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Tjøtta – ICRP reference site in Norway

Summary report for the TRAP project

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Transfer. Biota. Terrestrial. Freshwater. Marine. Reference animals and plants (RAP).

Abstract:
Description of a Norwegian ICRP reference site at Tjøtta/Alstahaug. The reported data concern all 12 ICRP RAP and include concentration ratios (CR) for around 50 stable and radioactive elements.

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Beskrivelse av ICRP referanseområde på Tjøtta. Konsentrasjonsfaktorer (CR) for ca. 50 stabile og radioaktive grunnstoffer for alle 12 RAP.

Head of project: Håvard Thørring
Approved:

Unn H. Refseth, director, Department of Monitoring and Research

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Summary report for the TRAP project

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Statens strålevern

Norwegian Radiation Protection Authority
Østerås, 2016

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1 Introduction

Following a paradigm shift, at the turn of the millennium, in relation to the perceived way in which radiological assessments might be conducted, the International Commission on Radiological Protection (ICRP) has developed a system that incorporates a means of quantifying environmental impacts from ionizing radiation explicitly within an overall radiological protection framework. In addition to the earlier stance of dealing primarily with issues related to human health, and thus with the achievement and maintenance of appropriately safe conditions for activities involving human exposure, the ICRP expanded its scope to environmental protection. In so doing, the aim would be to prevent or reduce the frequency of deleterious radiation effects to a level where they would have a negligible impact on the maintenance of biological diversity; the conservation of species; or the health and status of natural habitats, communities, and ecosystems (ICRP, 2007).

1.1 Environmental impact assessment approaches

Starting from a measured or modelled activity concentration of a given radionuclide in environmental media (i.e. soil, sediment, water), environmental impact assessment approaches typically involve three main steps (Figure 1). The initial step often involves the use of transfer models to make predictions for radionuclide activity concentrations in the bodies of selected animals and plants. Once this information is available, dosimetric models can be employed to derive exposure estimates – essentially external 'from media' and internal 'in body' doses and/or dose rates are derived via the application of dose conversion factors. Finally, the exposure estimates are interpreted in terms of what is known about dose responses for particular organisms (Real et al., 2004; UNSCEAR, 2008) which may (in cases deemed appropriate) be contextualized using information on background exposures occurring from the presence of naturally occurring radionuclides (Hosseini et al., 2010).

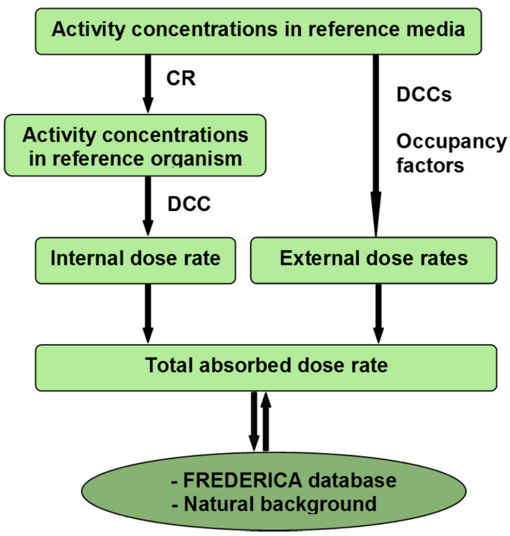


***Fig 1**: Typical assessment structure. CR = concentration ratio (see Section 1.5), DCC = dose conversion coefficient (relating activity concentrations to dose rates); media is soil, water, sediment or air depending upon the ecosystem, available data and radionuclide under assessment. The FREDERICA (radiation effects) database is described in Copplestone et al. (2008).*

1.2 Reference animals and plants (RAP)

The system for environmental protection that has been developed by the ICRP is centered on the concept of "Reference Animals and Plants" or RAPs. These are essentially a limited number of animals and plants to be used as the basis for systematically relating exposure to dose, and then dose (or dose rate) to different types of effect, for organisms that are characteristic of different types of natural environments. A RAP is defined in ICRP (2008) as:

> *"…a hypothetical entity, with the assumed basic biological characteristics of a particular type of animal or plant, as described to the generality of the taxonomic level of family, with defined anatomical, physiological and life history properties, that can be used for the purposes of relating exposure to dose, and dose to effects, for that type of living organism."*

