Cefas

Cefas contract report C6028

Radiological Habits Survey: Berkeley and Oldbury, 2014

2015

Environment Report RL 02/15

Environment Agency

Food Standards Agency
food.gov.uk

ONR Office for Nuclear Regulation

This page has been intentionally left blank

Cefas Document Control

Radiological Habits Survey: Berkeley and Oldbury, 2014

Submitted to:	Food Standards Agency, Environment Agency and Office for Nuclear Regulation
Date submitted:	19/3/15
Project Manager:	Fiona Clyne
Report compiled by:	Fiona Clyne
Quality control by:	John Hunt
Approved by & date:	Bill Camplin, 18/3/15
Version:	Final

Version Control History			
Author	**Date**	**Comment**	**Version**
Fiona Clyne	30/12/14	Sent to FSA and EA for comments.	Draft 1
Fiona Clyne	31/1/15	Sent to ONR for comments.	Draft 1
Fiona Clyne	4/2/15	Sent to John Hunt for comments.	Draft 2
Fiona Clyne	19/3/15	All amendments completed.	Final

This page has been intentionally left blank

Environment Report RL 02/15

Radiological Habits Survey: Berkeley and Oldbury, 2014

F.J. Clyne, C.J. Garrod and G.P. Papworth

2015

The work described in this report was carried out under contract to the Environment Agency and the Food Standards Agency.
Cefas contract C6028
FSA Project FS131008

This report should be cited as: Clyne, F.J., Garrod, C.J. and Papworth, G.P., 2015. Radiological Habits Survey: Berkeley and Oldbury, 2014. RL 02/15. Cefas, Lowestoft

A copy can be obtained by downloading from the Cefas website: www.cefas.defra.gov.uk

CONTENTS

TABLES

ANNEXES

SUMMARY

This report presents the results of a survey conducted in 2014 to determine the habits and consumption patterns of people living, working and pursuing recreational activities in the vicinity of the Berkeley and Oldbury nuclear power stations. Both sites discharge gaseous radioactive wastes via stacks to the atmosphere, liquid radioactive wastes via pipelines into the River Severn, and contain sources of direct radiation. Due to the close proximity of the sites, the liquid and gaseous radioactive wastes from Berkeley and Oldbury are considered together for the purposes of habits surveys, environmental monitoring, and dose assessments. The direct radiation pathways for Berkeley and Oldbury are considered separately in this report. 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 areas for ionising radiation emanating directly from the sites. The occupancy data collected from the direct radiation survey areas are 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 343 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 tidal waters and intertidal areas of the River Severn, from a line extending from Portskewett on the west bank to Severn Beach on the east bank, upriver to a line extending across the river at Broadoak.

Foods from the aquatic survey area were consumed from the following food groups: fish; crustaceans; wildfowl; salt marsh grazed cattle meat. The consumption of foods from the mollusc food group and marine plants/algae food group was not identified. The mean consumption rates for the adult high-rate groups for the separate aquatic consumption pathways for foods potentially affected by liquid discharges were:

- 10 kg y^{-1} for fish
- 0.3 kg y^{-1} for crustaceans
- 1.1 kg y^{-1} for wildfowl
- 10 kg y^{-1} for salt marsh grazed cattle meat

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

- For fish: cod, salmon, bass and flounder
- For crustaceans: brown shrimp
- For wildfowl: mallard and Canada goose
- For salt marsh grazed cattle meat: salt marsh grazed beef

The activities undertaken by adults in the high-rate groups for intertidal occupancy included wildfowling, putcher rank fishing (including setting up the ranks), fixing moorings, walking, angling, playing, dog walking, fossil hunting, collecting stones, and living on a houseboat. Gamma dose rate measurements were taken at most of the locations in the aquatic survey area where activities were occurring. The activities undertaken by adults in the high-rate group for handling fishing gear were handling lave nets and handling putcher ranks. The only activity in the adult high-rate group for handling sediment was wildfowling. The activities undertaken by people in and on the water included wake boarding, water skiing, jetskiing, kayaking, sailing, undertaking boat maintenance, putcher rank fishing, lave netting, living on a houseboat and operating a rescue boat. Beef cattle and sheep were allowed to access the shore along the River Severn to graze on salt marsh and drink from the river. The use of seaweed as a fertiliser or animal feed was not identified.

The terrestrial survey area

The terrestrial survey area covered the land and freshwater watercourses within 5 km of the centre of the Berkeley and Oldbury sites (see Figure 2 for Berkeley and Figure 3 for Oldbury). Interviews were conducted at thirty farms in the terrestrial survey area. Milk (from dairy cattle), beef, lamb, broiler chickens, chicken eggs, and venison were produced on the farms. One farm also kept a small number

of goats, which were sold privately for consumption; this was a newly identified pathway in 2014. Silage, hay and arable crops were grown on some farms for use as animal feed. Arable crops were also produced for human consumption. One smallholding produced small quantities of beef. The farmers and their families consumed foods that were produced commercially on their land as well as other foods that they produced solely for their own consumption. Four allotment sites and many private gardens were identified where a variety of fruit and vegetables were grown. Four beekeepers were identified who kept hives in the survey area and the consumption of honey was recorded. One private game shoot took place on farmland in the area and the shot pheasants were consumed. Wild blackberries, bullace plums, elderflower, mulberries and mushrooms were collected and consumed.

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; venison; goat meat. 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 freshwater fish was identified.

The human consumption of groundwater was not identified. Livestock were identified drinking borehole, spring and well water as well as drinking water from the River Severn, streams, ditches and ponds.

There is no active management of wildlife on the Berkeley and Oldbury sites since wildlife does not have access to controlled areas. Wild peregrine falcons naturally keep the numbers of other birds in the area low and rabbit populations are low.

The direct radiation survey areas

The direct radiation survey areas covered the land and water within 1 km of the Berkeley and Oldbury nuclear licensed site boundaries (see Figure 2 for Berkeley and Figure 3 for Oldbury). 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 Berkeley and Oldbury nuclear licensed site boundaries. In the Berkeley direct radiation survey area, the highest indoor, outdoor and total occupancy rates in the 0 – 0.25 km zone and in the >0.5 – 1 km zone were for residents. There were only two residential properties in the >0.25 – 0.5 km zone but the occupants were unavailable for an interview so estimated data have been provided for dose assessments purposes (see Annex 3). In the Oldbury direct radiation survey area, no activities were identified in the 0 – 0.25 km zone. The highest outdoor and total occupancy rates in the >0.25 – 0.5 km zone were for a farmer who lived outside the survey area. No indoor occupancy rates were recorded for this zone. The highest indoor, outdoor and total occupancy rates in the >0.5 – 1 km zone were for residents. 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 Berkeley and Oldbury site centres. The measurements taken at the properties were not notably different from the background measurements.

Comparisons with the previous survey

Comparisons were made with the results from a previous habits survey undertaken around the Berkeley and Oldbury sites in 2007. The results of the comparisons are shown in Figures i to v below.

There were decreases in the consumption rates for all aquatic food groups in 2014 compared with 2007 (see Figure i), with the largest decrease in the consumption of salt marsh grazed cattle meat. For intertidal occupancy and handling (see Figure ii), there was general decline in the 2014 rates, with significant decreases in occupancy over mud and sand, occupancy over mud, sand and stones, and handling fishing gear. A new intertidal pathway, boat on mud, was identified, which included occupancy for people living on houseboats that were predominantly resting on mud.

The consumption rates for all of the terrestrial food groups decreased in 2014, with the exception of the wild fungi food group (see Figure iii). Goat meat was a new terrestrial pathway in 2014 which had not previously been identified in the area.

The main change in the Berkeley direct radiation area was in the >0.25 – 5 km zone. There were two residential properties in this zone, which were unoccupied in 2007 but were occupied in 2014 (estimated data were provided since the occupants were not available for an interview) (see Figure iv). For Oldbury, the direct radiation survey area changed in 2014 compared with 2007 because a large part of the Oldbury site to the north-east and east was delicensed in 2011. This did not change the number of residential properties within the Oldbury direct radiation survey area but it did change the distance of the properties from the nuclear licensed site boundary. Therefore, in 2007 there were occupancy rates for residents within all three zones but in 2014 there were only occupancy rates for residents in the >0.5 – 1.0 km zone (see Figure v).

Reasons for changes in the consumption, occupancy and handling rates were identified for certain pathways and these are presented in Section 8 of this report.

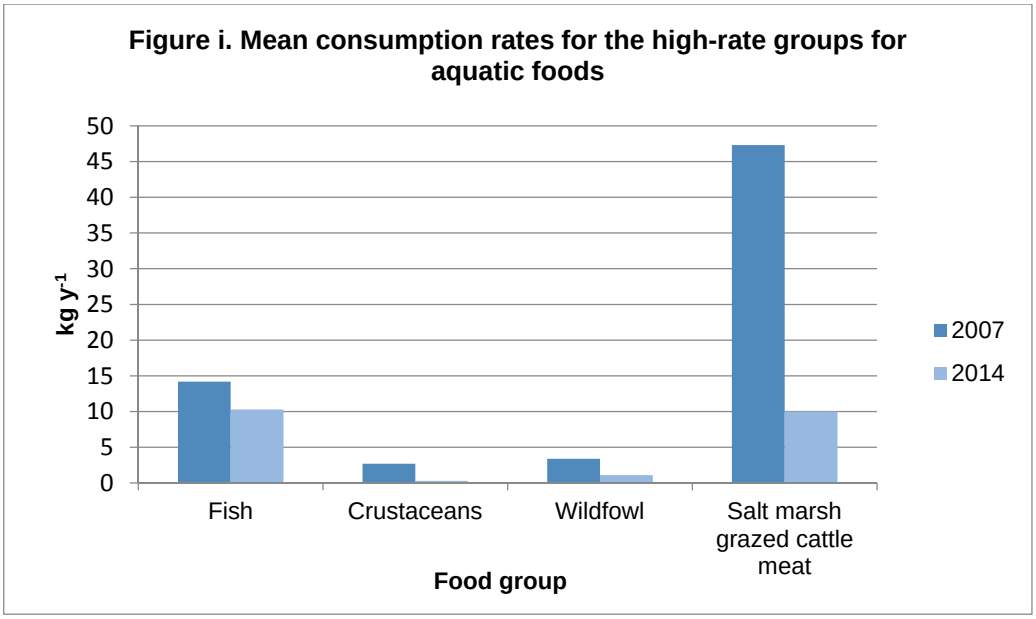
Figure i. Mean consumption rates for the high-rate groups for aquatic foods
kg y-1
50
45
40
35
30
25
20
15
10
5
0
Fish
Crustaceans
Wildfowl
Salt marsh grazed cattle meat
Food group
2007
2014

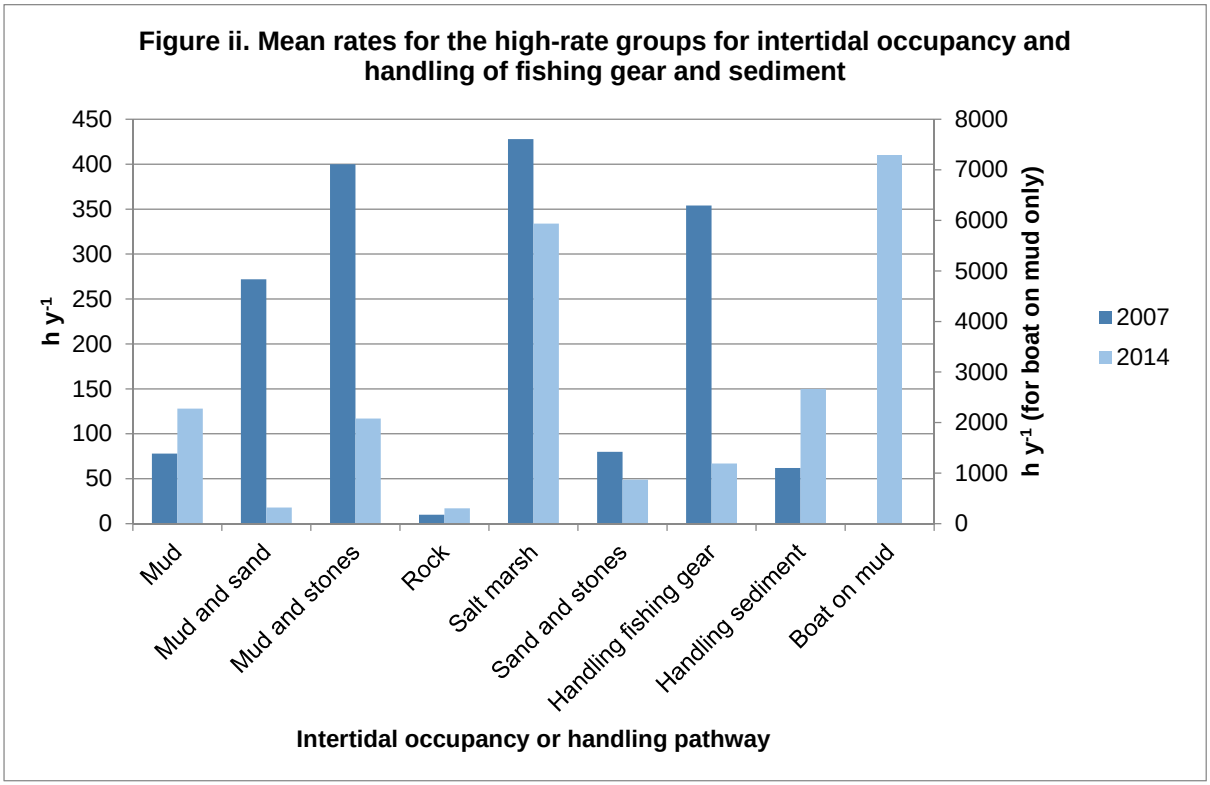
Figure ii. Mean rates for the high-rate groups for intertidal occupancy and handling of fishing gear and sediment
h y-1
450
400
350
300
250
200
150
100
50
0
8000
7000
6000
5000
4000
3000
2000
1000
0
h y-1 (for boat on mud only)
Mud
Mud and sand
Mud and stones
Rock
Salt marsh
Sand and stones
Handling fishing gear
Handling sediment
Boat on mud
Intertidal occupancy or handling pathway
2007
2014

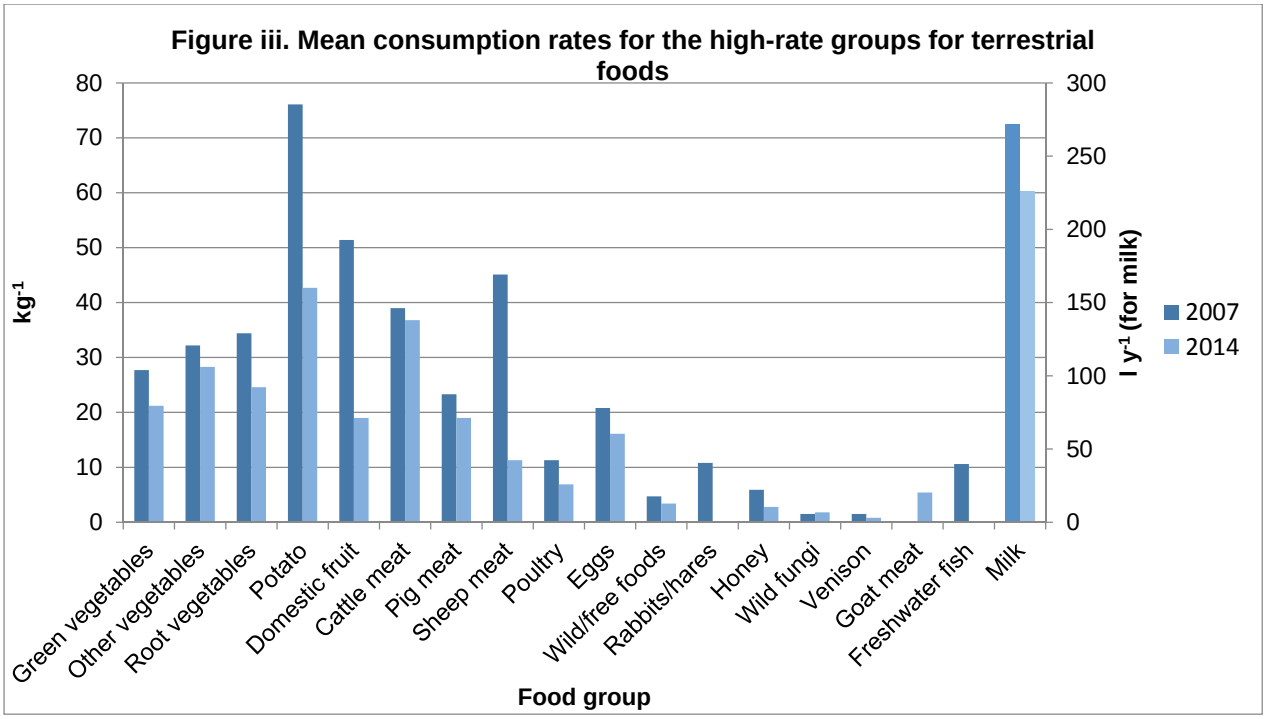
Figure iii. Mean consumption rates for the high-rate groups for terrestrial foods
kg-1
l y-1 (for milk)
2007
2014
Green vegetables
Other vegetables
Root vegetables
Potato
Domestic fruit
Cattle meat
Pig meat
Sheep meat
Poultry
Eggs
Wild/free foods
Rabbits/hares
Honey
Wild fungi
Venison
Goat meat
Freshwater fish
Milk
Food group

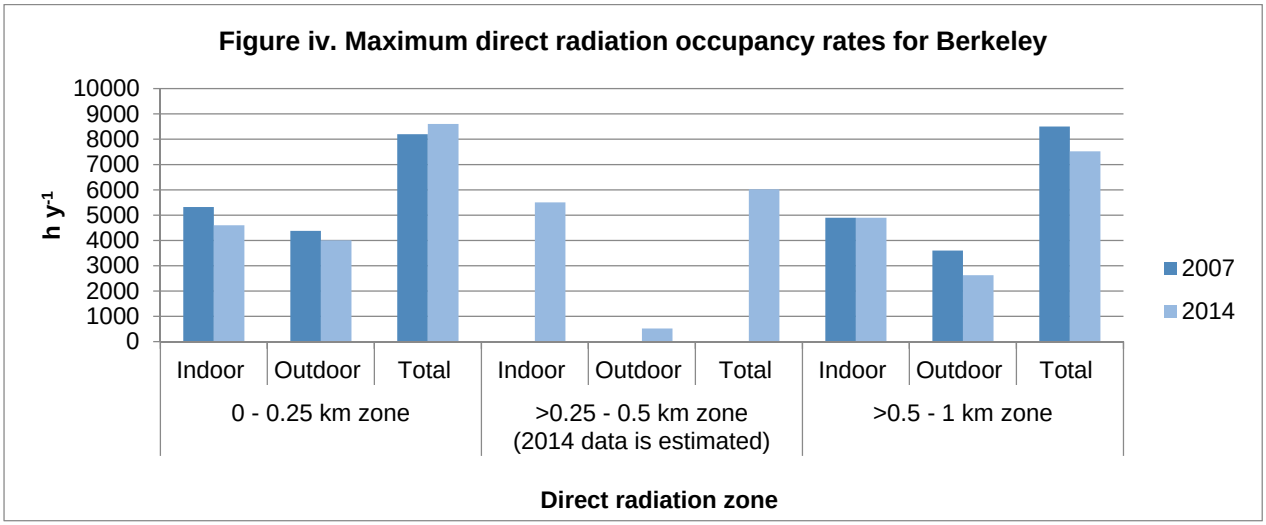
Figure iv. Maximum direct radiation occupancy rates for Berkeley
h y-1
2007
2014
Indoor
Outdoor
Total
0 - 0.25 km zone
>0.25 - 0.5 km zone
(2014 data is estimated)
>0.5 - 1 km zone
Direct radiation zone

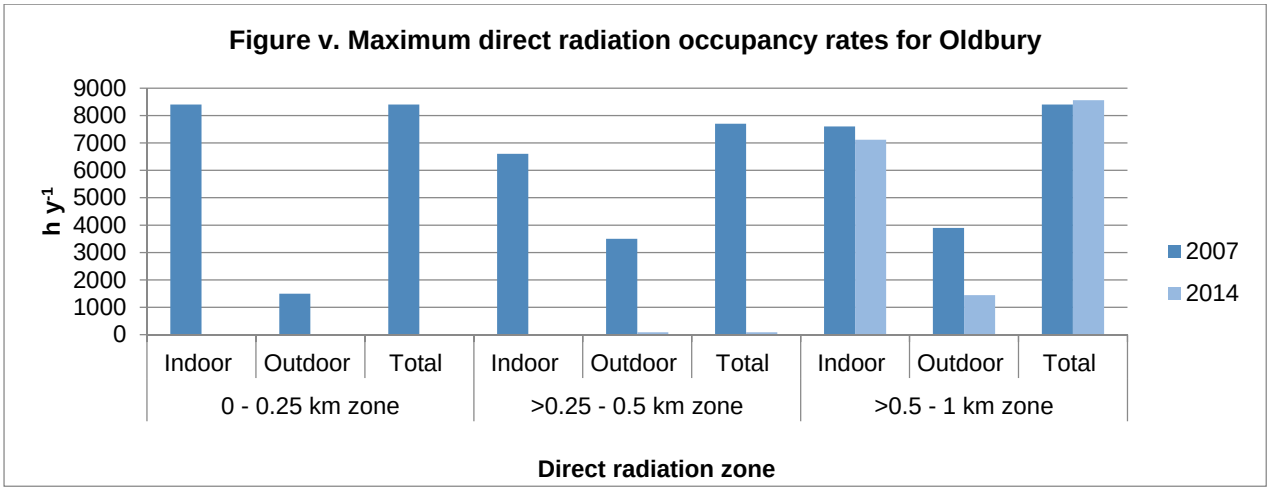
Figure v. Maximum direct radiation occupancy rates for Oldbury
h y-1
2007
2014
Indoor
Outdoor
Total
0 - 0.25 km zone
>0.25 - 0.5 km zone
>0.5 - 1 km zone
Direct radiation zone

Recommendations for changes to the monitoring programmes

Recommendations for changes to the monitoring programmes are provided, based on the findings of this survey. A revised food monitoring programme was introduced in 2014 by the Food Standards Agency following a review of the way that radioactivity in food is monitored. However, in order to maintain the convention adopted for habits survey reports, the recommendations are based on the most recently published monitoring programme, which was for 2013.

Recommendations for the environmental monitoring programme include, changing the location of the gamma dose rate measurement taken at Guscar Rocks to Beachley, and introducing gamma dose rate measurements over mud at Bullo Pill and over salt marsh at Northwick Warth. The recommendation for the food monitoring programme is to introduce a sample of goat meat.

1 INTRODUCTION

The public might be exposed to radiation as a result of the operations of the Berkeley and Oldbury nuclear licensed sites either through the permitted discharges of liquid or gaseous radioactive wastes into the local environment, or from radiation emanating directly from the sites. This report provides information on activities carried out by members of the public in the vicinity of the Berkeley and Oldbury sites, which may influence their radiation exposure. Due to the close proximity of the sites, the liquid and gaseous radioactive wastes from Berkeley and Oldbury are considered together for the purposes of habits surveys, environmental monitoring, and assessments. The direct radiation pathways from Berkeley and Oldbury are considered separately in this report. The study has been funded by the Environment Agency and the Food Standards Agency 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

The Environment Agency regulates the discharges of radioactive waste 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 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, 2009), 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, FSA, NRW, NIEA and SEPA,

2014), 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

The Berkeley and Oldbury nuclear power stations are located on the eastern bank of the River Severn in Gloucestershire and south Gloucestershire, respectively (see Figure 1). The Oldbury site is approximately 20 km north of Bristol and the Berkeley site is approximately 7 km north-east of the Oldbury site. The Berkeley station ceased electricity generation in March 1989 and is undergoing decommissioning. The Oldbury station ceased electricity generation in February 2012 and is currently in the defuelling phase. A large part of the of the Oldbury site to the north-east and east was delicensed in 2011, including a silt lagoon, grassland, meadows, an orchard and woodland.

The Berkeley and Oldbury nuclear sites are owned by the Nuclear Decommissioning Authority (NDA) and operated by Magnox Ltd. Magnox Ltd is permitted to undertake radioactive substances activities at the Berkeley and the Oldbury sites under the Radioactive Substances Regulation of the Environmental Permitting Regulations 2010. This includes permission to discharge liquid radioactive wastes via outfalls into the River Severn and gaseous radioactive wastes via stacks to the atmosphere. The sites are licensed for the purposes of operating certain activities prescribed under the Nuclear Installations Act, 1965. The sites contain sources of direct radiation. Details of the amounts of gaseous and liquid radioactive wastes discharged are published in the RIFE reports, for example, EA, FSA, NRW, NIEA and SEPA, 2014.

Oldbury is a potential site for a new nuclear power station. Approximately 170 hectares of land adjacent to the existing Oldbury site to the north-east has been acquired for the new nuclear site building activities. The energy company that is developing the proposed new site anticipates that early site works might commence in 2016 (www.horizonnuclearpower.com/oldbury).

2.2 Survey objectives

The Centre for Environment, Fisheries & Aquaculture Science (Cefas) undertook the Berkeley and Oldbury habits survey in 2014 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 Berkeley and Oldbury nuclear sites.

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 sites.

The aquatic survey area (see Figure 1) covered the tidal waters and intertidal areas of the River Severn, from a line extending from Portskewett on the west bank to Severn Beach on the east bank, upriver to a line extending across the river at Broadoak. This area was taken to represent the predominant area of mixing of discharged radionuclides in seawater.

The terrestrial survey area covered the land and freshwater watercourses within 5 km of the Berkeley and Oldbury site centres (National Grid Reference: ST 659 994 and ST 605 945 respectively) (see Figure 2 for Berkeley and Figure 3 for Oldbury) to encompass the main areas of potential deposition from gaseous discharges.

The direct radiation survey areas covered the land and water within 1 km of the nuclear licensed site boundary at Berkeley and Oldbury (see Figure 2 for Berkeley and Figure 3 for Oldbury). 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 sites.

The same aquatic and terrestrial survey areas, and the Berkeley direct radiation survey area were used in the previous habits survey conducted by Cefas in the Berkeley and Oldbury area, which was in 2007 (Clyne *et al*., 2008). The Oldbury direct radiation survey area was different in 2014 compared with 2007 because a large part of the Oldbury site to the north-east and east had been delicensed in 2011.

