey, seven fresh water streams were observed discharging into the cockle bed. The Ordnance Survey map indicates that there are potentially 9-10 fresh water streams in total discharging onto the cockle bed. The streams discharging into the eastern shoreline of the cockle bed had fresh water results varying from 70 to 310 *E. coli* cfu/100 ml. The highest result of 3900 *E. coli* cfu/100 ml was taken from the stream discharging onto the southern side of the cockle bed close to Bocarubha. These results indicate that *E. coli* contamination of the fresh watercourses was therefore relatively low on the day of the survey, with the exception of the stream next to Bocarubha, which would be expected to have a significant impact on the shellfishery. It would be expected that levels of faecal contamination in all of the streams would increase significantly after greater periods of rainfall. However, these samples represented conditions at one point in time only and contamination levels present in the identified watercourses could vary considerably from these values.

Analysis of results

There are no historical *E. coli* monitoring results for Vallay.

During the shoreline survey three common cockle samples were collected from eastern, western and southern parts of the cockle bed. The samples taken from the eastern and western sides of the cockle bed both had results of 490 *E. coli* MPN/100 g and the other sample taken towards the southern end of the cockle bed had a result of 70 *E. coli* MPN/100 g.

A total of three seawater samples were taken from the eastern, western and southern points of the cockle bed. All of the samples returned results of <10 *E. coli* cfu/100ml.

Movement of contaminants

Contamination arising on the eastern and south-eastern sides of the cockle bed will mainly impact on those parts of the bed on both the flooding and ebbing tides.

Overall conclusions

The main identified sources of human and animal contamination were located on the eastern and south-eastern shores of the area and would impact on the parts of the cockle bed nearest to them.

11. Recommendations

Production Area

The recommended production area boundaries are: the area bounded by lines drawn between NF 7849 7600 and NF 7979 7600 and between NF 7654 7595 and NF 7654 7554 and extending to MHWS.

RMP

It is recommended that the RMP be set at NF 7890 7370. This is situated towards the southern end of the fishery where most of the potential sources of contamination are located.

Tolerance

As there is likely to be variation in cockle density across the Vallay area, it is recommended that a 100 m tolerance be allowed for sampling. This will allow for some variability in density while still ensuring that monitoring is undertaken reasonably close to the assigned RMP.

Frequency

As there is no historical monitoring data for the area and some seasonal variation in sources of contamination is expected, it is recommended that monthly monitoring be undertaken until sufficient data has been accumulated to permit a review.

The locations of the recommended production area boundaries, RMP and tolerance zone are illustrated in Figure 11.1.

