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Radiological Habits Survey: Wylfa, 2013

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Radiological Habits Survey: Wylfa, 2013

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Final report

Radiological Habits Survey: Wylfa, 2013

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SUMMARY

This report presents the results of a survey conducted in 2013 to determine the habits and consumption patterns of people living, working and pursuing recreational activities in the vicinity of the Wylfa nuclear power station. The site discharges gaseous radioactive waste via stacks to the atmosphere, liquid radioactive waste via a culvert into the Irish Sea and contains sources of direct radiation. Areas likely to be most affected by the discharges and sources of radiation were defined as the aquatic survey area for liquid discharges, the terrestrial survey area for the deposition from gaseous discharges, and the direct radiation survey area for ionising radiation emanating directly from the site. The occupancy data collected from the direct radiation survey area is also applicable to the direct exposure arising from gaseous releases from the site.

The following potential exposure pathways were investigated:

- The consumption of food from the aquatic survey area
- Activities and occupancy over intertidal substrates
- The handling of fishing gear and sediment
- Activities and occupancy in and on water
- The use of seaweed as a fertiliser or animal feed
- The consumption of food from the terrestrial survey area
- The use and destination of produce originating from the survey areas
- The consumption and use of groundwater and surface water in the terrestrial survey area
- The transfer of contamination off-site by wildlife
- Activities and occupancy within the direct radiation survey area
- Any new or unusual exposure pathways

Interviews were conducted with members of the public and data collected for 357 individuals are presented and discussed. High rates of consumption, intertidal occupancy and handling are identified using established methods comprising (a) a 'cut off' to define the high-rate group and (b) 97.5th percentiles. The rates so identified can be used in dose assessments. Additionally, profiles of integrated habits data are presented specifically for use in total dose assessments.

The aquatic survey area

The aquatic survey area (see Figure 1) covered the intertidal areas along the northern coast of Anglesey from Carmel Head in the west, to Point Lynas in the east, and the adjacent sea area up to 6 km offshore.

Foods from the aquatic survey area were consumed from the following food groups: fish; crustaceans; molluscs. The mean consumption rates for the adult high-rate groups for the separate aquatic consumption pathways for foods potentially affected by liquid discharges were:

- 33 kg y^{-1} for fish
- 7.9 kg y^{-1} for crustaceans
- 1.8 kg y^{-1} for molluscs

The predominant foods consumed by the people in the high-rate groups were:

- For fish: bass, cod, mackerel, pollack and whiting
- For crustaceans: brown crab, common lobster and common prawn
- For molluscs: king scallop

The mean consumption rates for the adult high-rate groups for fish, crustaceans and molluscs were all less than the corresponding generic 97.5th percentile rates.

Four adults were identified who consumed vegetables that had been grown in soil fertilised with seaweed and two of these individuals also consumed domestic fruit that had been fertilised with seaweed. Sheep were deliberately allowed to access the shore at Hen Borth to graze on seaweed.

The activities undertaken by adults in the high-rate groups for intertidal occupancy included boat maintenance, fixing moorings, angling, collecting winkles, collecting limpets, walking, dog walking, beach warden duties and nature reserve warden duties. Gamma dose rate measurements were taken at most locations in the aquatic survey area where activities were occurring. The only activity undertaken by adults in the high-rate group for handling fishing gear was handling pots and the only activity undertaken by adults in the high-rate group for handling sediment was fixing moorings. The activities undertaken by people in and on the water included sub-aqua diving, kayaking, jet-skiing, wake boarding, swimming, skippering a charter boat, pleasure cruising, canoeing, boat angling, being on a dive boat, potting, sailing and rowing.

The terrestrial survey area

The terrestrial survey area (see Figure 2) covered the land and freshwater watercourses within 5 km of the centre of the Wylfa site. Thirty-two farms were identified that farmed the land in the terrestrial survey area. They produced milk (from dairy cattle), beef cattle, lambs and pigs. Silage and arable crops were grown on some farms for use as animal feed. Five smallholdings produced small quantities of sheep, lambs, beef cattle, pigs, chicken eggs and duck eggs. A small vineyard produced wine and chutneys. The farmers and their families consumed foods that were produced commercially on their land and also other foods that they produced solely for their own consumption. Two small allotment sites with approximately 24 plots in total and several private gardens were identified where a variety of fruit and vegetables were grown. Three gardeners kept chickens or ducks for eggs. Two

beekeepers were identified who kept hives in the survey area and the consumption of honey was recorded. Shooting took place on farmland in the area and the shot birds were consumed. Wild/free foods and wild fungi were collected and consumed. Small quantities of freshwater fish and freshwater plants were being consumed from waters in the terrestrial survey area.

Foods from the terrestrial survey area were consumed from the following food groups: green vegetables; other vegetables; root vegetables; potato; domestic fruit; milk; cattle meat; pig meat; sheep meat; poultry; eggs; wild/free foods; honey; wild fungi; freshwater fish; freshwater plants. None of the mean consumption rates for the adult high-rate groups were greater than the generic 97.5th percentile consumption rates. No consumption of rabbits/hares or venison was identified.

The human consumption of spring water and well water was identified at four residences located in the centre and east of the survey area. Livestock were identified drinking water from boreholes, wells, springs, streams, ditches and lakes.

Control measures taken by the site operator in order to limit the possibility that contamination is transferred off-site by wildlife included deterring wildlife from entering controlled areas by means of tarmac or concrete surfaces that prevented burrowing, tight security fencing and automatic doors and discouraging birds by playing recordings of gull distress calls and using a falconer and birds of prey.

The direct radiation survey area

The direct radiation survey area (see Figure 2) covered the land and water within 1.2 km of the Wylfa nuclear licensed site boundary. (The direct radiation survey area was extended from the area within 1.0 km of the site boundary, which is usually used for habits surveys, up to the area within 1.2 km of the site boundary, in order to include more residential properties within the survey area, since there were very few within 1.0 km of the site.) Occupancy rates were obtained for residents, visitors, and people working, farming and undertaking recreational activities in the area.

The occupancy rates were analysed in zones according to the distance from the Wylfa nuclear licensed site boundary. The highest indoor, outdoor and total occupancy rates in the 0 – 0.25 km zone were for two people working in the area. No indoor occupancy was identified in the >0.25 – 0.5 km zone and the highest outdoor and total occupancy rates in this zone were for two farmers. The highest indoor and total occupancy rates in the >0.5 – 1.2 km zone were for the same resident and the highest outdoor occupancy rate in this zone was for a resident who also farmed in the area.

Gamma dose rate measurements were taken indoors and outdoors at most properties where interviews were conducted in the direct radiation survey area. Background readings were taken at distances beyond 5 km of the Wylfa site centre.

Comparisons with the previous survey

Comparisons were made with the results from a previous habits survey undertaken around the Wylfa site in 2009. Reasons for changes in the consumption, occupancy and handling rates were identified for certain pathways and these are presented in Section 8.

In the aquatic survey area in 2013, compared with 2009, the mean consumption rates for the adult high-rate groups for fish increased, from 29 kg y^{-1} to 33 kg y^{-1}, for crustaceans decreased, from 16 kg y^{-1} to 7.9 kg y^{-1}, and for molluscs decreased, from 6.9 kg y^{-1} to 1.8 kg y^{-1}. The consumption of marine plants/algae was identified in 2009 but was not identified in 2013.

The mean intertidal occupancy rate for the adult high-rate group over mud and sand was the same in 2009 and 2013, at 390 h y^{-1}. The mean intertidal occupancy rates for the adult high-rate groups decreased in 2013 compared to 2009 over rock, from 580 h y^{-1} to 260 h y^{-1} and over sand, from 410 h y^{-1} to 370 h y^{-1}. The mean intertidal occupancy rate for the high-rate group over sand and stones increased from 260 h y^{-1} in 2009 to 370 h y^{-1} in 2013. Activities were recorded over mud, sand and stones in 2013, with a mean occupancy rate for the high-rate group of 35 h y^{-1}, but were not recorded over this substrate in 2009. The mean rate for the adult high-rate group for handling fishing gear increased from 1000 h y^{-1} in 2009 to 1300 h y^{-1} in 2013 and the mean rate for the adult high-rate group for handling sediment increased from 180 h y^{-1} in 2009 to 300 h y^{-1} in 2013.

In the terrestrial survey area in 2013, compared with 2009, there were relatively large increases in the mean consumption rates for the adult high-rate groups for pig meat, from 7.9 kg^{-1} to 26 kg^{-1}, for poultry, from 4.5 kg y^{-1} to 8.6 kg y^{-1}, for wild/free foods from 2.2 kg^{-1} to 6.0 kg^{-1}, for honey, from 1.7 kg y^{-1} to 3.4 kg y^{-1}, and for wild fungi, from 0.6 kg y^{-1} to 4.2 kg y^{-1}. There were relatively large decreases in the mean consumption rates for the adult high-rate groups for other vegetables, from 38 kg y^{-1} to 19 kg y^{-1}, for milk, from 160 l y^{-1} to 100 l y^{-1}, for sheep meat, from 26 kg y^{-1} to 12 kg y^{-1}, for eggs, from 21 kg y^{-1} to 13 kg y^{-1}, and for freshwater fish, from 2.5 kg y^{-1} to 0.3 kg y^{-1}. There were small increases in the mean consumption rates for the adult high-rate groups for potatoes and domestic fruit, and there were small decreases for green vegetables and root vegetables. The consumption of cattle meat and freshwater plants were identified in 2013 but not in 2009, and the consumption of rabbits/hares was identified in 2009 but not in 2013. No consumption of venison was identified in either 2009 or 2013.

In the direct radiation survey area the highest total occupancy rate in the 0 - 0.25 km zone was the same in 2009 and 2013, at 1600 h y^{-1}. There was a decrease in the highest total occupancy rate in the >0.25 - 0.5 km zone, from 730 h y^{-1} in 2009 to 370 h y^{-1} in 2013. The highest total occupancy rate in the >0.5 - 1.0 km zone in 2009 was the same as the highest total occupancy rate in the >0.5 – 1.2 km zone in 2013, at 8700 h y^{-1}. Three sets of gamma dose rate measurements taken at the same properties in

2009 and 2013 were compared. The outdoor measurements were all lower in 2013 than in 2009 but there was no consistent pattern to the changes to the indoor measurements between the two years.

Recommendations

Recommendations for changes to the current environmental monitoring programmes are provided. These are based on the information collected during the survey and also take into account the potential radiological significance of the various pathways that were identified. It is suggested that the sample of plaice from the 'fish' food group could be stopped and that the squash sample currently taken from the 'other vegetable' food group could be replaced with a sample of cauliflower or cabbage from the 'green vegetable' food group.

1 INTRODUCTION

The public may be exposed to radiation as a result of the operations of the Wylfa nuclear licensed site either through the permitted discharges of liquid or gaseous radioactive wastes into the local environment, or from radiation emanating directly from the site. This report provides information on activities carried out by members of the public in the vicinity of the Wylfa site, which may influence their radiation exposure. The study has been funded by the Environment Agency, the Food Standards Agency and the Office for Nuclear Regulation in order to support their respective roles in protecting the public from exposure to radiation.

UK policy on the control of radiation exposure has long been based on the recommendations of the International Commission on Radiological Protection (ICRP), which embody the principles of justification of practices, optimisation of protection and dose limitation. Radiological protection of the public is based on the concept of a 'representative person'. This notional individual is defined as being representative of the more highly exposed members of the population. It follows that, if the dose to the representative person is acceptable when compared to dose limits and optimisation, other members of the public will receive acceptable doses, and overall protection to the public is provided from the effects of radiation. The term 'representative person' is equivalent to, and replaces, the term 'average member of the critical group' as recommended by ICRP (ICRP, 2006). The recommendations of the ICRP were updated in 2007 (ICRP, 2007) and, for the public, still include the principle of protecting the individuals most highly exposed to radiation, characterised by the representative person.

1.1 Regulatory framework

Natural Resources Wales regulates the discharges of radioactive waste in Wales under the Environmental Permitting Regulations (UK Parliament, 2010). The regulations take account of the European Union (EU) Basic Safety Standards (BSS) Directive 96/29/Euratom (Commission of the European Communities, 1996) which embody the recommendations of the ICRP, particularly ICRP 60 (ICRP, 1991). A new Basic Safety Standards (BSS) Directive (2013/59/Euratom) was adopted by the EU on 5th December 2013 and the UK Government is required to implement the Directive into UK law by 6th February 2018. Installation and operation of certain prescribed activities can only occur on sites if they are licensed under the Nuclear Installations Act 1965 (as amended) (NIA 65) (UK Parliament, 1965). Since 1st April 2011, the Office for Nuclear Regulation (ONR), has implemented this legislation and is also responsible for regulating, under the Ionising Radiations Regulations 1999 (IRR 99) (UK Parliament, 1999), the exposure of the public to direct radiation from the operations occurring on these sites. Prior to 1st April 2011 these functions were carried out by the Nuclear Installations Inspectorate of the Health and Safety Executive.

Appropriate discharge limits are set by the Environment Agency, on behalf of Natural Resources Wales, after wide-ranging consultations that include the Food Standards Agency. The Food Standards Agency has responsibilities for ensuring that any radioactivity present in food does not compromise food safety and that permitted discharges of radioactivity do not result in unacceptable doses to consumers via the food chain. The Food Standards Agency also ensures that public radiation exposure via the food chain is within EU acceptable limits.

1.2 Radiological protection framework

Dose standards for the public are embodied in the national policy (UK Parliament, 2009a), in guidance from the International Atomic Energy Agency (IAEA), in the Basic Safety Standards for Radiation Protection (IAEA, 1996) and in European Community legislation in the EU BSS Directive 96/29/Euratom (Commission of the European Communities, 1996). The public dose standards were incorporated into UK law in IRR 99. The requirement to observe the conditions laid down in the Basic Safety Standards (BSS) in England and Wales is incorporated in the Environmental Permitting Regulations 2010 (UK Parliament, 2010). These require that the environment agencies ensure, wherever applicable, that:

- All public radiation exposures from radioactive waste disposals are kept As Low As Reasonably Achievable (ALARA), with social and economic factors being taken into account
- The sum of all exposures does not exceed the dose limit of 1 mSv a year
- The dose received from any new source does not exceed 0.3 mSv a year
- The dose received from any single site does not exceed 0.5 mSv a year

The dose limit of 1 mSv per year to the public from all anthropogenic sources other than medical applications is also the recommendation made by the ICRP (ICRP, 2007).

The environment agencies are also required to ensure that the dose estimates are as realistic as possible for the population as a whole and for reference groups of the population. They are required to take all necessary steps to identify the reference groups of the population taking into account the effective pathways of transmission of radioactive substances. Guidance on the principles underlying prospective radiological assessment (i.e. assessments of potential future doses) has been provided by the National Dose Assessment Working Group (NDAWG), which consists of representatives of UK Government Bodies and other organisations with responsibilities for dose assessments (EA, SEPA, DoENI, NRPB and FSA, 2002). NDAWG has also published principles underlying retrospective radiological assessment (i.e. assessment of doses already received from past discharges) (Allott, 2005) and possible methods of carrying out these assessments using the data from combined habits surveys (Camplin *et al.*, 2005). NDAWG agreed that the optimal method for performing retrospective dose assessments would be to use habits profiles (profiling method). This approach is being adopted in Radioactivity in Food and the Environment (RIFE) publications, (e.g. EA, NIEA, FSA and SEPA, 2013), as combined habits surveys are completed. NDAWG has also published reports on the

collection and use of habits survey data in retrospective and prospective dose assessments (NDAWG, 2005; NDAWG 2009); the principles described in these reports are consistent with those used here. More recently, the environment agencies, the Health Protection Agency (now part of Public Health England) and the Food Standards Agency have jointly produced an update of the 2002 interim guidance and principles for assessing doses (EA, SEPA, NIEA, HPA and FSA, 2012).

2 THE SURVEY

2.1 Site activity

Wylfa nuclear power station is located on the north coast of the Isle of Anglesey (Ynys Mon), approximately 2 km west of the village of Cemaes (see Figures 1 and 2). There are two Magnox reactors at the site; Reactor 2 ceased generating electricity in 2012 and Reactor 1 is currently expected to continue generating until 2014, with a possible further extension to 2015, after which the site will be decommissioned. At the time of the habits survey fieldwork Reactor 1 was operating at nominal full load and the other main activity being carried out at the site was the transfer of the useful fuel remaining in Reactor 2 to Reactor 1.

The site is owned by the Nuclear Decommissioning Authority (NDA) and operated by Magnox Ltd. Magnox Ltd is permitted to undertake radioactive substances activities at the Wylfa site under the Radioactive Substances Regulation of the Environmental Permitting Regulations 2010. This includes permission to discharge liquid radioactive wastes via a culvert into the Irish Sea and gaseous radioactive wastes via stacks and other outlets to the atmosphere. The site is licensed for the purposes of operating certain activities prescribed under the Nuclear Installations Act, 1965. The site contains sources of direct radiation. Details of the amounts of gaseous and liquid radioactive waste discharged are published in the RIFE reports, for example, EA, FSA, NIEA and SEPA, 2013.

Wylfa is a potential site for a possible new nuclear power station and approximately 254 hectares of land adjacent to the existing nuclear site have been proposed for new nuclear building activities (www.horizonnuclearpower.com/wylfa).

2.2 Survey objectives

The Centre for Environment, Fisheries & Aquaculture Science (Cefas) undertook the Wylfa habits survey in 2013 on behalf of the Environment Agency, the Food Standards Agency, and the Office for Nuclear Regulation. The aim of the survey was to obtain comprehensive information on the habits of the public that might lead to their exposure to radiation via gaseous discharges, liquid discharges and direct radiation from the Wylfa nuclear site.

Specifically, investigations were conducted into the following:

- The consumption of food from the aquatic survey area
- Activities and occupancy over intertidal substrates
- The handling of fishing gear and sediment
- Activities and occupancy in and on water

- The use of seaweed as a fertiliser or animal feed
- The consumption of food from the terrestrial survey area
- The use and destination of produce originating from the survey areas
- The consumption and use of groundwater and surface water in the terrestrial survey area
- The transfer of contamination off-site by wildlife
- Activities and occupancy within the direct radiation survey area
- Any new or unusual exposure pathways

No additional site-specific investigations were requested by the Environment Agency, the Food Standards Agency or the Office for Nuclear Regulation.

2.3 Survey areas

The geographic extents of potential effects from liquid discharges, from deposition from gaseous releases, and from direct radiation are different. Therefore, different survey areas were defined to cover each of these three main possible sources of exposure. These were an aquatic survey area relating to liquid discharges, a terrestrial survey area relating to deposition from gaseous discharges, and a direct radiation survey area relating to ionising radiation emanating directly from the site.

The aquatic survey area (see Figure 1) covered the intertidal areas along the northern coast of Anglesey from Carmel Head in the west, to Point Lynas in the east, and the adjacent sea area up to 6 km offshore. This area was taken to represent the predominant area of mixing of discharged radionuclides in seawater.

The terrestrial survey area (see Figure 2) covered the land and freshwater watercourses within 5 km of the site centre (National Grid Reference: SH 350 939) to encompass the main areas of potential deposition from gaseous discharges.

The direct radiation survey area (see Figure 2) covered the land and water within 1.2 km of the nuclear licensed site boundary. The occupancy data collected from the direct radiation survey area is also applicable to inhalation and external exposure pathways arising from gaseous releases from the site. The direct radiation survey area was extended from the area within 1.0 km of the site boundary, which is usually used for habits surveys, up to the area within 1.2 km of the site boundary, in order to include more residential properties within the survey area, since there were very few within 1.0 km of the site.

The same aquatic and terrestrial survey areas were used in the previous habits survey conducted by Cefas in the Wylfa area, which was in 2009 (Garrod *et al.*, 2010). However, the direct radiation survey area only extended to 1.0 km from the nuclear licensed site boundary for the 2009 survey since there were more residential properties within 1.0 km at that time.

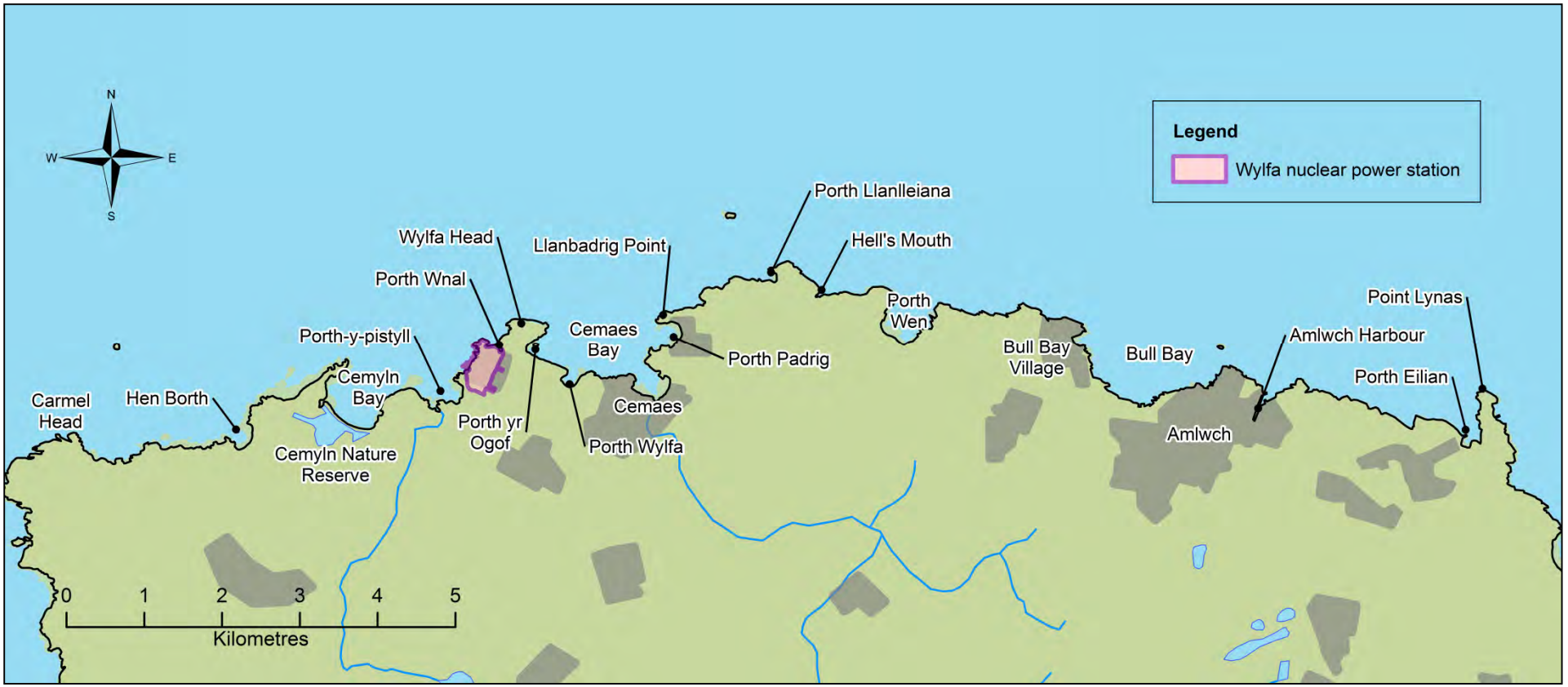

Figure 1. The Wylfa aquatic survey area

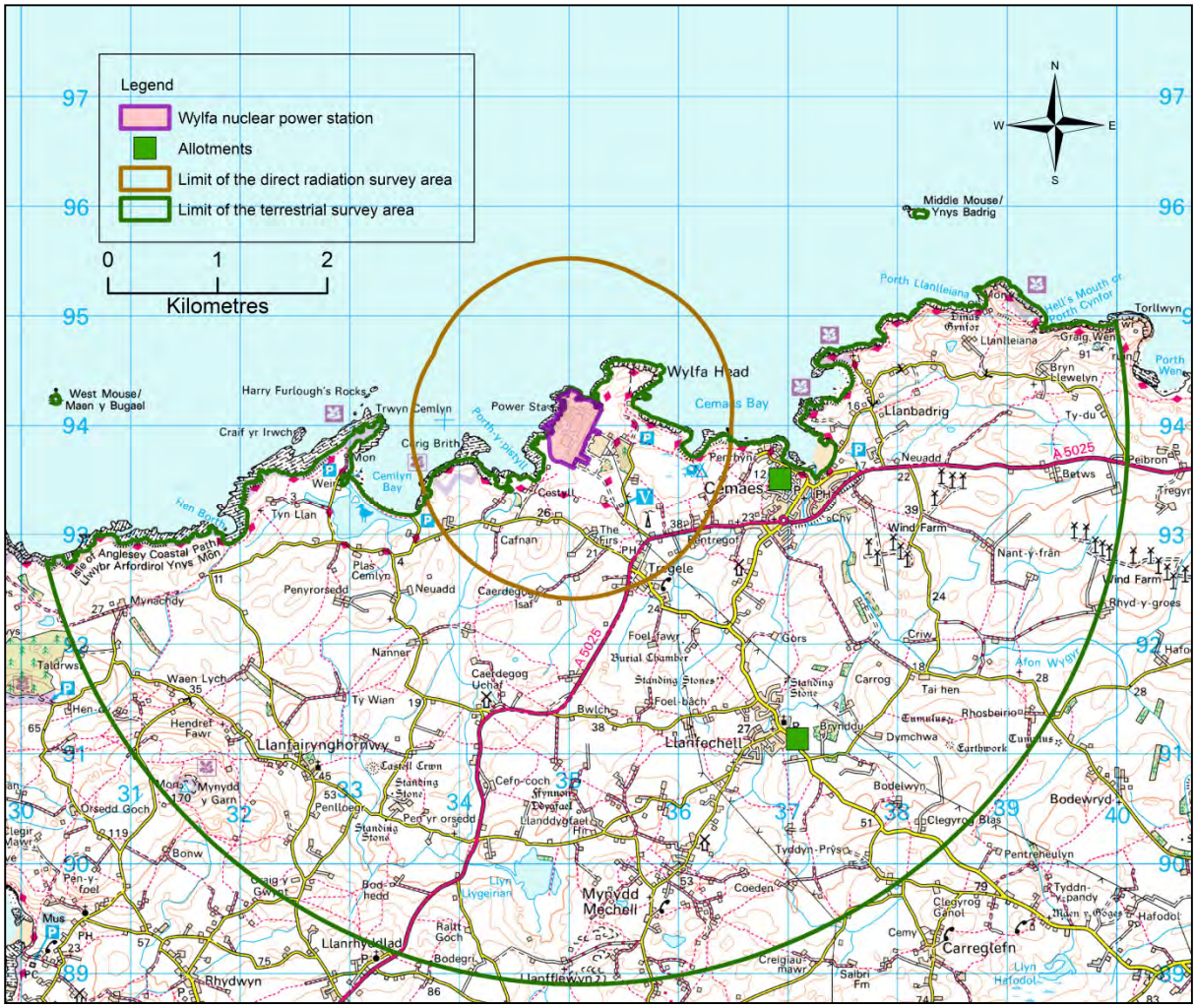

Figure 2. The Wylfa terrestrial and direct radiation survey areas

2.4 Conduct of the survey

As part of the pre-survey preparation, the Environment Agency, the Food Standards Agency and the Office for Nuclear Regulation were contacted to identify any additional site-specific requirements. Information relating to the activities of people in the aquatic and terrestrial survey areas was obtained from Internet searches, Ordnance Survey maps and from previous habits surveys undertaken around the Wylfa site. People with local knowledge of the survey area were contacted for information relevant to the various exposure pathways. These included representatives from the Inshore Fisheries and Conservation Authority who provided information on the local fishing industry.

A proposed programme for fieldwork was distributed to the Environment Agency, the Food Standards Agency, and the Office for Nuclear Regulation before the fieldwork commenced, for their comment.

The fieldwork was carried out from the 1st to the 11th October 2013 by a survey team of three people, according to techniques described by Leonard *et al.* (1982). During the fieldwork a meeting was held between the members of the survey team and representatives from Magnox Ltd. This discussion provided details about current site activities, local information, potential exposure pathways and activities in the area, and the potential for transfer of contamination off-site by wildlife.

The following information was obtained during the meeting, or subsequently:

- At the time of the survey Reactor 1 was operating at nominal full load. Reactor 2 had come to the end of its operational life and was shut down. The remaining useful fuel in Reactor 2 was being transferred to Reactor 1. Magnox Ltd had approval from the regulatory authorities to generate electricity from Reactor 1 until September 2014 and was seeking approval to continue generating until the end of 2015.
- The site has dry storage for fuel so there are no fuel storage ponds and no pond-derived liquid discharges. Other active effluent is fed into the cooling water outfall before it enters the sea at Porth Wnal. There is a single main stack on the reactor building for gaseous discharges. An incinerator situated at the north end of the site has a small stack, but this facility is expected to close during 2014. Gamma dose monitoring is carried out around the site and direct radiation is indistinguishable from background levels at the site perimeter.
- Most of the land surrounding the site had been bought-up by the company that intends to build a new nuclear power station next to the existing site. Most of the agricultural land was being rented out to farmers and was still being used for agriculture. There had never been many residential properties close to the site but most of those that had previously existed had also been bought-up and had either already been demolished or were un-occupied.
- Wildlife was deterred from entering controlled areas by tarmac or concrete surfaces that prevented burrowing, tight security fencing and automatic doors on buildings. Audio tapes of gull distress calls were broadcast in order to scare gulls away and a falconer and birds of prey were engaged periodically to discourage pigeons and gulls.

- Information about potential exposure pathways and activities in the area included; anglers at Porth Wnal and Wylfa Head, dog walkers and birdwatchers at Wylfa Head, possible winkle picking at Cemaes and Porth Padrig, seaweed from power station cooling water intake screens sent to a commercial composting company.

Interviews were conducted with individuals who were identified in the pre-survey preparation and others that were identified during the fieldwork. These included, for example, commercial and hobby fishermen, anglers, people spending time on intertidal substrates, farmers, allotment holders, beekeepers and people spending time within the direct radiation survey area. Interviews were used to establish individuals' consumption, occupancy and handling rates relevant to the aquatic, terrestrial and direct radiation survey areas. Any other information of possible use to the survey was also obtained. Gamma dose rate measurements were taken over intertidal substrates in the aquatic area, and indoors and outdoors at most properties in the direct radiation survey area where interviews were conducted. Background gamma dose rates were taken at a distance beyond 5 km from the site centre. All gamma dose rate measurements were taken using a Mini 600 Series Type 6-81 Environmental Radiation Meter with a compensated Geiger-Müller tube.

