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Radiological Habits Survey: Cardiff, 2003

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Radiological Habits Survey: Cardiff, 2003

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FIGURES

TABLES

ANNEXES

Annex 1	Adult's consumption rates (kg or l/y) and occupancy rates (h/y) in the Cardiff area
Annex 2	Children's consumption rates (kg or l/y) and occupancy rates (h/y) in the Cardiff area
Annex 3	Ratios for determining consumption rates for children

SUMMARY

This report presents the results of a survey conducted in 2003 into the habits and consumption patterns of people living, working and pursuing recreational activities in the vicinity of the Amersham plc site, located in north west Cardiff. Amersham plc manufactures radioactively labelled materials for use in research and medical diagnostic kits and is licensed to operate the site under the Nuclear Installations Act, 1965. Under the Radioactive Substances Act, 1993 it is authorised to discharge gaseous radioactive wastes via stacks to the atmosphere and liquid radioactive wastes to the Ystradyfodwg and Pontypridd sewer, through which they then travel to the Cardiff East Waste Water Treatment Works and into the Severn Estuary offshore from Orchard Ledges.

Potential exposure pathways related to site include:

- consumption of locally sourced terrestrial and marine foods
- occupancy of intertidal areas
- occupancy of fresh or marine water in the survey areas
- handling fishing gear and sediment
- occupancy in close proximity to the sewage sludge or sewage sludge granules at Cardiff East Waste Water Treatment Plant
- occupancy of land, to which sewage sludge granules have been applied
- consumption of food which has been produced on land fertilised by sewage sludge granules

Exposure to direct radiation from the site was not investigated since no relevant sources of gamma radiation exist on site.

Individuals from the local population were interviewed and the data obtained are presented and discussed. Data for over 1100 individuals were collected. Gamma dose rate measurements were taken to supplement those made in routine surveillance programmes.

High consumption rates were found in the following groups of locally produced foods: fish, green vegetables, other vegetables, root vegetables, sheep meat, eggs and honey. Other local foods consumed were crustaceans, wildfowl, potato, domestic fruit, milk, cattle meat, pig meat, poultry, wild/free foods, rabbits/hares, wild fungi and freshwater fish.

In the marine environment, the main activities relevant to occupancy included commercial fishing, sea and shore angling and boating activities. For fresh water courses, the activities observed were rowing, clearing reeds, clearing debris, dredging, sailing and paddling. The main handling pathways related to fishing gear and intertidal sediments.

Data were collected for individuals from the Cardiff East Waste Water Treatment Plant in relation to their times spent in close proximity to the sewage sludge or sewage sludge granules as the majority of the radioactive liquid waste discharges from Amersham plc pass through the treatment plant.

The data from the survey are presented in full for each individual in order to assist in assessments of the additive effects of exposures from multiple pathways. The information recorded during interviews was processed in two different ways to identify high rates appropriate to the various aquatic and terrestrial pathways. One method estimated a representative figure for each pathway by selecting a group at the upper end of the distribution of observations. The other chose the 97.5 percentile rate from the distribution.

Comparisons are made with the results from the previous aquatic and terrestrial surveys.

Suggestions are made for changes to environmental monitoring programmes on the basis of the information collected during the survey.

1 INTRODUCTION

The public may be exposed to radiation as a result of the operations of Amersham plc in Cardiff either from discharges of liquid or gaseous radioactive wastes into the local environment. This report provides information about activities carried out by members of the public which may influence their radiation exposure. The study has been funded by the Environment Agency, the Food Standards Agency and the Health and Safety Executive in order to support their respective roles in protecting the public from the effects of radiation.

1.1 Regulatory framework

The Environment Agency regulates discharges of waste under the Radioactive Substances Act 1993 (RSA 93) (UK Parliament, 1993) as amended by the Environment Act 1995 (EA 95) (UK Parliament, 1995a) and by legislation implementing the European Union (EU) Basic Safety Standards (BSS) Directive 96/29/Euratom (CEC, 1996). This Directive takes account of Recommendations of the International Commission on Radiological Protection (ICRP), particularly ICRP 60 (ICRP, 1991). Authorisations under RSA 93 are issued by the Environment Agency after wide-ranging consultation, including the Food Standards Agency. As well as being a Statutory Consultee, the Food Standards Agency has responsibilities for ensuring that any radioactivity present in food does not compromise food safety and that authorised 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 accepted limits. Consultation papers on Statutory Guidance to the Environment Agency on the regulation of radioactive waste discharges were issued by the Department for Environment, Food and Rural Affairs (Defra) in 2000 and the Welsh Assembly in 2002. These draft Guidance documents include, *inter alia*, affirmation that protection of the critical groups of the public is the appropriate radiological protection methodology to use. This report provides information to support assessments of critical groups.

Operation of nuclear sites anywhere in the UK can only take place if they are licensed under the Nuclear Installations Act 1965 (NIA 65) (UK Parliament, 1965). The Nuclear Installations Inspectorate of the Health and Safety Executive implements this legislation and is also responsible for regulating, under the Ionising Radiations Regulations (IRR 99) (UK Parliament, 1999), the restriction of exposure of the public to direct radiation from operations occurring on these sites.

1.2 Radiological protection framework

UK policy on the control of radiation exposure has long been based on the Recommendations of ICRP which embody the principles of justification of practices, optimisation of protection and dose limitation. The dose standards are embodied in national policy (UK Parliament, 1995b) and in guidance from the International Atomic Energy Agency (IAEA), in the Basic Safety Standards for Radiation Protection (IAEA, 1996). Radiological protection of the public is based on the concept of a critical group of individuals. This group is defined as those people who, because of where they live and their habits, receive the highest radiation dose due to the operations of a site. It follows that, if the dose to this group is acceptable when compared to relevant dose limits and constraints, other members of the public will receive lower doses, and overall protection is provided for.

Legislative dose standards are contained in the EU BSS Directive 96/29/Euratom and subsequently incorporated into UK law in IRR 99. In order to implement the Directive in England and Wales, the Environment Agency were issued a Direction by the Department of the Environment, Transport and the Regions (DETR) (now part of Defra) in 2000 (DETR, 2000). This includes the requirements that the Environment Agency ensure, wherever applicable,

- all public radiation exposures from radioactive waste disposal are kept As Low As Reasonably Achievable (ALARA);
- the sum of such 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.

Guidance on the principles underlying prospective assessments (i.e. assessments of potential future doses) has been provided by a group of UK public bodies (EA, SEPA, DoENI, NRPB and FSA, 2002). Where relevant, this guidance may also be applied to retrospective assessments (i.e. assessments of doses already received). A recent discussion paper (Camplin *et al*, 2002) has considered different ways in which data collected from habits surveys similar to this study may be used to carry out integrated (i.e. combined pathway) dose assessments.

2 THE SURVEY

2.1 Site activity

Amersham plc at Cardiff manufactures radioactively labelled materials for use in research and medical diagnostic kits. It is located on the outskirts of Cardiff, approximately 7 km north west of the main city centre. It lies on the east bank of the River Taff, immediately to the south of the M4 (see Figures 1 and 2).

Amersham plc is licensed to operate the site under NIA 65. Under RSA 93 they are authorised to discharge gaseous and liquid radioactive wastes. The gaseous radioactive wastes are discharged via stacks to the atmosphere and the liquid radioactive wastes are discharged to the Ystradyfodwg and Pontypridd (Y&P) sewer before travelling via the Cardiff East Waste Water Treatment Works (WWTW) into the Severn Estuary offshore from Orchard Ledges. Cardiff East WWTW has been operational since April 2002. OrthoClinical Diagnostics Ltd also have an RSA 93 authorisation allowing them to discharge from the site. However, the process for which this license was issued ceased approximately two years ago. Details of the amounts of radioactive waste discharged in 2002 have been published (EA, EHS, FSA and SEPA, 2003).

The Amersham plc site at Cardiff has been operating for nearly 25 years and, unlike a nuclear power station, there are no plans for it to shut down after a specified life span. Site activity was normal for the duration of the habits survey.

2.2 Survey objectives

The Centre for Environment, Fisheries and Aquaculture Science (CEFAS) undertook the survey in 2003 on behalf of the Environment Agency, the Food Standards Agency, and the Health and Safety Executive. The aim of the survey was to review habits related to public radiation exposure from Amersham plc in Cardiff via aquatic and terrestrial pathways. After

consultation with the customers, it was decided not to investigate the direct radiation pathway during this habits survey. This is because the Nuclear Installations Inspectorate (NII) of the Health and Safety Executive confirmed that no radionuclides used on site would give rise to a direct radiation dose offsite (Titley *et al*, 2001).

The last aquatic and terrestrial habits surveys conducted by CEFAS in the Cardiff area were in 1998 (Tipple, 1999 and Smith, 1999 respectively). The data from these surveys are currently being used for dose assessments for the Cardiff area (e.g. EA, EHS, FSA and SEPA, 2003).

Fieldwork was undertaken in order to obtain site specific habits survey data. These data were used to establish exposure pathways for the local population and the characteristics of those most exposed. General habits survey information for the area was also obtained.

Investigations were carried out to ascertain the following:

- External exposure activities on intertidal areas, including angling and commercial fishing (netting, potting, bait digging, etc)
- The production, use and destination of local produce
- The consumption rates of aquatic and terrestrial foods from within the survey areas
- Occupancy in close proximity to the sewage sludge or sewage sludge granules from Cardiff East Waste Water Treatment Works.
- Occupancy in or on water in the survey areas (including the River Taff, the Whitchurch Brook, the Glamorganshire Canal, Cardiff Inland Bay and the waters of the Severn Estuary)
- The extent of any unusual practices, which may be relevant, such as the use of seaweed or sewage sludge granules as a fertiliser or soil conditioner and the transfer of contamination by wildlife

2.3 Survey areas

Two main survey areas were defined to encompass the dominant activities expected for aquatic and terrestrial pathways. Areas affected by liquid discharges are discussed in the aquatic pathways section and areas affected by gaseous discharges are discussed in the terrestrial pathways section. The situation for water courses at Cardiff is complicated since some are affected by liquid discharges, some are affected by gaseous discharges and some are affected by both. This is explained further below.

The aquatic survey area, shown in Figure 1, covered the coastline and the intertidal reaches of rivers from Lavernock Point in the west to Gold Cliff in the east. In a seaward direction, it extended to the south bank of the River Severn, but only people based on the north (i.e.: Cardiff) side were interviewed. The same area was used in the 1998 survey and is based on hydrographic survey information.

During times of heavy rainfall, the Y&P sewer, carrying liquid radioactive wastes from the site, is designed to overflow into the natural water course because it is part of a combined rainwater and sewerage system. There is only one overflow point from the Y&P sewer, which affects the water courses in the survey area as it is downstream of where the site's liquid discharges enter the sewer. This is located in Llandaff North. It overflows into the Whitchurch Brook, which then flows into the River Taff just downstream of Llandaff Weir. In addition, therefore, the aquatic survey area included the Whitchurch Brook and the River Taff downstream of the overflow from the Y&P sewer. Stretches of the Whitchurch Brook and the River Taff are also in the 5 km terrestrial survey area and are potentially affected by washout from gaseous discharges as well. Areas where this overlap occurs have been considered in the aquatic section of this report.

The terrestrial survey area, shown in Figure 2, was defined as the circle to a radius of 5 km from the site centre (NGR ST 133 811) to encompass the main areas of potential deposition from gaseous discharges. This same area was surveyed in the 1998 survey. Originally it

was planned that if time allowed, the terrestrial survey area would be extended by 1 km to the north and south of the circle to allow for prevailing winds. However, due to the amount of interviews conducted within 5 km of the site, this was not possible.

Water courses in the 5 km area were also investigated. Stretches of water courses affected solely by terrestrial discharges (such as the River Taff upstream of Llandaff Weir where the site's liquid discharges enter the river) are described in the terrestrial section of the report, as is the consumption of freshwater fish from these stretches. However, for convenience, occupancy in or on water affected only by gaseous discharges has been included in the aquatic section.

2.4 Conduct of the survey

The fieldwork component of the survey was carried out between 12th August and 22nd August 2003, by a survey team of four people, according to techniques described by Leonard *et al,* (1982).

A programme of work was sent to the Environment Agency, the Food Standards Agency, and the Health and Safety Executive before the survey for comment. Pre-survey discussions between one of the survey team, Amersham plc, the Environment Agency, the Food Standards Agency and the Health and Safety Executive were held prior to the start of the fieldwork. These discussions provided an outline of the main aims of the survey and highlighted areas or items, which required special attention or effort by the team. On 13th August a meeting was held between the survey team and Amersham plc at the site. This served to provide details about site operations, including waste disposal, and information about potential pathways and activities in the area. Further information was sought about wildlife studies and pest control measures in and immediately around the site. Animals could be vectors for transporting radioactive materials off-site and are also potential food items for some individuals.

People with a local knowledge of the survey areas were contacted for information on any aspects relevant to the various exposure pathways. These included Welsh Office field officers, veterinary service officers and fisheries officers, the South Wales Sea Fisheries Committee officer, the British Association of Shooting and Conservation, a wildfowling club representative, seafood retailers, local councils, allotment secretaries, the Cardiff Beekeepers Association secretary and Cardiff Tourist Information Centre.

A meeting was held on 15th August 2003 with representatives from the Cardiff East WWTW to discuss exposure pathways relating to the sewage sludge and sewage sludge granules. The times spent by employees in close proximity to these materials were sought. Enquiries were also made into the final use and location of the sewage sludge granules. It was found that approximately 30 farms, (mainly beef and sheep farms) were regularly using the sewage sludge granules as a fertiliser and a land reclamation site in England was also receiving some granules. Most farms were located within 25 miles of the WWTW but none were within the terrestrial survey area.

During the survey, individuals who were identified as having the potential to be exposed to radioactivity from the site were contacted and interviewed. Interviews were used to establish individuals' consumption rates of locally grown terrestrial foods and locally caught seafoods, their handling rates of intertidal sediments and commercial fishing gear, and their occupancy rates relevant to external exposure. Any general information of possible use to the survey was also obtained. Using the information gained in the interviews, a list of occupations and activities was built up to produce a picture of potential exposure pathways. This then enabled emphasis to be placed on those individuals who were likely to be the most exposed and included commercial fishermen, boat owners, anglers, allotment holders, beekeepers and farmers.

The survey did not involve the whole population in the vicinity of Cardiff, but targeted subsets in order to identify the potentially most exposed individuals. To aid interpretation, the number of people interviewed in each group as a percentage of what we estimate to be complete

coverage for that group has been calculated. It is possible that there may be people in each group that we did not identify at the time of the survey. The results are summarised in Table 1. The 'groups' are described and quantified, and the number of people interviewed given as percentages of the totals. It should be noted that for certain groups, such as anglers and divers, it can be virtually impossible to calculate the total number of people who undertake the activity in the survey area as many people visit from outside or only visit occasionally during the year. In other cases, it may be necessary to estimate the number of individuals from the number of clubs for example. These cases are explained in Table 1.

The aquatic and terrestrial elements of the survey primarily targeted pathways relevant to those elements, for example people in the terrestrial survey were initially questioned because it was known that they grew a lot of terrestrial foodstuffs. However, where possible, every interviewee was asked about pathways in both areas. During interviews with representatives from companies, such as Welsh Water, it was not possible to collect data for all pathways (such as consumption of local foods) for each employee. In these cases, data were limited to those relating to the primary reason for the interview (e.g.: for Welsh Water this was the exposure to the sewage sludge from the Y&P sewer.) Such individuals only have data for the pathways of interest in Annex 1.

Approximately 36 person-days were spent interviewing and observations for over 1100 individuals were recorded. During the survey, some gamma dose rate measurements were taken to aid assessment of external exposure pathways.

3 METHODS FOR DATA ANALYSIS

3.1 Data recording

The data collected during the field work were recorded in logbooks or on questionnaire sheets. 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. 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.

During the interviews, people could not always provide consumption rates in kilograms per year for food or litres per year for milk. In these cases, 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. The database converted these data into consumption rates (kg/y for food and l/y for milk) using a variety of conversion factors. These 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. For the purpose of data analysis, foodstuffs are aggregated into food groups as identified in Table 2. Specific food types relevant to this survey are presented in the subsequent tables.

All consumption and occupancy data in the text of this report are rounded to two significant figures to reflect the authors' judgement on the accuracy of the methods used. In the tables and annexes, the consumption rate data are usually presented to one decimal place. Occasionally this rounding process causes the row totals to appear slightly erroneous ($\pm$ 0.1). The exception is for consumption rates less than 0.05 kg/y, which are presented to two decimal places, in order to avoid them appearing as 0.0 kg/y. External exposure data are quoted as integers.

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

- Experienced scientific staff were used for fieldwork and data assessment. They had been trained in the techniques of interviewing and obtaining data for all pathways, which were relevant to the survey being conducted. Where individuals offered information during interview which was 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 rates were calculated, observations were found to be high in relation to our experience of other surveys, taking into account local factors.
- Data were stored in a database in order to minimise transcription and other errors.
- Draft reports and data tables were formally reviewed by senior CEFAS staff.
- Final reports were only issued when the Environment Agency, the Food Standards Agency and the Health and Safety Executive were entirely satisfied with the format and content of the draft.

The habits data are structured into groups of activities with similar attributes. 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, for example, are grouped as ‘crustaceans’. For external exposure over intertidal sediments, occupancy over a common substrate, (for example, sand) is chosen. The choice of a group of activities is made when it is reasonable to assume that consistent concentrations or dose rates would apply within the group. In addition to grouping of activities, ingestion data are structured into age groups because different dose coefficients (i.e.: the factors which convert intakes of radioactivity into dose) can apply to different ages. These age groups are from 0 to 1.0 y of age (called 3 months old); more than 1.0 y to 2.0 y (called 1 year old); more than 2.0 y to 7.0 y (called 5 year old); more than 7.0 y to 12.0 y (called 10 year old); more than 12.0 y to 17.0 y (called 15 year old). Individuals over 17 are treated as adults. These age groupings are consistent with those used in ICRP 72 (1996).

3.2 Data analysis

The main output of the study is the statement of individuals' consumption, handling and occupancy rates given in Annexes 1 and 2. These can be used by those undertaking radiological assessments of the effects of the operation of the Amersham plc site – taking into account the concentration and/or dose rate distributions in space and time relevant to the assessment. It is only with the outcome of such an assessment that the critical group can strictly be defined as those most exposed.

In addition to providing the data in the Annexes, we have also analysed them to provide estimates of rates of occupancy, handling and consumption which can be regarded as typical of those most exposed prior to a formal assessment being undertaken. Two approaches are used.

Firstly, the 97.5 percentile rate was calculated for each group using the Excel mathematical function for calculating percentiles. This method accords with precedents used in risk assessment of the safety of food consumption. Mean and 97.5 percentile rates based on national statistics have been derived by MAFF and FSA (Byrom *et al,* 1995 and FSA, 2002), and these are referred to as generic rates in this report. Secondly, 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 maximum observed rate and all rates observed within a factor of three of the maximum value (termed the lower threshold value). It accords with the principle expressed by ICRP (ICRP, 1984) that the critical group should be small enough to be reasonably homogeneous with respect to age, diet and those aspects of behaviour that affect the doses received. In this report, the term critical group rate is used to represent the data derived by the 'cut-off' method for ease of presentation. A separate critical group rate was calculated for each food group or activity identified in the survey.

In exceptional cases the ‘cut-off’ method can result in only one member of the high rate group. In this case, judgement is used as to whether to include other individuals within the group.

In previous aquatic surveys (those undertaken prior to 2002) a factor of 1.5, instead of 3, was used to define the cut-off value for intertidal occupancy and handling. However, it is now considered appropriate that the same factor as for consumption is used. The factor reflects variations in the doses likely to be received due to natural variations in the interactions of radiations with tissues caused by, for example, differences in anatomy.

For ingestion pathways, high rates for children have been calculated from the survey data. However because few child consumers were identified the rates should be viewed with caution. For assessment purposes, an alternative, theoretical approach may be taken which involves scaling the critical group rates for adults by ratios. These ratios are given in Annex 3 and have been calculated using generic 97.5 percentile consumption rates.

4 AQUATIC RADIATION PATHWAYS

4.1 Aquatic survey area

The aquatic survey area covered all intertidal areas between Lavernock Point and Gold Cliff (Figure 1) as well as the Whitchurch Brook and the River Taff downstream of the overflow from the Y&P sewer.

Lavernock Point to Penarth Head

Lavernock Point was a rocky outcrop situated to the south of Penarth and to the east of Barry. It was a popular location for shore angling and public activities such as walking, dog walking and barbecuing. On the cliff top overlooking this location was a campsite and many visiting campers also used this area of foreshore.

From Lavernock Point to Penarth Head the intertidal substrate was mainly flat rock with areas of boulders, changing to sand with muddy patches in front of Penarth town. Walkers and anglers were observed along this stretch of coastline with the majority using the town beach. Penarth pier was used by anglers, but only during the winter months when the summer angling restriction was lifted.

Penarth to Queen Alexandra Dock

The River Taff and Ely River estuary has now been enclosed by the Cardiff Bay barrage, constructed from Penarth Marina to the Queen Alexandra Dock. This enclosed area of water is called the Cardiff Inland Bay and it was a large non-tidal freshwater area. A constant water level is maintained by five automatic sluice gates, which release controlled volumes of water into the Severn Estuary. The Cardiff Inland Bay contains the Roath Dock and Queen Alexander Dock, both of which appeared unused at the time of the survey. Three of the four commercial fishing boats (see section 4.2) were usually moored here in the inner harbour; the

fourth was moored in Penarth Marina. The area also contained two large yacht and boat clubs. Sailing, yachting, canoeing and rowing were all permitted inside the barrage in but angling was not.

The Whitchurch Brook ran approximately north-south just to the east of the Amersham site and joined the River Taff just south of Llandaff Weir. The section of the brook between the Y&P sewer overflow point and the River Taff was underground so there was no public access to it. The only activity noted in the river downstream from Llandaff Weir was children playing around Black Weir, although evidence of anglers on both banks was noted. The Taff Trail, a footpath and cycle path, ran parallel with the river on the east bank although it was set back from the river by up to 20 metres in places. It was popular with walkers, dog walkers, cyclists and children playing. The majority of the eastern bank was steep and overgrown so access to the river was difficult. Another footpath, also popular with walkers and dog walkers, ran along the western bank of the River Taff about 10 metres back from the river. The western bank was not as steep so access to some stretches of the river was possible.

Queen Alexandra Dock to River Rhymney

Along the outside of the dockland area was Orchard Ledges - a stony and muddy intertidal area. It was popular with anglers for cod in winter but access through the docks or parking in the docks were no longer allowed and could only be gained by walking round the north-east end of the docks.

Between Orchard Ledges and the River Rhymney is an industrial area where the Cardiff East WWTW was situated. The intertidal area again was muddy and at low tide approximately 1 km of mud flats were exposed due to the high tidal range of the River Severn. A few anglers said that they occasionally fished this shoreline.

River Rhymney to River Ebbw

There was a 4 km intertidal reach on the River Rhymney but no angling was noted from roads offering access. The stretch of coastline between the Rivers Rhymney and Ebbw was relatively homogenous. The intertidal area exposed at low tide was mud backed by a relatively narrow width of salt marsh running parallel with the coast for most of the length. A local wildfowling club had the shooting rights on the foreshore from the Rhymney River to St Brides Wentlooge. Some of the salt marshes were used for grazing livestock while others were unsuitable because of deep gullies, which would be hazardous to farm animals. At St Brides Wentlooge, a lane led down to a car park, which caused the foreshore in front of it to be another favoured angling location.

The River Usk estuary to Gold Cliff

The River Usk had approximately 25 km of tidal length and a smaller river draining into the estuary, the Ebbw, had approximately 2 km. Angling boats were moored in both rivers and the owners who were interviewed advised the habits team that very little angling took place in these tidal stretches. Most angling was pursued offshore in the Severn Estuary.

The coastline further east to Gold Cliff was again predominantly mud backing on to salt marsh with limited access for members of the public. At Gold Cliff, a lane led down to the seawall making this a very popular location for angling No wildfowling occurred along this length of salt marsh and no grazing of livestock was observed.

4.2 Commercial fisheries

At the time of the survey only four commercial boats were registered for the Cardiff area and only three of these were working on a regular basis. Trawling was the main method of fishing with Dover sole (*Solea solea*), thornback ray (*Raja clavata*), plaice (*Pleuronectes platessa*) and flounder (*Platichthys flesus*) being the common species caught during summer and cod

(*Gadus morhua*) and whiting (*Merlangius merlangus*) the main species in the winter. One of the fishermen was also doing some experimental potting for lobsters (*Homarus gammarus*) in the Lavernock Point area and had found this commercially viable. Common prawns (*Palaemon serratus*) were caught in very small quantities by one fisherman as a by-catch whilst trawling for fish.

There was no evidence of molluscs being collected by anybody in the survey area. In fact, no edible sized molluscs were noted on the foreshore.

No salmon drift netting had taken place in the area for three years as the eight fishermen previously involved sold their licences in 2001 in the interests of species conservation. Similarly the putcher rank at Gold Cliff was also being financially compensated not to operate for a five year period. Funding was provided by the North Atlantic Salmon Foundation and the Rivers Wye and Usk Foundation, together with local angling interests.

Another active commercial fishery in the Severn Estuary was for seasonal elver (*Anguilla anguilla*) fishery. Approximately 250 licences were issued to individuals during 2003 in Wales. Five to 10 % of the elver fishing activity in Wales was done on the tidal River Usk and 90 to 95% was done on the tidal River Wye (outside the survey area). Most of the elver catch was sold to elver stations in Gloucestershire, from which the majority was exported, with the Far East buying the largest proportion.

Approximately 6 charter boat owners took parties of anglers out several times a week. In the winter they tended to fish mainly inside the survey area but in the summer they went further afield.

4.3 Angling and hobby fishing

Angling from the shore and boats was popular in the survey area. Preferred locations for shore angling were Lavernock Point and beach, Penarth beach, Orchard Ledges, St Brides

Wentlooge seawall and Gold Cliff seawall. Individual anglers were interviewed as well as angling club members. The main species caught angling were bass (*Dicentrarchus labrax*), Dover sole, flounder, thornback ray, conger eel (*Conger conger*), dogfish (*Scyliorhinus canicula*), smooth hound (*Mustelus mustelus*), mackerel (*Scomber scombrus*), common ling (*Molva molva*), cod and whiting. The majority of the anglers who were interviewed did not consume all of these species. The main species eaten were Dover sole, bass, cod and whiting.

In addition to anglers, four hobby fishermen were interviewed – two who caught fish using staked trammel nets fixed to the foreshore at the low water mark and two who used a trawler. Their main catch was bass, cod and Dover sole.

4.4 Seafood wholesalers and retailers

The two seafood wholesalers in Cardiff who supplied seafood to local retailers were interviewed to ascertain whether the seafood sold locally was caught in the survey area. Both bought locally caught Dover sole and cod from the local fishermen, but they said this would amount to less than 1% of their total turnover.

4.5 Wildfowl

Members of a wildfowling club were licensed to shoot on the foreshore areas between the River Rhymney and St Brides Wentlooge. The club had approximately 50 members, but only 10 to 12 of these shot on a regular basis. Wild fowl tended to be consumed by both wildfowlers and members of their families. The main species shot were Canada geese (*Branta canadensis)*, mallard (*Anas platyrhynchos*), teal (*Anas crecca*) and widgeon (*Anas penelope*).

4.6 Internal exposure

Consumption data for locally caught aquatic foodstuffs are presented in Tables 3 to 5 for adults and Table 6 for children. These tables include the mean consumption rates of the critical groups together with the observed 97.5 percentile rates calculated as described in Section 3.2. No adult consumers of molluscs or marine plants and algae were observed and no child consumers of crustaceans, molluscs, marine plants and algae or wildfowl were observed. Furthermore, no children in the 1 year old or 3 month old age groups were noted to be consuming any locally caught seafood. For purposes of comparison, the data are summarised, in Table 7 for adults, and Tables 8 to 10 for children (15 year olds, 10 year olds and 5 year olds respectively). The summary tables also include mean rates and 97.5 percentile rates based on national data (referred to as 'generic' data in this report). No generic data are available for the 5 year old age group.

