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Radiological Habits Survey,
HM Naval Base Clyde, Faslane 2000

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SUMMARY

This report presents the results of a survey, conducted in 2000, into the habits and consumption patterns of people living and working in the vicinity of HM Naval Base Clyde, Faslane, which discharges gaseous and aqueous emissions to the atmosphere and the Gare Loch respectively. Potential exposure pathways to the radioactive discharges from these sites include consumption of locally sourced terrestrial and marine foods and occupancy of dwellings, the surrounding area and intertidal areas. The survey investigated all of these pathways and the data obtained on the consumption and occupancy rates of individuals are presented and discussed.

Food eaten included locally grown fruit and vegetables, wild/free foods and seafood. Occupancy habits include those related to residences and workplaces within one kilometre of the site, recreation and work activities over intertidal areas and handling of intertidal sediment. In the marine environment the main activities included beach cleaning, walking, scuba diving, mollusc collection, canoeing, sailing, bait digging and angling. Terrestrial pathways noted included consumption of vegetables and fruit grown by gardeners in Garelochhead and Rosneath and more general consumption of farm produce, including eggs. Farms around the east of the loch reared sheep and cattle. One dairy farm was identified just outside the 5 km survey radius whose occupants consumed a quantity of the beef and milk produced. These data have been included in this report. Other than these observations, no local sales and consumption of locally produced meat (beef, pork, lamb or chicken) were identified. One farm reared deer to supply venison to a supermarket chain. Most of the terrestrial survey area was given over to sheep grazing and production of a small amount of barley and silage. A crossover between the consumption of locally produced terrestrial food, seafood and game was identified. This report considers the additive effect of consumption rates from several food groups and makes recommendations accordingly.

1. BACKGROUND

1.1 Regulation of radioactive waste discharges

Sources of radiation exposure to members of the public from nuclear sites are subject to a system of control, which safeguards the potentially exposed people. There are three main sources of radiation exposure to members of the public from nuclear sites: discharges of radioactive waste to the aquatic environment, discharges to the atmosphere and direct radiation from the site. Regulation of waste discharges is carried out under the Radioactive Substances Act, 1993, (RSA93) with authorisations that set limits on the quantities and types of radioactivity released. In Scotland, the Scottish Environment Protection Agency (SEPA) is the primary regulatory authority under RSA93. Sources of direct radiation from sites are regulated by the Nuclear Installations Inspectorate (NII) of the Health and Safety Executive (HSE). However, as a Ministry of Defence (MOD) establishment, HM Naval Base Clyde, Faslane has Crown exemption from such regulation. Instead, SEPA undertakes surveillance around the site and discharges are made under letters of agreement between SEPA and the MOD.

1.2 The critical group concept

Radiological protection of the public is based on the concept of a critical group. The critical group is defined as the people who, because of where they live and their habits, receive the highest radiation dose from the site and its discharges. It is the assessed radiation dose to the critical group that is compared to relevant limits and constraints. If the dose to the critical group is acceptable, it follows that the lower doses received by other members of the public will be below any limits and constraints, and overall protection of the public is provided for. This survey provides information to assist SEPA in determining critical group doses.

1.3 Dose limits and constraints

Assessed radiation doses to critical groups are compared to nationally and internationally agreed dose limits, recommendations and constraints. Under current Government policy in Cm 2919 (United Kingdom - Parliament, 1995), these are as follows:

1) the principal limit of 1 mSv per year to the public recommended by the International Commission on Radiological Protection (ICRP) (subsidiary limits exist for particular organs of the body)

2) the 'source' dose constraint of 0.3 mSv per year which should not be exceeded for a single new source; in addition, the Government accepts that, in general, it should be possible to operate existing facilities within the 0.3 mSv per year constraints

3) the 'site' dose constraint of 0.5 mSv per year to be applied to all sources at a single location

2. THE SURVEY

2.1 Survey aims

The Centre for Environment, Fisheries and Aquaculture Science (CEFAS) undertook the survey in 2000 on behalf of SEPA (CEFAS contract C0767 and SEPA contract 230/2350). The aim of the survey was to review habits related to public radiation exposure via aquatic, terrestrial and external exposure pathways resulting from radioactive emissions from HM Naval Base Clyde, Faslane. Some survey data may be relevant to direct radiation exposure from the site.

The last survey at the base which CEFAS conducted, was in 1989 (Thurston & Gough, 1992). This survey considered aquatic pathways only.

Fieldwork was conducted in order to obtain site specific habits survey data for use in defining critical exposure pathways to the local population and subsequent definition of the critical group(s). General habits survey information for the area was also obtained.

Investigations were carried out to ascertain the following:

1) Activities which may give rise to external exposure, including angling, mollusc collection and bait digging along the intertidal shoreline.

2) Internal exposure from the consumption of food sources from the aquatic and terrestrial environments.

3) The production, use and destination of local produce.

4) The types, seasonality of and extent of consumption of wild foods in the area.

5) The land use and soil type in the area.

6) The extent of occupancy in the immediate vicinity of the site.

7) The consumption rates of foods in the area.

8) The extent of any unusual practices.

The survey team also investigated the possible use of seaweed as a fertiliser or soil conditioner and the transfer of contamination by wildlife. In addition, some information that might be relevant to pathways such as the inhalation of re-suspended radioactivity in road

dust and/or sea spray, the inadvertent ingestion of contaminated seawater and/or contact with and/or inadvertent ingestion of contaminated sediments was collected.

2.2 Survey areas

Different survey areas were selected to cover the aquatic, terrestrial and direct radiation pathways.

The aquatic survey area, shown in Figure 1, was taken to extend from Garelochhead at the northern tip of Gare Loch to Kilcreggan at the western mouth and Helensburgh at the eastern mouth of Gare Loch, including all of Gare Loch itself. The fishery officer at Ayr advised that there was little, if any, commercial fishing activity in the Clyde area outside the loch, and this area was not covered.

Local topography was considered when identifying the areas potentially most exposed to gaseous discharges. It was decided that the terrestrial survey area, shown in Figure 2, would extend to 5km from the base centre, but exclude terrain within the 5km radius which was situated to the west of the ridge line running along the Loch Lomond/Gare Loch peninsula. Individuals with significant occupancy within 1 km of the site perimeter fence were contacted with regard to direct radiation.

2.3 Conduct of the survey

The fieldwork component of the survey was carried out during the period 23rd – 31st August by three members of staff from the CEFAS laboratory at Lowestoft, according to techniques as described by Leonard *et al* (1982).

On 23rd August a meeting was arranged between SEPA, the base Radiological Protection Advisor, CEFAS. 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.

People with a local knowledge of the survey area were contacted for information on any aspects relevant to the exposure pathways. These included a Fishery Officer, Argyll and Bute council, individuals connected with the local inshore fishing industry, fish and shellfish wholesalers and retailers, an angling shop owner, farmers, keen gardeners and bee keepers encompassed by the five kilometre radius. Occupants of residences located within one kilometre of the site were interviewed about their times at home, both inside their properties and in their gardens. Gamma dose rate measurements were also taken inside and outside these properties.

Individuals who were identified as having the potential to be exposed to radioactivity were contacted and interviewed. For external exposure pathways, where appropriate, gamma dose measurements were taken using a Mini Instrument 6-81 and a compensated Geiger-Muller tube. Gamma dose measurements were also taken around the base perimeter. For comparison, background readings were taken from outside the five kilometre survey boundary.

Interviews were used to establish individual's consumption rates and occupancy times relevant to each pathway and obtain any general information of possible use to the survey. Using this information, a list of occupations and activities was built up to produce a picture of potential exposure pathways. Emphasis was placed on those individuals who were likely to be in the most exposed groups. These included boat owners, anglers, bait-diggers, gardeners, beekeepers, farmers, egg producers, game hunters and individuals living close to the site.

The survey also identified the land cover within the 5km terrestrial survey area.

2.4 Site activity

The base currently undertakes maintenance and repair of naval submarines at jetties alongside the loch, as well as in a dry dock facility.

Solid wastes arise from the refitting of nuclear submarines as well as the radiochemistry laboratory. Such wastes are removed to the BNFL facilities in Cumbria, subject to restrictions on the alpha activity and the total of all other activities in the material. Solid wastes are packaged and stored on site close to the perimeter fence in an active waste facility, prior to transport by road.

Liquid waste discharges of cobalt–60 and tritium are disposed of into Gare Loch along with alpha emitting radionuclides and beta emitting radionuclides (excluding cobalt-60 and tritium). Effluent treatment arisings and surface cleaning liquors, together with disposals from the chemistry laboratory are passed to tanks where batch analyses can be carried out. Discharges are routed to Gare Loch via a Low Active Effluent Drain.

Gaseous discharges of argon–41 and beta emitting radionuclides associated with particulate matter are disposed of by degassing, which is normally carried out at sea. Venting occurs from the active waste facility through filters with the vents being continuously monitored. All discharges are made and reported with agreement from SEPA under a letter of agreement.

3. METHODS FOR DATA ANALYSIS

3.1 Data conversion

The data collected during the fieldwork was recorded in logbooks or on questionnaire sheets. Information on individuals' consumption and external exposure rates was assessed and entered into Excel spreadsheets. Each individual for whom information was obtained was given a unique identifier (the Observation Number) to assist in data sorting. Consumption

data were converted to consumption rates in kilograms per year (wet weight) of locally produced food and litres per year for milk. Where interviewees were unable to provide consumption rates in weight per year, they were asked to estimate the number of units, e.g. the number of eggs consumed per year. These data were converted to approximate consumption rates, in kilograms per year, using published produce weights (Hessayon, 1997 and Good Housekeeping, 1994), edible fraction data researched by CEFAS (Smedley, 1997) and information supplied by the Meat and Livestock Commission. These data are shown in Table 1. In a limited number of cases, annual consumption was supplied in other quantities, for example the number of tomato plants on which the crop was grown or the length and number of rows in which the crop was grown. In these cases published yield values were used to convert the quantities to kilograms per year consumed (Hessayon, 1997). For the purpose of data analysis, foodstuffs are aggregated into food groups; the typical food groups used in surveys are shown in Table 2.

3.2 Determination of critical groups

The critical group is determined by assessing doses that are representative of the most exposed individuals. The group will change according to the assessment being undertaken. Each assessment will have associated concentrations and/or dose rates distributed in space and time. This survey provides information that can be used to help define the critical group in an assessment but it does not constitute an assessment in itself.

The critical group will be made up of high rate consumers and/or people with high occupancy and/or handling rates. The data from the survey are presented in several ways to provide assessors with options to determine critical groups. The presentations are different for ingestion and external radiation pathways but they have a common feature. The feature is that the habits data are structured into ages and groups of activities with similar attributes. For example, when considering terrestrial food, consumption of all root vegetables is grouped together in a food group called ‘root vegetables’. For aquatic food, consumption of all species of molluscs is grouped. For external exposure over intertidal sediments, exposures over a

common substrate are 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; from 0 to 1 y of age (3 months); from 1 y to 2 y (1 year old); more than 2 y to 7 y (5 year old); more than 7 y to 12 y (10 year old); more than 12 y to 17 y (15 year old); because different dose coefficients can apply to different ages. Children over 17 are treated as adults. These age groupings are consistent with those used by the ICRP 72 (1996).

Ingestion pathways

Consumption rate data are presented for individuals and are further characterised in two ways to represent high rate consumers in each food and age group. Firstly, the 97.5 percentile rate is calculated from the observed data, for each of the food groups where consumption occurred using the Excel mathematical function for calculating percentiles. This 97.5 percentile rate is calculated for all age groups where consumption was noted. Secondly, the 'cut-off' method described by Hunt *et al* (1982) is used for adult observations for each of the food groups where consumption occurred. In this case the rate representing high rate consumers is calculated by taking the arithmetic mean of the maximum value and all consumption 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 42, 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.

If, when the top consumption rate value is divided by three, the lower threshold value obtained is above the next highest observation, the next highest suitable observation is used to set the lower threshold but the top value is still included in the mean. CEFAS have called the rate derived by the cut-off method the critical group rate for ease of presentation though the term is not strictly correct. This is because the critical group can only be established when doses are determined taking into account all pathways. Consumption data for aquatic foodstuffs are presented for adults and children in Tables 3 and 4 respectively. For purpose of

comparison, values for 97.5 percentile rates based on national data, referred to as 'generic' rates in this report, are shown for aquatic foodstuffs for adults, 15, 10, 5 and 1 year old children in Tables 5, 6, 7, 8 and 9 respectively. Consumption data for terrestrial foodstuffs are presented for adults in Tables 10 to 21, and for children in Tables 22 to 28. Again, for purpose of comparison, values for 97.5 percentile rates based on national data, referred to as 'generic' rates in this report, are shown for aquatic foodstuffs for adults, 15 year old and 10 year old children in Tables 5, 6 and 7 respectively.

The critical group rate has been calculated from the survey data for children. However, because few child consumers were identified the method should be viewed with caution For assessment purposes, a theoretical approach may be taken where survey rate data for child age groups are absent or limited. This involves taking the rates for adults, provided in Table 5, and scaling them by ratios (Table 29). The ratios have been calculated using generic 97.5 percentile consumption rates determined by MAFF (Byrom *et al* 1995, MAFF, 1998) for adults, 15 year olds, 10 year olds and children aged 6 – 12 months.