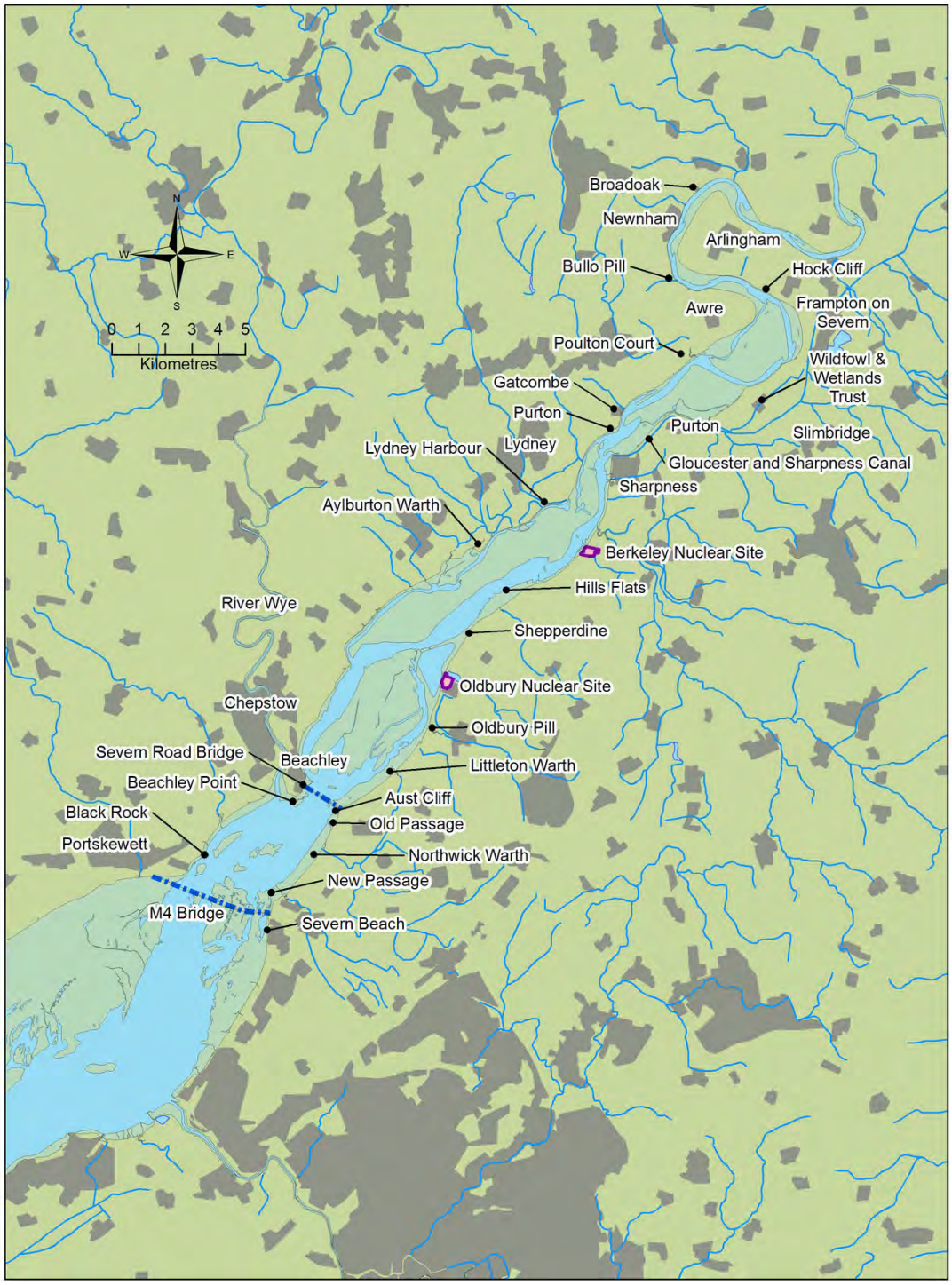

Figure 1. The Berkeley and Oldbury aquatic survey area

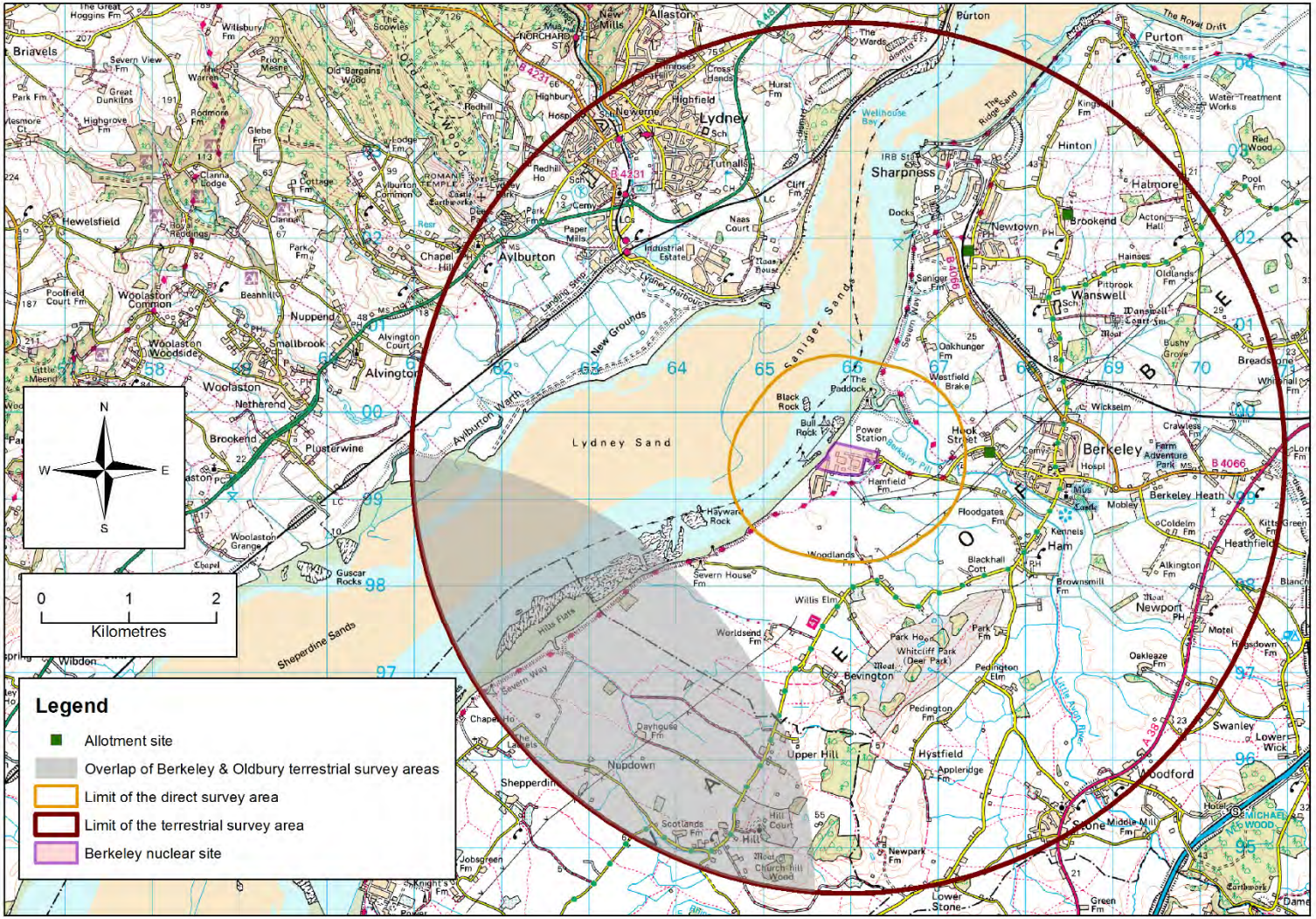

Figure 2. The Berkeley terrestrial and direct radiation survey area

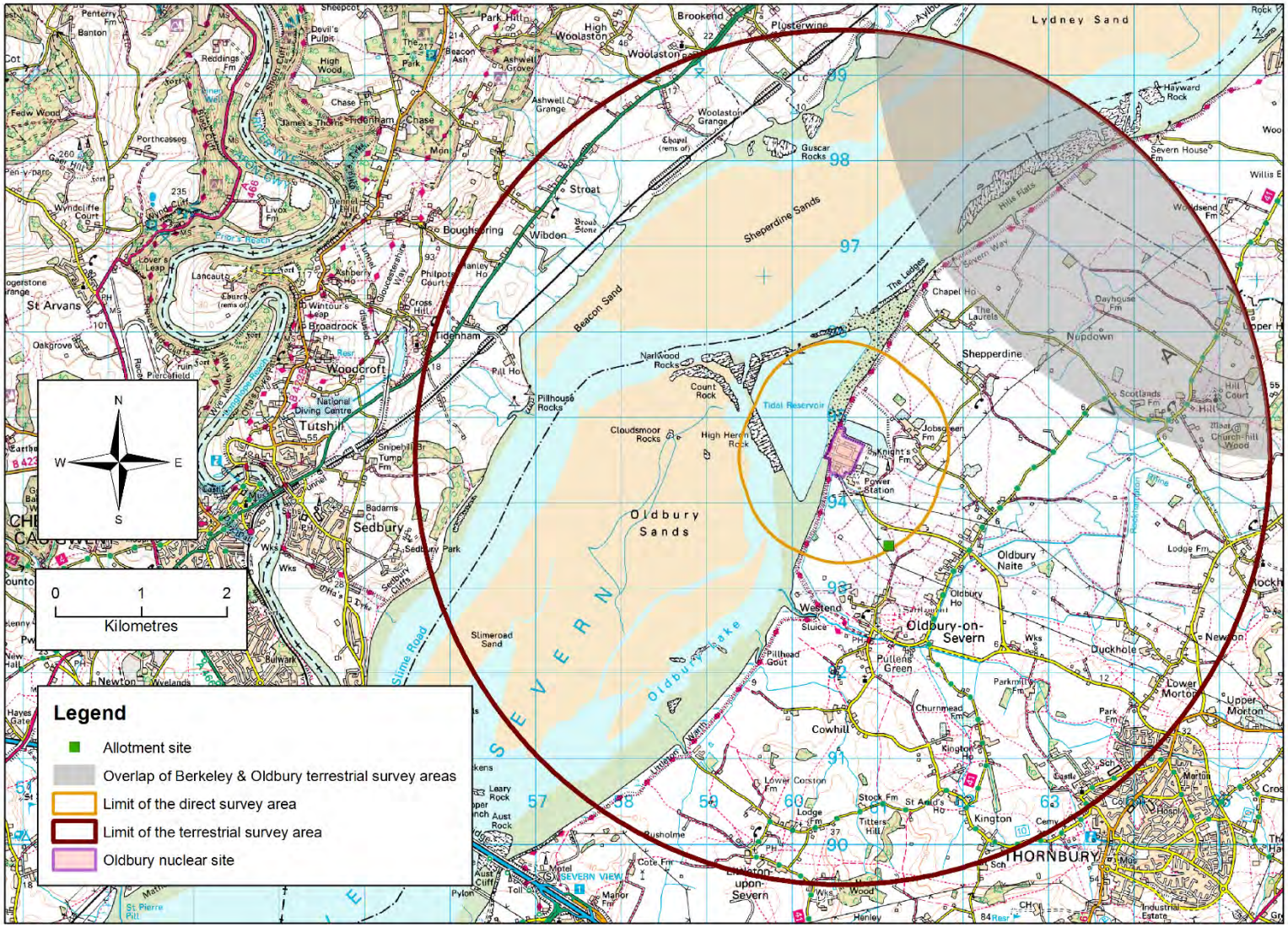

Figure 3. The Oldbury terrestrial and direct radiation survey area

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 Berkeley and Oldbury sites. People with local knowledge of the survey area were contacted for information relevant to the various exposure pathways. These included representatives from town and parish councils who provided information on the allotment sites in the terrestrial survey area.

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 12th to the 22nd August 2014 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:

- The main activities being undertaken on the Berkeley site involved preparation work for the Care and Maintenance phase.
- The construction of an intermediate-level waste store at Berkeley was completed in April 2014 and the store has been receiving intermediate waste from the decommissioning activities on the Berkeley site.
- The Oldbury site ceased generating electricity in 2012 and is currently in the process of defuelling. A new effluent outfall is under construction.
- A large area of the Oldbury site was delicensed in 2011, which included a silt lagoon in the north-eastern part of the site and grassland, meadows, an orchard and woodland in the eastern part of the site.
- An area of land to the north-east of the Oldbury site has been acquired for the construction of a new nuclear power station.
- There is no active management of wildlife on the Berkeley and Oldbury sites since wildlife does not have access to controlled areas. Wild peregrine falcons naturally keep the numbers of other birds in the area low and rabbit populations are low.
- Activities in the aquatic survey area include: putcher rank and lave net fishing, sailing, collecting fossils, beachcombing and dog walking.

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, 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 centres. 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 Berkeley and Oldbury 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.ons.gov.uk) there were approximately 13,000 people living in the Berkeley and Oldbury terrestrial survey areas, 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 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.

Annex 3 contains estimated data for pathways where it was not possible to obtain quantifiable data from interviews. Occupancy rates are presented for the occupants of two residential properties located in the >0.25 – 0.5 km zone in the Berkeley direct radiation area.

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. mud) 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, are provided as a baseline for comparison with the observed rates. The rates based on national statistics are referred to as generic rates in this report and have been taken from Byrom et al., 1995.

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.ons.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, FSA, NRW, NIEA, and SEPA, 2014).

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 tidal waters and intertidal areas of the River Severn, from a line extending from Portskewett on the west bank to Severn Beach on the east bank, upriver to a line extending across the river at Broadoak.

The shores of the River Severn in the aquatic survey area comprise salt marsh, mud, and sand interspersed with stones and rock. The River Severn has a high tidal range with fast running water and at low tide large areas of mud and sand are exposed. Activities are restricted at some locations due to the dangerous nature of the soft mud and sand, and the strong tides. The Severn Way footpath follows the course of the river on the eastern shore providing public access through most of the length of the aquatic survey area. A large stretch of the footpath is along a man-made embankment, which was built for flood defences purposes.

River Severn – western shore (south-west to north-east)

Portskewett and Black Rock

Portskewett marks the south-western limit of the aquatic survey area on the western shore. The shore, known as Black Rock (see Figure 4), is accessed by road from Portskewett and is a mixture of mud, sand, stones, rock and salt marsh. There is a car park, a picnic area, and a grass embankment where people were observed walking. There are steps from the embankment down to the shore but this is not a favourable place to walk due to the large areas of soft mud. The Black Rock lave net fishermen have a base near the picnic area from which they actively promote the heritage fishery. The fishermen walk out into the estuary at low tide and wade through the channels of the river operating hand held lave nets to catch salmon.

The River Wye

Approximately 3 km north-east of Black Rock is the confluence of the River Severn and the River Wye. The lower reaches of the River Wye have areas of low lying salt marsh and further inland towards Chepstow there are steep muddy banks and limestone cliffs. A boat club is based at Chepstow and club members have access to a pontoon to access boats on the river. There were several small boats moored in the river at Chepstow (see Figure 5). No other activities were observed on the River Wye.

Figure 4. Black Rock

Figure 5. The River Wye

Beachley

Beachley is a village located on a peninsula on the eastern side of the mouth of the River Wye. There is access to the shore at the south-eastern end of the peninsula near the Severn Road Bridge. An independent inshore rescue association and the coastguard have stations at Beachley near the road bridge and there is a slipway for launching rescue boats and other small craft including jetskis. The shore around the peninsula is mostly backed by salt marsh with patches of stones, rock and mud on

the mid to lower shore. There are large areas of rock at the southern end of the peninsula at Beachley Point (see Figure 6). The salt marsh at Beachley Point was popular with anglers and one angling club held regular competitions there. Many dog walkers walked in a loop around the southern part of the peninsula and children were identified playing on the rocks at Beachley Point. Wake boarding, water skiing and jetskiing were taking place in the River Severn near Beachley.

Figure 6. Beachley Point

Aylburton Warth and Lydney

Access to the shore between Beachley and Lydney is limited to via a few private farm tracks. At Aylburton Warth, a fisherman was fishing for salmon using a putcher rank, which is a line of funnel shaped fish traps fixed to a large frame constructed at right angles to the shore. Dog walking was also taking place at Aylburton Warth on the salt marsh.

A freshwater canal joins the River Severn at Lydney Harbour where there is a lock gate system that maintains water levels in the canal. People moor their boats along the canal bank as the seaward side of the harbour dries out at low tide. In recent years, the Environment Agency has been undertaking extensive restoration and improvement works at the harbour including restoring and enhancing flood defences and dredging the harbour. A yacht club is based at Lydney Harbour with approximately 75 members, 25 of whom sail on the River Severn regularly. Members launch their dinghies from a slipway and moor their yachts in the canal. The slipway at Lydney Harbour is regularly used by lave net fishermen to access the shore at low tide, where they walk into the channels to fish on the ebb tide. At low tide, extensive sand and mud flats are exposed (see Figure 7). Many people were walking and dog walking on the concrete quay at the harbour and the footpaths nearby rather than walking on the mud and sand shore.

Figure 7. Lydney

Upriver of Lydney to Broadoak

Between Lydney and Broadoak the river narrows and the height of the river bank increases. The river bank along this stretch is predominantly salt marsh, below which the shore is mud and sand with patches of stones on the upper shore in places. Access to the shore is very limited.

A railway track runs within metres of the shore at Purton and Gatcombe and locked gates and fences had been erected to prevent the public from crossing the railway track to reach the shore, so no activities were identified. Putcher rank fishing, wildfowling, and tending livestock on the salt marsh were taking place at Poulton Court. No activities were identified taking place on the shore at Awre.

Bullo Pill is a small tidal inlet off the River Severn where a boat repair yard is located. Several boats were moored in the inlet; two boats were being used as houseboats and other boats were being restored. The boats rest on the steep, soft muddy banks of the inlet and they only float on a spring tide.

North of Bullo, there is access to the shore at the village of Newnham. There were well trodden paths along the top of the grass river bank and there was evidence of people walking on the mud and sand banks at low tide (see Figure 8). Broadoak marks the north-eastern extent of the survey area on the western shore. Public access to the shore at Broadoak is limited as the residential properties have river frontage. The only activity identified in this area was lave let fishing.

Figure 8. Newnham

River Severn - eastern shore (south-west to north-east)

Severn Beach and New Passage

Severn Beach marks the south-western extent of the survey area on the eastern shore. It is a small tourist village with easy access through a residential area to the shore of the River Severn. The shore is backed by sea defences including a wave wall and an upper and lower concrete promenade which forms part of the Severn Way coastal footpath. There is also a concrete ramp for launching boats. At the foot of the sea defence wall there is a narrow strip of sand and stones (see Figure 9) where families were playing, and people were dog walking, beachcombing and collecting stones. Severn Beach is a popular location for anglers who fish from the sea wall or from the mud and stones, depending on the state of the tide.

The promenade continues from Severn Beach to New Passage, which is a small residential area located near the M4 Bridge. People were walking along the concrete promenade rather than spending time on the shore, which comprised mud, sand and stones.

Northwick Warth, Aust Cliff and Littleton Warth

North-east of New Passage, Northwick Warth is an area of salt marsh that stretches for approximately 2 km towards Old Passage. At the edge of the salt marsh the substrate is soft mud (see Figure 10). The warth can only be reached on foot by crossing farm fields or via the Severn Way footpath. Northwick Warth is a popular location for angling and birdwatching although many birdwatchers spent

time above the tidal limit on the embankment on the landward side of the warth. Cattle were observed grazing on the salt marsh.

Figure 9. Severn Beach

Figure 10. Northwick Warth

Aust Cliff, near the Severn Road Bridge, is accessible by footpath from Old Passage. The cliff is famous geologically for its range of fossils and the area is a popular location for fossil collectors. The beach at the foot of Aust Cliff is a mixture of sand and stones on the upper shore and mud, stones and salt marsh on the lower shore (see Figure 11). The beach was also used by anglers, walkers and dog walkers and was reported to be busy on hot summer days.

Figure 11. Aust Cliff

East of the Severn Road Bridge, Littleton Warth is a stretch of salt marsh approximately 3 km in length with three distinct levels. At low tide, the lower level at the seaward edge of the marsh is mud and no activities were identified. Anglers were fishing from the middle level which is regularly tide washed soft ground, with evidence of heavy poaching by livestock (see Figure 12). Walkers and dog walkers tended to use the upper level which was firmer ground, or the embankment at the landward side of the warth. Cattle were observed grazing on the salt marsh. There was no evidence of turf cutting in the area.

Figure 12. Littleton Warth

Oldbury Pill to the Berkeley Nuclear Power Station

Oldbury Pill is a muddy inlet with a fringe of salt marsh, which can be reached on foot via the Severn Way. A private sailing club with approximately 280 members is situated adjacent to the mouth of Oldbury Pill. The club members participate in regular dinghy and yacht races on the River Severn as well as sailing further afield. The larger yachts are moored in Oldbury Pill and occasionally the moorings that rest in the mud are repaired by club members. The dinghies are kept in a dry compound near the clubhouse.

Salt marsh stretches along the upper shore between Oldbury Pill and the Berkeley nuclear power station and on the seaward side of the marsh there are mud flats and occasional patches of rocks. Several farmers were identified who grazed livestock on the marsh. To the north of Oldbury Pill, there is a tidal reservoir in front of the Oldbury nuclear power station and it was reported that anglers occasionally fished from the rocks at the perimeter of the reservoir. Anglers were identified fishing from the salt marsh at Oldbury and people were identified walking and beachcombing on the salt marsh at Shepperdine (see Figure 13) where there was public road access to the shore. Many people walked along the Severn Way but this was typically on the embankment at the landward side of the marsh, which was not tide washed. North of Shepperdine, the shore at Hills Flats was popular with wildfowlers.

Figure 13. Shepperdine

Sharpness and Purton

A large area of the shore at Sharpness is taken up by Sharpness Dock, a working dock which is the gateway from the River Severn to the Gloucester and Sharpness Canal. Large lock gates are used to maintain the water level in the canal. There is a picnic area with parking at the dock but no access to the intertidal area. A thin strip of land separates the canal from the River Severn between Sharpness and Purton and a series of barges have been dumped along the river side of this strip near Purton in order to protect the bank from eroding. There is a footpath from Purton to the river shore but people were only observed walking along the canal path. Kayaking was taking place on the River Severn between Purton and the Slimbridge Wetlands and Wildfowl Trust.

Slimbridge, Frampton on Severn, Hock Cliff and Arlingham

Located upriver of Purton, the Slimbridge Wildfowl and Wetlands Trust reserve occupies a 3 km area of land on the shore of the River Severn. Wardens at the trust were spending time fixing fences and birdwatching on the salt marsh but most of the visitors to the reserve were not spending time on tide washed areas. Access to the shore at Frampton on Severn was limited and the only activity identified on the salt marsh and mud was wildfowling. The Severn Way ran along an embankment adjacent to the shore around the Awre peninsula, which includes Hock Cliff and Arlingham. Fences erected along the seaward side of the Severn Way restricted access to the shore along much of this stretch. At Hock Cliff, families were playing on the mud and stones and on the rocks (see Figure 14). At Arlingham, access to the mud and sand shore was possible but no activities were identified taking place.

Figure 14. Hock Cliff

4.2 Fisheries

The fishing methods being used in the survey area were putcher rank fishing and lave net fishing. A putcher rank consists of a fixed frame holding rows of funnel shaped baskets which are constructed at right angles to the shore. The traps are traditionally made from willow and hazel but more recently are made from stainless steel. Putcher ranks were identified at Aylburton Warth, Poulton Court and Broadoak. Some of the baskets made from willow and hazel get damaged by debris in the river during strong tides so the fishing seasons are sometimes missed or cut short. Lave nets are loosely hung nets with a wooden Y shaped frame. The fishermen walk out onto the sand and mud flats at low tide to reach the channels of water where they wade through known fishing grounds, lowering the net into the water to catch salmon. Lave netting was taking place at Black Rock, Lydney and Broadoak. The target species for both fishing methods is salmon. Other species of fish caught as a by-catch by the fishermen included bass, grey mullet and flounder.

Historically, there have not been limits on salmon catches for net and fixed engine fisheries in the River Severn and relatively high numbers of salmon have been caught. In 2011, catch limits were implemented with a limit of 29 salmon per season per putcher rank and five salmon per season per lave net. The salmon season commences on June 1st and finishes on August 31st but the fishermen now stop fishing once the catch limit is reached. The fishermen are actively opposed to the introduction of catch limits and are concerned that this will destroy their traditional fishing methods and their livelihoods.

Elver fishing is popular on the River Severn but this is mainly undertaken between Sharpness and Gloucester, most of which is outside the survey area. The elver season is generally January/February to March/April, depending on the environmental conditions. The fishermen use hand held dip nets with long handles whilst standing on the steep muddy banks of the river, typically on a night tide. 2014 was reported to be a record year for the third year running with large quantities of elvers being caught.

No commercial fishing for crustaceans or molluscs was identified in the survey area. One person was identified who was catching brown shrimps for his own consumption.

4.3 Destination of seafood originating from the aquatic survey area

Small amounts of salmon were sold to a wholesaler located outside the survey area. One company was identified who bought elvers from the fishermen in the River Severn. The elvers were being exported live to Holland and Scandinavia to restock rivers and fish farms.

4.4 Angling

Shore angling was popular at the south-western end of the survey area, mainly at Severn Beach, Beachley, Northwick Warth and Littleton Warth. One angling club was identified whose members regularly held angling matches at Beachley Point. No boat anglers were identified during the survey but angling boats were observed moored in the River Wye.

The main fish species being caught by shore anglers were cod, bass, flounder, grey mullet and whiting.

4.5 Wildfowling

One wildfowling club had shooting grounds between the Severn Bridge and the Awe peninsula including at Shepperdine, Hills Flats, Lydney, Poulton Court and Frampton on Severn. The club had approximately 150 members, half of which were regular wildfowlers. The club members shot all duck quarry species except goldeneye and the main species being shot were mallard, teal, wigeon, pintail, and gadwall. The main goose species being shot were Canada goose, graylag goose and European goose.

4.6 Other pathways

Many farmers were grazing beef cattle or sheep on salt marsh in the aquatic survey area. The length of time that livestock were grazing on the salt marsh varied according to the size of the available grazing area. The frequency at which the tide covers the salt marsh also varies throughout the survey area depending on the height of the tide and the height of the shore. Some of the stretches of salt marsh are also in the terrestrial survey area. Beef from cattle that had been partly grazed on salt marsh was being consumed.

The use of seaweed as fertiliser or animal feed was not identified.

4.7 Food consumption data

Consumption data for aquatic foods are presented in Tables 3 to 6 for adults and in Table 7 to 8 for children. No infants were identified consuming foods from the aquatic survey area. The mean consumption rates for the high-rate groups and the observed 97.5th percentile rates, calculated as described in Section 3.4, are given at the foot of each table.

Adults' consumption rates

The people consuming the greatest quantities of food from the aquatic survey area were anglers, fishermen, wildfowlers, and the families of these groups of people.

Table B presents a summary of the adults' consumption rates for the following food groups: fish; crustaceans; wildfowl; salt marsh grazed cattle meat. No consumption of molluscs 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 and crustaceans based on national data, which are referred to as 'generic' data in this report. No generic rates have been determined for wildfowl or salt marsh grazed cattle meat.

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	19	16	12.6	4.7	10.3	12.6	15.0	40.0
Crustaceans	1	1	0.3	0.3	0.3	Not applicable	3.5	10.0
Wildfowl	12	5	1.8	0.7	1.1	1.8	Not determined	Not determined
Salt marsh grazed cattle meat	4	4	10.0	10.0	10.0	10.0	Not determined	Not determined

(*Generic rates based on data from Byrom *et al.*, 1995.)

The predominant species of fish consumed by adults were cod, salmon, bass and flounder, with smaller quantities of grey mullet, whiting, sea trout and Dover sole. The fish were caught in the western part of the survey area, with the exception of salmon, which was caught throughout the survey area. Of the fish consumed by the 16 people in the high-rate group, the percentage breakdown of species, rounded to the nearest 5%, was 30% cod, 25% salmon, 15% bass, 10% flounder, and 15% a mix of grey mullet, whiting, sea trout and Dover sole (this does not total 100% due to rounding).

The only species of crustaceans consumed by adults was brown shrimp, which was caught near Lydney. Only one person was identified consuming brown shrimps.

The species of wildfowl consumed by adults were mallard, wigeon and Canada goose. The wildfowl were shot at Hills Flats, Poulton Court, Frampton on Severn and the Awe peninsula. Of the wildfowl

consumed by the five people in the high-rate group, the percentage breakdown of species, rounded to the nearest 5%, was 55% mallard and 40% Canada goose (this does not total 100% due to rounding).

The consumption of beef from cattle that had been partly grazed on salt marsh along the shores of the River Severn was identified.