The selection of RAPs was based on various criteria including considerations such as the fauna or flora being considered to be typical representatives of particular ecosystems and having a wide geographic variation and that a reasonable amount of radiobiological information was available for them, including data on probable radiation effects for given exposure levels. Furthermore, there was acknowledgement by the ICRP that, in general terms, eggs and larvae have usually been found to be more radiosensitive, in terms of mortality, than adults; thus, in terms of assessing the potential for overall reduced reproductive success, such factors (and thus exposure situations relevant to early stages in the life cycle) are important (ICRP, 2008). For this reason life stages have been included in the characterization of RAPs. This culminated in the selection of 12 RAPs (and relevant life stages) as presented in Table 1.

Table 1: *RAPs and their life stages*

Ecosystem	Taxomomic Family	Common name (life stage)
Terrestrial	*Poaceae*	Wild Grass
	Pinaceae	Pine tree
	Lumbricidae	Earthworm (adult, egg)
	Apidea	Bee (colony)
	Muridae	Rat
	Cervidae	Deer (adult, calf)
Freshwater	*Salmonidae*	Trout (adult, egg)
	Ranidae	Frog (mass of spawn, egg, tadpole, adult)
	Anatidae	Duck (adult, egg)
Marine	*Fucaceae*	Brown seaweed
	Cancridae	Crab (adult, egg mass, larvae)
	Pleuronectidae	Flatfish (adult, egg)

1.3 Radioelements considered by the ICRP

The ICRP have also selected a number of radioisotopes of 40 elements that have originally been considered priorities for collation of data. The full list is summarised in Table 2.

Table 2: *Elements and their radioisotopes considered by ICRP (2009)*

Element	Common name	Isotopes
Ag	Silver	Ag-110m
Am	Americium	Am-241
Ba	Barium	Ba-140
C	Carbon	C-14
Ca	Calcium	Ca-45
Cd	Cadmium	Cd-109
Ce	Cerium	Ce-141, Ce-144
Cf	Californium	Cf-252
Cl	Chlorine	Cl-36
Cm	Curium	Cm-242, Cm-243, Cm-244
Co	Cobalt	Co-57, Co-58, Co-60
Cr	Chromium	Cr-51
Cs	Caesium	Cs-134, Cs-135, Cs-136, Cs-137
Eu	Europium	Eu-152, Eu-154
H	Tritium	H-3
I	Iodine	I-125, I-129, I-131, I-132, I-133
Ir	Iridium	Ir-192
K	Potassium	K-40
La	Lanthanum	La-140
Mn	Mangenese	Mn-54
Nb	Niobium	Nb-94, Nb-95
Ni	Nickel	Ni-59, Ni-65
Np	Neptunium	Np-237
P	Phosphorus	P-32, P-33
Pa	Protactinium	Pa-231
Pb	Lead	Pb-210
Po	Polonium	Po-210
Pu	Plutonium	Pu-238, Pu-239, Pu-240, Pu-241
Ra	Radium	Ra-226, Ra-228
Ru	Ruthenium	Ru-103, Ru-106
S	Sulphur	S-35
Sb	Antimony	Sb-124, Sb-125
Se	Selenium	Se-75, Se-79
Sr	Strontium	Sr-89, Sr-90
Tc	Technetium	Tc-99
Te	Tellurium	Te-129m, Te-132
Th	Thorium	Th-227, Th-228, Th-230, Th-231, Th-232, Th-234
U	Uranium	U-234, U-235, U-238
Zn	Zinc	Zn-65
Zr	Zirconium	Zr-95