External exposure in intertidal areas

A similar approach is used for occupancy and handling rates (Tables 30 and 31 respectively). 97.5 percentile rates and critical group rates are determined for groups of activities or substrates with common attributes. However, the critical group rate is taken to be the arithmetic mean of all rates observed within a factor of 1.5 of the maximum value. 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.

External exposure in terrestrial areas

Data for the external radiation pathway are left in their detailed form, that is occupancy for each individual at each location. Grouping of these data is not helpful at this stage in the

assessment process when there is no definitive measurement or prediction of dose rate due to external radiation around the site. These data are presented in Table 32.

4. AQUATIC RADIATION PATHWAYS

4.1 Aquatic survey area description

Helensburgh to Rhu

Helensburgh is a busy town on the eastern shore of Gare Loch. The shoreline here consists mainly of sand, mud and stones, in between jetties and piers. Rock pools contain shrimp and peeler crab, which were used for bait by anglers on the loch. The beaches were used by bait diggers, shellfish collectors and anglers. Ragworm were available from the shore. There are marinas at Helensburgh and Rhu. Much of the area has coastal defences constructed of rocky prominences, which were used by anglers. The marinas are flooded and enclosed by large stone piers. Activities around the marina included sailing, diving and boat repairs. Rhu Spit is a shingle bank which extends into the loch and forms the Rhu Narrows; this spit was a popular location for anglers and walkers. The Narrows form the entrance to a deep water section of the loch and are occasionally closed to boat traffic to permit submarine movements.

Rhu to Shandon

Rhu jetty is owned by a sailing club and is private, which prohibits potential angling activity. The beach at Shandon is directly alongside the road and provides easily accessible facilities for angling and sailing. There is an outdoor activities centre at Shandon, which takes canoeists out onto the loch.

Shandon to Garelochhead

North of Shandon is a small sheltered bay providing facilities for angling. A muddy harbour is adjacent to the perimeter fence of the base. The harbour is used by a boatyard for maintenance of Clyde boats. Access to the boats is via pontoons over the mud. The yard also has a concrete slipway alongside the base. Access is not permitted into this harbour, and no angling took place here. There is an exclusion zone around the base prohibiting boats from entering. The base itself occupies a two kilometre stretch of the shoreline, from Carnban Point to Faslane Bay.

Limited activity took place in Faslane Bay as the area is occupied by naval support facilities, such as fuel depots. The shore is more easily accessible from the road towards Garelochhead. The foreshore around this point is narrow and rocky, and little activity took place.

The shoreline at Garelochhead has a large expanse of mud, sand and stones. The tidal range here is the greatest in the loch, and provides the potential for intertidal activities such as bait digging, shellfish collection, bonfires, barbecues and seaweed harvesting. There is an outdoor centre which conducts water sports activities, mostly for children; these activities included canoeing and sailing. The area was also popular with dog walkers.

Garelochhead to Rosneath

This stretch of the shore covers the majority of the west side of Gare Loch. The B833 road runs alongside the loch side, providing access from many lay-bys to the shoreline. The shoreline consists mostly of rock and shingle, and angling took place at convenient points along it. Some walking also took place. Most of this section of lochside provides access for launching boats and yachts. There are boatyards at Rosneath and Clynder, although the latter has become unused in recent years. Boatyard activity in this area has decreased

considerably. There is a large caravan park at Rosneath which has access to the shingle shore for the tourists, in addition to having a promontory from which angling was popular.

Rosneath to Kilcreggan

Access to the loch is difficult along this stretch of the coast. The headland is intersected by several rocky tracks and the B833 road traverses the terrain inland over to Kilcreggan. Here the loch flows into the Clyde. This area was popular for angling and small boat fishing. Commercial vessels from Gourock occasionally trawl here, although such visits are reported as being rare by the local Fishery Officer.

4.2 Commercial fisheries

No commercial fishing is permitted in Gare Loch. Previously trammel netting was allowed but this practice has been stopped. Some small boat fishing reportedly takes place around Kilcreggan, notably for crab and lobster. Nephrops were caught by Clyde fishing vessels near the entrance to Gare Loch. These catches were estimated to be approximately three tonnes per year.

Some commercial mollusc exploitation took place at Helensburgh. Winkles were harvested by visiting gangs, who collected 25 kg sacks for sale outside the area, reportedly to Glasgow. Evidence from similar surveys in Scotland suggested that most of this harvest would be bound for the continent.

4.3 Angling and hobby fishing

The majority of fish caught in the survey area was by anglers. Angling took place throughout the loch and was particularly popular at Helensburgh, Rhu, Mambeg, Rahane and Rosneath. Fish species caught included saithe, pollack, plaice, codling, mackerel and sea trout. All the anglers used rod and line, with either spinners or lugworm bait. The main species consumed

was mackerel; sea trout were seasonal and infrequent. The bait used by the anglers was frequently fresh, and dug from areas around the loch, including Helensburgh and Garelochhead. A tackle shop in the area supplied locally dug worms, indicating some commercial digging.

4.4 Seafood wholesalers and retailers

Fish retailers in the area were interviewed to assess the distribution and consumption pathways of local seafood. Fish, crustaceans and molluscs were landed from outside the survey area and imported for sale locally. The survey team did not identify any local fish, crustaceans or molluscs being sold by the retailers.

4.5 Internal exposure

Consumption rates for fish are presented in Tables 3 and 4. The critical group maximum, minimum, mean and 97.5 percentile consumption rates for aquatic foodstuffs have been calculated using data obtained from all individuals whose consumption was greater than nil, for adults, 15 and 10 year olds, and these results are presented in Tables 5, 6 and 7 respectively. These tables also present the national generic means and 97.5 percentile consumption rates (Byrom *et al*, 1995, MAFF, 1998) for comparison. Consumption rates for aquatic foodstuffs are summarised in Annex Table 1 for adults and Annex Table 2 for children. There were no observations of crustacean or mollusc consumption.

Some individuals could not provide details of edible portions eaten but could provide the total weight of fish prepared. In these cases appropriate values for edible fraction weights, generated from earlier CEFAS research, shown in Table 33, were used.

Fish

The main consumers of fish from the Gare Loch area were anglers together with their families.

Data for adult fish consumption rates are given in Table 3. The critical group maximum, minimum, mean and 97.5 percentile consumption rates for fish have been calculated using data obtained from all individuals whose consumption was greater than nil, and these results are presented in Table 5. The table also presents the national generic means and 97.5 percentile consumption rates (Byrom *et al*, 1995, MAFF, 1998) for comparison.

The main species of fish consumed were mackerel and cod. A critical group of fifteen individuals was determined with a maximum consumption rate of 14.6 kg/y and a mean of 9.9 kg/y. This compares with the adult generic mean consumption rate for fish of 15 kg/y and the adult generic 97.5 percentile consumption rates of 40 kg/y. Critical group fish consumption consists of a mix of 66% mackerel, 16% cod, 11% sea trout and 7% plaice.

Children's age group consumption rates of seafood are shown in Table 4. The critical group maximum, minimum, mean and 97.5 percentile consumption rates for fish have been calculated using data obtained from all individuals whose consumption was greater than nil, for 15 and 10 year olds, and these results are presented in Tables 6 and 7 respectively. These tables also present the national generic means and 97.5 percentile consumption rates (Byrom *et al*, 1995, MAFF, 1998) for comparison. No children in the three month, one year and five year old age groups were noted to be consuming seafood.

In the ten year old age group, the maximum fish consumption rate was 1.6 kg/y. This compares with the ten year old age group generic mean consumption rates for fish of 6 kg/y and the ten year old age group generic 97.5 percentile consumption rates for fish of 20 kg/y.

In the fifteen year old age group, the maximum fish consumption rate was 8.4 kg/y. This compares with the fifteen year old age group generic mean consumption rate for fish of 6.5 kg/y and the fifteen year old age group generic 97.5 percentile consumption rate for fish of 20 kg/y.

Crustaceans

No crustacean species were caught and consumed locally.

Molluscs

No mollusc species were caught and consumed locally. There were a group of mollusc collectors operating in the Helensburgh area, who were reportedly from the Glasgow area, but none of these people reported any consumption.

The use of seaweed as a fertiliser

The survey investigated the potential use of seaweed as a fertiliser and soil conditioner pathway. One vegetable grower used locally collected seaweed (*Fucus vesiculosus*) as compost.

4.6 External exposure

Intertidal occupancy

External exposure from artificial radiation to members of the public who frequent intertidal areas depends on the occupancy time and dose rate after subtraction of an appropriate figure for natural background radiation. Dose rates over mud and saltmarsh have a potential for being higher than over coarser substrates. Consequently occupancy times over these substrates are considered to be radiologically more important than similar times over other

substrates. Estimates of natural backgrounds used by CEFAS for assessing doses to individuals (FSA and SEPA, 2000) are 0.05 micro Gy/h for sandy substrates, 0.07 micro Gy/h for mud and saltmarsh and 0.06 micro Gy/h for other substrates.

The predominant substrate materials in the intertidal areas of the survey area are rocks, stones, sand and mud.

Intertidal activities observed during the survey included beach cleaning, walking, scuba diving, mollusc collection, canoeing, sailing, bait digging and angling. Gamma dose rate measurements were taken at some locations, shown in Table 32, to supplement those which were part of SEPA's scheduled monitoring programme.

The most significant intertidal occupancy times for individuals are listed in Table 30. Anglers and beach cleaners had the largest occupancy times over rock and formed the critical group. A mean time of 1000 h/y over rock was identified for five individuals (the maximum time recorded was 1250 h/y. This individual also spent a further 310 h/y over a mixture of mud and sand). A single individual represented the critical group for occupancy over a mixture of mud and sand. He was a bait digger spending 1400 h/y over this substrate. Fifteen individuals had an occupancy time of 200 h/y over mud, and formed the critical group for this substrate.

Handling

Handling sediment while bait digging or mollusc collection 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 60, 1991). Table 31 shows the most significant observations made during this survey for times spent handling sediment.

The critical group for handling sediment was made up of one individual of 1400 h/y, who regularly dug bait on a commercial basis.

Individuals rates of occupancy, handling, and descriptions of the activities undertaken by coastal area users are given in Tables 30 and 31. These provide quantitative data that might be of use in the probabilistic assessment of dose and/or risk to individuals via radiological pathways. Pathways to consider include individuals who may inhale re-suspended radioactivity in sea spray, inadvertently ingest contaminated seawater and/or have contact with and/or inadvertently ingest contaminated sediments while undertaking coastal area activities such as angling, walking, sailing and bait digging.

5. TERRESTRIAL RADIATION PATHWAYS

5.1 Terrestrial survey area description and local produce

Terrestrial pathways found included consumption of vegetables and fruit grown by gardeners in Garelochhead and Rosneath and more general consumption of farm produce, including eggs. Farms around the east of the loch reared sheep and cattle and there were three similar farms on the west side of the loch. One dairy farm was identified just outside the 5 km survey radius whose occupants consumed a quantity of the beef and milk produced. These data have been included in this report. Other than these observations, no local sales and consumption of locally produced meat (beef, pork, lamb or chicken) were identified. One farm reared deer for venison. Most of the terrestrial survey area was given over to grazing (mainly sheep), silage and production of a small amount of barley.

One allotment in Helensburgh was identified just outside the 5km survey radius, which had approximately 16 plots. These data, where available, have been included in this report.

Wild foods observed growing in the survey area included strawberries, blackberries, raspberries and mushrooms. Consumption rate data for duck, pheasant, pigeon and mushrooms were recorded, but such consumption was uncommon due to the general lack of these species in the area.

One individual living locally kept bee hives in his garden. He sold the honey produced locally.

The local shops visited included three butchers, a fishmonger and poulterer. None of these sold any local produce.

Most local seafood consumption by terrestrial food group consumers was on a small scale. Most of those interviewed purchased seafood from a local fishmonger, selling seafood caught outside the survey area.

5.2 Novel potential radiation pathways

Consideration was also given to novel pathways during the survey and the following observations were made:

One vegetable grower used locally collected seaweed (*Fucus vesiculosus*) as compost.

One farm reared deer for venison.

A few residents had their water supplied from streams above Shandon.

5.3 Land cover

Figure 3 shows the land cover in the survey area. The figure was reproduced from a land cover map produced by Macaulay Land Use Research Institute (Macauley Institute for soil research, 1988), with their consent.

A large proportion of the area was heather moor and improved grassland. There were large areas of coniferous plantation on the west side of Gare Loch, with the main urban areas being at the northern tip and the east side. There were also areas of blanket bog, open canopy and broadleaved and mixed woodland.

5.4 Internal exposure

The percentage contribution each food type makes to its food group is shown in Table 34.

Adult consumption rates

Consumption rate data for adults are shown grouped by the food groups, (defined in Table 2) where consumption occurred, in Tables 10 to 21. Consumption of terrestrial foods in the following food groups was identified: green vegetables, other vegetables, root vegetables, potatoes, domestic fruit, milk, bovine, poultry, eggs, wild/free foods, wild fungi and honey. No consumption was identified for the following food groups: ovine, porcine, rabbits & hares and venison. Also, no consumption of local cereal crops was identified. For each terrestrial food group the critical group maximum, minimum, mean and 97.5 percentile consumption rates have been calculated using data obtained from all individuals whose consumption was greater than nil. The results are presented in Table 5. The table also presents the national generic means and 97.5 percentile consumption rates (Byrom *et al*, 1995, MAFF, 1998) for comparison. Adult terrestrial food consumption data is summarised in Annex Table 1.