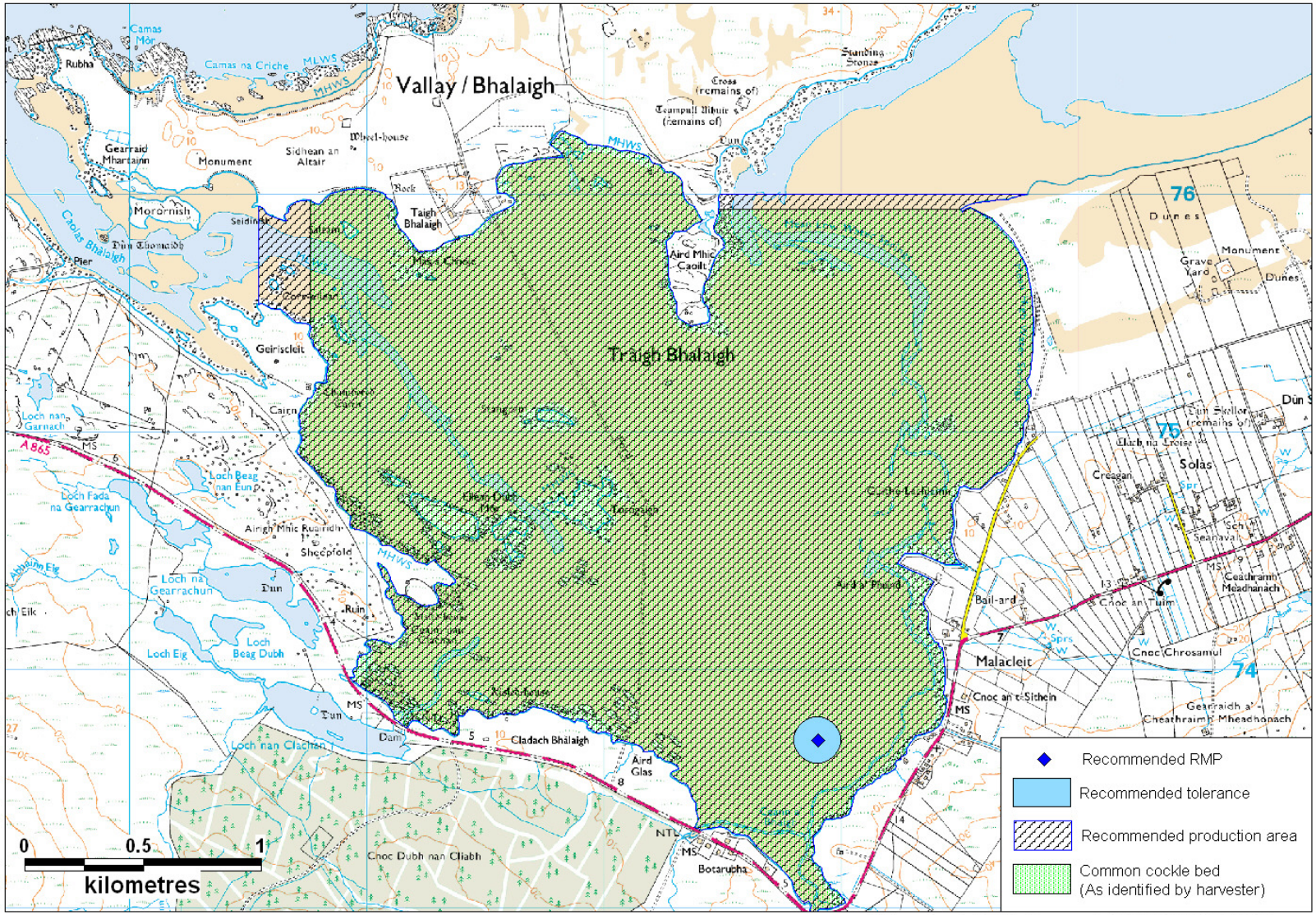

Figure 11. Vallay Recommendations

12. References

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Mallin, M.A., Ensign, S.H., McIver, M.R., Shank, G.C., Fowler, P.K. (2001). Demographic, landscape, and meteorological factors controlling the microbial pollution of coastal waters. *Hydrobiologia* 460, 185-193.

OPSI (Office of Public Sector Information) http://www.opsi.gov.uk/legislation/scotland/ssi2009/ssi_20090444_en_1 *The Inshore Fishing (Prohibition of Fishing for Cockles) (Western Isles) (Scotland) Order 2009* Accessed online 12/05/10

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Sampling Plan - Vallay

PRODUC-TION AREA	SITE NAME	SIN	SPECIES	TYPE OF FISH-ERY	NGR OF RMP	EAST	NORTH	TOLE R-ANCE (M)	DEPTH (M)	METHOD OF SAMPLING	FREQ OF SAMPLING	LOCAL AUTHORITY	AUTHORISED SAMPLER(S)	LOCAL AUTHORITY LIAISON OFFICER
Vallay	Traigh Bhalaigh Site 2	UB 490 847 04	Common cockles	Wild	NF 7890 7370	78900	873700	100	N/A	Hand raked	Monthly	CnES	Samantha Muir	Samantha Muir

Comparative Table of Boundaries and RMPs – Vallay

Production Area	Species	SIN	Existing Boundary	Existing RMP	New Boundary	New RMP	Comments
Vallay	Common cockles	UB 490 847 04	N/A	N/A	The area bounded by lines drawn between NF 7849 7600 and NF 7979 7600 and between NF 7654 7595 and NF 7654 7554 and extending to MHWS.	NF 7890 7370	New production area and RMP

Shoreline Survey Report

Vallay
UB 490

Scottish Sanitary Survey Project
Restricted Survey

Shoreline Survey Report

Production area:	Vallay
Site name:	Traigh Bhalaigh Site 2
Species:	Common Cockles (*Cerostoderma edule*.).
Harvester:	Duncan MacInnes
Local Authority:	CnES
Status:	New site
Date Surveyed:	Wednesday 14th April 2010 Tuesday 11th May 2010
Surveyed by:	Samantha Muir
Existing RMP:	NA
Area Surveyed:	See Figure 1.