Adult consumption rates

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

The predominant species of fish consumed by adults were cod, Dover sole and bass along with smaller quantities of whiting, conger eel, plaice, mackerel, thornback ray, dogfish and common ling. A critical group of 34 individuals was identified with a maximum consumption rate of 42 kg/y and a mean of 24 kg/y. The observed 97.5 percentile rate based on 101 observations was 35 kg/y. This compares with the adult generic mean and 97.5 percentile consumption rates for fish of 15 kg/y and 40 kg/y respectively. The percentage breakdown of species eaten by the critical group was 60% cod, 20% Dover sole, 15% bass and 5% other species as named in Table 3. These percentages, rounded to the nearest 5%, are based on the total amount of fish consumed by this group.

The species of crustaceans consumed by adults were common prawns and lobsters. A critical group of two individuals was identified with a maximum consumption rate of 5.1 kg/y and a mean of 3.8 kg/y. The observed 97.5 percentile rate based on three observations was 5.0 kg/y. This compares with the adult generic mean and 97.5 percentile consumption rates for crustaceans of 3.5 kg/y and 10 kg/y respectively. The percentage breakdown of species eaten by the critical group, rounded to the nearest 5%, was 65% common prawns and 35% lobsters.

The species of wildfowl consumed by adults were duck and goose. A critical group of 20 individuals was identified with maximum and mean consumption rates of 5.6 kg/y. The observed 97.5 percentile rate based on 20 observations was also 5.6 kg/y. No generic data are available for this food group. The percentage breakdown of species eaten by the critical group, rounded to the nearest 5%, was 80% duck and 20% goose.

Children's consumption rates

15 year old age group

For fish, a critical group of three individuals was identified with a maximum consumption rate of 35 kg/y and a mean of 26 kg/y. The observed 97.5 percentile rate based on seven observations was 34 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for fish of 6.5 kg/y and 20 kg/y respectively.

10 year old age group

For fish, a critical group of three individuals was identified with a maximum consumption rate of 16 kg/y and a mean of 6.6 kg/y. The observed 97.5 percentile rate based on five observations was 15 kg/y. This compares with the generic mean and 97.5 percentile consumption rates for fish of 6.0 kg/y and 20 kg/y respectively.

5 year old age group

For fish, a critical group of one individual was identified with a consumption rate of 12 kg/y. No 97.5 percentile rate was calculated as there was only one observation.

4.7 External exposure

Intertidal occupancy

Table 11 shows the intertidal occupancy data recorded during the survey. The six types of intertidal sediment in the survey area, where public occupancy was identified, were mud, rock, salt marsh, sand, sand and mud and sand and stone.

The maximum occupancy rate recorded over mud was 550 h/y for a hobby fisherman operating staked trammel nets. One other individual (also operating staked trammel nets) had an occupancy rate within a factor of three of this giving a mean rate of 500 h/y.

The maximum occupancy rate recorded over rock was 320 h/y for two anglers. No other occupancy rates came within a factor of three of this, giving a mean rate for this group of 320 h/y.

The maximum occupancy rate recorded over salt marsh was 50 h/y for 10 wildfowlers. No other occupancy rates were recorded over this substrate giving a mean rate for this group of 50 h/y.

The maximum occupancy rate recorded over sand was 28 h/y for three walkers. No other occupancy rates came within a factor of three of this, giving a mean occupancy rate for this group of 28 h/y.

The maximum occupancy rate recorded over sand and mud was 400 h/y for an angler. Nine other anglers, including one who also dug bait, had occupancy rate within a factor of three of this giving a mean occupancy for this group of 250 h/y.

The maximum occupancy rate recorded over sand and stones was 310 h/y for an angler. Five other anglers had occupancy rate within a factor of three of this giving a mean occupancy for this group of 160 h/y.

Handling

Handling sediment, while bait digging or mollusc collecting, or handling commercial fishing gear, which has become entrained with fine sediment particles, can give rise to skin exposure from beta radiation. This needs consideration even though the annual dose limit for skin is a factor of 50 times higher than that for effective dose. There is also a contribution to effective dose due to skin exposure (ICRP, 1991).

Fishing gear can also be a source of whole body gamma exposure due to occupancy in the vicinity of the gear. However this pathway is minor compared with the same exposure received during occupancy over intertidal areas and it has therefore been omitted from the report.

Table 12 shows the fishing gear and intertidal sediment handling rates recorded during the survey.

The maximum fishing gear handling rate recorded was 550 h/y for a hobby fisherman operating staked trammel nets. Three other fishermen (two commercial fishermen and another hobby fisherman operating staked trammel nets) had gear handling rates that came within a factor of three of this. This gives a mean handling rate for this group of 490 h/y. The only sediment handling rate recorded was 6 h/y for an individual digging for bait to use whilst angling.

Gamma dose rate measurements

Representative gamma dose rate measurements at 1 m above the substrate were taken at locations where high occupancy rates were observed. These measurements (shown in Table 13) ranged from 0.077 over stony ground to 0.087 µGy/h over salt marsh. Measurements for sand and mud and mud were also taken. Natural levels of around 0.05 and 0.07 µGy/h over sand and mud/salt marsh respectively are expected. A value of 0.06 µGy/h is expected for all other substrate types.

Exposure to sewage sludge or sewage sludge granules

Exposure pathways relating to sewage sludge and sewage sludge granules at and from Cardiff East WWTW were investigated as these works receive Amersham's liquid discharges. Activities in the sewer between the entry point of the liquid discharges and the WWTW were not considered.

The sewage enters the WWTW from the Y&P sewer. During the sewage treatment process the thicker sewage sludge sinks to the bottom of the treatment tanks and is transferred to the drying plant. The sludge is then dried out and turned into sewage sludge granules, which are bagged up and used as a soil fertiliser or for land reclamation.

Employees at the WWTW spend time in close proximity (within 10 metres) to the sewage sludge or granules during processes such as unblocking the pipes, sampling the sewage sludge, servicing the machinery or bagging up the granules. Table 14 shows the employees' occupancy rates in close proximity to the sewage sludge and granules.

The highest occupancy rate in close proximity to the sewage sludge was 550 h/y for two employees. The highest occupancy rate in close proximity to the granules was 900 h/y for four employees. These data may be used as a basis for an assessment. However, more information may be required for a full consideration of all potential pathways.

4.8 Water based activities

Activities taking place in or on the water can lead to ingestion of water and/or inhalation of spray. These are generally considered to be minor in comparison with other exposure pathways such as the ingestion of foods produced in the vicinity of a nuclear site. However, in order to allow for their assessment, relevant data have been collected. Occupancy rates for activities taking place in or on the water around Cardiff are shown in Table 15. This table includes two children. Table 15 indicates whether the observations are for water affected by liquid or gaseous discharges. The liquid discharges have been further sub-divided to show whether they have come from the overflow from the Y&P sewer (and hence into the River Taff, Cardiff Inland Bay and eventually into the River Severn via the barrage sluices) or whether they have stayed in the sewer all the way to the Cardiff East WWTW before being discharged into the Severn Estuary.

Unless people were very elderly or disabled, all interviewees (allotment tenants, gardeners, etc) were questioned about their water based activities.

Activities in the water

Observations of activities taking place in water around Cardiff were scarce. Only three people were seen and interviewed and they were in inland water courses. One was a marsh warden whose job involved clearing reeds from the Glamorganshire Canal (a stretch of disused canal running from north-west to south-east between the Amersham plc site and the village of Coryton) and occasionally from inland ponds near to the Amersham plc site. The Glamorganshire Canal and these ponds receive only washout from gaseous discharges. The other two observations were for children paddling in the River Taff around Black Weir although it was reported that 10 – 12 other children could be found playing during periods of very fine weather. Of the three observations recorded, the person with the highest occupancy rate in the water was the marsh warden with 24 h/y.

The survey team walked the length of the River Taff from the Llandaff Weir (because this is where the Whitchurch Brook joined the River Taff) to the Millennium Stadium. The places where it looked possible for children to play in the river were at Llandaff Weir, around the A48 road bridge and around Black Weir (see Figure 2) because at most other places the river was too deep, fast-flowing or the banks were steep-sided. It was also possible for children to play around Hailey Park (0-2 km upstream from Llandaff Weir) though this would only be affected by washout from gaseous discharges. The Whitchurch Brook was investigated between the overflow point from the Y&P sewer and where the brook meets the River Taff, but as the brook runs underground throughout this stretch there was no access to people.

River and riverbank maintenance done by the local council and the Environment Agency is occasionally supplemented by members of a local water sports club. An estimated 20 man hours per year are spent in the River Taff clearing weeds, and in addition a similar number of hours would be spent on a boat on the River Taff clearing litter or tidying bank-side vegetation.

Activities on the water

Activities taking place on the water around Cardiff were numerous, as there are several water sports clubs within the survey area. The activities observed were mainly boat angling, sailing, yachting and rowing. Five hundred observations for Cardiff Inland Bay staff, commercial fishermen, charter boat owners, sea anglers, and people sailing, yachting and rowing were recorded. However, it should be noted that a lot of this data was gained through interviews with representatives from water sports clubs giving generic figures for their members. The people with the highest occupancy rates on water were 12 Cardiff Inland Bay staff with 1900 h/y.

5 TERRESTRIAL RADIATION PATHWAYS

5.1 Terrestrial survey area

The terrestrial survey area covered all land and watercourses within 5 km of the site centre (NGR ST 133 811) as shown in Figure 2. In general it was heavily populated. The sector to the south and east of the site was highly urbanised, being made up of various suburbs of Cardiff City. The area to the west and south-west of the site was characterised by a few large villages such as St. Fagans, Radyr and Pentyrch, interspersed with some farms. The north of the survey area was more hilly in comparison and therefore a lot less built-up than the south. The River Taff bisected the survey area from north-west to south-east and the M4 bisected the area from north-east to south-west.

Nineteen working farms were identified in the area and several combinations of farming types were identified. Seven farms produced only beef, two produced only lamb, and four produced both. There were four dairy farms, which also produced small quantities of beef with three of them also producing lambs on a fairly large scale. One farm produced pigs and beef and the remaining farm produced only arable crops. Most livestock and dairy farms produced some arable crops as well. No commercial poultry or egg farms were located in the survey area.

Locally reared beef and lamb were consumed by six of the farming families and pork was consumed by the family who kept pigs. Two families from the dairy farms were drinking milk from their herds.

Beef and sheep from the survey area were sold to a variety of markets and abattoirs. The most common market used, especially for beef, was the nearest one at Newport. The remainder of the beef and lamb was sold to abattoirs or private buyers in England and Wales. Two farms were selling a portion of their beef directly from the farm to local customers and three were selling lamb in this way. Most of the pork was sold to an abattoir in England and the rest was sold directly to local customers.

All milk was sold to either First Milk or Dairy Crest. The milk then went to national dairies, and was re-distributed. Therefore there is a small chance that milk produced in the survey area could have been consumed by people in the survey area but this was thought very unlikely and was not considered further. No local dairies that delivered milk to households within the survey area were supplied by farms from the survey area.

Arable crops produced on farms were grass, silage and hay for winter feed for the livestock and wheat, barley, beans and grass which were sold to other farmers locally for winter feed for livestock and to national companies, possibly for commercial food production.

The Welsh Folk Museum kept livestock that was sold for consumption, but the main priority for keeping livestock was for show to the public. They kept beef cattle, ewes and their lambs, sows and their piglets, chickens and ducks. The eggs were used at the museum for cooking and sale to customers, the piglets were sold privately to a buyer in England, and the beef, lamb, mutton and sows were sold either privately or through Newport market.

Private gardens were noted in the survey area, but efforts were concentrated on the unusually large number of allotment plots since this was where the highest concentration of local fruit and vegetable producers could be found. There were 19 separate allotment sites (highlighted in Figure 2) within 5 km of the site centre, of which 15 were owned and run by Cardiff County Council. The total number of allotment plots being rented within 5 km of the site centre was approximately 800.

A great variety of fruit and vegetables were grown at the allotment sites. Some people grew just a few different species whereas others grew over 40 species of fruit and vegetables. Some allotment tenants and farmers also grew a few varieties of fruit and vegetables at home in their gardens. Foods were primarily grown to supply the needs of the people growing them, however most people grew an excess which they gave to extended family or friends.

No evidence of people using seaweed as a fertiliser either on allotment plots or in their private gardens was found.

Keeping chickens or ducks for egg production was noted at one farm and two residential properties. Eggs were also sold to local customers from the door in some cases. Two families ate locally reared domestic poultry in small quantities and one farmer and his wife ate pigeon shot on his farmland.

Wild/free foods, especially blackberries, were abundant throughout the survey area. Blackberries grew around the edges of most of the 19 allotment sites as well as in hedges along the roads in the rural parts of the survey area. Other wild foods consumed were hazelnuts, chestnuts, elderberries, mushrooms, rabbit, pigeon and brown trout. Nuts were collected from woodland areas such as Radyr Woods, Whitchurch golf course and Tongwynlais. Mushrooms were collected from the wild around Tongwynlais or by farmers from their farmland. Elderberries, rabbit, pigeon and brown trout were only consumed by small numbers of people and only in small quantities. Rabbit and pigeon were shot by people on their own land. No evidence of wildlife, such as rabbits, moving on and off the Amersham site was noted or reported. Brown trout were caught by an angler in the fresh water River Taff. Nearly all the freshwater fish caught by anglers from angling clubs on the Rivers Taff and Ely are released back into the rivers after being caught.

Little bank side occupancy along the River Taff was noted between Nantgarw at the north of the survey area and the Amersham site because access to the river on foot was limited. Between the Amersham site and Llandaff Weir, the Taff Trail runs alongside the river. However, bank side occupancy was still limited as the banks were steep and the path was set back from the river. Evidence of anglers around Hailey's Park was noted but no anglers were seen by the survey team. Observations for bank side occupancy downstream from the Llandaff Weir are discussed in Section 4.1 and observations for all occupancy in or on water are discussed in Section 4.8 and shown in Table 15.

Six beekeepers were identified in the survey area. The honey nearest to the site was produced less than 1 km to the south-west of the site. The beekeepers interviewed kept between three and seven hives each and production was around 25 kg/y per hive. Honey was consumed by beekeepers and their families as well as being given to friends, sold to private customers and sold through at least two commercial retailers in the area.

Three households interviewed were not on mains water. Two of these houses used water from boreholes and one used spring water. Three farms supplied their livestock with spring water as well as, or instead of mains water.

5.2 Terrestrial food wholesalers and retailers

Retailers, including greengrocers, butchers and convenience stores, in the survey area were interviewed in order to find out whether they were selling produce from within the survey area. The south and east of the survey area was heavily urbanised so it was not possible to visit every shop. Therefore efforts were concentrated on the out-lying villages and areas such as Whitchurch and Rhiwbina, which still had some small local shops as it was thought that these shops were more likely to sell local produce.

Twenty-one retail outlets were visited. The only retailer selling almost exclusively local products was Gelynis Farm – a Pick-Your-Own fruit farm and shop, which was open during the summer months and which produced and sold soft fruits, a selection of vegetables, honey and wine. One butchers shop sold local honey but no other retail outlets were found to sell any local produce at all.

5.3 Internal exposure

Consumption data for locally produced terrestrial foodstuffs are presented in Tables 16 to 31 for adults and Tables 32 to 42 for children. These tables include the mean consumption rates of the critical groups together with the observed 97.5 percentile rates calculated as described

in Section 3.2. For purposes of comparison, the data are summarised, in Table 7 for adults, and Tables 8 to 10 for children (15 year olds, 10 year olds and 5 year olds respectively). No children in the 1 year old or 3 month old age groups were noted to be consuming locally produced terrestrial foods.

In order to provide information relevant to surveillance and assessments studies, the consumption rate data collected during the survey were analysed to indicate which food types most commonly contributed to each food group. The data are summarised in Table 43. Those food types shown in bold and labelled with an asterisk were sampled as part of the 2002 Food Standards Agency monitoring programme (EA, EHS, FSA and SEPA, 2003).

Adult consumption rates

Consumption of terrestrial 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, rabbits/hares, honey, wild fungi and freshwater fish. No consumption of venison or local cereals was identified.

When compared with the generic 97.5 percentile consumption rates, the critical group mean consumption rate was greater only for root vegetables. A further 10 critical group mean consumption rates exceeded the generic mean consumption rates. These were for green vegetables, other vegetables, potato, domestic fruit, milk, cattle meat, pig meat, sheep meat, eggs, wild/free foods and honey. Five observed 97.5 percentile consumption rates exceeded the generic 97.5 percentile consumption rates. These were for green vegetables, other vegetables and root vegetables, eggs and honey.

Children's consumption rates

15 year old age group

Thirty-three children in this age group were identified to be eating locally produced terrestrial food. Consumption of terrestrial foods was identified in the following 11 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, milk, cattle meat, sheep meat, wild/free foods, honey and wild fungi. No consumption was identified for the following food groups: pig meat, poultry, eggs, rabbits/hares, venison and local cereals.

One critical group mean consumption rate, for root vegetables, exceeded the generic 97.5 percentile consumption rates. The critical group mean consumption rates for a further seven food groups; green vegetables, other vegetables, domestic fruit, milk, cattle meat, sheep meat and wild fungi, were higher than their respective generic mean consumption rates. The observed 97.5 percentile consumption rate exceeded the generic 97.5 percentile consumption rate for green vegetables, other vegetables and root vegetables.

10 year old age group

Twenty children in this age group were identified as eating locally produced food. Consumption of terrestrial foods was identified in the following eight food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, cattle meat, sheep meat and honey. No consumption was identified for the following food groups: milk, pig meat, poultry, eggs, wild/free foods, rabbits/hares, wild fungi, venison and local cereals.

One critical group mean consumption rate, for sheep meat, exceeded the generic 97.5 percentile consumption rate. The critical group mean consumption rates for five food groups; green vegetables, other vegetables, root vegetables, domestic fruit and honey, were higher than the generic mean consumption rate. The observed 97.5 percentile consumption rates

for green vegetables, other vegetables and root vegetables exceeded the generic 97.5 percentile consumption rates.

5 year old age group

Fifteen children in this age group were identified as eating locally produced food. Consumption of terrestrial foods was identified in the following 10 food groups: green vegetables, other vegetables, root vegetables, potato, domestic fruit, milk, cattle meat, sheep meat, wild/free foods and honey. No consumption was identified for the following food groups: pig meat, poultry, eggs, rabbits/hares, wild fungi, venison and local cereals. No generic 97.5 percentile or generic mean consumption rates have been determined for this age group so no comparisons with the corresponding observed rates are possible.

6 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 Annexes 1 and 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. 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 critical groups. Such assumptions will depend on the assessment in question but some initial observations are provided here as a starting point for those undertaking assessments. The most extensive combinations of pathways for adult dose assessment are shown in Table 44. These are based on information in Annex 1 and are derived irrespective of the magnitude of the rate observed for each pathway.

Combinations of pathways at critical group rates may be achieved by considering the data in Annexes 1 and 2. Although critical group rates are not given in the Annexes, the rates for individuals making up the groups are shown emboldened. Possible combinations of pathways and their associated critical group rates are therefore apparent.

The National Dose Assessments Working Group (NDAWG) has considered methods for calculating total dose from consumption and occupancy data provided by Habits surveys. The relevant profile for Cardiff is shown in Annex 4. Further discussion of the use of these data in assessments is given in Radioactivity in Food and the Environment, 2003 (EA, EHS, FSA and SEPA, 2004).

7 CONCLUSIONS AND SUGGESTIONS

7.1 Survey findings

During the survey, team members interviewed the majority of commercial fishermen and farmers in the survey area. In addition charter boat fishermen, anglers, wildfowlers, allotment holders, gardeners, bee keepers, rough shooters (people shooting rabbits, pigeons etc), people collecting wild/free foods and wild fungi were identified and interviewed. All consumption rates recorded in this report include only locally produced or caught foods.

Exposure pathways were investigated for over 1100 individuals. The survey found that pathways relating to each of the three potential sources of exposure from the Amersham plc site at Cardiff were present:

- Discharges of liquid radioactive waste to the Severn Estuary offshore from Orchard Ledges via the Y&P sewer and Cardiff East WWTW
- Discharges of liquid radioactive waste to the Severn Estuary via the Y&P sewer, the Whitchurch Brook and the River Taff
- Discharges of gaseous radioactive waste to the atmosphere

The adult critical group rates (as defined in Section 3.2) for the separate local aquatic consumption pathways were:

- 24 kg/y for fish
- 3.8 kg/y for crustaceans
- 5.6 kg/y for wildfowl

The predominant aquatic species consumed were cod, Dover sole, bass, common prawns and lobsters. The main species of wildfowl consumed was duck. No consumption of molluscs or marine plants and algae was found.

The critical group occupancy rates over the separate intertidal substrates were:

- 500 h/y for mud
- 320 h/y for rock
- 50 h/y for saltmarsh
- 28 h/y for sand
- 250 h/y for sand and mud
- 160 h/y for sand and stones

The critical group rate for handling fishing gear was 490 h/y and for handling of sediment was 6 h/y.

The highest times spent in close proximity to the sewage sludge was 550 h/y for two employees. The highest times spent in close proximity to the sewage sludge granules was 900 h/y for four employees.

The highest occupancy rate for time spent in water was 24 h/y for a marsh warden. The highest occupancy rate for time spent on water was 1900 h/y for 12 Cardiff Inland bay staff. In relation to the River Taff specifically, two observations for children playing in the water were made and rowing club members were noted on the water. It was reported that more children play in the River Taff, especially around Black Weir during periods of very fine weather.

The adult critical group rates for the separate local terrestrial pathways were:

- 39 kg/y for green vegetables
- 44 kg/y for other vegetables
- 63 kg/y for root vegetables
- 75 kg/y for potato
- 38 kg/y for domestic fruit
- 170 l/y for milk
- 32 kg/y for cattle meat

- 34 kg/y for pig meat
- 16 kg/y for sheep meat
- 1.2 kg/y for poultry
- 17 kg/y for eggs
- 7.2 kg/y for wild/free foods
- 1.3 kg/y for rabbits/hares
- 9.4 kg/y for honey
- 2.1 kg/y for wild fungi
- 2.4 kg/y for freshwater fish

No consumption of venison or local cereals was identified. Consumption of foodstuffs by children was also recorded. Combinations of food groups (both aquatic and terrestrial) consumed at critical group rates by individuals, together with their external pathway exposures, are presented in bold type in Annexes 1 and 2.

No direct radiation survey was conducted because the Nuclear Installations Inspectorate (NII) confirmed that no radionuclides used on site would give rise to a direct radiation dose offsite

7.2 Comparisons with previous surveys

The results from this survey can be compared with results from the last aquatic and terrestrial habits surveys undertaken concurrently at Cardiff, in 1998.

The critical group consumption rate for fish has decreased from 34 kg/y to 24 kg/y and the size of the critical group increased from 33 consumers in 1998 to 34 consumers in 2003. The maximum consumption rate has decreased by a significant amount from 74 kg/y in 1998 to 42 kg/y in 2003. The species of fish consumed have remained very similar. In 1998 the main species consumed were cod, whiting, Dover sole and bass. In 2003 the same species predominated except that whiting was consumed in smaller quantities.

The critical group consumption rate for crustaceans has increased from 1.4 kg/y in 1998 to 3.8 kg/y in 2003. In both surveys this was based on few consumers – one in 1998 and two in 2003. The maximum consumption rates were 1.4 kg/y and 5.1 kg/y in 1998 and 2003 respectively. In 1998 the crustacean consumer was eating common prawns. This was also the case in the 2003 survey, but someone else was found consuming lobsters. As in the 2003 survey, no consumption of molluscs or marine plants and algae was noted in 1998.

Generic rates for members of wildfowling clubs were obtained from secretaries of local clubs for the 1998 and 2003 surveys. The consumption rate for wildfowlers in 1998 was approximately 4.5 kg/y and in 2003 there was a slight increase to 5.6 kg/y.

Both the 1998 and 2003 surveys recorded observations for individuals over the following intertidal substrates – mud, sand and mud, and saltmarsh. The 2003 survey also recorded observations for individuals over sand, rock and sand and stones so no comparison of results can be made for these three substrates.

It must be noted that the methodology for determining the critical group has been altered since the 1998 survey so care is needed when comparing results. However, where the critical group rates for 2003 would have been different using the 1998 methodology, a comment is made in the comparisons.

In 2003 the highest intertidal occupancy rates observed were over mud, with a critical group rate of 500 h/y for two hobby fishermen operating trammel nets and a maximum observed occupancy rate of 550 h/y. In 1998, the critical group occupancy rate and maximum observed occupancy rate over mud were higher at 860 h/y for two individuals doing boat maintenance. The decrease in rates from 1998 to 2003 can be attributed to these two individuals having ceased to carry out any more boat maintenance.

Occupancy rates over sand and mud have also decreased since 1998. The 1998 survey identified a critical group occupancy rate over sand and mud of 990 h/y. Three people doing

angling and bait digging were included in the group and the maximum occupancy rate was 1200 h/y. In 2003, the critical group occupancy rate over sand and mud was 250 h/y. Ten people, again doing angling and bait digging, were included in the group and the maximum occupancy rate identified was 400 h/y. The high rate individuals from 1998 were not interviewed in 2003. Using the 1998 methodology, the critical group rate would have been 320 h/y for four people again doing angling and bait digging.

Occupancy rates over saltmarsh have also decreased since 1998. In 1998 the critical group occupancy rate over saltmarsh was 240 h/y for three people doing angling and bait digging and the maximum observed occupancy rate was 440 h/y. In 2003 the critical group occupancy rate was just 50 h/y for 10 wildfowlers and the maximum observed occupancy rate was the same were just 50 h/y. No individuals were found to be angling from the saltmarsh in the 2003 survey as other areas such as Gold Cliff had become more popular.

The 1998 survey identified a critical group handling rate for commercial fishing gear of 340 h/y for four commercial fishermen. The maximum handling rate was 450 h/y. The 2003 survey recorded a similar critical group gear handling rate of 490 h/y for four fishermen and a maximum handling rate of 550 h/y.

The 1998 survey identified a critical group sediment handling rate of 290 h/y for two bait diggers with a maximum sediment handling rate of 340 h/y. The 2003 survey recorded a critical group and maximum observed sediment handling rate of 6 h/y for one bait digger. Anglers digging for their own bait appears to be less popular now than in previous years. Also, one of the popular areas for bait digging used to be the area around the docks, where access is now more difficult.

No comparison of occupancy rates in and on water can be made as these were not considered in the 1998 survey.

For terrestrial food groups, the critical group consumption rates (kg/y or l/y) in the 2003 survey are tabulated below, together with those of the 1998 survey for ease of comparison:

	1998	2003
• Green vegetables	30	39
• Other vegetables	65	44
• Root vegetables	88	63
• Potato	68	75
• Domestic fruit	27	38
• Milk	210	170
• Cattle meat	33	32
• Pig meat	4.6	34
• Sheep meat	13	16
• Poultry	7.5	1.2
• Eggs	26	17
• Wild/free foods	5.2	7.2
• Rabbits/hares	2.0	1.3
• Honey	4.2	9.4
• Wild fungi	0.4	2.1
• Freshwater fish	11	2.4

Consumption rates had decreased in the following food groups: other vegetables, root vegetables, milk, cattle meat, poultry, eggs, rabbits/hares and freshwater fish. Consumption rates had increased in the following food groups: green vegetables, potato, domestic fruit, pig meat, sheep meat, wild/free foods, honey and wild fungi.

7.3 Suggestions for environmental monitoring

The 2002 monitoring programmes operated by the Environment Agency and the Food Standards Agency included the following samples and measurements (EA, EHS, FSA and SEPA, 2003):

Aquatic surveillance

- Flounder
- Sole
- Cod
- Mullet
- Mussels
- *Fucus vesiculosus*
- Seawater
- Sediment from east and west of the new pipeline and from Orchard Ledges East.
- Mud from Orchard Ledges
- Gamma dose rate measurements over intertidal mud east and west of the new pipeline and at Orchard Ledges East.
- Beta dose rate measurement on mud at Orchard Ledges East.
- Sewage sludge granules from Cardiff East WWTW

Terrestrial surveillance

- Milk
- Barley
- Blackberries
- Cabbage
- Courgettes/Cucumbers
- Honey
- Potato
- Rape Oil

- Raspberries
- Strawberries
- Grass
- Silage
- Soil
- Sediment from the canal
- Fresh water run-off into the River Taff
- Fresh water from the canal
- Fresh water from the River Taff

It should be noted that the suggestions put forward in this section for consideration are based solely on the findings of this survey. They are not the outcome of any form of assessment.