For practical and resource reasons, the survey did not involve the whole population in the vicinity of the Wylfa site, but targeted subsets or groups, chosen in order to identify those individuals potentially most exposed to radiation pathways. However, it is possible that even within a subset or group there may have been people not interviewed during the survey. Therefore, to aid interpretation, the number of people for whom data were obtained in each group as a percentage of the estimated complete coverage for that group (where it was possible to make such an estimate) has been calculated. The results are summarised in Table 1. The 'groups' are described and quantified, and the numbers of people for whom data were obtained are given as percentages of the totals. For certain groups, such as anglers, it can be virtually impossible to calculate the total number of people who undertake the activity in the survey area because it is difficult to quantify visitors from outside the area or occasional visitors during the year. Based on UK Office of National Statistics residential data for electoral wards (www.statistics.gov.uk) there were approximately 2880 people living in the terrestrial survey area, although information was obtained for a significantly smaller number than this. The survey did not include employees or contractors at the nuclear licensed site while they were at work. This is because dose criteria applicable to these people whilst at work and the dose assessment methods are different from those for members of the public. However, data were collected for employees and contractors while outside work if these people were encountered during the survey.

People were initially questioned about their habits relating to the survey area that their first identified activity occurred in and, where possible, they were also asked about their habits relating to the other two survey areas. For example, people in the terrestrial survey were initially questioned because it was known that they grew or produced significant quantities of terrestrial foodstuffs. However, they were also asked about habits that might lead to exposure to liquid discharges or direct radiation.

During interviews with representatives from organisations such as local businesses it was not possible to collect data for all pathways (for example consumption of local foods) for each person. In these cases, the data were limited to those relating to the primary reason for the interview, for example, in the case of a business within the 1.2 km direct radiation survey area, the occupancy rates for the employees.

3 METHODS FOR DATA ANALYSIS

3.1 Data recording and presentation

Data collected during the fieldwork were recorded in logbooks. On return to the laboratory, the data were examined and any notably high rates were double-checked, where possible, by way of a follow-up phone call. In cases where follow-up phone calls were not possible (e.g. interviewees who wished to remain anonymous), the data were accepted at face value. The raw data were entered into a habits survey database where each individual for whom information was obtained was given a unique identifier (the observation number) to assist in maintaining data quality and traceability.

The results of the individuals' consumption, occupancy and handling rates collected during the survey were grouped and presented in tables with the high-rate group members indicated in bold and with the calculated mean rates for the high-rate group and 97.5th percentile rates. The consumption rates, occupancy rates and handling rates for all groups are presented in Annex 1 for adults and Annex 2 for children and infants, with the high-rate group members indicated in bold.

Where quantifiable data cannot be obtained from interviews but pathways are believed to exist, it is sometimes necessary to provide estimated habits data for use in dose assessments. In this series of habits survey reports, such data is usually presented in Annex 3. It was not necessary to estimate data for the Wylfa survey, but Annex 3 is included in this report to maintain consistency of presentation through the series of reports.

3.2 Data conversion

During the interviews, people could not always provide consumption rates in kilograms per year for food or litres per year for milk. In these circumstances, interviewees were asked to provide the information in a different format. For example, some estimated the size and number of items (e.g. eggs) consumed per year, whereas others gave the number of plants in a crop or the length and number of rows in which the crop was grown per year. The database converted these data into consumption rates (kg y^{-1} for food and l y^{-1} for milk) using a variety of conversion factors. These factors included produce weights (Hessayon, 1990 and 1997 and Good Housekeeping, 1994), edible fraction data researched by Cefas, and information supplied by the Meat and Livestock Commission.

3.3 Rounding and grouping of data

The consumption and occupancy data in the text of this report are rounded to two significant figures, except for values less than 1.0, which are rounded to one decimal place. This method of presentation reflects the authors' judgement on the accuracy of the methods used. In the tables and annexes, the

consumption rate data are presented to one decimal place. Occasionally, this rounding process causes the computed values (row totals, mean rates and 97.5th percentiles), which are based on un-rounded data, to appear slightly erroneous. Consumption rates less than 0.05 kg y^{-1} are presented to two decimal places in order to avoid the value of 0.0 kg y^{-1}. External exposure data are quoted as integer numbers of hours per year.

For the purpose of data analysis, foodstuffs were aggregated into food groups as identified in Table 2. Specific food types relevant to this survey are presented in the subsequent tables. The data are structured into groups when it is reasonable to assume that consistent concentrations or dose rates would apply within the group. For example, when considering terrestrial food consumption, all types of root vegetables are grouped together in a food group called 'root vegetables'. Similarly, for aquatic food consumption, all crustacean species are grouped as 'crustaceans'. For external exposure over intertidal sediments, occupancies over the same substrate (e.g. sand) are grouped together.

Data were structured into age groups because different dose coefficients (i.e. the factors which convert intakes of radioactivity into dose) can apply to different ages. The International Commission on Radiological Protection (ICRP) revised its recommendations for the age groupings to be used in radiological assessments and these recommendations were adopted in the 2010 habits survey reports and thereafter. Consequently, the age ranges used in the habits survey reports prior to 2010 differ from those used currently. The age ranges used in this report and the names used for the age groups, based on the recommendations in ICRP 101 (ICRP, 2007), are shown in Table A below, together with those used in reports prior to 2010, for comparison.

Table A. Names of age groups and range of ages within each age group.

Age ranges used from 2010 onwards			Age ranges used prior to 2010	
Name of age group[a]	**Age range in group**		**Name of age group**	**Age range in group**
Infant	0 to 5-year-old		3-month-old	Under 1-year-old
			1-year-old	1-year-old
			5-year-old	2-year-old to 6-year-old
Child	6-year-old to 15-year-old		10-year-old	7-year-old to 11-year-old
			15-year-old	12-year-old to 16-year-old
Adult	16-year-old and over		Adult	17-year-old and over

[a] In the 2010 reports only, the infant age group was called the 1-year-old age group and the child age group was called the 10-year-old age group.

Since there are fewer age groups for children in the current regime, there should, in general, be more observations in each group, resulting in greater robustness in the data. However, data since 2010 will not be directly comparable with data prior to 2010, since the age ranges in the age groups will be different.

For direct radiation pathways, the data were grouped into distance zones from the nuclear site boundary as a coarse indication of the potential dose rate distribution due to this source of exposure.

The bands used in this report were: 0 - 0.25 km; >0.25 - 0.5 km; >0.5 - 1.2 km. These distance bands are also useful when assessing exposure to gaseous discharges.

3.4 Approaches for the identification of high rates

The habits data have been analysed to identify high rates of consumption, occupancy and handling, which are suitable for use in radiological assessments. Two approaches have been used:

Firstly, the 'cut-off' method described by Hunt *et al.* (1982) was used. With the 'cut-off' method, the appropriate high rate was calculated by taking the arithmetic mean of the values between the maximum observed rate and one third of the maximum observed rate. In this report, the term 'high-rate group' is used to represent the individuals derived by the 'cut-off' method. The mean of the high-rate group was calculated for each food group, intertidal substrate and handling pathway identified in the survey. In certain cases, using the 'cut-off' method resulted in only one person being in the high-rate group. In these cases, expert judgement was used to decide whether the high-rate group should remain as one individual or whether others should be included. If others were included, the second highest rate was divided by three and all observations above this were included in the high-rate group.

Secondly, the 97.5th percentile rate was calculated for each group by using the *Microsoft Excel* mathematical function for calculating percentiles. The use of percentiles accords with precedents used in risk assessments of the safety of food consumption. It should be noted that the interviewees in this study are often selected and, therefore, the calculated percentiles are not based on random data.

Mean and 97.5th percentile consumption rates for adults based on national statistics have been derived by the Ministry of Agriculture, Fisheries and Food (MAFF) (now a part of the Department for Environment, Food and Rural Affairs, Defra) and the Food Standards Agency (Byrom *et al.,* 1995 and FSA, 2002), and these are referred to as generic rates in this report. The generic rates are used as a baseline for comparison with the observed rates.

The mean rates for the high-rate groups for children and infants for consumption, intertidal occupancy and handling pathways, have been calculated. However, in cases where few child or infant observations were identified, an alternative approach that may be used for assessments is to estimate the mean rates for the high-rate groups for children and infants by applying scaling ratios to the mean rates for the high-rate groups for adults. Ratios for this purpose for the consumption and intertidal occupancy pathways, based on generic 97.5th percentile rates, are provided in Annex 4. The age ranges within the age groups in Annex 4 do not correspond exactly with the age ranges within the age groups used throughout the rest of this report, but these ratios are the best available data for

estimating child rates and infant rates from adult rates. Adult to child and adult to infant ratios are not available for handling pathways.

For use in assessments of foetal dose, consumption and occupancy rates are provided in Annex 5 for women of childbearing age. The age range used in this report for women of childbearing age is 15 – 44 years old, which is based on the classification used by the Office of National Statistics (www.statistics.gov.uk).

For the direct radiation pathway, mean occupancy rates and 97.5th percentile rates have not been calculated. Such an analysis is of limited value without a detailed knowledge of the spatial extent of dose rates due to direct radiation.

3.5 Profiles of habits survey data for use in total dose assessments

The survey data have been analysed to produce profiles of consumption and occupancy rates according to the method described by Camplin *et al.* 2005. The profiles for adults are used to assess total dose integrated across all pathways of exposure in the RIFE reports (e.g. EA, NIEA, FSA and SEPA, 2013).

Matrices of profiles for adults, children, infants and women of childbearing age are presented in Annexes 6 to 9 respectively. Within each matrix the means for the high-rate groups, as determined by the cut-off method, are presented on the diagonal. Except for the direct radiation pathway the figures across the rows are the means of the consumption and occupancy rates for the other pathways for the individuals within that profile. For the direct radiation pathway the figure denotes the proportion of the individuals within that profile who spend time within the direct radiation survey area.

3.6 Data quality

To ensure the quality of the data collected during the survey fieldwork and presented in the report, the following procedures have been employed:

- Experienced scientific staff were used for the fieldwork and data analysis. They had been trained in the techniques of interviewing and obtaining data for all pathways that were relevant to the survey being conducted. Where individuals offered information during interview that was considered unusual, they were questioned further in order to double-check the validity of their claims.
- Where possible, interviewees were contacted again to confirm the results of the initial interview if, when final consumption or occupancy rates were calculated, observations were found to be high in relation to our experience of other surveys. Local factors were taken into account in these cases.

- Data were manipulated in a purpose-built database using a consistent set of conversion factors.
- Data were stored in a database in order to minimise transcription and other errors.
- Draft reports were reviewed by the Environment Agency, the Food Standards Agency and the Office for Nuclear Regulation, and by a senior radiological consultant.
- Final reports were only issued when the Environment Agency, the Food Standards Agency and the Office for Nuclear Regulation were entirely satisfied with the format and content of the draft report.

4 AQUATIC RADIATION PATHWAYS

4.1 Aquatic survey area

The aquatic survey area (see Figure 1) covered the intertidal areas along the northern coast of Anglesey from Carmel Head in the west, to Point Lynas in the east, and extended 6 km offshore. The straight-line distance between Carmel Head and Point Lynas was approximately 18 km, although the actual length of the intertidal survey area was much greater than this owing to the convolutions of the coastline.

The coastline is predominantly exposed rocky headlands interspersed with bays and small coves of rock, sand and stones. The only expansive sand beach is located close to the village of Cemaes. There is limited road access to extensive areas of the coast but the Isle of Anglesey Coastal Path runs along the entire length of the survey area, providing access to the shore by foot in many places. Those places that are only accessible by foot tend to receive fewer visitors than the places that are accessible by road. Parts of the coast that are not specifically mentioned in the following description are stretches of open rocky coastline where no activities were observed or reported.

Carmel Head and Hen Borth

Carmel Head is a rocky outcrop situated approximately 5 km west of Wylfa power station and Hen Borth (see Figure 3) is a small cove approximately 3 km west of the power station. Carmel Head could only be reached by foot and no activities were recorded there. The substrate at Hen Borth is a mix of rock, sand and stones. Only a few people were observed using the cove at the time of the survey and these were angling, walking and playing. One person was identified who collected small quantities of winkles for his own family's consumption. Sheep from nearby fields were deliberately allowed access to the shore so that they could graze on seaweed.

Figure 3. Hen Borth

Cemlyn Bay and Porth-y-pistyll

At Cemlyn Bay (see Figure 4) a shingle ridge almost a kilometre long separates the sea from a brackish water lagoon behind. The lower shore on the seaward side of the ridge is predominantly sand and stones and there is a patch of mud and sand at the western end of the bay. The lagoon area forms the Cemlyn Nature Reserve, which is run by the North Wales Wildlife Trust. Two wardens worked at the nature reserve through the summer and spent time on intertidal substrates. Car parking was available at either end of the ridge and the area attracted walkers, dog walkers, bird watchers and people playing on the shore. Bait digging for lugworm and ragworm took place on the mud and sand at the western end of the bay and two people collected limpets for use as angling bait from the rocks either side of the bay. (These same two people, one adult and one child, also collected limpets for use as angling bait at Llanbadrig Point and Bull Bay.) Anglers fished from the shingle ridge and from the rocks. One person was identified who collected seaweed from the bay to use as fertiliser on his vegetable garden. A ramp to the shore at the western side of the bay was used for launching small angling boats and other pleasure craft brought by road. The bay was a popular area for kayaking and the kayakers spent time on the shore preparing and launching their kayaks. Two adults and three children were recorded swimming in the bay.

One person was identified collecting small quantities of winkles for his own family's consumption from the rocks just to the west of Cemlyn Bay and one family was recorded playing on patches of sand and stones in the same area.

Porth-y-pistyll, also known locally as Cestyll beach, is a small cove located between Cemlyn Bay and Wylfa power station, which can only be reached by foot. The substrate is a mix of rock, sand and stones. No activities were recorded there at the time of the survey.

Figure 4. Cemlyn Bay

Porth Wnal and Wylfa Head

Porth Wnal is a small cove of rugged rocks situated to the west of the rocky promontory of Wylfa Head and immediately north of the power station. The power station cooling water outfall discharged into Porth Wnal (see Figure 5). Angling took place from the rocks at Wylfa Head and the eastern shore of Porth Wnal was a particularly popular area for bass fishing. Anglers also fished from the western shore of Porth Wnal although this area was difficult to access because the perimeter fence on the north-west side of the power station extended out to the top of the shore and the anglers had to scramble along the shore below the fence at low tide. Angling boats, fishing boats and small pleasure craft were seen at the mouth of Porth Wnal and close to Wylfa Head. It was reported that an adult had been seen swimming in Porth Wnal.

Figure 5. The outfall at Porth Wnal

Porth yr Ogof and Porth Wylfa

Porth yr Ogof is a small cove located directly to the east of Wylfa Head, and Porth Wylfa is a small cove half a kilometre further east. Both coves are flanked by rocks. Porth yr Ogof has a small sand beach with patches of stones and Porth Wylfa is predominantly stones with patches of sand on the lower shore. The coves were only accessible by foot or from the sea and no activities were identified taking place on the shore at the time of the survey. Visiting pleasure boats were observed anchored temporarily just offshore of Porth yr Ogof.

Cemaes

Cemaes is a large coastal village approximately 2 km to the east of the power station. The bay in front of the village (see Figure 6) has rocks at either side and a concrete promenade approximately 300 metres long at its head. An extensive gently sloping sand beach is exposed in front of the promenade at low tide and there is a beach of sand and stones between patches of rocks on the west side of the bay. The small walled harbour in the corner of the bay at the south-west end of the promenade dries out at low tide to reveal patches of rock and a mix of mud, sand and stones. A very small river, Afon Wygyr, flows through the harbour into the sea. There are two concrete slipways in the harbour and other ramps to the beaches either side of the harbour, for launching small boats. The beaches are easily accessible by foot from the village and car parking is available at either end of the promenade.

It was reported that Cemaes was a popular location for family days out on the beach on warm summer days. The beaches were also very popular places for walking and dog walking, and although dogs were not permitted on the central part of the beach during the summer, they were allowed on other parts of the beach all year. People were recorded preparing water sports equipment on the beach and a beach warden patrolled the beach through the summer. Angling took place from the rocks and the harbour wall and swimming and kayaking took place out in the bay. Three commercial fishing boats, one of which also operated as an angling charter vessel, and another angling charter boat, operated out of Cemaes Harbour. Approximately 12 sailing yachts and 12 other angling boats, hobby fishing boats and pleasure craft were moored in the harbour at the time of the survey. Two individuals were recorded undertaking boat maintenance in the harbour at low tide, one of whom also spent time fixing moorings.

Figure 6. Cemaes

Porth Padrig, Llanbadrig Point, Porth Llanlleiana and Hell's Mouth

The small cove of Porth Padrig, also known locally as White Lady beach, is situated half a kilometre to the northeast of Cemaes and the rocky promontory of Llanbadrig Point is directly north of the cove. There is a small car park close by. The sand and stone beach at Porth Padrig was used by several people for dog walking, picnicking and angling. One person was identified swimming off the beach. Several anglers fished from the rocks at Llanbadrig Point, two of whom also collected limpets from the rocks for use as angling bait. A few walkers also crossed the rocks.

Porth Llanlleiana and Hell's Mouth are smaller coves further east along the coast and both have rocky shores with small beaches of sand and stones at the head. They could only be accessed by foot and no activities were identified taking place on these beaches at the time of the survey.

Porth Wen

Approximately one kilometre further east along the coast from Hell's Mouth is the rocky bay of Porth Wen. There is a derelict brickworks on the western shore of the bay (see Figure 7), fronted by a stone beach with patches of sand. By land the shore could only be reached by long walks, but the bay was a popular destination for pleasure boats sailing from other ports along the coast. Two walkers were identified on the beach and a school group had paddled along the coast from Bull Bay in kayaks and were swimming off the brickworks.

Figure 7. The brickworks at Porth Wen

Bull Bay

Bull Bay is located to the east of Porth Wen and about 8 km east of Wylfa power station. The bay is approximately 2 km wide and has a rocky shore. Bull Bay Village is situated at the western end of the bay and the western third of the bay's shore can be accessed from the road through the village. Access to the shore at the eastern end of the bay is only possible from the coastal path and involves descents down steep cliffs. There is a concrete slipway in front of the village leading onto a small beach of sand and stones, which is surrounded by rocks.

At weekends the slipway was a busy launching area for small pleasure craft such as powerboats, angling boats, sailing dinghies, jet skis, rowing boats and kayaks. Most of the boats were brought by road but there was a car park close to the slipway that was used as a boat compound and about five small boats were kept there at the time of the survey. A rowing club with approximately 40 members was based at Bull Bay and they mainly rowed along the coast between Porth Wen and Point Lynas. Shore angling from the rocks took place at numerous locations around the bay (see figure 8) and two anglers collected limpets for use as angling bait. People were also playing on the rocks, and dog walking and preparing water sports equipment on the beach. Sub-aqua divers launched boats from the slipway and were also identified diving from the shore.

Numerous activities were recorded or observed taking place out on the water of the bay including boat angling, potting, power boating, pleasure cruising, water-skiing, jet-skiing, wake boarding, sailing, kayaking and canoeing.

Figure 8. Anglers on the rocks at Bull Bay

Amlwch

Amlwch is the main port in the survey area. The harbour mouth is protected by a concrete breakwater (see Figure 9) and the shore either side of the harbour is rocky. The outer basin of the harbour retains water throughout the tidal cycle but the inner basin, which is long and narrow, dries out at low tide to expose a substrate of mud, sand and stones. There is a concrete slipway in the inner harbour for launching small boats brought by road. The harbour breakwater and surrounding rocks were popular angling venues. One individual was recorded undertaking boat maintenance in the harbour at low tide. Eight commercial fishing boats were based in the harbour but only four of

these fished within the survey area. The port was also home to four charter vessels that catered for anglers and sub-aqua divers from all over the UK. A lifeboat, pilot boat, supply cutter, workboat and about 20 other craft including sailing yachts, angling boats, hobby fishing boats and pleasure cruisers were using the harbour. Jet skiing, wake boarding, boat angling, potting, pleasure cruising and canoeing were recorded taking place offshore.

Figure 9. The harbour breakwater at Amlwch

Porth Eilian and Point Lynas

Porth Eilian (see Figure 10) is a small rocky inlet approximately 12 km east of Wylfa power station and close to the limit of the aquatic survey area. At the head of the inlet the upper shore is stones with patches of rock and the lower shore is sand and stones. There is a small concrete slipway leading to the shore. The activities recorded taking place at Porth Eilian were playing, picnicking and swimming. Although not as busy as Bull Bay, a variety of small pleasure craft bought by road were launched from the slipway and these were used for angling, sub-aqua diving and pleasure cruising.

The western shore of Point Lynas is very precipitous and there is no access to the sea from the cliffs. No activities were recorded taking place on the shore in this area but kayaking was recorded offshore.

Figure 10. Porth Eilian

4.2 Commercial fisheries

Only a limited amount of commercial fishing took place within the survey area. Four small commercial potting boats operated from Amlwch and three more operated from Cemaes. They were operated by both full time and part time fishermen and while some fished all through the year others only fished during the summer. They fished mainly for common lobster and brown crab but a minority also fished for common prawns and velvet swimming crabs. Crab and lobster fishing took place throughout the year but prawn fishing was mainly restricted to the winter months. Lobster catches were usually best in the summer when the lobsters were more active and the weather was more settled so that the pots could be set very close to the shore. Several fishermen reported that the catches of common prawns had been very poor in recent years. Four larger boats based at Amlwch fished for scallops and whelks outside the survey area. No commercial fishing for fin-fish was identified within the survey area.

It was reported that commercial winkle pickers from outside the area occasionally visited Porth-y-pistyll and the rocks to the west of Cemlyn Bay, but this was not observed at the time of the survey. The largest mussel cultivation beds in the UK are located at the north end of the Menai Strait, approximately 30 km away by sea from the eastern end of the aquatic survey area.

4.3 Destination of seafood originating from the aquatic survey area

Small amounts of common lobster, brown crab and common prawns were sold direct to the public and to local hotels and restaurants or sent to restaurants in London, but the bulk of the catch was exported to France, Spain and Portugal via two local wholesalers. All of the catch of velvet swimming crabs was exported to the continent.

4.4 Hobby fishing, angling and non-commercial shellfish collecting.

A few hobby fishermen operated out of Cemaes and Amlwch or launched small boats from the other slipways in the survey area. They used pots and mainly fished for brown crabs and common lobsters, although some also fished for common prawns, spiny spider crabs and velvet swimming crabs. The catches were consumed by the fishermen's families and friends.

Shore angling was very popular and occurred at many locations within the survey area including Hen Borth, Cemlyn Bay, Porth Wnal, Wylfa Head, Cemaes, Porth Padrig, Llanbadrig Point, Bull Bay and Amlwch. Most angling was carried out from the rocks but it also took place from the concrete breakwaters at Amlwch and the sand and stone beaches at Cemlyn Bay and Porth Padrig. Porth Wnal, where the cooling water from Wylfa power station was discharged, was a favourite location for many bass anglers. Boat angling was also very popular in the survey area and many private angling boats were kept at Cemaes and Amlwch harbours or launched from ramps and slipways at Cemlyn Bay, Cemaes, Bull Bay, Amlwch and Porth Eilian. Two angling charter boats operated out of the harbour at Cemaes and four operated out of the harbour at Amlwch. The anglers came from all over Anglesey and much further afield. The main edible species caught by anglers were bass, cod, mackerel and pollack.

Two people collected small quantities of winkles for their own families' consumption. One person collected winkles from the shore at Hen Borth and the other person collected from the shore to the west of Cemlyn Bay. Two sub-aqua divers collected small quantities of king scallops for their own families' consumption, while diving.

4.5 Wildfowling

No areas suitable for wildfowling, such as salt marshes or estuaries, were located in the survey area and no wildfowling activities were identified. (Several species of birds that are usually classified as wildfowl in habits surveys were shot over farmland in the area and these have been classified as poultry in this case and are included in the terrestrial section of this report. This is because they were potentially subject only to exposure to gaseous discharges, not to liquid discharges.)

4.6 Other pathways

Two people were identified who used seaweed as a fertiliser on their vegetable gardens and one of these also used seaweed as a fertiliser for fruit. The seaweed was collected from Cemlyn Bay and elsewhere depending on where it was washed up. Four adults were consuming the vegetables and two adults were consuming the fruit. Seaweed that collected on the power station cooling water intake screens was sent to a commercial composting company on Anglesey.

Sheep were deliberately allowed access to the shore at Hen Borth so that they could graze on seaweed, although it constituted a small part of their total diet.

Four adults were identified that dug lugworm and ragworm for angling bait from the west side of Cemlyn Bay. One adult and one child collected limpets for use as angling bait at Cemlyn Bay, Llanbadrig Point and Bull Bay.

4.7 Food consumption data

Consumption data for aquatic foods are presented in Tables 3 to 5 for adults and in Tables 6 to 8 for children. No infants were identified consuming aquatic foods. The tables include the mean consumption rates for the high-rate groups and the observed 97.5th percentile rates calculated as described in Section 3.4. Adults' consumption rates of vegetables and domestic fruit that were grown on land that had been fertilised with seaweed are presented in Table 9.

Adults' consumption rates

The people consuming the greatest quantities of food from the aquatic survey area were commercial and hobby fishermen, anglers, crews of charter boats, non-commercial shellfish collectors, and the families and friends of these groups of people.

Table B presents a summary of the adults' consumption rates for the following food groups: fish; crustaceans; molluscs. No consumption of wildfowl or marine plants/algae was identified. The table includes the mean consumption rates for the high-rate groups and the observed 97.5th percentile rates. For comparison, the table also includes mean consumption rates and 97.5th percentile consumption rates for fish, crustaceans and molluscs based on national data, which are referred to as 'generic' data in this report.

Table B. Summary of adults' consumption rates of foods from the aquatic survey area

Food group	Number of observations	Number of high-rate consumers	Observed maximum for the high-rate group (kg y^{-1})	Observed minimum for the high-rate group (kg y^{-1})	Observed mean for the high-rate group (kg y^{-1})	Observed 97.5th percentile (kg y^{-1})	Generic mean (kg y^{-1})	Generic 97.5th percentile (kg y^{-1})
Fish	75	10	67.1	25.0	33.5 (33.47)*	35.4	15.0	40.0
Crustaceans	30	9	18.1	6.5	7.9	9.9	3.5	10.0
Molluscs	9	3	1.8	1.8	1.8	1.8	3.5	10.0

*Shown to 2 decimal places to explain the rounding to 33 kg y^{-1} in other parts of the report.

The predominant species of fish consumed by adults were bass, cod, mackerel and pollack, with smaller quantities of ballan wrasse, conger eel, dab, flounder, garfish, grey mullet, huss, lesser spotted dogfish, octopus, plaice, pouting, red gurnard, saithe, thornback ray, tub gurnard and whiting. (Although octopus are molluscs they are radiologically more akin to fish and are included in the fish food group.) The fish were caught throughout the survey area. Of the fish consumed by the 10 people in the high-rate group, the percentage breakdown of species, rounded to the nearest 5%, was 25% mackerel, 20% pollack, 15% cod, 10% bass, 10% whiting and 20% a mix of ballan wrasse, conger eel, dab, flounder, garfish, huss, lesser spotted dogfish, octopus, plaice, pouting, red gurnard, and thornback ray.

The main species of crustaceans consumed by adults were brown crab and common lobster, with smaller quantities of common prawn, spiny spider crab and velvet swimming crab. The brown crab and common lobster were caught throughout the survey area. The common prawn were caught between Hell's Mouth and Amlwch. The spiny spider crab and velvet swimming crab were caught in the area around Cemaes Bay. Of the crustaceans consumed by the nine people in the high-rate group, the percentage breakdown of species, rounded to the nearest 5%, was 50% common lobster, 35% brown crab, 10% common prawn and 5% spiny spider crab.

The species of molluscs consumed by adults were king scallops and winkles. The king scallops were collected by recreational sub-aqua divers at various locations throughout the survey area. The winkles were collected from Hen Borth and the rocks to the west of Cemlyn Bay. The only species of mollusc consumed by the three people in the high-rate group was king scallop.

Children's consumption rates

Table C presents a summary of children's consumption rates of fish, crustaceans and molluscs from the aquatic survey area. For the child age group, no consumption of wildfowl or marine plants/algae

was identified. The table includes the mean consumption rates for the high-rate groups and the observed 97.5th percentile rates. No generic rates have been determined for the child age group.

Table C. Summary of children's consumption rates of foods from the aquatic survey area

Food group	Number of observations	Number of high-rate consumers	Observed maximum for the high-rate group (kg y^{-1})	Observed minimum for the high-rate group (kg y^{-1})	Observed mean for the high-rate group (kg y^{-1})	Observed 97.5th percentile (kg y^{-1})
Child age group (6 – 15 years old)						
Fish	13	5	25.0	8.8	15.5	21.9
Crustaceans	5	2	1.8	1.8	1.8	1.8
Molluscs	2	2	1.8	1.8	1.8	1.8

The predominant species of fish consumed by the individuals in the child age group were bass, cod, mackerel and pollack, with smaller quantities of dab, saithe, tub gurnard and whiting.

The species of crustacean consumed by the individuals in the child age group were brown crab and common lobster.

The only species of mollusc consumed by the individuals in the child age group were king scallop.

Consumption of vegetables and domestic fruit grown on land where seaweed has been used as a fertiliser

The consumption rate data for foods grown in soil that had been fertilised with seaweed collected from the shore in the aquatic survey area are presented in Table 9. Four adults were identified consuming green vegetables, other vegetables, root vegetables and potatoes grown in seaweed fertilised soil. Two of these individuals also consumed domestic fruit grown in seaweed fertilised soil. These foods are included in the aquatic section of this report as the exposure pathway is sea to land transfer and the source of potential exposure is liquid discharge. However, these foods were grown in the terrestrial survey area and they are also potentially subject to gaseous discharges. Therefore, they are also included in the terrestrial food groups and are included once in Annex 1 as terrestrial foods.