Weather observations

Wednesday 14th April: Sunny and dry, with no rain in previous week.
Tuesday 11th May: Changeable weather. Sunshine then showers of hail, sleet and snow. Cold northerly wind. A few rain showers in the previous week.

Site Observations

Fishery

The Vallay production area is harvested for common cockles (*Cerostoderma edule*). The common cockles are hand raked within the sands of Traigh Bhalaigh, shown in Figure 1. The harvesters plan to harvest the razors all year round.

Sewage/Faecal Sources

There are no large settlements surrounding Vallay. Human population is spread through scattered dwellings around the production area. No sewage outfall pipes or septic tanks were observed during the shoreline survey.

Seasonal Population

There are no caravan parks or campsites in the area surrounding Vallay, A large B&B and a small self catering house were located on the eastern coastline, south of Malacleit.

Boats/Shipping

At the time of the shoreline survey no boats were observed in Vallay.

Land Use

The land surrounding Vallay is mainly croft land primarily used for grazing sheep and some cattle and dunes with an area of coniferous woodland located on the south west coastline.

Livestock

On the eastern shoreline of the cockle bed, close to Malacleit a small farm and 50 sheep were observed. Slightly further north of Malacleit an additional 30 sheep were observed. From the intertidal zone, approximately 40 cattle were observed on the island of Vallay. No other livestock was observed at the time of the shoreline survey.

Wildlife/Birds

During the shoreline survey gulls, oyster catchers, geese, waders and other seabirds were observed on and around the Vallay area.

Observations can be found in Table 1.

Figure 1. Shoreline Observations

Table 1. Shoreline Observations

No.	Date	Time	NGR	East	North	Associated photograph	Description
1	14/04/2010	10:00	NF 79753 74894	79753	874894	-	Start of shoreline survey walk
2	14/04/2010	10:30	NF 79522 74422	79522	874422	-	Surrounding area is grazing land with 30 sheep, 4 croft houses
3	14/04/2010	10:35	NF 79512 74104	79512	874104	-	At road junction, 4 houses, small farm, 50 sheep
4	14/04/2010	10:40	NF 79429 73753	79429	873753	-	9 houses, 1 large B&B plus small self catering guest house
5	14/04/2010	10:45	NF 78968 72979	78968	872979	Figure 4.	2 oyster catchers, 5 gulls, 3 houses, culvert under road W 1.2 m
6	14/04/2010	11:00	NF 78563 73644	78563	873644	-	2 oyster catchers, 3 gulls
7	14/04/2010	11:40	NF 77156 73753	77156	873753	-	Pond and loch on the other side of the road, 7 geese, 1 swan. Tunnel under road, W 1.2 m
8	14/04/2010	11:45	NF 78092 73662	78092	873662	-	Tracks across sand to Vallay/Bhalaigh
9	14/04/2010	12:10	NF 77556 75522	77556	875522	-	4 oyster catchers
10	14/04/2010	12:30	NF 77550 75503	77550	875503	-	20 waders, 14 oyster catchers, approx. 40 cattle & derelict house/mansion visible on Vallay
11	11/05/2010	08:45	NF 77149 73752	77149	873752	Figure 5.	Fresh water stream sample VFW7, W 15, D 0.05-0.20. Rocky, not able to measure flow.
12	11/05/2010	08:55	NF 78406 73312	78406	873312	Figure 6.	Fresh water stream sample VFW6, W 15.8, D 0.02-0.12, virtually no flow
13	11/05/2010	09:00	NF 78900 72968	78900	872968	Figure 7.	Fresh water stream sample VFW5, W 6.7, D 0.01-0.03
14	11/05/2010	09:05	NF 79432 73751	79432	873751	Figure 8.	Fresh water stream sample VFW4, W 0.95, D 0.02-0.15. Rocky, not able to measure flow.
15	11/05/2010	09:10	NF 79516 74103	79516	874103	Figure 9.	Fresh water stream sample VFW3. Culvert.
16	11/05/2010	09:15	NF 79573 74397	79573	874397	Figure 10.	Fresh water stream sample VFW2, W 3.9, D 0.03-0.05. Rocky, not able to measure flow.
17	11/05/2010	09:20	NF 79729 74868	79729	874868	Figure 11.	Fresh water stream sample VFW1, W 1.1, D 0.01-0.12. Rocky, not able to measure flow.
18	11/05/2010	09:30	NF 79476 75130	79476	875130	-	Sea water sample VSW1, Cockle sample VC1
19	11/05/2010	09:50	NF 78604 74417	78604	874417	-	Sea water sample VSW2, Cockle sample VC2
20	11/05/2010	10:30	NF 77611 75130	77611	875130	-	Sea water sample VSW3, Cockle sample VC3

Photographs referenced in the table can be found attached as Figures 4 – 11.