For the aquatic monitoring programme, consideration should be given to the following:

- Monitoring of mullet could be stopped as no consumption was found. Bass could be introduced to the monitoring programme instead, as it was a commonly consumed species.
- Consumption of wildfowl was identified. One-off samples of duck and goose could be obtained for re-assurance purposes.
- A sample of water from Cardiff Inland Bay could be introduced, as the results would be relevant to possible future accumulation of radionuclides in the Bay.
- Sediment samples and gamma dose rate measurements over mud and saltmarsh at Peterstone Wentlooge should be introduced, as this was where the highest rates and occupancies over mud and saltmarsh were recorded.
- The farms applying the sewage sludge granules are producing mainly beef and sheep meat. A one-off sample of beef or sheep meat from one of these farms could be obtained for re-assurance purposes.

For the terrestrial monitoring programme, consideration could be given to the following:

- Monitoring of foods from the green vegetables group could be limited to cabbage as this was most commonly consumed, and cucumbers/courgettes could be stopped.
- Runner beans and onions could commence as these were the most commonly consumed vegetables in the other vegetables and root vegetables food groups respectively.
- Monitoring of a meat sample could be introduced because cattle meat, pig meat, sheep meat, chicken, pigeon and rabbit were all being consumed but none were being monitored in 2002. Cattle meat, pig meat or sheep meat would be the best options as they were consumed at higher rates and more commonly than other meats.
- If available, a one-off sample of rabbit could be obtained for re-assurance purposes.
- Eggs were consumed at high rates so a chicken egg sample could be introduced.
- Rape oil was not produced in large quantities so this could be removed from the monitoring programme.

8 ACKNOWLEDGEMENTS

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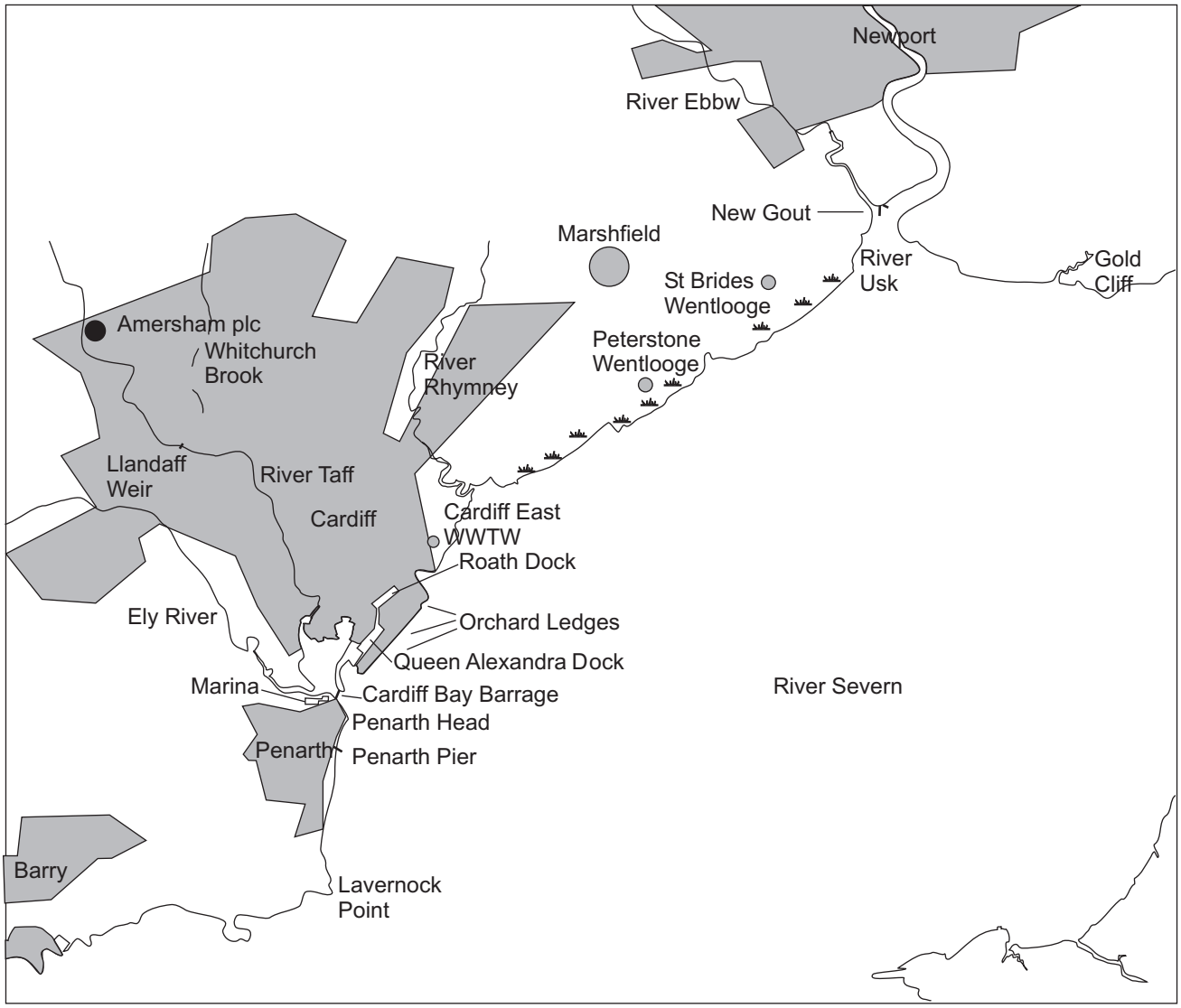

Figure 1. The Cardiff aquatic survey area

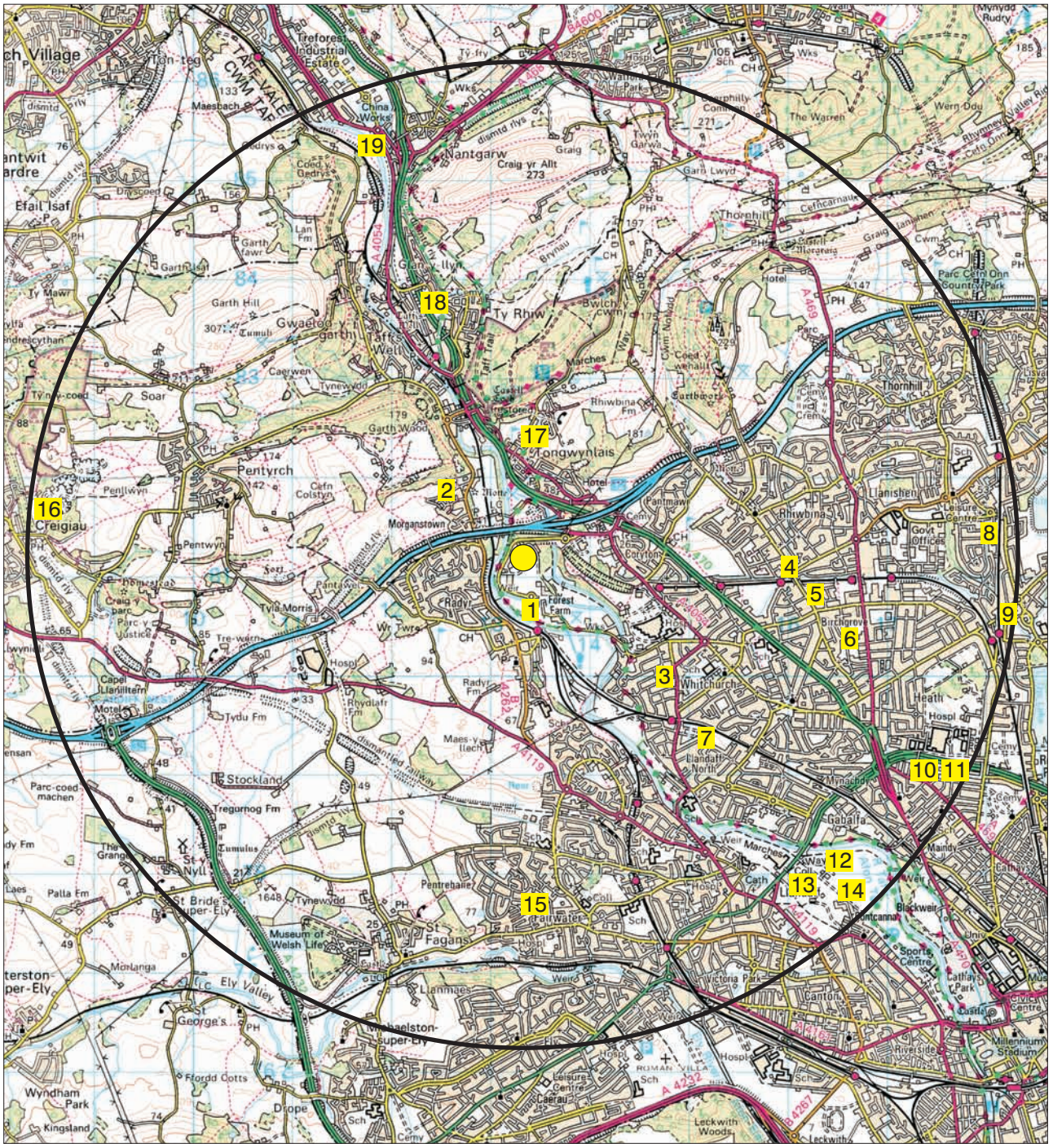

Figure 2. The Cardiff terrestrial survey area

1 = Forest Farm Allotments
2 = Morganstown and Radyr Allotments
3 = Heol Chappell Allotments
4 = Lon-Y-Deri Allotments
5 = Porthamal Allotments
6 = Birchgrove Allotments
7 = Llandaff North Allotments
8 = Llanishen Allotments
9 = Rhydypenau Allotments
10 = Flaxland Allotments
11 = Allensbank Allotments
12 = Llandaff Fields Allotments
13 = Pontcanna Permanent Allotment
14 = Pontcanna A Allotments
15 = Fairwater Allotments
16 = Creigau Allotments
17 = Tongwynlais Allotments
18 = Taff's Well Allotments
19 = Nantgarw Allotments
○ = Amersham plc

Table 1. Survey coverage

Group	Criteria	Estimate of complete coverage	Number for whom data obtained	Coverage	Notes
ALL PATHWAYS					
All potential people in Cardiff aquatic and terrestrial survey areas	Number of people resident in the 5km survey area plus all other users of the aquatic and direct radiation survey areas	~125000^	1148^^	*	
AQUATIC PATHWAYS					
Commercial fishermen	Number of commercial fishermen actively fishing in area	4	3	****	
Hobby fishermen	Number seen or heard of during survey	4	4	*****	
Charter boat owners	Number heard of during survey	6	3	***	
Boat anglers	Number seen in action or spoken to during survey	~100	~100	*****	Interviews with club representatives provided generic data for keenest members
Regular shore anglers	Number seen in action or spoken to during survey	~50	25	***	Interviews conducted during fishing matches
Wildfowlers	Number of club members licensed to shoot in survey area	45	10	**	Interview with Club secretary provided generic data for 10 keenest club members
Divers	Members of clubs in the area and people seen in action or spoken to during the survey	0	0		Area unsuitable for diving
Bait diggers	Number seen in action, spoken to or heard of during the survey	1	1	*****	Most anglers buy their own bait.
Other beach users	Number seen in action or spoken to during the survey	U	9	U	
Water sports participants (excl. diving)	Members of clubs in the area and people seen in action or spoken to during the survey	~500	~400	*****	Most data are generic, provided from interviews with 3 club representatives
TERRESTRIAL PATHWAYS					
Farmers	Number of farms or smallholdings indentified in area	20	17	*****	Possibly another 3 working farms in area but no confirmation as contact was not made
Allotment holders	Number of rented plots in survey area	~800	117	*	Not all 800 rented plots are actively used
Bee keepers	Number of active beekeepers with hives in survey area	6	4	****	
Shop keepers	Number in area	U	20	U	Only a selection of probable shops (i.e: bakers, grocers, etc) interviewed
Pick-Your-Own owners	Number in area	1	1	*****	Only 1 identified in the survey area
Dairy owners	Number in area plus number outside area who use milk from the survey area	1	0	0	6 dairies in surrounding area contacted but no milk from survey area used

Notes

^ - Data from www.statistics.gov.uk were used to estimate the figure for people resident in the 5 km survey area.

^^ The number of people for whom data was obtained for each pathway listed below, will not necessarily equal the total listed here. This is because some individuals, for example someone who fishes from a boat and the shore and digs their own bait will be counted three times, whereas others, such as the families of fishermen or farmers, will not be included counted at all.

U - Unknown

Coverage

* = 1-20% **= 20 - 40% ***= 40 - 60% ****= 60-80% *****=80-100%

Table 2. Typical food groups used in habits surveys

Green vegetables	Globe artichoke, asparagus, broccoli, brussel sprout, cabbage, calabrese, cauliflower, chard, courgettes, cucumber, gherkin, herbs, kale, leaf beet, lettuce, marrow, spinach
Other vegetables	Aubergine, broad bean, chilli pepper, french bean, mangetout, pea, pepper, runner bean, sweetcorn, tomato
Root vegetables	Jerusalem artichoke, beetroot, carrot, celeriac, celery, chicory, fennel, garlic, kohl rabi, leek, onion, parsnip, radish, shallot, spring onion, swede, turnip
Potato	
Domestic fruit	Apple, apricot, blackberry, blackcurrant, boysenberry, cherry, damson, fig, gooseberry, grapes, greengages, huckleberry, loganberry, melon, nectarines, peach, pear, plum, pumpkin, raspberry, redcurrants, rhubarb, rowanberry, strawberry, tayberry, whitecurrant
Milk	Milk, butter, cream, cheese, yoghurt, goats milk
Cattle meat †	
Pig meat †	
Sheep meat †	
Poultry	Chicken, duck, goose, grouse, guinea fowl, partridge, pheasant, pigeon, snipe, turkey, woodcock
Eggs	Chicken egg, duck egg, goose egg
Wild/free foods	Blackberry, blackcurrant, chestnut, crab apple, damson, dandelion root, elderberry, nettle, raspberry, rowanberry, samphire, sloe, strawberry, watercress, wild apple
Honey	
Wild Fungi	Mushrooms
Rabbits/Hare	Hare, rabbit
Venison †	
Fish (sea)	Bass, brill, cod, common ling, dab, Dover sole, flounder, gurnard, haddock, hake, herring, lemon sole, mackerel, monkfish, mullet, plaice, pollack, witch saithe, salmon, sea trout, squid*, cuttlefish*, rays, turbot, whitebait, whiting
Fish (fresh water)	Brown trout, rainbow trout, perch, pike, salmon (river), eels
Crustaceans	Brown crab, spider crab, crawfish, lobster, Nephrops, squat lobster, prawn, shrimp
Molluscs	Cockles, limpets, mussels, oysters, queen scallop, razor shell, whelks, winkles

Notes:
* Although squid and cuttlefish are molluscs, radiologically they are more akin to fish
† Including offal

Table 3. Adult consumption rates of fish in the Cardiff area (kg/y)

Observation number	Bass	Cod	Common ling	Conger eel	Dover sole	Dogfish	Mackerel	Mixed fish	Plaice	Thornback ray	Whiting	Total
79		**41.7**										**41.7**
19								**38.6**				**38.6**
80-81	**11.8**	**11.8**			**11.8**							**35.4**
101-103	**8.8**	**17.7**			**8.8**							**35.4**
1134-1135		**23.1**									**7.7**	**30.8**
2-4		**17.7**			**8.8**							**26.5**
11-14								**26.5**				**26.5**
46		**13.5**									**11.6**	**25.1**
83	**7.8**	**7.8**			**7.8**							**23.5**
18					**8.8**				**8.8**			**17.7**
84-90	**5.9**	**5.9**			**5.9**							**17.7**
554-555	**2.7**	**11.8**							**2.7**			**17.2**
133-134		**16.5**	**0.5**									**17.0**
5-8		**15.9**										**15.9**
1129		8.3				1.2				1.2	1.2	11.8
91-100								11.3				11.3
59-62		3.7		3.7							3.2	10.7
64	4.3	6.0										10.3
117-118		9.7										9.7
1130		6.2				0.9				0.9	0.9	8.8
26-45	2.3	3.3			3.1							8.7
75-76	1.6	2.2		2.2	2.1							8.2
1136-1137		4.4									1.5	5.9
67		3.0			2.8							5.8
65-66	2.1	3.0										5.1
68								4.5				4.5
70								4.5				4.5
616-618	0.7	1.2					2.3					4.2
71	1.6	2.2										3.8
48-49		3.0										3.0
52-55		3.0										3.0
47		1.5									1.3	2.8
119	2.2											2.2
316		2.0										2.0
72-74	0.7	1.0										1.7
50											1.3	1.3
20											1.0	1.0
57					0.4							0.4

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of fish based on the 34 highest adult consumers is 24.3 kg/y

The observed 97.5 percentile rate based on 101 observations is 35.4 kg/y

Table 4. Adult consumption rates of crustaceans in the Cardiff area (kg/y)

Observation number	Common prawn	Lobster	Total
1	**5.1**		**5.1**
12		**2.6**	**2.6**
11		1.3	1.3

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of crustaceans based on the 2 highest adult consumers is 3.8 kg/y
The observed 97.5 percentile rate based on 3 observations is 5.0 kg/y

Table 5. Adult consumption rates of wildfowl in the Cardiff area (kg/y)

Observation number	Duck	Goose	Total
202-221	**4.5**	**1.1**	**5.6**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of wildfowl based on the 20 highest adult consumers is 5.6 kg/y
The observed 97.5 percentile rate based on 20 observations is 5.6 kg/y

Table 6. Children's consumption rates of fish in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Bass	Cod	Dover sole	European eel	Dogfish	Mixed fish	Thornback ray	Whiting	Total
104	**14**	**8.8**	**17.7**	**8.8**						**35.4**
15	**12**						**26.5**			**26.5**
10	**12**		**15.9**							**15.9**
77	16	1.6	2.2	2.1	2.2					8.2
78	15	1.6	2.2	2.1	2.2					8.2
1131	12		5.2			0.6		0.6	0.6	6.9
21	14								1.0	1.0

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of fish based on the 3 highest 15 year old consumers is 25.9 kg/y

The observed 97.5 percentile rate based on 7 observations is 34.1 kg/y

10 year old age group

Observation number	Age	Bass	Cod	Dover sole	European eel	Dogfish	Mixed fish	Thornback ray	Whiting	Total	
9	**9**		**15.9**							**15.9**	
1132	**8**		**2.1**			**0.3**		**0.3**	**0.3**	**2.9**	
317	**11**		**1.0**							**1.0**	*
22	11								1.0	1.0	*
23	9								1.0	1.0	*

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of fish based on the 3 highest 10 year old consumers is 6.6 kg/y

The observed 97.5 percentile rate based on 5 observations is 14.6 kg/y

* - The cut-off value for this group is 0.9828. The emboldened 1.0 has been rounded up from 0.9879 and is therefore included in the critical group. The non-emboldened 1.0's have been rounded up from 0.9696 and are therefore not in the critical group.

5 year old age group

Observation number	Age	Bass	Cod	Dover sole	European eel	Dogfish	Mixed fish	Thornback ray	Whiting	Total
82	**4**	**3.9**	**3.9**	**3.9**						**11.8**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of fish based on the highest 5 year old consumer is 11.8 kg/y

Table 7. Summary of adult's consumption rates in the Cardiff area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical consumption rate	Observed minimum critical consumption rate	Observed critical group mean consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish	101	34	41.7	15.9	24.3	35.4	15	40.0
Crustaceans	3	2	5.1	2.6	3.8	5.0	3.5	10.0
Molluscs	NC	NC	NC	NC	NC	NC	3.5	10.0
Wildfowl	20	20	5.6	5.6	5.6	5.6	ND	ND
Green vegetables	382	84	76.0	25.5	38.8	58.0	15.0	45.0
Other vegetables	410	137	76.7	25.8	43.6	68.0	20.0	50.0
Root vegetables	394	73	116.7	39.3	62.5	91.5	10.0	40.0
Potato	377	66	145.0	50.8	74.9	100.1	50.0	120.0
Domestic fruit	378	76	65.7	22.2	38.0	53.7	20.0	75.0
Milk	5	5	207.4	121.7	173.1	207.4	95.0	240.0
Cattle meat	16	5	41.6	17.2	31.9	41.6	15.0	45.0
Pig meat	3	3	33.7	33.7	33.7	33.7	15.0	40.0
Sheep meat	17	6	23.6	11.8	15.7	23.6	8.0	25.0
Poultry	8	5	1.5	0.8	1.2	1.5	10.0	30.0
Eggs	11	11	25.5	8.9	17.3	25.5	8.5	25.0
Wild/free foods	108	10	12.7	4.5	7.2	7.5	7.0	25.0
Rabbits/hares	7	7	1.8	0.9	1.3	1.8	6.0	15.0
Honey	14	6	11.8	7.9	9.4	11.8	2.5	9.5
Wild fungi	16	6	2.3	2.0	2.1	2.3	3.0	10.0
Venison	NC	NC	NC	NC	NC	NC	ND	ND
Fish (freshwater)	2	2	2.4	2.4	2.4	2.4	15.0	40.0

ND = not determined
NC = not consumed

Table 8. Summary of 15 year old children's consumption rates in the Cardiff area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical consumption rate	Observed minimum critical consumption rate	Observed critical group mean consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish	7	3	35.4	15.9	25.9	34.1	6.5	20.0
Crustaceans	NC	NC	NC	NC	NC	NC	2.5	6.0
Molluscs	NC	NC	NC	NC	NC	NC	2.5	6.0
Wildfowl	NC	NC	NC	NC	NC	NC	ND	ND
Green vegetables	31	9	36.1	12.8	22.3	36.1	9.0	25.0
Other vegetables	33	18	44.0	14.8	20.2	31.1	10.0	30.0
Root vegetables	31	11	49.5	20.9	32.8	49.5	7.5	20.0
Potato	28	7	88.4	31.2	56.3	88.4	60.0	130.0
Domestic fruit	32	9	26.0	10.2	17.0	22.4	15.0	50.0
Milk	3	3	121.7	121.7	121.7	121.7	110.0	260.0
Cattle meat	4	4	17.2	11.8	15.8	17.2	15.0	35.0
Pig meat	NC	NC	NC	NC	NC	NC	10.0	30.0
Sheep meat	4	4	11.8	6.2	7.6	11.4	5.5	15.0
Poultry	NC	NC	NC	NC	NC	NC	6.5	20.0
Eggs	NC	NC	NC	NC	NC	NC	7.0	25.0
Wild/free foods	14	6	2.7	1.2	1.7	2.4	3.0	13.0
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	1	1	0.2	0.2	0.2	NA	2.0	5.0
Wild fungi	5	2	2.0	2.0	2.0	2.0	2.0	5.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed
NA = not applicable

Table 9. Summary of 10 year old children's consumption rates in the Cardiff area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical consumption rate	Observed minimum critical consumption rate	Observed critical group mean consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish	5	3	15.9	1.0	6.6	14.6	6.0	20.0
Crustaceans	NC	NC	NC	NC	NC	NC	2.5	7.0
Molluscs	NC	NC	NC	NC	NC	NC	2.5	7.0
Wildfowl	NC	NC	NC	NC	NC	NC	ND	ND
Green vegetables	17	7	32.7	11.2	16.1	26.0	6.0	20.0
Other vegetables	19	7	30.4	10.9	21.5	28.8	8.0	25.0
Root vegetables	17	8	20.9	7.0	16.2	20.9	6.0	20.0
Potato	16	8	25.8	8.7	15.8	22.8	45.0	85.0
Domestic fruit	18	7	26.6	9.5	21.1	26.3	15.0	50.0
Milk	NC	NC	NC	NC	NC	NC	110.0	240.0
Cattle meat	1	1	11.8	11.8	11.8	NA	15.0	30.0
Pig meat	NC	NC	NC	NC	NC	NC	8.5	25.0
Sheep meat	1	1	11.8	11.8	11.8	NA	4.0	10.0
Poultry	NC	NC	NC	NC	NC	NC	5.5	15.0
Eggs	NC	NC	NC	NC	NC	NC	6.5	20.0
Wild/free foods	NC	NC	NC	NC	NC	NC	3.0	11.0
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	1	1	3.0	3.0	3.0	NA	2.0	7.5
Wild fungi	NC	NC	NC	NC	NC	NC	1.5	4.5
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed
NA = not applicable

Table 10. Summary of 5 year old children's consumption rates in the Cardiff area (kg/y or l/y)

Food group	Number of observations	No. higher rate consumers	Observed maximum critical consumption rate	Observed minimum critical consumption rate	Observed critical group mean consumption rate	Observed 97.5 %ile consumption rate	Generic mean consumption rate	Generic 97.5 %ile consumption rate
Fish	1	1	11.8	11.8	11.8	NA	ND	ND
Crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
Molluscs	NC	NC	NC	NC	NC	NC	ND	ND
Wildfowl	NC	NC	NC	NC	NC	NC	ND	ND
Green vegetables	12	6	16.4	8.0	10.3	15.5	ND	ND
Other vegetables	14	10	15.2	7.4	9.5	14.2	ND	ND
Root vegetables	11	5	21.7	9.4	11.8	18.6	ND	ND
Potato	11	5	15.6	7.2	9.7	13.9	ND	ND
Domestic fruit	13	6	12.9	7.1	8.9	11.6	ND	ND
Milk	1	1	121.7	121.7	121.7	NA	ND	ND
Cattle meat	2	2	8.6	5.9	7.2	8.5	ND	ND
Pig meat	NC	NC	NC	NC	NC	NC	ND	ND
Sheep meat	2	2	5.9	3.1	4.5	5.8	ND	ND
Poultry	NC	NC	NC	NC	NC	NC	ND	ND
Eggs	NC	NC	NC	NC	NC	NC	ND	ND
Wild/free foods	1	1	0.8	0.8	0.8	NA	ND	ND
Rabbits/hares	NC	NC	NC	NC	NC	NC	ND	ND
Honey	1	1	3.0	3.0	3.0	NA	ND	ND
Wild fungi	NC	NC	NC	NC	NC	NC	ND	ND
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed
NA = not applicable

Table 11. Intertidal occupancy rates in the Cardiff area (h/y)

Observation number	Location	Activity	Mud	Rock	Salt marsh	Sand	Sand and mud	Sand and stone
79	**Peterstone Wentlooge**	**Gear handling on the shore**	**548**					
80	**St Brides Wentlooge**	**Gear handling on the shore**	**455**					
52	**Goldcliff**	**Angling**		**320**				
53	**Goldcliff**	**Angling**		**320**				
175	Marshfield	Walking		100				
176	Marshfield	Walking		100				
202	**Peterstone Wentlooge**	**Wildfowling**			**50**			
203	**Peterstone Wentlooge**	**Wildfowling**			**50**			
204	**Peterstone Wentlooge**	**Wildfowling**			**50**			
205	**Peterstone Wentlooge**	**Wildfowling**			**50**			
206	**Peterstone Wentlooge**	**Wildfowling**			**50**			
207	**Peterstone Wentlooge**	**Wildfowling**			**50**			
208	**Peterstone Wentlooge**	**Wildfowling**			**50**			
209	**Peterstone Wentlooge**	**Wildfowling**			**50**			
210	**Peterstone Wentlooge**	**Wildfowling**			**50**			
211	**Peterstone Wentlooge**	**Wildfowling**			**50**			
255	**All local beaches**	**Walking**				**28**		
256	**All local beaches**	**Walking**				**28**		
257	**All local beaches**	**Walking**				**28**		
201	All local beaches	Walking				4		
222	All local beaches	Walking				4		
173	All local beaches	Walking				3		
174	All local beaches	Walking				3		
67	**All local beaches**	**Angling**					**400**	
59	**All local beaches**	**Angling**					**320**	
46	**Newport area,Cardiff Beach**	**Bait digging,Angling**					**281**	
72	**All local beaches**	**Angling**					**273**	
75	**All local beaches**	**Angling**					**240**	
76	**All local beaches**	**Angling**					**240**	
63	**All local beaches**	**Angling**					**200**	
68	**All local beaches**	**Angling**					**200**	
117	**All local beaches**	**Angling**					**200**	
64	**All local beaches**	**Angling**					**175**	
57	St Brides Wentlooge	Angling					104	
58	St Brides Wentlooge	Angling					104	