4.8 Intertidal occupancy

Intertidal occupancy rates for adults are presented in Table 10 and intertidal occupancy rates for children and infants are presented in Table 11. It should be noted that there are often more than one

substrate at one named location and that substrates at a given location are liable to change over time. Activities were assigned to the predominant substrate over which they were taking place.

Adults' intertidal occupancy rates

Table D presents a summary of the adults' intertidal occupancy rates in the aquatic survey area. The table includes the mean occupancy rates for the high-rate groups and the observed 97.5th percentile rates.

Table D. Summary of adults' intertidal occupancy rates

Intertidal substrate	Number of observations	Number of people in the high-rate group	Maximum of the high-rate group (h y^{-1})	Mean of the high-rate group (h y^{-1})	97.5th percentile (h y^{-1})
Mud and sand	6	1	390	390	350
Mud, sand and stones	1	1	35	35	Not applicable
Rock	39	8	426	258	331
Sand	37	16	548	369	548
Sand and stones	50	7	612	374	556

The activities undertaken by people in the adult high-rate groups for occupancy over each of the intertidal substrates were:

- For mud and sand: boat maintenance and fixing moorings in Cemaes harbour.
- For mud, sand and stones: boat maintenance in Amlwch harbour.
- For rock: angling at Hen Borth, Porth Eilian, Cemlyn Bay, Llanbadrig Point, Bull Bay, Porth Wnal, Wylfa Head, Cemaes and Amlwch; collecting winkles (for a small amount of time) to the west of Cemlyn Bay; collecting limpets (for a small amount of time) at Cemlyn Bay, Llanbadrig Point and Bull Bay.
- For sand: dog walking and beach warden duties at Cemaes.
- For sand and stones: nature reserve warden duties at Cemlyn Bay; dog walking at Cemaes (west) and Porth Padrig; walking at Hen Borth, Cemlyn Bay, Cemaes (west) and Porth Wen; angling at Cemlyn Bay and Porth Padrig.

Children's and infants' intertidal occupancy rates

Table E presents a summary of the children's and infants' intertidal occupancy rates in the aquatic survey area. The table includes the mean occupancy rates for the high-rate groups and the observed 97.5th percentile rates.

Table E. Summary of children's and infants' intertidal occupancy rates					
Intertidal substrate	**Number of observations**	**Number of people in the high-rate group**	**Maximum of the high-rate group (h y^{-1})**	**Mean of the high-rate group (h y^{-1})**	**97.5th percentile (h y^{-1})**
Child age group (6 – 15 years old)					
Rock	6	1	426	426	379
Sand	9	4	140	114	140
Sand and stones	12	1	274	274	212
Infant age group (0 – 5 years old)					
Sand	2	2	22	22	22
Sand and stones	7	7	50	39	49

The activities undertaken by individuals in the child age group high-rate groups for occupancy over each of the intertidal substrates were:

- For rock: angling and collecting limpets (for a small amount of time) at Cemlyn Bay, Llanbadrig Point and Bull Bay.
- For sand: playing and walking at Cemaes.
- For sand and stones: dog walking at Cemaes (west).

The activities undertaken by individuals in the infant age group high-rate groups for occupancy over each of the intertidal substrates were:

- For sand: playing at Cemaes.
- For sand and stones: playing at Hen Borth, Cemlyn Bay, Porth Eilian and west of Cemlyn Bay; picnicking at Porth Padrig.

4.9 Gamma dose rate measurements

Gamma dose rate measurements were taken over five intertidal substrates. All measurements were taken at a height of 1 metre above the substrate. The results are presented in Table 12 and are summarised below.

- One measurement taken over mud and sand was 0.077 µGy h^{-1}
- Two measurements taken over mud, sand and stones ranged from 0.063 µGy h^{-1} to 0.085 µGy h^{-1}
- Four measurements taken over sand ranged from 0.048 µGy h^{-1} to 0.073 µGy h^{-1}
- Three measurements taken over sand and stones ranged from 0.058 µGy h^{-1} to 0.067 µGy h^{-1}
- Two measurement taken over stones from 0.063 µGy h^{-1} to 0.082 µGy h^{-1}

For comparison, natural background levels have been estimated at 0.05 µGy h^{-1} over sand, 0.07 µGy h^{-1} over mud and over salt marsh, and 0.06 µGy h^{-1} over other substrates (EA, FSA, NIEA and SEPA, 2013).

4.10 Handling of fishing gear and sediment

Handling fishing gear that has become entrained with fine sediment particles, or handling sediment while undertaking activities such as bait digging or mollusc collecting, can potentially give rise to skin exposure from beta radiation. Doses to the skin need consideration as part of the dose limitation system (ICRP, 1991).

Fishing gear can also be a source of gamma exposure due to occupancy in the vicinity of the gear. However, this pathway is minor compared with the exposure received during occupancy over intertidal areas and it has therefore been omitted from the report. Handling of angling equipment was not considered to be a significant pathway. Therefore, as in previous surveys, data for this pathway were not collected.

Handling rates of fishing gear and sediment for adults are presented in Table 13 and handling rates of sediment for children are presented in Table 14. No children were identified handling fishing gear and no infants were identified handling fishing gear or sediment.

Adults' handling rates of fishing gear and sediment

Table F presents a summary of the handling rates of fishing gear and sediment for adults. The table includes the mean handling rates for the high-rate groups and the observed 97.5th percentile rates.

Table F. Summary of adults' handling rates of fishing gear and sediment

Handling activity	Number of observations	Number of people in the high-rate group	Maximum of the high-rate group (h y^{-1})	Mean of the high-rate group (h y^{-1})	97.5th percentile (h y^{-1})
Handling fishing gear	14	6	1624	1289	1569
Handling sediment	7	1	300	300	262

The activities undertaken by people in the adult high-rate groups for handling included:

- For handling fishing gear: handling pots throughout the aquatic survey area from Carmel Head to Point Lynas.
- For handling sediment: fixing moorings in Cemaes harbour.

Children's handling rates of sediment

Table G presents a summary of the handling rate of sediment for children. The table includes the mean handling rate for the high-rate group. The observed 97.5th percentile rate is not applicable for one observation.

Table G. Summary of children's handling rates of sediment

Handling activity	Number of observations	Number of people in the high-rate group	Maximum of the high-rate group (h y^{-1})	Mean of the high-rate group (h y^{-1})	97.5th percentile (h y^{-1})
Handling sediment	1	1	20	20	Not applicable

The individual in the children's high-rate group for handling sediment was collecting limpets for use as angling bait at Cemlyn Bay, Llanbadrig Point and Bull Bay.

4.11 Water based activities

Activities taking place in or on the water can lead to ingestion of water and/or inhalation of spray. These pathways are generally considered to be minor in comparison with other exposure pathways such as the ingestion of foods produced in the vicinity of a nuclear site. However, relevant data have been collected for consideration in dose assessments. Mean occupancy rates for the high-rate groups and 97.5th percentile rates have not been calculated.

Activities where there is a high likelihood of the individual's face submerging under water have been classified as activities 'in water', as they are more likely to lead to ingestion of water. All other activities have been classified as activities 'on water'.

Occupancy rates for activities taking place 'in water' and 'on water' in the survey area are presented in Table 15 for adults and Table 16 for children. No infants were identified spending time 'in water' or 'on water'.

Activities in the water

The activities identified taking place in the water in the aquatic survey area were sub-aqua diving, kayaking, jet-skiing, wake boarding and swimming. Thirty-seven observations were recorded for adults and eight observations were recorded for the child age group. The highest occupancy rate for adults was 260 h y^{-1} for two individuals who were sub-aqua diving in the area between Carmel Head and Point Lynas. The highest occupancy rate for children was 80 h y^{-1} for three individuals who were kayaking in the area between Carmel Head and Point Lynas.

Activities on the water

The activities taking place on the water in the aquatic survey area were skippering a charter boat, pleasure cruising, canoeing, boat angling, being on a dive boat, potting, rowing and sailing. Sixty six observations were recorded for adults and three observations were recorded for the child age group. The highest occupancy rate for adults was 1600 h y^{-1} for three individuals, two of whom were potting between Amlwch and Point Lynas and one of whom was potting between Carmel Head and Cemaes Bay. The highest occupancy rate for the child age group was 320 h y^{-1} for two children who were angling and pleasure cruising between Carmel Head and Point Lynas.

5 TERRESTRIAL RADIATION PATHWAYS

5.1 Terrestrial survey area

The terrestrial survey area (see Figure 2) covered the land and freshwater watercourses within 5 km of the Wylfa site centre (National Grid Reference: SH 350 939).

The land within 5 km of the Wylfa site is predominantly agricultural. The only population centres are the coastal village of Cemaes to the east of the site, the hamlets of Tregele, Llanfechell and Mynydd Mechell to the south and the hamlet of Llanfairynghornwy to the south-west. A small river, Afon Wygyr, flows through the east of the survey area and enters the sea at Cemaes harbour. There is a lake called Llyn Llygeirian located towards the south of the survey area.

Thirty-two working farms were identified in the Wylfa terrestrial survey area. Of these:

- Six produced beef cattle
- Two produced lambs
- Eighteen produced beef cattle, and lambs
- One produced, beef cattle, lambs and pigs
- Two produced milk (from dairy cattle) and beef cattle
- Two produced milk (from dairy cattle) and lambs
- One produced milk (from dairy cattle), beef cattle and lambs

Hay or silage was grown on nine farms for use as feed for livestock kept on the same farms and arable crops comprising barley, oats, wheat, kale and turnips were grown on six farms for use as feed for livestock kept on the same farms. No arable crops were produced for human consumption.

Farmers and their families were consuming cows' milk, beef and lamb produced commercially on their own farms. Several farmers grew small quantities of fruit and vegetables solely for their own families' consumption and nine farmers kept chickens for eggs solely for their own families' consumption.

Five smallholdings were identified in the terrestrial survey area and these kept commercial livestock on a small scale. One raised sheep, one raised sheep and kept chickens and ducks for eggs, one raised lambs and beef cattle, one raised lambs and pigs, and one raised lambs, beef cattle and pigs and kept chickens and ducks for eggs. The smallholders and their families were consuming lamb, pork and chicken eggs produced commercially on their own smallholdings. One smallholder also kept chickens for eggs and ducks for meat, and another smallholder also kept ducks for meat and eggs and turkeys for meat, solely for consumption by their own families and friends. Fruit and vegetables

were also grown on some of the smallholdings, solely for consumption by the smallholders' families and friends.

A small-scale vineyard was located in the survey area. Grapes for wine making, and a variety of other fruit and vegetables for ingredients in chutneys were grown at the vineyard. The owner and their family consumed wine and chutneys produced commercially at the premises.

Two small allotment sites and several private gardens were identified in the terrestrial survey area. The locations of the allotment sites are shown in Figure 2. One of the sites had approximately six individual plots and the other had approximately 18 individual plots. The site with 18 plots was relatively new, having been opened in 2010. A wide variety of fruit and vegetables was grown on the allotments and in the private gardens. Two gardeners kept chickens for eggs for their own family's consumption and one gardener kept ducks for eggs for their own family's consumption.

Two beekeepers who kept hives in the survey area were identified but only one was available for interview. The beekeeper that was interviewed had 11 hives that were located to the south-east of the site at a distance of approximately 3.25 km from the site centre. Production of honey per hive per year varied between approximately 3 kg in a poor year to approximately 17 kg in a good year. Honey was consumed by the beekeeper and their family and friends.

Blackberries, crab apples, sloes and mushrooms were growing wild in the survey area and these were being collected and consumed.

An organised game shoot took place on farmland in the west of the survey area and independent shooting took place on several other farms. The consumption of duck (unspecified species), greylag goose, mallard, partridge, pheasant, pigeon and snipe was identified. (Wild duck, greylag goose, mallard and snipe are usually categorised as wildfowl in habits surveys and are considered an aquatic pathway since they may be subject to liquid discharges in estuarine environments. However, they have been categorised as poultry and included as a terrestrial pathway for this survey since they were shot over farmland and were therefore potentially subject only to exposure to gaseous discharges, not to liquid discharges.) No consumption of rabbits or hares was identified.

A private conservation and angling club with approximately 12 members fished on the small river called Afon Wygyr in the east of the survey area. The river was stocked with 100 rainbow trout per year and was inhabited by wild migratory trout. Most of the fishing was catch and return but the consumption of rainbow trout from the river was identified. There is a potential trout fishery on the lake called Llyn Llygeirian, which is situated in the south of the survey area, but the angling boats moored around the lake appeared derelict at the time of the survey.

One household was identified that consumed small quantities of watercress grown in a pond in their garden.

The consumption of groundwater by humans and livestock was identified. Two households in the east of the survey area used well water for their sole domestic supply and one household in the centre of the survey area used spring water for their sole domestic supply. Another household in the east of the survey area used both well water and mains water for domestic purposes. Livestock were supplied with drinking water from boreholes at three farms, from a well at one farm and from a spring at another farm. At several other farms the animals were supplied with mains water for drinking but also had access to stream, ditch or lake water.

5.2 Destination of food originating from the terrestrial survey area

Beef cattle and lambs were sold through a livestock auction at Gaerwen on Anglesey or sold privately direct to other farms. Beef cattle and lambs were also sent for slaughter at abattoirs in south Wales, Lancashire and Shropshire, and from these most of the meat went to national supermarket chains. Pigs were mainly auctioned at Chelford in Cheshire. Small quantities of beef and lamb were sold through retail outlets on Anglesey and small quantities of pork were sold direct to the public. Cows' milk was sold to a national company for the production of mozzarella cheese. Wine and chutneys were sold throughout Wales. Small amounts of chicken eggs and duck eggs were sold to the public from the door.

5.3 The potential transfer of contamination off-site by wildlife

Measures are taken in order to limit the possibility that contamination is transferred offsite by wildlife. Wildlife is deterred from entering controlled areas by tight security fencing, automatic doors on buildings, and tarmac or concrete surfaces that prevent burrowing. Audio tapes of gull distress calls are broadcast in order to scare gulls away and a falconer and birds of prey are engaged periodically to discourage pigeons and gulls.

5.4 Food consumption data

Consumption data for locally produced foodstuffs potentially affected by deposition of gaseous discharges are presented in Tables 17 to 32 for adults and Tables 33 to 44 for children and infants.

In order to provide information relevant to monitoring and assessments studies, the consumption rate data collected during the survey were analysed to indicate the percentage that each food type contributed to each food group. The data are summarised in Table 45.

Adults' consumption rates

Consumption of locally produced foods was identified in the following 16 food groups: green vegetables; other vegetables; root vegetables; potato; domestic fruit; milk; cattle meat; pig meat; sheep meat; poultry; eggs; wild/free foods; honey; wild fungi; freshwater fish; freshwater plants. No consumption of rabbits/hares or venison was identified.

Table H presents a summary of the adults' consumption rates for the foods consumed from the terrestrial survey area. The table includes the mean consumption rates for the high-rate groups and the observed 97.5th percentile rates calculated as described in Section 3.4. For comparison, the table also includes mean consumption rates and 97.5th percentile consumption rates based on national data, which are referred to as 'generic' data in this report. No generic rates have been determined for freshwater fish or freshwater plants.

Table H. Summary of adults' consumption rates of foods from the terrestrial survey area

Food group	Number of observations	Number of high-rate consumers	Observed maximum for the high-rate group (kg y^{-1} or l y^{-1})	Observed minimum for the high-rate group (kg y^{-1} or l y^{-1})	Observed mean for the high-rate group (kg y^{-1} or l y^{-1})	Observed 97.5th percentile (kg y^{-1} or l y^{-1})	Generic mean (kg y^{-1} or l y^{-1})	Generic 97.5th percentile (kg y^{-1} or l y^{-1})
Green vegetables	23	8	25.9	15.1	18.2	25.9	15.0	45.0
Other vegetables	41	11	27.5	13.1	18.6	27.5	20.0	50.0
Root vegetables	25	9	62.0	21.3	38.6	62.0	10.0	40.0
Potato	32	11	150.0	50.0	107.5	150.0	50.0	120.0
Domestic fruit	37	5	53.3	21.8	28.2	25.1	20.0	75.0
Milk	18	18	121.7	91.3	102.2	121.7	95.0	240.0
Cattle meat	3	3	31.5	31.5	31.5	31.5	15.0	45.0
Pig meat	16	9	32.5	12.7	25.9	32.5	15.0	40.0
Sheep meat	23	13	15.1	11.3	12.2	15.1	8.0	25.0
Poultry	16	4	11.6	5.5	8.6	11.6	10.0	30.0
Eggs	58	30	21.0	7.4	13.0	20.3	8.5	25.0
Wild/free foods	62	2	6.0	6.0	6.0	3.9	7.0	25.0
Honey	2	2	3.4	3.4	3.4	3.4	2.5	9.5
Wild fungi	52	9	6.8	2.7	4.6	6.8	3.0	10.0
Freshwater fish	2	2	0.3	0.3	0.3	0.3	Not determined	Not determined
Freshwater plants	2	2	0.7	0.7	0.7	0.7	Not determined	Not determined

None of the mean consumption rates for the high-rate groups were greater than the generic 97.5th percentile consumption rates. Eleven mean consumption rates for the high-rate groups exceeded the generic mean consumption rates. These were for green vegetables, root vegetables, potatoes,

domestic fruit, milk, cattle meat, pig meat, sheep meat, eggs, honey and wild fungi. Two observed 97.5th percentile consumption rates exceeded the generic 97.5th percentile consumption rates. These were for root vegetables and potato.

Children's and infants' consumption rates

Fifteen individuals in the child age group and six individuals in the infant age group were identified consuming foods from the terrestrial survey area. Table I presents a summary of children's and infants' consumption rates. The table includes the mean consumption rates for the high-rate groups and the observed 97.5th percentile rates. No generic data have been determined for the child or infant age groups. In the child age group, no consumption of foods from the following food groups was identified: domestic fruit; cattle meat; rabbits/hares; honey; venison; freshwater fish; freshwater plants. In the infant age group, no consumption of foods from the following food groups was identified: green vegetables; other vegetables; cattle meat; sheep meat; poultry; rabbits/hares; honey; wild fungi; venison; freshwater fish; freshwater plants.

Table I. Summary of children's and infants' consumption rates of foods from the terrestrial survey area

Food group	Number of observations	Number of high-rate consumers	Observed maximum for the high-rate group (kg y^{-1} or l y^{-1})	Observed minimum for the high-rate group (kg y^{-1} or l y^{-1})	Observed mean for the high-rate group (kg y^{-1} or l y^{-1})	Observed 97.5th percentile (kg y^{-1} or l y^{-1})
Child age group (6 - 15 years old)						
Green vegetables	2	2	0.2	0.2	0.2	0.2
Other vegetables	2	2	0.5	0.5	0.5	0.5
Root vegetables	2	2	0.5	0.5	0.5	0.5
Potato	4	4	0.3	0.2	0.2	0.3
Milk	5	3	97.3	73.0	81.1	94.9
Pig meat	2	2	6.3	6.3	6.3	6.3
Sheep meat	5	3	4.5	3.4	3.8	4.4
Poultry	2	2	5.5	5.5	5.5	5.5
Eggs	9	9	8.9	3.0	5.8	8.9
Wild/free foods	8	2	1.5	0.6	1.1	1.4
Wild fungi	5	5	0.6	0.5	0.5	0.6
Infant age group (0 - 5 years old)						
Root vegetables	2	2	0.5	0.5	0.5	0.5
Potato	2	2	0.3	0.3	0.3	0.3
Domestic fruit	2	2	0.2	0.2	0.2	0.2
Milk	1	1	59.1	59.1	59.1	Not applicable
Pig meat	1	1	7.1	7.1	7.1	Not applicable
Eggs	1	1	3.4	3.4	3.4	Not applicable
Wild/free foods	5	5	0.3	0.2	0.2	0.3

6 DIRECT RADIATION PATHWAYS

6.1 Direct radiation survey area

The direct radiation survey area (see Figure 2) covered the land and water within 1.2 km of the nuclear licensed site boundary. The occupancy data collected from the direct radiation survey area is also applicable to inhalation and external exposure pathways arising from gaseous releases from the site. (The direct radiation survey area was extended from the area within 1.0 km of the site boundary, which is usually used for habits surveys, up to the area within 1.2 km of the site boundary, in order to include more residential properties within the survey area, since there were very few within 1.0 km of the site.)

The land within the direct radiation survey area is predominantly agricultural. The promontory of Wylfa Head, which is a local nature reserve with open public access, is to the north-east of the site. Adjacent to the south-east side of the power station is an electricity substation and beyond this are the power station's Visitors Centre and Nature Trail, and the Sports and Social Club. Cestyll Gardens, which are occasionally open to the public, are situated approximately 300 m to the south-west of the site. The A5025 road passes through the south-east corner of the direct radiation survey area and minor roads branch off this towards the power station and towards the west. The main residential areas within the direct radiation survey area are the northern part of the village of Tregele, which is located close to the southern boundary of the survey area, and a row of properties along the A5025, to the east of the junction with the road leading to the power station entrance.

The power station is situated directly adjacent to the rocky coast and on the coast to the southwest of the site is the small bay of Porth-y-pistyll. The outfall from the power station flows into a small inlet on the west side of Wylfa Head, called Porth Wnal and on the east side of Wylfa Head there is a small bay called Porth yr Ogof. Further east along the coast, towards the limit of the 1.2 km area, there is another small bay called Porth Wylfa.

A large part of the land within 1.2 km of the site had been purchased by the developers proposing to build a new nuclear power station close to the existing site. Although there had never been many residential properties on the land that had been purchased by the developers, most of those properties that had previously been lived in were either already demolished or had been boarded up. The farmland that had been purchased by the developers had been leased back to farmers on short term leases and was still used for farming. The countryside areas were open to the public as before.

The activities of Magnox Ltd employees and contractors while at work were not considered in the direct radiation survey. This included employees working outside the licensed site boundary at the power station Visitors Centre and Nature Trail, the Sports and Social Club and Cestyll Gardens.

6.2 Residential activities

Interviews were conducted at 11 residential properties, seven of which were occupied solely by adults (*i.e.* 16 year olds and above) and four of which were occupied by families with infants or children. One of the residences was a smallholding and another was occupied by a farmer who farmed in the direct radiation survey area, although the property was not the farmhouse. There were no occupied residential properties in the 0 – 0.25 km zone or the >0.25 – 0.5 km zone and all the properties where interviews were conducted were in the >0.5 – 1.2 km zone.

6.3 Leisure activities

The power station Visitors Centre received approximately 30,000 visitors per year including members of the general public and educational groups ranging in age from primary school pupils to university students. The centre was also used for a variety of local community activities. The associated nature trail was used for nature studies and was also open to the public. It is anticipated that the centre will close when the power station ceases to generate electricity and this is expected to happen during 2014 or 2015. The Sports and Social Club had a playing field and a surfaced court that were infrequently used, although it was reported that dog walkers and people practising golf used the grounds. The clubhouse was used most weekday evenings by a variety of small clubs and associations and also used approximately once per fortnight for private functions such as weddings or public events such as country and western dances. Cestyll Gardens was open to visitors for three days per year. The Wylfa Head Nature Reserve was used by walkers, dog walkers and birdwatchers.

Angling was popular from the rocks around Wylfa Head, particularly on the eastern shore of Porth Wnal near the power station cooling water outfall, which was a favourite venue for bass fishing. Anglers also made their way along the shore outside the perimeter fence on the north-west of the site in order to fish from the rocks to the north-east of the site on the western shore of Porth Wnal. Swimming was reported to take place in Porth Wnal.

The small bays of Porth-y-pistyll, Porth yr Ogof and Porth Wylfa were only accessible by foot or from the sea. No activities were noted to be taking place on the shore at any of these bays at the time of the survey.

Angling and pleasure boats were observed passing close along the coast and either drifting or at anchor in the mouth of Porth Wnal and close to the beach at Porth yr Ogof.

6.4 Commercial activities

Few commercial activities took place within the direct radiation survey area. A small number of full time and part time staff worked at the electricity sub-station and the developers of the proposed new

nuclear power station had a few staff based at an office at the Visitors Centre. A petrol station and associated shop were located in Tregele, close to the boundary of the 1.2 km area. There was also an Inn in Tregele, but this was closed and unoccupied at the time of the survey. Six agricultural workers were identified that worked on farmland in the area and two of these also lived in the area. Fishermen were noted laying pots from boats at sea within 1.2 km of the site.

It was reported that a variety of employees and contractors of the company developing the proposed new nuclear power station visited the area. Most of the visits were of short duration. Depending on how the proposed development progresses there could be many hundreds of people working in the area for several years. At the time of writing the company is 'planning on the basis of site works beginning from 2015, leading to the start of major on-site work in 2018 and first nuclear construction around 2019.' (www.horizonnuclearpower.com/wylfa)

6.5 Occupancy rates

Table 46 presents indoor, outdoor and total occupancy data for adults, children and infants. An analysis of the data by distance zones and occupancy rates is shown in Table 47. A summary of occupancy rates in the direct radiation survey area is presented in Table J, below.

Table J. Summary of direct radiation occupancy rates

Zone	Number of observations	Highest indoor occupancy ($h\ y^{-1}$)	Highest outdoor occupancy ($h\ y^{-1}$)	Highest total occupancy ($h\ y^{-1}$)
0 - 0.25 km	23	806	806	1612
>0.25 - 0.5 km	9	0	365	365
>0.5 - 1.2 km	34	8578	1638	8656

0 - 0.25 km from the nuclear licensed site boundary

Occupancy data were collected for 23 individuals in the 0 - 0.25 km zone. The observations were for 12 people who worked in the area, one farmer who farmed land in the area and 10 anglers who were fishing from the shore at Porth Wnal and Wylfa Head. The highest indoor, outdoor and total occupancy rates were for two people who worked in the area.

>0.25 - 0.5 km from the nuclear licensed site boundary

Occupancy data were collected for 9 individuals in the >0.25 - 0.5 km zone. The observations were for three farmers who were farming land in the area, four anglers who were fishing from the shore and

two birdwatchers. No indoor occupancy was recorded in this zone. The highest outdoor and total occupancy rates were for the three farmers.

>0.5 - 1.2 km from the nuclear licensed site boundary

Occupancy data were collected for 34 people in the >0.5 - 1.2 km zone. The observations were for 33 residents, two of whom also farmed in the area, and one visitor. The highest indoor and total occupancy rates were for the same resident and the highest outdoor occupancy rate was for a resident who also farmed in the area.

6.6 Gamma dose rate measurements

Gamma dose rate measurements were taken indoors and outdoors at most properties where interviews were conducted in the Wylfa direct radiation survey area. Outdoor measurements were taken approximately 5 to 10 metres from the nearest building, where possible. Gamma dose rate measurements over rough grass were taken at locations further than 5 km from the site centre to obtain background dose rates. All measurements were taken at a height of 1 metre above the substrate using a Mini 600 Series Type 6-81 Environmental Radiation Meter with a compensated Geiger-Müller tube. The indoor and outdoor measurements have not been adjusted for background dose rates. The results are presented in Table 48 and are summarised below.

Indoor measurements

- Ten measurements taken over concrete ranged from 0.076 µGy h^{-1} to 0.123 µGy h^{-1}

Outdoor measurements

- Ten measurements taken over grass ranged from 0.065 µGy h^{-1} to 0.080 µGy h^{-1}
- One measurements taken over stone was 0.089 µGy h^{-1}

Background measurements

- Three measurements taken over grass ranged from 0.064 µGy h^{-1} to 0.076 µGy h^{-1}

Estimates of the average annual doses from background radiation to the population across the UK, by county, have been made by Public Health England (previously the Radiation Protection Division of the Health Protection Agency), the most recent of these being a review conducted in 2005 (Watson *et al*, 2005). Further information on background radiation relevant to the geographic region covered in the Wylfa habits survey can be found in the review.

7 USES OF HABITS DATA FOR DOSE ASSESSMENTS

7.1 Combined pathways

In determining habits data for the purposes of assessing radiological doses to the public, it may be necessary to consider a combination of pathways. Data are provided in Annex 1 and Annex 2 so that the full effect of combining pathways can be assessed for individual observations, given the concentrations and dose rates for a particular assessment. The rates for individuals in the high-rate groups are emboldened. In some circumstances, it will be possible to make simplifying assumptions and define the consumption and external exposure rates appropriate to a series of potential high-rate groups.

The most extensive combinations of pathways for adult dose assessment are shown in Table 49. Each of the 31 combinations shown in Table 49 represents an actual individual (or individuals) from Annex 1 who has positive data (irrespective of the magnitude), for each pathway marked with a cross. It should be noted that combination numbers in Table 49 do not correlate directly with observation numbers in Annex 1. Other individuals from Annex 1 have combinations that are not listed in Table 49 because they have fewer pathways and a dose assessment for them would be adequately covered by one of the 31 listed combinations.

7.2 Foetal dose assessment

Dose assessment of the foetus was introduced routinely for the first time in the Radioactivity in Food and the Environment report for 2005 (EA, EHS, FSA and SEPA, 2006), following the publication of recommendations by the Radiation Protection Division of the Health Protection Agency (National Radiological Protection Board, 2005). The adopted approach is to use the consumption and occupancy data for women of childbearing age in order to calculate the potential dose to the foetus. Therefore, consumption and occupancy data collected during the Wylfa habits survey for females of childbearing age are presented in Annex 5. The Office of National Statistics classifies women to be of childbearing age if they are between 15 – 44 years old (www.statistics.gov.uk); this age range has been used in Annex 5. It was not possible to collect ages for all female observations during the habits survey. However, these females with unknown ages have been included in Annex 5 as they might be women of childbearing age.

7.3 Total dose assessment

The environment agencies and the Food Standards Agency have considered ways of using habits data to calculate total dose retrospectively. The adopted approach is to use the adult consumption and occupancy data collected in each habits survey to create a matrix with a series of habits profiles

for each site. The National Dose Assessment Working Group (NDAWG) has considered this approach to assessing retrospective total doses (Camplin *et al*, 2005) and has agreed that using habits profiles is an appropriate approach. The relevant matrix for the adults' profiled habits data is shown in Annex 6. Additionally, profiles have been created for the child and infant age groups, and for women of childbearing age. These are shown in Annexes 7, 8, and 9 respectively.