Children's consumption rates

Table C presents a summary of children's consumption rates for the following food groups: wildfowl; salt marsh grazed cattle meat. 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)						
Wildfowl	1	1	0.7	0.7	0.7	Not applicable
Salt marsh grazed cattle meat	1	1	10	10	10	Not applicable

The species of wildfowl consumed by the individual in the child age group were mallard and Canada goose.

One individual was identified consuming beef from cattle that had been partly grazed on salt marsh on the shores of the River Severn.

4.8 Intertidal occupancy

Intertidal occupancy rates for adults are presented in Table 9 and intertidal occupancy rates for children and infants are presented in Table 10. 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	25	2	150	128	123
Mud and sand	7	6	30	18	30
Mud and stones	10	7	182	117	182
Rock	10	8	27	17	27
Salt marsh	33	6	548	334	390
Sand and stones	17	7	60	49	60
Boat on mud	2	1	7288	7288	7144

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

- For mud: wildfowling on the shores of the River Severn; putcher rank fishing at Poulton Court.
- For mud and sand: fixing moorings at Sharpness Dock; setting up putcher ranks at Aylburton Warth; walking at Broadoak.
- For mud and stones: angling at Severn Beach and Aust Cliff Beach; playing at Hock Cliff.
- For rock: walking at Black Rock; angling at Beachley Point.
- For salt marsh: dog walking at Beachley and along the shores of the River Severn; angling at Northwick Warth.
- For sand and stones: dog walking at Aust Cliff Beach and Severn Beach; fossil hunting and collecting stones at Aust Cliff Beach and Severn Beach; playing at Severn Beach.
- For occupancy on a boat over mud: living on a houseboat at Bullo Pill.

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)					
Mud and stones	5	3	72	56	72
Rock	2	2	12	12	12
Salt marsh	2	2	50	50	50
Sand and stones	2	2	26	26	26
Infant age group (0 – 5 years old)					
Mud and stones	2	2	24	24	24
Sand and stones	3	3	26	17	25

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

- For mud and stones: playing at Hock Cliff.
- For rock: playing at Beachley Point.
- For salt marsh: dog walking at Beachley.
- For sand and stones: playing at Severn Beach.

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

- For mud and stones: playing at Hock Cliff.
- For sand and stones: playing at Severn Beach.

4.9 Gamma dose rate measurements

Gamma dose rate measurements were taken over four intertidal substrates. All measurements were taken at a height of 1 metre above the substrate. The results are presented in Table 11 and are summarised below.

- Three measurements taken over mud ranged from 0.063 µGy h^{-1} to 0.072 µGy h^{-1}
- Two measurements taken over mud and stones ranged from 0.057 µGy h^{-1} to 0.098 µGy h^{-1}
- Five measurements taken over salt marsh ranged from 0.063 µGy h^{-1} to 0.096 µGy h^{-1}
- Two measurements taken over sand and stones ranged from 0.065 µGy h^{-1} to 0.089 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, NRW, NIEA and SEPA, 2014).

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 of minor radiological importance 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 12. No children or 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	7	129	67	112
Handling sediment	9	1	150	150	128

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

- For handling fishing gear: handling lave nets at Lydney, Black Rock and Broadoak; handling putcher ranks at Aylburton Warth and Poulton Court.
- For handling sediment: wildfowling on the shores of the River Severn

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 of minor radiological importance 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 13 for adults and Table 14 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 wake boarding, water skiing, jetskiing and kayaking. Surfing on the Severn Bore tidal surge is known to be a popular activity in the area but this was not taking place at the time of the survey. Eight observations were recorded for adults and three observations were recorded for the child age group. The highest occupancy rate for adults was 340 h y^{-1} for two individuals who were wake boarding, water skiing and jetskiing in the River Severn near Beachley. The highest occupancy rate for children was 79 h y^{-1} for one individual who was kayaking in the area between Purton and Slimbridge.

Activities on the water

The activities taking place on the water in the aquatic survey area were sailing, undertaking boat maintenance, putcher rank fishing, lave netting, living on a houseboat and operating a rescue boat. Forty-one observations were recorded for adults and two observations were recorded for the child age group. The highest occupancy rate for adults was 440 h y^{-1} for two individuals who were sailing on the River Severn. The two occupancy rates for the child age group were both 16 h y^{-1} for children who were sailing on the River Severn.

5 TERRESTRIAL RADIATION PATHWAYS

5.1 Terrestrial survey area

The Berkeley and Oldbury nuclear sites are located on the eastern shore of the River Severn and are approximately 7 km apart. Due to the close proximity of the sites, the terrestrial survey areas overlap. The terrestrial survey area covered the land and freshwater watercourses within 5 km of the Berkeley and Oldbury site centres (National Grid Reference: ST 659 994 and ST 605 945 respectively) (see Figure 2 for Berkeley and Figure 3 for Oldbury). The Berkeley and Oldbury sites are considered together for the purposes of monitoring, habits surveys and assessments because the effects from both sites contribute to the same area.

The land within 5 km of the Berkeley and Oldbury sites is predominantly agricultural. Many villages and towns are located in the terrestrial survey area including Lydney, Berkeley, Newtown, Wanswell, Ham, Newport and Stone near the Berkeley site, and Oldbury-on-Severn and Littleton-on-Severn, near the Oldbury site. The River Severn flows through the survey area from north-east to south-west. Areas of salt marsh along the shores of the River Severn were being used by farmers as grazing for beef cattle and sheep.

Interviews were conducted at 30 working farms in the Berkeley and Oldbury terrestrial survey area. Of these:

- Nine produced beef cattle
- One produced beef cattle and lambs
- Three produced beef cattle and arable crops
- Three produced lambs
- Five produced milk (from dairy cattle)
- Five produced milk (from dairy cattle) and beef cattle
- One produced milk (from dairy cattle), beef cattle and lambs
- One produced free range chicken eggs
- One produced broiler chickens (kept in sheds)
- One produced venison

The following arable crops were produced for human consumption: wheat for milling, beans for consumption and oil seed rape for food production. Hay, silage, wheat, barley, maize and oats were grown on farms for use as feed for livestock.

Farmers and their families were consuming cows' milk, beef, lamb and chicken eggs produced commercially on their own farms. One farm also kept a small number of goats, which were sold privately

for consumption; this was a newly identified pathway in 2014. Three farmers kept a small number of pigs, and eight farmers kept chickens for eggs solely for consumption by their families and friends. Several farmers also grew small quantities of fruit and vegetables for their own families' consumption.

One smallholding was identified in the terrestrial survey area where beef was produced on a small scale.

Four allotment sites and many private gardens were identified in the terrestrial survey area. Three allotment sites were located near Berkeley (see Figure 2), two of which had approximately 20 plots and one had approximately 40 plots. The allotment site near Oldbury (see Figure 3) had approximately 120 plots and was relatively new, having been opened in 2010. A wide variety of fruit and vegetables were grown on the allotments and in the private gardens.

Four beekeepers were identified who kept hives in the survey area. Hives were located to the north-east, south-east and south-west of the Berkeley site and on a field within the Berkeley site. The production of honey per hive per year varied between approximately 5 kg in a poor year to approximately 45 kg in an exceptional year. The production of honey per hive in an average year was reported to be approximately 15 kg. Honey was consumed by the beekeepers and their families' and friends, and was also sold to workers at the Berkeley site.

Blackberries, bullace plums, elderflower, mulberries and mushrooms were growing wild in the survey area and these were being collected and consumed.

An organised pheasant shoot took place on farmland to the south-east of the Oldbury nuclear site but very little shooting took place on other farms. The consumption of pheasant, pigeon and duck (unspecified species) was identified. No consumption of rabbits or hares was identified.

No freshwater fishing was identified in the terrestrial survey area.

The consumption of groundwater by humans was not identified. Livestock were supplied with drinking water from a borehole at one farm, from a well at two farms and from a spring at one farm. At several other farms the animals were supplied with mains water for drinking but also had access to the River Severn, streams, ditches and ponds.

5.2 Destination of food originating from the terrestrial survey area

Beef cattle and lambs were sold through livestock auctions at Cirencester, Ross-on-Wye and Bridgwater, sold privately to other farmers or were sent for slaughter at abattoirs in Glamorgan and Lincolnshire. Beef cattle were also sent to a meat processor in Bristol. Most of the processed meat was destined for sale at national supermarket chains. Cows' milk was sold to several national dairy

companies and to a national chocolate manufacturer. Chicken eggs were sold to the public from the farm and to a supermarket. Venison was being sold at a butcher shop within the terrestrial survey area. Wheat and oil seed rape were sold to national merchants and beans were exported to the Middle East.

5.3 The potential transfer of contamination off-site by wildlife

There is no active management of wildlife on the Berkeley and Oldbury sites since wildlife does not have access to controlled areas. Wild peregrine falcons naturally keep the numbers of other birds in the area low and rabbit populations are low.

5.4 Food consumption data

Consumption data for locally produced foodstuffs potentially affected by deposition of gaseous discharges are presented in Tables 15 to 30 for adults and Tables 31 to 42 for children and infants. The mean consumption rates for the high-rate groups and the observed 97.5th percentile rates, calculated as described in Section 3.4, are given at the foot of each table.

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 43.

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; venison; goat meat. No consumption of rabbits/hares or freshwater fish was identified.

Table G 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. 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 venison or goat meat.

Table G. 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	56	18	34.1	12.6	21.2	32.5	15.0	45.0
Other vegetables	68	19	48.0	22.7	28.3	40.7	20.0	50.0
Root vegetables	64	20	41.5	17.1	24.6	37.2	10.0	40.0
Potato	56	18	68.6	24.3	42.7	66.8	50.0	120.0
Domestic fruit	77	22	28.9	11.8	19.0	26.2	20.0	75.0
Milk	26	20	365.0	146.0	225.9	308.0	95.0	240.0
Cattle meat	18	18	42.0	23.7	36.8	42.0	15.0	45.0
Pig meat	15	12	25.3	12.7	19.0	25.3	15.0	40.0
Sheep meat	20	14	11.3	11.3	11.3	11.3	8.0	25.0
Poultry	17	5	6.9	6.9	6.9	6.9	10.0	30.0
Eggs	68	41	26.6	8.9	16.1	24.6	8.5	25.0
Wild/free foods	44	7	5.0	1.8	3.4	5.0	7.0	25.0
Honey	19	5	3.4	2.4	2.8	3.4	2.5	9.5
Wild fungi	31	5	2.9	1.0	1.8	2.9	3.0	10.0
Venison	2	2	0.8	0.8	0.8	0.8	Not determined	Not determined
Goat meat	3	3	5.4	5.4	5.4	5.4	Not determined	Not determined

(*Generic rates based on data from Byrom *et al.*, 1995.)

None of the mean consumption rates for the high-rate groups were greater than the generic 97.5th percentile consumption rates. Nine mean consumption rates for the high-rate groups exceeded the generic mean consumption rates. These were for green vegetables, other vegetables, root vegetables, milk, cattle meat, pig meat, sheep meat, eggs and honey. One observed 97.5th percentile consumption rate exceeded the generic 97.5th percentile consumption rate, which was for milk.

Children's and infants' consumption rates

Eleven individuals in the child age group and two individuals in the infant age group were identified consuming foods from the terrestrial survey area. Table H 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: cattle meat; poultry; rabbits/hares; honey; venison; freshwater fish. In the infant age group, no consumption of foods from the following food groups was identified: green vegetables; other vegetables;

root vegetables; potato; milk; cattle meat; pig meat; sheep meat; poultry; rabbits/hares; honey; wild fungi; venison; goat meat; freshwater fish.

Table H. 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	3	3	3.2	3.1	3.2	3.2
Other vegetables	3	3	5.1	4.5	4.9	5.1
Root vegetables	4	3	9.5	4.2	7.8	9.5
Potato	3	3	12.5	9.1	11.4	12.5
Domestic fruit	8	5	15.2	5.7	9.8	15.2
Milk	3	3	182.5	146.0	158.2	180.7
Pig meat	1	1	1.4	1.4	1.4	Not applicable
Sheep meat	2	2	1.7	1.4	1.5	1.7
Eggs	9	4	21.4	8.9	15.9	21.4
Wild/free foods	2	1	5.0	5.0	5.0	4.9
Wild fungi	1	1	0.5	0.5	0.5	Not applicable
Goat meat	1	1	4.1	4.1	4.1	Not applicable
Infant age group (0 - 5 years old)						
Domestic fruit	2	2	0.9	0.9	0.9	0.9
Eggs	2	2	4.3	4.3	4.3	4.3
Wild/free foods	2	2	0.9	0.9	0.9	0.9

6 DIRECT RADIATION PATHWAYS

6.1 Direct radiation survey area

The direct radiation survey areas covered the land and water within 1 km of the Berkeley and Oldbury nuclear licensed site boundaries (see Figure 2 for Berkeley and Figure 3 for Oldbury). The occupancy data collected from the direct radiation survey areas is also applicable to inhalation and external exposure pathways arising from gaseous releases from the sites.

The land within the Berkeley direct radiation survey area is predominantly agricultural. The area is sparsely populated with four residences located to the east of the Berkeley site and one residence located to the south of the site. Access to the survey area is limited to one main road entering the area from the east which leads to the Berkeley power station entrance. The power station is adjacent to the River Severn shore and the river covers a large part of the direct radiation survey area to the west. The Severn Way public footpath diverts inland from the shore in the north-east, along Berkeley Pill, around the power station and re-joins the shore near the south-western limit of the survey area.

The land within the Oldbury direct radiation survey area is also predominantly agricultural. There is one main residential area which is situated to the east of the Oldbury site. There are two main roads through the survey area, one that leads from the south-east of the survey area to the Oldbury power station entrance and one that passes through the residential area. An allotment site is located to the south-east of the power station. The River Severn covers the western half of the survey area and the Oldbury power station is located adjacent to the shore. The Severn Way runs along the shore of the River Severn in front of the Oldbury power station. There are many public footpaths in the survey area.

Oldbury is a potential site for a new nuclear power station and approximately 170 hectares of land adjacent to the north-eastern part of the existing nuclear site have been acquired for the new site building activities. The energy company that is developing the proposed new site anticipates that early site works might commence in 2016 (www.horizonnuclearpower.com/oldbury).

6.2 Residential activities

Five residential properties were identified in the Berkeley direct radiation survey area. Four properties were located to the east of the Berkeley site and one was located to the south. Interviews were conducted at two of these properties; one property was in the 0 – 0.25 km zone and the other property was in the >0.5 – 1 km zone. The occupants of the other properties were unavailable for an interview at the time of the survey. Since there were only two occupied properties in the >0.25 – 0.5 km zone and occupancy rates were not obtained, occupancy data have been estimated for these residents for use in dose assessments.

Eleven residential properties were identified in the Oldbury direct radiation survey area, all of which were located to the east of the Oldbury site in the >0.5 – 1 km zone. Interviews were conducted at nine residences, five of which included families with children.

6.3 Leisure activities

Few leisure activities were identified taking place in the Berkeley direct radiation survey area. Walkers and dog walkers were using the Severn Way public footpath which diverted inland around the Berkeley site from the shore of the River Severn. Bee hives were kept in the grounds of the Berkeley site and the beekeeper sold the honey to employees at the site.

Oldbury has a series of nature trails around the grounds of the power station in the de-licensed area, which is open to the public. There is also an orchard within the grounds at Oldbury and the apples are used to make cider. Walkers and dog walkers used the Severn Way, which runs along the shore of the River Severn in front of the Oldbury site. Angling also took place from the shore. Horse riding was popular in the area and many people kept horses at a livery in the area. An allotment site, which opened in 2010, has approximately 120 plots and is located near the outer limit of the survey area to the south-east of the Oldbury site.

6.4 Commercial activities

In the Berkeley area, a small number of full time and part time staff worked at different businesses located on a farm at the southern limit of the survey area. Two larger businesses, with 23 and 18 members of staff, were located near the eastern edge of the survey area. One agricultural worker was identified that worked on farmland in the area.

In the Oldbury area, there were three small businesses associated with residences to the east of the survey area that were run by the residents. A poultry farm that was not associated with a residence was also located to the east of the area.

6.5 Occupancy rates

Table 44 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 45. A summary of occupancy rates in the direct radiation survey area is presented in Table I, below.

Table I. 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})**
Berkeley				
0 - 0.25 km	3	4600	4004	8604
>0.25 - 0.5 km[a]	*4 (estimated)*	*5506 (estimated)*	*518 (estimated)*	*6024 (estimated)*
>0.5 - 1 km	55	4899	2625	7524
Oldbury				
0 - 0.25 km	-	-	-	-
>0.25 - 0.5 km	1	-	91	91
>0.5 - 1 km	37	7174	4284	8560

[a] There were only two properties in this zone. Data in italics are estimated since the properties are known to be occupied but the occupants were unavailable for an interview.

Berkeley

0 - 0.25 km from the nuclear licensed site boundary

Occupancy data were collected for three residents in the 0 - 0.25 km zone. The three individuals had the same indoor, outdoor and total occupancy rates.

>0.25 - 0.5 km from the nuclear licensed site boundary

The occupants of the only two residential properties in this zone were not available for an interview so no occupancy data were collected in this zone in 2014. However, estimates are provided for use in dose assessments since the properties are known to be occupied (see Annex 3).

>0.5 - 1.0 km from the nuclear licensed site boundary

Occupancy data were collected for 55 people in the >0.5 - 1 km zone. The observations were for one resident, who also farmed in the area, one visitor, one farmer who lived outside the survey area, and 52 employees. The resident had the highest indoor, outdoor and total occupancy rates.

Oldbury

0 - 0.25 km from the nuclear licensed site boundary

No one was identified spending time in the 0 - 0.25 km zone.

>0.25 - 0.5 km from the nuclear licensed site boundary

Occupancy data were collected for one individual who was farming in the >0.25 - 0.5 km zone but lived outside the survey area.

>0.5 - 1.0 km from the nuclear licensed site boundary

Occupancy data were collected for 37 people in the >0.5 - 1 km zone. The observations were for 26 residents, two of whom also farmed in the area, two employees, six horse riders, and three people tending an allotment plot. The highest indoor, outdoor and total occupancy rates were for residents.

6.6 Gamma dose rate measurements

Gamma dose rate measurements were taken indoors and outdoors at most properties where interviews were conducted in the Berkeley and Oldbury 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 centres 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 46 and are summarised below.

Berkeley

Indoor measurements

- Three measurements taken over concrete ranged from 0.058 µGy h^{-1} to 0.091 µGy h^{-1}
- One measurement taken over wood was 0.055 µGy h^{-1}

Outdoor measurements

- Four measurements taken over grass ranged from 0.065 µGy h^{-1} to 0.073 µGy h^{-1}

Oldbury

Indoor measurements

- Seven measurements taken over concrete ranged from 0.059 µGy h^{-1} to 0.092 µGy h^{-1}

Outdoor measurements

- Five measurements taken over grass ranged from 0.068 µGy h^{-1} to 0.078 µGy h^{-1}

Berkeley and Oldbury background measurements

- Three measurements taken over grass ranged from 0.062 µGy h^{-1} to 0.072 µGy h^{-1}

Considering that gamma dose rate measurements may be influenced by the substrate over which they are taken, the nature of any nearby building materials and many other factors, the measurements taken at the properties were not notably different from the background measurements.

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 Berkeley and Oldbury 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 47. Each of the 30 combinations shown in Table 47 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 47 do not correlate directly with observation numbers in Annex 1. Other individuals from Annex 1 have combinations that are not listed in Table 47 because they have fewer pathways and a dose assessment for them would be adequately covered by one of the 30 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 Berkeley and Oldbury 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.ons.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 2014 survey can be compared with results from the last habits survey undertaken at Berkeley and Oldbury in 2007. The aquatic and terrestrial survey areas, and the Berkeley direct radiation survey area in 2014 were the same as those in 2007. The Oldbury direct radiation survey area changed in 2014 compared with 2007 because a large part of the Oldbury site to the north-east and east was delicensed in 2011. The comparisons of consumption rates, intertidal occupancy rates and handling rates of fishing gear and sediment in this section are for adults only. The comparisons of occupancy rates in the direct radiation area are for all age groups combined.

8.1 Aquatic survey area

The main change in the aquatic survey area was the implementation of salmon catch limits for net and fixed engines in 2011. Since salmon is the target species for the putcher rank and lave net fishermen in the survey area, the introduction of catch limits has resulted in a significant reduction in their fishing times. The types of activities identified in 2014 were for the most part similar to those identified in 2007.

The main species of fish consumed by the adult high-rate group in 2007 were eel, cod, bass and whiting, and in 2014 the main species were cod, salmon, bass and flounder. In 2007 and 2014 the only species of crustaceans consumed by the adult high-rate group was brown shrimp. In 2007 the species of wildfowl consumed by the adult high-rate group were mallard, goose (unspecified species) and wigeon, and in 2014 the species consumed were mallard and Canada goose. In 2007 and 2014 the consumption of beef from cattle that had been grazed on salt marsh was identified.

A comparison between the 2007 and 2014 data for the consumption of aquatic foods is presented in Table J.

Table J. Comparison between 2007 and 2014 consumption rates of aquatic food groups for adults

	2007			2014		
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	19	19.5	14.2	16	12.6	10.3
Crustaceans	1	2.7	2.7	1	0.3	0.3
Wildfowl	3	6.1	3.4	5	1.8	1.1
Salt marsh grazed cattle meat	2	47.3	47.3	4	10.0	10.0

In 2014, compared with 2007, there was a decrease in the mean consumption rate for the adult high-rate group for fish, from 14 kg y^{-1} to 10 kg y^{-1}, and significant decreases in the mean consumption rates for the adult high-rate groups for crustaceans, from 2.7 kg y^{-1} to 0.3 kg y^{-1}, for wildfowl, from 3.4 kg y^{-1} to 1.1 kg y^{-1}, and for salt marsh grazed cattle meat, from 47 kg y^{-1} to 10 kg y^{-1}.

Fewer anglers were observed fishing during the 2014 survey compared with the 2007 survey and the anglers interviewed in 2014 were generally catching less fish which has resulted in a decrease in the maximum and mean consumption rates of fish. The decrease in the consumption of crustaceans and wildfowl was attributed to the interviewees spending less time fishing and wildfowling in 2014 compared with 2007. There was a decrease in the consumption of salt marsh grazed cattle meat because the high-rate group consumers identified in 2007 had reduced the quantity of beef that they consumed in 2014.

For adults' intertidal occupancy in 2007, activities were recorded over the following seven substrates: mud; mud and sand; mud and stones; mud, sand and stones; rock; salt marsh; sand and stones. In 2014, activities were recorded over the same substrates with the exception of occupancy over mud, sand and stones. Occupancy on a boat on mud was identified in 2014 but was not identified in 2007.

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

- In 2007: wildfowling, putcher rank fishing, angling, fossil hunting, dog walking, bird watching, and beachcombing.
- In 2014: wildfowling, putcher rank fishing (including setting up the ranks), fixing moorings, walking, angling, playing, dog walking, fossil hunting, collecting stones, and living on a houseboat.

The activities undertaken by the individuals in the adult high-rate groups for handling fishing gear in 2007 and 2014 were handling lave nets and handling putcher ranks.

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

- In 2007: setting up putcher ranks and wildfowling.
- In 2014: wildfowling.

A comparison between the 2007 and 2014 data for adult occupancy over intertidal substrates, handling fishing gear and handling sediment is shown in Table K.

Table K. Comparison between 2007 and 2014 intertidal occupancy rates and handling rates of fishing gear and sediment for adults						
	2007			2014		
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	1	78	78	2	150	128
Mud and sand	2	272	272	6	30	18
Mud and stones	1	400	400	7	182	117
Mud, sand and stones	2	120	120	Not identified		
Rock	5	10	10	8	27	17
Salt marsh	6	730	428	6	548	334
Sand and stones	3	84	80	7	60	49
Boat on mud	Not identified			1	7288	7288
Handling fishing gear	2	495	354	7	129	67
Handling sediment	5	78	62	1	150	150

In 2014 compared to 2007, the mean intertidal occupancy rate for the adult high-rate group over mud and over rock increased, whilst the mean rate for the adult high-rate group over mud and sand, over mud and stones, over salt marsh and over sand and stones decreased. In 2014, an individual was identified living on a houseboat which mainly rests on soft mud and only floats on a spring tide.

The increase in the occupancy rate over mud was attributed to a wildfowler who was wildfowling more regularly than those interviewed in 2007 and to a putcher rank fisherman who was not interviewed in 2007. The significant decrease in occupancy over mud and sand was attributed to the reduction in fishing effort by fishermen due to the implementation of salmon catch limits. For mud and stones, the decrease was due to a single individual who had spent a high amount of time angling in 2007, whereas in 2014 more anglers were included in the high-rate group but they were spending less time fishing. The decrease in the occupancy rate over sand and stones is due to a greater number of people in the high rate group in 2014 compared with 2007.

The mean rate for the adult high-rate group for handling fishing gear decreased significantly in 2014 compared to 2007 and the mean rate for the adult high-rate group for handling sediment increased significantly. The decrease in the handling rate for fishing gear was attributed to the reduction in fishing

effort due to the implementation of salmon catch limits. The increase in the handling rate of sediment was attributed to a wildfowler who was not identified in 2007.

8.2 Terrestrial survey area

Activities in the terrestrial survey area in 2014 were broadly similar to those in 2007. The principal types of farm produce continued to be a mix of beef cattle, milk (from dairy cattle), lambs, chicken eggs, venison, and arable crops. There was a decline in the number of farms producing milk in 2014 compared with 2007 but the farmers had switched to keeping beef cattle. In 2014, one farmer kept a small number of goats for consumption, which was a newly identified pathway.

Three allotment sites were identified in the Berkeley area in 2007 and 2014 and a new allotment site opened in 2010 in the Oldbury area. Beekeeping, private syndicate shooting on farmland and the collection of wild foods were identified in both surveys.

The mean consumption rates for the adult high-rate groups for terrestrial food groups from the 2007 and 2014 surveys are shown in Table L.

Table L. Comparison between 2007 and 2014 mean consumption rates for the adult high-rate groups for terrestrial food groups (kg y^{-1} or l y^{-1})

Food group	2007	2014
Green vegetables	27.7	21.2
Other vegetables	32.2	28.3
Root vegetables	34.4	24.6
Potato	76.1	42.7
Domestic fruit	51.4	19.0
Milk	271.6	225.9
Cattle meat	39.0	36.8
Pig meat	23.3	19.0
Sheep meat	45.1	11.3
Poultry	11.3	6.9
Eggs	20.8	16.1
Wild/free foods	4.7	3.4
Rabbits/hares	10.8	Not identified
Honey	5.9	2.8
Wild fungi	1.5	1.8
Venison	1.5	0.8
Goat meat	Not identified	5.4
Freshwater fish	10.6	Not identified

Consumption rates increased in 2014 in the wild fungi food group. Consumption rates decreased in 2014 in the following fourteen food groups: green vegetables; other vegetables; root vegetables; potatoes; domestic fruit; milk; cattle meat; pig meat; sheep meat; poultry; eggs; wild/free foods; honey;

venison. The consumption of rabbits/hares and freshwater fish were identified in 2007 but not in 2014, and the consumption of goat meat was identified in 2014 but not in 2007.

There were relatively large decreases in the consumption rates for potatoes, domestic fruit, sheep meat, poultry, honey and venison.

The decrease in the consumption rates for the vegetable and fruit food groups was the result of a general decline in the quantity of produce being grown by the gardeners that were interviewed. The decrease in the consumption of milk was attributed to several farmers switching from dairy farming to beef farming. The decrease in the consumption rate of pig meat was attributed to a farming family who kept fewer pigs for their own consumption in 2014 compared with 2007. The decrease in the consumption rates of poultry, honey and venison was due to a beekeeper who was consuming large quantities of these foods in 2007 but had moved away from the area in 2014. No specific reasons were identified for the other changes in consumption rates.