Three critical group mean consumption rates exceeded those of the generic 97.5 percentile rates. These were for green vegetables, root vegetables and eggs. A further five critical group mean consumption rates exceeded those of the generic means. These were for other domestic vegetables, potatoes, cattle meat, domestic fruit and milk. The food groups eaten at rates below the respective generic means were poultry, wild/free foods, honey and wild fungi.

Child consumption rates

Child consumers eating locally produced food were identified during the survey. Consumption rate data for children are shown grouped by the food groups where consumption occurred in Tables 22 to 28. No children in the 3 month old age group were identified as consuming local terrestrial foods. For each terrestrial food group the critical group maximum, minimum, mean

and 97.5 percentile consumption rates have been calculated using data obtained from all individuals whose consumption was greater than nil for 15 and 10 year olds. The results are presented in Tables 6 and 7 respectively. These tables also present the national generic means and 97.5 percentile consumption rates (Byrom *et al*, 1995, MAFF, 1998) for comparison. Children's terrestrial food consumption data is summarised in Annex Table 2.

15 year old age group

Twenty two children were identified to be eating locally produced terrestrial food in this age group in five of the terrestrial habits food groups (Tables 23, 24, 25, 26 and 27). Consumption of terrestrial foods in the following food groups was identified: other vegetables, root vegetables, potatoes, domestic fruit and eggs. No consumption was identified for the following food groups: green vegetables, milk, bovine, ovine, porcine, poultry, wild/free foods, honey, wild fungi, rabbits and hares and venison. Also, no consumption of local cereal crops was identified for this age group. No foods groups were consumed at a higher rate than their generic 97.5 percentile rate. Root vegetables and eggs were consumed at rates higher than their respective generic mean consumption rates. Other vegetables, potatoes and domestic fruit were consumed at rates lower than their respective generic mean consumption rates.

10 year old age group

Ten children were identified as eating locally produced food in this age group in four of the terrestrial habits food groups (Tables 23, 24, 25 and 27). Consumption of terrestrial foods in the following food groups was identified: other vegetables, root vegetables, potatoes and eggs. No consumption was identified for the following food groups: green vegetables, domestic fruit, milk, bovine, ovine, porcine, poultry, wild/free foods, honey, wild fungi, rabbits and hares and venison. Also, no consumption of local cereal crops was identified for this age group. No foods were consumed at a higher rate than their generic 97.5 percentile rate. Root vegetables and eggs were consumed at rates higher than their respective generic mean

consumption rates. Other vegetables and potatoes were consumed at rates lower than their respective generic mean consumption rates.

5 year old age group

Seven children were identified as eating locally produced food in this age group in four of the terrestrial habits food groups (Tables 24, 26, 27 and 28). Consumption of terrestrial foods in the following food groups was identified: root vegetables, domestic fruit, eggs and wild/free foods. No consumption was identified for the following food groups: green vegetables, other vegetables, potatoes, milk, bovine, ovine, porcine, poultry, honey, wild fungi, rabbits and hares and venison. Also, no consumption of local cereal crops was identified for this age group. No generic consumption rates had been determined by MAFF for this age group.

1 year old age group

Two children were identified as eating locally produced terrestrial foods food in this age group in six of the terrestrial habits food groups (Tables 22, 23, 24, 26, 27 and 28). Consumption of terrestrial foods in the following food groups was identified: green vegetables, other vegetables, root vegetables, domestic fruit, eggs and wild/free foods. No consumption was identified for the following food groups: potatoes, milk, bovine, ovine, porcine, poultry, honey, wild fungi, rabbits and hares and venison. Also, no consumption of local cereal crops was identified for this age group.. No generic consumption rates had been determined by MAFF for this age group.

5.5 External radiation

Site characteristics and survey area description

The survey area is shown in Figure 3. Gamma dose rate readings were measured around the site perimeter, shown in Table 32, and these showed minimal signs of elevated external dose

rates. The measurements were generally low and almost indistinguishable from background. Local residents and employees occupancy times within the one kilometre direct radiation survey area were recorded. All the residents interviewed spent large amounts of time at home, or in the immediate vicinity. Some of them were also employed by the base on a full or part-time basis. Boat repair was the only commercial activity noted as taking place in the one kilometre radius area.

Occupancy times

Local residents and employees occupancy times within the one kilometre external radiation survey area were recorded. The greatest occupancy time by one individual was 8408 h/y. Four individuals, living in Shandon, had occupancy times greater than 8000 h/y. Table 32 presents the occupancy data and the gamma dose rates inside and outside the property. This table also contains the gamma dose rates measured around the site perimeter and those used to establish a suitable background for the area.

The maximum site perimeter gamma dose rate measured was 0.083 micro Gy/h, in the area opposite the Faslane cemetery junction. The mean of the six gamma dose rate readings taken around the site was 0.0745 micro Gy/h. This compares to the mean of the two background measurements taken remote from the site of 0.078 micro Gy/h, demonstrating minimal elevation of site perimeter levels. Gamma dose rates measurements were taken both inside the properties and outside in the gardens. In most cases the gamma dose rates were higher inside the buildings. This phenomenon is probably caused by natural radiation from the building materials of properties and not site related. Therefore, the outdoor readings are considered more appropriate in attributing dose.

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. CEFAS have provided data in

Annex Tables 1 and 2 so that the full effect of combining pathways can be assessed for individual observations, given the concentrations and dose rates from 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.

On the basis of the information in Annex Table 1, the most significant combinations of pathways for adult dose assessment are shown in Annex Table 3.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Survey findings

Exposure pathways were investigated for approximately 230 individuals. The main aquatic species consumed were mackerel and sea trout.

The critical group mean consumption rates were 9.9 kg/y for fish. No consumption was noted for crustaceans or molluscs.

Local terrestrial food groups consumed included green vegetables, root vegetables, other vegetables, potatoes, domestic fruit, milk, cattle meat, poultry (including game birds), eggs, wild/free foods, wild fungi, and honey. The percentage contribution each food type makes to its food group, eaten by the critical adult groups, is shown in Table 34 and the critical adult group mean consumption rates are shown in Table 5.

Occupancy times of members of the public within one kilometre of the site were recorded.

A mean intertidal occupancy time over a mixture of mud and sand of 1400 h/y was identified, together with mean intertidal occupancies over rock and mud of 1000 h/y and 200h/y

respectively. Mean sediment handling times of 1400 h/y was identified for bait digging. A combined occupancy time by one individual of 1250 h/y over rocks and 312 h/y over sand and mud was also identified.

7.2 Comparisons with previous surveys

The mean consumption rates from within the survey area show a decrease in the consumption of fish, crustaceans and molluscs when compared to the mean consumption rates obtained from the 1989 survey. These were fish, 39 kg/y, crustaceans, 0.88 kg/y and molluscs 4.8 kg/y, compared to this survey's consumption rates of fish 9.9 kg/y, crustaceans nil and molluscs nil. A possible reason for the absence of mollusc consumption was the deepening and widening of the Rhu Narrows for submarine access since the 1989 survey. This area was previously identified as a source of mollusc collection and consumption.

The mean occupancy rate over a mixture of mud and sand have increased from 670 h/y recorded for the 1989 survey to 1400 h/y recorded during this survey. Mean occupancy rates over mud have decreased from 500 h/y recorded for the 1989 survey to 200 h/y recorded during this survey.

This survey was the first terrestrial food habits survey around HM Naval Base Clyde, Faslane.

7.3 Recommendations

One important objective of habit surveys is to identify any changes needed to the environmental monitoring programme.

The monitoring programme as reported in FSA and SEPA (2000) comprised sampling of sediments and seawater, and measurement of intertidal dose rates.

1) An annual sample of mackerel, cod or sea trout should be considered, as it is these fish species which are eaten in the largest quantities by members of this critical group.

2) In 1999, there was no sampling of terrestrial foodstuffs at the site. Should the importance of gaseous discharges warrant it, then sampling of those foods identified in this survey at high rates should be considered. The foods eaten at high rates included green vegetables, root vegetables and eggs.

8. ACKNOWLEDGEMENTS

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Table 1. Average individual and yield weights for terrestrial food types

Food type	Average edible weight per individual	Average yield	Reference (weight/yield)
Apple	0.114 kg		S
Bean, Broad		9.1 kg from a 10’ double row	H
Beetroot	0.15 kg	4.5 kg from a 10’ row (globe) 8.2 kg from a 10' row (long)	S/H
Blackcurrant		1 kg for a large margarine tub	S
Broccoli	0.68 kg	0.68 kg yield per plant	H
Brussels Sprouts	0.91 kg (stalk)	0.91 kg yield per plant	H
Cabbage	0.91 kg	0.34 – 1.4 kg yield per plant	S/H
Carrot	0.085 kg	3.6 kg from a 10’ row (early) 4.5 kg from 10' row (maincrop)	S/H
Cauliflower	0.68 kg	0.5 – 1.0 kg per plant	S/H
Garlic	0.063 kg (corm)		S
Herbs		2 large handfuls = 0.010 kg	S
Leek	0.20 kg	4.5 kg yield from a 10’ row	H
Lettuce	0.20 kg	10 – 20 heads from a 10’ row	S/H
Onion and shallots from sets		3.2 kg from a 10’ row	H
Parsnip	0.18 kg	3.6 kg from a 10’ row	S/H
Potato		5.5 kg from a 10’ row (early) 9.1 kg from a 10’ row (maincrop)	H
Raspberry		1 kg for a large margarine tub	S
Rhubarb		2.3 kg per plant	H
Swede	0.91 kg	13.5 kg yield from a 10’ row	S/H
Tomato, Greenhouse		3.6 kg yield per plant	H
Tomato, Outdoor		1.8 kg yield per plant	H
Turnip		3.2 kg from a 10’ row (early) 5.5 kg from a 10’ row (maincrop)	H
Lamb	22 kg		BLC
Beef	260 kg		BLC
Pork	62 kg		BLC
Hare	1.59 kg		GH
Rabbit	1 kg		GH
Red deer	136 kg		SE
Roe deer	34 kg		SE
Pigeon	0.45 kg dressed weight		GH
Pheasant	0.91 kg dressed weight		GH
Grouse	0.70 kg dressed weight		SE
Goose	4.5 kg dressed weight		GH
Duck	0.91 kg dressed weight		GH
Chicken	1.59 kg dressed weight		GH
Chicken egg	0.057 kg		GH
Duck egg	0.113 kg		GH

Key

S = Smedley, 1997
H = Hessayon, 1997
BLC = Beef and Livestock Commission information
GH = Good Housekeeping, 1994
SE = Estate information

Table 2. Food groups used in habits surveys.

Terrestrial food groups

Green vegetables	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	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, cream, goats milk, cheese
Cattle meat	Beef, offal
Sheep meat	Lamb, offal
Pig meat	Pork, offal
Poultry	Chicken, duck, goose, partridge, pheasant, pigeon, snipe, woodcock
Eggs	Chicken egg, duck egg, goose egg
Wild/free foods	Blackberrry, blackcurrant, chestnut, crab apple, damson, dandelion root, elderberry, nettle, raspberry, rowanberry, samphire, sloe, strawberry, watercress, wild apple
Rabbits & Hares	
Honey	
Wild fungi	
Venison	

Aquatic food groups

Fish	Bass, brill, cod, common ling, dab, dover sole, conger eel, flounder, grey gurnard, grey mullet, haddock, hake, herring, lemon sole, mackerel, monkfish, plaice, pollack, red gurnard, saithe, salmon, sea trout, thornback ray, turbot, whitebait, whiting, witch
Crustaceans	Brown shrimp, common prawn, crab, crawfish, lobster, Nephrops, pink shrimp, squat lobster
Molluscs	Cockle, cuttlefish, king scallop, limpet, mussel, oyster, queen scallop, razor shell, squid, whelk, winkle

Table 3. Adult consumption rates (kg/y) of fish caught from Gare Loch

Obsevation Number	Cod	Mackerel	Plaice	Sea Trout	Total
100		**3.3**		**11.3**	**14.6**
6		**12.2**			**12.2**
7		**12.2**			**12.2**
21	**11.6**				**11.6**
22	**11.6**				**11.6**
89		**11.1**			**11.1**
26		**10.8**			**10.8**
41		**5.4**	**3.6**		**9.0**
42		**5.4**	**3.6**		**9.0**
43		**5.4**	**3.6**		**9.0**
105		**5.5**		**2.8**	**8.3**
106		**5.5**		**2.8**	**8.3**
11		**8.1**			**8.1**
133		**6.6**			**6.6**
108		**5.5**			**5.5**
28				4.7	4.7
84		4.2			4.2
85		4.2			4.2
110			2.0	1.1	3.1
111			2.0	1.1	3.1
82				2.8	2.8
140		2.8			2.8
141		2.8			2.8
134		2.8			2.8
161				2.5	2.5
162				2.5	2.5
31		2.4			2.4
32		2.4			2.4
8		1.8			1.8
91		1.1		0.6	1.7
92		1.1		0.6	1.7
93		1.1		0.6	1.7
94		1.1		0.6	1.7
203		1.6			1.6
204		1.6			1.6
109		1.4			1.4
9		0.9			0.9
101		0.6			0.6
29				0.5	0.5
96		0.4			0.4
99		0.4			0.4

Notes

Emboldened observations are the critical group consumers.