8 COMPARISONS WITH THE PREVIOUS SURVEY

The results from this 2013 survey can be compared with results from the last combined habits survey undertaken at Wylfa in 2009. The aquatic and terrestrial survey areas in the 2013 survey were the same as those in the 2009 survey. The direct radiation survey area covered the area up to 1.0 km from the site boundary in 2009 but was extended up to 1.2 km from the site boundary in 2013. The comparisons below of consumption rates, intertidal occupancy rates and handling rates of fishing gear and sediment are for adults only. The comparison of occupancy rates in the direct radiation area is for all age groups combined.

8.1 Aquatic survey area

The types of activities identified in 2013 were for the most part similar to those identified in 2009. However, the number of commercial potting boats based in the area dropped from nine in 2009 to seven in 2013.

The main species of fish consumed by the adult high-rate group in 2009 were mackerel, bass and pollack, and in 2013 the main species were the same with the addition of cod and whiting. In 2009 and 2013 the main species of crustaceans consumed by the adult high-rate group were the same, comprising brown crab, common lobster and common prawn. In 2009 the only species of mollusc consumed by the adult high-rate group was mussels, whereas in 2013 the only species consumed by the adult high-rate group was king scallop. In 2009 the only species of marine plants/algae consumed by the adult high-rate group was *Porphyra sp* but in 2013 the consumption of marine plants/algae was not identified.

A comparison between the 2009 and 2013 data for the consumption of aquatic foods is presented in Table K.

Table K. Comparison between 2009 and 2013 consumption rates of aquatic food groups for adults

	2009			2013		
Food group	**Number in high-rate group**	**Maximum consumption rate (kg y^{-1})**	**Mean consumption rate for the high-rate group (kg y^{-1})**	**Number in high-rate group**	**Maximum consumption rate (kg y^{-1})**	**Mean consumption rate for the high-rate group (kg y^{-1})**
Fish	18	47.2	28.8	10	67.1	33.5 (33.47)
Crustaceans	5	23.4	15.8	9	18.1	7.9
Molluscs	2	6.9	6.9	3	1.8	1.8
Marine plants/algae	1	0.5	0.5	Not identified		

In 2013, compared with 2009, there was a slight increase in the mean consumption rate for the adult high-rate group for fish, from 29 kg y^{-1} to 33 kg y^{-1}, and significant decreases in the mean consumption rates for the adult high-rate groups for crustaceans, from 16 kg y^{-1} to 7.9 kg y^{-1}, and for molluscs, from 6.9 kg y^{-1} to 1.8 kg y^{-1}. The consumption of small quantities of marine plants/algae was identified in 2009 but not in 2013.

The decrease in the consumption rate of crustaceans was attributed to two commercial fishermen, whose families had high consumption rates in 2009, having left the fishing industry in 2013. The decrease in the consumption rate of molluscs was attributed to a person who had collected mussels for his own family's consumption, who had high consumption rates in 2009, having left the area in 2013. The cessation of the consumption of marine plants/algae was due to the single seaweed consumer who was identified in 2009 having left the area in 2013.

The consumption of vegetables grown in soil fertilised with seaweed was identified in 2009 and 2013 and the consumption of domestic fruit grown in soil fertilised with seaweed was identified in 2013 but not in 2009. Sheep were identified grazing on seaweed on the shore in both years.

For intertidal occupancy for adults in 2009, activities were recorded over the following four substrates: mud and sand; rock; sand; sand and stones. In 2013, activities were recorded over the same substrates with the addition of occupancy over mud, sand and stones.

The following activities were undertaken by the individuals in the adult high-rate groups for intertidal substrates:

- In 2009: angling, dog walking, boat maintenance, fixing moorings, nature reserve warden duties, beach warden duties, playing, collecting seaweed and collecting mussels.
- In 2013: angling, dog walking, boat maintenance, fixing moorings, nature reserve warden duties, beach warden duties, walking, collecting winkles and collecting limpets.

The only activity undertaken by the individuals in the adult high-rate groups for handling fishing gear in both 2009 and 2013 was handling pots.

The following activities were undertaken by the individuals in the adult high-rate groups for handling sediment:

- In 2009: fixing moorings, bait digging, collecting mussels and collecting seaweed.
- In 2013: fixing moorings.

A comparison between the 2009 and 2013 data for adult occupancy over intertidal substrates, handling fishing gear and handling sediment is shown in Table L.

Table L. Comparison between 2009 and 2013 intertidal occupancy rates and handling rates of fishing gear and sediment for adults						
	2009			2013		
Intertidal substrate or handling pathway	Number in high-rate group	Maximum occupancy or handling rate (h y^{-1})	Mean occupancy or handling rate for the high-rate group (h y^{-1})	Number in high-rate group	Maximum occupancy or handling rate (h y^{-1})	Mean occupancy or handling rate for the high-rate group (h y^{-1})
Mud and sand	1	390	390	1	390	390
Mud, sand and stones	Not identified			1	35	35
Rock	3	978	575	8	426	258
Sand	5	730	413	16	548	369
Sand and stones	9	504	260	7	612	374
Handling fishing gear	7	1400	1012	6	1624	1289
Handling sediment	3	300	180	1	300	300

There was no change in the mean intertidal occupancy rate for the adult high-rate group over mud and sand between 2009 and 2013. In 2013 activities were recorded taking place over mud, sand and stones but no activities were recorded over this substrate in 2009. In 2013 compared to 2009, the mean intertidal occupancy rate for the adult high-rate group over rock decreased significantly, whilst the mean rate for the adult high-rate group over sand decreased moderately and the mean rate for the adult high-rate group over sand and stones increased moderately.

The decrease in the occupancy rate over rock was mainly attributed to a single individual who had spent a high amount of time angling and collecting seaweed in 2009, having left the area in 2013. The decrease in the occupancy rate over sand was attributed to a lower maximum rate for dog walkers at Cemaes in 2013 than in 2009. The increase in the occupancy rate over sand and stones was attributed to nature reserve wardens at Cemlyn Bay working over a longer season in 2013 than in 2009.

The mean rate for the adult high-rate group for handling fishing gear increased moderately in 2013 compared to 2009 and the mean rate for the adult high-rate group for handling sediment increased significantly. No specific reason was identified for the increase in the handling rate for fishing gear. The increase in the handling rate of sediment was attributed to two people who had been bait digging and collecting mussels or seaweed and had been in the high-rate group in 2009, having left the area

in 2013. This left one person in the high rate group in 2013 and the mean for the high-rate group was then the same as the maximum rate.

8.2 Terrestrial survey area

Activities in the terrestrial survey area in 2013 were broadly similar to those in 2009. The principal types of farm produce continued to be a mix of beef cattle, milk (from dairy cattle), lambs, pigs and arable crops grown for feeding to the livestock. In 2009 one farm was identified that grew barley for human consumption but in 2013 all the barley was used for animal feed. The number of farms producing milk (from dairy cattle) dropped from seven in 2009 to five in 2013 and the number of farms producing pigs dropped from two to one. There was a slight decrease in the overall number of farms since some had been taken over and incorporated into larger farms.

Several smallholdings, beekeeping, shooting on farmland, freshwater angling and the collection of wild/free foods were identified in both surveys. Two small allotment sites were identified in 2013, whereas none were identified in 2009. One of these had newly opened in 2010 and the other had developed from a collection of private gardens into a fenced allotment site during the period between the two surveys.

The mean consumption rates for the adult high-rate groups for terrestrial food groups from the 2009 and 2013 surveys are shown in Table M.

Table M. Comparison between 2009 and 2013 mean consumption rates for the adult high-rate groups for terrestrial food groups (kg y^{-1} or l y^{-1})

Food group	2009	2013
Green vegetables	25.0	18.2
Other vegetables	38.2	18.6
Root vegetables	41.2	38.6
Potatoes	100.1	107.5
Domestic fruit	26.4	28.2
Milk	157.2	102.2
Cattle meat	Not identified	31.5
Pig meat	7.9	25.9
Sheep meat	25.7	12.2
Poultry	4.5	8.6
Eggs	21.1	13.0
Wild/free foods	2.2	6.0
Rabbits/hares	1.1	Not identified
Honey	1.7	3.4
Wild fungi	0.6	4.2
Freshwater fish	2.5	0.3
Freshwater plants	Not identified	0.7

Consumption rates increased in 2013 in the following seven food groups: potatoes; domestic fruit; pig meat; poultry; wild/free foods; honey; wild fungi. Consumption rates decreased in 2013 in the following seven food groups: green vegetables; other vegetables; root vegetables; milk; sheep meat; eggs; freshwater fish. The consumption of cattle meat and freshwater plants were identified in 2013 but not in 2009, and the consumption of rabbits/hares was identified in 2009 but not in 2013. No consumption of venison was identified in either 2009 or 2013.

There were relatively large increases in the consumption rates for pig meat, poultry, wild/free foods, honey and wild fungi, and relatively large decreases in the consumption rates for other vegetables, milk, sheep meat, eggs and freshwater fish.

The increase in the mean consumption rate for the high-rate group of pig meat was attributed to an increase in availability of pork produced on smallholdings in the area. The increase in the consumption rate of poultry was attributed to the identification in 2013 of a smallholder who reared and consumed turkeys, who had not been identified in 2009. The consumption of cattle meat by one farming family was identified in 2013. They had kept cattle in 2009 but were not consuming the meat at that time. The decreases in the consumption rates for green vegetables, other vegetables and root vegetables were partly attributable to keen gardeners identified in 2009 becoming less active in 2013 as they became more elderly. The decrease in the consumption rate of milk was due to two dairy farming families drinking less milk in 2013 than 2009. The decrease in the consumption rate of sheep meat was largely due to a smallholder and his family who had been high consumers in 2009, no longer keeping sheep in 2013. The decrease in the consumption rate of eggs was largely attributable to smallholder who had kept chickens for eggs in 2009 no longer keeping chickens in 2013. No specific reasons were identified for the other changes in consumption rates.

Humans were identified consuming spring water and well water in both 2009 and 2013. Livestock were identified drinking water from boreholes, wells, springs, streams, ditches and lakes in both 2009 and 2013.

8.3 Direct radiation survey area

Activities identified in the direct radiation survey area in 2009 and 2013 were similar and included people residing, working, farming and undertaking recreational activities. There have never been many residential properties on the land within 1 km of the site but most of those that existed at the time of the 2009 survey had been demolished by 2013. Therefore the direct radiation survey area was extended to 1.2 km from the licensed site boundary in order to include more residential properties, since the occupants of residential properties were likely to have the highest occupancy rates in the area.

A comparison between the 2009 and 2013 direct radiation occupancy rates for all age groups combined, by zone, is presented in Table N.

Table N. Comparison between 2009 and 2013 direct radiation occupancy rates for all age groups combined (h y^{-1})		
	2009	**2013**
0 - 0.25 km zone		
Highest indoor	807	806
Highest outdoor	807	806
Highest total	1613	1612
>0.25 - 0.5 km zone		
Highest indoor	0	0
Highest outdoor	730	365
Highest total	730	365
>0.5 - 1.0 km zone in 2009 OR >0.5 - 1.2 km zone in 2013		
Highest indoor	8602	8578
Highest outdoor	2080	1638
Highest total	8656	8656

In both 2009 and 2013 the highest indoor, outdoor and total occupancy rates in the 0 - 0.25 km zone were for people working in the area. In both 2009 and 2013 no indoor occupancy was recorded in the >0.25 – 0.5 km zone and the highest outdoor and total occupancy rate in this zone were for farmers. In 2009, the highest indoor and total occupancy rates in the >0.5 – 1.0 km zone were for residents and in 2013 the highest indoor and total occupancy rates in the >0.5 – 1.2 km zone were also for residents. In 2009, the highest outdoor occupancy rate in the >0.5 – 1.0 km zone was for two smallholders who also lived in the area and in 2013 the highest outdoor rate in the >0.5 – 1.2 km zone was for a farmer who also lived in the area.

In the Wylfa direct radiation survey area, three sets of gamma dose measurements taken in 2013 can be compared with those taken at the same properties in 2009. These data are shown in Table O.

Table O. Comparison between 2009 and 2013 gamma dose rates (µGy h^{-1})				
	Indoor		**Outdoor**	
Location	**2009**	**2013**	**2009**	**2013**
Residence 1	0.085	0.091	0.082	0.070
Residence 2	0.125	0.107	0.091	0.078
Business 1	Not measured	Not measured	0.092	0.069

Notes
These measurements have not been adjusted for background dose rates
The locations correspond to those in Table 48

9 MAIN FINDINGS

The survey investigated three potential sources of public radiation exposure from the Wylfa site, which were:

- Discharges of liquid radioactive waste into the Irish Sea
- Discharges of gaseous radioactive waste to the atmosphere
- Emissions of direct radiation

Data were collected for 357 individuals including, for example, commercial and hobby fishermen, anglers, people spending time on intertidal substrates, farmers, allotment holders, beekeepers and people spending time within the direct radiation survey area. These people were targeted because their habits and where they live may cause them to be exposed to radioactivity from the site. However, it should be noted that the most exposed people can only be defined with the outcome of a dose assessment. All consumption rates recorded are only for foods produced, collected or caught from within the aquatic and terrestrial survey areas as defined in Section 2.3.

9.1 Aquatic survey area

The mean consumption rates for the adult high-rate groups (as defined in Section 3.4) for the separate aquatic consumption pathways for foods potentially affected by liquid discharges were:

- 33 kg y^{-1} for fish
- 7.9 kg y^{-1} for crustaceans
- 1.8 kg y^{-1} for molluscs

The predominant foods consumed by the people in the high-rate groups were:

- For fish: bass, cod, mackerel, pollack and whiting
- For crustaceans: brown crab, common lobster and common prawn
- For molluscs: king scallop

Four adults were identified who consumed vegetables that had been grown in soil fertilised with seaweed and two of these individuals also consumed domestic fruit that had been fertilised with seaweed. Sheep were deliberately allowed to access the shore at Hen Borth to graze on seaweed.

The mean occupancy rates for the adult high-rate groups over the separate intertidal substrates were:

- 390 h y^{-1} for mud and sand
- 35 h y^{-1} for mud, sand and stones
- 260 h y^{-1} for rock
- 370 h y^{-1} for sand
- 370 h y^{-1} for sand and stones

The mean rates for the adult high-rate groups for handling were:

- 1300 h y^{-1} for handling fishing gear (pots)
- 300 h y^{-1} for handling sediment

The maximum adult occupancy rates for water based activities were:

- 260 h y^{-1} for 'in water'
- 1600 h y^{-1} for 'on water'

9.2 Terrestrial survey area

The mean consumption rates for the adult high-rate groups for the separate consumption pathways for foods potentially affected by gaseous discharges were:

- 18 kg y^{-1} for green vegetables
- 19 kg y^{-1} for other vegetables
- 39 kg y^{-1} for root vegetables
- 110 kg y^{-1} for potato
- 28 kg y^{-1} for domestic fruit
- 100 l y^{-1} for milk
- 32 kg y^{-1} for cattle meat
- 26 kg y^{-1} for pig meat
- 12 kg y^{-1} for sheep meat
- 8.6 kg y^{-1} for poultry
- 13 kg y^{-1} for eggs
- 6.0 kg y^{-1} for wild/free foods
- 3.4 kg y^{-1} for honey
- 4.2 kg y^{-1} for wild fungi
- 0.3 kg y^{-1} for freshwater fish
- 0.7 kg y^{-1} for freshwater plants

No consumption of rabbits/hares or venison from the survey area was identified.

The consumption of foodstuffs by individuals in the child and infant age groups was also recorded.

The human consumption of spring water and well water was identified at four residences located in the centre and east of the survey area. Livestock were identified drinking water from boreholes, wells, springs, streams, ditches and lakes.

Control measures taken by the site operator in order to limit the possibility that contamination is transferred off-site by wildlife included deterring wildlife from entering controlled areas by means of tarmac or concrete surfaces that prevented burrowing, tight security fencing and automatic doors, and discouraging birds by playing recordings of gull distress calls and using a falconer and birds of prey.

9.3 Direct radiation survey area

The highest indoor, outdoor and total occupancy rates in the 0 – 0.25 km zone were for two people working in the area. No indoor occupancy was recorded in the >0.25 – 0.5 km zone and the highest outdoor and total occupancy rates in this zone were for three farmers working on the land. The highest indoor and total occupancy rates in the >0.5 – 1.2 km zone were for a resident and the highest outdoor occupancy rate in this zone was for a resident who also farmed in the area. The highest indoor, outdoor and total occupancy rates recorded for each zone were:

0 - 0.25 km zone

- 810 h y^{-1} for the indoor occupancy rate
- 810 h y^{-1} for the outdoor occupancy rate
- 1600 h y^{-1} for the total occupancy rate

>0.25 - 0.5 km zone

- 0 h y^{-1} for the indoor occupancy rate (no indoor occupancy identified in this zone)
- 370 h y^{-1} for the outdoor occupancy rate
- 370 h y^{-1} for the total occupancy rate

>0.5 – 1.2 km zone

- 8600 h y^{-1} for the indoor occupancy rate
- 1600 h y^{-1} for the outdoor occupancy rate
- 8700 h y^{-1} for the total occupancy rate

10 RECOMMENDATIONS FOR CHANGES TO THE MONITORING PROGRAMME

The information collected during this habits survey can be used to make recommendations for changes to the current monitoring programmes operated by the Environment Agency and the Food Standards Agency, and published in the RIFE report (EA, FSA, NIEA and SEPA, 2013).

10.1 Summary of current environmental monitoring programmes

The 2012 monitoring programmes relevant to the areas covered in this report included the samples and measurements listed below. The location names, foods and substrate classifications are taken directly from RIFE. Some of the samples and measurements taken for the monitoring programme may be from outside the survey area used for the 2013 Wylfa habits survey.

Aquatic monitoring

Aquatic samples

Sample	***Location***
Plaice	Pipeline
Bass	Outfall
Crabs	Pipeline
Lobsters	Pipeline
Winkles	Cemaes Bay
Seaweed	Cemaes Bay
Sediment	Cemaes Bay
Sediment	Cemlyn Bay West
Seawater	Cemaes Bay
Seawater	Cemlyn Bay West

Gamma dose rate measurements over intertidal sediments

Substrate	***Location***
Sand	Cemaes Bay
Pebbles	Cemlyn Bay West

Terrestrial monitoring

Terrestrial samples

Milk
Apples
Barley
Blackberries
Broad beans
Honey
Potatoes
Squash
Freshwater from public supply

10.2 Recommendations

Recommendations for changes to the current environmental monitoring programmes are made below. They are based on the findings of this survey and also take into account the potential radiological significance of the various pathways that were identified.

It is recommended that the samples and gamma dose rate measurements currently taken, which are not listed below, remain unchanged in the monitoring programmes.

Environment Agency monitoring

The current environmental monitoring programme adequately covers the Wylfa area and no changes to this are suggested.

Food Standards Agency monitoring

- The sample of plaice currently taken could be stopped since very few plaice were consumed and the 'fish' food group is adequately covered by the sample of bass.

- The squash sample currently taken from the 'other vegetable' food group could be replaced with a sample of cauliflower or cabbage from the 'green vegetable' food group. The 'other vegetable' food group is adequately covered by the sample of broad beans, which are consumed at a higher rate than squash, whereas no sample is currently taken from the green vegetable food group despite significant consumption of green vegetables.

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Table 1. Survey coverage

Group	Criteria	Estimate of complete coverage	Number for whom positive data was obtained	Coverage for positive observations	Notes
SUMMARY OF ALL PATHWAYS					
All potential interviewees in the Wylfa aquatic, terrestrial and direct radiation survey areas.	Number of people resident in the terrestrial survey area (excluding those resident in the direct radiation survey area) (See **(B) TERRESTRIAL PATHWAYS**)	2770[a]	91[b]	3.3%	The survey targeted individuals who were potentially the most exposed, mostly producers of local foods such as farmers and allotment holders.
	Number of people resident in the direct radiation survey area (See **(C) DIRECT RADIATION PATHWAYS**)	110	33[b]	30%	Interviews were conducted at 11 properties out of a total of 37 occupied residential properties in the direct radiation survey area.
	Number of people working, visiting and undertaking recreational activities in the direct radiation survey area (See **(C) DIRECT RADIATION PATHWAYS**)	U	16[b]	U	Excluding people living in the direct radiation survey area, employees and contractors at the nuclear licensed site and short term workers associated with the potential nuclear new build. Seventeen people who spent relatively short periods in the direct radiation survey area but were also potentially exposed via the consumption of terrestrial foods or aquatic pathways have been assigned to terrestrial or aquatic pathways as appropriate.
	Number of people effected by liquid discharges (excluding those assigned to other categories above) (See **(A) AQUATIC PATHWAYS**)	U	217[b]	U	
	Total for aquatic, terrestrial and direct radiation survey areas	U	357[b]	U	
(A) AQUATIC PATHWAYS					
Commercial fishermen	Number of commercial fishing vessels actively fishing in the aquatic survey area	7	7	100%	
People undertaking activities in or on water (*e.g.* swimmers, sub-aqua divers, boat anglers, commercial and hobby fishermen etc.)	Number of people undertaking activities in or on water in the aquatic survey area	U	102	U	
People using the shore (e.g. dog walkers, shore anglers, people playing, people collecting shellfish, etc.)	Number of people undertaking intertidal activities in the aquatic survey area	U	133	U	
Fish consumers	Number of people consuming fish from the aquatic survey area	U	88	U	
Crustacean consumers	Number of people consuming crustaceans from the aquatic survey area	U	35	U	
Mollusc consumers	Number of people consuming molluscs from the aquatic survey area	U	11	U	

Table 1. Survey coverage

Group	Criteria	Estimate of complete coverage	Number for whom positive data was obtained	Coverage for positive observations	Notes
(B) TERRESTRIAL PATHWAYS					
Farmers, smallholders and vineyard keepers	Number of farmers, smallholders, vineyard keepers and their family members consuming food from the terrestrial survey area	106	81	76%	Interviews were conducted at 29 out of 38 agricultural enterprises identified within the survey area.
Gardeners and allotment holders	Number of gardeners and allotment holders and and their family members consuming food from the terrestrial survey area	U	10	U	Excluding farmers and smallholders who grew food for their own families' consumption in their gardens. These people are included in the Farmers etc group, directly above.
Honey consumers	Number of people consuming honey produced in the survey area	U	2	U	An interview was conducted with one of two identified beekeepers
Freshwater fish consumers	Number of people consuming freshwater fish caught in the survey area	U	2	U	
(C) DIRECT RADIATION PATHWAYS					
Residents	Number of residents in the survey area	110	33	30%	Interviews were conducted at 11 properties out of a total of 37 occupied residential properties in the direct radiation survey area.
Employees	Number of people working in the survey area	25	16	64%	Excluding people living in the direct radiation survey area, employees and contractors at the nuclear licensed site and short term workers associated with the potential nuclear new build.
Visitors (including people undertaking recreational activities and people visiting residents)	Number of people visiting the survey area	U	17	U	
BREAKDOWN OF AGE GROUPS FOR PEOPLE RESIDENT IN THE 5 km TERRESTRIAL SURVEY AREA					
Adult	16-year-old and over	2420[a]	308	13%	
Child	6-year-old to 15-year-old	290[a]	38	13%	
Infant	0 to 5-year-old	170[a]	11	6%	

Notes

[a] Estimate of the number of people resident in the 5 km terrestrial survey area based on data from www.statistics.gov.uk.

[b] The number of people for whom positive data was obtained for pathways (A) and (B) and (C) will usually not equal the relevant totals in the summary of all pathways. This is because in sections (A), (B) and (C) some individuals may be counted two or more times, for example someone who goes shore angling and consumes the catch.

U - Unknown

Table 2. Typical food groups used in habits surveys

Food group	Examples of foods within the group
Green vegetables	Asparagus, broccoli, Brussels sprout, cabbage, calabrese, cauliflower, chard, courgette, cucumber, gherkin, globe artichoke, herbs, kale, leaf beet, lettuce, marrow, spinach
Other vegetables	Aubergine, broad bean, chilli pepper, French bean, kohl rabi, mangetout, pea, pepper, pumpkin, runner bean, sweetcorn, tomato
Root vegetables	Beetroot, carrot, celeriac, celery, chicory, fennel, garlic, Jerusalem artichoke, leek, onion, parsnip, radish, shallot, spring onion, swede, turnip
Potato	Potato
Domestic fruit	Apple, apricot, blackberry, blackcurrant, boysenberry, cherry, damson, fig, gooseberry, grape, greengage, huckleberry, loganberry, melon, nectarine, peach, pear, plum, raspberry, redcurrant, rhubarb, rowanberry, strawberry, tayberry, whitecurrant
Milk	Cows' milk, cream, goats' milk, yoghurt
Cattle meat[a]	Beef
Pig meat[a]	Pork
Sheep meat[a]	Lamb, mutton
Poultry[b]	Chicken, duck, goose, grouse, guinea fowl, partridge, pheasant, pigeon, turkey, woodcock
Eggs	Chicken egg, duck egg, goose egg
Wild/free foods	Blackberry, chestnut, crab apple, damson, dandelion root, elderberry, nettle, rowanberry, sloe
Honey	Honey
Wild fungi	Mushrooms, other edible fungi
Rabbits/Hares	Hare, rabbit
Venison[a]	Venison
Fish (sea)	Bass, brill, cod, ling, dab, Dover sole, flounder, gurnard, haddock, hake, herring, lemon sole, mackerel, monkfish, mullet, plaice, pollack, rays, saithe, salmon, sea trout, sprat, turbot, whitebait, whiting, witch, cuttlefish[c], squid[c]
Fish (freshwater)	Brown trout, eel (river), perch, pike, rainbow trout, salmon (river)
Crustaceans	Brown crab, common lobster, crawfish, *Nephrops*, prawn, shrimp, spider crab, squat lobster, velvet swimming crab
Molluscs	Cockles, limpets, mussels, oysters, razor clam, scallops, whelks, winkles
Wildfowl[b]	Canada goose, greylag goose, mallard, pink-footed goose, pintail, shoveler, teal, wigeon

Notes

[a] Including offal

[b] Domesticated ducks and geese are classified as poultry. Wild ducks and geese are classified as wildfowl.

[c] Although squid and cuttlefish are molluscs, radiologically they are more akin to fish.