The consumption of ground water by humans was not identified in 2007 or 2014. Livestock were identified drinking water from boreholes, wells, streams and ponds in 2007 and 2014 with the addition of spring water in 2014.

8.3 Direct radiation survey area

Activities identified in the direct radiation survey area in 2007 and 2014 were similar and included people residing, working, farming and undertaking recreational activities.

The Oldbury direct radiation survey area changed in 2014 compared with 2007. A large part of the Oldbury site to the north-east and east was delicensed in 2011 so the nuclear licensed site boundary moved to the west, as did the survey area. This did not change the number of residential properties within the Oldbury direct radiation survey area but it did change the distance of the properties from the nuclear licensed site boundary. Therefore, in 2007 there were properties within all three zones but in 2014 there were only properties in the >0.5 – 1.0 km zone.

A comparison between the 2007 and 2014 direct radiation occupancy rates for all age groups combined, by zone, is presented in Table M.

Table M. Comparison between 2007 and 2014 direct radiation occupancy rates for all age groups combined (h y^{-1})				
	Berkeley		***Oldbury***	
	2007	**2014**	**2007**	**2014**
0 - 0.25 km zone				
Highest indoor	5320	4600	8368	-
Highest outdoor	4380	4004	1460	-
Highest total	8240	8604	8448	-
>0.25 - 0.5 km zone[a]				
Highest indoor	-	*5506 (estimated)*	6636	-
Highest outdoor	-	*518 (estimated)*	3468	91
Highest total	-	*6024 (estimated)*	7720	91
>0.5 - 1.0 km zone				
Highest indoor	4910	4899	7572	7174
Highest outdoor	3580	2625	3850	4284
Highest total	8490	7524	8370	8560

[a] There were only two properties in this zone. Data in italics are estimated since the properties are known to be occupied but the occupants were unavailable for an interview.

For Berkeley, in 2007 and 2014, the highest indoor, outdoor and total occupancy rates in the 0 - 0.25 km zone were for residents. In 2007, no occupancy rates were recorded in the >0.25 – 0.5 km zone. Only two properties were identified in this zone but they were unoccupied. In 2014, these two properties were occupied but the occupants were unavailable for an interview so occupancy rates have been estimated for dose assessment purposes. In 2007 and 2014, the highest indoor and total occupancy rates in the >0.5 – 1.0 km zone were for residents.

For Oldbury, the occupancy rates for all three zones in 2007 were for residents. In 2014, due to the shift of the nuclear licensed site boundary (and therefore the survey area) to the west, there were no residential properties in the 0 - 0.25 km zone or the >0.25 – 0.5 km zone. The only occupancy rate in the >0.25 – 0.5 km zone was for a farmer who had fields in the area but lived outside the survey area. In 2014, the highest indoor, outdoor and total occupancy rates in the >0.5 – 1.0 km zone were for residents.

In the Berkeley and Oldbury direct radiation survey areas, four sets of gamma dose measurements taken in 2014 can be compared with those taken at the same properties in 2007. These data are shown in Table N.

Table N. Comparison between 2007 and 2014 gamma dose rates (μGy h^{-1})				
	Indoor		Outdoor	
Location	2007	2014	2007	2014
Residence 1 (Berkeley)	0.096	0.083	0.080	0.073
Residence 2 (Berkeley)	0.098	0.084	0.091	0.065
Residence 1 (Oldbury)	0.071	0.081	0.071	0.068
Residence 2 (Oldbury)	0.095	0.081	0.079	0.074

Notes
These measurements have not been adjusted for background dose rates.
The locations correspond to those in Table 46.

9 MAIN FINDINGS

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

- Discharges of liquid radioactive waste into the River Severn
- Discharges of gaseous radioactive waste to the atmosphere
- Emissions of direct radiation

Data were collected for 343 individuals including, for example, 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 and/or radiation 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:

- 10 kg y^{-1} for fish
- 0.3 kg y^{-1} for crustaceans
- 1.1 kg y^{-1} for wildfowl
- 10 kg y^{-1} for salt marsh grazed cattle meat

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

- For fish: cod, salmon, bass and flounder
- For crustaceans: brown shrimp
- For wildfowl: mallard and Canada goose
- For salt marsh grazed cattle meat: salt marsh grazed beef

No consumption of foods from the mollusc or marine plants/algae food group was identified.

Beef cattle and sheep were allowed to access the shore along the River Severn to graze on salt marsh and drink from the river. The use of seaweed as fertiliser or animal feed was not identified.

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

- 130 h y^{-1} for mud
- 18 h y^{-1} for mud and sand
- 120 h y^{-1} for mud and stones
- 17 h y^{-1} for rock
- 330 h y^{-1} for salt marsh
- 49 h y^{-1} for sand and stones
- 7300 h y^{-1} for occupancy on a boat over mud

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

- 67 h y^{-1} for handling fishing gear
- 150 h y^{-1} for handling sediment

The maximum adult occupancy rates for water based activities were:

- 340 h y^{-1} for 'in water'
- 440 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:

- 21 kg y^{-1} for green vegetables
- 28 kg y^{-1} for other vegetables
- 25 kg y^{-1} for root vegetables
- 43 kg y^{-1} for potato
- 19 kg y^{-1} for domestic fruit
- 230 l y^{-1} for milk
- 37 kg y^{-1} for cattle meat
- 19 kg y^{-1} for pig meat
- 11 kg y^{-1} for sheep meat
- 6.9 kg y^{-1} for poultry
- 16 kg y^{-1} for eggs
- 3.4 kg y^{-1} for wild/free foods
- 2.8 kg y^{-1} for honey
- 1.8 kg y^{-1} for wild fungi
- 0.8 kg y^{-1} for venison
- 5.4 kg y^{-1} for goat meat

No consumption of foods from the rabbits/hares or freshwater fish food groups was identified.

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

The human consumption of groundwater was not identified. Livestock were identified drinking water from boreholes, wells, springs, the River Severn, streams, ditches and ponds.

There is no active management of wildlife on the Berkeley and Oldbury sites since wildlife does not have access to controlled areas. Wild peregrine falcons naturally keep the numbers of other birds in the area low and rabbit populations are low.

9.3 Direct radiation survey area

In the Berkeley direct radiation survey area, the highest indoor, outdoor and total occupancy rates in the 0 – 0.25 km zone and in the >0.5 – 1 km zone were for residents. There were two residential properties in the >0.25 – 0.5 km zone but the occupants were unavailable for an interview so estimated data have been provided for dose assessment purposes.

In the Oldbury direct radiation survey area, no activities were identified in the 0 – 0.25 km zone. The highest outdoor and total occupancy rates in the >0.25 – 0.5 km zone were for a farmer who lived outside the survey area and there were no indoor occupancy rates. The highest indoor, outdoor and total occupancy rates in the >0.5 – 1 km zone were for residents. The highest indoor, outdoor and total occupancy rates recorded for each zone were:

Berkeley

0 – 0.25 km zone

- 4600 h y^{-1} for the indoor occupancy rate
- 4000 h y^{-1} for the outdoor occupancy rate
- 8600 h y^{-1} for the total occupancy rate

>0.25 – 0.5 km zone

- *5500* h y^{-1} for the indoor occupancy rate (estimated data)
- *520* h y^{-1} for the outdoor occupancy rate (estimated data)
- *6000* h y^{-1} for the total occupancy rate (estimated data)

>0.5 – 1 km zone

- 4900 h y^{-1} for the indoor occupancy rate
- 2600 h y^{-1} for the outdoor occupancy rate
- 7500 h y^{-1} for the total occupancy rate

Oldbury

0 – 0.25 km zone

- No activities were identified in this zone

>0.25 – 0.5 km zone

- No indoor occupancy was identified in this zone
- 91 h y^{-1} for the outdoor occupancy rate
- 91 h y^{-1} for the total occupancy rate

>0.5 – 1 km zone

- 7200 h y^{-1} for the indoor occupancy rate
- 4300 h y^{-1} for the outdoor occupancy rate
- 8600 h y^{-1} for the total occupancy rate

10 RECOMMENDATIONS FOR CHANGES TO THE MONITORING PROGRAMMES

In England and Wales, the monitoring programme for radioactivity in food is undertaken by the Food Standards Agency, and the monitoring programme for radioactivity in the environment is conducted by the Environment Agency. The results of these programmes are published annually in the RIFE report (e.g. EA, FSA, NRW, NIEA and SEPA, 2014). The information collected during this habits survey can be used to make recommendations for changes to these monitoring programmes.

In 2013 the Food Standards Agency completed a public consultation to review the way that they monitor radioactivity in food. The outcome of the consultation was to implement an optimised monitoring programme on a risk basis in line with current international best practice guidance and sufficient to meet legal and international commitments (www.food.gov.uk). The revised monitoring programme was introduced in 2014. However, in order to maintain the convention adopted for habits survey reports the recommendations presented here are based on the 2013 monitoring programme as published in RIFE 19.

10.1 Summary of the monitoring programmes

The 2013 monitoring programmes relevant to the Berkeley and Oldbury area 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 programmes may be from outside the survey area used for the 2014 Berkeley and Oldbury habits survey.

Aquatic samples

Sample	***Location***
Salmon	Beachley
Mullet	River Severn
Elvers	River Severn
Shrimps	Guscar
Seaweed	Pipeline
Sediment	Hills Flats
Sediment	1 km south of Oldbury
Sediment	2 km south west of Berkeley
Sediment	Sharpness
Seawater	Local beach

Gamma dose rate measurements over intertidal sediments

Substrate	*Location*
Mud and salt marsh	1 km south of Oldbury
Mud and salt marsh	2 km south west of Oldbury
Mud and salt marsh	Guscar Rocks
Salt marsh	Guscar Rocks
Mud and salt marsh	Lydney Rocks
Mud and salt marsh	Sharpness
Mud and salt marsh	Hills Flats

Terrestrial samples

Milk
Apples
Beetroot
Blackberries
Cabbage
Honey
Runner beans
Wheat
Freshwater from the Gloucester and Sharpness Canal and the public water supply

10.2 Recommendations

Recommendations for changes to the monitoring programmes for Berkeley and Oldbury based on the findings of this survey are made below.

Environment Agency monitoring

- The gamma dose rate measurement currently taken over salt marsh at Guscar Rocks could be moved to the salt marsh at Beachley as this was a popular location for dog walkers and high occupancy rates were recorded.
- A gamma dose rate measurement could be taken over mud at Bullo Pill where people were identified living on houseboats that were predominantly resting on mud.
- A gamma dose rate measurement could be taken over salt marsh at Northwick Warth since this was a popular location for anglers and high occupancy rates were recorded.

Food Standards Agency monitoring

- A one-off sample of goat meat could be taken since this was a newly identified pathway in 2014. Alternatively, a sample of goat faeces could be taken as a more economic option.

11 ACKNOWLEDGEMENTS

Gratitude is expressed to representatives of Magnox Ltd, local authorities and associations, and members of the public who offered helpful advice and information during the survey. This survey was undertaken on behalf of the Environment Agency, the Food Standards Agency and the Office for Nuclear Regulation. The project officers for these organisations provided considerable help during the planning of the survey and the drafting of the report.

12 REFERENCES

Allott, R., 2005. Assessment of compliance with the public dose limit. Principles for the assessment of total retrospective public doses. National Dose Assessment Working Group. NDAWG/2/2005.

Byrom, J., Robinson, C., Simmonds, J.R., Walters, B., and Taylor, R.R., 1995. Food consumption rates for use in generalised radiological dose assessments. J. Radiol. Prot. 1995 Vol. 15 No 4 335-341.

Camplin, W.C., Grzechnik, M.P. and Smedley, C.A., 2005. Methods for assessment of total dose in the Radioactivity in Food and the Environment report. Presented to the *National Dose Assessments Working Group (NDAWG)*. Paper NDAWG/3/2005, 27th April 2005.

Clyne, F.C., Tipple, J.R., Garrod, C.J., and Smedley, C.S., 2008. Radiological Habits Survey: Berkeley and Oldbury, 2007. RL 06/08. Cefas, Lowestoft.

Commission of the European Communities, 1996. Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation. Off. J. Eur. Commun., 39(L159): 1-114.

EA, EHS, FSA and SEPA, 2006. Radioactivity in Food and the Environment, 2005. EA, EHS, FSA and SEPA, Warrington, Belfast, London and Stirling. RIFE (11).

EA, FSA, NRW, NIEA and SEPA, 2014. Radioactivity in Food and the Environment, 2013. EA, FSA, NRW, NIEA and SEPA, Bristol, London, Cardiff, Belfast and Stirling. RIFE (19).

EA, SEPA, DoENI, NRPB and FSA, 2002. Authorisation of discharges of radioactive waste to the environment. Principles for the assessment of prospective public doses. Interim Guidance. EA, SEPA, DoENI, NRPB and FSA, Lancaster.

EA, SEPA, NIEA, HPA and FSA, 2012. Principles for the Assessment of Prospective Public Doses arising from Authorised Discharges of Radioactive Waste to the Environment. EA, SEPA, NIEA, HPA and FSA, Penrith.

Good Housekeeping, 1994. Good Housekeeping Cook Book. Ebury Press, London.

Hessayon, D. G., 1990. The Fruit Expert, pbi Publications, Waltham Cross.

Hessayon, D. G., 1997. The New Vegetable & Herb Expert, Expert Books, London.

Hunt, G.J., Hewett, C.J. and Shepherd, J.G., 1982. The identification of critical groups and its application to fish and shellfish consumers in the coastal area of the north-east Irish Sea. Health Physics, Vol. 43, No 6, 875-889.

IAEA, 1996. International basic safety standards for protection against ionizing radiation and for the safety of radiation sources. Saf. Ser. No. 115. IAEA, Vienna.

ICRP, 1991. 1990 Recommendations of the International Commission on Radiological Protection. Annal. ICRP 21 (1-3). Pergamon Press, Oxford, (ICRP Publ. 60).

ICRP, 2006. Assessing dose of the representative person for the purpose of radiation protection of the public. Annal. ICRP 36 (3). Elsevier Science, Oxford, (ICRP Publ. 101).

ICRP, 2007. The 2007 Recommendations of the International Commission on Radiological Protection. Annal. ICRP 37 (2-4). Elsevier Science, Oxford, (ICRP Publ. 103).

Leonard, D.R.P., Hunt, G.J. and Jones, P.G.W., 1982. Investigation of individual radiation exposures from discharges to the aquatic environment: techniques used in habits surveys. Proc. 3rd Int. Symp. Soc. Radiol. Prot., Inverness, 6 to 11 June 1982. Vol 2, 512-517. Society for Radiological Protection.

NDAWG, 2005. Position paper on the collection and use of habits data for retrospective dose assessments. National Dose Assessment Working Group. NDAWG/4/2005.

NDAWG, 2009. Acquisition and use of habits data for prospective assessments. National Dose Assessment Working Group. NDAWG/2/2009.

National Radiological Protection Board, 2005. Guidance on the application of dose coefficients for the embryo and fetus from intakes of radionuclides by the mother. Docs NRPB 16(2). NRPB, Chilton, 41pp.

Smith, K.R. and Jones, A.L., 2003. Generalised habit data for radiological assessments. NRPB-W41. NRPB, Chilton.

UK Parliament, 1965. Nuclear Installations Act, 1965 (as amended). HMSO, London.

UK Parliament, 1999. The Ionising Radiation Regulations 1999. Stat. Inst. 1999/3232. HMSO, London, 67pp.

UK Parliament, 2009. UK Strategy for Radioactive Discharges. DECC, London.

UK Parliament, 2010. Environmental Permitting (England and Wales) Regulations, 2010. Statutory Instrument 2010 No 675. HMSO, London.

Watson, S.J., Jones, A.L., Oatway, W.B. and Hughes, J.S., 2005. Ionising Radiation Exposure of the UK Population: 2005 review. HPA-RPD-001, Chilton.

www.food.gov.uk

www.horizonnuclearpower.com/oldbury

www.ons.gov.uk

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 Berkeley and Oldbury 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**)	13,000[a]	117[b]	0.9%	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**)	45	30[b]	67%	Interviews were conducted at 11 residences out of a possible 16 properties.
	Number of people employed, visiting and undertaking leisure actvities in the direct radiation survey area (See **(C) DIRECT RADIATION PATHWAYS**)	U	66[b]	U	Excluding people living in the direct radiation survey area and employees and contractors of the Berkeley and Oldbury sites.
	Number of people effected by liquid discharges (excluding those assigned to other categories above) (See **(A) AQUATIC PATHWAYS**)	U	130[b]	U	
	Total for aquatic, terrestrial and direct radiation survey areas	U	343[b]	U	
(A) AQUATIC PATHWAYS					
Fishermen	Number of fishermen operating in the aquatic survey area	U	14	U	
People undertaking activities in or on water (e.g. sailing and kayaking)	Number of people undertaking activities in or on water in the aquatic survey area	U	50	U	
People using the shore including anglers, dog walkers and people playing etc.	Number of people undertaking intertidal activities in the aquatic survey area	U	100	U	
Fish consumers	Number of people consuming fish from the aquatic survey area	U	19	U	
Wildfowl consumers	Number of people consuming wildfowl from the aquatic survey area	U	13	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	Number of farmers and their family members consuming food from the terrestrial survey area	200	105	52%	Interviews were conducted at 30 working farms identified within the survey area.
Allotment holders	Number of allotment holders and their family members consuming food from the terrestrial survey area	250	18	7%	
Fruit and vegetable gardeners	Number of gardeners and their family members consuming food from the terrestrial survey area	U	8	U	
Beekeepers	Number of people consuming honey produced in the survey area	U	19	U	Four beekeepers wre identified with hives in the survey area.
(C) DIRECT RADIATION PATHWAYS					
Residents	Number of residents in the Berkeley and Oldbury survey areas	50	30	60%	Interviews were conducted at 11 residences.
Employees	Number of people employed in the Berkeley and Oldbury survey areas	60	56	100%	Excluding people living in the direct radiation survey area and employees and contractors of the Berkeley and Oldbury sites.
Visitors and people undertaking leisure activities	Number of visitors to the Berkeley and Oldbury survey areas	U	10	U	
BREAKDOWN OF AGE GROUPS					
Adult	16-year-old and over	10,600	313	3%	
Child	6-year-old to 15-year-old	1500	21	1%	
Infant	0 to 5-year-old	900	9	1%	

Notes

[a] Estimate of the number of people resident in the 5 km terrestrial survey area based on data from www.ons.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, common 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 Berkeley and Oldbury aquatic survey area (kg y^{-1})

Observation number	Bass	Cod	Dover sole	Flounder	Grey mullet	Salmon	Sea trout	Whiting	Total
271	**5.1**	**7.5**	**-**	**-**	**-**	**-**	**-**	**-**	**12.6**
272	**5.1**	**7.5**	**-**	**-**	**-**	**-**	**-**	**-**	**12.6**
280	**2.8**	**5.7**	**-**	**1.7**	**-**	**-**	**-**	**2.2**	**12.4**
282	**2.8**	**5.7**	**-**	**1.7**	**-**	**-**	**-**	**2.2**	**12.4**
283	**2.8**	**5.7**	**-**	**1.7**	**-**	**-**	**-**	**2.2**	**12.4**
281	**2.8**	**5.7**	**-**	**1.7**	**-**	**-**	**-**	**2.2**	**12.4**
330	**-**	**-**	**-**	**-**	**-**	**11.8**	**-**	**-**	**11.8**
331	**-**	**-**	**-**	**-**	**-**	**11.8**	**-**	**-**	**11.8**
130	**-**	**-**	**-**	**5.4**	**3.4**	**2.0**	**-**	**-**	**10.8**
131	**-**	**-**	**-**	**5.4**	**3.4**	**2.0**	**-**	**-**	**10.8**
290	**3.1**	**6.3**	**1.3**	**-**	**-**	**-**	**-**	**-**	**10.6**
291	**3.1**	**6.3**	**1.3**	**-**	**-**	**-**	**-**	**-**	**10.6**
311	**-**	**-**	**-**	**-**	**1.1**	**4.1**	**1.9**	**-**	**7.0**
312	**-**	**-**	**-**	**-**	**1.1**	**4.1**	**1.9**	**-**	**7.0**
328	**-**	**-**	**-**	**-**	**0.6**	**4.1**	**-**	**-**	**4.7**
329	**-**	**-**	**-**	**-**	**0.6**	**4.1**	**-**	**-**	**4.7**
294	-	1.4	-	1.4	-	-	-	1.4	4.1
295	-	1.4	-	1.4	-	-	-	1.4	4.1
183	-	1.8	-	-	-	-	-	-	1.8

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of fish based on the 16 high-rate adult consumers is 10.3 kg y^{-1}

The observed 97.5th percentile rate based on 19 observations is 12.6 kg y^{-1}

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

Observation number	Brown shrimp
311	**0.3**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of crustaceans based on the only adult consumer is 0.3 kg y^{-1}

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

Table 5. Adults' consumption rates of wildfowl from the Berkeley and Oldbury aquatic survey area (kg y^{-1})

Observation number	Canada goose	Mallard	Wigeon	Total
326	**0.7**	**1.1**	**-**	**1.8**
327	**0.7**	**1.1**	**-**	**1.8**
337	**0.4**	**0.3**	**-**	**0.7**
338	**0.4**	**0.3**	**-**	**0.7**
339	**0.4**	**0.3**	**-**	**0.7**
296	-	0.5	-	0.5
297	-	0.5	-	0.5
298	-	0.5	-	0.5
299	-	0.5	-	0.5
300	-	0.5	-	0.5
341	-	0.2	0.2	0.4
342	-	0.2	0.2	0.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wildfowl based on the 5 high-rate adult consumers is 1.1 kg y^{-1}

The observed 97.5th percentile rate based on 12 observations is 1.8 kg y^{-1}

Table 6. Adults' consumption rates of salt marsh grazed cattle meat from the Berkeley and Oldbury aquatic survey area (kg y^{-1})

Observation number	Salt marsh grazed beef
159	**10.0**
160	**10.0**
161	**10.0**
163	**10.0**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of salt marsh grazed cattle meat based on the 4 high-rate adult consumers is 10.0 kg y^{-1}

The observed 97.5th percentile rate based on 4 observations is 10.0 kg y^{-1}

Table 7. Children's consumption rates of wildfowl from the Berkeley and Oldbury aquatic survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Canada goose	Mallard	Total
340	**14**	**0.4**	**0.3**	**0.7**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wildfowl for the child age group based upon the only high-rate consumer is 0.7 kg y^{-1}

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

Table 8. Children's consumption rates of salt marsh grazed cattle meat from the Berkeley and Oldbury aquatic survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Salt marsh grazed beef
162	**11**	**10.0**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of salt marsh grazed cattle meat for the child age group based upon the only high-rate consumer is 10.0 kg y^{-1}

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

Table 9. Adults' intertidal occupancy rates in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud	Mud and sand	Mud and stones	Rock	Salt marsh	Sand and stones	Boat on mud
343	**Shores of the River Severn**	**Wildfowling**	**150**	**-**	**-**	**-**	**-**	**-**	**-**
328	**Poulton Court**	**Putcher rank fishing**	**105**	**-**	**-**	**-**	**-**	**-**	**-**
		Tending livestock	**-**	**-**	**-**	**-**	11	**-**	**-**
341	Frampton on Severn, Hills Flats and Poulton Court	Wildfowling	42	**-**	**-**	**-**	**-**	**-**	**-**
337	Frampton on Severn, Hills Flats and Poulton Court	Wildfowling	12	**-**	**-**	**-**	6	**-**	**-**
97	River Severn	Inshore rescue duties	6	**-**	**-**	**-**	**-**	**-**	**-**
98	River Severn	Inshore rescue duties	6	**-**	**-**	**-**	**-**	**-**	**-**
99	River Severn	Inshore rescue duties	6	**-**	**-**	**-**	**-**	**-**	**-**
100	River Severn	Inshore rescue duties	6	**-**	**-**	**-**	**-**	**-**	**-**
101	River Severn	Inshore rescue duties	6	**-**	**-**	**-**	**-**	**-**	**-**
102	River Severn	Inshore rescue duties	6	**-**	**-**	**-**	**-**	**-**	**-**
130	**Black Rock**	**Walking**	5	**-**	**-**	**27**	**-**	**-**	**-**
132	**Black Rock**	**Walking**	5	**-**	**-**	**27**	**-**	**-**	**-**
267	Oldbury Pill	Fixing moorings	5	**-**	**-**	**-**	**-**	**-**	**-**
268	Oldbury Pill	Fixing moorings	4	**-**	**-**	**-**	**-**	**-**	**-**
115	River Severn	Coastguard duties	3	**-**	**-**	**-**	**-**	**-**	**-**
116	River Severn	Coastguard duties	3	**-**	**-**	**-**	**-**	**-**	**-**
117	River Severn	Coastguard duties	3	**-**	**-**	**-**	**-**	**-**	**-**
118	River Severn	Coastguard duties	3	**-**	**-**	**-**	**-**	**-**	**-**
119	River Severn	Coastguard duties	3	**-**	**-**	**-**	**-**	**-**	**-**
120	River Severn	Coastguard duties	3	**-**	**-**	**-**	**-**	**-**	**-**
121	River Severn	Coastguard duties	3	**-**	**-**	**-**	**-**	**-**	**-**
133	**Black Rock**	**Walking**	2	**-**	**-**	**14**	**-**	**-**	**-**
134	**Black Rock**	**Walking**	2	**-**	**-**	**14**	**-**	**-**	**-**
135	**Black Rock**	**Walking**	2	**-**	**-**	**14**	**-**	**-**	**-**
136	**Black Rock**	**Walking**	2	**-**	**-**	**14**	**-**	**-**	**-**
228	**Sharpness Dock**	**Fixing moorings**	**-**	**30**	**-**	**-**	**-**	**-**	**-**
227	**Sharpness Dock**	**Fixing moorings**	**-**	**30**	**-**	**-**	**-**	**-**	**-**

Table 9. Adults' intertidal occupancy rates in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud	Mud and sand	Mud and stones	Rock	Salt marsh	Sand and stones	Boat on mud
330	**Aylburton Warth**	**Setting up putcher ranks**	**-**	**20**	**-**	**-**	**-**	**-**	**-**
	Shores of the River Severn	Beachcombing	**-**	**-**	**-**	**-**	30	**-**	**-**
	Aylburton Warth	Dog walking	**-**	**-**	**-**	**-**		**-**	**-**
311	**Broadoak**	**Walking**	**-**	**10**	**-**	**-**	**-**	**-**	**-**
313	**Broadoak**	**Walking**	**-**	**10**	**-**	**-**	**-**	**-**	**-**
314	**Broadoak**	**Walking**	**-**	**10**	**-**	**-**	**-**	**-**	**-**
326	Lydney	Walking	**-**	5	**-**	**-**	**-**	**-**	**-**
288	**Severn Beach**	**Angling**	**-**	**-**	**182**	**-**	**-**	**-**	**-**
	Northwick Warth		**-**	**-**	**-**	**-**	182	**-**	**-**
289	**Severn Beach**	**Angling**	**-**	**-**	**182**	**-**	**-**	**-**	**-**
	Northwick Warth		**-**	**-**	**-**	**-**	182	**-**	**-**
290	**Severn Beach**	**Angling**	**-**	**-**	**116**	**-**		**-**	**-**
	Littleton Warth and Northwick Warth		**-**	**-**	**-**	**-**	84	**-**	**-**
	Aust Cliff Beach		**-**	**-**	**-**	**-**	**-**	10	**-**
291	**Severn Beach**	**Angling**	**-**	**-**	**116**	**-**	**-**	**-**	**-**
	Littleton Warth and Northwick Warth		**-**	**-**	**-**	**-**	84	**-**	**-**
	Aust Cliff Beach		**-**	**-**	**-**	**-**	**-**	10	**-**
183	**Aust Cliff Beach**	**Angling**	**-**	**-**	**78**	**-**	**-**	**-**	**-**
	Littleton Warth, Northwick Warth and Oldbury		**-**	**-**	**-**	**-**	156	**-**	**-**
220	**Hock Cliff**	**Playing**	**-**	**-**	**72**	**-**	**-**	**-**	**-**
221	**Hock Cliff**	**Playing**	**-**	**-**	**72**	**-**	**-**	**-**	**-**
216	Hock Cliff	Playing	**-**	**-**	24	**-**	**-**	**-**	**-**
215	Hock Cliff	Playing	**-**	**-**	24	**-**	**-**	**-**	**-**
224	Hock Cliff	Fossil hunting	**-**	**-**	3	**-**	**-**	**-**	**-**
106	**Beachley Point**	**Angling**	**-**	**-**	**-**	**12**	13	**-**	**-**
107	**Beachley Point**	**Angling**	**-**	**-**	**-**	**12**	13	**-**	**-**
137	Black Rock	Walking	**-**	**-**	**-**	2	**-**	**-**	**-**
138	Black Rock	Walking	**-**	**-**	**-**	2	**-**	**-**	**-**
321	**Beachley and the shores of the River Severn**	**Dog walking**	**-**	**-**	**-**	**-**	**548**	**-**	**-**
317	**Beachley**	**Dog walking**	**-**	**-**	**-**	**-**	**351**	**-**	**-**