Sampling

Water and shellfish samples were collected at sites marked on the map. Bacteriology results follow in Tables 2 and 3.

Seawater samples were tested for salinity using a hand held refractometer. These readings are recorded in Table 1 as salinity in parts per thousand (ppt).

Samples were also tested for salinity by the laboratory using a salinity meter under more controlled conditions. These results are shown in Table 2, given in units of grams salt per litre of water. This is the same as ppt.

Table 2. Water Sample Results

No.	Date	Sample	Grid Ref	Type	E. coli (cfu/100ml)	Salinity (g/L)
1	11/05/2010	VSW1	NF 79476 75130	Sea water	<10	37
2	11/05/2010	VSW2	NF 78604 74417	Sea water	<10	37
3	11/05/2010	VSW3	NF 77611 75130	Sea water	<10	29
4	11/05/2010	VFW1	NF 79736 74862	Fresh water	270	-
5	11/05/2010	VFW2	NF 79573 74397	Fresh water	70	-
6	11/05/2010	VFW3	NF 79516 74103	Fresh water	310	-
7	11/05/2010	VFW4	NF 79432 73751	Fresh water	140	-
8	11/05/2010	VFW5	NF 78900 72968	Fresh water	220	-
9	11/05/2010	VFW6	NF 78406 73312	Fresh water	3900	-
10	11/05/2010	VFW7	NF 77149 73752	Fresh water	30	-

Table 3. Shellfish Sample Results

No.	Date	Sample	Grid Ref	Type	E. coli (MPN/100g)
1	11/05/2010	VC1	NF 79476 75130	Common cockles	490
2	11/05/2010	VC2	NF 78604 74417	Common cockles	70
3	11/05/2010	VC3	NF 77611 75130	Common cockles	490