Table 11. Intertidal occupancy rates in the Cardiff area (h/y)

Observation number	Location	Activity	Mud	Rock	Salt marsh	Sand	Sand and mud	Sand and stone
119	Penarth Beach	Angling					96	
71	All local beaches	Angling					90	
48	St Brides Wentlooge	Angling					84	
69	All local beaches	Angling					70	
50	St Brides Wentlooge	Angling					28	
51	St Brides Wentlooge	Angling					24	
56	St Brides Wentlooge	Angling					16	
17	**Penarth Beach**	**Angling**						**312**
19	**All local beaches**	**Angling**						**260**
20	**Penarth Beach**	**Angling**						**104**
21	**Penarth Beach**	**Angling**						**104**
22	**Penarth Beach**	**Angling**						**104**
23	**Penarth Beach**	**Angling**						**104**
24	Lavernock Beach	Angling						20
25	Lavernock Beach	Angling						20

Notes

Emboldened observations are the critical group members
The critical group intertidal occupancy over mud based on 2 observations is 502 h/y
The observed 97.5 percentile rate based on 2 observations for mud is 546 h/y
The critical group intertidal occupancy over rock based on 2 observations is 320 h/y
The observed 97.5 percentile rate based on 4 observations for rock is 320 h/y
The critical group intertidal occupancy over salt marsh based on 10 observations is 50 h/y
The observed 97.5 percentile rate based on 10 observations for salt marsh is 50 h/y
The critical group intertidal occupancy over sand based on 3 observations is 28 h/y
The observed 97.5 percentile rate based on 7 observations for sand is 28 h/y
The critical group intertidal occupancy over sand and mud based on 10 observations is 253 h/y
The observed 97.5 percentile rate based on 19 observations for sand and mud is 364 h/y
The critical group intertidal occupancy over sand and stones based on 6 observations is 165 h/y
The observed 97.5 percentile rate based on 8 observations for sand and stones is 303 h/y

Table 12. Handling rates of fishing gear and sediment in the Cardiff area (h/y)

Observation number	Location	Activity	Fishing gear	Sediment
79	**Peterstone Wentlooge**	**Gear handling**	**548**	
1	**Severn Estuary**	**Gear handling**	**470**	
5	**Severn Estuary**	**Gear handling**	**470**	
80	**St Brides Wentlooge**	**Gear handling**	**455**	
101	Severn Estuary	Gear handling	50	
103	Severn Estuary	Gear handling	50	
46	**Newport area**	**Bait digging**		**6**

Notes
Emboldened observations are the critical group members
The critical group fishing gear handling time based on 4 observations is 486 h/y
The observed 97.5 percentile rate based on 6 observations for fishing gear is 538 h/y
The critical group sediment handling time based on 1 observation is 6 h/y

Table 13. Gamma dose rate measurements over intertidal substrates in the Cardiff area (micro Gy/h)

Location	NGR	Substrate	Gamma dose rate at 1 metre
Lavernock Beach	ST 187 683	Sand and stone	0.0766
New Gout	ST 312 838	Salt marsh	0.0796
Penarth Beach	ST 189 712	Mud and sand	0.0842
Peterstone Wentlooge	ST 257 787	Mud	0.0853
Peterstone Wentlooge	ST 256 789	Salt marsh	0.0868

Table 14. Rates for occupancy in close vicinity to sewage sludge or granules (h/y)

Observation number	Activity	Occupancy in close proximity (<10m) to the sewage sludge	Occupancy in close proximity (<10m) to the sewage sludge granules
629-633	Unblocking pipes	120	
634-635	Sampling	548	
636-639	Bagging granules, cleaning filters, unblocking pumps/pipes, sampling	62	896
640-645	Bagging granules, unblocking pumps/pipes, sampling	62	768
646-656	Bagging granules		768

Notes
When assessing all pathways of exposure to liquid discharges via the sewers, the data in Table 14 will serve as the basis for an assessment only. More information would be required for a full consideration of all potential pathways

Table 15. Occupancy rates in and on water in the Cardiff area (h/y)

Observation number	Location	Activity	In water	On water	Affected by L, O and/or G*
415	Glamorganshire Canal	Marsh warden duties	24		G
317	River Taff, upstream of Blackweir	Paddling in the water	13		O,G
318	River Taff, upstream of Blackweir	Paddling in the water	13		O,G
105-116	Cardiff Inland Bay	Cardiff Inland Bay staff		1880	O,G
16	Severn Estuary	Sea angling		1456	L,O,G
1	Severn Estuary	Commercial fishing		1400	L,O,G
5	Severn Estuary	Commercial fishing		1400	L,O,G
1134	Severn Estuary	Charter fishing		1305	L,O,G
1133	Severn Estuary	Charter fishing		1170	L,O,G
80	Severn Estuary	Sea angling		1000	L,O,G
1129	Severn Estuary	Charter fishing		624	L,O,G
91-100	Severn Estuary	Sea angling		416	L,O,G
26-35	Newport area	Sea angling		350	L,O,G
101	Severn Estuary	Commercial fishing		300	L,O,G
103	Severn Estuary	Commercial fishing		300	L,O,G
46	Severn Estuary	Sea angling		216	L,O,G
656-725	Severn Estuary	Sea angling		208	L,O,G
726-765	Cardiff Inland Bay	Sailing		208	O.G
766-865	Severn Estuary	Boat racing		208	L,O,G
989-1108	River Taff, upstream of Llandaff Weir	Rowing		183	G
19	Severn Estuary	Sea angling		120	L,O,G
866-910	Severn Estuary	Yachting		104	L,O,G
316	Severn Estuary	Sea angling		83	L,O,G
48	St Brides Wentlooge	Sea angling		54	L,O,G
11	Severn Estuary	Sea angling		48	L,O,G
911-970	Cardiff Inland Bay	Sailing		39	O,G
971-988	Cardiff Inland Bay	Sailing		26	O,G

Notes

* L - Liquid discharges reaching the Severn Estuary via the Cardiff East WWTW
  O - Liquid discharges overflowing from the Y&P sewer into the Whitchurch Brook and then into the River Taff, Cardiff Inland Bay, and through the barrage sluices into the Severn Estuary
  G - Gaseous discharges

Observations 317 and 318 are 11 and 6 year old children respectively

Table 16. Adult consumption rates of green vegetables in the Cardiff area (kg/y)

Observation number	Arti-choke	Aspar-agus	Broccoli	Brussel sprout	Cabbage	Cala-brese	Cauli-flower	Chard	Cour-gettes	Cucumber	Gherkin	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
509-510			**24.3**	**27.3**	**24.4**													**76.0**
616-618			**9.0**	**5.5**	**14.6**	**9.0**	**9.0**			**17.0**				**7.2**				**71.2**
575-576			**7.5**	**13.7**	**24.4**				**9.2**					**12.0**				**66.7**
379-381			**13.5**	**10.6**	**32.9**					**2.5**								**59.5**
544-545				**5.7**	**24.4**	**9.4**	**4.7**			**5.1**				**7.5**				**56.7**
567-568	**2.7**		**7.9**		**12.8**		**3.9**		**18.4**					**6.3**			**3.6**	**55.6**
591-593				**13.7**	**20.3**					**5.7**				**9.0**				**48.6**
556-557			**2.2**	**10.9**	**14.6**				**5.5**	**8.5**				**5.4**				**47.2**
579-580			**7.5**		**24.4**									**12.0**				**43.8**
577-578			**9.0**	**5.5**	**7.3**				**9.2**	**8.5**							**2.0**	**41.5**
175-176			**9.4**					**4.0**		**12.8**			**8.0**	**0.9**			**4.3**	**39.3**
195-196				**2.3**	**21.3**				**2.8**	**12.8**								**39.1**
398-399	**8.1**			**2.7**	**9.1**				**5.5**	**12.8**								**38.3**
481-484			**5.6**	**3.4**	**13.7**		**2.8**		**1.8**	**3.4**				**2.3**			**5.1**	**38.1**
306-308				**6.8**	**27.4**									**3.0**				**37.2**
477-478				**6.8**	**18.3**		**11.2**											**36.3**
581-582					**12.8**			**1.9**	**8.3**				**3.8**	**7.2**			**2.0**	**36.1**
443-447				**3.6**	**11.1**		**17.7**		**0.7**					**2.4**				**35.5**
251-252			**25.2**						**4.1**								**3.8**	**33.2**
347-348		**0.3**	**2.8**	**0.9**	**10.3**		**1.4**		**8.3**	**5.1**				**2.3**			**1.3**	**32.7**
558-559				**17.1**	**4.6**		**1.4**			**4.3**			**2.4**		**2.7**			**32.4**
598-601			**5.6**		**18.3**				**2.8**					**4.5**				**31.1**
562-563			**7.5**	**4.6**	**3.0**				**1.8**	**10.2**					**3.6**			**30.7**
385-387				**4.4**	**11.7**		**1.8**		**5.4**	**5.1**				**1.4**				**29.8**
201			**22.4**					**0.8**	**2.9**			**0.3**		**1.5**		**0.8**	**0.9**	**29.5**
222			**22.4**					**0.8**	**2.9**			**0.3**		**1.5**		**0.8**	**0.9**	**29.5**
243-244				**5.5**	**14.6**					**4.1**	**0.5**	**0.1**		**1.8**	**2.9**			**29.4**
258			**5.1**	**4.6**	**12.2**									**7.2**				**29.0**
169-170					**4.2**	**18.7**						**0.03**		**3.8**			**1.6**	**28.3**
560-561			**5.6**	**3.4**			**2.8**		**7.4**					**9.0**				**28.2**
382-384				**3.6**	**9.7**										**12.6**		**1.4**	**27.3**
375-376			**3.6**	**4.9**	**1.9**					**13.6**				**2.7**				**26.7**
614-615				**2.3**	**12.2**		**1.9**						**3.2**	**5.1**			**1.7**	**26.3**
342-344				**1.9**	**12.5**				**6.1**	**5.7**								**26.2**
253-254			**11.2**		**9.1**		**5.6**											**26.0**
511-513					**20.3**		**3.7**							**1.5**				**25.5**

Table 16. Adult consumption rates of green vegetables in the Cardiff area (kg/y)

Observation number	Arti-choke	Aspar-agus	Broccoli	Brussel sprout	Cabbage	Cala-brese	Cauli-flower	Chard	Cour-gettes	Cucumber	Gherkin	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
542-543										12.8				12.0				24.8
550-553				4.6	3.0				6.4	8.5							1.7	24.2
250					21.9					1.7								23.6
340					7.3				6.9					9.0				23.2
1138					7.3				6.9					9.0				23.2
411				1.4	5.6					2.1					14.0			23.1
594-597			2.8	8.5	6.9								4.8					23.0
448-449	4.5	0.9	2.3		5.1		1.4	1.4	2.7	0.5		0.4		2.7		0.4	0.2	22.5
131-132	5.7				2.4	5.8			2.2			0.3	3.8				2.0	22.3
180-181				2.3	6.1				0.9			0.03		9.0			3.4	21.7
138-139		0.6	11.6	2.8	3.8			2.0				0.1						20.9
1113			1.7	3.6	2.8				1.8	3.4				5.5	1.8			20.7
1114			1.7	3.6	2.8				1.8	3.4				5.5	1.8			20.7
173-174		4.2			8.2				2.9	1.4				3.0				19.7
197-198				1.1	10.7				1.4	6.4								19.6
530-541		0.2	0.6	0.6	9.1	0.6	0.5	0.1	1.2	3.5			0.8	0.6			0.3	18.2
524-525					4.6				3.7	4.3				3.0			2.6	18.0
619-624				6.1	2.0		5.0			2.8				2.0				17.9
392-393				9.1	8.5													17.6
497-506			2.2	2.0	5.5	1.1	2.8			1.7				1.8				17.2
485-488				2.3	5.5	1.5			2.0	2.8				2.1			0.7	16.9
275					15.2									1.5				16.7
229-234	2.4		3.7	4.2			1.9							3.0		0.8	0.6	16.5
333-334			1.9	1.8	2.4	1.1		1.7	5.9					1.6				16.3
514-520			5.1	6.2	4.2					0.5								16.0
458-465		0.7		2.0	4.7				4.0	4.6								16.0
223-226			6.4		5.2				2.8			0.3		1.1				15.7
389-391		0.2		3.0	5.7		1.4			2.8				1.2			1.4	15.7
471-476			2.3	4.6	4.6								3.2	0.5				15.1
554-555				2.7						8.5				3.0				14.2
238-239			2.6		11.4													14.0
569-574			3.7	1.1	3.0		0.9		1.8					3.0				13.7
305				2.8	8.5		1.5					0.4						13.2
1115-1124			1.0	2.1	2.4		0.5		1.1	1.9				3.2	1.0			13.1
240-242				3.4	6.9										2.7			13.0
319-320				2.8	8.5		1.5											12.8

Table 16. Adult consumption rates of green vegetables in the Cardiff area (kg/y)

Observation number	Arti-choke	Aspar-agus	Broccoli	Brussel sprout	Cabbage	Cala-brese	Cauli-flower	Chard	Cour-gettes	Cucumber	Gherkin	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
166-168				1.9	5.1		0.3		1.8	0.6		0.1		1.3			1.4	12.5
507-508		0.8	1.1	2.3	3.0	1.1				1.7			1.0	0.8			0.3	12.2
235-237					5.8									4.3	1.9			12.1
159-162			6.4		5.2													11.6
190					7.6									3.8				11.4
408-410				1.6	2.0		2.7			2.6				2.4				11.3
585-588					3.0				3.7					4.5				11.2
421-430			0.2		8.5					0.9				1.0				10.6
259-260			0.5		2.1									4.2	3.4			10.2
345-346					10.0													10.0
123-125			0.9	2.7	4.1					0.5				1.8				9.9
271-272					7.2	1.5								1.2				9.9
274					7.2	1.5								1.2				9.9
266					3.7					1.4				1.8			3.1	9.9
227-228				4.1	5.5													9.6
247-249			1.9	2.3			0.9		3.7					0.8				9.5
245-246					6.4					3.0								9.4
296-298					9.1													9.1
129-130					4.1									2.0			2.3	8.4
526-529			2.8	0.5			1.4		1.8	1.7								8.2
369-372									1.1	6.4				0.5			0.1	8.0
188-189				2.8	1.8		1.1		0.9			0.3					1.0	8.0
156-157				3.4					2.2					2.3				7.9
373-374			1.1		3.6				2.2								0.9	7.8
491-494				1.1			0.9		1.8	2.3				1.5				7.7
136-137					7.6													7.6
179		2.1		2.3	3.0													7.4
280-281					4.8					1.1		0.2		0.6			0.7	7.4
182-183				0.8	2.0				0.3					3.0			1.1	7.2
262-265		0.5			2.1				1.7	1.5		0.1					1.1	7.0
521-523					4.1		1.2							1.5				6.8
324-325				1.6	4.5									0.6				6.6
400-401				1.1	1.6			1.0	0.2					1.3	1.4			6.5
404-405				3.4	1.3		0.9							0.5			0.1	6.1
335-336									2.8					2.9				5.7
120-122										5.7								5.7

Table 16. Adult consumption rates of green vegetables in the Cardiff area (kg/y)

Observation number	Arti-choke	Aspar-agus	Broccoli	Brussel sprout	Cabbage	Cala-brese	Cauli-flower	Chard	Cour-gettes	Cucumber	Gherkin	Herbs	Kale	Lettuce	Marrow	Rocket	Spinach	Total
431-433				2.2	1.2					2.0								5.4
435-436				2.2	1.2					2.0								5.4
440				2.2	1.2					2.0								5.4
351-354			0.7	1.0	2.7		0.4							0.2				5.0
358-363			0.7	1.0	2.7		0.4							0.2				5.0
365-368			0.7	1.0	2.7		0.4							0.2				5.0
548-549				2.3					1.8					0.8				4.9
299-300					4.3													4.3
133-135									1.2					2.5				3.7
602-607									3.7									3.7
269-270					3.7													3.7
177-178		0.8			2.4							0.3						3.5
147-150					2.2									1.1				3.2
330-332								2.6										2.6
255-257				2.2								0.3						2.5
171-172					1.4							0.01					0.5	1.9
140-142														1.7				1.7
286-295																	1.7	1.7
126-128					1.1									0.5				1.7
450-455										0.5								0.5
337												0.5						0.5
322												0.4						0.4
338-339												0.3						0.3

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 84 highest adult consumers is 38.8 kg/y

The observed 97.5 percentile rate based on 382 observations is 58.0 kg/y

Table 17. Adult consumption rates of other vegetables in the Cardiff area (kg/y)

Observation number	Aubergine	Broad bean	Chilli pepper	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
577-578		**2.7**		**9.0**		**4.5**		**24.5**			**36.0**	**76.7**
509-510		**22.8**		**7.2**		**9.0**		**23.8**			**13.6**	**76.4**
392-393		**32.8**		**3.2**		**32.4**					**7.2**	**75.6**
223-226		**11.3**		**14.9**		**3.8**	**2.9**	**20.4**		**0.3**	**18.0**	**71.7**
276		**27.2**						**40.8**				**68.0**
598-601		**20.5**				**27.0**		**20.4**				**67.9**
575-576		**18.2**		**7.2**		**9.0**		**27.2**		**2.1**	**2.7**	**66.4**
567-568		**14.1**		**7.6**		**14.2**		**28.6**				**64.4**
560-561		**20.5**		**5.4**		**8.1**		**25.0**		**3.5**		**62.4**
616-618		**8.2**		**4.3**	**2.7**	**2.7**		**32.6**		**3.8**	**7.2**	**61.6**
340		**27.3**		**13.0**				**20.4**				**60.7**
1138		**27.3**		**13.0**				**20.4**				**60.7**
556-557		**5.5**		**4.3**	**2.7**	**8.1**	**1.4**	**20.4**			**18.0**	**60.4**
251-252		**20.4**		**20.3**		**2.5**		**15.3**		**0.5**		**59.0**
619-624		**6.1**		**0.6**		**4.5**	**3.3**	**36.3**		**1.9**	**4.5**	**57.1**
382-384		**7.3**		**11.5**		**10.8**		**21.8**		**0.7**		**52.1**
569-574		**18.2**		**1.8**		**4.5**		**27.2**				**51.7**
243-244		**8.2**				**2.7**	**1.6**	**32.7**			**6.5**	**51.6**
562-563				**3.6**		**4.5**		**34.0**		**2.3**	**5.4**	**49.8**
1113		**8.4**		**2.5**		**2.6**	**1.8**	**25.0**			**9.0**	**49.2**
1114		**8.4**		**2.5**		**2.6**	**1.8**	**25.0**			**9.0**	**49.2**
544-545		**11.4**		**5.4**		**5.6**		**20.4**		**2.5**		**45.3**
477-478		**20.5**		**10.8**		**13.5**						**44.8**
385-387		**2.2**		**1.7**		**8.6**	**1.8**	**13.1**		**2.2**	**14.4**	**44.0**
133-135		**6.0**		**4.5**		**15.0**		**4.5**	**6.7**	**0.3**	**5.1**	**42.2**
134-135		**6.0**		**4.5**		**15.0**		**4.5**	**6.7**	**0.3**	**5.1**	**42.2**
521-523		**6.8**		**3.6**		**1.5**		**13.6**		**1.4**	**15.0**	**41.9**
471-476		**11.4**						**17.0**			**12.0**	**40.4**
258		**7.7**						**27.2**			**4.3**	**39.2**
481-484		**10.2**				**3.4**		**20.4**			**3.6**	**37.6**
614-615				**3.6**				**27.2**			**6.8**	**37.6**
269-270		**2.7**		**10.8**				**16.3**		**1.4**	**5.8**	**37.0**
238-239								**30.6**		**0.7**	**5.4**	**36.7**
579-580						**9.0**		**27.2**				**36.2**
195-196		**6.8**	**0.7**				**1.0**	**13.6**			**12.6**	**34.7**
558-559	**1.0**	**3.4**		**2.7**		**5.1**		**10.2**		**2.9**	**7.2**	**32.5**
342-344						**7.4**		**19.0**		**3.1**	**2.4**	**31.8**
245-246		**4.8**				**4.7**	**0.7**	**15.9**		**0.5**	**5.0**	**31.6**
330-332		**14.6**						**16.3**				**30.9**
347-348		**3.4**				**10.2**		**12.3**		**1.0**	**3.4**	**30.4**
131-132		**1.8**		**1.0**		**3.5**		**4.1**	**18.2**	**1.8**		**30.3**
511-513		**6.8**		**0.6**		**4.5**		**9.1**			**8.4**	**29.4**
240-242		**5.3**		**6.1**		**6.8**		**9.1**		**1.7**		**28.9**
524-525		**10.2**		**2.7**						**1.4**	**14.4**	**28.7**
514-520		**7.8**				**3.1**		**9.3**		**1.6**	**6.2**	**28.0**
169-170								**6.4**			**21.6**	**28.0**
159-162		**7.8**					**2.9**	**11.7**			**5.4**	**27.8**
235-237	**1.1**	**4.4**					**1.0**	**12.7**		**0.4**	**7.7**	**27.2**
190								**27.2**				**27.2**
275								**27.2**				**27.2**
1115-1124		**4.8**		**1.4**		**1.2**	**1.0**	**14.3**			**4.1**	**26.8**
546-547				**5.4**				**20.4**				**25.8**
379-381								16.5			8.6	25.2
140-142				6.2		5.2		13.6				25.0
408-410		4.0	0.7			1.4	1.5	4.0		1.1	12.0	24.6
550-553				1.8		4.5	1.2	6.8		2.4	7.2	23.9

Table 17. Adult consumption rates of other vegetables in the Cardiff area (kg/y)

Observation number	Aubergine	Broad bean	Chilli pepper	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
594-597		1.7		1.4				10.2		1.4	9.0	23.6
398-399	2.3	1.7	0.3					8.2		2.6	8.1	23.1
277-279		9.1						13.6				22.7
443-447		1.4						15.9	5.4			22.7
497-506		2.7		0.5		4.1		4.1		0.3	10.8	22.5
375-376		3.7						8.2		1.2	8.6	21.8
608-613						2.3		17.0			1.8	21.1
591-593								13.6			7.2	20.8
255-257								12.7		2.2	5.8	20.7
554-555				1.1			1.5	6.8		2.3	9.0	20.7
154-155				5.4		2.2		10.9			2.2	20.6
548-549		1.1		3.6		9.0		6.8				20.5
259-260		1.6						9.5			8.4	19.5
389-391		3.6		1.5		7.2		3.0		0.4	3.6	19.4
306-308								19.1				19.1
333-334				1.9				14.1	3.0			19.0
136-137						11.3		6.8	0.3			18.4
526-529		1.7						15.3			1.4	18.4
335-336								17.7		0.5		18.1
581-582				3.2	1.4	2.7	1.5	8.2			0.9	17.8
485-488		1.8				1.8		3.4		4.6	6.0	17.6
197-198		3.4	0.3				0.5	6.8			6.3	17.3
250		3.4				3.4		10.2				17.0
458-465		1.0		0.4		1.5		8.9		1.3	3.9	16.9
345-346								16.7				16.7
280-281		6.3	0.1				0.3	5.4	0.03	0.1	4.5	16.7
173-174								13.6	0.2	2.3		16.1
156-157		3.4		2.7				8.2		1.7		16.0
144-146		3.0				3.8		9.1				15.8
373-374		3.6		1.8				5.4	1.1	3.7		15.7
247-249				5.4				10.2				15.6
602-607								13.6			1.8	15.4
227-228				6.5				8.2			0.7	15.4
507-508		2.3		0.9		2.3		3.4			6.3	15.1
491-494		4.6		0.9			0.7	6.8			2.1	15.0
201		1.1	0.5	5.4				6.8		1.0		14.9
222		1.1	0.5	5.4				6.8		1.0		14.9
299-300						6.4		6.4			2.0	14.8
542-543											14.4	14.4
180-181								13.6		0.5		14.1
266						0.02		12.2		1.4		13.6
253-254		1.7						10.2		1.7		13.6
296-298								13.6				13.6
120-122		1.5						4.5			7.2	13.2
400-401				0.2	0.5	0.5	0.4	6.0		0.3	3.0	10.9
177-178				2.2				5.4		2.8		10.4
337						2.2				3.5	4.5	10.2
585-588		2.3		0.9				6.8				10.0
179				2.7				6.8				9.5
188-189								8.5			0.9	9.4
305								6.8			2.1	8.9
319-320								6.8			2.1	8.9
138-139				0.4		1.4		6.8				8.5
123-125		1.1		1.3		1.1		4.5			0.4	8.4
191-194		1.3						4.6			2.4	8.3
421-430		3.2		2.4							2.7	8.3

Table 17. Adult consumption rates of other vegetables in the Cardiff area (kg/y)

Observation number	Aubergine	Broad bean	Chilli pepper	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
285								8.2				8.2
262-265		3.1						4.6	0.2			7.9
431-433							0.3	4.1			3.2	7.6
435-436							0.3	4.1			3.2	7.6
440							0.3	4.1			3.2	7.6
271-272		1.8						5.6				7.4
274		1.8						5.6				7.4
147-150		1.3				1.6		3.9		0.3		7.1
448-449				0.5		0.5	0.2	0.5		4.5	0.8	7.0
229-234		1.5						4.5		0.8		6.8
286-295								6.8				6.8
530-541		1.1		0.2		1.1		1.7		0.4	1.8	6.3
411								4.9			1.4	6.3
328-329											5.4	5.4
338-339						1.1				1.7	2.3	5.1
166-168							0.2	4.9				5.1
351-354		0.3		0.3	0.2	0.2		2.6		0.3	1.1	5.0
358-363		0.3		0.3	0.2	0.2		2.6		0.3	1.1	5.0
365-368		0.3		0.3	0.2	0.2		2.6		0.3	1.1	5.0
182-183								4.5		0.2		4.7
412-414		2.0						2.7				4.7
369-372							0.2	1.2			1.9	3.3
175-176							2.5					2.5
126-128		1.1		1.3								2.4
394-396								2.3				2.3
171-172								2.1				2.1
322											2.1	2.1
404-405						0.2		1.8				2.0
450-455				0.5				0.5			0.8	1.8
324-325							0.7					0.7

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of other vegetables based on the 137 highest adult consumers is 43.6 kg/y

The observed 97.5 percentile rate based on 410 observations is 68.0 kg/y

Table 18. Adult consumption rates of root vegetables in the Cardiff area (kg/y)