Table 3. Adults' consumption rates of fish from the Wylfa aquatic survey area (kg y^{-1})

Observation number	Ballan wrasse	Bass	Cod	Conger eel	Dab	Flounder	Garfish	Grey mullet	Huss	Lesser spotted dogfish	Mackerel	Octopus	Plaice	Pollack	Pouting	Red gurnard	Saithe	Thornback ray	Tub gurnard	Whiting	Total
335	**-**	**-**	**13.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**40.8**	**-**	**-**	**13.2**	**-**	**-**	**-**	**-**	**-**	**-**	**67.1**
209	**4.7**	**-**	**-**	**0.9**	**0.9**	**-**	**0.9**	**-**	**4.7**	**4.7**	**4.7**	**0.9**	**0.9**	**4.7**	**0.9**	**0.9**	**-**	**0.9**	**-**	**4.7**	**35.4**
210	**4.7**	**-**	**-**	**0.9**	**0.9**	**-**	**0.9**	**-**	**4.7**	**4.7**	**4.7**	**0.9**	**0.9**	**4.7**	**0.9**	**0.9**	**-**	**0.9**	**-**	**4.7**	**35.4**
161	**-**	**7.0**	**7.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**7.0**	**-**	**-**	**7.0**	**-**	**-**	**-**	**-**	**-**	**7.0**	**35.0**
339	**-**	**-**	**7.3**	**-**	**-**	**2.3**	**-**	**-**	**-**	**-**	**7.3**	**-**	**2.3**	**7.3**	**-**	**1.8**	**-**	**-**	**-**	**2.7**	**30.8**
305	**-**	**6.4**	**3.6**	**-**	**1.1**	**-**	**-**	**-**	**-**	**-**	**6.4**	**-**	**-**	**6.4**	**-**	**-**	**-**	**-**	**-**	**2.7**	**26.5**
306	**-**	**6.4**	**3.6**	**-**	**1.1**	**-**	**-**	**-**	**-**	**-**	**6.4**	**-**	**-**	**6.4**	**-**	**-**	**-**	**-**	**-**	**2.7**	**26.5**
304	**-**	**6.4**	**3.6**	**-**	**1.1**	**-**	**-**	**-**	**-**	**-**	**6.4**	**-**	**-**	**6.4**	**-**	**-**	**-**	**-**	**-**	**2.7**	**26.5**
336	**-**	**-**	**13.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**13.2**	**-**	**-**	**-**	**-**	**-**	**-**	**26.3**
162	**-**	**5.0**	**5.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**5.0**	**-**	**-**	**5.0**	**-**	**-**	**-**	**-**	**-**	**5.0**	**25.0**
74	-	-	3.0	-	3.0	3.0	-	-	-	-	4.5	-	3.0	3.0	-	-	-	-	-	-	19.5
75	-	-	3.0	-	3.0	3.0	-	-	-	-	4.5	-	3.0	3.0	-	-	-	-	-	-	19.5
244	-	4.1	-	-	-	-	-	-	-	-	6.8	-	-	6.8	-	-	-	-	-	-	17.7
237	-	2.3	1.8	-	1.1	-	-	-	-	-	4.5	-	-	3.6	-	-	1.4	-	-	-	14.7
238	-	2.3	1.8	-	1.1	-	-	-	-	-	4.5	-	-	3.6	-	-	1.4	-	-	-	14.7
239	-	2.3	1.8	-	1.1	-	-	-	-	-	4.5	-	-	3.6	-	-	1.4	-	-	-	14.7
240	-	2.3	1.8	-	1.1	-	-	-	-	-	4.5	-	-	3.6	-	-	1.4	-	-	-	14.7
242	-	2.3	1.8	-	1.1	-	-	-	-	-	4.5	-	-	3.6	-	-	1.4	-	-	-	14.7
241	-	2.3	1.8	-	1.1	-	-	-	-	-	4.5	-	-	3.6	-	-	1.4	-	-	-	14.7
281	-	-	3.6	-	-	-	-	-	-	-	4.5	-	-	4.5	-	-	-	-	1.8	-	14.5
279	-	-	3.6	-	-	-	-	-	-	-	4.5	-	-	4.5	-	-	-	-	1.8	-	14.5
284	-	-	3.6	-	-	-	-	-	-	-	4.5	-	-	4.5	-	-	-	-	1.8	-	14.5
245	-	2.0	-	-	-	-	-	-	-	-	3.4	-	-	3.4	-	-	-	-	-	-	8.8
1	1.6	1.6	2.2	-	-	-	-	-	-	1.1	-	-	-	2.1	-	-	-	-	-	-	8.6
167	-	2.8	-	-	-	-	-	4.8	-	-	-	-	-	-	-	-	-	-	-	-	7.6
168	-	2.8	-	-	-	-	-	4.8	-	-	-	-	-	-	-	-	-	-	-	-	7.6
328	-	2.3	-	-	-	-	-	-	-	-	2.3	-	-	2.3	-	-	-	-	-	-	6.8
329	-	2.3	-	-	-	-	-	-	-	-	2.3	-	-	2.3	-	-	-	-	-	-	6.8
330	-	2.3	-	-	-	-	-	-	-	-	2.3	-	-	2.3	-	-	-	-	-	-	6.8
331	-	2.3	-	-	-	-	-	-	-	-	2.3	-	-	2.3	-	-	-	-	-	-	6.8
354	-	-	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7
355	-	-	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7

Table 3. Adults' consumption rates of fish from the Wylfa aquatic survey area (kg y^{-1})

Observation number	Ballan wrasse	Bass	Cod	Conger eel	Dab	Flounder	Garfish	Grey mullet	Huss	Lesser spotted dogfish	Mackerel	Octopus	Plaice	Pollack	Pouting	Red gurnard	Saithe	Thornback ray	Tub gurnard	Whiting	Total
231	-	-	-	-	-	-	-	-	-	-	2.7	-	-	2.5	-	0.5	-	-	-	-	5.7
232	-	-	-	-	-	-	-	-	-	-	2.7	-	-	2.5	-	0.5	-	-	-	-	5.7
233	-	-	-	-	-	-	-	-	-	-	2.7	-	-	2.5	-	0.5	-	-	-	-	5.7
234	-	-	-	-	-	-	-	-	-	-	2.7	-	-	2.5	-	0.5	-	-	-	-	5.7
235	-	-	-	-	-	-	-	-	-	-	2.7	-	-	2.5	-	0.5	-	-	-	-	5.7
236	-	-	-	-	-	-	-	-	-	-	2.7	-	-	2.5	-	0.5	-	-	-	-	5.7
128	-	-	-	-	-	-	-	-	-	0.1	5.0	-	-	-	-	-	-	-	-	-	5.1
129	-	-	-	-	-	-	-	-	-	0.1	5.0	-	-	-	-	-	-	-	-	-	5.1
300	-	0.9	-	-	-	-	-	-	-	-	1.8	-	-	1.8	-	-	-	-	-	-	4.5
301	-	0.9	-	-	-	-	-	-	-	-	1.8	-	-	1.8	-	-	-	-	-	-	4.5
302	-	0.9	-	-	-	-	-	-	-	-	1.8	-	-	1.8	-	-	-	-	-	-	4.5
303	-	0.9	-	-	-	-	-	-	-	-	1.8	-	-	1.8	-	-	-	-	-	-	4.5
337	-	-	-	-	0.7	-	-	-	-	-	1.8	-	-	1.8	-	-	-	-	-	-	4.3
338	-	-	-	-	0.7	-	-	-	-	-	1.8	-	-	1.8	-	-	-	-	-	-	4.3
285	-	1.4	0.9	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	-	-	-	4.1
286	-	1.4	0.9	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	-	-	-	4.1
319	-	-	0.9	-	-	-	-	-	-	-	1.4	-	-	1.8	-	-	-	-	-	-	4.1
320	-	-	-	-	-	-	-	-	-	-	4.1	-	-	-	-	-	-	-	-	-	4.1
247	-	-	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	-	-	1.8	3.6
248	-	-	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	-	-	1.8	3.6
260	-	-	-	-	0.7	-	-	-	-	-	0.9	-	-	0.9	-	-	-	-	-	0.9	3.4
261	-	-	-	-	0.7	-	-	-	-	-	0.9	-	-	0.9	-	-	-	-	-	0.9	3.4
262	-	-	-	-	0.7	-	-	-	-	-	0.9	-	-	0.9	-	-	-	-	-	0.9	3.4
264	-	-	-	-	0.7	-	-	-	-	-	0.9	-	-	0.9	-	-	-	-	-	0.9	3.4
169	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0
170	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0
171	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0
174	-	0.6	0.6	-	-	-	-	-	-	-	0.6	-	-	0.6	-	-	-	-	-	-	2.6
175	-	0.6	0.6	-	-	-	-	-	-	-	0.6	-	-	0.6	-	-	-	-	-	-	2.6
176	-	0.6	0.6	-	-	-	-	-	-	-	0.6	-	-	0.6	-	-	-	-	-	-	2.6
11	-	0.8	-	-	-	-	-	-	-	-	1.1	-	-	0.3	-	-	-	-	-	-	2.2
12	-	0.8	-	-	-	-	-	-	-	-	1.1	-	-	0.3	-	-	-	-	-	-	2.2

Table 3. Adults' consumption rates of fish from the Wylfa aquatic survey area (kg y^{-1})

Observation number	Ballan wrasse	Bass	Cod	Conger eel	Dab	Flounder	Garfish	Grey mullet	Huss	Lesser spotted dogfish	Mackerel	Octopus	Plaice	Pollack	Pouting	Red gurnard	Saithe	Thornback ray	Tub gurnard	Whiting	Total
324	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3
325	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.3
326	-	0.5	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	1.2
327	-	0.5	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-	1.2
7	-	0.4	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	1.0
8	-	0.4	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	1.0
78	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
81	-	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
61	-	-	0.4	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	0.7
111	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
112	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of fish based on the 10 high-rate adult consumers is 33.5 kg y^{-1}

The observed 97.5th percentile rate based on 75 observations is 35.4 kg y^{-1}

Table 4. Adults' consumption rates of crustaceans from the Wylfa aquatic survey area (kg y^{-1})

Observation number	Common prawn	Brown crab	Common lobster	Spiny spider crab	Velvet swimming crab	Total
214	**6.8**	**2.7**	**8.6**	**-**	**-**	**18.1**
328	**-**	**3.4**	**3.4**	**-**	**-**	**6.8**
329	**-**	**3.4**	**3.4**	**-**	**-**	**6.8**
330	**-**	**3.4**	**3.4**	**-**	**-**	**6.8**
331	**-**	**3.4**	**3.4**	**-**	**-**	**6.8**
78	**-**	**2.0**	**3.6**	**1.0**	**-**	**6.5**
79	**-**	**2.0**	**3.6**	**1.0**	**-**	**6.5**
80	**-**	**2.0**	**3.6**	**1.0**	**-**	**6.5**
81	**-**	**2.0**	**3.6**	**1.0**	**-**	**6.5**
335	-	4.4	-	-	-	4.4
336	-	4.4	-	-	-	4.4
339	-	2.0	0.6	-	-	2.7
354	-	-	2.6	-	-	2.6
355	-	-	2.6	-	-	2.6
279	-	0.9	0.9	-	-	1.8
281	-	0.9	0.9	-	-	1.8
284	-	0.9	0.9	-	-	1.8
75	-	0.4	0.6	-	0.2	1.2
323	-	1.2	-	-	-	1.2
320	-	1.1	-	-	-	1.1
74	-	0.4	0.6	-	-	1.0
260	-	0.2	0.3	-	-	0.5
262	-	0.2	0.3	-	-	0.5
261	-	0.2	0.2	-	-	0.4
264	-	0.2	0.2	-	-	0.4
209	-	-	-	0.4	-	0.4
210	-	-	-	0.4	-	0.4
188	-	0.2	-	-	-	0.2
191	-	0.2	-	-	-	0.2
192	-	0.2	-	-	-	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of crustaceans based on the 9 high-rate adult consumers is 7.9 kg y^{-1}

The observed 97.5th percentile rate based on 30 observations is 9.9 kg y^{-1}

Table 5. Adults' consumption rates of molluscs from the Wylfa aquatic survey area (kg y^{-1})

Observation number	King scallop	Winkle	Total
279	**1.8**	**-**	**1.8**
281	**1.8**	**-**	**1.8**
284	**1.8**	**-**	**1.8**
209	-	0.1	0.1
210	-	0.1	0.1
188	-	0.1	0.1
190	-	0.1	0.1
191	-	0.1	0.1
192	-	0.1	0.1

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of molluscs based on the 3 high-rate adult consumers is 1.8 kg y^{-1}

The observed 97.5th percentile rate based on 9 observations is 1.8 kg y^{-1}

Table 6. Children's consumption rates of fish from the Wylfa aquatic survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Bass	Cod	Dab	Mackerel	Pollack	Saithe	Tub gurnard	Whiting	Total
163	**14**	**5.0**	**5.0**	**-**	**5.0**	**5.0**	**-**	**-**	**5.0**	**25.0**
243	**12**	**2.3**	**1.8**	**1.1**	**4.5**	**3.6**	**1.4**	**-**	**-**	**14.7**
282	**9**	**-**	**3.6**	**-**	**4.5**	**4.5**	**-**	**1.8**	**-**	**14.5**
283	**7**	**-**	**3.6**	**-**	**4.5**	**4.5**	**-**	**1.8**	**-**	**14.5**
246	**15**	**2.0**	**-**	**-**	**3.4**	**3.4**	**-**	**-**	**-**	**8.8**
249	14	-	-	-	1.8	-	-	-	1.8	3.6
250	11	-	-	-	1.8	-	-	-	1.8	3.6
265	12	-	-	0.7	0.9	0.9	-	-	0.9	3.4
263	10	-	-	0.7	0.9	0.9	-	-	0.9	3.4
266	8	-	-	0.7	0.9	0.9	-	-	0.9	3.4
62	14	-	0.4	-	0.6	0.3	-	-	-	1.3
113	15	0.1	-	-	-	-	-	-	-	0.1
114	12	0.1	-	-	-	-	-	-	-	0.1

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of fish for the child age group based upon the 5 high-rate consumers is 15.5 kg y^{-1}

The observed 97.5th percentile rate based on 13 observations is 21.9 kg y^{-1}

Table 7. Children's consumption rates of crustaceans from the Wylfa aquatic survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Brown crab	Common lobster	Total
282	**9**	**0.9**	**0.9**	**1.8**
283	**7**	**0.9**	**0.9**	**1.8**
263	10	0.2	0.3	0.5
265	12	0.2	0.2	0.4
266	8	0.2	0.2	0.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of crustaceans for the child age group based upon the 2 high-rate consumers is 1.8 kg y^{-1}

The observed 97.5th percentile rate based on 5 observations is 1.8 kg y^{-1}

Table 8. Children's consumption rates of molluscs from the Wylfa aquatic survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	King scallop
282	**9**	**1.8**
283	**7**	**1.8**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of molluscs for the child age group based upon the 2 high-rate consumers is 1.8 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 1.8 kg y^{-1}

Table 9. Adults' consumption rates of vegetables and domestic fruit grown on land where seaweed has been used as a fertiliser (kg y^{-1})

Green vegetables

Observation number	Broccoli	Brussel sprout	Courgette	Herbs	Kale	Lettuce	Marrow	Spinach	Total
5	1.8	0.5	-	-	-	-	-	0.5	2.7
6	1.8	0.5	-	-	-	-	-	0.5	2.7
209	-	-	4.9	1.0	1.0	1.3	4.8	3.4	16.3
210	-	-	4.9	1.0	1.0	1.3	4.8	3.4	16.3

Other vegetables

Observation number	French bean	Pea	Runner bean	Tomato	Total
5	-	-	1.6	2.3	3.9
6	-	-	1.6	2.3	3.9
209	3.6	0.7	5.4	10.5	20.1
210	3.6	0.7	5.4	10.5	20.1

Root vegetables

Observation number	Beetroot	Carrot	Leek	Onion	Parsnip	Spring onion	Swede	Turnip	Total
5	1.8	-	-	-	-	-	-	-	1.8
6	1.8	-	-	-	-	-	-	-	1.8
209	12.3	5.9	6.6	25.4	1.8	0.5	6.7	2.7	62.0
210	12.3	5.9	6.6	25.4	1.8	0.5	6.7	2.7	62.0

Table 9. Adults' consumption rates of vegetables and domestic fruit grown on land where seaweed has been used as a fertiliser (kg y^{-1})

Potato

Observation number	Potato
5	3.4
6	3.4
209	66.0
210	66.0

Domestic fruit

Observation number	Apple	Blackcurrant	Cherry	Fig	Pear	Plum	Raspberry	Strawberry	Total
5	2.3	4.5	1.1	2.3	2.3	0.5	4.5	4.5	22.0
6	2.3	4.5	1.1	2.3	2.3	0.5	4.5	4.5	22.0
209	-	-	-	-	-	-	-	-	-
210	-	-	-	-	-	-	-	-	-

Notes

These foods are included in the aquatic section of this report as the exposure pathway is sea to land transfer and the source of potential exposure is liquid discharge. However these foods were grown in the terrestrial survey area and they are also potentially subject to gaseous discharges. Therefore they are also included in the terrestrial food groups and are included in Annex 1 as terrestrial foods.

Table 10. Adults' intertidal occupancy rates in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud and sand	Mud, sand and stones	Rock	Sand	Sand and stones
354	**Cemaes harbour**	**Boat maintenance and fixing moorings**	**390**	-	-	-	-
319	Cemaes harbour	Boat maintenance	70	-	-	-	-
209	Cemlyn Bay (west)	Bait digging	40	-	-	-	-
	Hen Borth to Porth Eilian	**Angling**	-	-	**282**	-	-
	West of Cemlyn Bay	**Collecting winkles**	-	-		-	-
	Cemlyn Bay	Angling and collecting seaweed	-	-	-	-	35
174	Cemlyn Bay (west)	Bait digging	8	-	-	-	-
	Llanbadrig Point	Angling	-	-	26	-	-
175	Cemlyn Bay (west)	Bait digging	8	-	-	-	-
	Llanbadrig Point	Angling	-	-	26	-	-
176	Cemlyn Bay (west)	Bait digging	8	-	-	-	-
	Llanbadrig Point	Angling	-	-	26	-	-
339	**Amlwch harbour**	**Boat maintenance**	-	**35**	-	-	-
61	**Cemyln Bay, Llanbadrig Point and Bull Bay**	**Angling and collecting limpets**	-	-	**426**	-	-
167	**Porth Wnal**	**Angling**	-	-	**326**	-	-
168	**Porth Wnal**	**Angling**	-	-	**326**	-	-
26	**Llanbadrig Point**	**Angling**	-	-	**200**	-	-
27	**Llanbadrig Point**	**Angling**	-	-	**200**	-	-
304	**Wylfa Head, Cemaes and Amlwch**	**Angling**	-	-	**156**	-	-
285	**Wylfa Head and Bull Bay**	**Angling**	-	-	**150**	-	-
161	Cemlyn Bay	Angling	-	-	139	-	139
181	Porth Wnal	Angling	-	-	130	-	-
182	Porth Wnal	Angling	-	-	130	-	-
317	Wylfa Head, Llanbadrig Point, Bull Bay and Amlwch	Angling	-	-	90	-	-
318	Wylfa Head, Llanbadrig Point, Bull Bay and Amlwch	Angling	-	-	90	-	-
169	Porth Wnal	Angling	-	-	63	-	-
170	Porth Wnal	Angling	-	-	63	-	-
171	Porth Wnal	Angling	-	-	63	-	-
326	Cemaes and Bull Bay	Angling	-	-	60	-	-
	Cemlyn Bay	Angling	-	-	-	-	20
356	**Cemlyn Bay**	**Nature reserve warden duties**	-	-	51	-	**612**
357	**Cemlyn Bay**	**Nature reserve warden duties**	-	-	51	-	**612**
1	Llanbadrig Point	Angling	-	-	42	-	-
	Cemaes	Dog walking	-	-	-	130	-
262	Bull Bay	Playing	-	-	40	-	-
264	Bull Bay	Playing	-	-	40	-	-
298	Porth Eilian	Playing	-	-	28	-	50
273	Bull Bay	Angling	-	-	28	-	-
274	Bull Bay	Angling	-	-	28	-	-
275	Bull Bay	Angling	-	-	28	-	-

Table 10. Adults' intertidal occupancy rates in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud and sand	Mud, sand and stones	Rock	Sand	Sand and stones
276	Bull Bay	Angling	-	-	28	-	-
277	Bull Bay	Angling	-	-	28	-	-
278	Bull Bay	Angling	-	-	28	-	-
9	Llanbadrig Point	Walking	-	-	20	-	-
	Cemaes	Walking	-	-	-	18	-
10	Llanbadrig Point	Walking	-	-	20	-	-
	Cemaes	Walking	-	-	-	18	-
260	Llanbadrig Point	Angling	-	-	8	-	-
261	Llanbadrig Point	Angling	-	-	8	-	-
183	Porth Wnal	Angling	-	-	4	-	-
	Cemlyn Bay	Angling	-	-	-	-	4
184	Porth Wnal	Angling	-	-	4	-	-
	Cemlyn Bay	Angling	-	-	-	-	4
185	Porth Wnal	Angling	-	-	4	-	-
	Cemlyn Bay	Angling	-	-	-	-	4
309	**Cemaes**	**Dog walking**	-	-	-	**548**	-
311	**Cemaes**	**Dog walking**	-	-	-	**548**	-
312	**Cemaes**	**Dog walking**	-	-	-	**548**	-
341	**Cemaes**	**Beach warden duties**	-	-	-	**473**	-
307	**Cemaes**	**Dog walking**	-	-	-	**456**	-
308	**Cemaes**	**Dog walking**	-	-	-	**456**	-
219	**Cemaes**	**Dog walking**	-	-	-	**330**	-
220	**Cemaes**	**Dog walking**	-	-	-	**330**	-
310	**Cemaes**	**Dog walking**	-	-	-	**320**	-
316	**Cemaes**	**Dog walking**	-	-	-	**320**	-
218	**Cemaes**	**Dog walking**	-	-	-	**312**	-
48	**Cemaes**	**Dog walking**	-	-	-	**307**	-
	Cemaes (west)	**Dog walking**	-	-	-	**-**	**307**
314	**Cemaes**	**Dog walking**	-	-	-	**300**	-
2	**Cemaes**	**Dog walking**	-	-	-	**228**	-
	Porth Padrig	**Dog walking**	-	-	-	**-**	**228**
313	**Cemaes**	**Dog walking**	-	-	-	**228**	-
315	**Cemaes**	**Dog walking**	-	-	-	**195**	-
43	Cemaes	Dog walking	-	-	-	182	-
44	Cemaes	Walking	-	-	-	182	-
332	Cemaes	Playing,Walking	-	-	-	140	-
82	Cemaes	Dog walking	-	-	-	109	-

Table 10. Adults' intertidal occupancy rates in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud and sand	Mud, sand and stones	Rock	Sand	Sand and stones
119	Cemaes	Walking	-	-	-	88	-
	Cemlyn Bay	Walking	-	-	-	-	23
223	Cemaes	Dog walking	-	-	-	72	-
	Cemlyn Bay	Dog walking	-	-	-	-	50
224	Cemaes	Dog walking	-	-	-	72	-
	Cemlyn Bay	Dog walking	-	-	-	-	50
221	Cemaes	Dog walking	-	-	-	52	-
222	Cemaes	Dog walking	-	-	-	52	-
41	Cemaes	Dog walking	-	-	-	39	-
	Bull Bay	Dog walking	-	-	-	-	39
42	Cemaes	Dog walking	-	-	-	39	-
	Bull Bay	Dog walking	-	-	-	-	39
191	Cemaes	Playing	-	-	-	22	-
	Hen Borth and Cemlyn Bay	Playing	-	-	-	-	43
	Hen Borth	Collecting winkles	-	-	-	-	
293	Cemaes	Playing	-	-	-	10	-
	Cemlyn Bay and Porth Eilian	Playing	-	-	-	-	18
294	Cemaes	Playing	-	-	-	10	-
	Cemlyn Bay and Porth Eilian	Playing	-	-	-	-	18
39	Cemaes	Water sports preparation	-	-	-	7	-
	Cemlyn Bay and Bull Bay	Water sports preparation	-	-	-	-	12
40	Cemaes	Water sports preparation	-	-	-	7	-
	Cemlyn Bay and Bull Bay	Water sports preparation	-	-	-	-	12
22	Cemaes	Walking	-	-	-	2	-
23	Cemaes	Walking	-	-	-	2	-
45	**Cemaes (west)**	**Dog walking**	-	-	-	-	**365**
46	**Cemaes (west)**	**Dog walking**	-	-	-	-	**274**
7	**Hen Borth, Cemlyn Bay, Cemaes (west) and Porth Wen**	**Walking**	-	-	-	-	**222**
	Cemyln Bay and Porth Padrig	**Angling**	-	-	-	-	
8	Hen Borth, Cemlyn Bay, Cemaes (west) and Porth Wen	Walking	-	-	-	-	182
172	Cemlyn Bay	Dog walking	-	-	-	-	182
173	Cemlyn Bay	Dog walking	-	-	-	-	182
57	Porth Padrig	Dog walking	-	-	-	-	143
58	Porth Padrig	Dog walking	-	-	-	-	143
59	Porth Padrig	Dog walking	-	-	-	-	143
60	Porth Padrig	Dog walking	-	-	-	-	143
204	Cemlyn Bay	Dog walking	-	-	-	-	143
206	Cemlyn Bay	Dog walking	-	-	-	-	143

Table 10. Adults' intertidal occupancy rates in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud and sand	Mud, sand and stones	Rock	Sand	Sand and stones
49	Porth Padrig	Dog walking and picnicking	-	-	-	-	133
179	Cemlyn Bay	Dog walking	-	-	-	-	52
180	Cemlyn Bay	Dog walking	-	-	-	-	52
225	Porth Eilian	Playing	-	-	-	-	50
226	Porth Eilian	Playing	-	-	-	-	50
227	Porth Eilian	Playing	-	-	-	-	50
228	Porth Eilian	Playing	-	-	-	-	50
50	Porth Padrig	Picnicking	-	-	-	-	42
51	Porth Padrig	Picnicking	-	-	-	-	42
157	Cemlyn Bay	Angling	-	-	-	-	32
158	West of Cemlyn Bay	Playing	-	-	-	-	26
292	Bull Bay	Dog walking	-	-	-	-	26
233	Cemlyn Bay	Bird watching	-	-	-	-	20
	Porth Eilian	Picnicking	-	-	-	-	
231	Porth Eilian	Picnicking	-	-	-	-	12
232	Porth Eilian	Picnicking	-	-	-	-	12
164	Cemlyn Bay	Dog walking	-	-	-	-	5
165	Cemlyn Bay	Dog walking	-	-	-	-	5

Notes

Emboldened observations are the high-rate individuals

The mean intertidal occupancy rate over mud and sand based on 1 high-rate observation is 390 h y^{-1}

The observed 97.5th percentile rate based on 6 observations for mud and sand is 350 h y^{-1}

The mean intertidal occupancy rate over mud, sand and stones based on the only observation is 35 h y^{-1}

The observed 97.5th percentile rate is not applicable for 1 observation

The mean intertidal occupancy rate over rock based on 8 high-rate observations is 258 h y^{-1}

The observed 97.5th percentile rate based on 39 observations for rock is 331 h y^{-1}

The mean intertidal occupancy rate over sand based on 16 high-rate observations is 369 h y^{-1}

The observed 97.5th percentile rate based on 37 observations for sand is 548 h y^{-1}

The mean intertidal occupancy rate over sand and stones based on 7 high-rate observations is 374 h y^{-1}

The observed 97.5th percentile rate based on 50 observations for sand and stones is 556 h y^{-1}

Table 11. Children's and infants' intertidal occupancy rates in the Wylfa aquatic survey area (h y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Location	Activity	Rock	Sand	Sand and stones
62	**14**	**Cemyln Bay, Llanbadrig Point and Bull Bay**	**Angling and collecting limpets**	**426**	-	-
114	12	Wylfa Head	Angling	54	-	-
263	10	Bull Bay	Playing	40	-	-
265	12	Bull Bay	Playing	40	-	-
266	8	Bull Bay	Playing	40	-	-
299	6	Porth Eilian	Playing	28	-	-
		Porth Eilian	Playing	-	-	50
333	**10**	**Cemaes**	**Playing and walking**	-	**140**	-
334	**9**	**Cemaes**	**Playing and walking**	-	**140**	-
121	**14**	**Cemaes**	**Walking**	-	**88**	-
		Cemlyn Bay	Walking	-	**-**	23
122	**14**	**Cemaes**	**Walking**	-	**88**	-
		Cemlyn Bay	Walking	-	**-**	23
295	13	Cemaes	Playing	-	9	-
		Cemlyn Bay and Porth Eilian	Playing	-	-	16
296	8	Cemaes	Playing	-	9	-
		Cemlyn Bay and Porth Eilian	Playing	-	-	16
297	12	Cemaes	Playing	-	9	-
		Cemlyn Bay and Porth Eilian	Playing	-	-	16
24	8	Cemaes	Walking	-	2	-
25	6	Cemaes	Walking	-	2	-
47	**13**	**Cemaes (west)**	**Dog walking**	-	-	**274**
230	10	Porth Eilian	Playing	-	-	50
52	13	Porth Padrig	Picnicking	-	-	42
53	10	Porth Padrig	Picnicking	-	-	42
54	9	Porth Padrig	Picnicking	-	-	42
166	7	Cemlyn Bay	Dog walking	-	-	5

Notes

Emboldened observations are the high-rate individuals

The mean intertidal occupancy rate over rock for the child age group based on 1 high-rate observations is 426 h y^{-1}

The observed 97.5th percentile rate based on 6 observations for rock is 379 h y^{-1}

The mean intertidal occupancy rate over sand for the child age group based on 4 high-rate observations is 114 h y^{-1}

The observed 97.5th percentile rate based on 9 observations for sand is 140 h y^{-1}

The mean intertidal occupancy rate over sand and stones for the child age group based on 1 high-rate observations is 274 h y^{-1}

The observed 97.5th percentile rate based on 12 observations for sand and stones is 212 h y^{-1}

Table 11. Children's and infants' intertidal occupancy rates in the Wylfa aquatic survey area (h y^{-1})

Infant age group (0 - 5 years old)

Observation number	Age	Location	Activity	Sand	Sand and stones
193	4	Cemaes	Playing	22	-
		Hen Borth and Cemlyn Bay	Playing	-	43
194	2	Cemaes	Playing	22	-
		Hen Borth and Cemlyn Bay	Playing	-	43
229	4	Porth Eilian	Playing	-	50
55	3	Porth Padrig	Picnicking	-	42
56	1	Porth Padrig	Picnicking	-	42
159	5	West of Cemlyn Bay	Playing	-	26
160	2	West of Cemlyn Bay	Playing	-	26

Notes

Emboldened observations are the high-rate individuals

The mean intertidal occupancy rate over sand for the infant age group based on 2 high-rate observations is 22 h y^{-1}

The observed 97.5th percentile rate based on 2 observations for sand is 22 h y^{-1}

The mean intertidal occupancy rate over sand and stones for the infant age group based on 7 high-rate observations is 39 h y^{-1}

The observed 97.5th percentile rate based on 7 observations for sand and stones is 49 h y^{-1}

Table 12. Gamma dose rate measurements over intertidal substrates in the Wylfa aquatic survey area (µGy h^{-1})

Location	National Grid Reference	Substrate	Gamma dose rate at 1 metre[a]
Hen Borth	SH 325 935	Sand and stones	0.067
Cemlyn Bay (west)	SH 330 937	Mud and sand	0.077
Cemlyn Bay (east)	SH 335 931	Sand and stones	0.058
Porth yr Ogof	SH 356 942	Sand	0.073
Porth yr Ogof	SH 356 942	Sand and stones	0.065
Cemaes harbour	SH 372 935	Mud, sand and stones	0.063
Cemaes	SH 372 937	Sand	0.048
Porth Padrig	SH 375 943	Sand	0.056
Porth Wen (brickworks)	SH 402 946	Stones	0.063
Bull Bay slipway area	SH 426 943	Stones	0.082
Amlwch harbour	SH 450 934	Mud, sand and stones	0.085
Porth Eilian	SH 476 929	Sand	0.063

Notes

[a] These measurements have not been adjusted for natural background dose rates.