Figure 2. Water sample results

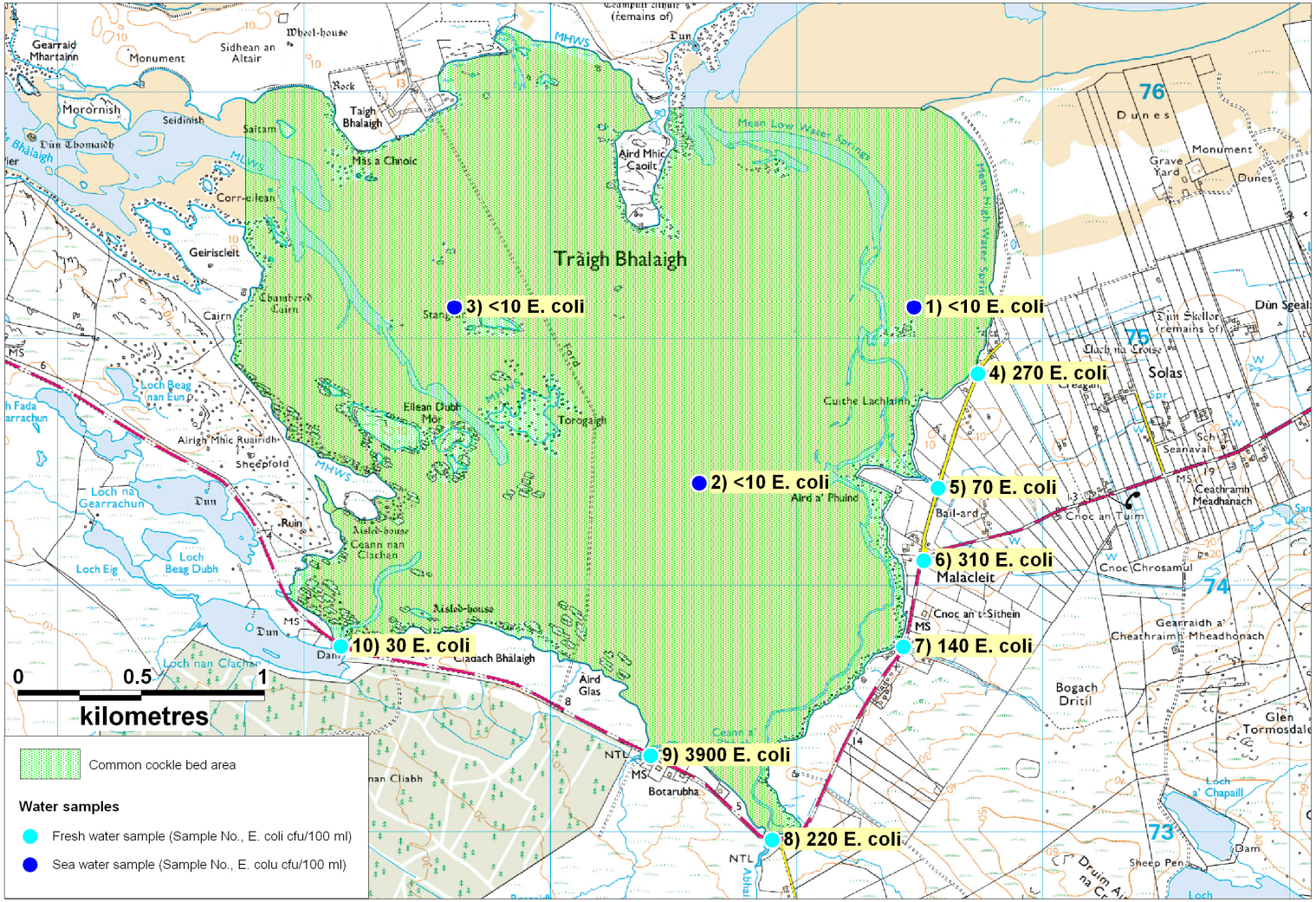
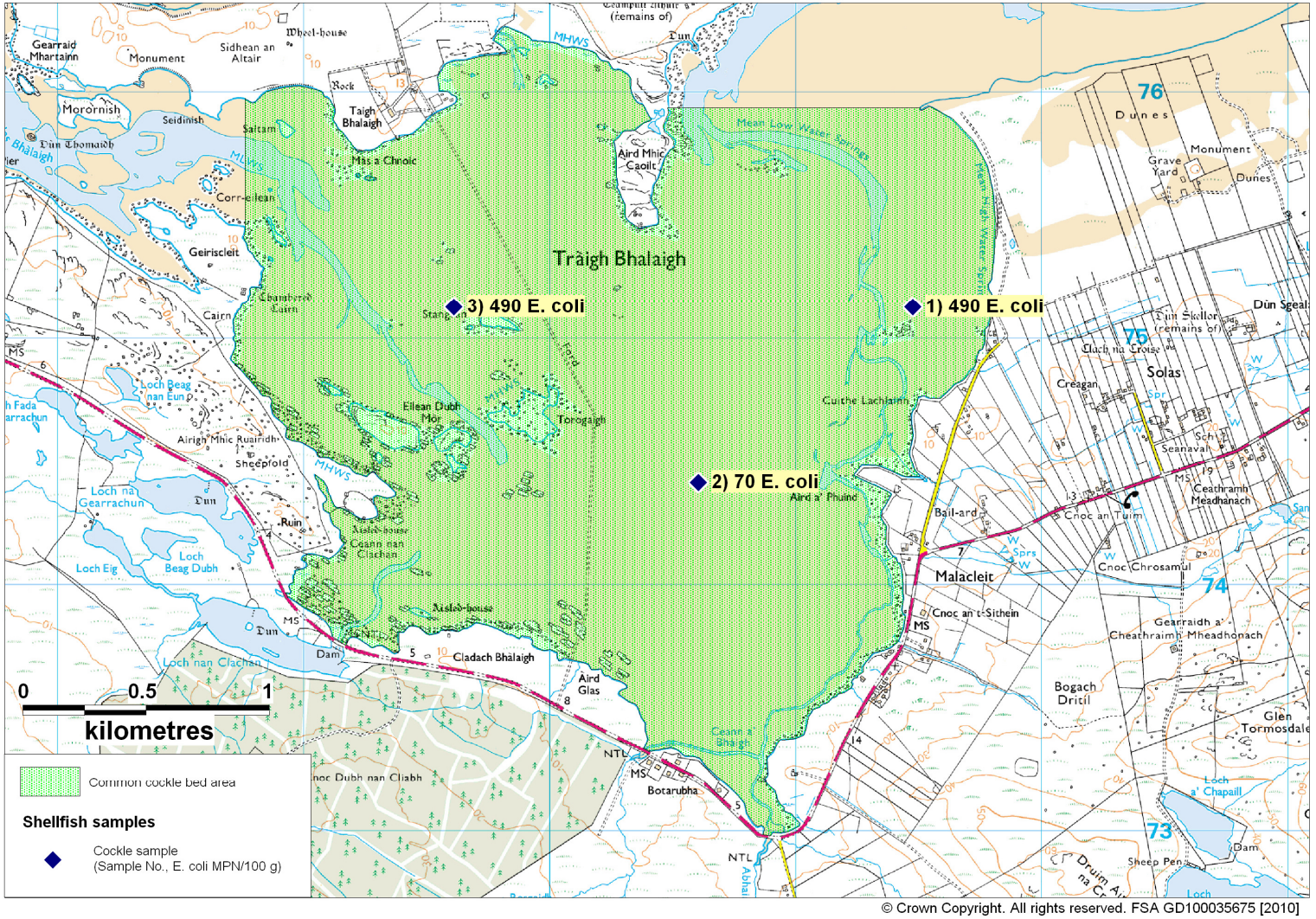