The critical group mean consumption rate of fish caught in the survey area based on the 15 highest adult consumers is 9.9 kg/y.

The observed 97.5 percentile rate based on 41 observations is 12.15 kg/y

Table 4. Children's consumption rates (kg/y) of fish caught from Gare Loch

15 year old age group

Observation Number	Sex	Age	Fish		
			Mackerel	Sea Trout	Fish total
103	**M**	**16**	**5.5**	**2.8**	**8.4**
104	**M**	**12**	**5.5**	**2.8**	**8.4**
27	**M**	**15**		**4.7**	**4.7**
163	M	12		2.5	2.5
164	F	13		2.5	2.5
165	F	14		2.5	2.5
166	M	15		2.5	2.5
95	F	13	1.1	0.6	1.7
205	M	14	1.6		1.6
98	M	14	0.4		0.4

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of fish caught in the survey area based on the 3 highest 15 year old consumers is 7.1 kg/y.
The observed 97.5 percentile rate for fish based on 10 observations is 8.36 kg/y

10 year old age group

Observation Number	Sex	Age	Fish		
			Mackerel	Sea Trout	Fish total
206	**M**	**10**	**1.6**		**1.6**
30	**F**	**11**		**0.5**	**0.5**
97	M	10	0.4		0.4

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of fish caught in the survey area based on the 2 highest 10 year old consumers is 1.1 kg/y.
The observed 97.5 percentile rate for fish based on 3 observations is 1.58 kg/y

Table 5. Adult aquatic and terrestrial critical group maximum, minimum and mean consumption rates in the Gare Loch area and the actual 97.5 percentile rates, generic mean and 97.5 percentile rates (kg or l/y).

Food group	Number of Observations	No. Higher Rate Consumers	Observed Maximum Critical Consumption Rate	Observed Lower Critical Consumption Rate	Observed Critical Group Mean Consumption Rate	Observed 97.5th %ile Consumption Rate	Generic Mean Consumption Rate	Generic 97.5th %ile Consumption Rate
Fish	41	15	14.6	5.5	9.9	12.2	15.0	40.0
Crustaceans	NC	NC	NC	NC	NC	NC	3.5	10.0
Molluscs	NC	NC	NC	NC	NC	NC	3.5	10.0
Green vegetables	22	6	52.6	24.2	35.6	52.6	15.0	45.0
Other vegetables	24	6	44.5	17.0	29.8	44.5	20.0	50.0
Root vegetables	30	9	62.8	37.0	52.2	62.8	10.0	40.0
Potatoes	20	6	76.3	29.1	54.8	76.3	50.0	120.0
Domestic fruit	35	10	38.2	15.4	20.7	38.2	20.0	75.0
Milk	5	5	182.5	182.5	182.5	182.5	95.0	240.0
Cattle meat	5	5	37.8	37.8	37.8	37.8	15.0	45.0
Sheep meat	NC	NC	NC	NC	NC	0.0	8.0	25.0
Pig meat	NC	NC	NC	NC	NC	0.0	15.0	40.0
Poultry	9	7	3.6	2.3	2.6	3.6	10.0	30.0
Eggs	14	4	29.6	11.9	22.2	29.6	8.5	25.0
Wild/free foods	34	17	2.9	1.4	2.0	2.9	7.0	25.0
Honey	4	4	1.8	0.7	1.3	1.8	2.5	9.5
Wild fungi	9	7	0.9	0.5	0.7	0.9	3.0	10.0
Rabbits and hares	NC	NC	NC	NC	NC	NC	6.0	15.0
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed

Table 6. 15 year old age group's aquatic and terrestrial critical group maximum, minimum and mean consumption rates in the Gare Loch area and the actual 97.5 percentile rates, generic mean and 97.5 percentile rates (kg or l/y).

Food group	Number of Observations	No. Higher Rate Consumers	Observed Maximum Critical Consumption Rate	Observed Lower Critical Consumption Rate	Observed Critical Group Mean Consumption Rate	Observed 97.5th %ile Consumption Rate	Generic Mean Consumption Rate	Generic 97.5th %ile Consumption Rate
Fish	10	3	8.4	4.7	7.1	8.4	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
Green vegetables	NC	NC	NC	NC	NC	NC	9.0	25.0
Other vegetables	3	3	3.6	0.5	1.5	3.4	10.0	30.0
Root vegetables	2	2	7.6	7.6	7.6	7.6	7.5	20.0
Potatoes	2	2	5.1	5.1	5.1	5.1	60.0	130.0
Domestic fruit	2	2	3.6	3.4	3.5	3.6	15.0	50.0
Milk	NC	NC	NC	NC	NC	NC	110.0	260.0
Cattle meat	NC	NC	NC	NC	NC	NC	15.0	35.0
Sheep meat	NC	NC	NC	NC	NC	NC	5.5	15.0
Pig meat	NC	NC	NC	NC	NC	NC	10.0	30.0
Poultry	NC	NC	NC	NC	NC	NC	6.5	20.0
Eggs	4	4	11.9	4.1	8.6	11.7	7.0	25.0
Wild/free foods	NC	NC	NC	NC	NC	NC	3.0	13.0
Honey	NC	NC	NC	NC	NC	NC	2.0	5.0
Wild fungi	NC	NC	NC	NC	NC	NC	2.0	5.5
Rabbits and hares	NC	NC	NC	NC	NC	NC	ND	ND
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed

Table 7. 10 year old age group's aquatic and terrestrial critical group maximum, minimum and mean consumption rates in the Gare Loch area and the actual 97.5 percentile rates, generic mean and 97.5 percentile rates (kg/y).

Food group	Number of Consumers	No. Higher Rate Consumers	Observed Maximum Critical Consumption Rate	Observed Lower Critical Consumption Rate	Observed Critical Group Mean Consumption Rate	Observed 97.5th %ile Consumption Rate	Generic Mean Consumption Rate	Generic 97.5th %ile Consumption Rate
Fish	3	2	1.6	0.5	1.1	1.6	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
Green vegetables	NC	NC	NC	NC	NC	NC	6.0	20.0
Other vegetables	1	1	0.5	0.5	0.5	NA	8.0	25.0
Root vegetables	1	1	7.6	7.6	7.6	NA	6.0	20.0
Potatoes	1	1	5.1	5.1	5.1	NA	45.0	85.0
Domestic fruit	NC	NC	NC	NC	NC	NC	15.0	50.0
Milk	NC	NC	NC	NC	NC	NC	110.0	240.0
Cattle meat	NC	NC	NC	NC	NC	NC	15.0	30.0
Sheep meat	NC	NC	NC	NC	NC	NC	4.0	10.0
Pig meat	NC	NC	NC	NC	NC	NC	8.5	25.0
Poultry	NC	NC	NC	NC	NC	NC	5.5	15.0
Eggs	2	2	8.9	8.9	8.9	8.9	6.5	20.0
Wild/free foods	NC	NC	NC	NC	NC	NC	3.0	11.0
Honey	NC	NC	NC	NC	NC	NC	2.0	7.5
Wild fungi	NC	NC	NC	NC	NC	NC	1.5	4.5
Rabbits and hares	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 (only one consumer observed)

Table 8. 5 year old age group's aquatic and terrestrial critical group maximum, minimum and mean consumption rates in the Gare Loch area and the actual 97.5 percentile rates, generic mean and 97.5 percentile rates (kg/y).

Food group	Number of Consumers	No. Higher Rate Consumers	Observed Maximum Critical Consumption Rate	Observed Lower Critical Consumption Rate	Observed Critical Group Mean Consumption Rate	Observed 97.5th %ile Consumption Rate	Generic Mean Consumption Rate	Generic 97.5th %ile Consumption Rate
Fish	NC	NC	NC	NC	NC	NC	ND	ND
Crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
Molluscs	NC	NC	NC	NC	NC	NC	ND	ND
Green vegetables	NC	NC	NC	NC	NC	NC	ND	ND
Other vegetables	NC	NC	NC	NC	NC	NC	ND	ND
Root vegetables	2	2	0.3	0.3	0.3	0.3	ND	ND
Potatoes	NC	NC	NC	NC	NC	NC	ND	ND
Domestic fruit	3	3	38.6	4.5	26.9	38.2	ND	ND
Milk	NC	NC	NC	NC	NC	NC	ND	ND
Cattle meat	NC	NC	NC	NC	NC	NC	ND	ND
Sheep meat	NC	NC	NC	NC	NC	NC	ND	ND
Pig meat	NC	NC	NC	NC	NC	NC	ND	ND
Poultry	NC	NC	NC	NC	NC	NC	ND	ND
Eggs	2	2	1.1	1.1	1.1	1.1	ND	ND
Wild/free foods	NC	NC	NC	NC	NC	NC	ND	ND
Honey	NC	NC	NC	NC	NC	NC	ND	ND
Wild fungi	2	2	0.7	0.7	0.7	0.7	ND	ND
Rabbits and hares	NC	NC	NC	NC	NC	NC	ND	ND
Venison	NC	NC	NC	NC	NC	NC	ND	ND

ND = not determined
NC = not consumed

Table 9. 1 year old age group's aquatic and terrestrial critical group maximum, minimum and mean consumption rates in the Gare Loch area and the actual 97.5 percentile rates, generic mean and 97.5 percentile rates (kg/y).

Food group	Number of Consumers	No. Higher Rate Consumers	Observed Maximum Critical Consumption Rate	Observed Lower Critical Consumption Rate	Observed Critical Group Mean Consumption Rate	Observed 97.5th %ile Consumption Rate	Generic Mean Consumption Rate	Generic 97.5th %ile Consumption Rate
Fish	NC	NC	NC	NC	NC	NC	ND	ND
Crustaceans	NC	NC	NC	NC	NC	NC	ND	ND
Molluscs	NC	NC	NC	NC	NC	NC	ND	ND
Green vegetables	1	1	2.9	2.9	2.9	NA	ND	ND
Other vegetables	1	1	8.5	8.5	8.5	NA	ND	ND
Root vegetables	2	2	1.5	0.2	0.8	1.5	ND	ND
Potatoes	NC	NC	NC	NC	NC	NC	ND	ND
Domestic fruit	2	2	19.1	1.7	10.4	18.7	ND	ND
Milk	NC	NC	NC	NC	NC	NC	ND	ND
Cattle meat	NC	NC	NC	NC	NC	NC	ND	ND
Sheep meat	NC	NC	NC	NC	NC	NC	ND	ND
Pig meat	NC	NC	NC	NC	NC	NC	ND	ND
Poultry	NC	NC	NC	NC	NC	NC	ND	ND
Eggs	1	1	0.5	0.5	0.5	NA	ND	ND
Wild/free foods	2	2	1.4	0.3	0.8	1.3	ND	ND
Honey	NC	NC	NC	NC	NC	NC	ND	ND
Wild fungi	NC	NC	NC	NC	NC	NC	ND	ND
Rabbits and hares	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 (only one consumer observed)

Table 10. Adult consumption rates of green vegetables from the survey area (kg/y).

Observation Number	Broccoli	Brussel sprout	Cabbage	Cauliflower	Courgette	Cucumber	Herbs	Lettuce	Spinach	Total
222	**6.8**	**7.3**	**7.3**	**10.2**	**9.2**	**3.4**		**5.0**	**3.5**	**52.6**
223	**6.8**	**7.3**	**7.3**	**10.2**	**9.2**	**3.4**		**5.0**	**3.5**	**52.6**
53					**27.0**		**1.2**	**1.7**		**29.9**
54					**27.0**		**1.2**	**1.7**		**29.9**
220			**18.2**					**1.5**	**4.5**	**24.2**
221			**18.2**					**1.5**	**4.5**	**24.2**
134					11.0	1.4				12.4
135					11.0	1.4				12.4
139			5.7					3.0		8.7
138			5.7							5.7
145								3.0		3.0
146								3.0		3.0
63					2.9					2.9
64					2.9					2.9
116		0.9								0.9
117		0.9								0.9
132							0.5			0.5
133							0.5			0.5
44								0.3		0.3
45								0.3		0.3
153							0.2			0.2
154							0.2			0.2

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of green vegetables in the survey area based on the 6 highest adult consumers is 35.57 kg/y.
The observed 97.5 percentile rate based on 22 observations is 52.61 kg/y

Table 11. Adult consumption rates of other vegetables from the survey area (kg/y).

Observation Number	Broad bean	French bean	Mangetout	Pea	Pepper	Runner bean	Tomato	Total
222	**9.1**		**7.5**		**0.7**	**13.7**	**13.5**	**44.5**
223	**9.1**		**7.5**		**0.7**	**13.7**	**13.5**	**44.5**
134							**28.0**	**28.0**
135							**28.0**	**28.0**
220	**6.8**			**6.8**		**3.4**		**17.0**
221	**6.8**			**6.8**		**3.4**		**17.0**
66				1.2		10.8		12.0
67				1.2		10.8		12.0
68				1.2		10.8		12.0
118				0.9		2.3	6.8	10.0
119				0.9		2.3	6.8	10.0
63	4.0			1.5			3.0	8.5
64		4.0		1.5			3.0	8.5
116				0.9			6.8	7.7
117				0.9			6.8	7.7
53							5.4	5.4
54							5.4	5.4
28							3.6	3.6
140				0.5		0.7		1.1
141				0.5		0.7		1.1
44							0.8	0.8
45							0.8	0.8
145							0.7	0.7
146							0.7	0.7

Notes

Emboldened observations are the critical group consumers.