Table 13. Adults' handling rates of fishing gear and sediment in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	Fishing gear	Sediment
340	**Carmel Head to Cemaes**	**Handling pots**	**1624**	-
322	**Amlwch to Point Lynas**	**Handling pots**	**1456**	-
323	**Amlwch to Point Lynas**	**Handling pots**	**1456**	-
354	**Cemaes Bay**	**Handling pots**	**1170**	-
	Cemaes harbour	**Fixing moorings**	-	**300**
215	**Wylfa to Amlwch**	**Handling pots**	**1080**	-
214	**Hell's Mouth to Amlwch**	**Handling pots**	**948**	-
216	Wylfa to Amlwch	Handling pots	540	-
328	Cemaes Bay	Handling pots	390	-
78	Cemaes Bay	Handling pots	105	-
79	Cemaes Bay	Handling pots	105	-
339	Wylfa Head to Point Lynas	Handling pots	50	-
320	Amlwch	Handling pots	43	-
321	Amlwch	Handling pots	26	-
74	Cemaes Bay	Handling pots	13	-
209	Cemlyn Bay (west)	Bait digging	-	45
	Cemlyn Bay	Collecting seaweed	-	
	West of Cemlyn Bay	Collecting winkles	-	
61	Cemyln Bay, Llanbadrig Point and Bull Bay	Collecting limpets	-	20
174	Cemlyn Bay (west)	Bait digging	-	8
175	Cemlyn Bay (west)	Bait digging	-	8
176	Cemlyn Bay (west)	Bait digging	-	8
191	Hen Borth	Collecting winkles	-	2

Notes

Emboldened observations are the high-rate individuals

The mean handling rate of fishing gear based on 6 high-rate observations is 1289 h y^{-1}

The observed 97.5th percentile rate based on 14 observations for fishing gear is 1569 h y^{-1}

The mean handling rate of sediment based on 1 high-rate observation is 300 h y^{-1}

The observed 97.5th percentile rate based on 7 observations for sediment is 262 h y^{-1}

Table 14. Children's handling rates of sediment in the Wylfa aquatic survey area (h y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Location	Activity	Sediment
62	14	Cemyln Bay, Llanbadrig Point and Bull Bay	Collecting limpets	20

Notes

Emboldened observation is the high-rate individual

The handling rate of sediment for the child age group based on the only observation is 20 h y^{-1}

The observed 97.5th percentile rate is not applicable for 1 observation

Table 15. Adults' occupancy rates in and on water in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	In water	On water
279	Carmel Head to Point Lynas	Sub-aqua diving	256	-
	Carmel Head to Point Lynas	Charter boat skipper	-	400
280	Carmel Head to Point Lynas	Sub-aqua diving	256	-
	Carmel Head to Point Lynas	Charter boat skipper	-	400
260	Carmel Head to Point Lynas	Sub-aqua diving and kayaking	216	-
261	Carmel Head to Point Lynas	Sub-aqua diving and kayaking	216	-
39	Cemyln Bay, Cemaes Bay and Bull Bay	Kayaking	167	-
40	Cemyln Bay, Cemaes Bay and Bull Bay	Kayaking	167	-
255	Cemyln Bay and Bull Bay	Kayaking	156	-
256	Cemyln Bay and Bull Bay	Kayaking	156	-
179	Cemaes Bay, Bull Bay and Point Lynas	Kayaking	102	-
	Carmel Head to Point Lynas	Sub-aqua diving		-
	Carmel Head to Point Lynas	Pleasure cruising	-	52
180	Cemaes Bay, Bull Bay and Point Lynas	Kayaking	102	-
	Carmel Head to Point Lynas	Sub-aqua diving		-
	Carmel Head to Point Lynas	Pleasure cruising	-	52
262	Carmel Head to Point Lynas	Kayaking	80	-
264	Carmel Head to Point Lynas	Kayaking	80	-
76	Cemaes Bay	Kayaking	45	-
77	Cemaes Bay	Kayaking	45	-
258	Bull Bay and Amlwch	Jetskiing and wake boarding	28	-
	Bull Bay and Amlwch	Canoeing	-	14
259	Bull Bay and Amlwch	Jetskiing and wake boarding	28	-
	Bull Bay and Amlwch	Canoeing	-	14
231	Carmel Head to Point Lynas	Sub-aqua diving	9	-
	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	131
32	Porth Wen (brickworks)	Swimming	9	-
	Porth Wen to Bull Bay	Kayaking		-
33	Porth Wen (brickworks)	Swimming	9	-
	Porth Wen to Bull Bay	Kayaking		-
34	Porth Wen (brickworks)	Swimming	9	-
	Porth Wen to Bull Bay	Kayaking		-
35	Porth Wen (brickworks)	Swimming	9	-
	Porth Wen to Bull Bay	Kayaking		-

Table 15. Adults' occupancy rates in and on water in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	In water	On water
36	Porth Wen (brickworks)	Swimming	9	-
	Porth Wen to Bull Bay	Kayaking		-
37	Porth Wen (brickworks)	Swimming	9	-
	Porth Wen to Bull Bay	Kayaking		-
38	Porth Wen (brickworks)	Swimming	9	-
	Porth Wen to Bull Bay	Kayaking		-
7	Cemaes Bay to Bull Bay	Kayaking	8	-
8	Cemaes Bay to Bull Bay	Kayaking	8	-
28	Porth Wen to Bull Bay	Kayaking	8	-
29	Porth Wen to Bull Bay	Kayaking	8	-
287	Bull Bay	Sub-aqua diving	6	-
	Bull Bay	On dive boat	-	14
288	Bull Bay	Sub-aqua diving	6	-
	Bull Bay	On dive boat	-	14
289	Bull Bay	Sub-aqua diving	6	-
	Bull Bay	On dive boat	-	14
290	Bull Bay	Sub-aqua diving	6	-
	Bull Bay	On dive boat	-	14
291	Bull Bay	Sub-aqua diving	6	-
	Bull Bay	On dive boat	-	14
49	Porth Padrig	Swimming	4	-
293	Cemlyn Bay, Cemaes Bay and Porth Eilian	Swimming	2	-
294	Cemlyn Bay, Cemaes Bay and Porth Eilian	Swimming	2	-
213	Cemaes Bay	Swimming	2	-
322	Amlwch to Point Lynas	Potting	-	1638
323	Amlwch to Point Lynas	Potting	-	1638
340	Carmel Head to Cemaes Bay	Potting	-	1638
354	Cemaes Bay	Potting	-	1382
	Carmel Head to Point Lynas	Charter boat skipper	-	
215	Wylfa Head to Amlwch	Potting	-	1260
214	Hell's Mouth to Amlwch	Potting	-	1092
	Porth Wen to Point Lynas	Rowing	-	
335	Carmel Head to Point Lynas	Charter boat skipper	-	968
216	Wylfa Head to Amlwch	Potting	-	630

Table 15. Adults' occupancy rates in and on water in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	In water	On water
339	Wylfa Head to Point Lynas	Boat angling and potting	-	468
244	Hell's Mouth to Bull Bay	Boat angling	-	442
245	Hell's Mouth to Bull Bay	Boat angling	-	442
78	Cemaes Bay	Potting	-	420
79	Cemaes Bay	Potting	-	420
217	Carmel Head to Point Lynas	Charter boat skipper	-	416
328	Cemaes Bay	Boat angling and potting	-	390
247	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	320
248	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	320
161	Carmel Head to Point Lynas	Boat angling	-	308
237	Wylfa Head to Point Lynas	Boat angling and pleasure cruising	-	300
238	Wylfa Head to Point Lynas	Boat angling and pleasure cruising	-	300
239	Wylfa Head to Point Lynas	Boat angling and pleasure cruising	-	300
74	Cemaes Bay	Boat angling, potting and sailing	-	234
320	Amlwch	Boat angling and potting	-	208
209	Carmel Head to Point Lynas	Boat angling	-	194
267	Porth Wen to Point Lynas	Rowing	-	175
268	Porth Wen to Point Lynas	Rowing	-	175
270	Porth Wen to Point Lynas	Rowing	-	175
271	Porth Wen to Point Lynas	Rowing	-	175
272	Porth Wen to Point Lynas	Rowing	-	175
251	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	160
252	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	160
253	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	160
254	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	160
232	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	140
233	Carmel Head to Point Lynas	Boat angling and pleasure cruising	-	140
176	Cemlyn Bay	Boat angling	-	102
175	Cemlyn Bay	Boat angling	-	102
319	Carmel Head to Point Lynas	Boat angling	-	102
174	Cemlyn Bay	Boat angling	-	102
257	Bull Bay	Canoeing	-	90
321	Amlwch	Potting	-	78
304	Carmel Head to Point Lynas	Boat angling	-	42

Table 15. Adults' occupancy rates in and on water in the Wylfa aquatic survey area (h y^{-1})

Observation number	Location	Activity	In water	On water
300	Carmel Head to Point Lynas	Boat angling	-	28
63	Cemaes Bay	Sailing	-	26
64	Cemaes Bay	Sailing	-	26
65	Cemaes Bay	Sailing	-	26
66	Cemaes Bay	Sailing	-	26
67	Cemaes Bay	Sailing	-	26
68	Cemaes Bay	Sailing	-	26
69	Cemaes Bay	Sailing	-	26
70	Cemaes Bay	Sailing	-	26
71	Cemaes Bay	Sailing	-	26
72	Cemaes Bay	Sailing	-	26
73	Cemaes Bay	Sailing	-	26

Table 16. Children's occupancy rates in and on water in the Wylfa aquatic survey area (h y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Location	Activity	In water	On water
266	8	Carmel Head to Point Lynas	Kayaking	80	-
263	10	Carmel Head to Point Lynas	Kayaking	80	-
265	12	Carmel Head to Point Lynas	Kayaking	80	-
30	15	Porth Wen (brickworks)	Swimming	9	-
		Porth Wen to Bull Bay	Kayaking		
31	15	Porth Wen (brickworks)	Swimming	9	-
		Porth Wen to Bull Bay	Kayaking		
296	8	Cemlyn Bay, Cemaes Bay and Porth Eilian	Swimming	5	-
297	12	Cemlyn Bay, Cemaes Bay and Porth Eilian	Swimming	5	-
295	13	Cemlyn Bay, Cemaes Bay and Porth Eilian	Swimming	5	-
250	11	Carmel Head to Point Lynas	Angling and pleasure cruising	-	320
249	14	Carmel Head to Point Lynas	Angling and pleasure cruising	-	320
269	15	Porth Wen to Point Lynas	Rowing	-	175

Table 17. Adults' consumption rates of green vegetables from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Artichoke	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Courgette	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
7	**0.3**	**2.3**	**1.0**	**5.1**	**4.1**	**4.1**	**4.5**	**4.5**	**-**	**-**	**-**	**-**	**-**	**25.9**
8	**0.3**	**2.3**	**1.0**	**5.1**	**4.1**	**4.1**	**4.5**	**4.5**	**-**	**-**	**-**	**-**	**-**	**25.9**
209	**-**	**-**	**-**	**-**	**-**	**-**	**4.9**	**-**	**1.0**	**1.0**	**1.3**	**4.8**	**3.4**	**16.3**
210	**-**	**-**	**-**	**-**	**-**	**-**	**4.9**	**-**	**1.0**	**1.0**	**1.3**	**4.8**	**3.4**	**16.3**
128	**-**	**-**	**-**	**-**	**-**	**13.6**	**-**	**-**	**-**	**-**	**1.8**	**-**	**-**	**15.4**
129	**-**	**-**	**-**	**-**	**-**	**13.6**	**-**	**-**	**-**	**-**	**1.8**	**-**	**-**	**15.4**
74	**-**	**-**	**3.4**	**8.5**	**-**	**-**	**1.4**	**-**	**-**	**-**	**1.2**	**0.6**	**-**	**15.1**
75	**-**	**-**	**3.4**	**8.5**	**-**	**-**	**1.4**	**-**	**-**	**-**	**1.2**	**0.6**	**-**	**15.1**
98	-	-	-	3.4	-	2.7	-	-	-	-	-	-	-	6.1
99	-	-	-	3.4	-	2.7	-	-	-	-	-	-	-	6.1
100	-	-	-	3.4	-	2.7	-	-	-	-	-	-	-	6.1
133	-	-	-	-	-	-	-	5.7	-	-	-	-	-	5.7
134	-	-	-	-	-	-	-	5.7	-	-	-	-	-	5.7
135	-	-	-	-	-	-	-	5.7	-	-	-	-	-	5.7
223	-	-	-	2.6	-	-	-	-	-	1.4	-	-	1.4	5.3
5	-	1.8	0.5	-	-	-	-	-	-	-	-	-	0.5	2.7
6	-	1.8	0.5	-	-	-	-	-	-	-	-	-	0.5	2.7
224	-	-	-	1.0	-	-	-	-	-	0.5	-	-	0.5	2.1
130	-	-	-	-	-	-	-	2.0	-	-	-	-	-	2.0
131	-	-	-	-	-	-	-	2.0	-	-	-	-	-	2.0
132	-	-	-	-	-	-	-	2.0	-	-	-	-	-	2.0
22	-	-	-	-	-	-	-	-	-	-	0.2	-	-	0.2
23	-	-	-	-	-	-	-	-	-	-	0.2	-	-	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of green vegetables based on the 8 high-rate adult consumers is 18.2 kg y^{-1}

The observed 97.5th percentile rate based on 23 observations is 25.9 kg y^{-1}

Table 18. Adults' consumption rates of other vegetables from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Broad bean	French bean	Pea	Runner bean	Squash	Tomato	Total
7	**2.5**	**2.5**	**-**	**2.5**	**-**	**20.0**	**27.5**
8	**2.5**	**2.5**	**-**	**2.5**	**-**	**20.0**	**27.5**
209	**-**	**3.6**	**0.7**	**5.4**	**-**	**10.5**	**20.1**
210	**-**	**3.6**	**0.7**	**5.4**	**-**	**10.5**	**20.1**
128	**5.0**	**-**	**-**	**9.1**	**6.0**		**20.1**
129	**5.0**	**-**	**-**	**9.1**	**6.0**		**20.1**
223	**-**	**4.3**	**-**	**6.1**	**-**	**5.4**	**15.8**
117	**6.8**	**-**	**6.8**	**-**	**-**		**13.6**
118	**6.8**	**-**	**6.8**	**-**	**-**		**13.6**
11	**-**	**-**	**-**	**-**	**-**	**13.1**	**13.1**
12	**-**	**-**	**-**	**-**	**-**	**13.1**	**13.1**
83	-	-	-	-	-	7.2	7.2
84	-	-	-	-	-	7.2	7.2
85	-	-	-	-	-	7.2	7.2
86	-	-	-	-	-	7.2	7.2
224	-	1.7	-	2.4	-	2.2	6.3
133	-	-	-	-	-	4.8	4.8
134	-	-	-	-	-	4.8	4.8
135	-	-	-	-	-	4.8	4.8
9	-	-	-	-	-	4.5	4.5
10	-	-	-	-	-	4.5	4.5
74	-	-	-	-	-	4.5	4.5
75	-	-	-	-	-	4.5	4.5
5	-	-	-	1.6	-	2.3	3.9
6	-	-	-	1.6	-	2.3	3.9
15	-	-	0.2	0.2	-	2.8	3.3
16	-	-	0.2	0.2	-	2.8	3.3
17	-	-	0.2	0.2	-	2.8	3.3
18	-	-	0.2	0.2	-	2.8	3.3
130	-	-	-	-	-	2.0	2.0
131	-	-	-	-	-	2.0	2.0
132	-	-	-	-	-	2.0	2.0
98	1.4	-	0.6	-	-		2.0
99	1.4	-	0.6	-	-		2.0
100	1.4	-	0.6	-	-		2.0

Table 18. Adults' consumption rates of other vegetables from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Broad bean	French bean	Pea	Runner bean	Squash	Tomato	Total
1	-	0.4	-	-	-	0.4	0.8
2	-	0.4	-	-	-	0.4	0.8
3	-	0.4	-	-	-	0.4	0.8
4	-	0.4	-	-	-	0.4	0.8
22	-	0.2	-	-	-	0.2	0.5
23	-	0.2	-	-	-	0.2	0.5

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of other vegetables based on the 11 high-rate adult consumers is 18.6 kg y^{-1}

The observed 97.5th percentile rate based on 41 observations is 27.5 kg y^{-1}

Table 19. Adults' consumption rates of root vegetables from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Beetroot	Carrot	Celery	Garlic	Leek	Onion	Parsnip	Spring onion	Swede	Turnip	Total
209	**12.3**	**5.9**	**-**	**-**	**6.6**	**25.4**	**1.8**	**0.5**	**6.7**	**2.7**	**62.0**
210	**12.3**	**5.9**	**-**	**-**	**6.6**	**25.4**	**1.8**	**0.5**	**6.7**	**2.7**	**62.0**
128	**4.5**	**-**	**-**	**5.7**	**30.0**	**19.8**	**-**	**-**	**-**	**-**	**60.0**
129	**4.5**	**-**	**-**	**3.8**	**30.0**	**13.2**	**-**	**-**	**-**	**-**	**51.5**
7	**2.5**	**0.5**	**2.1**	**0.4**	**3.7**	**15.0**	**-**	**-**	**-**	**-**	**24.2**
8	**2.5**	**0.5**	**2.1**	**0.4**	**3.7**	**15.0**	**-**	**-**	**-**	**-**	**24.2**
98	**3.2**	**9.1**	**-**	**-**	**-**	**-**	**-**	**-**	**9.1**	**-**	**21.3**
99	**3.2**	**9.1**	**-**	**-**	**-**	**-**	**-**	**-**	**9.1**	**-**	**21.3**
100	**3.2**	**9.1**	**-**	**-**	**-**	**-**	**-**	**-**	**9.1**	**-**	**21.3**
74	6.8	-	-	-	-	2.2	-	-	-	-	9.0
75	6.8	-	-	-	-	2.2	-	-	-	-	9.0
223	3.3	-	-	-	-	4.3	-	-	-	-	7.6
224	1.3	-	-	-	-	1.7	-	-	-	-	3.0
5	1.8	-	-	-	-	-	-	-	-	-	1.8
6	1.8	-	-	-	-	-	-	-	-	-	1.8
15	1.1	0.6	-	-	-	-	-	-	-	-	1.7
16	1.1	0.6	-	-	-	-	-	-	-	-	1.7
17	1.1	0.6	-	-	-	-	-	-	-	-	1.7
18	1.1	0.6	-	-	-	-	-	-	-	-	1.7
1	0.4	0.4	-	-	-	-	-	-	-	-	0.8
2	0.4	0.4	-	-	-	-	-	-	-	-	0.8
3	0.4	0.4	-	-	-	-	-	-	-	-	0.8
4	0.4	0.4	-	-	-	-	-	-	-	-	0.8
196	-	0.3	-	-	-	-	-	-	0.3	-	0.5
197	-	0.3	-	-	-	-	-	-	0.3	-	0.5

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of root vegetables based on the 9 high-rate adult consumers is 38.6 kg y^{-1}

The observed 97.5th percentile rate based on 25 observations is 62.0 kg y^{-1}

Table 20. Adults' consumption rates of potato from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Potato
128	**150.0**
142	**150.0**
143	**150.0**
144	**150.0**
145	**150.0**
146	**150.0**
209	**66.0**
210	**66.0**
7	**50.0**
8	**50.0**
129	**50.0**
98	47.2
99	47.2
100	47.2
74	45.4
75	45.4
19	37.5
20	37.5
117	15.0
118	15.0
5	3.4
6	3.4
223	3.0
15	2.6
16	2.6
17	2.6
18	2.6
224	1.2
196	0.3
197	0.3
22	0.2
23	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of potato based on the 11 high-rate adult consumers is 107.5 kg y^{-1}

The observed 97.5th percentile rate based on 32 observations is 150.0 kg y^{-1}

Table 21. Adults' consumption rates of domestic fruit from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Apple	Blackberry	Blackcurrant	Blueberry	Cherry	Fig	Gooseberry	Grape	Loganberry	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
128	**21.9**	**-**	**21.9**	**-**	**-**	**-**	**-**	**-**	**1.1**	**-**	**-**	**-**	**1.6**	**-**	**6.8**	**53.3**
5	**2.3**	**-**	**4.5**	**-**	**1.1**	**2.3**	**-**	**-**	**-**	**2.3**	**0.5**	**4.5**	**-**	**-**	**4.5**	**22.0**
6	**2.3**	**-**	**4.5**	**-**	**1.1**	**2.3**	**-**	**-**	**-**	**2.3**	**0.5**	**4.5**	**-**	**-**	**4.5**	**22.0**
7	**10.0**	**-**	**2.5**	**0.3**	**-**	**-**	**1.0**	**-**	**-**	**0.5**	**-**	**5.0**	**0.5**	**1.0**	**1.0**	**21.8**
8	**10.0**	**-**	**2.5**	**0.3**	**-**	**-**	**1.0**	**-**	**-**	**0.5**	**-**	**5.0**	**0.5**	**1.0**	**1.0**	**21.8**
1	0.4	-	-	-	-	-	-	13.0	-	0.4	0.4	-	-	-	-	14.3
2	0.4	-	-	-	-	-	-	13.0	-	0.4	0.4	-	-	-	-	14.3
3	0.4	-	-	-	-	-	-	13.0	-	0.4	0.4	-	-	-	-	14.3
4	0.4	-	-	-	-	-	-	13.0	-	0.4	0.4	-	-	-	-	14.3
9	13.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.6
10	13.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.6
11	10.0	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	11.0
12	10.0	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	11.0
129	-	-	-	-	-	-	-	-	1.1	-	-	-	1.6	-	6.8	9.5
74	-	-	-	-	-	-	-	-	-	-	-	4.5	-	-	4.5	9.1
75	-	-	-	-	-	-	-	-	-	-	-	4.5	-	-	4.5	9.1
209	-	2.0	-	-	-	-	-	-	-	-	-	-	-	4.5	0.7	7.2
210	-	2.0	-	-	-	-	-	-	-	-	-	-	-	4.5	0.7	7.2
98	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	5.1
99	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	5.1
100	-	-	-	-	-	-	-	-	-	-	-	-	-	5.1	-	5.1
15	0.7	-	0.5	-	-	-	0.5	-	-	0.3	-	0.2	-	2.3	0.7	5.1
16	0.7	-	0.5	-	-	-	0.5	-	-	0.3	-	0.2	-	2.3	0.7	5.1
17	0.7	-	0.5	-	-	-	0.5	-	-	0.3	-	0.2	-	2.3	0.7	5.1
18	0.7	-	0.5	-	-	-	0.5	-	-	0.3	-	0.2	-	2.3	0.7	5.1
130	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.9
131	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.9
132	3.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.9
133	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3
134	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3
135	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.3
147	-	-	-	-	-	-	-	-	-	1.6	-	-	-	-	-	1.6
188	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
189	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
190	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
191	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
192	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of domestic fruit based on the 5 high-rate adult consumers is 28.2 kg y^{-1}

The observed 97.5th percentile rate based on 37 observations is 25.1 kg y^{-1}

Table 22. Adults' consumption rates of milk from the Wylfa terrestrial survey area (l y^{-1})

Observation number	Cows' milk
154	121.7
155	121.7
156	121.7
19	104.0
20	104.0
21	104.0
130	103.7
131	103.7
132	103.7
87	97.3
88	97.3
89	97.3
90	97.3
91	97.3
83	91.3
84	91.3
85	91.3
86	91.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of milk based on the 18 high-rate adult consumers is 102.2 l y^{-1}

The observed 97.5th percentile rate based on 18 observations is 121.7 l y^{-1}

Table 23. Adults' consumption rates of cattle meat from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Beef
95	31.5
96	31.5
97	31.5

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of cattle meat based on the 3 high-rate adult consumers is 31.5 kg y^{-1}

The observed 97.5th percentile rate based on 3 observations is 31.5 kg y^{-1}

Table 24. Adults' consumption rates of pig meat from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Pork
207	**32.5**
208	**32.5**
148	**28.6**
149	**28.6**
150	**28.6**
151	**28.6**
153	**28.6**
124	**12.7**
125	**12.7**
119	6.3
120	6.3
106	3.3
107	3.3
108	3.3
109	3.3
110	3.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of pig meat based on the 9 high-rate adult consumers is 25.9 kg y^{-1}

The observed 97.5th percentile rate based on 16 observations is 32.5 kg y^{-1}

Table 25. Adults' consumption rates of sheep meat from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Lamb
95	**15.1**
96	**15.1**
97	**15.1**
11	**11.3**
12	**11.3**
15	**11.3**
16	**11.3**
17	**11.3**
18	**11.3**
128	**11.3**
129	**11.3**
207	**11.3**
208	**11.3**
87	4.5
88	4.5
89	4.5
90	4.5
91	4.5
98	3.8
99	3.8
100	3.8
119	1.4
120	1.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of sheep meat based on the 13 high-rate adult consumers is 12.2 kg y^{-1}

The observed 97.5th percentile rate based on 23 observations is 15.1 kg y^{-1}

Table 26. Adults' consumption rates of poultry from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Duck (unspecified species)	Greylag goose	Mallard	Partridge	Pheasant	Pigeon	Snipe	Turkey	Total
207	**1.1**	**-**	**-**	**-**	**-**	**-**	**-**	**10.5**	**11.6**
208	**1.1**	**-**	**-**	**-**	**-**	**-**	**-**	**10.5**	**11.6**
279	**-**	**-**	**0.9**	**0.6**	**0.9**	**2.9**	**0.2**	**-**	**5.5**
281	**-**	**-**	**0.9**	**0.6**	**0.9**	**2.9**	**0.2**	**-**	**5.5**
15	-	1.1	0.8	-	1.9	-	-	-	3.8
16	-	1.1	0.8	-	1.9	-	-	-	3.8
17	-	1.1	0.8	-	1.9	-	-	-	3.8
18	-	1.1	0.8	-	1.9	-	-	-	3.8
101	-	-	-	-	1.1	-	-	-	1.1
133	0.7	-	-	-	-	-	-	-	0.7
134	0.7	-	-	-	-	-	-	-	0.7
135	0.7	-	-	-	-	-	-	-	0.7
5	-	-	-	-	0.5	-	-	-	0.5
6	-	-	-	-	0.5	-	-	-	0.5
140	-	-	-	-	0.3	-	-	-	0.3
141	-	-	-	-	0.3	-	-	-	0.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of poultry based on the 4 high-rate adult consumers is 8.6 kg y^{-1}

The observed 97.5th percentile rate based on 16 observations is 11.6 kg y^{-1}

Table 27. Adults' consumption rates of eggs from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Chicken egg	Duck egg	Total
11	**21.0**	**-**	**21.0**
12	**21.0**	**-**	**21.0**
128	**16.3**	**2.9**	**19.2**
129	**16.3**	**2.9**	**19.2**
9	**17.8**	**-**	**17.8**
10	**17.8**	**-**	**17.8**
124	**17.8**	**-**	**17.8**
125	**17.8**	**-**	**17.8**
7	**17.1**	**-**	**17.1**
8	**17.1**	**-**	**17.1**
148	**13.5**	**-**	**13.5**
149	**13.5**	**-**	**13.5**
150	**13.5**	**-**	**13.5**
151	**13.5**	**-**	**13.5**
153	**13.5**	**-**	**13.5**
208	**-**	**11.8**	**11.8**
15	**9.6**	**-**	**9.6**
16	**9.6**	**-**	**9.6**
17	**9.6**	**-**	**9.6**
18	**9.6**	**-**	**9.6**
83	**8.9**	**-**	**8.9**
84	**8.9**	**-**	**8.9**
85	**8.9**	**-**	**8.9**
86	**8.9**	**-**	**8.9**
102	**8.9**	**-**	**8.9**
103	**8.9**	**-**	**8.9**
104	**8.9**	**-**	**8.9**
111	**8.9**	**-**	**8.9**
112	**8.9**	**-**	**8.9**
120	**7.4**	**-**	**7.4**
133	6.2	-	6.2
134	6.2	-	6.2
135	6.2	-	6.2
98	5.9	-	5.9
99	5.9	-	5.9

Table 27. Adults' consumption rates of eggs from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Chicken egg	Duck egg	Total
100	5.9	-	5.9
207	-	5.9	5.9
87	4.7	-	4.7
88	4.7	-	4.7
89	4.7	-	4.7
90	4.7	-	4.7
91	4.7	-	4.7
22	4.0	-	4.0
23	4.0	-	4.0
106	3.6	-	3.6
107	3.6	-	3.6
108	3.6	-	3.6
109	3.6	-	3.6
110	3.6	-	3.6
13	2.2	-	2.2
14	2.2	-	2.2
211	2.1	-	2.1
212	2.1	-	2.1
209	0.9	-	0.9
210	0.9	-	0.9
204	-	0.5	0.5
205	-	0.5	0.5
206	-	0.5	0.5

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of eggs based on the 30 high-rate adult consumers is 13.0 kg y^{-1}

The observed 97.5th percentile rate based on 58 observations is 20.3 kg y^{-1}

Table 28. Adults' consumption rates of wild/free foods from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Blackberry	Crab apple	Sloe	Total
74	**1.5**	**-**	**4.5**	**6.0**
75	**1.5**	**-**	**4.5**	**6.0**
101	2.0	-	-	2.0
15	1.9	-	-	1.9
16	1.9	-	-	1.9
17	1.9	-	-	1.9
18	1.9	-	-	1.9
128	1.8	-	-	1.8
129	1.8	-	-	1.8
164	1.5	-	-	1.5
165	1.5	-	-	1.5
98	1.2	-	-	1.2
99	1.2	-	-	1.2
100	1.2	-	-	1.2
140	1.1	-	-	1.1
141	1.1	-	-	1.1
11	1.0	-	0.1	1.1
12	1.0	-	0.1	1.1
19	1.0	-	-	1.0
20	1.0	-	-	1.0
95	0.9	-	-	0.9
96	0.9	-	-	0.9
97	0.9	-	-	0.9
209	-	0.6	0.3	0.9
210	-	0.6	0.3	0.9
136	0.9	-	-	0.9
137	0.9	-	-	0.9
138	0.9	-	-	0.9
139	0.9	-	-	0.9
148	0.9	-	-	0.9
149	0.9	-	-	0.9
150	0.9	-	-	0.9
151	0.9	-	-	0.9
153	0.9	-	-	0.9
211	0.7	-	-	0.7

Table 28. Adults' consumption rates of wild/free foods from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Blackberry	Crab apple	Sloe	Total
212	0.7	-	-	0.7
204	0.7	-	-	0.7
205	0.7	-	-	0.7
206	0.7	-	-	0.7
87	0.6	-	-	0.6
88	0.6	-	-	0.6
89	0.6	-	-	0.6
90	0.6	-	-	0.6
91	0.6	-	-	0.6
13	0.5	-	-	0.5
14	0.5	-	-	0.5
22	0.5	-	-	0.5
23	0.5	-	-	0.5
186	0.5	-	-	0.5
187	0.5	-	-	0.5
142	0.3	-	-	0.3
143	0.3	-	-	0.3
144	0.3	-	-	0.3
145	0.3	-	-	0.3
146	0.3	-	-	0.3
196	0.3	-	-	0.3
197	0.3	-	-	0.3
188	0.2	-	-	0.2
189	0.2	-	-	0.2
190	0.2	-	-	0.2
191	0.2	-	-	0.2
192	0.2	-	-	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild/free foods based on the 2 high-rate adult consumers is 6.0 kg y^{-1}

The observed 97.5th percentile rate based on 62 observations is 3.9 kg y^{-1}

Table 29. Adults' consumption rates of honey from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Honey
7	**3.4**
8	**3.4**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of honey based on the 2 high-rate adult consumers is 3.4 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 3.4 kg y^{-1}

Table 30. Adults' consumption rates of wild fungi from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Mushrooms
16	**6.8**
17	**6.8**
18	**6.8**
9	**4.5**
10	**4.5**
133	**3.0**
134	**3.0**
135	**3.0**
147	**2.7**
74	**2.3**
75	**2.3**
83	1.7
84	1.7
85	1.7
86	1.7
209	1.1
210	1.1
11	1.0
12	1.0
101	1.0
14	0.9
100	0.9
19	0.8
20	0.8
21	0.8
87	0.6
88	0.6
89	0.6
90	0.6
91	0.6
5	0.5
6	0.5
22	0.5
23	0.5
186	0.5