Observation number	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Salsify	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
575-576	**9.0**	**18.0**					**1.3**			**18.0**	**36.0**	**7.2**					**27.2**			**116.7**
579-580	**9.0**	**4.5**								**36.0**	**25.2**	**7.2**				**4.0**	**27.2**			**113.1**
175-176	**33.8**	**5.6**					**1.7**		**9.0**	**33.8**	**10.8**	**10.8**	**2.3**			**2.5**				**110.1**
544-545	**16.9**	**16.9**	**0.5**			**0.2**	**1.0**		**6.8**	**11.3**	**21.6**	**5.4**	**3.4**			**2.5**	**17.0**		**6.8**	**110.1**
509-510	**18.0**	**9.0**								**13.0**	**21.6**	**10.8**					**19.5**			**91.9**
591-593	**18.0**	**18.0**								**9.0**	**21.6**	**7.2**				**4.0**	**13.6**			**91.4**
616-618	**8.1**	**10.8**		**7.0**			**0.8**				**13.0**	**6.5**	**2.2**				**24.5**			**72.8**
481-484	**6.8**	**6.8**					**1.0**			**3.4**	**10.8**	**8.1**	**0.5**				**30.6**			**67.8**
477-478	**20.3**	**6.8**					**2.0**			**13.5**	**16.2**	**5.4**								**64.1**
443-447	**31.2**	**9.1**		**0.8**						**12.0**	**5.7**	**4.0**								**62.8**
243-244	**8.1**									**5.4**	**14.4**	**4.3**			**9.6**	**2.4**	**16.3**			**60.5**
556-557	**5.4**	**13.5**					**0.4**			**8.1**	**5.5**	**1.1**	**1.8**				**24.5**			**60.3**
558-559	**27.0**	**1.7**					**0.5**			**15.8**	**5.5**	**1.4**					**5.1**		**2.0**	**58.9**
340	**21.6**									**18.9**	**17.3**									**57.8**
1138	**21.6**									**18.9**	**17.3**									**57.8**
173-174	**2.2**	**9.0**								**27.0**	**10.8**	**7.2**								**56.2**
190	**11.3**	**16.9**									**27.0**									**55.1**
133-135	**3.8**	**11.3**	**2.7**						**15.0**		**12.0**			**1.5**	**5.3**		**1.2**			**52.7**
598-601	**6.8**	**3.4**					**2.0**			**10.1**	**16.2**	**2.7**	**1.4**				**10.2**			**52.7**
276	**3.4**									**20.3**	**27.0**									**50.6**
251-252									**20.3**	**15.2**	**14.7**									**50.2**
195-196	**9.0**	**4.5**	**3.2**							**9.0**	**7.2**	**3.6**					**13.6**			**50.1**
581-582	**4.1**						**1.2**			**13.5**	**10.8**	**6.5**				**1.2**	**12.2**			**49.5**
398-399	**2.7**	**2.7**					**0.8**			**9.5**	**20.0**	**2.2**			**3.7**		**4.1**		**3.2**	**48.9**
569-574	**6.8**	**4.5**					**2.6**			**9.0**	**16.2**						**6.8**			**45.9**
159-162	**3.9**	**5.8**								**3.9**	**9.3**	**3.1**					**17.5**			**43.3**
567-568							**10.6**			**9.9**	**21.6**									**42.1**
337	**5.9**	**23.6**								**4.8**	**5.3**	**1.8**								**41.3**
342-344	**11.1**	**11.1**									**11.8**	**5.9**				**0.8**				**40.6**
392-393	**4.1**									**7.0**	**25.9**	**3.2**								**40.2**
258	**7.7**										**4.9**	**3.7**					**23.1**			**39.3**
180-181	2.3	4.5								18.0	5.4		3.6		3.2				1.4	38.3
223-226	1.9							3.2	3.4	14.6	9.0	4.6								36.7
1113	4.1	5.2		1.2			1.1			6.2	6.6	2.5	0.4			0.5	6.3		2.5	36.6
1114	4.1	5.2		1.2			1.1			6.2	6.6	2.5	0.4			0.5	6.3		2.5	36.6
277-279										20.3	14.4									34.7
524-525		6.8					2.0			6.8	18.9									34.4
382-384	3.6	10.8					0.5				5.8	2.9			5.1		5.4			34.1
136-137	11.3	16.9								5.6										33.8
166-168	5.6	1.9				0.04				11.3			0.4			0.8	11.3		2.3	33.6

Table 18. Adult consumption rates of root vegetables in the Cardiff area (kg/y)

Observation number	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Salsify	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
240-242	5.1	3.4								5.1	6.8	2.7					10.2			33.2
411		1.4								7.0	14.0						10.5			32.9
507-508	0.7	1.1		2.5			0.3			2.3	22.0	0.5	0.2			0.3	2.7			32.6
385-387	2.2	8.1								4.3		1.7					13.1		2.6	32.0
614-615	4.5	9.0		3.0						4.5	7.2	3.6								31.8
271-272	7.1	1.8								7.1	1.4	1.4				0.4	10.8			30.0
274	7.1	1.8								7.1	1.4	1.4				0.4	10.8			30.0
389-391	1.8	3.6					0.5			3.6	2.9	1.4	0.7		1.3		10.9		2.2	28.9
245-246		2.4									16.4	1.9					7.1			27.8
306-308	4.5	4.5					4.0			4.5	5.4	3.6								26.5
497-506	2.7	5.4							0.7	1.4		1.6					12.2		1.2	25.2
191-194	9.1	4.6					1.8				9.7									25.2
197-198	4.5	2.3	1.6							4.5	3.6	1.8					6.8			25.0
562-563	1.4									4.5	10.8	7.2	0.3							24.1
594-597	3.4									3.4	5.4	1.4					10.2			23.7
247-249	1.1	2.3								7.5	6.0	1.8			3.2	1.0				22.9
345-346	3.7	3.7								14.9										22.3
335-336	2.9	4.4									7.1	1.2			2.1		4.4			22.1
1115-1124	2.4	3.0		0.7			0.6			3.5	3.8	1.4	0.2			0.3	3.6		1.4	20.9
491-494	1.1						0.1			1.1	2.7	1.8	0.5				13.6			20.9
201	2.3					1.2	2.8			9.0	5.4									20.7
222	2.3					1.2	2.8			9.0	5.4									20.7
338-339	2.9	11.8								2.4	2.6	0.9								20.7
521-523										9.0	10.8									19.8
619-624	6.0	6.0									6.0		1.8							19.8
296-298	6.8	6.8										5.4								18.9
458-465		1.5					1.7			2.0	3.5	1.2					8.9			18.8
560-561		6.8											2.7			9.0				18.5
227-228	2.7	2.7		3.2						5.4		4.3								18.4
131-132	1.4	1.4	2.9				0.8			2.7	2.4	3.2							3.2	17.9
542-543		4.5									5.5	7.2								17.2
511-513	3.0	4.5					0.9			4.5	1.5	2.4								16.8
408-410	2.8	0.7								3.4	6.4	1.1			1.1		1.1			16.7
448-449	2.7	1.1		2.5			0.9	2.3			2.3	2.7			1.1		0.9			16.6
379-381	7.3									7.3	1.9									16.5
373-374	0.9	3.6								5.4	3.6	2.9								16.5
577-578	1.4						0.6			5.6	5.4	3.2								16.2
585-588	2.3	2.3								5.0	5.4	0.9								15.8
262-265		1.5					0.4	4.6			2.4	1.2			5.4					15.6
235-237	4.3	4.3									3.5	3.5								15.6

Table 18. Adult consumption rates of root vegetables in the Cardiff area (kg/y)

Observation number	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Salsify	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
188-189	1.4	1.4									8.5	2.3			2.0					15.5
421-430	1.4	0.5					0.2			1.2	2.2				0.6	0.2	9.1			15.3
330-332										3.6	11.5									15.1
123-125	4.6	1.6									1.7		0.4			0.1	6.5			15.0
305	1.2	1.2			0.7					1.8	1.3	1.0			1.7		5.6			14.5
319-320	1.2	1.2			0.7					1.8	1.3	1.0			1.7		5.6			14.5
322	1.2	1.2			0.7					1.8	1.3	1.0			1.7		5.6			14.5
229-234	1.1	0.8				1.1			3.8	2.3	2.7							1.5	0.9	14.1
375-376	2.2						0.6		2.1	1.6	2.3		1.2		4.1					14.1
550-553	2.3	2.3					0.1			4.5	1.8	2.7	0.5							14.0
154-155	4.5											3.6							5.4	13.5
177-178	2.7	2.7								4.5		2.9								12.8
182-183	0.8	1.5								6.0	1.8		1.2		1.1				0.5	12.8
347-348	0.8	3.4								2.5	3.4		1.4		1.2					12.7
299-300	3.2	3.2									1.7	4.3								12.4
285	2.7	2.7								2.7		2.2			1.9					12.2
548-549	2.3	4.5								1.1	1.8	0.9	1.1							11.7
554-555							1.3			0.6	7.2		2.0							11.1
514-520	1.5	1.5									1.3	1.2				0.7	4.7			10.9
238-239	5.1									1.2	4.5									10.8
259-260	1.6	1.6								3.2	3.8					0.4				10.5
156-157		3.4								3.4	2.7									9.5
530-541	0.9	0.9								1.9	3.0	0.8					1.7			9.2
275	2.3									6.8										9.0
138-139		2.8								5.6						0.5				8.9
147-150	1.6	1.6								1.6	3.9									8.7
255-257	4.3			2.6								1.7								8.6
169-170		4.2									3.4					1.0				8.6
324-325		1.3								1.3	1.2	3.1	0.7		0.9					8.4
471-476	0.8									1.1	5.4	0.6								7.9
269-270	2.7	2.7									2.2									7.6
485-488	0.9	0.9				0.1					3.2	0.4					1.4			6.8
129-130		3.0																	3.6	6.7
431-433	0.4	0.4					0.1			0.6	1.4						3.6			6.5
435-436	0.4	0.4					0.1			0.6	1.4						3.6			6.5
440	0.4	0.4					0.1			0.6	1.4						3.6			6.5
526-529											1.4						5.1			6.5
179	2.3	2.3									1.8									6.3
280-281		1.8								1.8		2.1								5.7
351-354	0.7	1.0					0.1			0.4	0.7	0.5	0.1		0.3	0.1	1.8			5.7

Table 18. Adult consumption rates of root vegetables in the Cardiff area (kg/y)

Observation number	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Jerusalem artichoke	Kohl rabi	Leek	Onion	Parsnip	Radish	Salsify	Shallot	Spring onion	Swede	Sweet potato	Turnip	Total
358-363	0.7	1.0					0.1			0.4	0.7	0.5	0.1		0.3	0.1	1.8			5.7
365-368	0.7	1.0					0.1			0.4	0.7	0.5	0.1		0.3	0.1	1.8			5.7
286-295	2.3									3.4										5.6
404-405	0.5									2.3	1.8	0.9								5.4
564-566											5.3									5.3
253-254	0.8	1.7									2.7									5.2
120-122		1.8									2.9									4.7
144-146		3.8																		3.8
602-607										3.4										3.4
126-128	1.1	0.5									0.9						0.6			3.1
400-401		0.3					0.1			1.5	1.0									2.9
171-172		1.4									1.1									2.5
333-334	0.6																		1.8	2.4
369-372				0.3					0.3		0.2		0.1							0.9
608-613																0.8				0.8

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 73 highest adult consumers is 62.5 kg/y

The observed 97.5 percentile rate based on 394 observations is 91.5 kg/y

Table 19. Adult consumption rates of potato in the Cardiff area (kg/y)

Observation number	Potato
544-545	**145.0**
577-578	**125.4**
579-580	**118.0**
195-196	**113.8**
509-510	**103.2**
245-246	**95.6**
581-582	**88.4**
345-346	**83.9**
392-393	**81.9**
591-593	**81.9**
223-226	**77.4**
616-618	**75.2**
235-237	**72.8**
340	**65.5**
1138	**65.5**
481-484	**65.5**
471-476	**62.7**
548-549	**58.0**
569-574	**58.0**
614-615	**57.3**
197-198	**56.9**
575-576	**55.2**
411	**52.5**
382-384	**51.0**
443-447	**50.8**
238-239	47.8
337	47.8
179	45.5
330-332	43.7
554-555	43.5
560-561	43.5
511-513	42.3
140-142	41.0
180-181	41.0
240-242	41.0
277-279	41.0
306-308	41.0
342-344	38.5
133-135	36.4
243-244	36.4
1113	35.8
1114	35.8
169-170	35.8
175-176	32.8

Observation number	Potato
250	32.8
159-162	31.2
507-508	30.9
398-399	30.7
608-613	30.4
514-520	29.8
379-381	29.5
173-174	27.3
524-525	27.3
556-557	26.1
585-588	25.8
477-478	24.3
338-339	23.9
594-597	23.1
136-139	22.8
258	21.8
598-601	21.8
521-523	21.7
201	20.5
222	20.5
602-607	20.5
166-168	19.0
564-566	18.9
485-488	18.5
275	18.2
542-543	18.2
271-272	18.0
274	18.0
347-348	17.8
491-494	17.2
188-189	17.1
1115-1124	16.2
147-150	15.6
389-391	14.6
562-563	14.5
280-281	14.4
182-183	13.7
253-254	13.7
296-298	13.7
123-125	12.7
394-396	12.7
497-506	12.2
171-172	11.9
335-336	11.8

Observation number	Potato
286-295	11.4
567-568	11.3
404-405	11.1
120-122	10.9
550-553	10.5
400-401	10.0
191-194	9.2
262-265	9.2
247-249	9.1
351-354	8.7
358-363	8.7
365-368	8.7
448-455	8.1
619-624	7.9
126-128	7.6
144-146	7.6
177-178	7.3
276	6.8
156-157	6.8
269-270	5.5
285	5.5
375-376	5.2
385-287	5.2
251-252	5.1
458-465	4.7
255-257	4.4
431-433	3.6
435-436	3.6
440	3.6
526-529	3.4
229-234	3.0
530-541	2.7
558-559	2.7
305	2.6
319-320	2.6
322	2.6
333-334	2.4
369-372	2.0

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of potato based on the 66 highest adult consumers is 74.9 kg/y

The observed 97.5 percentile rate based on 377 observations is 100.1 kg/y

Table 20. Adult consumption rates of domestic fruit in the Cardiff area (kg/y)

Observation number	Apple	Blackberry	Blackcurrant	Cherry	Damson	Fig	Gooseberry	Grapes	Huckelberry	Jostaberry	Loganberry	Melon	Pear	Plum	Pumpkin	Raspberry	Redcurrant	Rhubarb	Sharon fruit	Strawberry	Tayberry	Walnut	Whitecurrant	Total
577-578			**19.9**				**8.2**									**21.7**	**6.8**	**9.2**						**65.7**
579-580	**6.8**						**8.2**									**13.6**		**6.9**		**28.6**				**64.0**
251-252			**8.5**							**3.4**						**19.1**		**0.9**		**26.8**				**58.6**
575-576	**5.4**	**4.0**	**14.2**				**10.2**									**13.6**	**6.8**	**2.3**						**56.5**
175-176		**19.9**					**10.2**					**5.2**				**8.5**	**11.4**							**55.1**
477-478			**17.0**				**2.0**										**9.1**	**2.3**		**21.4**				**51.9**
550-553	**2.8**	**2.7**	**11.4**				**4.1**						**2.8**	**2.8**		**3.4**	**2.3**	**2.9**		**8.3**	**8.0**			**51.5**
619-624	**15.1**						**2.7**	**2.3**			**1.5**		**7.6**	**2.3**		**4.5**		**1.2**		**11.3**				**48.5**
342-344		**2.7**	**11.4**								**2.7**					**11.1**	**12.1**	**3.8**		**3.6**				**47.3**
507-508			**9.1**				**0.7**				**0.2**					**13.6**	**3.4**	**5.8**		**11.3**				**44.1**
556-557			**11.4**				**16.3**	**6.8**								**4.8**		**4.6**						**43.9**
243-244										**21.5**						**10.2**		**0.9**		**9.1**				**41.7**
1113		**9.5**	**6.8**				**3.9**				**9.5**				**2.4**	**2.7**	**1.8**	**1.2**		**3.4**				**41.3**
1114		**9.5**	**6.8**				**3.9**				**9.5**				**2.4**	**2.7**	**1.8**	**1.2**		**3.4**				**41.3**
481-484	**4.5**		**3.8**				**6.1**				**6.0**			**3.4**		**5.1**	**3.4**	**2.9**						**35.2**
569-574	**7.6**	**4.0**	**1.9**													**1.4**	**9.1**	**0.4**		**7.1**	**1.3**			**32.7**
345-346			**10.6**				**0.7**									**5.6**	**5.1**	**1.7**		**8.0**				**31.8**
333-334	**9.1**	**9.5**					**4.9**									**0.8**	**5.4**	**0.9**						**30.7**
173-174		**6.4**														**6.8**		**1.8**		**14.3**				**29.3**
614-615	**3.4**	**8.0**															**4.5**	**2.3**		**10.7**				**28.9**
347-348			**5.4**				**4.6**							**2.6**		**7.7**	**1.7**	**0.9**		**3.8**				**26.6**
238-239			**11.4**													**15.3**								**26.6**
1115-1124		**5.5**	**3.9**				**3.9**				**5.5**				**1.1**	**1.6**	**1.1**	**1.6**		**1.9**				**26.0**
542-543	**11.3**						**6.1**									**1.0**		**6.9**						**25.4**
223-226	**6.8**		**3.4**				**10.2**	**0.3**								**1.7**		**2.3**		**0.3**				**25.1**
255-257		**4.2**	**4.5**								**4.2**					**0.7**	**3.6**			**1.3**			**3.6**	**22.3**
524-525			**8.5**															**3.5**		**10.2**				**22.2**
229-234							2.0							17.0		1.1		0.4		1.2				21.8
581-582			5.7				3.1									6.1	4.5	1.2		0.9				21.4
497-506	4.5		5.7				0.4						1.8			4.1	0.5	0.5		3.4				20.8
154-155			9.1				4.9									6.8								20.8
398-399	4.8		0.9	0.9		2.2	0.9						1.7	1.7		1.7		5.1		1.0				20.8
558-559			14.2				6.1																	20.3
335-336			7.4				3.1									6.7		2.3						19.5

Table 20. Adult consumption rates of domestic fruit in the Cardiff area (kg/y)

Observation number	Apple	Blackberry	Blackcurrant	Cherry	Damson	Fig	Gooseberry	Grapes	Huckelberry	Jostaberry	Loganberry	Melon	Pear	Plum	Pumpkin	Raspberry	Redcurrant	Rhubarb	Sharon fruit	Strawberry	Tayberry	Walnut	Whitecurrant	Total
385-387									2.7			0.3				5.4		5.4		5.4				19.4
259-260	9.5	5.6	4.0																					19.1
138-139																12.7				6.0				18.7
235-237		6.4	4.5													0.5				6.9				18.3
392-393			4.5				3.4				4.5							5.8						18.2
562-563							2.0										9.1			6.8				17.9
491-494	3.8		6.6				3.4											3.1						16.9
443-447	6.8	2.7																7.3						16.8
458-465		1.2	3.1				1.9				5.8					3.0		1.9						16.8
585-588	7.6	2.0	3.8				1.4									0.5	1.1	0.4						16.7
245-246			6.0													3.6	1.6			5.0				16.1
269-270							6.5									4.1	5.4							16.1
564-566			9.5													1.4		4.6						15.4
250		1.4														10.2				3.6				15.1
330-332	6.0	1.2	1.5														1.8	4.0						14.6
591-593																3.4		1.0		10.2				14.5
448-449		0.5	0.4			0.5	0.5	1.1			0.5			2.3	5.6	0.5	0.5	0.2	0.5	1.4				14.3
441-442	6.0							1.0					0.5					6.0						13.5
511-513	4.5		2.8				0.7						4.5											12.6
594-597	2.8		3.5				5.1											0.9						12.4
240-242										6.0						2.3		0.6		3.0				11.9
180-181		4.0														6.8		0.6						11.3
195-196																		1.2		9.5				10.7
485-488		8.0														2.3								10.2
373-374	3.6		0.9				0.7									1.8	0.4	1.8						9.3
276		4.5														3.4		1.2						9.1
389-391			0.4				0.3									0.8	0.4	3.1		3.8				8.7
136-137																8.5								8.5
369-372	1.7					0.8		2.0					0.3	3.1	0.4									8.4
379-381		5.4																2.8						8.2
156-157			6.8															1.4						8.2
382-384	0.9	1.1	0.3												1.5	0.9		2.3		0.9				8.0
266	0.9			2.7																4.3				7.9
262-265							5.5									0.6				1.6				7.7

Table 20. Adult consumption rates of domestic fruit in the Cardiff area (kg/y)

Observation number	Apple	Blackberry	Blackcurrant	Cherry	Damson	Fig	Gooseberry	Grapes	Huckelberry	Jostaberry	Loganberry	Melon	Pear	Plum	Pumpkin	Raspberry	Redcurrant	Rhubarb	Sharon fruit	Strawberry	Tayberry	Walnut	Whitecurrant	Total
131-132										4.5	1.6						1.4							7.5
450-455			0.4				0.5								5.6		0.5							7.1
179			5.7															1.2						6.8
408-410	1.7										1.6		1.1					0.7		1.0		0.7		6.8
201															6.8									6.8
222															6.8									6.8
306-308																		1.8		4.8				6.6
514-520													1.8	1.8		2.3								6.0
340			3.4																	2.6				6.0
1138			3.4																	2.6				6.0
197-198																		0.6		4.8				5.3
140-142	1.7		2.8		0.7																			5.2
400-401	0.9	0.2	0.1													1.0	0.3	0.7		0.3	1.2		0.2	5.0
188-189																4.2		0.6						4.8
548-549																				4.8				4.8
546-547		0.5														4.1								4.5
412-414			0.7												1.0	0.7				2.0				4.3
166-168							3.4											0.8						4.2
227-228																4.1								4.1
375-376															3.1			0.7						3.8
530-541			0.5				0.3									0.6	0.4	0.4		1.7				3.8
182-183		1.3														2.3		0.2						3.8
526-529															1.5	2.0								3.5
598-601																3.4								3.4
299-300	3.3																							3.3
351-354	0.1	0.7	0.02	0.1			0.2	0.7								0.2	0.02	1.0		0.1				3.1
358-363	0.1	0.7	0.02	0.1			0.2	0.7								0.2	0.02	1.0		0.1				3.1
365-366	0.1	0.7	0.02	0.1			0.2	0.7								0.2	0.02	1.0		0.1				3.1
120-122	3.0																							3.0
560-561																1.4				1.4				2.7
177-178																2.7								2.7
191-194							1.8									0.5		0.1						2.4
521-523																		2.3						2.3
147-150							1.8									0.2		0.3						2.3

Table 20. Adult consumption rates of domestic fruit in the Cardiff area (kg/y)

Observation number	Apple	Blackberry	Blackcurrant	Cherry	Damson	Fig	Gooseberry	Grapes	Huckelberry	Jostaberry	Loganberry	Melon	Pear	Plum	Pumpkin	Raspberry	Redcurrant	Rhubarb	Sharon fruit	Strawberry	Tayberry	Walnut	Whitecurrant	Total
394-396	2.3																							2.3
509-510		2.3																						2.3
544-545							2.0																	2.0
123-125																		0.6		1.1				1.8
431-433		0.4						1.1				0.3												1.7
435-436		0.4						1.1				0.3												1.7
440		0.4						1.1				0.3												1.7
247-249																1.7								1.7
324			0.4				0.1									0.1		0.9		0.1				1.5
296-298							0.5									0.5		0.5						1.4
319-320												0.3						0.4		0.6				1.2
305												0.3						0.4		0.6				1.2
322												0.3						0.4		0.6				1.2
169-170												0.9						0.3						1.2
314-315			0.5				0.5																	1.0
159-162			0.8																					0.8
133-135																		0.8						0.8
325			0.4				0.1									0.1				0.1				0.6
421-430																		0.6						0.6
253-254																		0.6						0.6
404-405							0.1													0.5				0.6
258																		0.5						0.5
286-295																		0.5						0.5
608-613		0.5																						0.5
271-272																		0.4						0.4
274																		0.4						0.4
171-172																		0.1						0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 76 highest adult consumers is 38.0 kg/y

The observed 97.5 percentile rate based on 378 observations is 53.7 kg/y

Table 21. Adult consumption rates of milk in the Cardiff area (l/y)

Observation number	Milk
296-298	**207.4**
299-300	**121.7**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of milk based on the 5 highest adult consumers is 173.1 l/y
The observed 97.5 percentile rate based on 5 observations is 207.4 l/y

Table 22. Adult consumption rates of cattle meat in the Cardiff area (kg/y)

Observation number	Beef
296-298	**41.6**
299-300	**17.2**
625	11.8
1139-1141	11.8
120-122	11.7
328-329	5.4
626	5.4
1145	5.4

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of cattle meat based on the 5 highest adult consumers is 31.9 kg/y
The observed 97.5 percentile rate based on 16 observations is 41.6 kg/y

Table 23. Adult consumption rates of pig meat in the Cardiff area (kg/y)

Observation number	Pork
628	**33.7**
1146-1147	**33.7**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of pig meat based on the 3 highest adult consumers is 33.7 kg/y
The observed 97.5 percentile rate based on 3 observations is 33.7 kg/y

Table 24. Adult consumption rates of sheep meat in the Cardiff area (kg/y)

Observation number	Lamb
328-329	**23.6**
625	**11.8**
1139-1141	**11.8**
299-300	6.2
314-315	5.7
626	5.4
1145	5.4
309-313	4.5

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of sheep meat based on the 6 highest adult consumers is 15.7 kg/y
The observed 97.5 percentile rate based on 17 observations is 23.6 kg/y

Table 25. Adult consumption rates of poultry in the Cardiff area (kg/y)

Observation number	Chicken	Pigeon	Total
445-447	**1.5**		**1.5**
328-329	**0.8**		**0.8**
144-146		0.5	0.5

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of poultry based on the 5 highest adult consumers is 1.2 kg/y
The observed 97.5 percentile rate based on 8 observations is 1.5 kg/y

Table 26. Adult consumption rates of eggs in the Cardiff area (kg/y)

Observation number	Chicken egg	Duck egg	Total
309-313	**25.0**	**0.5**	**25.5**
445-447	**11.9**		**11.9**
408-410	**8.9**		**8.9**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of eggs based on the 11 highest adult consumers is 17.3 kg/y
The observed 97.5 percentile rate based on 11 observations is 25.5 kg/y

Table 27. Adult consumption rates of wild/free foods in the Cardiff area (kg/y)

Observation number	Blackberry	Chestnut	Elderberry	Hazel nuts	Total
411	**4.5**	**6.4**	**1.8**		**12.7**
507-508	**9.1**				**9.1**
577-578	**6.8**				**6.8**
240-242	**6.0**				**6.0**
579-580	**4.5**				**4.5**
385-387	2.7				2.7
443				2.3	2.3
481-484	2.3				2.3
408-410	1.1			0.6	1.7
299-300	1.6				1.6
305	0.8	0.4		0.1	1.2
319-320	0.8	0.4		0.1	1.2
322	0.8	0.4		0.1	1.2
373-374	1.1				1.1
544-545	1.1				1.1
398-399	0.9			0.2	1.0
245-246	0.9				0.9
416	0.9				0.9
564-566	0.9				0.9
560-561	0.2			0.6	0.8
491-494	0.8				0.8
177-178	0.7				0.7
251-252	0.7				0.7
328-329	0.7				0.7
581-582	0.7				0.7
594-597	0.6				0.6
131-132	0.5				0.5
296-298	0.5				0.5
314-315	0.5				0.5
324-325	0.5				0.5
524-525	0.5				0.5
266	0.4				0.4
223-226	0.3				0.3
514-520	0.3				0.3
138-142	0.2				0.2
497-506	0.2				0.2
526-529	0.2				0.2
156-157	0.2				0.2
306-308		0.2			0.2
191-194	0.1				0.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of wild/free foods based on the 10 highest adult consumers is 7.2 kg/y

The observed 97.5 percentile rate based on 108 observations is 7.5 kg/y

Table 28. Adult consumption rates of rabbits/hares in the Cardiff area (kg/y)

Observation number	Rabbit
1148	**1.8**
628	**1.5**
1146-1147	**1.5**
144-146	**0.9**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of rabbits/hares based on the 7 highest adult consumers is 1.3 kg/y

The observed 97.5 percentile rate based on 7 observations is 1.8 kg/y

Table 29. Adult consumption rates of honey in the Cardiff area (kg/y)

Observation number	Honey
267-268	**11.8**
416	**9.1**
412-414	**7.9**
417-418	3.0
411	0.9
408-410	0.6
156-157	0.2

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on the 6 highest adult consumers is 9.4 kg/y
The observed 97.5 percentile rate based on 14 observations is 11.8 kg/y

Table 30. Adult consumption rates of wild fungi in the Cardiff area (kg/y)

Observation number	Mushrooms
560-561	**2.3**
305	**2.0**
319-320	**2.0**
322	**2.0**
328-329	0.7
408-410	0.3
581-582	0.3
140-142	0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of fungi based on the 6 highest adult consumers is 2.1 kg/y
The observed 97.5 percentile rate based on 16 observations is 2.3 kg/y

Table 31. Adult consumption rates of fish (freshwater) in the Cardiff area (kg/y)

Observation number	Brown trout
441-442	**2.4**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of fish (freshwater) based on the 2 highest adult consumers is 2.4 kg/y
The observed 97.5 percentile rate based on 2 observations is 2.4 kg/y