The critical group mean consumption rate of other vegetables in the survey area based on the 6 highest adult consumers is 29.82 kg/y.

The observed 97.5 percentile rate based on 24 observations is 44.46 kg/y

Table 12. Adult consumption rates of root vegetables from the survey area (kg/y).

Observation Number	Beetroot	Carrot	Garlic	Leek	Onion	Parsnip	Turnip	Total
222	**3.4**	**14.4**			**36.0**	**9.0**		**62.8**
223	**3.4**	**14.4**			**36.0**	**9.0**		**62.8**
58		**19.4**		**17.3**	**17.3**			**54.0**
59		**19.4**		**17.3**	**17.3**			**54.0**
60		**19.4**		**17.3**	**17.3**			**54.0**
61		**19.4**		**17.3**	**17.3**			**54.0**
62		**19.4**		**17.3**	**17.3**			**54.0**
220	**6.8**			**15.0**	**4.5**	**2.5**	**8.3**	**37.0**
221	**6.8**			**15.0**	**4.5**	**2.5**	**8.3**	**37.0**
116	2.7	4.5		0.5	1.4		9.1	18.2
117	2.7	4.5		0.5	1.4		9.1	18.2
136				11.3				11.3
137				11.3				11.3
140				7.6				7.6
141				7.6				7.6
145	0.9			2.5	3.2			6.6
146	0.9			2.5	3.2			6.6
134		3.2		0.5				3.7
135		3.2		0.5				3.7
44					2.3			2.3
45					2.3			2.3
138				2.0				2.0
139				2.0				2.0
63		1.5						1.5
64		1.5						1.5
66		1.2						1.2
67		1.2						1.2
68		1.2						1.2
77			0.3					0.3
78			0.3					0.3

Notes

Emboldened observations are the critical group consumers.

The critical group mean consumption rate of root vegetables in the survey area based on the 9 highest adult consumers is 52.18 kg/y.

The observed 97.5 percentile rate based on 30 observations is 62.77 kg/y

Table 13. Adult consumption rates of potatoes from the survey area (kg/y).

Observation Number	Total
116	**76.3**
117	**76.3**
222	**59.1**
223	**59.1**
220	**29.1**
221	**29.1**
134	19.1
135	19.1
147	19.1
148	19.1
118	14.4
119	14.4
145	9.5
146	9.5
140	5.1
141	5.1
136	3.2
137	3.2
138	2.3
139	2.3

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of potates in the survey area based on the 6 highest adult consumers is 54.82 kg/y.
The observed 97.5 percentile rate based on 20 observations is 76.27 kg/y

Table 14. Adult consumption rates of domestic fruit from the survey area (kg/y).

Observation Number	Apple	Blackberry	Blackcurrant	Cherry	Damson	Fig	Gooseberry	Grape	Peach	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
77	**4.1**			**2.3**	**5.4**	**5.4**	**1.4**	**1.4**		**5.4**	**1.6**		**11.3**		**38.2**
78	**4.1**			**2.3**	**5.4**	**5.4**	**1.4**	**1.4**		**5.4**	**1.6**		**11.3**		**38.2**
75	**3.4**									**13.5**					**16.9**
76	**3.4**									**13.5**					**16.9**
44	**0.7**		**8.1**				**5.4**					**2.3**			**16.4**
45	**0.7**		**8.1**				**5.4**					**2.3**			**16.4**
118	**9.1**		**0.9**				**1.4**			**4.5**		**0.5**			**16.3**
119	**9.1**		**0.9**				**1.4**			**4.5**		**0.5**			**16.3**
220							**5.4**				**3.4**		**1.5**	**5.1**	**15.4**
221							**5.4**				**3.4**		**1.5**	**5.1**	**15.4**
53	3.4	0.5		1.7				2.3	2.3		0.6			0.2	10.8
54	3.4	0.5		1.7				2.3	2.3		0.6			0.2	10.8
222	4.5												2.4		6.9
223	4.5												2.4		6.9
73	5.0														5.0
74	5.0														5.0
145													4.8		4.8
146													4.8		4.8
16	4.5														4.5
17	4.5														4.5
57	1.1	0.2		0.6				0.8	0.8					0.1	3.4
136													3.0		3.0
137													3.0		3.0
153	1.9	0.5											0.5		2.8
154	1.9	0.5											0.5		2.8
213	2.3														2.3
214	2.3														2.3
63										0.6	0.5	0.6			1.7
64										0.6	0.5	0.6			1.7
125										1.7					1.7

Table 14 (cont). Adult consumption rates of domestic fruit from the survey area (kg/y).

Observation Number	Apple	Blackberry	Blackcurrant	Cherry	Damson	Fig	Gooseberry	Grape	Peach	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
126										1.7					1.7
140													1.1		1.1
141													1.1		1.1
215				0.5											0.5
217				0.5											0.5

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of domestic fruit in the survey area
based on the 10 highest adult consumers is 20.65 kg/y.
The observed 97.5 percentile rate based on 35 observations is 38.16 kg/y

Table 15. Adult consumption rates of milk from the survey area (l/y).

Observation Number	Total
58	**182.5**
59	**182.5**
60	**182.5**
61	**182.5**
62	**182.5**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of milk in the survey area based on the 5 highest adult consumers is 182.5 l/y.
The observed 97.5 percentile rate based on 5 observations is 182.5 l/y

Table 16. Adult consumption rates of cattle meat from the survey area (kg/y).

Observation Number	Total
58	**37.8**
59	**37.8**
60	**37.8**
61	**37.8**
62	**37.8**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of cattle meat in the survey area based on the 5 highest adult consumers is 37.8 kg/y.
The observed 97.5 percentile rate based on 5 observations is 37.8 kg/y

Table 17. Adult consumption rates of poultry from the survey area (kg/y).

Observation Number	Duck	Pigeon	Pheasant	Total
53			**3.6**	**3.6**
54			**3.6**	**3.6**
58	**0.4**	**1.0**	**0.9**	**2.3**
59	**0.4**	**1.0**	**0.9**	**2.3**
60	**0.4**	**1.0**	**0.9**	**2.3**
61	**0.4**	**1.0**	**0.9**	**2.3**
62	**0.4**	**1.0**	**0.9**	**2.3**
77			0.5	0.5
78			0.5	0.5

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of poultry in the survey area based on the 7 highest adult consumers is 2.64 kg/y.
The observed 97.5 percentile rate based on 9 observations is 3.6 kg/y

Table 18. Adult consumption rates of eggs from the survey area (kg/y).

Observation Number	Chicken eggs	Goose eggs	Total
53	**29.6**		**29.6**
54	**29.6**		**29.6**
50	**17.8**		**17.8**
70	**11.9**		**11.9**
57	9.1		9.1
157	8.0		8.0
112	4.1		4.1
114	4.1		4.1
158	3.1		3.1
77		2.1	2.1
78		2.1	2.1
69	0.2		0.2
73	0.2		0.2
74	0.2		0.2

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of eggs in the survey area based on the 4 highest adult consumers is 22.23 kg/y.
The observed 97.5 percentile rate based on 14 observations is 29.64 kg/y

Table 19. Adult consumption rates of wild/free foods from the survey area (kg/y).

Observation Number	Blackberry	Raspberry	Strawberry	Total
53	**2.3**	**0.5**	**0.2**	**2.9**
54	**2.3**	**0.5**	**0.2**	**2.9**
120	**2.7**			**2.7**
132	**2.3**		**0.5**	**2.7**
133	**2.3**			**2.3**
75	**2.0**			**2.0**
76	**2.0**			**2.0**
58	**1.8**			**1.8**
59	**1.8**			**1.8**
60	**1.8**			**1.8**
61	**1.8**			**1.8**
62	**1.8**			**1.8**
77	**1.4**			**1.4**
78	**1.4**			**1.4**
63	**1.4**			**1.4**
64	**1.4**			**1.4**
73	**1.4**			**1.4**
207	0.9			0.9
208	0.9			0.9
210		0.9		0.9
215	0.9			0.9
217	0.9			0.9
159	0.7			0.7
160	0.7			0.7
134	0.5			0.5
135	0.5			0.5
147	0.5			0.5
148	0.5			0.5
44			0.3	0.3
45			0.3	0.3
157	0.2			0.2
158	0.2			0.2
153			0.1	0.1
154			0.1	0.1

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of wild/free foods in the survey area based on the 17 highest adult consumers is 1.96 kg/y.
The observed 97.5 percentile rate based on 34 observations is 2.93 kg/y

Table 20. Adult consumption rates of honey from the survey area (kg/y).

Observation Number	Total
155	**1.8**
156	**1.8**
159	**0.7**
160	**0.7**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of honey in the survey area based on the 4 highest adult consumers is 1.25 kg/y.
The observed 97.5 percentile rate based on 4 observations is 1.82 kg/y

Table 21. Adult consumption rates of wild fungi from the survey area (kg/y).

Observation Number	Mushrooms	Total
134	**0.9**	**0.9**
135	**0.9**	**0.9**
53	**0.9**	**0.9**
54	**0.9**	**0.9**
222	**0.5**	**0.5**
223	**0.5**	**0.5**
73	**0.5**	**0.5**
159	0.2	0.2
160	0.2	0.2

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of wild fungi in the survey area based on the 7 highest adult consumers is 0.73 kg/y.
The observed 97.5 percentile rate based on 9 observations is 0.91 kg/y

Table 22. Children's consumption rates of green vegetables from the survey area (kg/y).

1 year old age group

Observation Number	Sex	Age	Courgette	Total
65	**F**	**1**	**2.9**	**2.9**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of green vegetables in the survey area based on the 1 highest 1 year old consumer is 2.9 kg/y.

Table 23. Children's consumption rates of other vegetables from the survey area (kg/y).

15 year old age group

Observation Number	Sex	Age	French bean	Pea	Tomato	Total
27	**M**	**15**			**3.6**	**3.6**
142	**F**	**15**		**0.5**		**0.5**
143	**M**	**13**		**0.5**		**0.5**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of other vegetables in the survey area based on the 3 highest 15 year old consumers is 1.5 kg/y.
The observed 97.5 percentile rate, based on 3 observations is 3.44 kg/y

10 year old age group

Observation Number	Sex	Age	French bean	Pea	Tomato	Total
144	**M**	**10**		**0.5**		**0.5**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of other vegetables in the survey area based on the 1 highest 10 year old consumer is 0.5 kg/y.

1 year old age group

Observation Number	Sex	Age	French bean	Pea	Tomato	Total
65	**F**	**1**	**4**	**1.5**	**3**	**8.5**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of other vegetables in the survey area based on the 1 highest 1 year old consumer is 8.5kg/y.

Table 24. Children's consumption rates of root vegetables from the survey area (kg/y).

15 year old age group

Observation Number	Sex	Age	Leek	Garlic	Carrot	Total
142	**F**	**15**	**7.6**			**7.6**
143	**M**	**13**	**7.6**			**7.6**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of root vegetables in the survey area based on the 2 highest 15 year old consumers is 7.6 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 7.6 kg/y

10 year old age group

Observation Number	Sex	Age	Leek	Garlic	Carrot	Total
144	**M**	**10**	**7.6**			**7.6**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of root vegetables in the survey area based on the 1 highest 10 year old consumer is 7.6 kg/y.

5 year old age group

Observation Number	Sex	Age	Leek	Garlic	Carrot	Total
80	**F**	**4**		**0.3**		**0.3**
81	**F**	**6**		**0.3**		**0.3**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of root vegetables in the survey area based on the 2 highest 5 year old consumers is 0.3 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 0.3 kg/y

1 year old age group

Observation Number	Sex	Age	Leek	Garlic	Carrot	Total
65	**F**	**1**			**1.5**	**1.5**
79	**F**	**1**		**0.2**		**0.2**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of root vegetables in the survey area based on the 2 highest 1 year old consumers is 0.85 kg/y.

Table 25. Children's consumption rates of potatoes from the survey area (kg/y).

15 year old age group

Observation Number	Sex	Age	Total
142	**F**	**15**	**5.1**
143	**M**	**13**	**5.1**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of potatoes in the survey area based on the 2 highest 15 year old consumers is 5.1 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 5.1 kg/y

10 year old age group

Observation Number	Sex	Age	Potatoes
144	**M**	**10**	**5.1**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of potatoes in the survey area based on the 1 highest 10 year old consumers is 5.1 kg/y.

Table 26. Children's consumption rates of domestic fruit from the survey area (kg/y).