Table 30. Adults' consumption rates of wild fungi from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Mushrooms
187	0.5
130	0.3
131	0.3
132	0.3
188	0.3
189	0.3
190	0.3
191	0.3
192	0.3
95	0.2
96	0.2
97	0.2
140	0.2
141	0.2
128	0.2
129	0.2
142	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild fungi based on the 11 high-rate adult consumers is 4.2 kg y^{-1}

The observed 97.5th percentile rate based on 52 observations is 6.8 kg y^{-1}

Table 31. Adults' consumption rates of freshwater fish from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Rainbow trout
7	0.3
8	0.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of freshwater fish based on the 2 high-rate adult consumers is 0.3 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.3 kg y^{-1}

Table 32. Adults' consumption rates of freshwater plants from the Wylfa terrestrial survey area (kg y^{-1})

Observation number	Watercress
209	0.7
210	0.7

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of freshwater plants based on the 2 high-rate adult consumers is 0.7 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.7 kg y^{-1}

Table 33. Children's consumption rates of green vegetables from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Lettuce
24	8	0.2
25	6	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of green vegetables for the child age group based upon the 2 high-rate consumers is 0.2 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.2 kg y^{-1}

Table 34. Children's consumption rates of other vegetables from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	French bean	Tomato	Total
24	8	0.2	0.2	0.5
25	6	0.2	0.2	0.5

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of other vegetables for the child age group based upon the 2 high-rate consumers is 0.5 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.5 kg y^{-1}

Table 35. Children's and infants' consumption rates of root vegetables from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Carrot	Swede	Total
198	**12**	**0.3**	**0.3**	**0.5**
199	**10**	**0.3**	**0.3**	**0.5**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of root vegetables for the child age group based upon the 2 high-rate consumers is 0.5 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.5 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Carrot	Swede	Total
200	**4**	**0.3**	**0.3**	**0.5**
201	**0.3**	**0.3**	**0.3**	**0.5**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of root vegetables for the infant age group based upon the 2 high-rate consumers is 0.5 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.5 kg y^{-1}

Table 36. Children's and infants' consumption rates of potato from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Potato
198	**12**	**0.3**
199	**10**	**0.3**
24	**8**	**0.2**
25	**6**	**0.2**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of potato for the child age group based upon the 4 high-rate consumers is 0.2 kg y^{-1}

The observed 97.5th percentile rate based on 4 observations is 0.3 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Potato
200	**4**	**0.3**
201	**0.3**	**0.3**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of potato for the infant age group based upon the 2 high-rate consumers is 0.3 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.3 kg y^{-1}

Table 37. Infants' consumption rates of domestic fruit from the Wylfa terrestrial survey area (kg y^{-1})

Infant age group (0 - 5 years old)

Observation number	Age	Apple
193	**4**	**0.2**
194	**2**	**0.2**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of domestic fruit for the infant age group based upon the 2 high-rate consumers is 0.2 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.2 kg y^{-1}

Table 38. Children's and infants' consumption rates of milk from the Wylfa terrestrial survey area (l y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Cows' milk
92	**12**	**97.3**
93	**10**	**73.0**
94	**6**	**73.0**
121	14	6.8
122	14	6.8

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of milk for the child age group based upon the 3 high-rate consumers is 81.1 l y^{-1}

The observed 97.5th percentile rate based on 5 observations is 94.9 l y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Cows' milk
123	**2**	**59.1**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of milk for the infant age group based upon the only high-rate consumer is 59.1 l y^{-1}

The observed 97.5th percentile rate is not applicable for 1 observation

Table 39. Children's and infants' consumption rates of pig meat from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Pork
121	**14**	**6.3**
122	**14**	**6.3**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of pig meat for the child age group based upon the 2 high-rate consumers is 6.3 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 6.3 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Pork
152	**2**	**7.1**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of pig meat for the infant age group based upon the only high-rate consumer is 7.1 kg y^{-1}

The observed 97.5th percentile rate is not applicable for 1 observation

Table 40. Children's consumption rates of sheep meat from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Lamb
92	**12**	**4.5**
93	**10**	**3.4**
94	**6**	**3.4**
121	14	1.4
122	14	1.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of sheep meat for the child age group based upon the 3 high-rate consumers is 3.8 kg y^{-1}

The observed 97.5th percentile rate based on 5 observations is 4.4 kg y^{-1}

Table 41. Children's consumption rates of poultry from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Mallard	Partridge	Pheasant	Pigeon	Snipe	Total
282	**9**	**0.9**	**0.6**	**0.9**	**2.9**	**0.2**	**5.5**
283	**7**	**0.9**	**0.6**	**0.9**	**2.9**	**0.2**	**5.5**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of poultry for the child age group based upon the 2 high-rate consumers is 5.5 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 5.5 kg y^{-1}

Table 42. Children's and infants' consumption rates of eggs from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Chicken egg
105	**15**	**8.9**
113	**15**	**8.9**
114	**12**	**8.9**
122	**14**	**7.4**
92	**12**	**4.7**
93	**10**	**3.6**
94	**6**	**3.6**
24	**8**	**3.0**
25	**6**	**3.0**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of eggs for the child age group based upon the 9 high-rate consumers is 5.8 kg y^{-1}

The observed 97.5th percentile rate based on 9 observations is 8.9 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Chicken egg
152	**2**	**3.4**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of eggs for the infant age group based upon the only high-rate consumer is 3.4 kg y^{-1}

The observed 97.5th percentile rate is not applicable for 1 observation

Table 43. Children's and infants' consumption rates of wild/free foods from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Blackberry
166	**7**	**1.5**
92	**12**	**0.6**
93	10	0.5
24	8	0.5
25	6	0.5
94	6	0.5
198	12	0.3
199	10	0.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild/free foods for the child age group based upon the 2 high-rate consumers is 1.1 kg y^{-1}

The observed 97.5th percentile rate based on 8 observations is 1.4 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Blackberry
200	**4**	**0.3**
201	**0.3**	**0.3**
152	**2**	**0.2**
193	**4**	**0.2**
194	**2**	**0.2**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild/free foods for the infant age group based upon the 5 high-rate consumers is 0.2 kg y^{-1}

The observed 97.5th percentile rate based on 5 observations is 0.3 kg y^{-1}

Table 44. Children's consumption rates of wild fungi from the Wylfa terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Mushrooms
92	**12**	**0.6**
93	**10**	**0.5**
24	**8**	**0.5**
25	**6**	**0.5**
94	**6**	**0.5**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild fungi for the child age group based upon the 5 high-rate consumers is 0.5 kg y^{-1}

The observed 97.5th percentile rate based on 5 observations is 0.6 kg y^{-1}

Table 45. Percentage contribution each food type makes to its terrestrial food group for adults

Green vegetables	
Cauliflower	21.8 %
Cabbage	20.5 %
Cucumber	16.1 %
Courgette	10.8 %
Marrow	5.4 %
Brussel sprout	4.9 %
Spinach	4.8 %
Lettuce	4.5 %
Broccoli	4.1 %
Calabrese	4.1 %
Kale	2.0 %
Herbs	1.0 %
Artichoke	0.3 %

Other vegetables	
Tomato	58.2 %
Runner bean	15.1 %
Broad bean	10.6 %
French bean	6.6 %
Pea	5.7 %
Squash	3.9 %

Root vegetables	
Onion	31.8 %
Leek	20.6 %
Beetroot	19.5 %
Carrot	11.4 %
Swede	10.5 %
Garlic	2.6 %
Turnip	1.4 %
Celery	1.1 %
Parsnip	0.9 %
Spring onion	0.3 %

Potato	
Potato	100.0 %

Domestic fruit	
Apple	34.0 %
Grapes	15.6 %
Strawberry	10.9 %
Blackcurrant	10.9 %
Rhubarb	10.2 %
Raspberry	8.4 %
Pear	2.9 %
Fig	1.3 %
Redcurrant	1.2 %
Blackberry	1.2 %
Gooseberry	1.1 %
Plum	0.7 %
Cherry	0.7 %
Loganberry	0.7 %
Blueberry	0.1 %

Milk	
Cows' milk	100.0 %

Cattle meat	
Beef	100.0 %

Pig meat	
Pork	100.0 %

Sheep meat	
Lamb	100.0 %

Poultry	
Turkey	38.8 %
Pheasant	22.5 %
Pigeon	10.6 %
Mallard	9.1 %
Greylag goose	8.1 %
Duck	7.9 %
Partridge	2.2 %
Snipe	0.7 %

Eggs	
Chicken egg	95.0 %
Duck egg	5.0 %

Wild/free foods	
Blackberry	82.4 %
Sloe	15.8 %
Crab apple	1.8 %

Honey	
Honey	100.0 %

Wild fungi	
Mushrooms	100.0 %

Freshwater fish	
Rainbow trout	100.0 %

Freshwater plants	
Watercress	100.0 %

Notes

Food types in emboldened italics were monitored by FSA in 2012 (EA, FSA, NIEA and SEPA, 2013).

Barley was also monitored.

Percentages are based on the consumption of all adults in the survey consuming that particular food group.

Table 46. Direct radiation occupancy rates for adults, children and infants in the Wylfa area (h y^{-1})

Observation Number	Sex	Age (years)	Main activity	Indoor occupancy	Outdoor occupancy	Total occupancy
0 to 0.25 km zone						
342	M	U	Working	806	806	1612
343	M	U	Working	806	806	1612
344	M	U	Working	306	306	612
349	M	U	Working	210	210	420
350	M	U	Working	210	210	420
351	M	U	Working	210	210	420
352	M	U	Working	210	210	420
353	M	U	Working	210	210	420
167	M	55	Angling	-	372	372
168	M	23	Angling	-	372	372
345	M	U	Working	96	96	192
346	M	U	Working	96	96	192
347	M	U	Working	96	96	192
348	M	U	Working	96	96	192
181	M	22	Angling	-	143	143
182	M	23	Angling	-	143	143
195	M	U	Farming	-	90	90
169	M	35	Angling	-	72	72
170	M	32	Angling	-	72	72
171	M	38	Angling	-	72	72
183	M	26	Angling	-	5	5
184	M	30	Angling	-	5	5
185	M	32	Angling	-	5	5
>0.25 to 0.5 km zone						
19	M	64	Farming	-	365	365
20	M	58	Farming	-	365	365
21	M	62	Farming	-	365	365
285	M	50	Angling	-	75	75
304	M	40	Angling	-	52	52
177	M	68	Birdwatching	-	20	20
317	M	54	Angling	-	15	15
318	M	54	Angling	-	15	15
178	M	39	Birdwatching	-	10	10
>0.5 to 1.2 km zone						
127	F	52	Residing	8578	78	8656
115	F	64	Residing	8500	26	8526
204	F	48	Residing	7204	780	7984
106	M	41	Residing	7950	26	7976
124	M	65	Residing	7716	208	7924
125	F	63	Residing	7716	208	7924
207	F	59	Residing	7187	689	7876
208	M	59	Residing and farming	6238	1638	7876
107	F	38	Residing	7794	26	7820
108	M	18	Residing	7794	26	7820
196	F	39	Residing	7530	194	7724
201	F	0.3	Residing	7530	194	7724
111	F	39	Residing	7279	365	7644
119	F	33	Residing	6462	888	7350
202	M	70	Residing and farming	6456	672	7128
203	F	70	Residing	6960	168	7128
199	M	10	Residing	6222	698	6920
200	M	4	Residing	6222	698	6920
198	F	12	Residing	6118	698	6816
109	F	16	Residing	6422	26	6448
110	F	16	Residing	6422	26	6448
113	F	15	Residing	6371	26	6397
114	M	12	Residing	6297	100	6397

Table 46. Direct radiation occupancy rates for adults, children and infants in the Wylfa area (h y^{-1})

Observation Number	Sex	Age (years)	Main activity	Indoor occupancy	Outdoor occupancy	Total occupancy
126	M	63	Residing	6314	78	6392
197	M	54	Residing	5875	364	6239
206	M	53	Residing	4942	806	5748
112	M	40	Residing	5494	100	5594
205	F	21	Residing	5231	47	5278
122	M	14	Residing	4563	156	4719
121	F	14	Residing	4563	26	4589
211	F	63	Residing	3872	455	4327
212	M	63	Residing	3872	455	4327
120	M	36	Residing	3398	592	3990
116	F	39	Visiting	2095	91	2186

Notes

U = Unknown

Table 47. Analysis of direct radiation occupancy rates for adults, children and infants in the Wylfa area

0 to 0.25 km zone	
Number of hours	**Number of observations**
8000 to 8760	0
7000 to 8000	0
6000 to 7000	0
5000 to 6000	0
4000 to 5000	0
3000 to 4000	0
2000 to 3000	0
1000 to 2000	2
0 to 1000	21
0 to 8760	**23**

>0.25 to 0.5 km zone	
Number of hours	**Number of observations**
8000 to 8760	0
7000 to 8000	0
6000 to 7000	0
5000 to 6000	0
4000 to 5000	0
3000 to 4000	0
2000 to 3000	0
1000 to 2000	0
0 to 1000	9
0 to 8760	**9**

>0.5 to 1.2 km zone	
Number of hours	**Number of observations**
8000 to 8760	2
7000 to 8000	14
6000 to 7000	9
5000 to 6000	3
4000 to 5000	4
3000 to 4000	1
2000 to 3000	1
1000 to 2000	0
0 to 1000	0
0 to 8760	**34**

Table 48. Gamma dose rate measurements for the Wylfa direct radiation survey (µGy h^{-1})

Residences and businesses

Location	Indoor substrate	Indoor gamma dose rate at 1 metre[a]	Outdoor substrate	Outdoor gamma dose rate at 1 metre[a]
Residence 1	Concrete	0.091	Grass	0.070
Residence 2	Concrete	0.107	Grass	0.078
Residence 3	Concrete	0.076	Grass	0.065
Residence 4	Concrete	0.090	Grass	0.078
Residence 5	Concrete	0.094	Stone	0.089
Residence 6	Concrete	0.084	Grass	0.080
Residence 7	Concrete	0.085	Grass	0.067
Residence 8	Concrete	0.084	Grass	0.067
Residence 9	Concrete	0.085	Grass	0.076
Residence 10	Concrete	0.123	Grass	0.069
Business 1	-	Not measured	Grass	0.069

Notes

[a] These measurements have not been adjusted for background dose rates.

Backgrounds

	Location	National Grid Reference	Substrate	Background gamma dose rate at 1 metre
Background 1	North of Llyn Alaw reservoir	SH 396 877	Grass	0.064
Background 2	West of Amlwch	SH 431 928	Grass	0.066
Background 3	Near Porth Trwyn	SH 297 876	Grass	0.076

Table 49. Combinations of adult pathways for consideration in dose assessments in the Wylfa area

Combination number	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
1	X				X	X		X														X	X							
2					X	X		X															X	X						
3				X	X	X	X	X					X				X													
4	X			X	X	X	X	X						X		X		X						X			X			
5					X			X						X			X					X	X							
6	X			X	X	X	X	X				X		X	X		X													
7					X	X	X	X				X	X	X	X		X													
8							X		X						X		X													X
9				X	X		X							X	X		X						X							
10																							X	X			X			
11	X	X	X	X	X	X	X	X						X	X		X		X	X		X		X		X		X		
12	X	X		X	X	X	X	X							X		X								X			X		
13					X				X					X			X													
14									X			X		X	X		X													
15										X		X			X		X													
16											X	X	X	X															X	X
17	X													X															X	X
18											X	X											X	X					X	X
19				X	X			X	X								X													
20				X	X			X					X	X			X													
21											X			X	X															
22		X	X					X							X		X						X	X		X				
23	X																					X						X		X
24	X																							X			X	X		
25																						X		X						X
26						X	X								X														X	X
27														X	X									X					X	X
28				X	X	X	X																X	X						
29	X	X																				X					X			
30	X	X	X										X															X		
31	X	X																			X				X	X		X		

Notes

The food groups and external exposure pathways marked with a cross are combined for the corresponding combination number. For example, combination number 1 represents an individual (or individuals) from Annex 1 who had positive data for the following pathways: fish, other vegetables, root vegetables, domestic fruit, intertidal occupancy over rock and intertidal occupancy over sand.

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
1	M	44	8.6	-	-	-	0.8	0.8	-	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	42	130	-	-	-	-	-	-
2	F	44	-	-	-	-	0.8	0.8	-	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**228**	**228**	-	-	-	-	-	-
3	M	66	-	-	-	-	0.8	0.8	-	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	F	66	-	-	-	-	0.8	0.8	-	14.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	M	74	-	-	-	2.7	3.9	1.8	3.4	**22.0**	-	-	-	-	0.5	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
6	F	70	-	-	-	2.7	3.9	1.8	3.4	**22.0**	-	-	-	-	0.5	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
7	M	65	1.0	-	-	**25.9**	**27.5**	**24.2**	**50.0**	**21.8**	-	-	-	-	-	**17.1**	-	**3.4**	-	**0.3**	-	-	-	-	-	**222**	-	-	8	-	-	-
8	F	63	1.0	-	-	**25.9**	**27.5**	**24.2**	**50.0**	**21.8**	-	-	-	-	-	**17.1**	-	**3.4**	-	**0.3**	-	-	-	-	-	182	-	-	8	-	-	-
9	M	75	-	-	-	-	4.5	-	-	13.6	-	-	-	-	-	**17.8**	-	-	**4.5**	-	-	-	-	20	18	-	-	-	-	-	-	-
10	F	73	-	-	-	-	4.5	-	-	13.6	-	-	-	-	-	**17.8**	-	-	**4.5**	-	-	-	-	20	18	-	-	-	-	-	-	-
11	M	53	2.2	-	-	-	**13.1**	-	-	11.0	-	-	-	**11.3**	-	**21.0**	1.1	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-
12	F	53	2.2	-	-	-	**13.1**	-	-	11.0	-	-	-	**11.3**	-	**21.0**	1.1	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-
13	M	66	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	F	65	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2	0.5	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-
15	F	58	-	-	-	-	3.3	1.7	2.6	5.1	-	-	-	**11.3**	3.8	**9.6**	1.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	M	55	-	-	-	-	3.3	1.7	2.6	5.1	-	-	-	**11.3**	3.8	**9.6**	1.9	-	**6.8**	-	-	-	-	-	-	-	-	-	-	-	-	-
17	M	28	-	-	-	-	3.3	1.7	2.6	5.1	-	-	-	**11.3**	3.8	**9.6**	1.9	-	**6.8**	-	-	-	-	-	-	-	-	-	-	-	-	-
18	M	23	-	-	-	-	3.3	1.7	2.6	5.1	-	-	-	**11.3**	3.8	**9.6**	1.9	-	**6.8**	-	-	-	-	-	-	-	-	-	-	-	-	-
19	M	64	-	-	-	-	-	-	37.5	-	**104.0**	-	-	-	-	-	1.0	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	365
20	M	58	-	-	-	-	-	-	37.5	-	**104.0**	-	-	-	-	-	1.0	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	365
21	M	62	-	-	-	-	-	-	-	-	**104.0**	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	365
22	M	38	-	-	-	0.2	0.5	-	0.2	-	-	-	-	-	-	4.0	0.5	-	0.5	-	-	-	-	-	2	-	-	-	-	-	-	-
23	F	38	-	-	-	0.2	0.5	-	0.2	-	-	-	-	-	-	4.0	0.5	-	0.5	-	-	-	-	-	2	-	-	-	-	-	-	-
26	M	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**200**	-	-	-	-	-	-	-	-
27	F	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**200**	-	-	-	-	-	-	-	-
28	M	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-
29	M	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-
32	M	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
33	M	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
34	M	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
35	M	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
36	M	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
37	M	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
38	M	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
39	M	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	12	-	-	167	-	-	-
40	M	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	12	-	-	167	-	-	-
41	M	69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39	39	-	-	-	-	-	-

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
42	F	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	39	39	-	-	-	-	-	-
43	F	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	182	-	-	-	-	-	-	-
44	F	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	182	-	-	-	-	-	-	-
45	F	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**365**	-	-	-	-	-	-
46	M	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**274**	-	-	-	-	-	-
48	M	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**307**	**307**	-	-	-	-	-	-
49	F	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	133	-	-	4	-	-	-
50	M	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-	-
51	F	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-	-
57	M	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	143	-	-	-	-	-	-
58	F	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	143	-	-	-	-	-	-
59	M	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	143	-	-	-	-	-	-
60	F	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	143	-	-	-	-	-	-
61	M	40	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**426**	-	-	-	20	-	-	-	-
63	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
64	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
65	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
66	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
67	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
68	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
69	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
70	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
71	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
72	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
73	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
74	M	62	19.5	1.0	-	**15.1**	4.5	9.0	45.4	9.1	-	-	-	-	-	-	**6.0**	-	**2.3**	-	-	-	-	-	-	-	13	-	-	234	-	-
75	F	52	19.5	1.2	-	**15.1**	4.5	9.0	45.4	9.1	-	-	-	-	-	-	**6.0**	-	**2.3**	-	-	-	-	-	-	-	-	-	-	-	-	-
76	M	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	-	-	-
77	F	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	-	-	-
78	M	45	0.7	**6.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	105	-	-	420	-	-
79	M	71	-	**6.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	105	-	-	420	-	-
80	F	45	-	**6.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	F	27	0.7	**6.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	M	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	109	-	-	-	-	-	-	-
83	M	52	-	-	-	-	7.2	-	-	-	**91.3**	-	-	-	-	**8.9**	-	-	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-
84	F	48	-	-	-	-	7.2	-	-	-	**91.3**	-	-	-	-	**8.9**	-	-	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-
85	M	25	-	-	-	-	7.2	-	-	-	**91.3**	-	-	-	-	**8.9**	-	-	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
86	M	19	-	-	-	-	7.2	-	-	-	**91.3**	-	-	-	-	**8.9**	-	-	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-
87	M	65	-	-	-	-	-	-	-	-	**97.3**	-	-	4.5	-	4.7	0.6	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
88	F	58	-	-	-	-	-	-	-	-	**97.3**	-	-	4.5	-	4.7	0.6	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
89	M	39	-	-	-	-	-	-	-	-	**97.3**	-	-	4.5	-	4.7	0.6	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
90	F	37	-	-	-	-	-	-	-	-	**97.3**	-	-	4.5	-	4.7	0.6	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
91	F	18	-	-	-	-	-	-	-	-	**97.3**	-	-	4.5	-	4.7	0.6	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-
95	M	62	-	-	-	-	-	-	-	-	-	**31.5**	-	**15.1**	-	-	0.9	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
96	M	24	-	-	-	-	-	-	-	-	-	**31.5**	-	**15.1**	-	-	0.9	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
97	F	57	-	-	-	-	-	-	-	-	-	**31.5**	-	**15.1**	-	-	0.9	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
98	F	56	-	-	-	6.1	2.0	**21.3**	47.2	5.1	-	-	-	3.8	-	5.9	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
99	M	83	-	-	-	6.1	2.0	**21.3**	47.2	5.1	-	-	-	3.8	-	5.9	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	F	83	-	-	-	6.1	2.0	**21.3**	47.2	5.1	-	-	-	3.8	-	5.9	1.2	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-
101	M	67	-	-	-	-	-	-	-	-	-	-	-	-	1.1	-	2.0	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-
102	M	49	-	-	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
103	F	49	-	-	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
104	M	18	-	-	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
106	M	41	-	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7950	26
107	F	38	-	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7794	26
108	M	18	-	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7794	26
109	F	16	-	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6422	26
110	F	16	-	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6422	26
111	F	39	0.1	-	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7279	365
112	M	40	0.1	-	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5494	100
115	F	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8500	26
116	F	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2095	91
117	M	67	-	-	-	-	**13.6**	-	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
118	F	65	-	-	-	-	**13.6**	-	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
119	F	33	-	-	-	-	-	-	-	-	-	-	6.3	1.4	-	-	-	-	-	-	-	-	-	-	88	23	-	-	-	-	6462	888
120	M	36	-	-	-	-	-	-	-	-	-	-	6.3	1.4	-	**7.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3398	592
124	M	65	-	-	-	-	-	-	-	-	-	-	**12.7**	-	-	**17.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7716	208
125	F	63	-	-	-	-	-	-	-	-	-	-	**12.7**	-	-	**17.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7716	208
126	M	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6314	78
127	F	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8578	78
128	M	70	5.1	-	-	**15.4**	**20.1**	**60.0**	**150.0**	**53.3**	-	-	-	**11.3**	-	**19.2**	1.8	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
129	F	69	5.1	-	-	**15.4**	**20.1**	**51.5**	**50.0**	9.5	-	-	-	**11.3**	-	**19.2**	1.8	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
130	M	58	-	-	-	2.0	2.0	-	-	3.9	**103.7**	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
131	F	58	-	-	-	2.0	2.0	-	-	3.9	**103.7**	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
132	M	26	-	-	-	2.0	2.0	-	-	3.9	**103.7**	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
133	M	53	-	-	-	5.7	4.8	-	-	2.3	-	-	-	-	0.7	6.2	-	-	**3.0**	-	-	-	-	-	-	-	-	-	-	-	-	-
134	F	51	-	-	-	5.7	4.8	-	-	2.3	-	-	-	-	0.7	6.2	-	-	**3.0**	-	-	-	-	-	-	-	-	-	-	-	-	-
135	M	25	-	-	-	5.7	4.8	-	-	2.3	-	-	-	-	0.7	6.2	-	-	**3.0**	-	-	-	-	-	-	-	-	-	-	-	-	-
136	M	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
137	F	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
138	F	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
139	F	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
140	M	69	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	1.1	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
141	F	62	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	1.1	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
142	M	55	-	-	-	-	-	-	**150.0**	-	-	-	-	-	-	-	0.3	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
143	F	23	-	-	-	-	-	-	**150.0**	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
144	M	22	-	-	-	-	-	-	**150.0**	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
145	M	21	-	-	-	-	-	-	**150.0**	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
146	M	18	-	-	-	-	-	-	**150.0**	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
147	M	U	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	-	**2.7**	-	-	-	-	-	-	-	-	-	-	-	-	-
148	F	54	-	-	-	-	-	-	-	-	-	-	**28.6**	-	-	**13.5**	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
149	M	51	-	-	-	-	-	-	-	-	-	-	**28.6**	-	-	**13.5**	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
150	F	22	-	-	-	-	-	-	-	-	-	-	**28.6**	-	-	**13.5**	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
151	M	33	-	-	-	-	-	-	-	-	-	-	**28.6**	-	-	**13.5**	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
153	M	28	-	-	-	-	-	-	-	-	-	-	**28.6**	-	-	**13.5**	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
154	M	64	-	-	-	-	-	-	-	-	**121.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
155	F	61	-	-	-	-	-	-	-	-	**121.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
156	M	40	-	-	-	-	-	-	-	-	**121.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157	M	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32	-	-	-	-	-	-
158	M	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-	-	-	-	-
161	M	52	**35.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	139	-	139	-	-	-	308	-	-
162	F	48	**25.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
164	M	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
165	F	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
167	M	55	7.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**326**	-	-	-	-	-	-	-	372
168	M	23	7.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**326**	-	-	-	-	-	-	-	372
169	M	35	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	72
170	M	32	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	72
171	M	38	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	72
172	M	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	182	-	-	-	-	-	-
173	F	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	182	-	-	-	-	-	-

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
174	M	68	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	26	-	-	-	8	-	102	-	-
175	F	49	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	26	-	-	-	8	-	102	-	-
176	M	16	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	26	-	-	-	8	-	102	-	-
177	M	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
178	M	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
179	M	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	-	-	102	52	-	-
180	F	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	-	-	102	52	-	-
181	M	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130	-	-	-	-	-	-	-	143
182	M	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130	-	-	-	-	-	-	-	143
183	M	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4	-	-	-	-	-	5
184	M	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4	-	-	-	-	-	5
185	M	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	4	-	-	-	-	-	5
186	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
187	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-
188	M	60	-	0.2	0.1	-	-	-	-	0.2	-	-	-	-	-	-	0.2	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
189	F	55	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	0.2	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
190	M	29	-	-	0.1	-	-	-	-	0.2	-	-	-	-	-	-	0.2	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
191	F	37	-	0.2	0.1	-	-	-	-	0.2	-	-	-	-	-	-	0.2	-	0.3	-	-	-	-	-	22	43	-	2	-	-	-	-
192	M	35	-	0.2	0.1	-	-	-	-	0.2	-	-	-	-	-	-	0.2	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-
195	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90
196	F	39	-	-	-	-	-	0.5	0.3	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	7530	194
197	M	54	-	-	-	-	-	0.5	0.3	-	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	5875	364
202	M	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6456	672
203	F	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6960	168
204	F	48	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.7	-	-	-	-	-	-	-	-	143	-	-	-	-	7204	780
205	F	21	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	5231	47
206	M	53	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.7	-	-	-	-	-	-	-	-	143	-	-	-	-	4942	806
207	F	59	-	-	-	-	-	-	-	-	-	-	**32.5**	**11.3**	**11.6**	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7187	689
208	M	59	-	-	-	-	-	-	-	-	-	-	**32.5**	**11.3**	**11.6**	**11.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6238	1638
209	M	61	**35.4**	0.4	0.1	**16.3**	**20.1**	**62.0**	**66.0**	7.2	-	-	-	-	-	0.9	0.9	-	1.1	-	**0.7**	40	-	**282**	-	35	-	45	-	194	-	-
210	F	63	**35.4**	0.4	0.1	**16.3**	**20.1**	**62.0**	**66.0**	7.2	-	-	-	-	-	0.9	0.9	-	1.1	-	**0.7**	-	-	-	-	-	-	-	-	-	-	-	-
211	F	63	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	3872	455
212	M	63	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	3872	455
213	F	69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
214	M	62	-	**18.1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**948**	-	-	1092	-	-
215	M	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1080**	-	-	1260	-	-
216	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	540	-	-	630	-	-