Figure 3. Shellfish sample results



Photographs

Figure 4. Culvert flowing under road

Figure 5. Location of fresh water sample VFW7

Figure 6. Location of fresh water sample VFW6

Figure 7. Location of fresh water sample VFW5

Figure 8. Location of fresh water sample VFW4

Figure 9. Location of fresh water sample VFW3

Figure 10. Location of fresh water sample VFW2

Figure 11. Location of fresh water sample VFW1

SEPA Discharge Consents – Soakaways

No.	Consent No.	NGR of discharge	Discharge Type	Close/Far Soakaway	Discharges to
1	CAR/R/1049468	NF 79785 74992	Sewage (Private) Primary	Close soakaway	Machair House, STE to soakaway, 4 Malaclete, Isle Of North Uist
2	CAR/R/1051294	NF 79690 74820	Sewage (Private) Primary	Close soakaway	Oir Na Mara, STE to Soakaway, Isle of North Uist
3	CAR/R/1059898	NF 79750 74220	Sewage (Private) Primary	Close soakaway	Balard, STE to soakaway, Malaglate, Isle of North Uist
4	CAR/R/1046768	NF 79551 74162	Sewage (Private) Primary	Close soakaway	10 Malaglate, STE to soakaway, Isle of North Uist
5	CAR/R/1048209	NF 79479 74183	Sewage (Private) Primary	Close soakaway	Aird A Phunid, STE to soakaway, Isle of North Uist
6	CAR/R/1059923	NF 79452 74178	Sewage (Private) Primary	Close soakaway	11 Malaglate, STE to soakaway, Sollas, Isle of North Uist
7	CAR/R/1059677	NF 79450 74070	Sewage (Private) Primary	Close soakaway	Cnoc Sitheil, STE to Soakaway, Isle of North Uist
8	CAR/R/1059845	NF 79490 73880	Sewage (Private) Primary	Close soakaway	12 Malaglate, STE to soakaway, Isle of North Uist
9	CAR/R/1056616	NF 79401 73656	Sewage (Private) Primary	Close soakaway	Free Church Mission House, STE to Soakaway, Sollas
10	CAR/R/1060173	NF 79380 73630	Sewage (Private) Primary	Close soakaway	Strvan, STE to Soakaway, Sollas
11	CAR/R/1065269	NF 79160 73200	Sewage (Private) Primary	Close soakaway	Gwel Y Don, STE to soakaway, 5 Malaglate, Isle of North Uist
12	CAR/R/1059507	NF 78990 73210	Sewage (Private) Primary	Close soakaway	Gearraidh Iain, STE to soakaway, Malaglate, Isle of North Uist
13	CAR/R/1049555	NF 75300 76080	Sewage (Private) Primary	Close soakaway	Callernish House, STE to soakaway, Griminish
14	CAR/R/1064907	NF 80530 74693	Sewage (Private) Primary	Far soakaway	4 Middlequarter, STE to soakaway, Isle Of North Uist
15	CAR/R/1059903	NF 80430 74760	Sewage (Private) Primary	Far soakaway	6 Middlequarter, STE to soakaway, Isle of North Uist
16	CAR/R/1059879	NF 80672 74685	Sewage (Private) Primary	Far soakaway	Garadh Mor, STE to soakaway, 1 Middlequarter, North Uist