Table 32. Children's consumption rates of green vegetables in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
584	**16**				**12.8**			**1.9**	**8.3**			**3.8**	**7.2**		**2.0**	**36.1**
583	**14**				**12.8**			**1.9**	**8.3**			**3.8**	**7.2**		**2.0**	**36.1**
388	**15**			**4.4**	**11.7**		**1.8**		**5.4**	**5.1**			**1.4**			**29.8**
199	**15**			**1.1**	**10.7**				**1.4**	**6.4**						**19.6**
200	**13**			**1.1**	**10.7**				**1.4**	**6.4**						**19.6**
489	**16**			**2.3**	**5.5**	**1.5**			**2.0**	**2.8**			**2.1**		**0.7**	**16.9**
490	**14**			**2.3**	**5.5**	**1.5**			**2.0**	**2.8**			**2.1**		**0.7**	**16.9**
1125	**14**		**1.0**	**2.1**	**2.4**		**0.5**		**1.1**	**1.9**			**3.2**	**1.0**		**13.1**
321	**13**			**2.8**	**8.5**		**1.5**									**12.8**
163	16		6.4		5.2											11.6
164	15		6.4		5.2											11.6
590	13				3.0				3.7				4.5			11.2
273	15				7.2	1.5							1.2			9.9
158	15			3.4					2.2				2.3			7.9
496	16			1.1			0.9		1.8	2.3			1.5			7.7
495	12			1.1			0.9		1.8	2.3			1.5			7.7
282	12				4.8					1.1	0.2		0.6		0.7	7.4
184	15			0.8	2.0				0.3				3.0		1.1	7.2
186	12			0.8	2.0				0.3				3.0		1.1	7.2
185	12			0.8	2.0				0.3				3.0		1.1	7.2
326	16			1.6	4.5								0.6			6.6
327	13			1.6	4.5								0.6			6.6
402	12			1.1	1.6			1.0	0.2				1.3	1.4		6.5
403	12			1.1	1.6			1.0	0.2				1.3	1.4		6.5
406	16			3.4	1.3		0.9						0.5		0.1	6.1
407	12			3.4	1.3		0.9						0.5		0.1	6.1
355	12		0.7	1.0	2.7		0.4						0.2			5.0
301	16				4.3											4.3
302	14				4.3											4.3
303	12				4.3											4.3
143	13												1.7			1.7

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 9 highest 15 year old consumers is 22.3 kg/y

The observed 97.5 percentile rate based on 31 observations is 36.1 kg/y

Table 32. Children's consumption rates of green vegetables in the Cardiff area (kg/y)

10 year old age group

Observation number	Age	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
349	**10**	**0.3**	**2.8**	**0.9**	**10.3**		**1.4**		**8.3**	**5.1**			**2.3**		**1.3**	**32.7**
466	**10**	**0.7**		**2.0**	**4.7**				**4.0**	**4.6**						**16.0**
377	**7**		**1.8**	**2.4**	**1.0**					**6.8**			**1.3**			**13.3**
1127	**11**		**1.0**	**2.1**	**2.4**		**0.5**		**1.1**	**1.9**			**3.2**	**1.0**		**13.1**
1126	**10**		**1.0**	**2.1**	**2.4**		**0.5**		**1.1**	**1.9**			**3.2**	**1.0**		**13.1**
1128	**7**		**1.0**	**2.1**	**2.4**		**0.5**		**1.1**	**1.9**			**3.2**	**1.0**		**13.1**
589	**11**				**3.0**				**3.7**				**4.5**			**11.2**
187	9			0.8	2.0				0.3				3.0		1.1	7.2
434	10			2.2	1.2					2.0						5.4
437	9			2.2	1.2					2.0						5.4
438	7			2.2	1.2					2.0						5.4
283	8				3.4					0.8	0.1		0.4		0.5	5.2
261	7		0.2		1.1								2.1	1.7		5.1
356	10		0.7	1.0	2.7		0.4						0.2			5.0
153	9				1.1		0.7						0.5			2.3
151	7				1.1		0.7						0.5			2.3
152	7				1.1		0.7						0.5			2.3

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 7 highest 10 year old consumers is 16.1 kg/y

The observed 97.5 percentile rate based on 17 observations is 26.0 kg/y

Table 32. Children's consumption rates of green vegetables in the Cardiff area (kg/y)

5 year old age group

Observation number	Age	Asparagus	Broccoli	Brussel sprout	Cabbage	Calabrese	Cauliflower	Chard	Courgettes	Cucumber	Herbs	Kale	Lettuce	Marrow	Spinach	Total
350	**5**	**0.2**	**1.4**	**0.4**	**5.2**		**0.7**		**4.2**	**2.6**			**1.1**		**0.6**	**16.4**
378	**5**		**1.8**	**2.4**	**1.0**					**6.8**			**1.3**			**13.3**
467	**6**	**0.4**		**1.0**	**2.3**				**2.0**	**2.3**						**8.0**
468	**6**	**0.4**		**1.0**	**2.3**				**2.0**	**2.3**						**8.0**
469	**4**	**0.4**		**1.0**	**2.3**				**2.0**	**2.3**						**8.0**
470	**4**	**0.4**		**1.0**	**2.3**				**2.0**	**2.3**						**8.0**
439	5			2.2	1.2					2.0						5.4
357	3		0.7	1.0	2.7		0.4						0.2			5.0
165	6		3.2		1.6											4.8
284	5				2.4					0.6	0.1		0.3		0.3	3.7
304	2				2.2											2.2
456	4									0.5						0.5

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of green vegetables based on the 6 highest 5 year old consumers is 10.3 kg/y

The observed 97.5 percentile rate based on 12 observations is 15.5 kg/y

Table 33. Children's consumption rates of other vegetables in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Broad bean	Chilli pepper	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
388	**15**	**2.2**		**1.7**		**8.6**	**1.8**	**13.1**		**2.2**	**14.4**	**44.0**
163	**16**	**7.8**					**2.9**	**11.7**			**5.4**	**27.8**
164	**15**	**7.8**					**2.9**	**11.7**			**5.4**	**27.8**
1125	**14**	**4.8**		**1.4**		**1.2**	**1.0**	**14.3**			**4.1**	**26.8**
143	**13**			**6.2**		**5.2**		**13.6**				**25.0**
584	**16**			**3.2**	**1.4**	**2.7**	**1.5**	**8.2**			**0.9**	**17.8**
583	**14**			**3.2**	**1.4**	**2.7**	**1.5**	**8.2**			**0.9**	**17.8**
489	**16**	**1.8**				**1.8**		**3.4**		**4.6**	**6.0**	**17.6**
490	**14**	**1.8**				**1.8**		**3.4**		**4.6**	**6.0**	**17.6**
199	**15**	**3.4**	**0.3**				**0.5**	**6.8**			**6.3**	**17.3**
200	**13**	**3.4**	**0.3**				**0.5**	**6.8**			**6.3**	**17.3**
282	**12**	**6.3**	**0.1**				**0.3**	**5.4**	**0.03**	**0.1**	**4.5**	**16.7**
158	**15**	**3.4**		**2.7**				**8.2**		**1.7**		**16.0**
496	**16**	**4.6**		**0.9**			**0.7**	**6.8**			**2.1**	**15.0**
495	**12**	**4.6**		**0.9**			**0.7**	**6.8**			**2.1**	**15.0**
301	**16**					**6.4**		**6.4**			**2.0**	**14.8**
302	**14**					**6.4**		**6.4**			**2.0**	**14.8**
303	**12**					**6.4**		**6.4**			**2.0**	**14.8**
403	12			0.2	0.5	0.5	0.4	6.0		0.3	3.0	10.9
402	12			0.2	0.5	0.5	0.4	6.0		0.3	3.0	10.9
590	13	2.3		0.9				6.8				10.0
321	13							6.8			2.1	8.9
273	15	1.8						5.6				7.4
355	12	0.3		0.3	0.2	0.2		2.6		0.3	1.1	5.0
184	15							4.5		0.2		4.7
185	12							4.5		0.2		4.7
186	12							4.5		0.2		4.7
397	14							2.3				2.3
323	16										2.1	2.1
406	16					0.2		1.8				2.0
407	12					0.2		1.8				2.0
326	16						0.7					0.7
327	13						0.7					0.7

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of other vegetables based on the 18 highest 15 year old consumers is 20.2 kg/y

The observed 97.5 percentile rate based on 33 observations is 31.1 kg/y

Table 33. Children's consumption rates of other vegetables in the Cardiff area (kg/y)

10 year old age group

Observation number	Age	Broad bean	Chilli pepper	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
349	**10**	**3.4**				**10.2**		**12.3**		**1.0**	**3.4**	**30.4**
1127	**11**	**4.8**		**1.4**		**1.2**	**1.0**	**14.3**			**4.1**	**26.8**
1126	**10**	**4.8**		**1.4**		**1.2**	**1.0**	**14.3**			**4.1**	**26.8**
1128	**7**	**4.8**		**1.4**		**1.2**	**1.0**	**14.3**			**4.1**	**26.8**
466	**10**	**1.0**		**0.4**		**1.5**		**8.9**		**1.3**	**3.9**	**16.9**
283	**8**	**4.4**	**0.1**				**0.2**	**3.8**	**0.02**	**0.1**	**3.2**	**11.7**
377	**7**	**1.9**						**4.1**		**0.6**	**4.3**	**10.9**
589	11	2.3		0.9				6.8				10.0
261	7	0.8						4.8			4.2	9.8
1109	10					8.1						8.1
1110	9					8.1						8.1
434	10						0.3	4.1			3.2	7.6
437	9						0.3	4.1			3.2	7.6
438	7						0.3	4.1			3.2	7.6
356	10	0.3		0.3	0.2	0.2		2.6		0.3	1.1	5.0
187	9							4.5		0.2		4.7
153	9	0.6				0.8		1.9		0.1		3.5
151	7	0.6				0.8		1.9		0.1		3.5
152	7	0.6				0.8		1.9		0.1		3.5

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of other vegetables based on the 7 highest 10 year old consumers is 21.5 kg/y

The observed 97.5 percentile rate based on 19 observations is 28.8 kg/y

5 year old age group

Observation number	Age	Broad bean	Chilli pepper	French bean	Mange-tout	Pea	Pepper	Runner bean	Squash	Sweet-corn	Tomato	Total
350	**5**	**1.7**				**5.1**		**6.2**		**0.5**	**1.7**	**15.2**
165	**6**	**3.9**					**1.5**	**5.8**			**0.9**	**12.1**
378	**5**	**1.9**						**4.1**		**0.6**	**4.3**	**10.9**
467	**6**	**0.5**		**0.2**		**0.7**		**4.5**		**0.6**	**2.0**	**8.5**
468	**6**	**0.5**		**0.2**		**0.7**		**4.5**		**0.6**	**2.0**	**8.5**
469	**4**	**0.5**		**0.2**		**0.7**		**4.5**		**0.6**	**2.0**	**8.5**
470	**4**	**0.5**		**0.2**		**0.7**		**4.5**		**0.6**	**2.0**	**8.5**
284	**5**	**3.1**	**0.04**				**0.1**	**2.7**	**0.02**	**0.1**	**2.3**	**8.3**
439	**5**						**0.3**	**4.1**			**3.2**	**7.6**
304	**2**					**3.2**		**3.2**			**1.0**	**7.4**
357	3	0.3		0.3	0.2	0.2		2.6		0.3	1.1	5.0
1111	6					4.1						4.1
1112	4					4.1						4.1
456	4			0.5				0.5			0.8	1.8

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of other vegetables based on the 10 highest 5 year old consumers is 9.5 kg/y

The observed 97.5 percentile rate based on 14 observations is 14.2 kg/y

Table 34. Children's consumption rates of root vegetables in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Kohl rabi	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
584	**16**	**4.1**						**1.2**		**13.5**	**10.8**	**6.5**			**1.2**	**12.2**		**49.5**
583	**14**	**4.1**						**1.2**		**13.5**	**10.8**	**6.5**			**1.2**	**12.2**		**49.5**
163	**16**	**3.9**	**5.8**							**3.9**	**9.3**	**3.1**				**17.5**		**43.3**
164	**15**	**3.9**	**5.8**							**3.9**	**9.3**	**3.1**				**17.5**		**43.3**
388	**15**	**2.2**	**8.1**							**4.3**		**1.7**				**13.1**	**2.6**	**32.0**
273	**15**	**7.1**	**1.8**							**7.1**	**1.4**	**1.4**			**0.4**	**10.8**		**30.0**
199	**15**	**4.5**	**2.3**	**1.6**						**4.5**	**3.6**	**1.8**				**6.8**		**25.0**
200	**13**	**4.5**	**2.3**	**1.6**						**4.5**	**3.6**	**1.8**				**6.8**		**25.0**
1125	**14**	**2.4**	**3.0**		**0.7**			**0.6**		**3.5**	**3.8**	**1.4**	**0.2**		**0.3**	**3.6**	**1.4**	**20.9**
496	**16**	**1.1**						**0.1**		**1.1**	**2.7**	**1.8**	**0.5**			**13.6**		**20.9**
495	**12**	**1.1**						**0.1**		**1.1**	**2.7**	**1.8**	**0.5**			**13.6**		**20.9**
590	13	2.3	2.3							5.0	5.4	0.9						15.8
323	16	1.2	1.2			0.7				1.8	1.3	1.0		1.7		5.6		14.5
321	13	1.2	1.2			0.7				1.8	1.3	1.0		1.7		5.6		14.5
185	12	0.8	1.5							6.0	1.8		1.2	1.1			0.5	12.8
184	15	0.8	1.5							6.0	1.8		1.2	1.1			0.5	12.8
186	12	0.8	1.5							6.0	1.8		1.2	1.1			0.5	12.8
301	16	3.2	3.2								1.7	4.3						12.4
302	14	3.2	3.2								1.7	4.3						12.4
303	12	3.2	3.2								1.7	4.3						12.4
158	15		3.4							3.4	2.7							9.5
326	16		1.3							1.3	1.2	3.1	0.7	0.9				8.4
327	13		1.3							1.3	1.2	3.1	0.7	0.9				8.4
489	16	0.9	0.9				0.1				3.2	0.4				1.4		6.8
490	14	0.9	0.9				0.1				3.2	0.4				1.4		6.8
282	12		1.8							1.8		2.1						5.7
355	12	0.7	1.0					0.1		0.4	0.7	0.5	0.1	0.3	0.1	1.8		5.7
407	12	0.5								2.3	1.8	0.9						5.4
406	16	0.5								2.3	1.8	0.9						5.4
402	12		0.3					0.1		1.5	1.0							2.9
403	12		0.3					0.1		1.5	1.0							2.9

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 11 highest 15 year old consumers is 32.8 kg/y

The observed 97.5 percentile rate based on 31 observations is 49.5 kg/y

Table 34. Children's consumption rates of root vegetables in the Cardiff area (kg/y)

10 year old age group

Observation number	Age	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Kohl rabi	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
1127	**11**	**2.4**	**3.0**		**0.7**			**0.6**		**3.5**	**3.8**	**1.4**	**0.2**		**0.3**	**3.6**	**1.4**	**20.9**
1126	**10**	**2.4**	**3.0**		**0.7**			**0.6**		**3.5**	**3.8**	**1.4**	**0.2**		**0.3**	**3.6**	**1.4**	**20.9**
1128	**7**	**2.4**	**3.0**		**0.7**			**0.6**		**3.5**	**3.8**	**1.4**	**0.2**		**0.3**	**3.6**	**1.4**	**20.9**
466	**10**		**1.5**					**1.7**		**2.0**	**3.5**	**1.2**				**8.9**		**18.8**
589	**11**	**2.3**	**2.3**							**5.0**	**5.4**	**0.9**						**15.8**
187	**9**	**0.8**	**1.5**							**6.0**	**1.8**		**1.2**	**1.1**			**0.5**	**12.8**
349	**10**	**0.8**	**3.4**							**2.5**	**3.4**		**1.4**	**1.2**				**12.7**
377	**7**	**1.1**						**0.3**	**1.1**	**0.8**	**1.2**		**0.6**	**2.0**				**7.0**
437	9	0.4	0.4					0.1		0.6	1.4					3.6		6.5
438	7	0.4	0.4					0.1		0.6	1.4					3.6		6.5
434	10	0.4	0.4					0.1		0.6	1.4					3.6		6.5
356	10	0.7	1.0					0.1		0.4	0.7	0.5	0.1	0.3	0.1	1.8		5.7
261	7	0.8	0.8							1.6	1.9				0.2			5.2
153	9	0.8	0.8							0.8	1.9							4.3
151	7	0.8	0.8							0.8	1.9							4.3
152	7	0.8	0.8							0.8	1.9							4.3
283	8		1.2							1.2		1.5						4.0

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 8 highest 10 year old consumers is 16.2 kg/y

The observed 97.5 percentile rate based on 17 observations is 20.9 kg/y

Table 34. Children's consumption rates of root vegetables in the Cardiff area (kg/y)

5 year old age group

Observation number	Age	Beetroot	Carrot	Celeriac	Celery	Chicory root	Fennel	Garlic	Kohl rabi	Leek	Onion	Parsnip	Radish	Shallot	Spring onion	Swede	Turnip	Total
165	**6**	**1.9**	**2.9**							**1.9**	**4.6**	**1.5**				**8.7**		**21.7**
467	**6**		**0.7**					**0.9**		**1.0**	**1.8**	**0.6**				**4.5**		**9.4**
468	**6**		**0.7**					**0.9**		**1.0**	**1.8**	**0.6**				**4.5**		**9.4**
469	**4**		**0.7**					**0.9**		**1.0**	**1.8**	**0.6**				**4.5**		**9.4**
470	**4**		**0.7**					**0.9**		**1.0**	**1.8**	**0.6**				**4.5**		**9.4**
378	5	1.1						0.3	1.1	0.8	1.2		0.6	2.0				7.0
439	5	0.4	0.4					0.1		0.6	1.4					3.6		6.5
350	5	0.4	1.7							1.2	1.7		0.7	0.6				6.3
304	2	1.6	1.6								0.9	2.2						6.2
357	3	0.7	1.0					0.1		0.4	0.7	0.5	0.1	0.3	0.1	1.8		5.7
284	5		0.9							0.9		1.1						2.9

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of root vegetables based on the 5 highest 5 year old consumers is 11.8 kg/y

The observed 97.5 percentile rate based on 11 observations is 18.6 kg/y

Table 35. Children's consumption rates of potato in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Potato
584	**16**	**88.4**
583	**14**	**88.4**
199	**15**	**56.9**
200	**13**	**56.9**
143	**13**	**41.0**
163	**16**	**31.2**
164	**15**	**31.2**
590	13	25.8
489	16	18.5
490	14	18.5
273	15	18.0
496	16	17.2
495	12	17.2
1125	14	16.2
282	12	14.4
184	15	13.7
185	12	13.7
186	12	13.7
397	14	12.7
406	16	11.1
407	12	11.1
402	12	10.0
403	12	10.0
355	12	8.7
158	15	6.8
388	15	5.2
323	16	2.6
321	13	2.6

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of potato based on the 7 highest 15 year old consumers is 56.3 kg/y

The observed 97.5 percentile rate based on 28 observations is 88.4 kg/y

Table 35. Children's consumption rates of potato in the Cardiff area (kg/y)

10 year old age group

Observation number	Age	Potato
589	**11**	**25.8**
349	**10**	**17.8**
1127	**11**	**16.2**
1126	**10**	**16.2**
1128	**7**	**16.2**
187	**9**	**13.7**
283	**8**	**11.5**
356	**10**	**8.7**
153	9	7.8
151	7	7.8
152	7	7.8
466	10	4.7
434	10	3.6
437	9	3.6
438	7	3.6
377	7	2.6

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potato based on the 8 highest 10 year old consumers is 15.8 kg/y
The observed 97.5 percentile rate based on 16 observations is 22.8 kg/y

5 year old age group

Observation number	Age	Potato
165	**6**	**15.6**
350	**5**	**8.9**
357	**3**	**8.7**
456	**4**	**8.1**
284	**5**	**7.2**
439	5	3.6
378	5	2.6
467	6	2.4
468	6	2.4
469	4	2.4
470	4	2.4

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of potato based on the 5 highest 5 year old consumers is 9.7 kg/y
The observed 97.5 percentile rate based on 11 observations is 13.9 kg/y

Table 36. Children's consumption rates of domestic fruit in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Apple	Black-berry	Black-currant	Cherry	Damson	Goose-berry	Grapes	Huckel-berry	Logan-berry	Melon	Plum	Pumpkin	Rasp-berry	Red-currants	Rhubarb	Straw-berry	Tay-berry	White-currants	Total
1125	**14**		**5.5**	**3.9**			**3.9**			**5.5**			**1.1**	**1.6**	**1.1**	**1.6**	**1.9**			**26.0**
584	**16**			**5.7**			**3.1**							**6.1**	**4.5**	**1.2**	**0.9**			**21.4**
388	**15**								**2.7**		**0.3**			**5.4**		**5.4**	**5.4**			**19.4**
496	**16**	**3.8**		**6.6**			**3.4**									**3.1**				**16.9**
495	**12**	**3.8**		**6.6**			**3.4**									**3.1**				**16.9**
590	**13**	**7.6**	**2.0**	**3.8**			**1.4**							**0.5**	**1.1**	**0.4**				**16.7**
583	**14**			**5.7**			**3.1**								**4.5**	**1.2**	**0.9**			**15.3**
489	**16**		**8.0**											**2.3**						**10.2**
490	**14**		**8.0**											**2.3**						**10.2**
158	15			6.8												1.4				8.2
301	16	7.3																		7.3
302	14	7.3																		7.3
303	12	7.3																		7.3
199	15															0.6	4.8			5.3
200	13															0.6	4.8			5.3
143	13	1.7		2.8		0.7														5.2
403	12	0.9	0.2	0.1										1.0	0.3	0.7	0.3	1.2	0.2	5.0
402	12	0.9	0.2	0.1										1.0	0.3	0.7	0.3	1.2	0.2	5.0
184	15		1.3											2.3		0.2				3.8
185	12		1.3											2.3		0.2				3.8
186	12		1.3											2.3		0.2				3.8
355	12	0.1	0.7	0.02	0.1		0.2	0.7						0.2	0.02	1.0	0.1			3.1
397	14	2.3																		2.3
323	16										0.3					0.4	0.6			1.2
321	13										0.3					0.4	0.6			1.2
163	16			0.8																0.8
164	15			0.8																0.8
326	16			0.4			0.1							0.1			0.1			0.6
327	13			0.4			0.1							0.1			0.1			0.6
406	16						0.1										0.5			0.6
407	12						0.1										0.5			0.6
273	15															0.4				0.4

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 9 highest 15 year old consumers is 17.0 kg/y

The observed 97.5 percentile rate based on 32 observations is 22.4 kg/y

Table 36. Children's consumption rates of domestic fruit in the Cardiff area (kg/y)

10 year old age group

Observation number	Age	Apple	Black-berry	Black-currant	Cherry	Damson	Goose-berry	Grapes	Huckel-berry	Logan-berry	Melon	Plum	Pumpkin	Rasp-berry	Red-currants	Rhubarb	Straw-berry	Tay-berry	White-currants	Total
349	**10**			**5.4**			**4.6**					**2.6**		**7.7**	**1.7**	**0.9**	**3.8**			**26.6**
1126	**10**		**5.5**	**3.9**			**3.9**			**5.5**			**1.1**	**1.6**	**1.1**	**1.6**	**1.9**			**26.0**
1127	**11**		**5.5**	**3.9**			**3.9**			**5.5**			**1.1**	**1.6**	**1.1**	**1.6**	**1.9**			**26.0**
1128	**7**		**5.5**	**3.9**			**3.9**			**5.5**			**1.1**	**1.6**	**1.1**	**1.6**	**1.9**			**26.0**
466	**10**		**1.2**	**3.1**			**1.9**			**5.8**				**3.0**		**1.9**				**16.8**
589	**11**	**7.6**	**2.0**	**3.8**			**1.4**							**0.5**	**1.1**	**0.4**				**16.7**
261	**7**	**4.8**	**2.8**	**2.0**																**9.5**
187	9		1.3											2.3		0.2				3.8
356	10	0.1	0.7	0.02	0.1		0.2	0.7						0.2	0.02	1.0	0.1			3.1
377	7												1.6			0.4				1.9
437	9		0.4					1.1			0.3									1.7
438	7		0.4					1.1			0.3									1.7
434	10		0.4					1.1			0.3									1.7
1109	10																1.4			1.4
1110	9																1.4			1.4
153	9						0.9							0.1		0.2				1.1
151	7						0.9							0.1		0.2				1.1
152	7						0.9							0.1		0.2				1.1

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 7 highest 10 year old consumers is 21.1 kg/y

The observed 97.5 percentile rate based on 18 observations is 26.3 kg/y

Table 36. Children's consumption rates of domestic fruit in the Cardiff area (kg/y)

5 year old age group

Observation number	Age	Apple	Black-berry	Black-currant	Cherry	Damson	Goose-berry	Grapes	Huckel-berry	Logan-berry	Melon	Plum	Pumpkin	Rasp-berry	Red-currants	Rhubarb	Straw-berry	Tay-berry	White-currants	Total
350	**5**			**2.7**			**2.3**					**1.3**		**3.8**	**0.9**	**0.4**	**1.5**			**12.9**
467	**6**		**0.6**	**1.5**			**0.9**			**2.9**				**1.5**		**0.9**				**8.4**
468	**6**		**0.6**	**1.5**			**0.9**			**2.9**				**1.5**		**0.9**				**8.4**
469	**4**		**0.6**	**1.5**			**0.9**			**2.9**				**1.5**		**0.9**				**8.4**
470	**4**		**0.6**	**1.5**			**0.9**			**2.9**				**1.5**		**0.9**				**8.4**
456	**4**			**0.4**			**0.5**						**5.6**		**0.5**					**7.1**
357	3	0.1	0.7	0.02	0.1		0.2	0.7						0.2	0.02	1.0	0.1			3.1
378	5												1.6			0.4				1.9
439	5		0.4					1.1			0.3									1.7
304	2	1.6																		1.6
1111	6																1.4			1.4
1112	4																1.4			1.4
165	6			0.4																0.4

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of domestic fruit based on the 6 highest 5 year old consumers is 8.9 kg/y

The observed 97.5 percentile rate based on 13 observations is 11.6 kg/y

Table 37. Children's consumption rates of milk in the Cardiff area (l/y)

15 year old age group

Observation number	Age	Milk
301	**16**	**121.7**
302	**14**	**121.7**
303	**12**	**121.7**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of milk based on the 3 highest 15 year old consumers is 121.7 l/y
The observed 97.5 percentile rate based on 3 observations is 121.7 l/y

5 year old age group

Observation number	Age	Milk
304	**2**	**121.7**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of milk based on the highest 5 year old consumer is 121.7 l/y
The observed 97.5 percentile is not applicable for 1 observation

Table 38. Children's consumption rates of cattle meat in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Beef
301	**16**	**17.2**
302	**14**	**17.2**
303	**12**	**17.2**
1142	**14**	**11.8**

Notes

Emboldened observations are the critical group consumers
The critical group consumption rate of cattle meat based on the 4 highest 15 year old consumers is 15.8 kg/y
The observed 97.5 percentile rate based on 4 observations is 17.2 kg/y

10 year old age group

Observation number	Age	Beef
1143	**10**	**11.8**

Notes

Emboldened observations are the critical group consumers
The critical group consumption rate of cattle meat based on the highest 10 year old consumer is 11.8 kg/y
The observed 97.5 percentile is not applicable for 1 observation

5 year old age group

Observation number	Age	Beef
304	**2**	**8.6**
1144	**5**	**5.9**

Notes

Emboldened observations are the critical group consumers
The critical group consumption rate of cattle meat based on the 2 highest 5 year old consumers is 7.2 kg/y
The observed 97.5 percentile rate based on 2 observations is 8.5 kg/y

Table 39. Children's consumption rates of sheep meat in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Lamb
1142	**14**	**11.8**
301	**16**	**6.2**
302	**14**	**6.2**
303	**12**	**6.2**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of sheep meat based on the 4 highest 15 year old consumers is 7.6 kg/y
The observed 97.5 percentile rate based on 4 observations is 11.4 kg/y

10 year old age group

Observation number	Age	Lamb
1143	**10**	**11.8**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of sheep meat based on the highest 10 year old consumer is 11.8 kg/y
The observed 97.5 percentile is not applicable for 1 observation

5 year old age group

Observation number	Age	Lamb
1144	**5**	**5.9**
304	**2**	**3.1**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of sheep meat based on the 2 highest 5 year old consumers is 4.5 kg/y
The observed 97.5 percentile rate based on 2 observations is 5.8 kg/y

Table 40. Children's consumption rates of wild/free foods in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Blackberry	Chestnut	Hazel nuts	Total
388	**15**	**2.7**			**2.7**
301	**16**	**1.6**			**1.6**
302	**14**	**1.6**			**1.6**
303	**12**	**1.6**			**1.6**
323	**16**	**0.8**	**0.4**	**0.1**	**1.2**
321	**13**	**0.8**	**0.4**	**0.1**	**1.2**
496	16	0.8			0.8
495	12	0.8			0.8
584	16	0.7			0.7
583	14	0.7			0.7
326	16	0.5			0.5
327	13	0.5			0.5
143	13	0.2			0.2
158	15	0.2			0.2