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
217	M	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	416	-	-
218	F	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**312**	-	-	-	-	-	-	-
219	F	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**330**	-	-	-	-	-	-	-
220	M	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**330**	-	-	-	-	-	-	-
221	M	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	-	-	-	-	-	-	-
222	F	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	-	-	-	-	-	-	-
223	F	68	-	-	-	5.3	**15.8**	7.6	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72	50	-	-	-	-	-	-
224	F	50	-	-	-	2.1	6.3	3.0	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72	50	-	-	-	-	-	-
225	M	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-
226	F	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-
227	M	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-
228	F	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-
231	M	55	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	9	131	-	-
232	M	61	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	140	-	-
233	M	68	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	140	-	-
234	F	U	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	F	U	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
236	F	U	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
237	M	35	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	-	-
238	M	36	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	-	-
239	M	40	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	-	-
240	F	32	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
241	F	35	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
242	F	40	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
244	M	49	17.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	442	-	-
245	M	58	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	442	-	-
247	M	44	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320	-	-
248	F	43	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320	-	-
251	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	-	-
252	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	-	-
253	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	-	-
254	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	-	-
255	M	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	156	-	-	-
256	M	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	156	-	-	-
257	M	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90	-	-
258	M	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	14	-	-
259	M	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	14	-	-

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
260	M	52	3.4	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	216	-	-	-
261	M	38	3.4	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	216	-	-	-
262	F	46	3.4	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	-	80	-	-	-
264	F	38	3.4	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	-	80	-	-	-
267	M	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	-	-
268	M	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	-	-
270	M	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	-	-
271	M	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	-	-
272	F	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	-	-
273	M	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-
274	M	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-
275	M	58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-
276	M	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-
277	M	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-
278	M	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-	-	-	-	-	-	-
279	M	45	14.5	1.8	**1.8**	-	-	-	-	-	-	-	-	-	**5.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	256	400	-	-
280	M	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	256	400	-	-
281	F	38	14.5	1.8	**1.8**	-	-	-	-	-	-	-	-	-	**5.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
284	M	U	14.5	1.8	**1.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
285	M	50	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**150**	-	-	-	-	-	-	-	75
286	F	51	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
287	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	14	-	-
288	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	14	-	-
289	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	14	-	-
290	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	14	-	-
291	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	14	-	-
292	M	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-	-	-	-	-
293	M	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	18	-	-	2	-	-	-
294	F	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	18	-	-	2	-	-	-
298	M	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	50	-	-	-	-	-	-
300	M	44	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	-
301	F	42	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
302	M	19	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
303	F	17	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
304	M	40	**26.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**156**	-	-	-	-	-	42	-	52
305	F	39	**26.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
306	M	17	**26.5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
307	F	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**456**	-	-	-	-	-	-	-
308	F	58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**456**	-	-	-	-	-	-	-
309	F	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**548**	-	-	-	-	-	-	-
310	F	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**320**	-	-	-	-	-	-	-
311	F	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**548**	-	-	-	-	-	-	-
312	M	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**548**	-	-	-	-	-	-	-
313	F	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**228**	-	-	-	-	-	-	-
314	M	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**300**	-	-	-	-	-	-	-
315	F	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**195**	-	-	-	-	-	-	-
316	M	69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**320**	-	-	-	-	-	-	-
317	M	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90	-	-	-	-	-	-	-	15
318	M	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90	-	-	-	-	-	-	-	15
319	M	62	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70	-	-	-	-	-	-	-	102	-	-
320	M	22	4.1	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	43	-	-	208	-	-
321	M	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-	78	-	-
322	M	69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1456**	-	-	1638	-	-
323	M	24	-	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1456**	-	-	1638	-	-
324	M	71	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
325	F	71	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
326	M	40	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	-	20	-	-	-	-	-	-
327	F	41	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
328	M	26	6.8	**6.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	390	-	-	390	-	-
329	F	26	6.8	**6.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	M	50	6.8	**6.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
331	F	55	6.8	**6.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
332	F	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140	-	-	-	-	-	-	-
335	M	56	**67.1**	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	968	-	-
336	F	65	**26.3**	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
337	M	81	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
338	F	79	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
339	M	62	**30.8**	2.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**35**	-	-	-	50	-	-	468	-	-
340	M	57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**1624**	-	-	1638	-	-
341	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**473**	-	-	-	-	-	-	-
342	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	806	806
343	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	806	806
344	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	306	306
345	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	96

Annex 1. Adults' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Freshwater fish	Freshwater plants	Intertidal occupancy over mud and sand	Intertidal occupancy over mud, sand and stones	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
346	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	96
347	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	96
348	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	96
349	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210
350	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210
351	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210
352	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210
353	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	210	210
354	M	63	5.7	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**390**	-	-	-	-	**1170**	**300**	-	1382	-	-
355	F	65	5.7	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
356	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	-	**612**	-	-	-	-	-	-
357	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51	-	**612**	-	-	-	-	-	-

Notes

Emboldened observations are the high-rate individuals

U = Unknown

Annex 2. Children's and infants' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
Child age group (6 - 15 years old)																									
24	M	8	-	-	-	**0.2**	**0.5**	-	**0.2**	-	-	-	-	-	**3.0**	0.5	**0.5**	-	2	-	-	-	-	-	-
25	F	6	-	-	-	**0.2**	**0.5**	-	**0.2**	-	-	-	-	-	**3.0**	0.5	**0.5**	-	2	-	-	-	-	-	-
30	M	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
31	M	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-
47	M	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**274**	-	-	-	-	-
52	M	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-
53	M	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-
54	F	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-
62	M	14	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**426**	-	-	**20**	-	-	-	-
92	F	12	-	-	-	-	-	-	-	-	**97.3**	-	**4.5**	-	**4.7**	**0.6**	**0.6**	-	-	-	-	-	-	-	-
93	M	10	-	-	-	-	-	-	-	-	**73.0**	-	**3.4**	-	**3.6**	0.5	**0.5**	-	-	-	-	-	-	-	-
94	M	6	-	-	-	-	-	-	-	-	**73.0**	-	**3.4**	-	**3.6**	0.5	**0.5**	-	-	-	-	-	-	-	-
105	F	15	-	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	-	-	-	-	-	-	-	-
113	F	15	0.1	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	-	-	-	-	-	-	6371	26
114	M	12	0.1	-	-	-	-	-	-	-	-	-	-	-	**8.9**	-	-	54	-	-	-	-	-	6297	100
121	F	14	-	-	-	-	-	-	-	-	6.8	**6.3**	1.4	-	-	-	-	-	**88**	23	-	-	-	4563	26
122	M	14	-	-	-	-	-	-	-	-	6.8	**6.3**	1.4	-	**7.4**	-	-	-	**88**	23	-	-	-	4563	156
163	F	14	**25.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
166	M	7	-	-	-	-	-	-	-	-	-	-	-	-	-	**1.5**	-	-	-	5	-	-	-	-	-
198	F	12	-	-	-	-	-	**0.5**	**0.3**	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	6118	698
199	M	10	-	-	-	-	-	**0.5**	**0.3**	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	6222	698
230	F	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-
243	F	12	**14.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
246	F	15	**8.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
249	M	14	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320	-	-
250	F	11	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320	-	-
263	F	10	3.4	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	80	-	-	-
265	F	12	3.4	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	80	-	-	-

Annex 2. Children's and infants' consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) in the Wylfa area

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
266	M	8	3.4	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	80	-	-	-
269	M	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	-	-
282	M	9	**14.5**	**1.8**	**1.8**	-	-	-	-	-	-	-	-	**5.5**	-	-	-	-	-	-	-	-	-	-	-
283	M	7	**14.5**	**1.8**	**1.8**	-	-	-	-	-	-	-	-	**5.5**	-	-	-	-	-	-	-	-	-	-	-
295	M	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	16	-	5	-	-	-
296	F	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	16	-	5	-	-	-
297	M	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	16	-	5	-	-	-
299	M	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28	-	50	-	-	-	-	-
333	F	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**140**	-	-	-	-	-	-
334	F	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**140**	-	-	-	-	-	-
Infant age group (0 - 5 years old)																									
55	F	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**42**	-	-	-	-	-
56	M	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**42**	-	-	-	-	-
123	M	2	-	-	-	-	-	-	-	-	**59.1**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
152	F	2	-	-	-	-	-	-	-	-	-	**7.1**	-	-	**3.4**	**0.2**	-	-	-	-	-	-	-	-	-
159	M	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**26**	-	-	-	-	-
160	M	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**26**	-	-	-	-	-
193	M	4	-	-	-	-	-	-	-	**0.2**	-	-	-	-	-	**0.2**	-	-	**22**	**43**	-	-	-	-	-
194	F	2	-	-	-	-	-	-	-	**0.2**	-	-	-	-	-	**0.2**	-	-	**22**	**43**	-	-	-	-	-
200	M	4	-	-	-	-	-	**0.5**	**0.3**	-	-	-	-	-	-	**0.3**	-	-	-	-	-	-	-	6222	698
201	F	0.3	-	-	-	-	-	**0.5**	**0.3**	-	-	-	-	-	-	**0.3**	-	-	-	-	-	-	-	7530	194
229	M	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**50**	-	-	-	-	-

Notes

Emboldened observations are the high-rate individuals

Annex 3. Qualitative and estimated data for use in dose assessments

Details of activity	Exposure pathways involved	Estimated rate
None identified	None identified	Not applicable

Annex 4. Ratios for determining consumption and occupancy rates for children and infants

Group	Ratio[a]	
	Child[e]/adult	Infant[e]/adult
Fish[b]	0.200	0.050
Crustaceans[b]	0.250	0.050
Molluscs[b]	0.250	0.050
Green vegetables	0.444	0.222
Other vegetables	0.500	0.200
Root vegetables	0.500	0.375
Potatoes	0.708	0.292
Domestic fruit	0.667	0.467
Milk	1.000	1.333
Cattle meat	0.667	0.222
Pig meat	0.625	0.138
Sheep meat	0.400	0.120
Poultry	0.500	0.183
Eggs	0.800	0.600
Wild/free foods[c]	0.490	0.110
Game[d]	0.500	0.140
Honey	0.789	0.789
Wild fungi	0.450	0.150
Freshwater fish[b]	0.250	0.050
External exposure over intertidal substrates	0.500	0.030

Notes

[a]Excepting notes b and c, consumption ratios were derived from Byrom et al., (1995) which presented data for infants aged 6 to 12 months and children aged 10 to 11 years.

[b]Ratios were derived from Smith and Jones, (2003) which presented data for infants and children of unspecified ages.

[c]Ratios were derived from FSA data for wild fruit and nuts for infants and 10-year-old children.

[d]Game includes rabbits/hares and venison.

[e]Note that the age ranges within the age groups in this table do not correspond exactly with the age ranges within the age groups used throughout the rest of this report.

Annex 5. Consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) for women of childbearing age[a] in the Wylfa area, for use in foetal dose assessments

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
2	F	44	-	-	-	-	0.8	0.8	-	14.3	-	-	-	-	-	-	-	-	228	228	-	-	-	-	-
23	F	38	-	-	-	0.2	0.5	-	0.2	-	-	-	-	-	4.0	0.5	0.5	-	2	-	-	-	-	-	-
27	F	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	-	-	-	-	-	-	-
45	F	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	365	-	-	-	-	-
51	F	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-
60	F	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	143	-	-	-	-	-
63	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
64	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
65	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-
77	F	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	-	-	-
81	F	27	0.7	6.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	F	37	-	-	-	-	-	-	-	-	97.3	-	4.5	-	4.7	0.6	0.6	-	-	-	-	-	-	-	-
91	F	18	-	-	-	-	-	-	-	-	97.3	-	4.5	-	4.7	0.6	0.6	-	-	-	-	-	-	-	-
105	F	15	-	-	-	-	-	-	-	-	-	-	-	-	8.9	-	-	-	-	-	-	-	-	-	-
107	F	38	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	7794	26
109	F	16	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	6422	26
110	F	16	-	-	-	-	-	-	-	-	-	3.3	-	-	3.6	-	-	-	-	-	-	-	-	6422	26
111	F	39	0.1	-	-	-	-	-	-	-	-	-	-	-	8.9	-	-	-	-	-	-	-	-	7279	365
113	F	15	0.1	-	-	-	-	-	-	-	-	-	-	-	8.9	-	-	-	-	-	-	-	-	6371	26
116	F	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2095	91
119	F	33	-	-	-	-	-	-	-	-	-	6.3	1.4	-	-	-	-	-	88	23	-	-	-	6462	888
138	F	24	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-
139	F	22	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-
143	F	23	-	-	-	-	-	-	150.0	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	-	-
150	F	22	-	-	-	-	-	-	-	-	-	28.6	-	-	13.5	0.9	-	-	-	-	-	-	-	-	-

Annex 5. Consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) for women of childbearing age[a] in the Wylfa area, for use in foetal dose assessments

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
165	F	44	-	-	-	-	-	-	-	-	-	-	-	-	-	1.5	-	-	-	5	-	-	-	-	-
180	F	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	-	102	52	-	-
187	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.5	-	-	-	-	-	-	-	-
191	F	37	-	0.2	0.1	-	-	-	-	0.2	-	-	-	-	-	0.2	0.3	-	22	43	2	-	-	-	-
196	F	39	-	-	-	-	-	0.5	0.3	-	-	-	-	-	-	0.3	-	-	-	-	-	-	-	7530	194
205	F	21	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.7	-	-	-	-	-	-	-	5231	47
218	F	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	312	-	-	-	-	-	-
222	F	31	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	-	-	-	-	-	-
228	F	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-
234	F	U	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	F	U	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
236	F	U	5.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
240	F	32	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
241	F	35	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
242	F	40	14.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
246	F	15	8.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
248	F	43	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	320	-	-
253	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	-	-
254	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	160	-	-
264	F	38	3.4	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	80	-	-	-
272	F	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	175	-	-
281	F	38	14.5	1.8	1.8	-	-	-	-	-	-	-	-	5.5	-	-	-	-	-	-	-	-	-	-	-
301	F	42	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
303	F	17	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
305	F	39	26.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Annex 5. Consumption rates (kg y^{-1} or l y^{-1}) and occupancy rates (h y^{-1}) for women of childbearing age[a] in the Wylfa area, for use in foetal dose assessments

Observation number	Sex	Age (years)	Fish	Crustaceans	Molluscs	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Wild fungi	Intertidal occupancy over rock	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1.2 km of the licensed site boundary	Outdoor occupancy within 1.2 km of the licensed site boundary
309	F	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	548	-	-	-	-	-	-
313	F	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	228	-	-	-	-	-	-
327	F	41	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
329	F	26	6.8	6.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
332	F	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	140	-	-	-	-	-	-

Notes

U = Unknown

[a] Based on National Statistics guidelines women were deemed to be of childbearing age if they were between 15 and 44 years old. Women of unknown age were included as they were potentially women of childbearing age.

Annex 6. Summary of profiles for adults in the Wylfa area

Profile Name	Number of individuals	Pathway Name																									
		Crustacea	Direct[a]	Eggs	Fish - Fresh	Fish - Sea	Freshwater Plants	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Sediments[b]	Honey	Meat - Cow	Meat - Pig	Meat - Poultry	Meat - Sheep	Milk	Mollusca	Mushrooms	Occupancy IN water	Occupancy ON water	Plume (IN; 0-0.25 km)[c]	Plume (MID; >0.25-0.5 km)[c]	Plume (OUT; >0.5-1.2 km)[c]	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		kg	-	kg	kg	kg	kg	kg	kg	h	kg	kg	kg	kg	kg	l	kg	kg	h	h	h	h	h	kg	kg	kg	kg
Crustacean consumers	**9**	7.9	-	-	-	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	260	-	-	-	-	-	-	-
Occupants for direct radiation	**58**	-	1.00	1.8	-	0.95	-	-	0.10	7	-	-	2.1	0.40	0.44	5.4	-	0.04	-	<1	140	22	3010	-	-	1.3	0.02
Egg consumers	**30**	-	0.20	13.0	0.02	0.56	-	5.9	0.60	15	0.23	-	6.9	0.89	3.4	12.2	-	1.3	<1	-	-	-	1370	2.7	5.7	10.3	5.6
Freshwater fish consumers	**2**	-	-	17.1	0.26	0.97	-	21.8	-	200	3.4	-	-	-	-	-	-	-	8	-	-	-	-	25.9	27.5	50.0	24.2
Sea fish consumers	**10**	1.2	0.10	0.17	-	33.5	0.14	1.4	0.18	25	-	-	-	-	-	-	0.02	0.23	-	200	-	5	-	3.3	4.0	13.2	12.4
Freshwater plant consumers	**2**	0.36	-	0.86	-	35.4	0.68	7.2	0.91	38	-	-	-	-	-	-	0.11	1.1	-	97	-	-	-	16.3	20.1	66.0	62.0
Domestic fruit consumers	**5**	-	-	10.7	0.10	1.4	-	28.2	0.36	81	1.4	-	-	0.18	2.3	-	-	0.22	3	-	-	-	-	14.5	16.6	51.4	22.4
Wild fruit and nut consumers	**2**	1.1	-	-	-	19.5	-	9.1	6.0	-	-	-	-	-	-	-	-	2.3	-	120	-	-	-	15.1	4.5	45.4	9.0
Occupants over sediment	**21**	0.12	-	0.81	0.01	0.32	-	1.7	-	410	0.16	-	-	-	-	-	-	-	<1	66	-	-	-	1.2	1.3	2.4	1.2
Honey consumers	**2**	-	-	17.1	0.26	0.97	-	21.8	-	200	3.4	-	-	-	-	-	-	-	8	-	-	-	-	25.9	27.5	50.0	24.2
Cattle meat consumers	**3**	-	-	-	-	-	-	-	0.91	-	-	31.5	-	-	15.1	-	-	0.23	-	-	-	-	-	-	-	-	-
Pig meat consumers	**9**	-	0.44	13.4	-	-	-	-	0.48	-	-	-	25.9	2.6	2.5	-	-	-	-	-	-	-	3510	-	-	-	-
Poultry meat consumers	**4**	0.90	0.50	4.4	-	7.3	-	-	-	-	-	-	16.3	8.6	5.7	-	0.90	-	64	100	-	-	3940	-	-	-	-
Sheep meat consumers	**13**	-	0.15	10.5	-	1.1	-	8.1	1.3	-	-	7.3	5.0	3.0	12.2	-	-	1.8	-	-	-	-	1210	2.4	6.1	16.2	9.1
Milk consumers	**18**	-	0.17	3.3	-	-	-	0.66	0.28	-	-	-	-	-	1.3	102.2	-	0.73	-	-	-	61	-	0.34	1.9	4.2	-
Mollusc consumers	**3**	1.8	-	-	-	14.5	-	-	-	-	-	-	-	3.7	-	-	1.8	-	85	130	-	-	-	-	-	-	-
Mushroom consumers	**11**	0.20	-	7.5	-	3.5	-	6.3	1.6	3	-	-	-	1.2	3.1	-	-	4.2	-	21	-	-	-	4.3	3.9	9.0	2.1
Occupants IN water	**10**	0.27	-	-	-	2.1	-	-	-	14	-	-	-	0.55	-	-	0.18	-	180	90	-	-	-	-	-	-	-
Occupants ON water	**8**	3.3	-	-	-	9.1	-	-	-	49	-	-	-	-	-	-	-	-	-	1280	-	-	-	-	-	-	-
Occupants for plume pathways (0 - 0.25 km)	**3**	-	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1280	-	-	-	-	-	-
Occupants for plume pathways (>0.25 - 0.5 km)	**3**	-	1.00	-	-	-	-	-	0.67	-	-	-	-	-	-	104.0	-	0.80	-	-	-	370	-	-	-	25.0	-
Occupants for plume pathways (>0.5 - 1.2 km)	**25**	-	1.00	4.1	-	<0.01	-	-	0.16	16	-	-	4.8	0.93	1.0	-	-	-	-	-	-	-	6890	-	-	0.02	0.04
Green vegetable consumers	**8**	0.37	-	9.3	0.07	15.2	0.17	17.4	2.2	60	0.85	-	-	-	2.8	-	0.03	0.90	2	54	-	-	-	18.2	18.1	65.3	37.7
Other domestic vegetable consumers	**11**	0.06	-	10.6	0.05	7.9	0.12	13.0	0.69	55	0.62	-	-	-	4.1	-	0.02	0.42	1	18	-	-	-	10.9	18.6	42.3	26.5
Potato consumers	**11**	0.06	-	6.8	0.05	7.5	0.12	11.0	0.62	44	0.62	-	-	-	2.1	-	0.02	0.26	1	18	-	-	-	10.5	12.3	107.5	25.8
Root vegetable consumers	**9**	0.08	-	10.2	0.06	9.2	0.15	15.1	1.0	53	0.76	-	-	-	3.8	-	0.02	0.40	2	22	-	-	-	14.8	15.7	63.7	38.6

Notes

[a]Expressed as the proportion of the profile members who are exposed to direct radiation.

[b]Gamma ext - sediment includes occupancy over mud and sand; mud, sand and stones; sand; sand and stones.

[c]Plume times are the sums of individuals' indoor and outdoor times.

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal.

Annex 7. Summary of profiles for the child age group (6 - 15 years old) in the Wylfa area

		Pathway Name																			
Profile Name	Number of individuals	Crustacea	Direct[a]	Eggs	Fish - Sea	Fruit and nuts - Wild	Gamma ext - Sediments[b]	Meat - Pig	Meat - Poultry	Meat - Sheep	Milk	Mollusca	Mushrooms	Occupancy IN water	Occupancy ON water	Plume (OUT; >0.5-1.2 km)[c]	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		kg	-	kg	kg	kg	h	kg	kg	kg	l	kg	kg	h	h	h	kg	kg	kg	kg
Crustacean consumers	2	1.8	-	-	14.5	-	-	-	5.5	-	-	1.8	-	-	-	-	-	-	-	-
Occupants for direct radiation	6	-	1.00	4.2	0.04	0.09	37	2.1	-	0.47	2.3	-	-	-	-	5970	-	-	0.09	0.18
Egg consumers	9	-	0.33	5.8	0.03	0.27	13	0.70	-	1.4	27.8	-	0.27	-	-	1950	0.05	0.10	0.05	-
Sea fish consumers	5	0.72	-	-	15.5	-	-	-	2.2	-	-	0.72	-	-	-	-	-	-	-	-
Wild fruit and nut consumers	2	-	-	2.4	-	1.1	3	-	-	2.3	48.7	-	0.30	-	-	-	-	-	-	-
Occupants over sediment	5	-	0.40	1.5	-	-	150	2.5	-	0.57	2.7	-	-	-	-	1860	-	-	-	-
Pig meat consumers	2	-	1.00	3.7	-	-	110	6.3	-	1.4	6.8	-	-	-	-	4650	-	-	-	-
Poultry meat consumers	2	1.8	-	-	14.5	-	-	-	5.5	-	-	1.8	-	-	-	-	-	-	-	-
Sheep meat consumers	3	-	-	4.0	-	0.50	-	-	-	3.8	81.1	-	0.50	-	-	-	-	-	-	-
Milk consumers	3	-	-	4.0	-	0.50	-	-	-	3.8	81.1	-	0.50	-	-	-	-	-	-	-
Mollusc consumers	2	1.8	-	-	14.5	-	-	-	5.5	-	-	1.8	-	-	-	-	-	-	-	-
Mushroom consumers	5	-	-	3.6	-	0.48	<1	-	-	2.3	48.7	-	0.48	-	-	-	0.09	0.18	0.09	-
Occupants IN water	3	0.44	-	-	3.4	-	-	-	-	-	-	-	-	80	-	-	-	-	-	-
Occupants ON water	3	-	-	-	2.4	-	-	-	-	-	-	-	-	-	270	-	-	-	-	-
Occupants for plume pathways (>0.5 - 1.2 km)	6	-	1.00	4.2	0.04	0.09	37	2.1	-	0.47	2.3	-	-	-	-	5970	-	-	0.09	0.18
Green vegetable consumers	2	-	-	3.0	-	0.45	2	-	-	-	-	-	0.45	-	-	-	0.23	0.45	0.23	-
Other domestic vegetable consumers	2	-	-	3.0	-	0.45	2	-	-	-	-	-	0.45	-	-	-	0.23	0.45	0.23	-
Potato consumers	4	-	0.50	1.5	-	0.36	1	-	-	-	-	-	0.23	-	-	3430	0.11	0.23	0.25	0.27
Root vegetable consumers	2	-	1.00	-	-	0.27	-	-	-	-	-	-	-	-	-	6870	-	-	0.27	0.54

Notes

[a]Expressed as the proportion of the profile members who are exposed to direct radiation.

[b]Gamma ext - sediment includes occupancy over sand; sand and stones.

[c]Plume times are the sums of individuals' indoor and outdoor times.

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal.

Annex 8. Summary of profiles for the infant age group (0 - 5 years old) in the Wylfa area

Profile Name	Number of individuals	Pathway Name									
		Direct[a]	Eggs	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Sediments[b]	Meat - Pig	Milk	Plume (OUT; >0.5-1.2 km)[c]	Vegetables - Potatoes	Vegetables - Root
		-	kg	kg	kg	h	kg	l	h	kg	kg
Occupants for direct radiation	**2**	1.00	-	-	0.27	-	-	-	7320	0.27	0.54
Egg consumers	**1**	-	3.4	-	0.22	-	7.1	-	-	-	-
Domestic fruit consumers	**2**	-	-	0.19	0.19	65	-	-	-	-	-
Wild fruit and nut consumers	**5**	0.40	0.68	0.08	0.23	26	1.4	-	2930	0.11	0.22
Occupants over sediment	**7**	-	-	0.06	0.06	45	-	-	-	-	-
Pig meat consumers	**1**	-	3.4	-	0.22	-	7.1	-	-	-	-
Milk consumers	**1**	-	-	-	-	-	-	59.1	-	-	-
Occupants for plume pathways (>0.5 - 1.2 km)	**2**	1.00	-	-	0.27	-	-	-	7320	0.27	0.54
Potato consumers	**2**	1.00	-	-	0.27	-	-	-	7320	0.27	0.54
Root vegetable consumers	**2**	1.00	-	-	0.27	-	-	-	7320	0.27	0.54

Notes

[a]Expressed as the proportion of the profile members who are exposed to direct radiation.

[b]Gamma ext - sediment includes occupancy over sand; sand and stones.

[c]Plume times are the sums of individuals' indoor and outdoor times.

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal.

Annex 9. Summary of profiles for women of childbearing age in the Wylfa area, for use in foetal dose assessments

		Pathway Name																			
Profile Name	Number of individuals	Crustacea	Direct[a]	Eggs	Fish - Sea	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Sediments[b]	Meat - Pig	Meat - Poultry	Meat - Sheep	Milk	Mollusca	Mushrooms	Occupancy IN water	Occupancy ON water	Plume (OUT; >0.5-1.2 km)[c]	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		kg	-	kg	kg	kg	kg	h	kg	kg	kg	l	kg	kg	h	h	h	kg	kg	kg	kg
Crustacean consumers	2	6.7	-	-	3.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Occupants for direct radiation	9	-	1.00	3.2	0.03	-	0.10	12	1.8	-	0.16	-	-	-	-	-	6370	-	-	0.03	0.06
Egg consumers	6	-	0.33	8.3	0.04	-	0.35	-	4.8	-	1.5	32.4	-	0.20	-	-	2340	-	-	-	-
Sea fish consumers	6	0.30	-	-	15.7	-	-	-	-	0.91	-	-	0.30	-	-	-	-	-	-	-	-
Domestic fruit consumers	1	-	-	-	-	14.3	-	460	-	-	-	-	-	-	-	-	-	-	0.84	-	0.84
Wild fruit and nut consumers	7	-	0.14	3.4	-	-	0.86	<1	4.1	-	1.3	27.8	-	0.17	-	-	750	-	-	-	-
Occupants over sediment	5	-	-	-	-	2.9	-	380	-	-	-	-	-	-	-	-	-	-	0.17	-	0.17
Pig meat consumers	1	-	-	13.5	-	-	0.86	-	28.6	-	-	-	-	-	-	-	-	-	-	-	-
Poultry meat consumers	1	1.8	-	-	14.5	-	-	-	-	5.5	-	-	1.8	-	-	-	-	-	-	-	-
Sheep meat consumers	2	-	-	4.7	-	-	0.60	-	-	-	4.5	97.3	-	0.60	-	-	-	-	-	-	-
Milk consumers	2	-	-	4.7	-	-	0.60	-	-	-	4.5	97.3	-	0.60	-	-	-	-	-	-	-
Mollusc consumers	1	1.8	-	-	14.5	-	-	-	-	5.5	-	-	1.8	-	-	-	-	-	-	-	-
Mushroom consumers	5	0.03	-	2.7	-	0.04	0.46	13	-	-	1.8	38.9	0.01	0.48	-	-	-	0.05	0.09	0.05	-
Occupants IN water	3	0.13	-	-	1.1	-	-	17	-	-	-	-	-	-	76	17	-	-	-	-	-
Occupants ON water	4	-	-	-	0.91	-	-	-	-	-	-	-	-	-	-	200	-	-	-	-	-
Occupants for plume pathways (>0.5 - 1.2 km)	8	-	1.00	3.6	0.03	-	0.12	14	2.0	-	0.18	-	-	-	-	-	6890	-	-	0.03	0.07
Green vegetable consumers	1	-	-	4.0	-	-	0.45	2	-	-	-	-	-	0.45	-	-	-	0.23	0.45	0.23	-
Other domestic vegetable consumers	2	-	-	2.0	-	7.1	0.23	230	-	-	-	-	-	0.23	-	-	-	0.11	0.65	0.11	0.42
Potato consumers	1	-	-	-	-	-	0.27	-	-	-	-	-	-	-	-	-	-	-	-	150.0	-
Root vegetable consumers	2	-	0.50	-	-	7.1	0.14	230	-	-	-	-	-	-	-	-	3860	-	0.42	0.14	0.69

Notes

[a]Expressed as the proportion of the profile members who are exposed to direct radiation.

[b]Gamma ext - sediment includes occupancy over sand; sand and stones.

[c]Plume times are the sums of individuals' indoor and outdoor times.

The means of the high-rate groups are determined by the 'cut-off' method and are highlighted on the diagonal.

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About us

Cefas is a multi-disciplinary scientific research and consultancy centre providing a comprehensive range of services in fisheries management, environmental monitoring and assessment, and aquaculture to a large number of clients worldwide.

We have more than 500 staff based in 2 laboratories, our own ocean-going research vessel, and over 100 years of fisheries experience.

We have a long and successful track record in delivering high-quality services to clients in a confidential and impartial manner.
(www.cefas.defra.gov.uk)

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CTL systems and services are developed by teams that are experienced in fisheries, environmental management and aquaculture, and in working closely with clients to ensure that their needs are fully met.
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We also work successfully in partnership with other organisations, operate in international consortia and have several joint ventures commercialising our intellectual property.

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