Table 9. Adults' intertidal occupancy rates in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud	Mud and sand	Mud and stones	Rock	Salt marsh	Sand and stones	Boat on mud
318	**Beachley**	**Dog walking**	**-**	**-**	**-**	**-**	**351**	**-**	**-**
280	**Northwick Warth**	**Angling**	**-**	**-**	**-**	**-**	**273**	**-**	**-**
282	**Northwick Warth**	**Angling**	**-**	**-**	**-**	**-**	**273**	**-**	**-**
294	**Northwick Warth**	**Angling**	**-**	**-**	**-**	**-**	**208**	**-**	**-**
272	Littleton Warth and Northwick Warth	Angling	-	-	-	-	96	-	-
271	Littleton Warth and Northwick Warth	Angling	-	-	-	-	96	-	-
108	Beachley Point	Dog walking	-	-	-	-	40	-	-
109	Beachley Point	Dog walking	-	-	-	-	40	-	-
110	Beachley Point	Dog walking	-	-	-	-	38	-	-
111	Beachley Point	Dog walking	-	-	-	-	38	-	-
212	Slimbridge WWT	Nature reserve warden	-	-	-	-	35	-	-
213	Slimbridge WWT	Nature reserve warden	-	-	-	-	35	-	-
214	Slimbridge WWT	Nature reserve warden	-	-	-	-	35	-	-
103	Beachley Point	Angling	-	-	-	-	25	-	-
104	Beachley Point	Angling	-	-	-	-	25	-	-
105	Beachley Point	Angling	-	-	-	-	25	-	-
93	Beachley Point	Dog walking	-	-	-	-	20	-	-
94	Beachley Point	Dog walking	-	-	-	-	20	-	-
144	Shepperdine	Walking	-	-	-	-	5	-	-
31	Shepperdine	Beachcombing	-	-	-	-	2	-	-
32	Shepperdine	Beachcombing	-	-	-	-	2	-	-
292	**Aust Cliff Beach and Severn Beach**	**Dog walking**	**-**	**-**	**-**	**-**	**-**	**60**	**-**
293	**Aust Cliff Beach and Severn Beach**	**Dog walking**	**-**	**-**	**-**	**-**	**-**	**60**	**-**
145	**Aust Cliff Beach and Severn Beach**	**Fossil hunting and collecting stones**	**-**	**-**	**-**	**-**	**-**	**60**	**-**
146	**Aust Cliff Beach and Severn Beach**	**Fossil hunting and collecting stones**	**-**	**-**	**-**	**-**	**-**	**60**	**-**
139	**Severn Beach**	**Dog walking**	**-**	**-**	**-**	**-**	**-**	**52**	**-**
275	**Severn Beach**	**Playing**	**-**	**-**	**-**	**-**	**-**	**26**	**-**
276	**Severn Beach**	**Playing**	**-**	**-**	**-**	**-**	**-**	**26**	**-**
284	Aust Cliff Beach	Fossil hunting	-	-	-	-	-	13	-

Table 9. Adults' intertidal occupancy rates in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Observation number	Location	Activity	Mud	Mud and sand	Mud and stones	Rock	Salt marsh	Sand and stones	Boat on mud
285	Aust Cliff Beach	Fossil hunting	-	-	-	-	-	13	-
141	Severn Beach	Playing	-	-	-	-	-	12	-
140	Severn Beach	Playing	-	-	-	-	-	12	-
286	Aust Cliff Beach	Fossil hunting	-	-	-	-	-	8	-
287	Aust Cliff Beach	Fossil hunting	-	-	-	-	-	8	-
274	Severn Beach	Beachcombing	-	-	-	-	-	5	-
273	Severn Beach	Beachcombing	-	-	-	-	-	5	-
333	**Bullo Pill**	**Living on a houseboat**	-	-	-	-	-	-	**7288**
332	Bullo Pill	Boat maintenance	-	-	-	-	-	-	1530

Notes

Emboldened observations are the high-rate individuals

The mean intertidal occupancy rate over mud based on 2 observations is 128 h y^{-1}

The observed 97.5th percentile rate based on 25 observations for mud is 123 h y^{-1}

The mean intertidal occupancy rate over mud and sand based on 6 high-rate observations is 18 h y^{-1}

The observed 97.5th percentile rate based on 7 observations for mud and sand is 30 h y^{-1}

The mean intertidal occupancy rate over mud and stones based on 7 high-rate observations is 117 h y^{-1}

The observed 97.5th percentile rate based on 10 observations for mud and stones is 182 h y^{-1}

The mean intertidal occupancy rate over rock based on 8 high-rate observations is 17 h y^{-1}

The observed 97.5th percentile rate based on 10 observations for rock is 27 h y^{-1}

The mean intertidal occupancy rate over salt marsh based on 6 high-rate observations is 334 h y^{-1}

The observed 97.5th percentile rate based on 33 observations for salt marsh is 390 h y^{-1}

The mean intertidal occupancy rate over sand and stones based on 7 high-rate observations is 49 h y^{-1}

The observed 97.5th percentile rate based on 17 observations for sand and stones is 60 h y^{-1}

The mean intertidal occupancy rate on a boat over mud based on 1 observation is 7288 h y^{-1}

The observed 97.5th percentile rate based on 2 observations for a boat on mud is 7144 h y^{-1}

Table 10. Children's and infants' intertidal occupancy rates in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Location	Activity	Mud and stones	Rock	Salt marsh	Sand and stones
222	**13**	**Hock Cliff**	**Playing**	**72**	-	-	-
223	**10**	**Hock Cliff**	**Playing**	**72**	-	-	-
217	**8**	**Hock Cliff**	**Playing**	**24**	-	-	-
225	8	Hock Cliff	Fossil hunting	3	-	-	-
226	6	Hock Cliff	Fossil hunting	3	-	-	-
319	**9**	**Beachley Point**	**Playing**	-	**12**	-	-
		Beachley	**Dog walking**	-	-	**50**	-
320	**13**	**Beachley Point**	**Playing**	-	**12**	-	-
		Beachley	**Dog walking**	-	-	**50**	-
278	**9**	**Severn Beach**	**Playing**	-	-	-	**26**
279	**7**	**Severn Beach**	**Playing**	-	-	-	**26**

Notes

Emboldened observations are the high-rate individuals

The mean intertidal occupancy rate over mud and stones based on 3 high-rate observations is 56 h y^{-1}

The observed 97.5th percentile rate based on 5 observations for mud and stones is 72 h y^{-1}

The mean intertidal occupancy rate over rock based on 2 high-rate observations is 12 h y^{-1}

The observed 97.5th percentile rate based on 2 observations for rock is 12 h y^{-1}

The mean intertidal occupancy rate over salt marsh based on 2 high-rate observations is 50 h y^{-1}

The observed 97.5th percentile rate based on 2 observations for salt marsh is 50 h y^{-1}

The mean intertidal occupancy rate over sand and stones based on 2 high-rate observations is 26 h y^{-1}

The observed 97.5th percentile rate based on 2 observations for sand and stones is 26 h y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Location	Activity	Mud and stones	Rock	Salt marsh	Sand and stones
218	**5**	**Hock Cliff**	**Playing**	**24**	-	-	-
219	**3**	**Hock Cliff**	**Playing**	**24**	-	-	-
277	**4**	**Severn Beach**	**Playing**	-	-	-	**26**
142	**5**	**Severn Beach**	**Playing**	-	-	-	**12**
143	**2**	**Severn Beach**	**Playing**	-	-	-	**12**

Notes

Emboldened observations are the high-rate individuals

The mean intertidal occupancy rate over mud and stones based on 2 high-rate observations is 24 h y^{-1}

The observed 97.5th percentile rate based on 2 observations for mud and stones is 24 h y^{-1}

The mean intertidal occupancy rate over sand and stones based on 3 high-rate observations is 17 h y^{-1}

The observed 97.5th percentile rate based on 3 observations for sand and stones is 25 h y^{-1}

Table 11. Gamma dose rate measurements over intertidal substrates in the Berkeley and Oldbury aquatic survey area (μGy h^{-1})

Location	National Grid Reference	Substrate	Gamma dose rate at 1 metre[a]
Western shore of the River Severn (west to east)			
Black Rock	ST 513 879	Mud	0.072
Beachley	ST 551 904	Salt marsh	0.063
Lydney	SO 650 013	Mud	0.063
Newnham	SO 692 117	Salt marsh	0.065
Eastern shore of the River Severn (west to east)			
Severn Beach	ST 538 847	Sand and stones	0.065
New Passage	ST 542 864	Mud and stones	0.057
Northwick Warth	ST 558 882	Salt marsh	0.076
Aust Cliff	ST 565 895	Mud and stones	0.098
Aust Cliff	ST 565 896	Sand and stones	0.089
Littleton Warth	ST 585 910	Salt marsh	0.096
Oldbury Pill	ST 599 929	Mud	0.065
Shepperdine	ST 612 961	Salt marsh	0.065

Notes

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

Table 12. Adults' handling rates of fishing gear and sediment in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Observation number	Location	Activity	Fishing gear	Sediment
330	**Lydney**	**Handling lave nets**	**129**	**-**
	Aylburton Warth	**Handling putcher ranks**		
	Aylburton Warth	Setting up putcher ranks	**-**	20
328	**Poulton Court**	**Handling putcher ranks**	**77**	**-**
		Setting up putcher ranks	**-**	28
130	**Black Rock**	**Handling lave nets**	**64**	**-**
132	**Black Rock**	**Handling lave nets**	**64**	**-**
311	**Broadoak**	**Handling lave nets**	**45**	**-**
313	**Broadoak**	**Handling lave nets**	**45**	**-**
314	**Broadoak**	**Handling lave nets**	**45**	**-**
133	Black Rock	Handling lave nets	32	**-**
134	Black Rock	Handling lave nets	32	**-**
135	Black Rock	Handling lave nets	32	**-**
136	Black Rock	Handling lave nets	32	**-**
326	Lydney	Handling lave nets	18	**-**
137	Black Rock	Handling lave nets	4	**-**
138	Black Rock	Handling lave nets	4	**-**
343	**Shores of the River Severn**	**Wildfowling**	**-**	**150**
341	Frampton, Hills Flats and Poulton Court	Wildfowling	**-**	42
227	Sharpness Dock	Fixing moorings	**-**	30
228	Sharpness Dock	Fixing moorings	**-**	30
337	Frampton, Hills Flats and Poulton Court	Wildfowling	**-**	18
267	Oldbury Pill	Fixing moorings	**-**	5
268	Oldbury Pill	Fixing moorings	**-**	4

Notes

Emboldened observations are the high-rate individuals

The mean fishing gear handling rate based on 7 high-rate observations is 67 h y^{-1}

The observed 97.5th percentile rate based on 14 observations for fishing gear is 112 h y^{-1}

The mean sediment handling rate based on 1 observation is 150 h y^{-1}

The observed 97.5th percentile rate based on 9 observations for sediment is 128 h y^{-1}

Table 13. Adults' occupancy rates in and on water in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Observation number	Location	Activity	In water	On water
95	River Severn near Beachley	Wake boarding, water skiing and jetskiing	340	-
96	River Severn near Beachley	Wake boarding, water skiing and jetskiing	340	-
114	River Severn near Beachley	Jetskiing	260	-
112	River Severn near Beachley	Jetskiing	120	-
149	Purton to Slimbridge	Kayaking	79	-
113	River Severn near Beachley	Jetskiing	70	-
220	River Severn	Kayaking	32	-
		Sailing	-	16
221	River Severn	Kayaking	32	-
		Sailing	-	16
269	River Severn	Sailing	-	440
270	River Severn	Sailing	-	440
261	River Severn	Sailing	-	387
262	River Severn	Sailing	-	387
263	River Severn	Sailing	-	387
264	River Severn	Sailing	-	387
265	River Severn	Sailing	-	387
266	River Severn	Sailing	-	387
122	River Severn	Sailing	-	168
123	River Severn	Sailing	-	168
124	River Severn	Sailing	-	168
125	River Severn	Sailing	-	168
332	Bullo Pill	Boat maintenance	-	150
330	Aylburton Warth and Lydney	Putcher rank fishing and lave netting	-	129
333	Bullo Pill	Living on a houseboat	-	120
268	River Severn	Sailing	-	119
126	River Severn	Sailing	-	84
127	River Severn	Sailing	-	84
128	River Severn	Sailing	-	84
129	River Severn	Sailing	-	84
97	River Severn	Operating a rescue boat	-	72
98	River Severn	Operating a rescue boat	-	72
99	River Severn	Operating a rescue boat	-	72
100	River Severn	Operating a rescue boat	-	72
101	River Severn	Operating a rescue boat	-	72
102	River Severn	Operating a rescue boat	-	72
267	River Severn	Sailing	-	48
311	Broadoak	Lave netting	-	45
313	Broadoak	Lave netting	-	45
314	Broadoak	Lave netting	-	45
130	Black Rock	Lave netting	-	32
132	Black Rock	Lave netting	-	32
326	Lydney	Lave netting	-	18
133	Black Rock	Lave netting	-	16
134	Black Rock	Lave netting	-	16
135	Black Rock	Lave netting	-	16
136	Black Rock	Lave netting	-	16
137	Black Rock	Lave netting	-	2
138	Black Rock	Lave netting	-	2

Table 14. Children's occupancy rates in and on water in the Berkeley and Oldbury aquatic survey area (h y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Location	Activity	In water	On water
150	10	Purton to Slimbridge	Kayaking	79	-
222	13	River Severn	Kayaking	32	-
			Sailing	-	16
223	10	River Severn	Kayaking	32	-
			Sailing	-	16

Table 15. Adults' consumption rates of green vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Broccoli	Brussel sprout	Cabbage	Cauliflower	Chard	Courgette	Cucumber	Herbs	Lettuce	Rocket	Total
188	**3.7**	**4.1**	**6.4**	**1.7**	**-**	**7.4**	**8.5**	**0.3**	**0.8**	**1.3**	**34.1**
189	**3.7**	**4.1**	**6.4**	**1.7**	**-**	**7.4**	**8.5**	**0.3**	**0.8**	**1.3**	**34.1**
239	**1.6**	**10.9**	**6.8**	**5.4**	**-**	**4.4**	**-**	**0.7**	**-**	**-**	**29.9**
238	**1.6**	**10.9**	**6.8**	**5.4**	**-**	**4.4**	**-**	**0.7**	**-**	**-**	**29.9**
316	**7.6**	**7.6**	**7.6**	**-**	**-**	**-**	**-**	**-**	**4.1**	**-**	**26.7**
315	**7.6**	**7.6**	**7.6**	**-**	**-**	**-**	**-**	**-**	**4.1**	**-**	**26.7**
35	**-**	**-**	**20.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**20.3**
36	**-**	**-**	**20.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**20.3**
37	**-**	**-**	**20.3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**20.3**
307	**-**	**-**	**13.7**	**-**	**-**	**5.0**	**-**	**-**	**-**	**-**	**18.7**
308	**-**	**-**	**13.7**	**-**	**-**	**5.0**	**-**	**-**	**-**	**-**	**18.7**
309	**-**	**6.8**	**9.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**16.0**
310	**-**	**6.8**	**9.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**16.0**
240	**0.8**	**5.5**	**3.4**	**2.7**	**-**	**2.2**	**-**	**0.3**	**-**	**-**	**14.9**
210	**-**	**-**	**5.5**	**-**	**-**	**-**	**7.7**	**-**	**1.4**	**-**	**14.5**
211	**-**	**-**	**5.5**	**-**	**-**	**-**	**7.7**	**-**	**1.4**	**-**	**14.5**
199	**-**	**1.9**	**7.8**	**1.6**	**-**	**-**	**-**	**-**	**1.3**	**-**	**12.6**
200	**-**	**1.9**	**7.8**	**1.6**	**-**	**-**	**-**	**-**	**1.3**	**-**	**12.6**
301	-	-	5.7	-	-	-	4.5	-	0.7	-	10.9
302	-	-	5.7	-	-	-	4.5	-	0.7	-	10.9
303	-	-	5.7	-	-	-	4.5	-	0.7	-	10.9
260	5.1	-	-	-	-	0.7	-	-	5.0	-	10.8
201	-	-	4.0	-	-	-	5.5	-	1.0	-	10.5
202	-	-	4.0	-	-	-	5.5	-	1.0	-	10.5
153	-	-	-	-	-	-	8.5	-	-	-	8.5
154	-	-	-	-	-	-	8.5	-	-	-	8.5
194	-	-	-	-	0.6	1.2	5.7	-	-	-	7.5
195	-	-	-	-	0.6	1.2	5.7	-	-	-	7.5
196	-	-	-	-	0.6	1.2	5.7	-	-	-	7.5
256	-	-	5.1	-	-	-	-	-	0.5	-	5.6

Table 15. Adults' consumption rates of green vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Broccoli	Brussel sprout	Cabbage	Cauliflower	Chard	Courgette	Cucumber	Herbs	Lettuce	Rocket	Total
257	-	-	5.1	-	-	-	-	-	0.5	-	5.6
258	-	-	5.1	-	-	-	-	-	0.5	-	5.6
259	-	-	5.1	-	-	-	-	-	0.5	-	5.6
22	-	-	-	-	2.6	-	-	-	2.4	-	5.0
172	-	-	4.6	-	-	-	-	-	-	-	4.6
173	-	-	4.6	-	-	-	-	-	-	-	4.6
197	-	-	-	-	-	3.3	-	-	0.7	-	4.0
198	-	-	-	-	-	3.3	-	-	0.7	-	4.0
322	3.2	-	-	-	-	-	-	-	-	-	3.2
323	3.2	-	-	-	-	-	-	-	-	-	3.2
23	-	-	-	-	1.6	-	-	-	1.5	-	3.1
24	-	-	-	-	1.6	-	-	-	1.5	-	3.1
25	-	-	-	-	1.6	-	-	-	1.5	-	3.1
10	-	-	-	-	-	-	-	-	3.0	-	3.0
11	-	-	-	-	-	-	-	-	3.0	-	3.0
208	-	-	-	-	-	-	2.1	-	0.8	-	2.9
209	-	-	-	-	-	-	2.1	-	0.8	-	2.9
184	-	-	-	-	-	-	2.0	0.2	-	-	2.3
185	-	-	-	-	-	-	2.0	0.2	-	-	2.3
186	-	-	-	-	-	-	2.0	0.2	-	-	2.3
187	-	-	-	-	-	-	2.0	0.2	-	-	2.3
296	-	-	-	-	-	-	-	-	1.2	-	1.2
297	-	-	-	-	-	-	-	-	1.2	-	1.2
298	-	-	-	-	-	-	-	-	1.2	-	1.2
299	-	-	-	-	-	-	-	-	1.2	-	1.2
300	-	-	-	-	-	-	-	-	1.2	-	1.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of green vegetables based on the 18 high-rate adult consumers is 21.2 kg y^{-1}

The observed 97.5th percentile rate based on 56 observations is 32.5 kg y^{-1}

Table 16. Adults' consumption rates of other vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Broad bean	Chilli pepper	French bean	Mangetout	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomato	Total
188	**-**	**-**	**10.4**	**1.8**	**1.6**	**-**	**-**	**10.4**	**-**	**2.3**	**21.6**	**48.0**
189	**-**	**-**	**10.4**	**1.8**	**1.6**	**-**	**-**	**10.4**	**-**	**2.3**	**21.6**	**48.0**
197	**12.3**	**-**	**2.4**	**-**	**-**	**-**	**-**	**3.1**	**-**	**-**	**19.4**	**37.2**
198	**12.3**	**-**	**2.4**	**-**	**-**	**-**	**-**	**3.1**	**-**	**-**	**19.4**	**37.2**
210	**-**	**-**	**2.4**	**-**	**4.1**	**-**	**-**	**12.2**	**-**	**-**	**9.7**	**28.4**
211	**-**	**-**	**2.4**	**-**	**4.1**	**-**	**-**	**12.2**	**-**	**-**	**9.7**	**28.4**
201	**-**	**-**	**10.5**	**-**	**-**	**0.6**	**1.5**	**-**	**-**	**-**	**14.0**	**26.7**
202	**-**	**-**	**10.5**	**-**	**-**	**0.6**	**1.5**	**-**	**-**	**-**	**14.0**	**26.7**
199	**-**	**0.1**	**4.6**	**-**	**-**	**0.8**	**-**	**5.8**	**8.6**	**-**	**4.6**	**24.5**
200	**-**	**0.1**	**4.6**	**-**	**-**	**0.8**	**-**	**5.8**	**8.6**	**-**	**4.6**	**24.5**
194	**-**	**-**	**0.4**	**-**	**3.6**	**-**	**-**	**10.9**	**-**	**3.1**	**5.4**	**23.3**
195	**-**	**-**	**0.4**	**-**	**3.6**	**-**	**-**	**10.9**	**-**	**3.1**	**5.4**	**23.3**
196	**-**	**-**	**0.4**	**-**	**3.6**	**-**	**-**	**10.9**	**-**	**3.1**	**5.4**	**23.3**
238	**5.8**	**-**	**-**	**-**	**-**	**-**	**-**	**8.7**	**-**	**-**	**8.6**	**23.2**
239	**5.8**	**-**	**-**	**-**	**-**	**-**	**-**	**8.7**	**-**	**-**	**8.6**	**23.2**
309	**6.2**	**-**	**5.4**	**-**	**6.8**	**-**	**-**	**-**	**-**	**0.7**	**4.1**	**23.2**
310	**6.2**	**-**	**5.4**	**-**	**6.8**	**-**	**-**	**-**	**-**	**0.7**	**4.1**	**23.2**
10	**9.1**	**-**	**-**	**-**	**-**	**-**	**-**	**13.6**	**-**	**-**	**-**	**22.7**
11	**9.1**	**-**	**-**	**-**	**-**	**-**	**-**	**13.6**	**-**	**-**	**-**	**22.7**
301	1.8	-	-	-	-	-	-	4.5	-	-	9.0	15.4
302	1.8	-	-	-	-	-	-	4.5	-	-	9.0	15.4
303	1.8	-	-	-	-	-	-	4.5	-	-	9.0	15.4
208	-	-	1.4	-	-	-	-	6.8	-	-	3.6	11.8
209	-	-	1.4	-	-	-	-	6.8	-	-	3.6	11.8
240	2.9	-	-	-	-	-	-	4.4	-	-	4.3	11.6
22	-	-	-	-	-	-	-	10.9	-	-	-	10.9
153	-	-	-	-	-	-	-	-	-	-	10.8	10.8
154	-	-	-	-	-	-	-	-	-	-	10.8	10.8
315	-	-	-	-	3.1	-	-	6.1	-	-	-	9.2

Table 16. Adults' consumption rates of other vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Broad bean	Chilli pepper	French bean	Mangetout	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomato	Total
316	-	-	-	-	3.1	-	-	6.1	-	-	-	9.2
35	1.5	-	-	-	-	-	-	4.5	-	-	-	6.1
36	1.5	-	-	-	-	-	-	4.5	-	-	-	6.1
37	1.5	-	-	-	-	-	-	4.5	-	-	-	6.1
260	-	-	-	-	3.4	-	-	0.9	-	1.7	-	6.0
322	-	-	-	-	-	-	-	5.1	-	-	-	5.1
323	-	-	-	-	-	-	-	5.1	-	-	-	5.1
296	-	-	0.4	-	0.9	-	-	2.3	-	-	1.1	4.7
300	-	-	0.4	-	0.9	-	-	2.3	-	-	1.1	4.7
297	-	-	0.4	-	0.9	-	-	2.3	-	-	1.1	4.7
298	-	-	0.4	-	0.9	-	-	2.3	-	-	1.1	4.7
299	-	-	0.4	-	0.9	-	-	2.3	-	-	1.1	4.7
1	-	-	-	-	-	-	-	4.5	-	-	-	4.5
2	-	-	-	-	-	-	-	4.5	-	-	-	4.5
184	-	-	-	-	1.1	-	-	-	-	-	3.4	4.5
185	-	-	-	-	1.1	-	-	-	-	-	3.4	4.5
186	-	-	-	-	1.1	-	-	-	-	-	3.4	4.5
187	-	-	-	-	1.1	-	-	-	-	-	3.4	4.5
172	-	-	4.1	-	-	-	-	-	-	-	-	4.1
173	-	-	4.1	-	-	-	-	-	-	-	-	4.1
307	-	-	1.6	-	2.0	-	-	-	-	-	-	3.6
308	-	-	1.6	-	2.0	-	-	-	-	-	-	3.6
155	-	-	3.3	-	-	-	-	-	-	-	-	3.3
156	-	-	3.3	-	-	-	-	-	-	-	-	3.3
157	-	-	3.3	-	-	-	-	-	-	-	-	3.3
158	-	-	3.3	-	-	-	-	-	-	-	-	3.3
190	-	-	2.7	-	-	-	-	-	-	-	-	2.7
191	-	-	2.7	-	-	-	-	-	-	-	-	2.7
192	-	-	2.7	-	-	-	-	-	-	-	-	2.7

Table 16. Adults' consumption rates of other vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Broad bean	Chilli pepper	French bean	Mangetout	Pea	Pepper	Pumpkin	Runner bean	Squash	Sweetcorn	Tomato	Total
193	-	-	2.7	-	-	-	-	-	-	-	-	2.7
167	-	-	2.2	-	-	-	-	-	-	-	-	2.2
168	-	-	2.2	-	-	-	-	-	-	-	-	2.2
169	-	-	2.2	-	-	-	-	-	-	-	-	2.2
170	-	-	2.2	-	-	-	-	-	-	-	-	2.2
171	-	-	2.2	-	-	-	-	-	-	-	-	2.2
256	1.4	-	-	-	-	-	-	-	-	-	-	1.4
257	1.4	-	-	-	-	-	-	-	-	-	-	1.4
258	1.4	-	-	-	-	-	-	-	-	-	-	1.4
259	1.4	-	-	-	-	-	-	-	-	-	-	1.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of other vegetables based on the 19 high-rate adult consumers is 28.3 kg y^{-1}