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of wild/free foods based on the 6 highest 15 year old consumers is 1.7 kg/y

The observed 97.5 percentile rate based on 14 observations is 2.4 kg/y

5 year old age group

Observation number	Age	Blackberry	Chestnut	Hazel nuts	Total
304	**2**	**0.8**			**0.8**

Notes

Emboldened observations are the critical group consumers

The critical group consumption rate of wild/free foods based on the highest 5 year old consumer is 0.8 kg/y

The observed 97.5 percentile is not applicable for 1 observation

Table 41. Children's consumption rates of honey in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Honey
158	**15**	**0.2**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on the highest 15 year old consumer is 0.2 kg/y
The observed 97.5 percentile is not applicable for 1 observation

10 year old age group

Observation number	Age	Honey
419	**8**	**3.0**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on the highest 10 year old consumer is 3.0 kg/y
The observed 97.5 percentile is not applicable for 1 observation

5 year old age group

Observation number	Age	Honey
420	**4**	**3.0**

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of honey based on the highest 5 year old consumer is 3.0 kg/y
The observed 97.5 percentile is not applicable for 1 observation

Table 42. Children's consumption rates of wild fungi in the Cardiff area (kg/y)

15 year old age group

Observation number	Age	Mushrooms
323	**16**	**2.0**
321	**13**	**2.0**
584	16	0.3
583	14	0.3
143	13	0.1

Notes
Emboldened observations are the critical group consumers
The critical group consumption rate of fungi based on the 2 highest 15 year old consumers is 2.0 kg/y
The observed 97.5 percentile rate based on 5 observations is 2.0 kg/y

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

Green vegetables	
***Cabbage**	34.3 %
Brussel sprout	13.0 %
***Cucumber**	10.6 %
Broccoli	10.4 %
Lettuce	9.6 %
***Courgettes**	7.6 %
Cauliflower	5.2 %
Spinach	2.2 %
Calabrese	2.0 %
Marrow	1.6 %
Kale	1.4 %
Other (6 varieties)	2.1 %

Other vegetables	
Runner bean	46.0 %
Broad bean	16.4 %
Tomato	16.0 %
Pea	10.0 %
French bean	6.6 %
Sweetcorn	2.5 %
Pepper	1.1 %
Squash	1.0 %
Other (3 varieties)	0.4 %

Root vegetables	
Onion	22.5 %
Leek	17.2 %
Swede	16.7 %
Beetroot	15.0 %
Carrot	12.6 %
Parsnip	6.7 %
Kohl rabi	1.7 %
Shallot	1.5 %
Garlic	1.5 %
Turnip	1.2 %
Other (9 varieties)	3.4 %

Domestic fruit	
***Raspberry**	14.7 %
Blackcurrant	14.6 %
***Strawberry**	14.5 %
Apple	10.0 %
Gooseberry	9.3 %
Rhubarb	8.3 %
***Blackberry**	7.2 %
Redcurrants	6.0 %
Loganberry	3.6 %
Plum	3.4 %
Pear	2.1 %
Pumpkin	1.8 %
Jostaberry	1.5 %
Grapes	1.1 %
Other (9 varieties)	1.8 %

Poultry	
Chicken	81.3 %
Pigeon	18.7 %

Eggs	
Chicken egg	98.6 %
Duck egg	1.4 %

Rabbits/hares	
Rabbit	100.0 %

Wild/free foods	
***Blackberry**	88.9 %
	5.8 %
Hazel nuts	4.0 %
Elderberry	1.3 %

Fish (freshwater)	
Brown trout	100.0 %

NOTES
Food types astrisked and emboldened were monitored by FSA in 2002 (EA, EHS, FSA and HSE, 2003)
Other foods monitored were milk, barley, honey and potato
Percentages are based on the consumption of all adults in the survey consuming that particular food group

Table 44. Examples of food groups eaten and external exposure combinations by adults for consideration for dose assessment purposes

Combination number	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to the sewage sludge	Occupancy in close proximity to the sewage sludge granules	Occupancy in water	Occupancy on water
1		*																								*					*
2	*																			*						*					*
3	*	*																													*
4	*																							*						*
5	*																					*					*				*
6	*																				*										
7				*	*	*	*	*	*	*					*																
8				*	*	*	*	*							*		*														
9	*			*	*	*	*	*																							
10				*	*	*	*	*							*			*													
11					*	*	*						*			*															
12				*	*	*	*	*															*								
13				*	*	*	*	*													*										
14			*																						*						
15				*	*	*		*	*	*		*			*																
16					*					*		*		*																	
17					*					*		*	*		*			*													
18				*	*	*		*						*	*		*	*													
19								*																						*	
20								*											*												
21				*	*	*	*	*					*	*																	
22											*					*															
23																												*	*		

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (km) (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
1	M	55	7.0		**5.1**																								**470**					1400
2	F	75	7.0	**26.5**																														
3	F	51	7.0	**26.5**																														
4	F	54	7.0	**26.5**																														
5	M	53	5.0	**15.9**																									**470**					1400
6	M	U	5.0	**15.9**																														
7	M	18	5.0	**15.9**																														
8	F	17	5.0	**15.9**																														
11	M	45	5.0	**26.5**	1.3																													48
12	M	65	5.0	**26.5**	**2.6**																													
13	M	65	5.0	**26.5**																														
14	F	44	5.0	**26.5**																														
16	M	U	U																															1456
17	M	35	U																									**312**						
18	M	69	U	**17.7**																														
19	M	22	U	**38.6**																								**260**						120
20	M	40	U	1.0																								**104**						
24	M	U	U																									20						
25	M	U	U																									20						
26	M	66	U	8.7																														350
27	M	U	U	8.7																														350
28	M	U	U	8.7																														350
29	M	U	U	8.7																														350
30	M	U	U	8.7																														350
31	M	U	U	8.7																														350
32	M	U	U	8.7																														350
33	M	U	U	8.7																														350
34	M	U	U	8.7																														350
35	M	U	U	8.7																														350
36	M	U	U	8.7																														
37	F	U	U	8.7																														
38	F	U	U	8.7																														
39	F	U	U	8.7																														
40	F	U	U	8.7																														

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
41	F	U	U	8.7																														
42	F	U	U	8.7																														
43	F	U	U	8.7																														
44	F	U	U	8.7																														
45	F	U	U	8.7																														
46	M	47	U	**25.1**																					**281**					6				216
47	F	46	U	2.8																														
48	M	39	U	3.0																					84									54
49	F	39	U	3.0																														
50	M	U	U	1.3																					28									
51	M	U	U																						24									
52	M	28	U	3.0																				**320**										
53	M	32	U	3.0																				**320**										
54	M	28	U	3.0																														
55	M	28	U	3.0																														
56	M	49	U																						16									
57	M	43	U	0.4																					104									
58	M	27	U																						104									
59	M	40	U	10.7																					**320**									
60	M	U	U	10.7																														
61	F	U	U	10.7																														
62	F	U	U	10.7																														
63	M	35	U																						**200**									
64	M	38	U	10.3																					**175**									
65	M	72	U	5.1																														
66	F	71	U	5.1																														
67	M	40	U	5.8																					**400**									
68	M	50	U	4.5																					**200**									
69	M	29	U																						70									
70	M	29	U	4.5																														
71	M	46	U	3.8																					90									
72	M	36	U	1.7																					**273**									
73	M	U	U	1.7																														
74	F	U	U	1.7																														

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (km) (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
75	M	38	U	8.2																					**240**									
76	F	37	U	8.2																					**240**									
79	M	56	U	**41.7**																			**548**						**548**					
80	M	40	U	**35.4**																			**455**						**455**					1000
81	F	40	U	**35.4**																														
83	M	U	U	**23.5**																														
84	F	U	U	**17.7**																														
85	F	U	U	**17.7**																														
86	F	U	U	**17.7**																														
87	F	U	U	**17.7**																														
88	M	U	U	**17.7**																														
89	M	U	U	**17.7**																														
90	M	U	U	**17.7**																														
91	M	U	U	11.3																														416
92	M	U	U	11.3																														416
93	M	U	U	11.3																														416
94	M	U	U	11.3																														416
95	M	U	U	11.3																														416
96	M	U	U	11.3																														416
97	M	U	U	11.3																														416
98	M	U	U	11.3																														416
99	M	U	U	11.3																														416
100	M	U	U	11.3																														416
101	M	54	U	**35.4**																									50					300
102	F	46	U	**35.4**																														
103	M	20	U	**35.4**																									50					300
105	M	U	U																															1880
106	M	U	U																															1880
107	M	U	U																															1880
108	M	U	U																															1880
109	M	U	U																															1880
110	M	U	U																															1880
111	M	U	U																															1880
112	M	U	U																															1880

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (km) (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
113	M	U	U																															1880
114	M	U	U																															1880
115	M	U	U																															1880
116	M	U	U																															1880
117	M	29	U	9.7																					**200**									
118	F	27	U	9.7																														
119	M	50	U	2.2																					96									
120	M	58	4.5				5.7	13.2	4.7	10.9	3.0		11.7																						
121	F	55	4.5				5.7	13.2	4.7	10.9	3.0		11.7																						
122	M	23	4.5				5.7	13.2	4.7	10.9	3.0		11.7																						
123	M	46	5.3				9.9	8.4	15.0	12.7	1.8																								
124	F	46	5.3				9.9	8.4	15.0	12.7	1.8																								
125	F	19	5.3				9.9	8.4	15.0	12.7	1.8																								
126	M	55	5.3				1.7	2.4	3.1	7.6																									
127	F	42	5.3				1.7	2.4	3.1	7.6																									
128	M	17	5.3				1.7	2.4	3.1	7.6																									
129	M	33	3.8				8.4		6.7																										
130	M	24	3.8				8.4		6.7																										
131	M	41	U				22.3	**30.3**	17.9		7.5							0.5																	
132	M	79	U				22.3	**30.3**	17.9		7.5							0.5																	
133	M	63	5.2	**17.0**			3.7	**42.2**	**52.7**	36.4	0.8																								
134	F	51	5.2	**17.0**			3.7	**42.2**	**52.7**	36.4	0.8																								
135	M	20	5.2				3.7	**42.2**	**52.7**	36.4	0.8																								
136	M	70	U				7.6	18.4	33.8	22.8	8.5																								
137	F	U	U				7.6	18.4	33.8	22.8	8.5																								
138	M	69	U				20.9	8.5	8.9	22.8	18.7							0.2																	
139	M	49	U				20.9	8.5	8.9	22.8	18.7							0.2																	
140	M	47	3.0				1.7	25.0		41.0	5.2							0.2			0.1														
141	F	44	3.0				1.7	25.0		41.0	5.2							0.2			0.1														
142	F	18	3.0				1.7	25.0		41.0	5.2							0.2			0.1														
144	M	42	1.7					15.8	3.8	7.6						0.5			**0.9**																
145	M	70	1.7					15.8	3.8	7.6						0.5			**0.9**																
146	F	68	1.7					15.8	3.8	7.6						0.5			**0.9**																
147	M	50	0.5				3.2	7.1	8.7	15.6	2.3																								

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
148	F	50	0.5				3.2	7.1	8.7	15.6	2.3																							
149	M	18	0.5				3.2	7.1	8.7	15.6	2.3																							
150	M	23	0.5				3.2	7.1	8.7	15.6	2.3																							
154	M	65	2.5					20.6	13.5		20.8																							
155	F	65	2.5					20.6	13.5		20.8																							
156	M	48	0.5				7.9	16.0	9.5	6.8	8.2							0.2		0.2														
157	F	52	0.5				7.9	16.0	9.5	6.8	8.2							0.2		0.2														
159	M	77	5.3				11.6	**27.8**	**43.3**	31.2	0.8																							
160	F	76	5.3				11.6	**27.8**	**43.3**	31.2	0.8																							
161	F	38	5.3				11.6	**27.8**	**43.3**	31.2	0.8																							
162	F	45	5.3				11.6	**27.8**	**43.3**	31.2	0.8																							
166	M	60	4.5				12.5	5.1	33.6	19.0	4.2																							
167	F	70	4.5				12.5	5.1	33.6	19.0	4.2																							
168	M	70	4.5				12.5	5.1	33.6	19.0	4.2																							
169	M	47	4.0				**28.3**	**28.0**	8.6	35.8	1.2																							
170	F	75	4.0				**28.3**	**28.0**	8.6	35.8	1.2																							
171	M	45	U				1.9	2.1	2.5	11.9	0.1																							
172	F	41	U				1.9	2.1	2.5	11.9	0.1																							
173	M	U	2.5				19.7	16.1	**56.2**	27.3	**29.3**															3								
174	F	U	2.5				19.7	16.1	**56.2**	27.3	**29.3**															3								
175	M	U	4.5				**39.3**	2.5	**110.1**	32.8	**55.1**													100										
176	F	U	4.5				**39.3**	2.5	**110.1**	32.8	**55.1**													100										
177	M	35	5.8				3.5	10.4	12.8	7.3	2.7							0.7																
178	F	29	5.8				3.5	10.4	12.8	7.3	2.7							0.7																
179	M	U	5.3				7.4	9.5	6.3	45.5	6.8																							
180	F	63	4.0				21.7	14.1	38.3	41.0	11.3																							
181	M	68	4.0				21.7	14.1	38.3	41.0	11.3																							
182	F	39	U				7.2	4.7	12.8	13.7	3.8																							
183	F	36	U				7.2	4.7	12.8	13.7	3.8																							
188	M	82	5.3				8.0	9.4	15.5	17.1	4.8																							
189	F	76	5.3				8.0	9.4	15.5	17.1	4.8																							
190	M	80	U				11.4	**27.2**	**55.1**																									
191	M	59	5.0					8.3	25.2	9.2	2.4							0.1																
192	F	57	5.0					8.3	25.2	9.2	2.4							0.1																

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (km) (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
193	M	21	5.0					8.3	25.2	9.2	2.4							0.1																
194	M	19	5.0					8.3	25.2	9.2	2.4							0.1																
195	M	64	5.3				**39.1**	**34.7**	**50.1**	**113.8**	10.7																								
196	F	65	5.3				**39.1**	**34.7**	**50.1**	**113.8**	10.7																								
197	M	40	4.5				19.6	17.3	25.0	**56.9**	5.3																								
198	F	38	4.5				19.6	17.3	25.0	**56.9**	5.3																								
201	F	40	4.8				**29.5**	14.9	20.7	20.5	6.8															4								
202	*M*	*50*	*U*			***5.6***																						***50***						
203-211	*M*	*U*	*U*			***5.6***																						***50***						
212-221	*F*	*U*	*U*			***5.6***																												
222	M	42	4.8				**29.5**	14.9	20.7	20.5	6.8															4								
223	M	60	1.0				15.7	**71.7**	36.7	**77.4**	**25.1**							0.3																
224	F	52	1.0				15.7	**71.7**	36.7	**77.4**	**25.1**							0.3																
225	F	24	1.0				15.7	**71.7**	36.7	**77.4**	**25.1**							0.3																
226	M	22	1.0				15.7	**71.7**	36.7	**77.4**	**25.1**							0.3																
227	M	78	0.5				9.6	15.4	18.4		4.1																								
228	F	U	0.5				9.6	15.4	18.4		4.1																								
229	M	60	0.5				16.5	6.8	14.1	3.0	21.8																								
230	F	54	0.5				16.5	6.8	14.1	3.0	21.8																								
231	M	27	0.5				16.5	6.8	14.1	3.0	21.8																								
232	M	25	0.5				16.5	6.8	14.1	3.0	21.8																								
233	M	21	0.5				16.5	6.8	14.1	3.0	21.8																								
234	F	19	0.5				16.5	6.8	14.1	3.0	21.8																								
235	M	76	3.0				12.1	**27.2**	15.6	**72.8**	18.3																								
236	F	68	3.0				12.1	**27.2**	15.6	**72.8**	18.3																								
237	M	29	3.0				12.1	**27.2**	15.6	**72.8**	18.3																								
238	M	77	2.8				14.0	**36.7**	10.8	47.8	**26.6**																								
239	F	82	2.8				14.0	**36.7**	10.8	47.8	**26.6**																								
240	M	65	3.0				13.0	**28.9**	33.2	41.0	11.9							**6.0**																
241	F	64	3.0				13.0	**28.9**	33.2	41.0	11.9							**6.0**																
242	F	40	3.0				13.0	**28.9**	33.2	41.0	11.9							**6.0**																
243	M	65	3.0				**29.4**	**51.6**	**60.5**	36.4	**41.7**																								
244	F	62	3.0				**29.4**	**51.6**	**60.5**	36.4	**41.7**																								
245	M	70	3.0				9.4	**31.6**	27.8	**95.6**	16.1							0.9																

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
246	F	67	3.0				9.4	**31.6**	27.8	**95.6**	16.1							0.9																
247	M	62	3.8				9.5	15.6	22.9	9.1	1.7																							
248	F	61	3.8				9.5	15.6	22.9	9.1	1.7																							
249	F	40	3.8				9.5	15.6	22.9	9.1	1.7																							
250	M	U	3.0				23.6	17.0		32.8	15.1																							
251	M	62	3.8				**33.2**	**59.0**	**50.2**	5.1	**58.6**							0.7																
252	F	59	3.8				**33.2**	**59.0**	**50.2**	5.1	**58.6**							0.7																
253	M	80	3.0				**26.0**	13.6	5.2	13.7	0.6																							
254	F	77	3.0				**26.0**	13.6	5.2	13.7	0.6																							
255	M	55	3.8				2.5	20.7	8.6	4.4	**22.3**															**28**								
256	F	55	3.8				2.5	20.7	8.6	4.4	**22.3**															**28**								
257	F	24	3.8				2.5	20.7	8.6	4.4	**22.3**															**28**								
258	M	66	3.0				**29.0**	**39.2**	**39.3**	21.8	0.5																							
259	F	38	5.5				10.2	19.5	10.5		19.1																							
260	M	40	5.5				10.2	19.5	10.5		19.1																							
262	M	60	5.3				7.0	7.9	15.6	9.2	7.7																							
263	F	57	5.3				7.0	7.9	15.6	9.2	7.7																							
264	M	32	5.3				7.0	7.9	15.6	9.2	7.7																							
265	F	35	5.3				7.0	7.9	15.6	9.2	7.7																							
266	F	38	6.0				9.9	13.6			7.9							0.4																
267	M	83	3.5																	**11.8**													
268	F	83	3.5																	**11.8**													
269	M	61	5.0				3.7	**37.0**	7.6	5.5	16.1																							
270	F	48	5.0				3.7	**37.0**	7.6	5.5	16.1																							
271	M	62	6.0				9.9	7.4	30.0	18.0	0.4																							
272	F	52	6.0				9.9	7.4	30.0	18.0	0.4																							
274	F	32	6.0				9.9	7.4	30.0	18.0	0.4																							
275	M	59	8.0				16.7	**27.2**	9.0	18.2																								
276	M	83	3.8					**68.0**	**50.6**	6.8	9.1																							
277	M	92	3.8					22.7	34.7	41.0																								
278	F	87	3.8					22.7	34.7	41.0																								
279	F	60	3.8					22.7	34.7	41.0																								
280	M	67	5.0				7.4	16.7	5.7	14.4																								
281	F	56	5.0				7.4	16.7	5.7	14.4																								

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
285	M	77	3.8					8.2	12.2	5.5																								
286	M	78	2.5				1.7	6.8	5.6	11.4	0.5																								
287	F	75	2.5				1.7	6.8	5.6	11.4	0.5																								
288	M	52	2.5				1.7	6.8	5.6	11.4	0.5																								
289	F	53	2.5				1.7	6.8	5.6	11.4	0.5																								
290	F	45	2.5				1.7	6.8	5.6	11.4	0.5																								
291	M	50	2.5				1.7	6.8	5.6	11.4	0.5																								
292	F	32	2.5				1.7	6.8	5.6	11.4	0.5																								
293	F	25	2.5				1.7	6.8	5.6	11.4	0.5																								
294	F	21	2.5				1.7	6.8	5.6	11.4	0.5																								
295	M	17	2.5				1.7	6.8	5.6	11.4	0.5																								
296	M	73	1.8				9.1	13.6	18.9	13.7	1.4	**207.4**	**41.6**					0.5																	
297	M	26	1.8				9.1	13.6	18.9	13.7	1.4	**207.4**	**41.6**					0.5																	
298	M	23	1.8				9.1	13.6	18.9	13.7	1.4	**207.4**	**41.6**					0.5																	
299	M	43	4.0				4.3	14.8	12.4		3.3	**121.7**	**17.2**		6.2			1.6																	
300	F	39	4.0				4.3	14.8	12.4		3.3	**121.7**	**17.2**		6.2			1.6																	
305	M	59	0.7				13.2	8.9	14.5	2.6	1.2							1.2			**2.0**													
306	M	62	7.0				**37.2**	19.1	26.5	41.0	6.6							0.2																	
307	F	59	7.0				**37.2**	19.1	26.5	41.0	6.6							0.2																	
308	F	32	7.0				**37.2**	19.1	26.5	41.0	6.6							0.2																	
309	M	53	4.0												4.5		**25.5**																	
310	F	53	4.0												4.5		**25.5**																	
311	F	25	4.0												4.5		**25.5**																	
312	M	31	4.0												4.5		**25.5**																	
313	M	83	4.0												4.5		**25.5**																	
314	M	26	3.9								1.0				5.7			0.5																	
315	F	56	3.9								1.0				5.7			0.5																	
316	M	33	U	2.0																															83
319	F	36	4.5				12.8	8.9	14.5	2.6	1.2							1.2			**2.0**													
320	M	35	4.5				12.8	8.9	14.5	2.6	1.2							1.2			**2.0**													
322	F	60	0.7				0.4	2.1	14.5	2.6	1.2							1.2			**2.0**													
324	M	35	4.5				6.6	0.7	8.4		1.5							0.5																	
325	F	37	4.5				6.6	0.7	8.4		0.6							0.5																	
328	F	55	1.3					5.4					5.4		**23.6**	**0.8**		0.7			0.7													

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
329	M	51	1.3					5.4					5.4		**23.6**	**0.8**		0.7			0.7														
330	M	U	2.2				2.6	**30.9**	15.1	43.7	14.6																								
331	F	U	2.2				2.6	**30.9**	15.1	43.7	14.6																								
332	F	U	2.2				2.6	**30.9**	15.1	43.7	14.6																								
333	F	25	4.0				16.3	19.0	2.4	2.4	**30.7**																								
334	F	U	4.0				16.3	19.0	2.4	2.4	**30.7**																								
335	M	U	2.2				5.7	18.1	22.1	11.8	19.5																								
336	F	U	2.2				5.7	18.1	22.1	11.8	19.5																								
337	M	31	4.0				0.5	10.2	**41.3**	47.8																									
338	F	U	4.0				0.3	5.1	20.7	23.9																									
339	F	U	4.0				0.3	5.1	20.7	23.9																									
340	M	70	2.5				23.2	**60.7**	**57.8**	**65.5**	6.0																								
342	M	55	2.5				**26.2**	**31.8**	**40.6**	38.5	**47.3**																								
343	F	55	2.5				**26.2**	**31.8**	**40.6**	38.5	**47.3**																								
344	F	81	2.5				**26.2**	**31.8**	**40.6**	38.5	**47.3**																								
345	M	72	2.5				10.0	16.7	22.3	**83.9**	**31.8**																								
346	F	72	2.5				10.0	16.7	22.3	**83.9**	**31.8**																								
347	M	72	4.0				**32.7**	**30.4**	12.7	17.8	**26.6**																								
348	F	U	4.0				**32.7**	**30.4**	12.7	17.8	**26.6**																								
351	M	U	U				5.0	5.0	5.7	8.7	3.1																								
352	F	U	U				5.0	5.0	5.7	8.7	3.1																								
353	M	U	U				5.0	5.0	5.7	8.7	3.1																								
354	F	U	U				5.0	5.0	5.7	8.7	3.1																								
358	F	U	U				5.0	5.0	5.7	8.7	3.1																								
359	M	U	U				5.0	5.0	5.7	8.7	3.1																								
360	M	U	U				5.0	5.0	5.7	8.7	3.1																								
361	F	U	U				5.0	5.0	5.7	8.7	3.1																								
362	F	U	U				5.0	5.0	5.7	8.7	3.1																								
363	F	U	U				5.0	5.0	5.7	8.7	3.1																								
365	M	U	U				5.0	5.0	5.7	8.7	3.1																								
366	F	U	U				5.0	5.0	5.7	8.7	3.1																								
367	M	U	U				5.0	5.0	5.7	8.7	3.1																								
368	F	U	U				5.0	5.0	5.7	8.7	3.1																								
369	M	U	U				8.0	3.3	0.9	2.0	8.4																								

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
370	F	U	U				8.0	3.3	0.9	2.0	8.4																							
371	M	U	U				8.0	3.3	0.9	2.0	8.4																							
372	F	U	U				8.0	3.3	0.9	2.0	8.4																							
373	M	U	2.2				7.8	15.7	16.5		9.3							1.1															
374	F	U	2.2				7.8	15.7	16.5		9.3							1.1															
375	M	36	4.0				**26.7**	21.8	14.1	5.2	3.8																							
376	F	36	4.0				**26.7**	21.8	14.1	5.2	3.8																							
379	M	55	4.0				**59.5**	25.2	16.5	29.5	8.2																							
380	F	55	4.0				**59.5**	25.2	16.5	29.5	8.2																							
381	F	41	4.0				**59.5**	25.2	16.5	29.5	8.2																							
382	M	55	2.2				**27.3**	**52.1**	34.1	**51.0**	8.0																							
383	M	83	8.5				**27.3**	**52.1**	34.1	**51.0**	8.0																							
384	F	79	8.5				**27.3**	**52.1**	34.1	**51.0**	8.0																							
385	M	44	2.5				**29.8**	**44.0**	32.0	5.2	19.4							2.7															
386	F	43	2.5				**29.8**	**44.0**	32.0	5.2	19.4							2.7															
387	F	18	2.5				**29.8**	**44.0**	32.0	5.2	19.4							2.7															
389	M	57	4.0				15.7	19.4	28.9	14.6	8.7																							
390	F	55	4.0				15.7	19.4	28.9	14.6	8.7																							
391	M	27	4.0				15.7	19.4	28.9	14.6	8.7																							
392	M	U	2.5				17.6	**75.6**	**40.2**	**81.9**	18.2																							
393	F	U	2.5				17.6	**75.6**	**40.2**	**81.9**	18.2																							
394	F	49	2.0					2.3		12.7	2.3																							
395	M	61	2.0					2.3		12.7	2.3																							
396	F	21	2.0					2.3		12.7	2.3																							
398	M	65	2.2				**38.3**	23.1	**48.9**	30.7	20.8							1.0															
399	F	62	2.2				**38.3**	23.1	**48.9**	30.7	20.8							1.0															
400	M	53	2.5				6.5	10.9	2.9	10.0	5.0																							
401	F	49	2.5				6.5	10.9	2.9	10.0	5.0																							
404	M	U	2.5				6.1	2.0	5.4	11.1	0.6																							
405	F	U	2.5				6.1	2.0	5.4	11.1	0.6																							
408	M	63	0.5				11.3	24.6	16.7		6.8						**8.9**	1.7		0.6	0.3												
409	F	60	0.5				11.3	24.6	16.7		6.8						**8.9**	1.7		0.6	0.3												
410	F	31	0.5				11.3	24.6	16.7		6.8						**8.9**	1.7		0.6	0.3												
411	M	49	1.3				23.1	6.3	32.9	**52.5**								**12.7**		0.9													