1.4 Endpoints of protection and internal distribution of radionuclides

In reflecting the widely held view that the endpoint for protection in most cases of environmental impact assessment tends to be a population of wild organisms as oppose to individuals of a given species (Copplestone et al., 2007), it would appear valid to focus upon assessment endpoints which are relevant for population integrity. The ICRP has indeed considered this by acknowledging that the biological endpoints of most relevance in individuals, after radiation exposure, will be those that could lead to changes in population size or structure. Among these endpoints the ICRPs considered that early mortality, some forms of morbidity, impairment of reproductive capacity, and the induction of chromosomal damage are important. These considerations, in turn, have implications for the organs or body parts one might be interested in focusing upon in an attempt to provide a more detailed insight into the heterogeneity of exposure and the implications of this in terms of the potential to cause biological harm. For example, it is apparent that information on the potential for accumulation of a given radionuclide in the gonads of an animal might be important because of the implications this might have for reproductive capacity. Furthermore, based on prior knowledge of how elements are distributed within living organisms, there appears to be some merit in focusing on organs and body parts that might be expected to accumulate radionuclides. One might expect the types of deterministic effects that could be of interest to occur at locations where the exposure of tissues is most elevated. These arguments are consistent with those provided by the ICRP who refer to 'tissue or organ of interest' (ICRP, 2008), interpreted by ICRP (2009) in the case of animals to mean tissues or organs such as the reproductive organs, because of their importance with respect to the maintenance of populations, and accumulating organs or tissues, because clearly the highest exposures will be associated with these body compartments. These reflections on the importance of characterizing the internal heterogeneity of elemental distributions exist despite the consideration that the transfer of a given radionuclide is currently often characterized from a whole-body perspective.

1.5 Whole body concentration ratios

For planned exposure situations involving the assessment of prospective routine releases of radionuclides, the ICRP has recommended (ICRP, 2009) the use of concentration ratios (CR):

$$CR_{b,X} = \frac{C_b}{C_X} \qquad \text{(eq.1)}$$

Where:
C_b= concentration of an element for the whole-body of organism b (µg/g, fresh weight)
C_X= concentration of an element in medium X – i.e. soil (dry weight), freshwater or seawater (µg/g)

There are pragmatic reasons why transfer is modelled in this way, i.e. in relation to whole body, reflecting the state of current knowledge although this does not obviate an approach involving a more detailed mapping of internal distributions with a view to future elucidation of exposure-effects relationships.

1.6 Data gaps

It might misleadingly appear, in view of the summary provided above, that ICRP's system has entered a late stage of development and that many of the components (including the parameters necessary to allow their implementation) underpinning the system are robustly consolidated. Indeed, dose conversion factors are available for all reference organisms and life stages covering radioisotopes of some 40 elements (ICRP, 2008). Information also exists for transfer factors (ICRP, 2009) and derived consideration reference levels which allow calculated dose rates for RAPs to be compared against exposures where there is likely to be some chance of deleterious effects occurring (ICRP, 2008). Nonetheless, a more detailed examination of some of the underlying datasets supporting the ICRP system lead rapidly to the view that severe limitations exist in some cases. In particular, the datasets on transfer for RAPs are far from comprehensive.

The CR values for RAPs as reported in ICRP (2009) were derived from the database described by Copplestone et al. (2013), which was comprised of a comprehensive literature review of published materials from many disparate sources of information. Only those data specifically for species falling within the taxonomic family at which the RAP was defined were used to derive CR values for the ICRP RAPs. As reported by Barnett et al. (2014) in relation to the terrestrial dataset, data were only available to derive $CR_{wo\text{-}soil}$ for 25 % of the required radionuclide–RAP combinations. For example, data for 10 or fewer elements were available for Reference Deer *(Cervidae)*, Duck *(Anatidae)* and Rat *(Muridae)*, whilst there were no data for Reference Bee *(Apidea)*. A similarly poor coverage was noted for the aquatic environments. Consequently, there was reliance in ICRP (2009), on the use of derived (or surrogate) CR values. These surrogate values were generally derived from the generic wildlife groups, but in a few cases, recourse was made to element analogues. Of particular concern in ICRP (2009) was the observation that few CR data were found for the various life stages of RAPs. The lack of available information was considered to be so acute that the ICRP considered it premature, if not impracticable, to attempt to derive values for each and every life stage–element combinations. Finally, very little information was available in relation to distributions of elements/radionuclides within organisms. Although conversion factors have been published recently (Yankovich et al., 2010) and could be used to calculate organ- or body-part-specific CR values in the future, the ICRP (2009) considered that more work was needed to establish a comprehensive data set of organ or body-part CR values.