The observed 97.5th percentile rate based on 68 observations is 40.7 kg y^{-1}

Table 17. Adults' consumption rates of root vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Beetroot	Carrot	Celeriac	Fennel	Garlic	Leek	Onion	Parsnip	Radish	Spring onion	Swede	Total
10	**8.2**	**13.5**	**-**	**-**	**-**	**9.0**	**3.6**	**7.2**	**-**	**-**	**-**	**41.5**
11	**8.2**	**13.5**	**-**	**-**	**-**	**9.0**	**3.6**	**7.2**	**-**	**-**	**-**	**41.5**
307	**7.4**	**6.1**	**-**	**-**	**-**	**8.1**	**-**	**3.2**	**-**	**-**	**9.2**	**34.0**
308	**7.4**	**6.1**	**-**	**-**	**-**	**8.1**	**-**	**3.2**	**-**	**-**	**9.2**	**34.0**
238	**-**	**5.8**	**-**	**-**	**-**	**9.6**	**7.1**	**3.5**	**-**	**-**	**-**	**25.9**
239	**-**	**5.8**	**-**	**-**	**-**	**9.6**	**7.1**	**3.5**	**-**	**-**	**-**	**25.9**
194	**6.6**	**-**	**-**	**-**	**-**	**10.8**	**5.1**	**-**	**-**	**-**	**-**	**22.5**
195	**6.6**	**-**	**-**	**-**	**-**	**10.8**	**5.1**	**-**	**-**	**-**	**-**	**22.5**
196	**6.6**	**-**	**-**	**-**	**-**	**10.8**	**5.1**	**-**	**-**	**-**	**-**	**22.5**
197	**1.8**	**6.1**	**-**	**0.2**	**-**	**-**	**13.0**	**-**	**0.4**	**0.5**	**-**	**22.0**
198	**1.8**	**6.1**	**-**	**0.2**	**-**	**-**	**13.0**	**-**	**0.4**	**0.5**	**-**	**22.0**
309	**6.2**	**6.8**	**-**	**-**	**-**	**4.5**	**2.7**	**1.4**	**-**	**-**	**-**	**21.5**
310	**6.2**	**6.8**	**-**	**-**	**-**	**4.5**	**2.7**	**1.4**	**-**	**-**	**-**	**21.5**
35	**-**	**6.0**	**-**	**-**	**-**	**-**	**14.4**	**-**	**-**	**-**	**-**	**20.4**
36	**-**	**6.0**	**-**	**-**	**-**	**-**	**14.4**	**-**	**-**	**-**	**-**	**20.4**
37	**-**	**6.0**	**-**	**-**	**-**	**-**	**14.4**	**-**	**-**	**-**	**-**	**20.4**
315	**1.0**	**3.1**	**-**	**-**	**-**	**11.4**	**4.1**	**-**	**-**	**-**	**-**	**19.6**
316	**1.0**	**3.1**	**-**	**-**	**-**	**11.4**	**4.1**	**-**	**-**	**-**	**-**	**19.6**
188	**2.5**	**1.4**	**1.2**	**-**	**0.9**	**2.5**	**5.5**	**3.2**	**-**	**-**	**-**	**17.1**
189	**2.5**	**1.4**	**1.2**	**-**	**0.9**	**2.5**	**5.5**	**3.2**	**-**	**-**	**-**	**17.1**
210	3.7	4.1	-	-	-	2.0	3.2	-	-	-	-	13.0
211	3.7	4.1	-	-	-	2.0	3.2	-	-	-	-	13.0
240	-	2.9	-	-	-	4.8	3.5	1.7	-	-	-	12.9
201	2.7	1.5	-	-	-	2.9	4.7	-	-	0.7	-	12.4
202	2.7	1.5	-	-	-	2.9	4.7	-	-	0.7	-	12.4
322	6.2	3.4	-	-	-	-	-	-	-	-	-	9.5
323	6.2	3.4	-	-	-	-	-	-	-	-	-	9.5
301	-	1.8	-	-	-	1.3	6.0	-	-	-	-	9.1
302	-	1.8	-	-	-	1.3	6.0	-	-	-	-	9.1

Table 17. Adults' consumption rates of root vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Beetroot	Carrot	Celeriac	Fennel	Garlic	Leek	Onion	Parsnip	Radish	Spring onion	Swede	Total
303	-	1.8	-	-	-	1.3	6.0	-	-	-	-	9.1
208	4.1	0.6	-	-	-	1.1	2.7	-	-	-	-	8.5
209	4.1	0.6	-	-	-	1.1	2.7	-	-	-	-	8.5
184	5.8	-	-	-	-	-	2.6	-	-	-	-	8.4
185	5.8	-	-	-	-	-	2.6	-	-	-	-	8.4
186	5.8	-	-	-	-	-	2.6	-	-	-	-	8.4
187	5.8	-	-	-	-	-	2.6	-	-	-	-	8.4
199	-	1.9	-	-	-	-	4.6	-	-	-	-	6.5
200	-	1.9	-	-	-	-	4.6	-	-	-	-	6.5
172	6.1	-	-	-	-	-	-	-	-	-	-	6.1
173	6.1	-	-	-	-	-	-	-	-	-	-	6.1
167	3.3	1.8	-	-	-	-	-	-	-	-	-	5.1
168	3.3	1.8	-	-	-	-	-	-	-	-	-	5.1
169	3.3	1.8	-	-	-	-	-	-	-	-	-	5.1
170	3.3	1.8	-	-	-	-	-	-	-	-	-	5.1
171	3.3	1.8	-	-	-	-	-	-	-	-	-	5.1
260	0.2	2.3	-	-	-	-	-	2.3	-	-	-	4.7
1	2.7	-	-	-	-	1.5	-	-	-	-	-	4.2
2	2.7	-	-	-	-	1.5	-	-	-	-	-	4.2
190	2.0	1.1	-	-	-	-	-	-	-	-	-	3.2
191	2.0	1.1	-	-	-	-	-	-	-	-	-	3.2
192	2.0	1.1	-	-	-	-	-	-	-	-	-	3.2
193	2.0	1.1	-	-	-	-	-	-	-	-	-	3.2
296	1.6	-	-	-	-	-	-	-	-	-	-	1.6
297	1.6	-	-	-	-	-	-	-	-	-	-	1.6
298	1.6	-	-	-	-	-	-	-	-	-	-	1.6
299	1.6	-	-	-	-	-	-	-	-	-	-	1.6
300	1.6	-	-	-	-	-	-	-	-	-	-	1.6
256	-	1.4	-	-	-	-	-	-	-	-	-	1.4

Table 17. Adults' consumption rates of root vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Beetroot	Carrot	Celeriac	Fennel	Garlic	Leek	Onion	Parsnip	Radish	Spring onion	Swede	Total
257	-	1.4	-	-	-	-	-	-	-	-	-	1.4
258	-	1.4	-	-	-	-	-	-	-	-	-	1.4
259	-	1.4	-	-	-	-	-	-	-	-	-	1.4
23	-	-	-	-	-	-	-	-	-	1.2	-	1.2
24	-	-	-	-	-	-	-	-	-	1.2	-	1.2
25	-	-	-	-	-	-	-	-	-	1.2	-	1.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of root vegetables based on the 20 high-rate adult consumers is 24.6 kg y^{-1}

The observed 97.5th percentile rate based on 64 observations is 37.2 kg y^{-1}

Table 18. Adults' consumption rates of potato from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Potato
315	**68.6**
316	**68.6**
10	**63.7**
11	**63.7**
256	**47.8**
257	**47.8**
258	**47.8**
259	**47.8**
197	**41.0**
198	**41.0**
309	**41.0**
310	**41.0**
194	**25.5**
195	**25.5**
196	**25.5**
35	**24.3**
36	**24.3**
37	**24.3**
201	17.7
202	17.7
210	16.4
211	16.4
199	15.5
200	15.5
238	13.1
239	13.1
322	12.5
323	12.5
301	12.1
302	12.1
303	12.1
184	10.8
185	10.8
186	10.8
187	10.8
153	9.1
154	9.1
208	9.1
209	9.1
1	9.1
2	9.1
188	8.1
189	8.1
172	6.8
173	6.8
240	6.6
190	4.6
191	4.6
192	4.6
193	4.6
167	3.6
168	3.6

Table 18. Adults' consumption rates of potato from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Potato
169	3.6
170	3.6
171	3.6
260	2.7

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of potato based on the 18 high-rate adult consumers is 42.7 kg y^{-1}

The observed 97.5^{th} percentile rate based on 56 observations is 66.8 kg y^{-1}

Table 19. Adults' consumption rates of domestic fruit from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Apple	Blackberry	Blackcurrant	Blueberry	Damson	Gooseberry	Greengages	Jostaberry	Loganberry	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Tayberry	Total
188	**4.0**	**-**	**6.8**	**-**	**3.4**	**-**	**-**	**-**	**-**	**2.2**	**6.8**	**1.6**	**0.5**	**2.3**	**1.4**	**-**	**28.9**
189	**4.0**	**-**	**6.8**	**-**	**3.4**	**-**	**-**	**-**	**-**	**2.2**	**6.8**	**1.6**	**0.5**	**2.3**	**1.4**	**-**	**28.9**
260	**2.7**	**-**	**2.3**	**2.3**	**-**	**-**	**-**	**2.3**	**2.3**	**-**	**-**	**-**	**4.5**	**-**	**8.6**	**0.9**	**25.9**
315	**12.7**	**2.7**	**-**	**-**	**-**	**3.1**	**-**	**-**	**-**	**-**	**-**	**3.1**	**-**	**-**	**3.1**	**-**	**24.6**
316	**12.7**	**2.7**	**-**	**-**	**-**	**3.1**	**-**	**-**	**-**	**-**	**-**	**3.1**	**-**	**-**	**3.1**	**-**	**24.6**
310	**20.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.5**	**-**	**1.1**	**-**	**-**	**24.3**
309	**20.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.1**	**-**	**-**	**21.8**
256	**19.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**19.5**
257	**19.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**19.5**
258	**19.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**19.5**
259	**19.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**19.5**
238	**9.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.4**	**1.4**	**2.0**	**-**	**1.6**	**3.0**	**-**	**17.8**
239	**9.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**0.4**	**1.4**	**2.0**	**-**	**1.6**	**3.0**	**-**	**17.8**
210	**7.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**2.0**	**-**	**2.0**	**3.1**	**-**	**16.3**
211	**7.1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**2.0**	**-**	**2.0**	**3.1**	**-**	**16.3**
322	**2.9**	**-**	**-**	**-**	**2.4**	**-**	**2.4**	**-**	**-**	**-**	**2.4**	**-**	**-**	**-**	**5.1**	**-**	**15.2**
323	**2.9**	**-**	**-**	**-**	**2.4**	**-**	**2.4**	**-**	**-**	**-**	**2.4**	**-**	**-**	**-**	**5.1**	**-**	**15.2**
247	**13.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**13.0**
248	**13.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**13.0**
185	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**12.8**	**-**	**-**	**-**	**-**	**-**	**12.8**
197	**-**	**-**	**2.0**	**-**	**-**	**4.1**	**-**	**-**	**-**	**-**	**-**	**0.6**	**2.0**	**-**	**3.1**	**-**	**11.8**
198	**-**	**-**	**2.0**	**-**	**-**	**4.1**	**-**	**-**	**-**	**-**	**-**	**0.6**	**2.0**	**-**	**3.1**	**-**	**11.8**
201	5.9	-	-	-	-	-	-	-	-	-	-	1.5	-	-	2.2	-	9.6
202	5.9	-	-	-	-	-	-	-	-	-	-	1.5	-	-	2.2	-	9.6
36	3.0	-	0.8	-	-	1.5	-	-	0.8	-	1.5	-	-	-	1.5	-	9.1
35	3.0	-	0.8	-	-	1.5	-	-	0.8	-	1.5	-	-	-	1.5	-	9.1
37	3.0	-	0.8	-	-	1.5	-	-	0.8	-	1.5	-	-	-	1.5	-	9.1
240	4.7	-	-	-	-	-	-	-	-	0.2	-	1.0	-	0.8	1.5	-	8.2
194	4.5	-	-	-	0.8	-	-	-	-	0.8	1.5	-	-	-	-	-	7.6
195	4.5	-	-	-	0.8	-	-	-	-	0.8	1.5	-	-	-	-	-	7.6

Table 19. Adults' consumption rates of domestic fruit from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Apple	Blackberry	Blackcurrant	Blueberry	Damson	Gooseberry	Greengages	Jostaberry	Loganberry	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Tayberry	Total
196	4.5	-	-	-	0.8	-	-	-	-	0.8	1.5	-	-	-	-	-	7.6
147	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5
148	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5
149	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5
172	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5
173	7.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5
241	1.1	-	-	-	-	-	-	-	-	1.1	1.1	1.1	-	-	1.1	-	5.7
242	1.1	-	-	-	-	-	-	-	-	1.1	1.1	1.1	-	-	1.1	-	5.7
243	1.1	-	-	-	-	-	-	-	-	1.1	1.1	1.1	-	-	1.1	-	5.7
244	1.1	-	-	-	-	-	-	-	-	1.1	1.1	1.1	-	-	1.1	-	5.7
155	5.0	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	5.6
156	5.0	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	5.6
157	5.0	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	5.6
158	5.0	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	5.6
167	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
168	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
169	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
170	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
171	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	-	4.5
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	-	4.5
199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.3	-	4.3
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.3	-	4.3
301	-	-	-	-	-	-	-	-	-	-	-	2.7	-	-	-	-	2.7
302	-	-	-	-	-	-	-	-	-	-	-	2.7	-	-	-	-	2.7
303	-	-	-	-	-	-	-	-	-	-	-	2.7	-	-	-	-	2.7
304	1.1	-	-	-	-	-	-	-	-	-	1.1	-	-	-	-	-	2.3
305	1.1	-	-	-	-	-	-	-	-	-	1.1	-	-	-	-	-	2.3
18	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
19	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8

Table 19. Adults' consumption rates of domestic fruit from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Apple	Blackberry	Blackcurrant	Blueberry	Damson	Gooseberry	Greengages	Jostaberry	Loganberry	Pear	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Tayberry	Total
22	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
23	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
24	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
25	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
27	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
28	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
29	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8
249	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
250	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
251	1.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.7
208	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	1.4
209	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	1.4
153	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0
154	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0
184	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3
186	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3
187	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-	0.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of domestic fruit based on the 22 high-rate adult consumers is 19.0 kg y^{-1}

The observed 97.5th percentile rate based on 77 observations is 26.2 kg y^{-1}

Table 20. Adults' consumption rates of milk from the Berkeley and Oldbury terrestrial survey area (l y^{-1})

Observation number	Cows' milk
303	**365.0**
256	**273.8**
257	**273.8**
258	**273.8**
259	**273.8**
301	**273.8**
302	**273.8**
172	**260.7**
173	**260.7**
296	**200.8**
297	**200.8**
298	**200.8**
299	**200.8**
300	**200.8**
147	**182.5**
148	**182.5**
149	**182.5**
203	**146.0**
204	**146.0**
205	**146.0**
252	103.7
253	103.7
174	91.3
175	91.3
176	91.3
177	91.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of milk based on the 20 high-rate adult consumers is 225.9 l y^{-1}

The observed 97.5th percentile rate based on 26 observations is 308.0 l y^{-1}

Table 21. Adults' consumption rates of cattle meat from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Beef
229	42.0
230	42.0
231	42.0
232	42.0
233	42.0
234	42.0
235	42.0
236	42.0
237	42.0
296	37.8
297	37.8
298	37.8
299	37.8
300	37.8
252	23.7
253	23.7
254	23.7
255	23.7

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of cattle meat based on the 18 high-rate adult consumers is 36.8 kg y^{-1}

The observed 97.5th percentile rate based on 18 observations is 42.0 kg y^{-1}

Table 22. Adults' consumption rates of pig meat from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Pork
172	**25.3**
173	**25.3**
296	**20.2**
297	**20.2**
298	**20.2**
299	**20.2**
300	**20.2**
194	**16.9**
195	**16.9**
196	**16.9**
304	**12.7**
305	**12.7**
27	1.4
28	1.4
29	1.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of pig meat based on the 12 high-rate adult consumers is 19.0 kg y^{-1}

The observed 97.5th percentile rate based on 15 observations is 25.3 kg y^{-1}

Table 23. Adults' consumption rates of sheep meat from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Lamb
194	**11.3**
195	**11.3**
196	**11.3**
229	**11.3**
230	**11.3**
231	**11.3**
232	**11.3**
233	**11.3**
234	**11.3**
235	**11.3**
236	**11.3**
237	**11.3**
304	**11.3**
305	**11.3**
23	2.3
24	2.3
25	2.3
27	1.4
28	1.4
29	1.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of sheep meat based on the 14 high-rate adult consumers is 11.3 kg y^{-1}

The observed 97.5th percentile rate based on 20 observations is 11.3 kg y^{-1}

Table 24. Adults' consumption rates of poultry from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Duck	Pheasant	Pigeon	Total
296	**-**	**6.9**	**-**	**6.9**
297	**-**	**6.9**	**-**	**6.9**
298	**-**	**6.9**	**-**	**6.9**
299	**-**	**6.9**	**-**	**6.9**
300	**-**	**6.9**	**-**	**6.9**
23	-	-	1.2	1.2
24	-	-	1.2	1.2
239	-	1.0	-	1.0
229	0.3	0.6	-	0.9
230	0.3	0.6	-	0.9
231	0.3	0.6	-	0.9
232	0.3	0.6	-	0.9
233	0.3	0.6	-	0.9
234	0.3	0.6	-	0.9
235	0.3	0.6	-	0.9
236	0.3	0.6	-	0.9
237	0.3	0.6	-	0.9

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of poultry based on the 5 high-rate adult consumers is 6.9 kg y^{-1}

The observed 97.5th percentile rate based on 17 observations is 6.9 kg y^{-1}

Table 25. Adults' consumption rates of eggs from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Chicken egg	Duck egg	Total
172	**8.9**	**17.7**	**26.6**
173	**8.9**	**17.7**	**26.6**
249	**23.7**	**-**	**23.7**
250	**23.7**	**-**	**23.7**
251	**23.7**	**-**	**23.7**
238	**22.2**	**-**	**22.2**
239	**22.2**	**-**	**22.2**
203	**21.4**	**-**	**21.4**
204	**21.4**	**-**	**21.4**
205	**21.4**	**-**	**21.4**
10	**21.4**	**-**	**21.4**
11	**21.4**	**-**	**21.4**
190	**17.8**	**-**	**17.8**
191	**17.8**	**-**	**17.8**
192	**17.8**	**-**	**17.8**
193	**17.8**	**-**	**17.8**
35	**17.8**	**-**	**17.8**
36	**17.8**	**-**	**17.8**
37	**17.8**	**-**	**17.8**
247	**17.8**	**-**	**17.8**
248	**17.8**	**-**	**17.8**
22	**17.1**	**-**	**17.1**
296	**12.5**	**-**	**12.5**
297	**12.5**	**-**	**12.5**
298	**12.5**	**-**	**12.5**
299	**12.5**	**-**	**12.5**
300	**12.5**	**-**	**12.5**
1	**11.9**	**-**	**11.9**
2	**11.9**	**-**	**11.9**
241	**10.7**	**-**	**10.7**
242	**10.7**	**-**	**10.7**
243	**10.7**	**-**	**10.7**
244	**10.7**	**-**	**10.7**
309	**10.4**	**-**	**10.4**
310	**10.4**	**-**	**10.4**
194	**9.9**	**-**	**9.9**
195	**9.9**	**-**	**9.9**
196	**9.9**	**-**	**9.9**
27	**8.9**	**-**	**8.9**
28	**8.9**	**-**	**8.9**
29	**8.9**	**-**	**8.9**
315	8.2	-	8.2
316	8.2	-	8.2
304	7.0	-	7.0
305	7.0	-	7.0
164	5.9	-	5.9
165	5.9	-	5.9
166	5.9	-	5.9
301	5.9	-	5.9
302	5.9	-	5.9
303	5.9	-	5.9
178	-	5.9	5.9

Table 25. Adults' consumption rates of eggs from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Chicken egg	Duck egg	Total
179	-	5.9	5.9
174	4.5	-	4.5
175	4.5	-	4.5
176	4.5	-	4.5
177	4.5	-	4.5
184	4.5	-	4.5
185	4.5	-	4.5
186	4.5	-	4.5
187	4.5	-	4.5
322	4.4	-	4.4
323	4.4	-	4.4
18	4.3	-	4.3
19	4.3	-	4.3
23	0.7	-	0.7
24	0.7	-	0.7
25	0.7	-	0.7

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of eggs based on the 41 high-rate adult consumers is 16.1 kg y^{-1}

The observed 97.5th percentile rate based on 68 observations is 24.6 kg y^{-1}

Table 26. Adults' consumption rates of wild/free foods from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Blackberry	Bullace plum	Elderflower	Mulberry	Total
147	**5.0**	**-**	**-**	**-**	**5.0**
148	**5.0**	**-**	**-**	**-**	**5.0**
149	**5.0**	**-**	**-**	**-**	**5.0**
238	**1.4**	**-**	**1.4**	**-**	**2.7**
239	**1.4**	**-**	**1.4**	**-**	**2.7**
307	**1.8**	**-**	**-**	**-**	**1.8**
308	**1.8**	**-**	**-**	**-**	**1.8**
178	1.6	-	-	-	1.6
179	1.6	-	-	-	1.6
180	1.6	-	-	-	1.6
181	1.6	-	-	-	1.6
182	1.6	-	-	-	1.6
260	1.4	-	-	-	1.4
194	1.2	-	-	-	1.2
195	1.2	-	-	-	1.2
196	1.2	-	-	-	1.2
172	1.1	-	-	-	1.1
173	1.1	-	-	-	1.1
188	-	-	-	1.1	1.1
189	-	-	-	1.1	1.1
18	0.9	-	-	-	0.9
19	0.9	-	-	-	0.9
22	0.9	-	-	-	0.9
31	0.5	0.5	-	-	0.9
32	0.5	0.5	-	-	0.9
159	0.5	-	-	-	0.5
160	0.5	-	-	-	0.5
161	0.5	-	-	-	0.5
163	0.5	-	-	-	0.5
38	0.5	-	-	-	0.5
39	0.5	-	-	-	0.5
190	0.5	-	-	-	0.5
191	0.5	-	-	-	0.5
192	0.5	-	-	-	0.5
193	0.5	-	-	-	0.5
241	0.5	-	-	-	0.5
242	0.5	-	-	-	0.5
304	0.5	-	-	-	0.5
305	0.5	-	-	-	0.5
296	0.3	-	-	-	0.3
297	0.3	-	-	-	0.3
298	0.3	-	-	-	0.3
299	0.3	-	-	-	0.3
300	0.3	-	-	-	0.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild/free foods based on the 7 high-rate adult consumers is 3.4 kg y^{-1}

The observed 97.5th percentile rate based on 44 observations is 5.0 kg y^{-1}

Table 27. Adults' consumption rates of honey from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Honey
188	**3.4**
189	**3.4**
334	**2.4**
335	**2.4**
336	**2.4**
184	1.0
186	1.0
155	0.9
156	0.9
157	0.9
158	0.9
178	0.6
179	0.6
180	0.6
181	0.6
182	0.6
249	0.2
250	0.2
251	0.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of honey based on the 5 high-rate adult consumers is 2.8 kg y^{-1}

The observed 97.5th percentile rate based on 19 observations is 3.4 kg y^{-1}

Table 28. Adults' consumption rates of wild fungi from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Mushrooms
188	**2.9**
189	**2.9**
249	**1.0**
250	**1.0**
251	**1.0**
307	0.9
308	0.9
151	0.5
152	0.5
159	0.5
160	0.5
161	0.5
163	0.5
38	0.5
39	0.5
238	0.3
239	0.3
296	0.3
297	0.3
298	0.3
299	0.3
300	0.3
229	0.3
230	0.3
231	0.3
232	0.3
233	0.3
234	0.3
235	0.3
236	0.3
237	0.3

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild fungi based on the 5 high-rate adult consumers is 1.8 kg y^{-1}

The observed 97.5th percentile rate based on 31 observations is 2.9 kg y^{-1}

Table 29. Adults' consumption rates of venison from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Venison
238	0.8
239	0.8

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of venison based on the 2 high-rate adult consumers is 0.8 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.8 kg y^{-1}

Table 30. Adults' consumption rates of goat meat from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Observation number	Goat meat
23	5.4
24	5.4
25	5.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of goat meat based on the 3 high-rate adult consumers is 5.4 kg y^{-1}

The observed 97.5th percentile rate based on 3 observations is 5.4 kg y^{-1}

Table 31. Children's consumption rates of green vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Broccoli	Chard	Lettuce	Total
324	15	3.2	-	-	3.2
325	13	3.2	-	-	3.2
26	8	-	1.6	1.5	3.1

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of green vegetables for the child age group based upon the 3 high-rate consumers is 3.2 kg y^{-1}

The observed 97.5th percentile rate based on 3 observations is 3.2 kg y^{-1}

Table 32. Children's consumption rates of other vegetables from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Runner bean
324	15	5.1
325	13	5.1
3	15	4.5

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of other vegetables for the child age group based upon the 3 high-rate consumers is 4.9 kg y^{-1}

The observed 97.5th percentile rate based on 3 observations is 5.1 kg y^{-1}

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

Child age group (6 - 15 years old)

Observation number	Age	Beetroot	Carrot	Leek	Spring onion	Total
324	**15**	**6.2**	**3.4**	**-**	**-**	**9.5**
325	**13**	**6.2**	**3.4**	**-**	**-**	**9.5**
3	**15**	**2.7**	**-**	**1.5**	**-**	**4.2**
26	8	-	-	-	1.2	1.2

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of root vegetables for the child age group based upon the 3 high-rate consumers is 7.8 kg y^{-1}

The observed 97.5th percentile rate based on 4 observations is 9.5 kg y^{-1}

Table 34. Children's consumption rates of potato from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Potato
324	**15**	**12.5**
325	**13**	**12.5**
3	**15**	**9.1**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of potato for the child age group based upon the 3 high-rate consumers is 11.4 kg y^{-1}

The observed 97.5th percentile rate based on 3 observations is 12.5 kg y^{-1}

Table 35. Children's and infants' consumption rates of domestic fruit from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Apple	Damson	Greengage	Pear	Plum	Raspberry	Strawberry	Total
324	**15**	**2.9**	**2.4**	**2.4**	**-**	**2.4**	**-**	**5.1**	**15.2**
325	**13**	**2.9**	**2.4**	**2.4**	**-**	**2.4**	**-**	**5.1**	**15.2**
150	**10**	**7.5**	**-**	**-**	**-**	**-**	**-**	**-**	**7.5**
246	**8**	**1.1**	**-**	**-**	**1.1**	**1.1**	**1.1**	**1.1**	**5.7**
245	**6**	**1.1**	**-**	**-**	**1.1**	**1.1**	**1.1**	**1.1**	**5.7**
3	15	-	-	-	-	-	-	4.5	4.5
30	13	1.8	-	-	-	-	-	-	1.8
26	8	1.8	-	-	-	-	-	-	1.8

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of domestic fruit for the child age group based upon the 5 high-rate consumers is 9.8 kg y^{-1}

The observed 97.5th percentile rate based on 8 observations is 15.2 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Apple	Damson	Greengage	Pear	Plum	Raspberry	Strawberry	Total
20	**5**	**0.9**	**-**	**-**	**-**	**-**	**-**	**-**	**0.9**
21	**4**	**0.9**	**-**	**-**	**-**	**-**	**-**	**-**	**0.9**

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 0.9 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.9 kg y^{-1}

Table 36. Children's consumption rates of milk from the Berkeley and Oldbury terrestrial survey area (l y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Cows' milk
150	10	182.5
206	14	146.0
207	12	146.0

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 158.2 l y^{-1}

The observed 97.5th percentile rate based on 3 observations is 180.7 l y^{-1}

Table 37. Children's consumption rates of pig meat from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Pork
30	13	1.4

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of pig meat for the child age group based upon the only high-rate consumer is 1.4 kg y^{-1}

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

Table 38. Children's consumption rates of sheep meat from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Lamb
26	**8**	**1.7**
30	**13**	**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 2 high-rate consumers is 1.5 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 1.7 kg y^{-1}