No.	Consent No.	NGR of discharge	Discharge Type	Close/Far Soakaway	Discharges to
17	CAR/R/1057018	NF 80512 74992	Sewage (Private) Primary	Far soakaway	Clach na Croise, STE to Land, Sollas, Isle of North Uist
18	CAR/R/1059606	NF 80729 74624	Sewage (Private) Primary	Far soakaway	Dunskellar Schoolhouse, STE to soakaway, Isle of North
19	CAR/R/1056276	NF 80510 74550	Sewage (Private) Primary	Far soakaway	Daisy Bank, STE to soakaway, 5 Middlequarter, Isle of North Uist
20	CAR/R/1075770	NF 80790 75020	Sewage (Private) Primary	Far soakaway	Dunskellar School, STE to soakaway, Sollas, Isle Of North Uis
21	CAR/R/1061918	NF 80717 74497	Sewage (Private) Primary	Far soakaway	Cnoc Nan Uan, STE to soakaway, 1 Middlequarter, Isle of North Uist
22	CAR/R/1049918	NF 80260 74630	Sewage (Private) Primary	Far soakaway	10 Middlequarter, STE to soakaway, Isle of North Uist
23	CAR/R/1057709	NF 80683 74476	Sewage (Private) Primary	Far soakaway	Cnoc an Locha, STE to soakaway, Sollas, Isle of North Uist
24	CAR/R/1049465	NF 80169 74764	Sewage (Private) Primary	Far soakaway	Tigh A Bhruaich, STE to soakaway, 11 Middlequarter, Isle Of North Ui
25	CAR/R/1068549	NF 80860 74550	Sewage (Private) Primary	Far soakaway	3 Sollas, STE to Land, Isle of North Uist
26	CAR/R/1067508	NF 80330 74490	Sewage (Private) Primary	Far soakaway	Quirang, 10 Middlequater, STE To soakaway, Isle Of North Vist
27	CAR/R/1059900	NF 81070 74660	Sewage (Private) Primary	Far soakaway	Park Cottage, STE to soakaway, Isle of North Uist
28	CAR/R/1056618	NF 80279 74381	Sewage (Private) Primary	Far soakaway	12 Middlequarter, STE to soakaway, Isle of North Uist
29	CAR/R/1079130	NF 80217 74380	Sewage (Private) Primary	Far soakaway	1 Malaclate, STE to soakaway, Isle Of North Uist
30	CAR/R/1076172	NF 81229 74730	Sewage (Private) Primary	Far soakaway	Sheillaidh, STE to soakaway, 8 Sollas, Isle of North Uist
31	CAR/R/1032229	NF 81230 75030	Sewage (Private) Primary	Far soakaway	Havisgarry, STE to soakaway, Sollas, Isle of North Uist
32	CAR/R/1020153	NF 81265 74745	Sewage (Private) Primary	Far soakaway	8 Sollas, STE to land, Isle of North Uist

No.	Consent No.	NGR of discharge	Discharge Type	Close/Far Soakaway	Discharges to
33	CAR/R/1075900	NF 81250 75050	Sewage (Private) Primary	Far soakaway	Arvillas Rock, STE to Soakaway, Sollas
34	CAR/R/1060027	NF 80055 74267	Sewage (Private) Primary	Far soakaway	7 Malaglate, STE to Soakaway, Sollas, Isle of North Uist
35	CAR/R/1075685	NF 81400 74870	Sewage (Private) Primary	Far soakaway	Oceanview, STE to soakaway, Sollas
36	CAR/R/1066699	NF 81440 74899	Sewage (Private) Primary	Far soakaway	Primrose Cottage, STE to Soakaway, Sollas, Isle of North Uist
37	CAR/R/1059891	NF 79850 74260	Sewage (Private) Primary	Far soakaway	8 Malaglate, STE to soakaway, Isle of North Uist
38	CAR/R/1059895	NF 79811 74246	Sewage (Private) Primary	Far soakaway	9 Malaglate, STE to soakaway, Isle of North Uist
39	CAR/R/1049559	NF 75209 75680	Sewage (Private) Primary	Far soakaway	Olabhat House, STE to soakaway, Griminish