15 year old age group

Observation Number	Sex	Age	Apple	Blackberry	Cherry	Damson	Fig	Gooseberry	Grape	Peach	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
55	**F**	**12**	**1.1**	**0.2**	**0.6**				**0.8**	**0.8**		**0.2**			**0.1**	**3.6**
56	**F**	**13**	**1.1**	**0.2**	**0.6**				**0.8**	**0.8**					**0.1**	**3.4**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of domestic fruit in the survey area based on the 2 highest 15 year old consumers is 3.5 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 3.6 kg/y

5 year old age group

Observation Number	Sex	Age	Apple	Blackberry	Cherry	Damson	Fig	Gooseberry	Grape	Peach	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
80	**F**	**4**	**4.1**		**2.3**	**5.4**	**5.4**	**1.4**	**1.4**		**5.4**	**1.6**		**11.3**		**38.2**
81	**F**	**6**	**4.1**		**2.3**	**5.4**	**5.4**	**1.4**	**1.4**		**5.4**	**1.6**		**11.3**		**38.2**
123	F	4								4.5						4.5

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of domestic fruit in the survey area based on the 2 highest 5 year old consumers is 38.2 kg/y.
The observed 97.5 percentile rate, based on 3 observations is 38.16 kg/y

1 year old age group

Observation Number	Sex	Age	Apple	Blackberry	Cherry	Damson	Fig	Gooseberry	Grape	Peach	Plum	Raspberry	Redcurrant	Rhubarb	Strawberry	Total
79	**F**	**1**	**2.0**		**1.1**	**2.7**	**2.7**	**0.7**	**0.7**		**2.7**	**0.8**		**5.6**		**19.1**
65	**F**	**1**									**0.6**	**0.5**	**0.6**			**1.7**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of domestic fruit in the survey area based on the 2 highest 1 year old consumers is 10.4 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 18.65 kg/y

Table 27. Children's consumption rates of eggs from the survey area (kg/y).

15 year old age group

Observation Number	Sex	Age	Chicken eggs	Goose eggs	Total
71	**M**	**12**	**11.9**		**11.9**
55	**F**	**12**	**9.1**		**9.1**
56	**F**	**13**	**9.1**		**9.1**
115	**F**	**16**	**4.1**		**4.1**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of eggs in the survey area based on the 4 highest 15 year old consumers is 8.55 kg/y.
The observed 97.5 percentile rate, based on 4 observations is 11.65 kg/y

10 year old age group

Observation Number	Sex	Age	Chicken eggs	Goose eggs	Total
51	**F**	**8**	**8.9**		**8.9**
52	**F**	**8**	**8.9**		**8.9**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of eggs in the survey area based on the 2 highest 10 year old consumers is 8.9 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 8.9 kg/y

5 year old age group

Observation Number	Sex	Age	Chicken eggs	Goose eggs	Total
80	**F**	**4**		**1.1**	**1.1**
81	**F**	**6**		**1.1**	**1.1**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of eggs in the survey area based on the 2 highest 5 year old consumers is 1.1 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 1.1 kg/y

1 year old age group

Observation Number	Sex	Age	Chicken eggs	Goose egg	Total
79	**F**	**1**		**0.5**	**0.5**

Notes
Emboldened observations are the critical group consumers.
The critical group mean consumption rate of eggs in the survey area based on the 1 highest 1 year old consumer is 0.5 kg/y.

Table 28. Children's consumption rates of wild/free foods from the survey area (kg/y).

5 year old age group

Observation Number	Sex	Age	Blackberry	Total
80	**F**	**4**	**0.7**	**0.7**
81	**F**	**6**	**0.7**	**0.7**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of wild/free foods in the survey area based on the 2 highest 5 year old consumers is 0.7 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 0.7 kg/y

1 year old age group

Observation Number	Sex	Age	Blackberry	Total
65	**F**	**1**	**1.4**	**1.4**
79	**F**	**1**	**0.3**	**0.3**

Notes

Emboldened observations are the critical group consumers.
The critical group mean consumption rate of wild/free foods in the survey area based on the 2 highest 1 year old consumers is 0.85 kg/y.
The observed 97.5 percentile rate, based on 2 observations is 1.32 kg/y

Table 29. Ratios for determining consumption rates for children.

Food Group	Ratio child/adult		
	6 - 12 months	10 yr old	15 yr old
Green Vegetables	0.222	0.444	0.556
Other Vegetables	0.2	0.5	0.6
Root Vegetables	0.375	0.5	0.5
Potatoes	0.292	0.708	1.083
Domestic Fruit	0.467	0.667	0.667
Milk	1.333	1	1.083
Cattle Meat	0.222	0.667	0.778
Sheep Meat	0.12	0.4	0.6
Pig Meat	0.138	0.625	0.75
Poultry	0.183	0.5	0.667
Eggs	0.6	0.8	1
Wild/free foods	0.072	0.44	0.52
Rabbits & Hares	ND	ND	ND
Venison	ND	ND	ND
Honey	0.789	0.789	0.526
Wild Fungi	0.15	0.45	0.55
Fish	0.375	0.5	0.5
Crustaceans	0.525*	0.7	0.6
Molluscs	0.525*	0.7	0.6

ND - No data

* No MAFF 1998 data were available for these rates. Ratios were derived by scaling the 10 year olds crustaceans and mollusc consumption data

Table 30. Intertidal occupancy rates (h/y) in the Gare Loch area.

Observation number	Location	Activity	Occupancy (h/y) Sand & mud	Occupancy (h/y) Rock	Occupancy (h/y) Mud	Total (h/y)
102	**Rosneath Bay**	**Angling and bait digging**	312	**1250**		**1562**
34	**Garelochhead**	**Bait digging**	**1404**			**1404**
4	**Rhu**	**Beach cleaning**		**1014**		**1014**
5	**"**	**"**		**1014**		**1014**
178	**Mambeg**	**Angling**		**950**		**950**
179	**"**	**"**		**950**		**950**
10	**Carnban**	**Boat maintenance**			**200**	**200**
229	**"**	**"**			**200**	**200**
230	**"**	**"**			**200**	**200**
231	**"**	**"**			**200**	**200**
232	**"**	**"**			**200**	**200**
233	**"**	**"**			**200**	**200**
234	**"**	**"**			**200**	**200**
235	**"**	**"**			**200**	**200**
236	**"**	**"**			**200**	**200**
237	**"**	**"**			**200**	**200**
238	**"**	**"**			**200**	**200**
239	**"**	**"**			**200**	**200**
240	**"**	**"**			**200**	**200**
241	**"**	**"**			**200**	**200**
242	**"**	**"**			**200**	**200**
198	Helensburgh	"		780		780
199	"	"		780		780
200	"	"		780		780
201	"	"		780		780
202	"	Angling		780		780
1	Rhu marina	Boatyard worker	528			528
2	"	"	528			528
3	"	"	528			528
23	Helensburgh	Angling	468			468
189	Rosneath	Walking		468		468
190	"	"		468		468
169	Rhu spit	Angling and bait digging	12	360		372
167	"	"	12	360		372
149	Shandon	Walking		365		365
176	Clynder	Dog walking		365		365
177	"	"		365		365
27	Rhu	Angling		364		364
28	"	"		364		364
88	Rhu spit	"		364		364
194	Helensburgh	"		364		364
195	"	"		364		364
196	"	"		364		364
197	"	"		364		364
170	Rosneath	Boatyard worker		240		240
171	"	"		240		240
172	"	"		240		240
173	"	"		240		240

Table 30 (cont). Intertidal occupancy rates (h/y) in the Gare Loch area.

Observation number	Location	Activity	Occupancy (h/y) Sandy mud	Occupancy (h/y) Rock	Occupancy (h/y) Mud	Total (h/y)
191	Mambeg	Angling		240		240
82	Garelochhead	Angling and dog walking		203		203
108	Garelochhead	Angling		192		192
180	Mambeg	"		182		182
181	"	"		182		182
182	"	"		182		182
11	Rosneath	"	180			180
41	Rhu	"		180		180
100	Rockville	"		156		156
33	Garelochhead	Beach cleaning		130		130
224	"	"		130		130
225	"	"		130		130
226	"	"		130		130
227	"	"		130		130
228	"	"		130		130
103	Rosneath bay	Angling		120		120
104	"	"		120		120
105	"	"		120		120
134	Garelochhead	Dog walking and seaweed collection		114		114
175	Mambeg	Angling		96		96
183	Rosneath	Walking		96		96
184	"	"		96		96
185	"	"		96		96
186	"	"		96		96
36	Helensburgh	Winkle picking	95			95
37	"	"	95			95
38	"	"	90			90
39	"	"	90			90
83	Garelochhead	Dog walking		87		87
168	Rosneath bay	Watersports instructor	84			84
91	Garelochhead	Angling		80		80
25	Rhu	"		78		78
107	Rosneath bay	"		72		72
6	Helensburgh	"	68			68
90	Garelochhead	"		65		65
140	"	"		64		64
143	"	"		64		64
144	"	"		64		64
147	Shandon	Dog walking		52		52
148	"	Walking		52		52
203	Helensburgh	Angling		52		52
204	"	"		52		52
205	"	"		52		52
206	"	"		52		52
132	Shandon	Boat handling		40		40
13	Mambeg	Dog walking	39			39
84	Garelochhead	Bait digging	35			35
40	Helensburgh	Winkle picking	32			32

Table 30 (cont). Intertidal occupancy rates (h/y) in the Gare Loch area.

Observation number	Location	Activity	Occupancy (h/y) Sandy mud	Occupancy (h/y) Rock	Occupancy (h/y) Mud	Total (h/y)
187	Rosneath	Boat handling	32			32
188	"	"	32			32
101	Rockville	Angling		30		30
110	Helensburgh	Bait digging	26			26
35	Mambeg	Angling	24			24
31	Garelochhead	"	21			21
32	"	"	21			21
86	"	BBQs on beach		19		19
87	"	"		19		19
29	Rhu	Angling		18		18
30	"	"		18		18
118	Shandon	Boat handling		17		17
24	Rhu	Angling		15		15
14	Garelochhead	Sailing	13			13
15	"	"	13			13
96	Mambeg	Angling		10		10
97	"	"		10		10
98	"	"		10		10
8	Helensburgh	"	9			9
192	"	Canoeing		6		6
193	"	"		6		6
18	Garelochhead	Mussel collection	2			2
19	"	"	2			2
20	"	Bait digging	2			2

NOTES

Emboldened observations are the critical group

The critical group mean intertidal occupancy over sandy mud based on one observation is 1404 h/y

The critical group mean intertidal occupancy over rock based on 5 observations is 1036 h/y

The critical group mean intertidal occupancy over mud based on 15 observations is 200 h/y

The observed 97.5 percentile rate, based on 30 observations for sandy mud is 768.9 h/y

The observed 97.5 percentile rate, based on 78 observations for rock is 1014 h/y

The observed 97.5 percentile rate, based on 15 observations for mud is 200 h/y

Table 31. Handling of sediment rates (h/y) in the Gare Loch area.

Observation number	Location	Activity	Sediment handling time (h/y)	Total (h/y)
34	**Garelochhead**	**Bait digging**	**1404**	**1404**
102	Rosneath bay	Bait digging	312	312
36	Helensburgh	Winkle pickers	95	95
37	"	"	95	95
38	"	"	90	90
39	"	"	90	90
40	"	"	32	32
110	"	Bait digging	26	26
167	Rhu	"	12	12
169	"	"	12	12
84	Garelochhead	"	4	4
18	"	Bait digging/Mussel collection	2	2
19	"	"	2	2
20	"	"	2	2

NOTES

Emboldened observations are the critical group

The most exposed group mean sediment handling time based on one observation is 1404 h/y

The observed 97.5 percentile rate, based on 14 observations for sediment handling is 1049.1 h/y

Table 32. External gamma dose rates (micro Gy/h) and occupancy times (h/y) in the Gare Loch area.

Observation number	Sex	Age (in years)(U if unknown)	Outdoor occupancy (h/y)	Indoor occupancy (h/y)	Total occupancy (h/y)	Gamma dose rate in the building (micro Gy/h)	Gamma dose rate outside (micro Gy/h)
Adult observations							
149	M	57	1460	6948	8408	0.1	0.07
112	F	45	77	8203	8280	0.11	0.08
128	F	59		8012	8012	0.07	0.07
127	M	61	312	7700	8012	0.07	0.07
118	M	67	300	7556	7856	0.09	0.06
122	F	64	120	7472	7592	0.08	0.06
44	F	U	744	6696	7440	0.11	
45	M	U	744	6696	7440	0.11	
125	M	65	208	7176	7384	0.08	0.08
121	M	65	1032	6338	7370	0.08	0.06
133	F	71	351	6976	7327	0.09	0.08
114	F	19		7300	7300	0.11	0.08
126	F	56	52	7228	7280	0.08	0.08
64	F	U	224	7048	7272	0.08	
153	M	69	432	6787	7219	0.09	0.07
154	F	69	384	6835	7219	0.09	0.07
75	M	U	3604	3604	7208	0.1	
120	F	50	288	6844	7132	0.09	0.06
213	M	U	756	6364	7120	0.09	

Table 32 (cont). External gamma dose rates (micro Gy/h) and occupancy times (h/y) in the Gare Loch area.