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

Child age group (6 - 15 years old)

Observation number	Age	Chicken egg
206	**14**	**21.4**
207	**12**	**21.4**
3	**15**	**11.9**
30	**13**	**8.9**
246	8	5.3
245	6	5.3
324	15	4.4
325	13	4.4
26	8	0.7

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of eggs for the child age group based upon the 4 high-rate consumers is 15.9 kg y^{-1}

The observed 97.5th percentile rate based on 9 observations is 21.4 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Chicken egg
20	**5**	**4.3**
21	**4**	**4.3**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of eggs for the infant age group based upon the 2 high-rate consumers is 4.3 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 4.3 kg y^{-1}

Table 40. Children's and infants' consumption rates of wild/free foods from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Blackberry
150	**10**	**5.0**
162	11	0.5

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild/free foods for the child age group based upon the only high-rate consumer is 5.0 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 4.9 kg y^{-1}

Infant age group (0 - 5 years old)

Observation number	Age	Blackberry
20	**5**	**0.9**
21	**4**	**0.9**

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of wild/free foods for the infant age group based upon the 2 high-rate consumers is 0.9 kg y^{-1}

The observed 97.5th percentile rate based on 2 observations is 0.9 kg y^{-1}

Table 41. Children's consumption rates of wild fungi from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Mushrooms
162	11	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 only high-rate consumer is 0.5 kg y^{-1}

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

Table 42. Children's consumption rates of goat meat from the Berkeley and Oldbury terrestrial survey area (kg y^{-1})

Child age group (6 - 15 years old)

Observation number	Age	Goat meat
26	8	4.1

Notes

Emboldened observations are the high-rate consumers

The mean consumption rate of goat meat for the child age group based upon the only high-rate consumer is 4.1 kg y^{-1}

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

Table 43. Percentage contribution each food type makes to its terrestrial food group for adults

Green vegetables	
Cabbage	40.67 %
Cucumber	18.07 %
Brussel sprout	11.92 %
Lettuce	8.32 %
Courgette	8.17 %
Broccoli	6.67 %
Cauliflower	3.53 %
Chard	1.62 %
Herbs	0.56 %
Rocket	0.46 %
Other vegetables	
Tomato	32.05 %
Runner bean	29.62 %
French bean	15.24 %
Broad bean	10.53 %
Pea	7.15 %
Squash	2.12 %
Sweetcorn	2.09 %
Mangetout	0.45 %
Pumpkin	0.36 %
Pepper	0.36 %
Chilli pepper	0.02 %
Root vegetables	
Onion	25.82 %
Beetroot	24.27 %
Carrot	20.82 %
Leek	19.65 %
Parsnip	5.47 %
Swede	2.46 %
Spring onion	0.78 %
Celeriac	0.32 %
Garlic	0.25 %
Radish	0.11 %
Fennel	0.06 %
Potato	
Potato	100.00 %
Domestic fruit	
Apple	56.07 %
Strawberry	12.31 %
Plum	8.69 %
Raspberry	5.71 %
Blackcurrant	3.37 %
Gooseberry	2.85 %
Rhubarb	2.27 %
Damson	2.10 %
Pear	1.83 %
Redcurrant	1.44 %
Blackberry	1.13 %
Greengage	0.72 %
Loganberry	0.69 %
Blueberry	0.34 %
Jostaberry	0.34 %
Tayberry	0.14 %
Milk	
Cows' milk	100.00 %
Cattle meat	
Beef	100.00 %
Pig meat	
Pork	100.00 %
Sheep meat	
Lamb	100.00 %
Poultry	
Pheasant	89.04 %
Duck	5.92 %
Pigeon	5.04 %
Eggs	
Chicken egg	94.05 %
Duck egg	5.95 %
Wild/free foods	
Blackberry	89.04 %
Elderflower	5.06 %
Mulberry	4.22 %
Bullace plum	1.69 %
Honey	
Honey	100.00 %
Wild fungi	
Mushrooms	100.00 %
Venison	
Venison	100.00 %
Goat meat	
Goat	100.00 %

Notes

Food types in emboldened italics were monitored by FSA in 2013 (EA, FSA, NIEA and SEPA, 2014).
Wheat was also monitored.
Percentages are based on the consumption of all adults in the survey consuming that particular food group.

Table 44. Direct radiation occupancy rates for adults, children and infants in the Berkeley and Oldbury areas (h y^{-1})

Observation number	Sex	Age (years)	Main activity	Indoor occupancy	Outdoor occupancy	Total occupancy
Berkeley						
0 to 0.25 km zone						
35	M	71	Residing	4600	4004	8604
36	F	70	Residing	4600	4004	8604
37	M	42	Residing	4600	4004	8604
>0.25 to 0.5 km zone						
See Annex 3 for estimated data						
>0.5 to 1 km zone						
38	M	38	Residing	4899	2625	7524
51	M	U	Working	2048	50	2098
52	M	U	Working	2048	50	2098
53	M	U	Working	2048	50	2098
54	M	U	Working	2048	50	2098
55	M	U	Working	2048	50	2098
56	M	U	Working	2048	50	2098
57	M	U	Working	2048	50	2098
58	M	U	Working	2048	50	2098
59	M	U	Working	2048	50	2098
60	M	U	Working	2048	50	2098
61	F	U	Working	2048	50	2098
62	F	U	Working	2048	50	2098
63	F	U	Working	2048	50	2098
64	F	U	Working	2048	50	2098
41	M	U	Working	1955	115	2070
42	M	U	Working	1955	115	2070
43	M	U	Working	1955	115	2070
44	M	U	Working	1955	115	2070
45	M	U	Working	1955	115	2070
46	F	U	Working	1955	115	2070
47	F	U	Working	1955	115	2070
74	M	U	Working	1992	56	2048
75	M	U	Working	1992	56	2048
76	F	U	Working	1992	56	2048
77	F	U	Working	1992	56	2048
78	M	U	Working	1696	56	1752
79	F	U	Working	1696	56	1752
80	F	U	Working	1696	56	1752
81	F	U	Working	1696	56	1752
82	F	U	Working	1696	56	1752
83	F	U	Working	1696	56	1752
84	M	U	Working	1468	284	1752
85	M	U	Working	1468	284	1752
86	M	U	Working	1468	284	1752
87	M	U	Working	1468	284	1752
88	M	U	Working	1468	284	1752
89	M	U	Working	1468	284	1752
40	M	U	Farming	-	1050	1050
48	M	U	Working	482	70	552
49	M	U	Working	482	70	552
50	M	U	Working	482	70	552
39	F	U	Visiting	250	250	500
65	U	U	Working	200	50	250
66	U	U	Working	200	50	250
67	U	U	Working	200	50	250
68	U	U	Working	200	50	250
69	U	U	Working	200	50	250
70	U	U	Working	200	50	250
71	U	U	Working	200	50	250

Table 44. Direct radiation occupancy rates for adults, children and infants in the Berkeley and Oldbury areas (h y^{-1})

Observation number	Sex	Age (years)	Main activity	Indoor occupancy	Outdoor occupancy	Total occupancy
72	U	U	Working	200	50	250
73	U	U	Working	200	50	250
90	M	U	Working	100	52	152
91	M	U	Working	100	52	152
92	M	U	Working	100	52	152
Oldbury						
0 to 0.25 km zone						
-	-	-	-	-	-	-
>0.25 to 0.5 km zone						
306	M	U	Farming	-	91	91
>0.5 to 1 km zone						
23	M	38	Residing	7116	1444	8560
1	F	55	Residing	4206	4284	8490
28	F	42	Residing	6884	1530	8414
10	M	72	Residing	6068	2106	8174
11	F	66	Residing	6419	1755	8174
24	F	42	Residing	5709	1872	7581
19	F	36	Residing	7174	350	7524
22	F	65	Residing	6649	875	7524
14	M	U	Residing	6024	1400	7424
15	F	U	Residing	6024	1400	7424
26	M	8	Residing	6648	540	7188
25	F	23	Residing	5352	1728	7080
3	F	15	Residing	5328	1500	6828
29	M	17	Residing	5644	1064	6708
30	M	13	Residing	5644	1064	6708
20	M	5	Residing	5959	700	6659
21	M	4	Residing	5959	700	6659
2	M	U	Residing	5583	765	6348
16	F	4	Residing	5864	260	6124
17	M	2	Residing	5864	260	6124
12	M	53	Residing	4770	1304	6074
27	M	43	Residing	5434	608	6042
13	F	53	Residing	5648	338	5986
18	M	40	Residing	4474	1050	5524
31	M	28	Residing	3762	138	3900
32	F	27	Residing	3762	138	3900
33	M	U	Working	1728	576	2304
34	F	U	Working	960	480	1440
4	M	U	Horse riding	-	700	700
5	M	U	Horse riding	-	700	700
6	M	U	Horse riding	-	700	700
7	F	U	Horse riding	-	700	700
8	F	U	Horse riding	-	700	700
9	F	U	Horse riding	-	700	700
260	F	69	Tending an allotment plot	-	217	217
307	M	68	Tending an allotment plot	-	196	196
308	F	68	Tending an allotment plot	-	196	196

Notes

U = Unknown

Table 45. Analysis of direct radiation occupancy rates for adults, children and infants in the Berkeley and Oldbury areas

Berkeley	
Number of hours	Number of observations
0 to 0.25 km zone	
8000 to 8760	3
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	0
0 to 8760	**3**
>0.25 to 0.5 km zone	
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	0
0 to 8760	**0**
>0.5 to 1 km zone	
8000 to 8760	0
7000 to 8000	1
6000 to 7000	0
5000 to 6000	0
4000 to 5000	0
3000 to 4000	0
2000 to 3000	25
1000 to 2000	13
0 to 1000	16
0 to 8760	**55**

Oldbury	
Number of hours	Number of observations
0 to 0.25 km zone	
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	0
0 to 8760	**0**
>0.25 to 0.5 km zone	
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	1
0 to 8760	**1**
>0.5 to 1 km zone	
8000 to 8760	5
7000 to 8000	7
6000 to 7000	10
5000 to 6000	2
4000 to 5000	0
3000 to 4000	2
2000 to 3000	1
1000 to 2000	1
0 to 1000	9
0 to 8760	**37**

Table 46. Gamma dose rate measurements for the Berkeley and Oldbury direct radiation surveys (μGy h^{-1})

Location	Indoor substrate	Indoor gamma dose rate at 1 metre[a]	Outdoor substrate	Outdoor gamma dose rate at 1 metre[a]
Residences and businesses				
Berkeley				
Residence 1	Concrete	0.080	Grass	0.073
Residence 2	Concrete	0.091	Grass	0.065
Business 1	Wood	0.055	Grass	0.071
Business 2	Concrete	0.058	Grass	0.071
Oldbury				
Residence 1	Concrete	0.071	Grass	0.068
Residence 2	Concrete	0.079	Grass	0.074
Residence 3	Concrete	0.063	Grass	0.075
Residence 4	Concrete	0.086	Grass	0.078
Residence 5	Concrete	0.068	-	-
Residence 6	Concrete	0.092	-	-
Business 1	Concrete	0.059	Grass	0.077

Backgrounds				
	Location	**National Grid Reference**	**Substrate**	**Background gamma dose rate at 1 metre**
Background 1	Old Down, west of Alveston	ST 617 876	Grass	0.062
Background 2	Tortworth	ST 694 926	Grass	0.072
Background 3	Near Woolaston	ST 588 992	Grass	0.066

Notes

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

Table 47. Combinations of adult pathways for consideration in dose assessments in the Berkeley and Oldbury area

Combination number	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wildfree foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat over mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
1					X	X	X	X	X						X																	X	X
2					X	X			X						X	X																X	X
3					X		X		X				X	X	X					X												X	X
4									X			X	X		X																	X	X
5																X										X						X	X
6																X		X														X	X
7									X	X						X														X			
8	X																						X	X				X			X		
9																								X		X							
10	X																					X			X	X							
11					X	X	X	X	X						X		X																
12				X												X		X															
13					X	X	X	X	X	X		X			X	X																	
14															X	X	X																
15					X	X	X	X	X							X	X	X															
16					X	X	X	X	X			X	X		X	X																	
17																						X								X	X		
18	X																				X					X		X	X		X		
19											X		X	X				X															
20					X	X	X	X	X					X	X	X		X	X														
21									X						X		X	X															
22			X		X	X	X			X	X	X		X	X	X		X															
23					X	X	X	X	X							X																	X
24																							X						X		X		
25					X	X	X									X		X															X
26	X	X																			X							X			X		
27			X																		X							X			X		
28	X																						X			X		X	X				
29																											X				X		
30			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: green vegetables, other vegetables, root vegetables, potato, domestic fruit, eggs, indoor and outdoor occupancy within 1 km of the licensed site boundary.

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
1	F	55	-	-	-	-	-	4.5	4.2	9.1	4.5	-	-	-	-	-	**11.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4206	4284
2	M	U	-	-	-	-	-	4.5	4.2	9.1	4.5	-	-	-	-	-	**11.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5583	765
4	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
5	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
6	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
7	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
8	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
9	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
10	M	72	-	-	-	-	3.0	**22.7**	**41.5**	**63.7**	-	-	-	-	-	-	**21.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6068	2106
11	F	66	-	-	-	-	3.0	**22.7**	**41.5**	**63.7**	-	-	-	-	-	-	**21.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6419	1755
12	M	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4770	1304
13	F	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5648	338
14	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6024	1400
15	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6024	1400
18	M	40	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	4.3	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4474	1050
19	F	36	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	4.3	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7174	350
22	F	65	-	-	-	-	5.0	10.9	-	-	1.8	-	-	-	-	-	**17.1**	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6649	875
23	M	38	-	-	-	-	3.1	-	1.2	-	1.8	-	-	-	2.3	1.2	0.7	-	-	-	-	**5.4**	-	-	-	-	-	-	-	-	-	-	7116	1444
24	F	42	-	-	-	-	3.1	-	1.2	-	1.8	-	-	-	2.3	1.2	0.7	-	-	-	-	**5.4**	-	-	-	-	-	-	-	-	-	-	5709	1872
25	F	23	-	-	-	-	3.1	-	1.2	-	1.8	-	-	-	2.3	-	0.7	-	-	-	-	**5.4**	-	-	-	-	-	-	-	-	-	-	5352	1728
27	M	43	-	-	-	-	-	-	-	-	1.8	-	-	1.4	1.4	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5434	608
28	F	42	-	-	-	-	-	-	-	-	1.8	-	-	1.4	1.4	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6884	1530
29	M	17	-	-	-	-	-	-	-	-	1.8	-	-	1.4	1.4	-	**8.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5644	1064
31	M	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	2	-	-	-	-	-	3762	138
32	F	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	2	-	-	-	-	-	3762	138
33	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1728	576
34	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	960	480
35	M	71	-	-	-	-	**20.3**	6.1	**20.4**	**24.3**	9.1	-	-	-	-	-	**17.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4600	4004
36	F	70	-	-	-	-	**20.3**	6.1	**20.4**	**24.3**	9.1	-	-	-	-	-	**17.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4600	4004
37	M	42	-	-	-	-	**20.3**	6.1	**20.4**	**24.3**	9.1	-	-	-	-	-	**17.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4600	4004
38	M	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	4899	2625

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
39	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	250	250
40	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1050
41	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
42	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
43	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
44	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
45	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
46	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
47	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
48	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	482	70
49	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	482	70
50	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	482	70
51	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
52	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
53	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
54	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
55	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
56	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
57	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
58	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
59	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
60	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
61	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
62	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
63	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
64	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
65	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
66	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
67	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
68	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
69	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
70	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
71	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
72	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
73	U	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	50
74	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1992	56
75	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1992	56
76	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1992	56
77	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1992	56
78	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
79	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
80	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
81	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
82	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
83	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
84	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1468	284
85	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1468	284
86	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1468	284
87	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1468	284
88	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1468	284
89	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1468	284
90	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	52
91	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	52
92	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	52
93	M	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-
94	F	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-
95	M	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	340	-	-	-
96	M	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	340	-	-	-
97	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	72	-	-
98	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	72	-	-
99	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	72	-	-
100	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	72	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
101	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	72	-	-
102	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	72	-	-
103	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-
104	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-
105	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25	-	-	-	-	-	-	-	-
106	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**12**	13	-	-	-	-	-	-	-	-
107	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**12**	13	-	-	-	-	-	-	-	-
108	F	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-
109	F	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-
110	M	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38	-	-	-	-	-	-	-	-
111	F	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38	-	-	-	-	-	-	-	-
112	M	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120	-	-	-
113	M	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	70	-	-	-
114	M	41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	260	-	-	-
115	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
116	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
117	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
118	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
119	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
120	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
121	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
122	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	-	-
123	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	-	-
124	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	-	-
125	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	-	-
126	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	-	-
127	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	-	-
128	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	-	-
129	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	-	-
130	M	U	**10.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	**27**	-	-	-	**64**	-	-	32	-	-
131	F	U	**10.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
132	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	**27**	-	-	-	**64**	-	-	32	-	-
133	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	**14**	-	-	-	32	-	-	16	-	-
134	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	**14**	-	-	-	32	-	-	16	-	-
135	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	**14**	-	-	-	32	-	-	16	-	-
136	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	**14**	-	-	-	32	-	-	16	-	-
137	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	4	-	-	2	-	-
138	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	4	-	-	2	-	-
139	F	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**52**	-	-	-	-	-	-	-
140	F	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-
141	F	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-
144	M	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-
145	M	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**60**	-	-	-	-	-	-	-
146	F	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**60**	-	-	-	-	-	-	-
147	M	54	-	-	-	-	-	-	-	-	7.5	**182.5**	-	-	-	-	-	**5.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
148	F	46	-	-	-	-	-	-	-	-	7.5	**182.5**	-	-	-	-	-	**5.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
149	F	16	-	-	-	-	-	-	-	-	7.5	**182.5**	-	-	-	-	-	**5.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	79	-	-	-
151	M	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
152	M	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
153	M	U	-	-	-	-	8.5	10.8	-	9.1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
154	F	U	-	-	-	-	8.5	10.8	-	9.1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
155	M	U	-	-	-	-	-	3.3	-	-	5.6	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
156	F	U	-	-	-	-	-	3.3	-	-	5.6	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157	F	24	-	-	-	-	-	3.3	-	-	5.6	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
158	M	22	-	-	-	-	-	3.3	-	-	5.6	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
159	M	53	-	-	-	**10.0**	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	F	48	-	-	-	**10.0**	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
161	M	16	-	-	-	**10.0**	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
163	F	18	-	-	-	**10.0**	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
164	M	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
165	F	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
166	F	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
167	M	76	-	-	-	-	-	2.2	5.1	3.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
168	F	75	-	-	-	-	-	2.2	5.1	3.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
169	M	U	-	-	-	-	-	2.2	5.1	3.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
170	F	U	-	-	-	-	-	2.2	5.1	3.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
171	F	U	-	-	-	-	-	2.2	5.1	3.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
172	M	59	-	-	-	-	4.6	4.1	6.1	6.8	7.5	**260.7**	-	**25.3**	-	-	**26.6**	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
173	F	57	-	-	-	-	4.6	4.1	6.1	6.8	7.5	**260.7**	-	**25.3**	-	-	**26.6**	1.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
174	M	17	-	-	-	-	-	-	-	-	-	91.3	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
175	M	49	-	-	-	-	-	-	-	-	-	91.3	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
176	F	48	-	-	-	-	-	-	-	-	-	91.3	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
177	M	21	-	-	-	-	-	-	-	-	-	91.3	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
178	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	1.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
179	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	1.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
180	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
181	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
182	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
183	M	36	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**78**	-	156	-	-	-	-	-	-	-
184	M	49	-	-	-	-	2.3	4.5	8.4	10.8	0.3	-	-	-	-	-	4.5	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
185	F	49	-	-	-	-	2.3	4.5	8.4	10.8	**12.8**	-	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
186	M	22	-	-	-	-	2.3	4.5	8.4	10.8	0.3	-	-	-	-	-	4.5	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
187	F	26	-	-	-	-	2.3	4.5	8.4	10.8	0.3	-	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
188	M	67	-	-	-	-	**34.1**	**48.0**	**17.1**	8.1	**28.9**	-	-	-	-	-	-	1.1	**3.4**	**2.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
189	F	67	-	-	-	-	**34.1**	**48.0**	**17.1**	8.1	**28.9**	-	-	-	-	-	-	1.1	**3.4**	**2.9**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
190	M	19	-	-	-	-	-	2.7	3.2	4.6	-	-	-	-	-	-	**17.8**	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
191	M	56	-	-	-	-	-	2.7	3.2	4.6	-	-	-	-	-	-	**17.8**	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
192	F	24	-	-	-	-	-	2.7	3.2	4.6	-	-	-	-	-	-	**17.8**	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
193	F	84	-	-	-	-	-	2.7	3.2	4.6	-	-	-	-	-	-	**17.8**	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
194	F	63	-	-	-	-	7.5	**23.3**	**22.5**	**25.5**	7.6	-	-	**16.9**	**11.3**	-	**9.9**	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
195	M	71	-	-	-	-	7.5	**23.3**	**22.5**	**25.5**	7.6	-	-	**16.9**	**11.3**	-	**9.9**	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
196	M	93	-	-	-	-	7.5	**23.3**	**22.5**	**25.5**	7.6	-	-	**16.9**	**11.3**	-	**9.9**	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
197	M	66	-	-	-	-	4.0	**37.2**	**22.0**	**41.0**	**11.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
198	F	64	-	-	-	-	4.0	**37.2**	**22.0**	**41.0**	**11.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
199	F	43	-	-	-	-	**12.6**	**24.5**	6.5	15.5	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
200	M	61	-	-	-	-	**12.6**	**24.5**	6.5	15.5	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
201	M	67	-	-	-	-	10.5	**26.7**	12.4	17.7	9.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
202	F	66	-	-	-	-	10.5	**26.7**	12.4	17.7	9.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
203	M	47	-	-	-	-	-	-	-	-	-	**146.0**	-	-	-	-	**21.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
204	F	48	-	-	-	-	-	-	-	-	-	**146.0**	-	-	-	-	**21.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
205	M	16	-	-	-	-	-	-	-	-	-	**146.0**	-	-	-	-	**21.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
208	M	74	-	-	-	-	2.9	11.8	8.5	9.1	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
209	F	73	-	-	-	-	2.9	11.8	8.5	9.1	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
210	M	68	-	-	-	-	**14.5**	**28.4**	13.0	16.4	**16.3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
211	F	68	-	-	-	-	**14.5**	**28.4**	13.0	16.4	**16.3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
212	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	-	-	-	-	-	-
213	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	-	-	-	-	-	-
214	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	-	-	-	-	-	-
215	F	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-
216	M	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	-	-	-	-	-	-	-	-	-
220	F	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**72**	-	-	-	-	-	-	32	16	-	-
221	M	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**72**	-	-	-	-	-	-	32	16	-	-
224	M	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
227	M	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**30**	-	-	-	-	-	-	30	-	-	-	-
228	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**30**	-	-	-	-	-	-	30	-	-	-	-
229	M	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
230	F	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
231	M	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
232	F	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
233	M	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
234	F	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
235	M	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
236	F	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
237	M	U	-	-	-	-	-	-	-	-	-	-	**42.0**	-	**11.3**	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
238	F	55	-	-	-	-	**29.9**	**23.2**	**25.9**	13.1	**17.8**	-	-	-	-	-	**22.2**	**2.7**	-	0.3	**0.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
239	M	55	-	-	-	-	**29.9**	**23.2**	**25.9**	13.1	**17.8**	-	-	-	-	1.0	**22.2**	**2.7**	-	0.3	**0.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
240	F	27	-	-	-	-	**14.9**	11.6	12.9	6.6	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
241	M	66	-	-	-	-	-	-	-	-	5.7	-	-	-	-	-	**10.7**	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
242	F	61	-	-	-	-	-	-	-	-	5.7	-	-	-	-	-	**10.7**	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
243	M	39	-	-	-	-	-	-	-	-	5.7	-	-	-	-	-	**10.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
244	F	32	-	-	-	-	-	-	-	-	5.7	-	-	-	-	-	**10.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
247	M	47	-	-	-	-	-	-	-	-	**13.0**	-	-	-	-	-	**17.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
248	F	43	-	-	-	-	-	-	-	-	**13.0**	-	-	-	-	-	**17.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
249	M	55	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	**23.7**	-	0.2	**1.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
250	F	56	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	**23.7**	-	0.2	**1.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
251	F	83	-	-	-	-	-	-	-	-	1.7	-	-	-	-	-	**23.7**	-	0.2	**1.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
252	M	U	-	-	-	-	-	-	-	-	-	103.7	**23.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
253	M	U	-	-	-	-	-	-	-	-	-	103.7	**23.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
254	M	U	-	-	-	-	-	-	-	-	-	-	**23.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
255	F	U	-	-	-	-	-	-	-	-	-	-	**23.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
256	F	67	-	-	-	-	5.6	1.4	1.4	**47.8**	**19.5**	**273.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
257	M	68	-	-	-	-	5.6	1.4	1.4	**47.8**	**19.5**	**273.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
258	M	40	-	-	-	-	5.6	1.4	1.4	**47.8**	**19.5**	**273.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
259	F	33	-	-	-	-	5.6	1.4	1.4	**47.8**	**19.5**	**273.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
260	F	69	-	-	-	-	10.8	6.0	4.7	2.7	**25.9**	-	-	-	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	217
261	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
262	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
263	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
264	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
265	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
266	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
267	M	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	5	-	48	-	-
268	M	71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	4	-	119	-	-
269	M	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	440	-	-
270	F	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	440	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
271	M	42	**12.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	-	-	-	-	-	-	-	-
272	M	U	**12.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	96	-	-	-	-	-	-	-	-
273	F	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-
274	M	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-
275	M	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**26**	-	-	-	-	-	-	-
276	F	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**26**	-	-	-	-	-	-	-
280	M	U	**12.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**273**	-	-	-	-	-	-	-	-
281	F	U	**12.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
282	M	U	**12.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**273**	-	-	-	-	-	-	-	-
283	F	U	**12.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
284	M	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-
285	F	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-
286	M	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-
287	F	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-
288	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**182**	-	182	-	-	-	-	-	-	-	-
289	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**182**	-	182	-	-	-	-	-	-	-	-
290	M	38	**10.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**116**	-	84	10	-	-	-	-	-	-	-
291	M	35	**10.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**116**	-	84	10	-	-	-	-	-	-	-
292	M	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**60**	-	-	-	-	-	-	-
293	F	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**60**	-	-	-	-	-	-	-
294	M	U	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**208**	-	-	-	-	-	-	-	-
295	F	U	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
296	F	46	-	-	0.5	-	1.2	4.7	1.6	-	-	**200.8**	**37.8**	**20.2**	-	**6.9**	**12.5**	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
297	M	46	-	-	0.5	-	1.2	4.7	1.6	-	-	**200.8**	**37.8**	**20.2**	-	**6.9**	**12.5**	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
298	M	22	-	-	0.5	-	1.2	4.7	1.6	-	-	**200.8**	**37.8**	**20.2**	-	**6.9**	**12.5**	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
299	M	20	-	-	0.5	-	1.2	4.7	1.6	-	-	**200.8**	**37.8**	**20.2**	-	**6.9**	**12.5**	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300	M	17	-	-	0.5	-	1.2	4.7	1.6	-	-	**200.8**	**37.8**	**20.2**	-	**6.9**	**12.5**	0.3	-	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
301	F	59	-	-	-	-	10.9	15.4	9.1	12.1	2.7	**273.8**	-	-	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
302	M	64	-	-	-	-	10.9	15.4	9.1	12.1	2.7	**273.8**	-	-	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
303	M	27	-	-	-	-	10.9	15.4	9.1	12.1	2.7	**365.0**	-	-	-	-	5.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
304	M	72	-	-	-	-	-	-	-	-	2.3	-	-	**12.7**	**11.3**	-	7.0	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
305	F	67	-	-	-	-	-	-	-	-	2.3	-	-	**12.7**	**11.3**	-	7.0	0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
306	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	91
307	M	68	-	-	-	-	**18.7**	3.6	**34.0**	-	-	-	-	-	-	-	-	**1.8**	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	196
308	F	68	-	-	-	-	**18.7**	3.6	**34.0**	-	-	-	-	-	-	-	-	**1.8**	-	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-	196
309	M	75	-	-	-	-	**16.0**	**23.2**	**21.5**	**41.0**	**21.8**	-	-	-	-	-	**10.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
310	F	71	-	-	-	-	**16.0**	**23.2**	**21.5**	**41.0**	**24.3**	-	-	-	-	-	**10.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
311	M	U	**7.0**	**0.3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**10**	-	-	-	-	-	**45**	-	-	45	-	-
312	F	U	**7.0**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
313	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**10**	-	-	-	-	-	**45**	-	-	45	-	-
314	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**10**	-	-	-	-	-	**45**	-	-	45	-	-
315	M	77	-	-	-	-	**26.7**	9.2	**19.6**	**68.6**	**24.6**	-	-	-	-	-	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
316	F	76	-	-	-	-	**26.7**	9.2	**19.6**	**68.6**	**24.6**	-	-	-	-	-	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
317	M	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**351**	-	-	-	-	-	-	-	-
318	F	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**351**	-	-	-	-	-	-	-	-
321	M	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**548**	-	-	-	-	-	-	-	-
322	M	49	-	-	-	-	3.2	5.1	9.5	12.5	**15.2**	-	-	-	-	-	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
323	F	51	-	-	-	-	3.2	5.1	9.5	12.5	**15.2**	-	-	-	-	-	4.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
326	M	U	-	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	18	-	-	18	-	-
327	F	U	-	-	**1.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
328	M	U	**4.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**105**	-	-	-	11	-	-	**77**	28	-	-	-	-
329	F	U	**4.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
330	M	U	**11.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**20**	-	-	30	-	-	**129**	20	-	129	-	-
331	F	U	**11.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
332	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1530	-	-	-	150	-	-
333	M	60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**7288**	-	-	-	120	-	-
334	M	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	F	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
336	F	66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
337	M	51	-	-	**0.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	6	-	-	-	18	-	-	-	-
338	F	47	-	-	**0.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
339	F	17	-	-	**0.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Observation number	Sex	Age (years)	Fish	Crustaceans	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Venison	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and sand	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Intertidal occupancy on a boat on mud	Handling fishing gear	Handling sediment	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
341	M	U	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	42	-	-	-	-	-	-	-	42	-	-	-	-
342	F	U	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
343	M	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**150**	-	-	-	-	-	-	-	**150**	-	-	-	-