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
412	M	57	0.3					4.7			4.3									**7.9**														
413	F	56	0.3					4.7			4.3									**7.9**														
414	M	26	0.3					4.7			4.3									**7.9**														
415	M	U	U																														**24**	
416	M	61	U															0.9		**9.1**														
417	M	41	U																	3.0														
418	F	36	U																	3.0														
421	M	54	4.2				10.6	8.3	15.3		0.6																							
422	F	53	4.2				10.6	8.3	15.3		0.6																							
423	F	U	4.2				10.6	8.3	15.3		0.6																							
424	F	U	4.2				10.6	8.3	15.3		0.6																							
425	F	U	4.2				10.6	8.3	15.3		0.6																							
426	F	U	4.2				10.6	8.3	15.3		0.6																							
427	M	U	4.2				10.6	8.3	15.3		0.6																							
428	M	U	4.2				10.6	8.3	15.3		0.6																							
429	M	U	4.2				10.6	8.3	15.3		0.6																							
430	M	U	4.2				10.6	8.3	15.3		0.6																							
431	M	52	4.2				5.4	7.6	6.5	3.6	1.7																							
432	F	48	4.2				5.4	7.6	6.5	3.6	1.7																							
433	F	30	4.2				5.4	7.6	6.5	3.6	1.7																							
435	F	28	4.2				5.4	7.6	6.5	3.6	1.7																							
436	M	29	4.2				5.4	7.6	6.5	3.6	1.7																							
440	M	27	4.2				5.4	7.6	6.5	3.6	1.7																							
441	M	53	3.2								13.5											**2.4**												
442	F	52	3.2								13.5											**2.4**												
443	M	65	2.5				**35.5**	22.7	**62.8**	**50.8**	16.8							2.3																
444	F	60	2.5				**35.5**	22.7	**62.8**	**50.8**	16.8																							
445	F	63	2.5				**35.5**	22.7	**62.8**	**50.8**	16.8					**1.5**	**11.9**																	
446	M	67	2.5				**35.5**	22.7	**62.8**	**50.8**	16.8					**1.5**	**11.9**																	
447	F	67	2.5				**35.5**	22.7	**62.8**	**50.8**	16.8					**1.5**	**11.9**																	
448	M	59	2.2				22.5	7.0	16.6	8.1	14.3																							
449	F	60	2.2				22.5	7.0	16.6	8.1	14.3																							
450	F	65	2.2				0.5	1.8		8.1	7.1																							
451	M	65	13.0				0.5	1.8		8.1	7.1																							

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
452	M	45	13.0				0.5	1.8		8.1	7.1																							
453	F	45	13.0				0.5	1.8		8.1	7.1																							
454	M	20	13.0				0.5	1.8		8.1	7.1																							
455	F	18	13.0				0.5	1.8		8.1	7.1																							
458	M	U	7.0				16.0	16.9	18.8	4.7	16.8																							
459	M	U	7.0				16.0	16.9	18.8	4.7	16.8																							
460	M	U	7.0				16.0	16.9	18.8	4.7	16.8																							
461	F	U	7.0				16.0	16.9	18.8	4.7	16.8																							
462	M	U	7.0				16.0	16.9	18.8	4.7	16.8																							
463	F	U	7.0				16.0	16.9	18.8	4.7	16.8																							
464	M	U	7.0				16.0	16.9	18.8	4.7	16.8																							
465	F	U	7.0				16.0	16.9	18.8	4.7	16.8																							
471	M	U	2.0				15.1	**40.4**	7.9	**62.7**																								
472	F	U	2.0				15.1	**40.4**	7.9	**62.7**																								
473	M	U	2.0				15.1	**40.4**	7.9	**62.7**																								
474	M	U	2.0				15.1	**40.4**	7.9	**62.7**																								
475	F	U	2.0				15.1	**40.4**	7.9	**62.7**																								
476	F	U	2.0				15.1	**40.4**	7.9	**62.7**																								
477	M	U	7.0				**36.3**	**44.8**	**64.1**	24.3	**51.9**																							
478	F	U	7.0				**36.3**	**44.8**	**64.1**	24.3	**51.9**																							
481	M	U	1.0				**38.1**	**37.6**	**67.8**	**65.5**	**35.2**							2.3																
482	F	U	1.0				**38.1**	**37.6**	**67.8**	**65.5**	**35.2**							2.3																
483	M	U	1.0				**38.1**	**37.6**	**67.8**	**65.5**	**35.2**							2.3																
484	F	U	1.0				**38.1**	**37.6**	**67.8**	**65.5**	**35.2**							2.3																
485	M	U	1.5				16.9	17.6	6.8	18.5	10.2																							
486	F	U	1.5				16.9	17.6	6.8	18.5	10.2																							
487	M	U	1.5				16.9	17.6	6.8	18.5	10.2																							
488	F	U	1.5				16.9	17.6	6.8	18.5	10.2																							
491	M	U	2.5				7.7	15.0	20.9	17.2	16.9							0.8																
492	F	U	2.5				7.7	15.0	20.9	17.2	16.9							0.8																
493	M	U	2.5				7.7	15.0	20.9	17.2	16.9							0.8																
494	F	U	2.5				7.7	15.0	20.9	17.2	16.9							0.8																
497	F	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
498	F	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
499	M	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
500	M	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
501	M	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
502	M	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
503	F	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
504	F	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
505	F	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
506	F	U	1.3				17.2	22.5	25.2	12.2	20.8							0.2																
507	M	U	1.3				12.2	15.1	32.6	30.9	**44.1**							**9.1**																
508	F	U	1.3				12.2	15.1	32.6	30.9	**44.1**							**9.1**																
509	M	U	1.3				**76.0**	**76.4**	**91.9**	**103.2**	2.3																							
510	F	U	1.3				**76.0**	**76.4**	**91.9**	**103.2**	2.3																							
511	M	U	1.0				**25.5**	**29.4**	16.8	42.3	12.6																							
512	F	U	1.0				**25.5**	**29.4**	16.8	42.3	12.6																							
513	M	U	1.0				**25.5**	**29.4**	16.8	42.3	12.6																							
514	M	U	2.0				16.0	**28.0**	10.9	29.8	6.0							0.3																
515	F	U	2.0				16.0	**28.0**	10.9	29.8	6.0							0.3																
516	M	U	2.0				16.0	**28.0**	10.9	29.8	6.0							0.3																
517	F	U	2.0				16.0	**28.0**	10.9	29.8	6.0							0.3																
518	F	U	2.0				16.0	**28.0**	10.9	29.8	6.0							0.3																
519	F	U	2.0				16.0	**28.0**	10.9	29.8	6.0							0.3																
520	F	U	2.0				16.0	**28.0**	10.9	29.8	6.0							0.3																
521	M	U	9.0				6.8	**41.9**	19.8	21.7	2.3																							
522	F	U	9.0				6.8	**41.9**	19.8	21.7	2.3																							
523	F	U	9.0				6.8	**41.9**	19.8	21.7	2.3																							
524	F	U	0.5				18.0	**28.7**	34.4	27.3	**22.2**							0.5																
525	M	U	0.5				18.0	**28.7**	34.4	27.3	**22.2**							0.5																
526	F	U	1.5				8.2	18.4	6.5	3.4	3.5							0.2																
527	M	U	1.5				8.2	18.4	6.5	3.4	3.5							0.2																
528	F	U	1.5				8.2	18.4	6.5	3.4	3.5							0.2																
529	M	U	1.5				8.2	18.4	6.5	3.4	3.5							0.2																
530	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
531	F	U	1.5				18.2	6.3	9.2	2.7	3.8																							
532	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (km) (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
533	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
534	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
535	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
536	F	U	1.5				18.2	6.3	9.2	2.7	3.8																							
537	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
538	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
539	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
540	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
541	M	U	1.5				18.2	6.3	9.2	2.7	3.8																							
542	M	U	2.0				24.8	14.4	17.2	18.2	**25.4**																							
543	F	U	2.0				24.8	14.4	17.2	18.2	**25.4**																							
544	M	U	3.0				**56.7**	**45.3**	**110.1**	**145.0**	2.0							1.1																
545	F	U	3.0				**56.7**	**45.3**	**110.1**	**145.0**	2.0							1.1																
546	M	U	2.0					**25.8**			4.5																							
547	F	U	2.0					**25.8**			4.5																							
548	M	U	4.0				4.9	20.5	11.7	**58.0**	4.8																							
549	F	U	4.0				4.9	20.5	11.7	**58.0**	4.8																							
550	M	U	1.5				24.2	23.9	14.0	10.5	**51.5**																							
551	F	U	1.5				24.2	23.9	14.0	10.5	**51.5**																							
552	M	U	1.5				24.2	23.9	14.0	10.5	**51.5**																							
553	F	U	1.5				24.2	23.9	14.0	10.5	**51.5**																							
554	M	U	2.5	**17.2**			14.2	20.7	11.1	43.5																								
555	F	U	2.5	**17.2**			14.2	20.7	11.1	43.5																								
556	F	U	4.5				**47.2**	**60.4**	**60.3**	26.1	**43.9**																							
557	M	U	4.5				**47.2**	**60.4**	**60.3**	26.1	**43.9**																							
558	M	U	4.5				**32.4**	**32.5**	**58.9**	2.7	20.3																							
559	F	U	4.5				**32.4**	**32.5**	**58.9**	2.7	20.3																							
560	M	U	4.5				**28.2**	**62.4**	18.5	43.5	2.7							0.8			**2.3**												
561	F	U	4.5				**28.2**	**62.4**	18.5	43.5	2.7							0.8			**2.3**												
562	M	U	4.5				**30.7**	**49.8**	24.1	14.5	17.9																							
563	F	U	4.5				**30.7**	**49.8**	24.1	14.5	17.9																							
564	M	U	U						5.3	18.9	15.4							0.9																
565	F	U	U						5.3	18.9	15.4							0.9																
566	M	U	U						5.3	18.9	15.4							0.9																

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if (km)	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
567	M	U	U				**55.6**	**64.4**	**42.1**	11.3																									
568	F	U	U				**55.6**	**64.4**	**42.1**	11.3																									
569	M	U	U				13.7	**51.7**	**45.9**	**58.0**	**32.7**																								
570	F	U	U				13.7	**51.7**	**45.9**	**58.0**	**32.7**																								
571	M	U	U				13.7	**51.7**	**45.9**	**58.0**	**32.7**																								
572	F	U	U				13.7	**51.7**	**45.9**	**58.0**	**32.7**																								
573	M	U	U				13.7	**51.7**	**45.9**	**58.0**	**32.7**																								
574	F	U	U				13.7	**51.7**	**45.9**	**58.0**	**32.7**																								
575	M	U	1.5				**66.7**	**66.4**	**116.7**	**55.2**	**56.5**																								
576	F	U	1.5				**66.7**	**66.4**	**116.7**	**55.2**	**56.5**																								
577	M	U	2.0				**41.5**	**76.7**	16.2	**125.4**	**65.7**							**6.8**																
578	F	U	2.0				**41.5**	**76.7**	16.2	**125.4**	**65.7**							**6.8**																
579	M	U	U				**43.8**	**36.2**	**113.1**	**118.0**	**64.0**							**4.5**																
580	F	U	U				**43.8**	**36.2**	**113.1**	**118.0**	**64.0**							**4.5**																
581	M	U	4.0				**36.1**	17.8	**49.5**	**88.4**	21.4							0.7			0.3													
582	F	U	4.0				**36.1**	17.8	**49.5**	**88.4**	21.4							0.7			0.3													
585	M	U	3.0				11.2	10.0	15.8	25.8	16.7																								
586	F	U	3.0				11.2	10.0	15.8	25.8	16.7																								
587	M	U	3.0				11.2	10.0	15.8	25.8	16.7																								
588	F	U	3.0				11.2	10.0	15.8	25.8	16.7																								
591	M	U	3.0				**48.6**	20.8	**91.4**	**81.9**	14.5																								
592	F	U	3.0				**48.6**	20.8	**91.4**	**81.9**	14.5																								
593	M	U	3.0				**48.6**	20.8	**91.4**	**81.9**	14.5																								
594	M	U	3.5				23.0	23.6	23.7	23.1	12.4							0.6																
595	F	U	3.5				23.0	14.6	23.7	23.1	12.4							0.6																
596	M	U	3.5				23.0	14.6	23.7	23.1	12.4							0.6																
597	M	U	3.5				23.0	23.6	23.7	23.1	12.4							0.6																
598	M	U	5.0				**31.1**	**67.9**	**52.7**	21.8	3.4																								
599	F	U	5.0				**31.1**	**67.9**	**52.7**	21.8	3.4																								
600	M	U	5.0				**31.1**	**67.9**	**52.7**	21.8	3.4																								
601	F	U	5.0				**31.1**	**67.9**	**52.7**	21.8	3.4																								
602	M	U	5.0				3.7	15.4	3.4	20.5																									
603	F	U	5.0				3.7	15.4	3.4	20.5																									
604	M	U	5.0				3.7	15.4	3.4	20.5																									

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
605	F	U	5.0				3.7	15.4	3.4	20.5																								
606	M	U	5.0				3.7	15.4	3.4	20.5																								
607	F	U	5.0				3.7	15.4	3.4	20.5																								
608	M	U	5.0					21.1	0.8	30.4	0.5																							
609	F	U	5.0					21.1	0.8	30.4	0.5																							
610	F	U	5.0					21.1	0.8	30.4	0.5																							
611	M	U	5.0					21.1	0.8	30.4	0.5																							
612	F	U	5.0					21.1	0.8	30.4	0.5																							
613	F	U	5.0					21.1	0.8	30.4	0.5																							
614	M	U	5.0				**26.3**	**37.6**	31.8	**57.3**	**28.9**																							
615	F	U	5.0				**26.3**	**37.6**	31.8	**57.3**	**28.9**																							
616	M	U	3.0	4.2			**71.2**	**61.6**	**72.8**	**75.2**																							
617	F	U	3.0	4.2			**71.2**	**61.6**	**72.8**	**75.2**																							
618	M	U	3.0	4.2			**71.2**	**61.6**	**72.8**	**75.2**																							
619	M	U	3.0				17.9	**57.1**	19.8	7.9	**48.5**																							
620	F	U	3.0				17.9	**57.1**	19.8	7.9	**48.5**																							
621	M	U	3.0				17.9	**57.1**	19.8	7.9	**48.5**																							
622	F	U	3.0				17.9	**57.1**	19.8	7.9	**48.5**																							
623	M	U	3.0				17.9	**57.1**	19.8	7.9	**48.5**																							
624	F	U	3.0				17.9	**57.1**	19.8	7.9	**48.5**																							
625	F	U	5.0										11.8		**11.8**																			
626	M	U	5.0										5.4		5.4																			
628	M	U	5.0											**33.7**					**1.5**															
629-633	*M*	*U*	*U*																												*120*			
634-635	*M*	*U*	*U*																												*548*			
636-639	*M*	*U*	*U*																												*62*	*896*		
640-645	*M*	*U*	*U*																												*62*	*768*		
646-655	*M*	*U*	*U*																													*768*		
656-865	*U*	*U*	*U*																															*208*
866-910	*U*	*U*	*U*																															*104*
911-970	*U*	*U*	*U*																															*39*
971-988	*U*	*U*	*U*																															*26*
989-1108	*U*	*U*	*U*																															*183*
1113	M	U	3.2				20.7	**49.2**	36.6	35.8	**41.3**																							

Annex 1. Adult consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex (U if unknown)	Age in years (U if unknown)	Distance of residence from site (U if	Fish	Crustaceans	Wildfowl	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits/hares	Honey	Wild fungi	Fish (freshwater)	Intertidal occupancy over mud	Intertidal occupancy over rock	Intertidal occupancy over sand and mud	Intertidal occupancy over sand	Intertidal occupancy over sand and stones	Intertidal occupancy over salt marsh	Handling fishing gear	Handling sediment	Occupancy in close proximity to sewage sludge	Occupancy in close proximity to sewage sludge granules	Occupancy in water	Occupancy on water
1114	F	U	3.2				20.7	**49.2**	36.6	35.8	**41.3**																							
1115	M	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1116	M	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1117	M	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1118	M	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1119	M	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1120	F	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1121	F	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1122	F	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1123	F	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1124	F	U	U				13.1	**26.8**	20.9	16.2	**26.0**																							
1129	M	U	U	11.8																														624
1130	F	U	U	8.8																														
1133	M	U	U																															1170
1134	M	U	U	**30.8**																														1305
1135	F	U	U	**30.8**																														
1136	M	U	U	5.9																														
1137	F	U	U	5.9																														
1138	F	69	2.5				23.2	**60.7**	**57.8**	**65.5**	6.0																							
1139	M	U	5.0										11.8		**11.8**																			
1140	F	U	5.0										11.8		**11.8**																			
1141	M	U	5.0										11.8		**11.8**																			
1145	F	U	5.0										5.4		5.4																			
1146	F	U	5.0											**33.7**					**1.5**															
1147	U	U	5.0											**33.7**					**1.5**															
1148	F	U	3.5																**1.8**															

Notes

Italicised observations indicate that data obtained was from a generic interview. Therefore data for pathways other than those given in the annex may be incomplete.

Annex 2. Children's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex	Age in years	Distance of residence from site (U if	Fish	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Sheep meat	Wild/free foods	Honey	Wild fungi	Intertidal occupancy over sand and stones	Occupancy in water
15 year old age group																	
10	M	12	5.0	**15.9**													
15	M	12	5.0	**26.5**													
185	M	12	U		7.2	4.7	12.8	13.7	3.8								
186	F	12	U		7.2	4.7	12.8	13.7	3.8								
282	F	12	5.0		7.4	**16.7**	5.7	14.4									
303	F	12	4.0		4.3	**14.8**	12.4		7.3	**121.7**	**17.2**	**6.2**	**1.6**				
355	F	12	U		5.0	5.0	5.7	8.7	3.1								
402	F	12	2.5		6.5	10.9	2.9	10.0	5.0								
403	F	12	2.5		6.5	10.9	2.9	10.0	5.0								
407	F	12	2.5		6.1	2.0	5.4	11.1	0.6								
495	F	12	2.5		7.7	**15.0**	**20.9**	17.2	**16.9**				0.8				
1131	M	12	U	6.9													
143	F	13	3.0		1.7	**25.0**		**41.0**	5.2				0.2		0.1		
200	F	13	4.5		**19.6**	**17.3**	**25.0**	**56.9**	5.3								
321	F	13	4.5		**12.8**	8.9	14.5	2.6	1.2				**1.2**		**2.0**		
327	F	13	4.5		6.6	0.7	8.4		0.6				0.5				
590	M	13	3.0		11.2	10.0	15.8	25.8	**16.7**								
21	M	14	U	1.0												**104**	
104	F	14	U	**35.4**													
302	F	14	4.0		4.3	**14.8**	12.4		7.3	**121.7**	**17.2**	**6.2**	**1.6**				
397	M	14	2.0			2.3		12.7	2.3								
490	F	14	1.5		**16.9**	**17.6**	6.8	18.5	**10.2**								
583	M	14	4.0		**36.1**	**17.8**	**49.5**	**88.4**	**15.3**				0.7		0.3		
1125	M	14	U		**13.1**	**26.8**	**20.9**	16.2	**26.0**								
78	F	15	U	8.2													
158	M	15	U.5		7.9	**16.0**	9.5	6.8	8.2				0.2	**0.2**			
164	M	15	5.3		11.6	**27.8**	**43.3**	**31.2**	0.8								
184	F	15	U		7.2	4.7	12.8	13.7	3.8								
199	M	15	4.5		**19.6**	**17.3**	**25.0**	**56.9**	5.3								
273	M	15	6.0		9.9	7.4	**30.0**	18.0	0.4								
388	M	15	2.5		**29.8**	**44.0**	**32.0**	5.2	**19.4**				**2.7**				
77	M	16	U	8.2													
163	M	16	5.3		11.6	**27.8**	**43.3**	**31.2**	0.8								
301	M	16	4.0		4.3	**14.8**	12.4		7.3	**121.7**	**17.2**	**6.2**	**1.6**				
323	M	16	4.5			2.1	14.5	2.6	1.2				**1.2**		**2.0**		
326	M	16	4.5		6.6	0.7	8.4		0.6				0.5				
406	M	16	2.5		6.1	2.0	5.4	11.1	0.6								
489	M	16	1.5		**16.9**	**17.6**	6.8	18.5	**10.2**								
496	F	16	2.5		7.7	**15.0**	**20.9**	17.2	**16.9**				0.8				
584	F	16	4.0		**36.1**	**17.8**	**49.5**	**88.4**	**21.4**				0.7		0.3		

Annex 2. Children's consumption rates (kg/y or l/y) and occupancy times (h/y) in the Cardiff area

Observation number	Sex	Age in years	Distance of residence from site (U if	Fish	Green vegetables	Other vegetables	Root vegetables	Potato	Domestic fruit	Milk	Cattle meat	Sheep meat	Wild/free foods	Honey	Wild fungi	Intertidal occupancy over sand and stones	Occupancy in water
10 year old age group																	
151	F	7	U.5		2.3	3.5	4.3	7.8	1.1								
152	F	7	U.5		2.3	3.5	4.3	7.8	1.1								
261	M	7	5.5		5.1	9.8	5.2		**9.5**								
377	M	7	4.0		**13.3**	**10.9**	**7.0**	2.6	1.9								
438	F	7	4.2		5.4	7.6	6.5	3.6	1.7								
1128	F	7	U		**13.1**	**26.8**	**20.9**	**16.2**	**26.0**								
283	M	8	5.0		5.2	**11.7**	4.0	**11.5**									
419	F	8	U											**3.0**			
1132	M	8	U	**2.9**													
9	F	9	5.0	**15.9**													
23	M	9	U	1.0												**104**	
153	M	9	U.5		2.3	3.5	4.3	7.8	1.1								
187	M	9	U		7.2	4.7	**12.8**	**13.7**	3.8								
437	F	9	4.2		5.4	7.6	6.5	3.6	1.7								
1110	M	9	4.5			8.1			1.4								
349	F	10	4.0		**32.7**	**30.4**	**12.7**	**17.8**	**26.6**								
356	F	10	U		5.0	5.0	5.7	**8.7**	3.1								
434	F	10	4.2		5.4	7.6	6.5	3.6	1.7								
466	F	10	7.0		**16.0**	**16.9**	**18.8**	4.7	**16.8**								
1109	M	10	4.5			8.1			1.4								
1126	M	10	U		**13.1**	**26.8**	**20.9**	**16.2**	**26.0**								
22	M	11	U	1.0												**104**	
317	M	11	U	**1.0**													**13**
589	F	11	3.0		**11.2**	10.0	**15.8**	**25.8**	**16.7**								
1127	F	11	U		**13.1**	**26.8**	**20.9**	**16.2**	**26.0**								
5 year old age group																	
304	M	2	4.0		2.2	**7.4**	6.2		1.6	**121.7**	**8.6**	**3.1**	**0.8**				
357	F	3	U		5.0	5.0	5.7	**8.7**	3.1								
82	F	4	U	**11.8**													
420	M	4	U											**3.0**			
456	M	4	13.0		0.5	1.8		**8.1**	**7.1**								
469	F	4	7.0		**8.0**	**8.5**	**9.4**	2.4	**8.4**								
470	M	4	7.0		**8.0**	**8.5**	**9.4**	2.4	**8.4**								
1112	F	4	4.5			4.1			1.4								
284	M	5	5.0		3.7	**8.3**	2.9	**7.2**									
350	M	5	4.0		**16.4**	**15.2**	6.3	**8.9**	**12.9**								
378	F	5	4.0		**13.3**	**10.9**	7.0	2.6	1.9								
439	M	5	4.2		5.4	**7.6**	6.5	3.6	1.7								
165	F	6	5.3		4.8	**12.1**	**21.7**	**15.6**	0.4								
318	F	6	U														**13**
467	M	6	7.0		**8.0**	**8.5**	**9.4**	2.4	**8.4**								
468	F	6	7.0		**8.0**	**8.5**	**9.4**	2.4	**8.4**								
1111	M	6	4.5			4.1			1.4								

Annex 3. Ratios for determining consumption rates for children

Food group	Ratio child/adult		
	6 - 12 months	10 yr old	15 yr old
Fish	0.375	0.500	0.500
Crustaceans	0.525*	0.700	0.600
Molluscs	0.525*	0.700	0.600
Green vegetables	0.222	0.444	0.556
Other vegetables	0.200	0.500	0.600
Root vegetables	0.375	0.500	0.500
Potatoes	0.292	0.708	1.083
Domestic fruit	0.467	0.667	0.667
Milk	1.333	1.000	1.083
Cattle meat	0.222	0.667	0.778
Pig meat	0.138	0.625	0.750
Sheep meat	0.120	0.400	0.600
Poultry	0.183	0.500	0.667
Eggs	0.600	0.800	1.000
Wild/free foods	0.072	0.440	0.520
Rabbits/hares	ND	ND	ND
Honey	0.789	0.789	0.526
Wild fungi	0.150	0.450	0.550
Venison	ND	ND	ND

ND - No data

* Ratios were derived by scaling the 10 year olds crustaceans and molluscs consumption data

Annex 4 - Summary of profiled habits data (Method E)

Profile Name	Pathway Name	Crustacea	Direct	Eggs	Fish - Fresh	Fish - Sea	Fruit - Domestic	Fruit and Nuts - Wild	Gamma ext - Rock	Gamma ext - Sediment	Honey	Meat - Cattle	Meat - Game	Meat - Offal	Meat - Pig	Meat - Poultry	Meat - Sheep	Milk	Mollusca	Mushrooms	Occupancy In Water	Occupancy On Water	Plume (IN; 0-0.25km)	Plume (MID; 0.25-0.5km)	Plume (OUT; 0.5-1km)	Vegetables - Green	Vegetables - Other Domestic	Vegetables - Potatoes	Vegetables - Root
		kg	h	kg	kg	kg	kg	kg	h	h	kg	kg	kg	kg	kg	kg	kg	l	kg	kg	h	h	h	h	h	kg	kg	kg	kg
Crustacean consumers		3.8	0	0	0	13.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	700	0	0	0	0	0	0	0
Occupants for direct radiation		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Egg consumers		0	0	17.3	0	0	6.4	0.5	0	0	0.2	0	0	0	0	0.4	2.1	0	0	0.1	0	0	0	0	0	12.8	12.9	13.9	21.7
Freshwater fish consumers		0	0	0	2.4	0	13.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sea fish consumers		0.1	0	0	0	24.3	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	1.1	3.7	4.7	3.8
Domestic fruit consumers		0	0	0	0	0	38	0.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23.5	38.6	37.4	38.4
Wild fruit and nut consumers		0	0	0	0	0	38.3	7.2	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25.7	34.9	72.4	45.6
Gamma ext - Rock		0	0	0	0	3	0	0	320	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupants for exposure over sediment		0	0	0	0	14.6	0	0	0	300	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0
Honey consumers		0	0	0	0	0	2.2	0.2	0	0	9.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.3	0	0
Cattle meat consumers		0	0	0	0	0	2.1	0.9	0	0	0	31.9	0	0	0	0	2.5	173	0	0	0	0	0	0	0	7.2	14.1	8.2	16.3
Game meat consumers		0	0	0	0	0	0	0	0	30	0	0	5.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Offal meat consumers		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pig meat consumers		0	0	0	0	0	0	0	0	0	0	0	1.5	0	33.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poultry meat consumers		0	0	7.1	0	0	10.1	0.3	0	0	0	2.2	0	0	0	1.2	9.4	0	0	0.3	0	0	0	0	0	21.3	15.8	30.5	37.7
Sheep meat consumers		0	0	0	0	0	0	0.2	0	0	0	9.7	0	0	0	0.3	15.7	0	0	0.2	0	0	0	0	0	0	1.8	0	0
Milk consumers		0	0	0	0	0	2.1	0.9	0	0	0	31.9	0	0	0	0	2.5	173	0	0	0	0	0	0	0	7.2	14.1	8.2	16.3
Mollusc consumers		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mushroom consumers		0	0	0	0	0	1.7	1.1	0	0	0	0	0	0	0	0	0	0	0	2.1	0	0	0	0	0	15.9	25.6	16.3	15.8
Occupants in water		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupants on water		0.3	0	0	0	2.8	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	1680	0	0	0	0	0	0	0
Occupants for plume pathways (inner area)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupants for plume pathways (middle area)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Occupants for plume pathways (outer area)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green vegetable consumers		0	0	0.4	0	0.2	21.4	0.6	0	0	0	0	0	0	0	0.1	0	0	0	0.1	0	0	0	0	0	38.8	39.6	47.3	49.8
Other domestic vegetable consumers		0	0	0	0	0.3	20.2	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	43.6	42.7	36.5
Potato consumers		0	0	0.5	0	0.2	19.9	0.8	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	30.4	42.7	74.9	49.4
Root vegetable consumers		0	0	0.5	0	0.6	22.5	0.4	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	33.6	42.5	51.8	62.5

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