Observation number	Sex	Age (in years)(U if unknown)	Outdoor occupancy (h/y)	Indoor occupancy (h/y)	Total occupancy (h/y)	Gamma dose rate in the building (micro Gy/h)	Gamma dose rate outside (micro Gy/h)
150	F	42	312	6656	6968	0.1	0.07
132	M	70	195	6769	6964	0.09	0.08
63	F	U	224	6724	6948	0.08	
148	F	49	364	6496	6860	0.06	0.07
214	F	U	756	5844	6600	0.09	
73	F	U		6576	6576	0.1	
147	M	42	104	6396	6500	0.06	0.07
74	M	U	3236	3236	6472	0.1	
210	F	U	522	5901	6422	0.1	
119	F	63	180	6234	6414	0.09	0.06
76	M	U	2772	3604	6376	0.1	
151	M	18	210	6142	6352	0.1	0.07
152	F	18		6352	6352	0.1	0.07
218	F	U	4832	1208	6040	0.11	
211	F	U	2016	3932	5948	0.09	
212	M	U	2068	3880	5948	0.09	
207	M	U	2940	2940	5880	0.09	
69	F	U	730	4902	5632	0.1	0.08
70	M	U	730	4902	5632	0.1	0.08
72	M	U	730	4902	5632	0.1	0.08
131	M	17		5408	5408	0.11	0.08

Table 32 (cont). External gamma dose rates (micro Gy/h) and occupancy times (h/y) in the Gare Loch area.

Observation number	Sex	Age (in years)(U if unknown)	Outdoor occupancy (h/y)	Indoor occupancy (h/y)	Total occupancy (h/y)	Gamma dose rate in the building (micro Gy/h)	Gamma dose rate outside (micro Gy/h)
215	M	U	2464	2464	4928	0.1	
130	M	19	52	4812	4864	0.11	0.08
217	F	U	1680	1680	3360	0.1	
10	M	U	1920		1920	0.06	0.07
229	M	U	1920		1920	0.06	0.07
230	M	U	1920		1920	0.06	0.07
231	M	U	1920		1920	0.06	0.07
232	M	U	1920		1920	0.06	0.07
233	M	U	1920		1920	0.06	0.07
234	M	U	1920		1920	0.06	0.07
235	M	U	1920		1920	0.06	0.07
236	M	U	1920		1920	0.06	0.07
237	M	U	1920		1920	0.06	0.07
238	M	U	1920		1920	0.06	0.07
239	M	U	1920		1920	0.06	0.07
240	M	U	1920		1920	0.06	0.07
241	M	U	1920		1920	0.06	0.07
242	M	U	1920		1920	0.06	0.07

Table 32 (cont). External gamma dose rates (micro Gy/h) and occupancy times (h/y) in the Gare Loch area.

Observation number	Sex	Age (in years)	Outdoor occupancy (h/y)	Indoor occupancy (h/y)	Total occupancy (h/y)	Gamma dose rate in the building (micro Gy/h)	Gamma dose rate outside (micro Gy/h)
Child observations							
115	F	16		6981	6981	0.11	0.08
71	M	12	730	4902	5632	0.1	0.08
123	F	4		410	410	0.08	0.06
46	M	4	36	36	72	0.11	0.08
124	M	2		410	410	0.08	0.06
47	F	2	36	36	72	0.11	0.08
65	F	1	84	7644	7728	0.08	

Table 32 (cont). External gamma dose rate related measurements (micro Gy/h).

Backgrounds	Location	(micro Gy/h)
1	NS 275 855 - Ardencaple Hotel car park	0.080
2	NS 275 855 - Ardencaple Hotel car park	0.076

Perimeter fence gamma doses	Location	(micro Gy/h)
1	NS 245 884 - South gate	0.076
2	NS 248 897 - Opposite Glen Fruin road junction	0.073
3	NS 247 898 - Opposite Faslane cemetery junction	0.083

Miscellaneous	Location	(micro Gy/h)
1	NS 239 910 - Garelochhead sewage outfall. Sandy mud.	0.06
2	NS 249 889 - Lay-by next to peace camp. Grass/stones.	0.06
3	NS 249 889 - Lay-by next to peace camp. Grass/stones.	0.071
4	NS 249 889 - Bus stop opposite peace camp. Tarmac.	0.059
5	NS 249 889 - Bus stop opposite peace camp. Tarmac.	0.06
6	NS 286 825 - Helensburgh winkle pickers area. Mud/stones.	0.068
7	NS 286 825 - Helensburgh winkle pickers area. Mud/stones.	0.069
8	NS 239 909 - Garelochhead bait diggers area. Sandy mud.	0.059
9	NS 305 819 - Helensburgh opposite BP garage. Sandy mud.	0.063

Table 33. Average seafood edible fractions.

Species	Edible fraction
Cod	0.66
Sea Trout	0.69
Mackerel	0.61
Plaice	0.44

Edible fraction = Average value for (Weight of edible flesh) / (Total weight of animal)

Table 34. Percentage contribution each food type makes to its terrestrial food group for adults.

Green vegetables	
Courgette	38.1 %
Cabbage	23.0 %
Lettuce	9.6 %
Cauliflower	7.5 %
Brussel sprout	6.0 %
Spinach	5.9 %
Broccoli	5.0 %
Cucumber	3.5 %
Herbs	1.4 %

Root vegetables	
Leek	31.0 %
Onion	29.9 %
Carrot	24.7 %
Turnip	5.7 %
Beetroot	4.5 %
Parsnip	3.8 %
Garlic	0.2 %

Other vegetables	
Tomato	46.7 %
Runner bean	24.1 %
Broad bean	11.9 %
Pea	9.2 %
Mangetout	5.0 %
French bean	2.7 %
Pepper	0.5 %

Domestic fruit	
Apple	22.3 %
Rhubarb	18.9 %
Plum	16.0 %
Gooseberry	7.6 %
Damson	5.9 %
Fig	5.9 %
Blackcurrant	4.4 %
Raspberry	4.2 %
Cherry	3.9 %
Grape	3.1 %
Peach	2.8 %
Strawberry	2.7 %
Redcurrants	1.8 %
Blackberry	0.6 %

Wild/free fruit	
Blackberry	92.3 %
Raspberry	4.0 %
Strawberry	3.7 %

Poultry	
Pheasent	64.9 %
Pigeon	25.8 %
Duck	9.3 %

Eggs	
Chicken	96.2 %
Goose	3.8 %

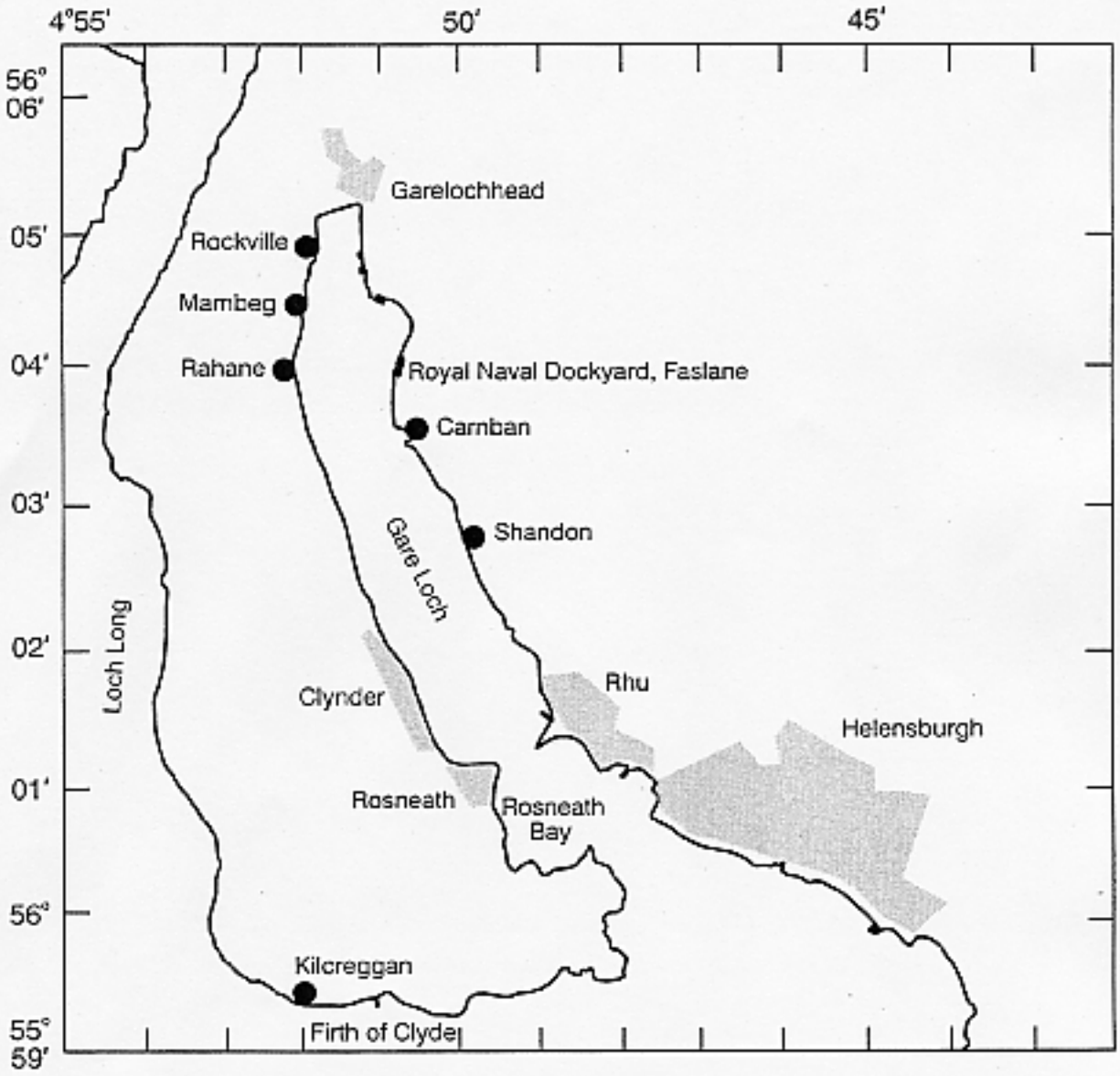

Figure 1. The Gare Loch aquatic survey area and locations.

Figure 2. The Gare Loch terrestrial and external radiation survey area.

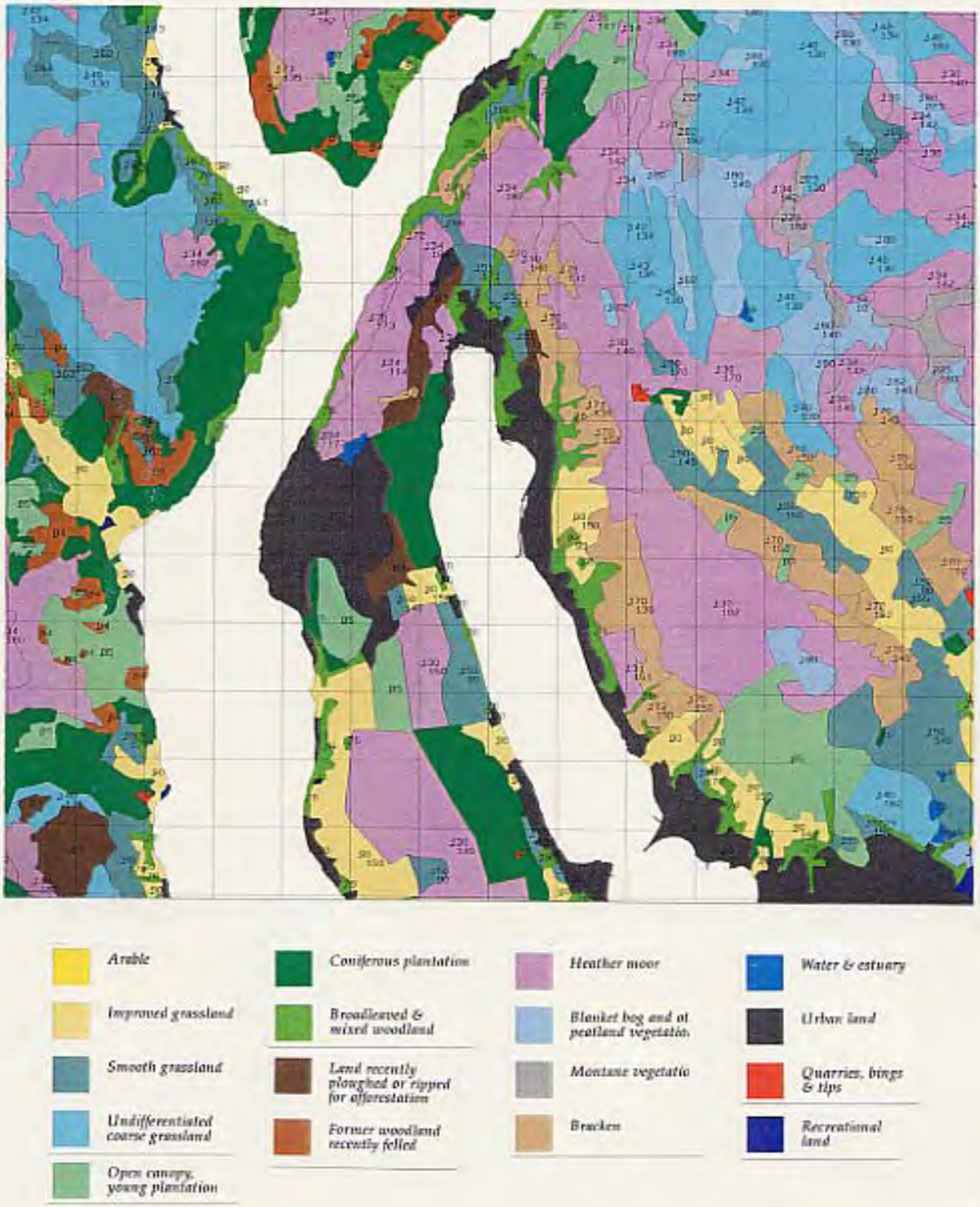

Figure 3. Land cover around HM Naval Base Clyde, Faslane.