Notes

Emboldened observations are the high-rate individuals

U = Unknown

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

Observation number	Sex	Age (years)	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Pig meat	Sheep meat	Eggs	Wild/free foods	Wild fungi	Goat meat	Intertidal occupancy over mud and stones	Intertidal occupancy over rock	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
Child age group (6 - 15 years old)																								
3	F	15	-	-	-	**4.5**	**4.2**	**9.1**	4.5	-	-	-	**11.9**	-	-	-	-	-	-	-	-	-	5328	1500
26	M	8	-	-	**3.1**	-	1.2	-	1.8	-	-	**1.7**	0.7	-	-	**4.1**	-	-	-	-	-	-	6648	540
30	M	13	-	-	-	-	-	-	1.8	-	**1.4**	**1.4**	**8.9**	-	-	-	-	-	-	-	-	-	5644	1064
150	M	10	-	-	-	-	-	-	**7.5**	**182.5**	-	-	-	**5.0**	-	-	-	-	-	-	79	-	-	-
162	M	11	-	**10.0**	-	-	-	-	-	-	-	-	-	0.5	**0.5**	-	-	-	-	-	-	-	-	-
206	F	14	-	-	-	-	-	-	-	**146.0**	-	-	**21.4**	-	-	-	-	-	-	-	-	-	-	-
207	F	12	-	-	-	-	-	-	-	**146.0**	-	-	**21.4**	-	-	-	-	-	-	-	-	-	-	-
217	F	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**24**	-	-	-	-	-	-	-
222	F	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**72**	-	-	-	32	16	-	-
223	M	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**72**	-	-	-	32	16	-	-
225	M	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
226	F	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
245	F	6	-	-	-	-	-	-	**5.7**	-	-	-	5.3	-	-	-	-	-	-	-	-	-	-	-
246	M	8	-	-	-	-	-	-	**5.7**	-	-	-	5.3	-	-	-	-	-	-	-	-	-	-	-
278	F	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**26**	-	-	-	-
279	M	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**26**	-	-	-	-
319	M	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**12**	**50**	-	-	-	-	-
320	M	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**12**	**50**	-	-	-	-	-
324	M	15	-	-	**3.2**	**5.1**	**9.5**	**12.5**	**15.2**	-	-	-	4.4	-	-	-	-	-	-	-	-	-	-	-
325	F	13	-	-	**3.2**	**5.1**	**9.5**	**12.5**	**15.2**	-	-	-	4.4	-	-	-	-	-	-	-	-	-	-	-
340	F	14	**0.7**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infant age group (0 - 5 years old)																								
16	F	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5864	260
17	M	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5864	260
20	M	5	-	-	-	-	-	-	**0.9**	-	-	-	**4.3**	**0.9**	-	-	-	-	-	-	-	-	5959	700
21	M	4	-	-	-	-	-	-	**0.9**	-	-	-	**4.3**	**0.9**	-	-	-	-	-	-	-	-	5959	700
142	F	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**12**	-	-	-	-
143	M	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**12**	-	-	-	-
218	M	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**24**	-	-	-	-	-	-	-
219	M	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**24**	-	-	-	-	-	-	-
277	F	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	**26**	-	-	-	-

Notes

Emboldened observations are the high-rate individuals

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

Estimated direct radiation occupancy rates in the Berkeley >0.25 to 0.5 km zone (h y^{-1})				
Sex	**Age (years)**	**Estimated indoor occupancy**	**Estimated outdoor occupancy**	**Estimated total occupancy**
M	U	5506	518	6024
F	U	5506	518	6024
M	U	5506	518	6024
F	U	5506	518	6024

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 Berkeley and Oldbury area, for use in foetal dose assessments

Observation number	Sex	Age (years)	Fish	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and stones	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
3	F	15	-	-	-	-	4.5	4.2	9.1	4.5	-	-	-	-	-	11.9	-	-	-	-	-	-	-	-	-	-	5328	1500
7	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
8	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
9	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700
15	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6024	1400
19	F	36	-	-	-	-	-	-	-	1.8	-	-	-	-	-	4.3	0.9	-	-	-	-	-	-	-	-	-	7174	350
24	F	42	-	-	-	3.1	-	1.2	-	1.8	-	-	-	2.3	1.2	0.7	-	-	-	5.4	-	-	-	-	-	-	5709	1872
25	F	23	-	-	-	3.1	-	1.2	-	1.8	-	-	-	2.3	-	0.7	-	-	-	5.4	-	-	-	-	-	-	5352	1728
28	F	42	-	-	-	-	-	-	-	1.8	-	-	1.4	1.4	-	8.9	-	-	-	-	-	-	-	-	-	-	6884	1530
32	F	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	-	-	-	-	-	2	-	-	-	3762	138
34	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	960	480
39	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	250	250
46	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
47	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1955	115
61	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
62	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
63	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
64	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2048	50
76	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1992	56
77	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1992	56
79	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
80	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
81	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
82	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
83	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1696	56
101	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	72	-	-
102	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	72	-	-

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 Berkeley and Oldbury area, for use in foetal dose assessments

Observation number	Sex	Age (years)	Fish	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and stones	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
124	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	-	-
125	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	168	-	-
128	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	-	-
129	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	84	-	-
131	F	U	10.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
139	F	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	52	-	-	-	-
140	F	33	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
141	F	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-
146	F	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	-	-	-	-
149	F	16	-	-	-	-	-	-	-	7.5	182.5	-	-	-	-	-	5.0	-	-	-	-	-	-	-	79	-	-	-
154	F	U	-	-	-	8.5	10.8	-	9.1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
156	F	U	-	-	-	-	3.3	-	-	5.6	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-
157	F	24	-	-	-	-	3.3	-	-	5.6	-	-	-	-	-	-	-	0.9	-	-	-	-	-	-	-	-	-	-
163	F	18	-	-	10.0	-	-	-	-	-	-	-	-	-	-	-	0.5	-	0.5	-	-	-	-	-	-	-	-	-
170	F	U	-	-	-	-	2.2	5.1	3.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
171	F	U	-	-	-	-	2.2	5.1	3.6	5.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
179	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	1.6	0.6	-	-	-	-	-	-	-	-	-	-
182	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	0.6	-	-	-	-	-	-	-	-	-	-
187	F	26	-	-	-	2.3	4.5	8.4	10.8	0.3	-	-	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-
192	F	24	-	-	-	-	2.7	3.2	4.6	-	-	-	-	-	-	17.8	0.5	-	-	-	-	-	-	-	-	-	-	-
199	F	43	-	-	-	12.6	24.5	6.5	15.5	4.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
215	F	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	-	-	-	-	-	-
220	F	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	72	-	-	32	16	-	-
230	F	U	-	-	-	-	-	-	-	-	-	42.0	-	11.3	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-
232	F	U	-	-	-	-	-	-	-	-	-	42.0	-	11.3	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-
234	F	U	-	-	-	-	-	-	-	-	-	42.0	-	11.3	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-
236	F	U	-	-	-	-	-	-	-	-	-	42.0	-	11.3	0.9	-	-	-	0.3	-	-	-	-	-	-	-	-	-

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 Berkeley and Oldbury area, for use in foetal dose assessments

Observation number	Sex	Age (years)	Fish	Wildfowl	Salt marsh grazed cattle	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Honey	Wild fungi	Goat meat	Intertidal occupancy over mud	Intertidal occupancy over mud and stones	Intertidal occupancy over salt marsh	Intertidal occupancy over sand and stones	Occupancy in water	Occupancy on water	Indoor occupancy within 1 km of the licensed site boundary	Outdoor occupancy within 1 km of the licensed site boundary
240	F	27	-	-	-	14.9	11.6	12.9	6.6	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
244	F	32	-	-	-	-	-	-	-	5.7	-	-	-	-	-	10.7	-	-	-	-	-	-	-	-	-	-	-	-
248	F	43	-	-	-	-	-	-	-	13.0	-	-	-	-	-	17.8	-	-	-	-	-	-	-	-	-	-	-	-
255	F	U	-	-	-	-	-	-	-	-	-	23.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
259	F	33	-	-	-	5.6	1.4	1.4	47.8	19.5	273.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
264	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
265	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
266	F	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	387	-	-
273	F	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-
276	F	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26	-	-	-	-
281	F	U	12.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
283	F	U	12.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
287	F	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
295	F	U	4.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
312	F	U	7.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
327	F	U	-	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
329	F	U	4.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
331	F	U	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
335	F	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.4	-	-	-	-	-	-	-	-	-	-
339	F	17	-	0.7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
342	F	U	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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 Berkeley and Oldbury area

Profile Name	Number of individuals	Pathway Name: Crustacea	Direct[a]	Eggs	Fish - Sea	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Houseboat[b]	Gamma ext - Sediments[c]	Honey	Meat - Cow	Meat - Game[d]	Meat - Pig	Meat - Poultry	Meat - Salt Marsh Grazed Cow	Meat - Sheep[e]	Meat - Wildfowl	Milk	Mushrooms	Occupancy IN water	Occupancy ON water	Plume (IN; 0 - 0.25 km)[f]	Plume (MID; >0.25 - 0.5 km)[f]	Plume (OUT; >0.5 - 1 km)[f]	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		kg	-	kg	kg	kg	kg	h	h	kg	kg	kg	kg	kg	kg	kg	kg	l	kg	h	h	h	h	h	kg	kg	kg	kg
Crustacean consumers	**1**	0.34	-	-	7.0	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	45	-	-	-	-	-	-	-
Occupants for direct radiation	**93**	-	1.00	1.9	-	0.84	0.11	-	<1	-	-	-	0.04	0.02	-	0.29	-	-	0.03	-	-	280	260	2420	1.4	1.0	2.4	2.5
Egg consumers	**41**	-	0.27	16.1	-	5.3	0.40	-	-	0.01	4.6	0.04	5.0	0.87	-	0.93	0.05	47.9	0.12	-	-	630	-	1460	4.9	7.0	10.6	8.5
Sea fish consumers	**16**	0.02	-	-	10.3	-	-	-	84	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-
Domestic fruit consumers	**22**	-	0.05	5.9	-	19.0	0.41	-	-	0.31	-	0.07	-	0.05	-	-	-	49.8	0.30	-	-	10	-	-	13.3	16.6	27.5	12.5
Wild fruit and nut consumers	**7**	-	0.29	6.4	-	8.3	3.4	-	-	-	-	0.23	-	0.14	-	-	-	78.2	0.36	11	-	56	-	-	13.9	7.7	3.7	17.1
Houseboat occupants	**1**	-	-	-	-	-	-	7290	-	-	-	-	-	-	-	-	-	-	-	-	120	-	-	-	-	-	-	-
Occupants over sediment	**11**	-	-	-	4.7	-	-	-	310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Honey consumers	**5**	-	-	-	-	11.5	0.45	-	-	2.8	-	-	-	-	-	-	-	-	1.2	-	-	-	-	-	13.7	19.2	3.2	6.8
Cattle meat consumers	**18**	-	-	3.5	-	-	0.08	-	-	-	36.8	-	5.6	2.4	-	5.7	0.13	67.3	0.20	-	-	-	-	-	0.33	1.3	-	0.46
Game meat consumers	**2**	-	-	22.2	-	17.8	2.7	-	-	-	-	0.79	-	0.51	-	-	-	-	0.34	-	-	-	-	-	29.9	23.2	13.1	25.9
Pig meat consumers	**12**	-	-	13.3	-	3.5	0.68	-	-	-	15.8	-	19.0	2.9	-	4.7	0.19	127.1	0.11	-	-	-	-	-	3.1	8.4	7.5	7.3
Poultry meat consumers	**5**	-	-	12.5	-	-	0.27	-	-	-	37.8	-	20.2	6.9	-	-	0.45	200.8	0.27	-	-	-	-	-	1.2	4.7	-	1.6
Consumers of meat from salt marsh grazed cattle	**4**	-	-	-	-	-	0.50	-	-	-	-	-	-	-	10.0	-	-	-	0.50	-	-	-	-	-	-	-	-	-
Sheep meat consumers	**17**	-	0.18	2.7	-	1.9	0.27	-	-	-	22.3	-	4.5	0.59	-	10.7	-	-	0.13	-	-	-	-	1370	1.9	4.1	4.5	4.2
Wildfowl consumers	**5**	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	1.1	-	-	-	4	-	-	-	-	-	-	-
Milk consumers	**20**	-	-	9.9	-	6.2	0.93	-	-	-	9.5	-	7.6	1.7	-	-	0.11	225.9	0.07	4	-	-	-	-	3.5	4.1	12.1	2.7
Mushroom consumers	**5**	-	-	14.2	-	12.5	0.45	-	-	1.5	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	13.7	19.2	3.2	6.8
Occupants In Water	**4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	270	-	-	-	-	-	-	-	-
Occupants On Water	**13**	-	-	-	-	-	-	120	-	-	-	-	-	-	-	-	-	-	-	-	310	-	-	-	-	-	-	-
Occupants for plume pathways (0 - 0.25 km)	**3**	-	1.00	17.8	-	9.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8600	-	-	20.3	6.1	24.3	20.4
Occupants for plume pathways (>0.25 - 0.5 km)	**4**	-	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6020	-	-	-	-	-
Occupants for plume pathways (>0.5 - 1.0 km)	**20**	-	1.00	6.0	-	1.3	0.25	-	<1	-	-	-	0.20	0.12	-	1.4	-	-	0.02	-	-	-	-	6920	1.0	3.3	7.3	4.8
Green vegetable consumers	**18**	-	0.28	7.5	-	14.7	0.63	-	-	0.38	-	0.09	-	0.06	-	-	-	-	0.47	-	-	1460	-	-	21.2	19.4	22.5	19.4
Other domestic vegetable consumers	**19**	-	0.11	7.2	-	13.0	0.60	-	-	0.36	-	0.08	2.7	0.05	-	1.8	-	-	0.35	-	-	-	-	860	14.3	28.3	26.8	20.4
Potato consumers	**18**	-	0.28	9.1	-	13.7	0.20	-	-	-	-	-	2.8	-	-	1.9	-	60.8	-	-	-	1430	-	910	11.4	15.4	42.7	19.1
Root vegetable consumers	**20**	-	0.35	10.4	-	13.1	0.75	-	-	0.34	-	0.08	2.5	0.05	-	1.7	-	-	0.42	-	-	1310	-	820	17.4	21.1	31.0	24.6

Notes

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

[b]Gamma ext - houseboats represents occupancy on a boat over mud.

[c]Gamma ext - sediments represents occupancy over mud; mud and sand; mud and stones; salt marsh; sand and stones.

[d]Game meat includes venison.

[e]Sheep meat includes goat meat.

[f]Plume times are the sums of individuals' indoor and outdoor times. Occupancy rates in the MID zone include estimated data (see Annex 3).

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 Berkeley and Oldbury area

		Pathway Name																		
Profile Name	**Number of individuals**	**Direct[a]**	**Eggs**	**Fruit - Domestic**	**Fruit and nuts - Wild**	**Gamma ext - Sediments[b]**	**Meat - Pig**	**Meat - Salt Marsh Grazed Cow**	**Meat - Sheep[c]**	**Meat - Wildfowl**	**Milk**	**Mushrooms**	**Occupancy IN water**	**Occupancy ON water**	**Plume (OUT; 0.5-1km)[d]**	**Vegetables - Green**	**Vegetables - Other Domestic**	**Vegetables - Potatoes**	**Vegetables - Root**
		-	**kg**	**kg**	**kg**	**h**	**kg**	**kg**	**kg**	**kg**	**l**	**kg**	**h**	**h**	**h**	**kg**	**kg**	**kg**	**kg**
Occupants for direct radiation	**3**	1.00	7.1	2.7	-	-	0.45	-	2.4	-	-	-	-	-	6910	1.0	1.5	3.0	1.8
Egg consumers	**4**	0.50	15.9	1.6	-	-	0.34	-	0.34	-	73.0	-	-	-	3380	-	1.1	2.3	1.1
Domestic fruit consumers	**5**	-	3.9	9.8	1.0	-	-	-	-	-	36.5	-	16	-	-	1.3	2.0	5.0	3.8
Wild fruit and nut consumers	**1**	-	-	7.5	5.0	-	-	-	-	-	182.5	-	79	-	-	-	-	-	-
Occupants over sediment	**7**	-	-	-	-	46	-	-	-	-	-	-	9	5	-	-	-	-	-
Pig meat consumers	**1**	1.00	8.9	1.8	-	-	1.4	-	1.4	-	-	-	-	-	6710	-	-	-	-
Consumers of meat from salt marsh grazed cattle	**1**	-	-	-	0.50	-	-	10.0	-	-	-	0.50	-	-	-	-	-	-	-
Sheep meat consumers	**1**	1.00	0.68	1.8	-	-	-	-	5.8	-	-	-	-	-	7190	3.1	-	-	1.2
Wildfowl consumers	**1**	-	-	-	-	-	-	-	-	0.69	-	-	-	-	-	-	-	-	-
Milk consumers	**3**	-	14.3	2.5	1.7	-	-	-	-	-	158.2	-	26	-	-	-	-	-	-
Mushroom consumers	**1**	-	-	-	0.50	-	-	10.0	-	-	-	0.50	-	-	-	-	-	-	-
Occupants In Water	**3**	-	-	2.5	1.7	48	-	-	-	-	60.8	-	48	11	-	-	-	-	-
Occupants On Water	**2**	-	-	-	-	72	-	-	-	-	-	-	32	16	-	-	-	-	-
Occupants for plume pathways (>0.5 - 1.0 km)	**3**	1.00	7.1	2.7	-	-	0.45	-	2.4	-	-	-	-	-	6910	1.0	1.5	3.0	1.8
Green vegetable consumers	**3**	0.33	3.2	10.7	-	-	-	-	1.9	-	-	-	-	-	2400	3.2	3.4	8.3	6.8
Other domestic vegetable consumers	**3**	0.33	6.9	11.6	-	-	-	-	-	-	-	-	-	-	2280	2.1	4.9	11.4	7.8
Potato consumers	**3**	0.33	6.9	11.6	-	-	-	-	-	-	-	-	-	-	2280	2.1	4.9	11.4	7.8
Root vegetable consumers	**3**	0.33	6.9	11.6	-	-	-	-	-	-	-	-	-	-	2280	2.1	4.9	11.4	7.8

Notes

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

[b]Gamma ext - sediments represents occupancy over mud and stones; salt marsh; sand and stones.

[c]Sheep meat includes goat meat.

[d]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 Berkeley and Oldbury area

		Pathway Name					
Profile Name	Number of individuals	Direct[a]	Eggs	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Sediments[b]	Plume (OUT; >0.5 - 1 km)[c]
		-	kg	kg	kg	h	h
Occupants for direct radiation	**4**	1.00	2.1	0.45	0.45	-	6390
Egg consumers	**2**	1.00	4.3	0.91	0.91	-	6660
Domestic fruit consumers	**2**	1.00	4.3	0.91	0.91	-	6660
Wild fruit and nut consumers	**2**	1.00	4.3	0.91	0.91	-	6660
Occupants over sediment	**5**	-	-	-	-	20	-
Occupants for plume pathways (>0.5 - 1.0 km)	**4**	1.00	2.1	0.45	0.45	-	6390

Notes

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

[b]Gamma ext - sediments represents occupancy over mud and stones; 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 Berkeley and Oldbury area, for use in foetal dose assessments

Profile Name	Number of individuals	Direct[a]	Eggs	Fish - Sea	Fruit - Domestic	Fruit and nuts - Wild	Gamma ext - Sediment[b]	Honey	Meat - Cow	Meat - Pig	Meat - Poultry	Meat - Salt marsh grazed sheep	Meat - Sheep[c]	Meat - Wildfowl	Milk	Mushrooms	Occupancy IN water	Occupancy ON water	Plume (MID; >0.25 - 0.5 km)[d]	Plume (OUT; >0.5 - 1 km)[d]	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		-	kg	kg	kg	kg	h	kg	kg	kg	kg	kg	kg	kg	l	kg	h	h		h	kg	kg	kg	kg
Occupants for direct radiation	**27**	1.00	0.98	-	0.44	0.08	<1	-	-	0.05	0.04	-	0.62	-	-	0.02	-	-	450	2900	0.23	0.17	0.34	0.25
Egg consumers	**5**	0.40	13.4	-	5.0	0.09	-	-	-	0.27	-	-	0.27	-	-	-	-	-	-	3050	-	1.4	2.7	1.5
Sea fish consumers	**6**	-	-	9.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Domestic fruit consumers	**4**	-	4.4	-	12.1	1.3	-	-	-	-	-	-	-	-	114.1	-	20	-	-	-	5.1	3.2	13.6	3.6
Wild fruit and nut consumers	**1**	-	-	-	7.5	5.0	-	-	-	-	-	-	-	-	182.5	-	79	-	-	-	-	-	-	-
Occupants over sediment	**5**	-	-	-	-	-	47	-	-	-	-	-	-	-	-	-	6	3	-	-	-	-	-	-
Honey consumers	**3**	-	-	-	3.8	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2	-	-
Cattle meat consumers	**5**	-	-	-	-	-	-	-	38.4	-	0.68	-	9.0	-	-	0.20	-	-	-	-	-	-	-	-
Pig meat consumers	**1**	1.00	8.9	-	1.8	-	-	-	-	1.4	-	-	1.4	-	-	-	-	-	-	8410	-	-	-	-
Poultry meat consumers	**5**	0.20	0.14	-	0.36	-	-	-	33.6	-	0.91	-	10.6	-	-	0.20	-	-	-	1520	0.62	-	-	0.24
Consumers of meat from salt marsh grazed cattle	**1**	-	-	-	-	0.50	-	-	-	-	-	10.0	-	-	-	0.50	-	-	-	-	-	-	-	-
Sheep meat consumers	**6**	0.33	0.23	-	0.60	-	-	-	28.0	-	0.76	-	10.1	-	-	0.17	-	-	-	2440	1.0	-	-	0.40
Wildfowl consumers	**2**	-	-	-	-	-	-	-	-	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-
Milk consumers	**2**	-	-	-	13.5	2.5	-	-	-	-	-	-	-	-	228.1	-	39	-	-	-	2.8	0.68	23.9	0.68
Mushroom consumers	**6**	0.17	-	-	-	0.16	-	-	28.0	-	0.57	1.7	7.5	-	-	0.33	-	-	-	83	-	-	-	-
Occupants In Water	**2**	-	-	-	3.8	2.5	36	-	-	-	-	-	-	-	91.3	-	55	8	-	-	-	-	-	-
Occupants On Water	**5**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	-	-	-	-	-	-
Occupants for plume pathways (>0.25 - 0.5 km)	**2**	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6020	-	-	-	-	-
Occupants for plume pathways (>0.5 - 1.0 km)	**7**	1.00	3.8	-	1.7	0.26	<1	-	-	0.19	0.16	-	2.4	-	-	-	-	-	-	6960	0.89	0.65	1.3	0.95
Green vegetable consumers	**4**	-	-	-	8.2	-	-	-	-	-	-	-	-	-	68.4	-	-	-	-	-	10.4	12.1	19.7	5.2
Other domestic vegetable consumers	**3**	-	-	-	4.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12.0	15.6	10.4	6.5
Potato consumers	**1**	-	-	-	19.5	-	-	-	-	-	-	-	-	-	273.8	-	-	-	-	-	5.6	1.4	47.8	1.4
Root vegetable consumers	**5**	-	0.89	-	4.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.0	9.0	8.0	7.6

Notes

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

[b]Gamma ext - sediments represents occupancy over mud; mud and stones; salt marsh; sand and stones.

[c]Sheep meat includes goat meat.

[d]Plume times are the sums of individuals' indoor and outdoor times. Occupancy rates in the MID zone are estimated (see Annex 3).

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

This page has been intentionally left blank

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)

Cefas Technology Limited (CTL) is a wholly owned subsidiary of Cefas specialising in the application of Cefas technology to specific customer needs in a cost-effective and focussed manner.

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.
(www.cefastechnology.co.uk)

Customer focus

With our unique facilities and our breadth of expertise in environmental and fisheries management, we can rapidly put together a multi-disciplinary team of experienced specialists, fully supported by our comprehensive in-house resources.

Our existing customers are drawn from a broad spectrum with wide ranging interests. Clients include:

- international and UK government departments
- the European Commission
- the World Bank
- Food and Agriculture Organisation of the United Nations (FAO)
- oil, water, chemical, pharmaceutical, agro-chemical, aggregate and marine industries
- non-governmental and environmental organisations
- regulators and enforcement agencies
- local authorities and other public bodies

We also work successfully in partnership with other organisations, operate in international consortia and have several joint ventures commercialising our intellectual property.

Head office
Centre for Environment,
Fisheries & Aquaculture Science
Pakefield Road, Lowestoft,
Suffolk NR33 0HT UK

Tel +44 (0) 1502 56 2244
Fax +44 (0) 1502 51 3865
Web www.cefas.defra.gov.uk

printed on paper made from
a minimum 75% de-inked
post-consumer waste