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Annex Table 1. Summary of adult consumption rates (kg/y or l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
1	M	U																								528.0		
2	M	U																								528.0		
3	M	U																								528.0		
4	M	U																									**1014.0**	
5	M	U																									**1014.0**	
6	M	U																	**12.2**							67.5		
7	F	U																	**12.2**									
8	M	U																	1.8							9.0		
9	F	U																	0.9									
10	M	U																					1920		1920			**200.0**
11	M	U																	**8.1**							180.0		
13	M	U																								39.0		
14	M	U																								13.0		
15	F	U																								13.0		
16	M	U					4.5																					
17	F	U					4.5																					
18	M	U																				2.0				2.0		
19	M	U																				2.0				2.0		
20	M	U																				2.0				2.0		
21	M	U																	**11.6**									

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
22	F	U																	**11.6**									
23	M	U																								468.0		
24	M	U																									15.0	
25	M	U																									78.0	
26	M	U																	**10.8**									
28	F	U		3.6															4.7								364.0	
29	M	U																	0.5								18.0	
31	M	U																	2.4							21.0		
32	M	U																	2.4							21.0		
33	M	U																									130.0	
34	M	U																				**1404.0**				**1404.0**		
35	M	U																								24.0		
36	M	U																				94.5				94.5		
37	M	U																				94.5				94.5		
38	M	U																				90.0				90.0		
39	F	U																				90.0				90.0		
41	M	U																	**9.0**								180.0	
42	M	U																	**9.0**									
43	M	U																	**9.0**									
44	F	U	0.3	0.8	2.3		**16.4**							0.3									744	**6696**				

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
45	M	U	0.3	0.8	2.3		**16.4**							0.3									744	**6696**	**7440**			
50	F	U											**17.8**															
53	M	U	**29.9**	5.4			10.8					**3.6**	**29.6**	**2.9**			**0.9**											
54	F	U	**29.9**	5.4			10.8					**3.6**	**29.6**	**2.9**			**0.9**											
57	F	U					3.4						9.1															
58	M	U			**54.0**			**182.5**	**37.8**			**2.3**		**1.8**														
59	M	U			**54.0**			**182.5**	**37.8**			**2.3**		**1.8**														
60	M	U			**54.0**			**182.5**	**37.8**			**2.3**		**1.8**														
61	M	U			**54.0**			**182.5**	**37.8**			**2.3**		**1.8**														
62	M	U			**54.0**			**182.5**	**37.8**			**2.3**		**1.8**														
63	F	U	2.9	8.5	1.5		1.7							**1.4**									224	**6724**	**6948**			
64	F	U	2.9	8.5	1.5		1.7							**1.4**									224	**7048**	**7272**			
66	M	U		12.0	1.2																							
67	M	U		12.0	1.2																							
68	M	U		12.0	1.2																							
69	F	U											0.2										730	4902	**5632**			
70	M	U											**11.9**										730	4902	**5632**			
72	M	U																					730	4902	**5632**			
73	F	U					5.0						0.2	**1.4**			**0.5**							**6576**	**6576**			
74	M	U					5.0						0.2										3236	3236	**6472**			

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
75	M	U					**16.9**							**2.0**									3604	3604	**7208**			
76	M	U					**16.9**							**2.0**									2772	3604	**6376**			
77	F	U			0.3		**38.2**					0.5	2.1	**1.4**														
78	M	U			0.3		**38.2**					0.5	2.1	**1.4**														
82	M	U																	2.8								202.5	
83	F	U																									86.7	
84	M	U																	4.2			4.0				34.8		
85	F	U																	4.2									
86	F	U																									19.0	
87	M	U																									19.0	
88	M	U																									364.0	
89	M	U																	**11.1**									
90	M	U																									65.0	
91	M	U																	1.7								80.0	
92	F	U																	1.7									
93	M	U																	1.7									
94	M	U																	1.7									
96	M	U																	0.4								10.0	
99	F	U																	0.4									
100	M	U																	**14.6**								156.0	

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
101	M	U																	0.6								30.0	
102	M	U																				312.0				312.0	**1250.0**	
105	M	U																	**8.3**								120.0	
106	F	U																	**8.3**									
107	M	U																									72.0	
108	M	U																	**5.5**								192.0	
109	F	U																	1.4									
110	M	U																	3.1			26.0				26.0		
111	F	U																	3.1									
112	F	45											4.1										77	**8203**	**8280**			
114	F	19											4.1											**7300**	**7300**			
116	M	70	0.9	7.7	18.2	**76.3**																						
117	F	68	0.9	7.7	18.2	**76.3**																						
118	M	67		10.0		14.4	**16.3**																300	**7556**	**7856**		17.3	
119	F	63		10.0		14.4	**16.3**																180	**6234**	**6414**			
120	F	50												**2.7**									288	**6844**	**7132**			
121	M	65																					1032	**6338**	**7370**			
122	F	64																					120	**7472**	**7592**			
125	M	65					1.7																208	**7176**	**7384**			
126	F	56					1.7																52	**7228**	**7280**			

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
127	M	61																					312	**7700**	**8012**			
128	F	59																						**8012**	**8012**			
130	M	19																					52	4812	**4864**			
131	M	17																						5408	**5408**			
132	M	70	0.5											**2.7**									195	**6769**	**6964**		40.0	
133	F	71	0.5											**2.3**					**6.6**				351	**6976**	**7327**			
134	M	50	12.4	**28.0**	3.7	19.1								0.5			**0.9**		2.8								113.8	
135	F	60	12.4	**28.0**	3.7	19.1								0.5			**0.9**											
136	M	73			11.3	3.2	3.0																					
137	F	70			11.3	3.2	3.0																					
138	M	40	5.7		2.0	2.3																						
139	F	74	8.7		2.0	2.3																						
140	M	40		1.1	7.6	5.1	1.1												2.8								64.0	
141	F	38		1.1	7.6	5.1	1.1												2.8									
145	F	66	3.0	0.7	6.6	9.5	4.8																					
146	M	73	3.0	0.7	6.6	9.5	4.8																					
147	M	42				19.1								0.5									104	**6396**	**6500**		52.0	
148	F	49				19.1								0.5									364	**6496**	**6860**		52.0	
149	M	57																					1460	**6948**	**8408**		365.0	
150	F	42																					312	**6656**	**6968**			

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
151	M	18																					210	**6142**	**6352**			
152	F	18																						**6352**	**6352**			
153	M	69	0.2				2.8							0.1									432	**6787**	**7219**			
154	F	69	0.2				2.8							0.1									384	**6835**	**7219**			
155	M	U														**1.8**												
156	F	U														**1.8**												
157	F	55											8.0	0.2														
158	M	54											3.1	0.2														
159	M	U												0.7		**0.7**	0.2											
160	F	U												0.7		**0.7**	0.2											
161	M	U																	2.5									
162	F	U																	2.5									
167	M	U																				12.0				12.0	360.0	
168	F	U																								84.0		
169	F	U																				12.0				12.0	360.0	
170	M	U																									240.0	
171	M	U																									240.0	
172	M	U																									240.0	
173	M	U																									240.0	
175	M	U																									96.0	

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
176	M	U																									365.0	
177	F	U																									365.0	
178	M	U																									**950.0**	
180	M	U																									182.0	
183	M	U																									96.0	
184	F	U																									96.0	
187	M	U																								32.0		
188	F	U																								32.0		
189	M	U																									468.0	
190	F	U																									468.0	
191	M	U																									240.0	
192	M	U																									6.0	
193	M	U																									6.0	
194	M	U																									364.0	
195	F	U																									364.0	
196	M	U																									364.0	
197	M	U																									364.0	
198	M	U																									780.0	
199	F	U																									780.0	
203	M	U																	1.6								52.0	

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
204	F	U																	1.6								52.0	
207	M	U												0.9									2940	2940	5880			
210	F	U												0.9									522	**5901**	6422			
211	F	U																					2016	3932	5948			
212	M	U																					2068	3880	5948			
213	M	U					2.3																756	**6364**	7120			
214	F	U					2.3																756	**5844**	6600			
215	M	U					0.5							0.9									2464	2464	4928			
217	F	U					0.5							0.9									1680	1680	3360			
218	F	U																					**4832**	1208	6040			
220	M	U	**24.2**	**17.0**	**37.0**	**29.1**	**15.4**																					
221	F	U	**24.2**	**17.0**	**37.0**	**29.1**	**15.4**																					
222	M	U	**52.6**	**44.5**	**62.8**	**59.1**	6.9										**0.5**											
223	F	U	**52.6**	**44.5**	**62.8**	**59.1**	6.9										**0.5**											
224	M	U																									130.0	
225	M	U																									130.0	
226	M	U																									130.0	
227	M	U																									130.0	
228	M	U																									130.0	
229	M	U																					1920		1920			**200.0**

Annex Table 1 (cont). Summary of adult consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock	External occupancy over Mud
230	M	U																					1920		1920			**200.0**
231	M	U																					1920		1920			**200.0**
232	M	U																					1920		1920			**200.0**
233	M	U																					1920		1920			**200.0**
234	M	U																					1920		1920			**200.0**
235	M	U																					1920		1920			**200.0**
236	M	U																					1920		1920			**200.0**
237	M	U																					1920		1920			**200.0**
238	M	U																					1920		1920			**200.0**
239	M	U																					1920		1920			**200.0**
240	M	U																					1920		1920			**200.0**
241	M	U																					1920		1920			**200.0**
242	M	U																					1920		1920			**200.0**

Emboldened observations are the critical group consumers.

Annex Table 2. Summary of child consumption rates (kg/y or l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock
One year old age group																											
65	F	1	2.9	8.5	1.5		1.7							1.4									84	7644	7728		
79	F	1			0.2		19.1						0.5	0.3													
Five year old age group																											
47	F	2																					36	36	72		
124	M	2																						410	410		
202	F	3																									780.0
46	M	4																					36	36	72		
80	F	4			0.3		38.2						1.1	0.7													
123	F	4					4.5																	410	410		
81	F	6			0.3		38.2						1.1	0.7													
Ten year old age group																											
51	F	8											8.9														
52	F	8											8.9														
179	M	8																									950.0
186	F	8																									96.0
201	F	8																									780.0
97	M	10																	0.4								10.0

Annex Table 2 (cont). Summary of child consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock
144	M	10		0.5	7.6	5.1																					64.0
185	M	10																									96.0
206	M	10																	1.6								52.0
30	F	11																	0.5								18.0
Fifteen year old age group																											
40	M	12																				32.0				32.0	
55	F	12					3.6						9.1														
71	M	12											11.9										730	4902	5632		
104	M	12																	8.4								120.0
163	M	12																	2.5								
49	F	13																					36	36	72		
56	F	13					3.4						9.1														
95	F	13																	1.7								
143	M	13		0.5	7.6	5.1																					64.0
164	F	13																	2.5								
98	M	14																	0.4								10.0
165	F	14																	2.5								
182	M	14																									182.0
200	M	14																									780.0

Annex Table 2 (cont). Summary of child consumption rates (kg/y, l/y) and occupancy times (h/y).

Consumer number	Sex	Age (in years. U if unknown)	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Sheep meat	Pig meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	Total occupancy	External occupancy over Sand & mu	External occupancy over Rock
205	M	14																	1.6								52.0
27	M	15		3.6															4.7								364.0
142	F	15		0.5	7.6	5.1																					
166	M	15																	2.5								
181	M	15																									182.0
48	M	16																					36	36	72		
103	M	16																	8.4								120.0
115	F	16											4.1											6891	6891		

Annex Table 3. Food group combinations eaten and external exposure by adults for consideration for dose assessment purposes

Combination Number	Green vegetables	Other domestic vegetables	Root vegetables	Potatoes	Domestic fruit	Milk	Cattle meat	Pig meat	Sheep meat	Poultry	Eggs	Wild/free foods	Rabbits and hares	Honey	Mushrooms	Venison	Fish	Crustaceans	Molluscs	Handling sediment	Outdoor occupancy	Indoor occupancy	External occupancy over Sand & mud	External occupancy over Rock	External occupancy over Mud
1																	*			*			*		
2																					*				*
3	*	*	*		*							*									*	*			
4	*	*	*	*								*			*		*							*	
5	*	*			*					*	*	*			*										
6			*			*	*			*		*													
7					*						*										*	*			
8					*						*	*			*							*			
9			*		*					*	*	*													
10																				*			*	*	
11		*		*	*																*	*		*	
12	*											*									*	*		*	
13	*											*					*				*	*			
14		*	*	*	*												*							*	
15	*	*	*	*	*										*								*	*	
16				*								*									*	*		*	
17												*		*	*										

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