1.7 Identification of 'Reference sites'

In developing systems for radiological assessment, the ICRP has placed much emphasis on internal consistency. Arguably, the collation of data as conducted to form the basis of the CR derivations in ICRP (2009) and involving a multitude of often disparate and ad-hoc studies, does not fit this criterion. In view of this and the other limitations, as noted above, one possible approach to mitigate this situation, and as considered in ICRP (2009), would be to identify a series of sites where samples of each RAP, and their different life stages, could be collected and analysed. In line with the systems nomenclature these might also be referred to as 'Reference sites'. An appropriate number of samples of each RAP and their life stages could be collected, along with corresponding samples of media (water, soil) at such sites. The number and specific location of any media samples would need to be taken into account, and spatial aspects, such as the home range of the RAP (and its life stages), might also need to be addressed. It is acknowledged in ICRP (2009) that whilst these sites could provide relevant data for the RAPs, the data will be, clearly, site specific in nature. However, these site-specific CR values could be compared with the wider CR data that are available (such as the values collated in this report for the RAPs) to help understand how CRs may vary between different geographic areas. In other words, they would serve as 'points of reference' consistent with other components of the ICRPs nascent system.

In fact, at least one study has been conducted in line with the recommendations outlined above. Barnett et al. (2014) describe a study in which terrestrial RAPs, and associated soil samples, were collected from a 'reference' site located in a managed coniferous forestry plantation in north-west England. The emphasis of the study was on the derivation of CR values providing a comparison with the ICRPs-recommended values where practicable. Although the study was comprehensive, providing concentrations of 60 elements and gamma emitting radionuclides in six RAPs, the study fell short of providing information for the RAPs Frog and Deer, neither were data provided on non-adult life-stages nor aquatic ecosystems. Therefore, there is not only scope in the future to provide information for the same elements and RAPs but from a different region, but also to broaden the coverage of data to encompass other ecosystems and life stages.

Characterising the distribution of elements within RAPs at controlled reference sites is not just a case of providing more specific and relevant data for parameterization of CRs, although this is an obvious application. Such information for humans formed important underpinning information for the development of retention and biokinetic models as applied for internal dosimetry (ICRP, 1979). Furthermore, elemental composition and distribution within the body are important inputs with respect to simulations of energy deposition (i.e. doses) within a given body using radiation transport modelling codes and much of the earlier work on non-human biota in this regard placed reliance on numerous assumptions (see Taranenko et al. , 2004). Clearly more specific information on composition and distribution for RAPs might have utility were dosimteric models to be rerun, using for example more advanced voxel phantom approaches. This would be in line with human radiological protection where reference persons are characterized by density and composition resolved adult voxel phantoms designed for use with Monte Carlo radiation transport codes (Hansen et al., 2014).

2 Aim of the present work

In view of the background provide above the rationale for further development and expansion of the reference site concept were clearly apparent. The objectives of the programme of work described in the report were thus to:

- Identify and describe a suitable reference site in Norway
- Identify species that may represent RAPs
- Sample RAPs, including life stages as far as practicable and environmental media for the organisms' habitat with a view to covering terrestrial, marine and freshwater ecosystems
- Analyse stable elements in RAPs (including accumulating organs/body parts and gonads where practicable) and environmental media in accordance with the prioritized list specified by the ICRP
- Derive whole body CRs accounting for factors such as home range where appropriate

3 Field work and sample preparation

Tjøtta was selected as a suitable reference site in Norway based on previous studies in connection with Chernobyl fallout in the area[1]. The presence of a local research centre (Bioforsk – now a part of the Norwegian Institute of Bioeconomy Research, NIBIO) including an agricultural meteorological station, was also considered an advantage particularly in relation to sampling / field work. The present work thus involved the participation of representatives from this centre.

3.1 General description of the reference site

Tjøtta is an 11.3 km^2 island in the municipality of Alstahaug in Nordland County (see map – Fig. 2). The island is rather flat, with the highest point being Kalvberghaugen (77 m). The area is well mapped and comprises of agricultural and pasture land, marshland, other open areas, and forests – mainly deciduous or mixed (Area A in Figure 2).

Several lakes and ponds are also found on the island – the largest being (the shallow) lake Storvatnet. In 2013, the main village (Tjøtta) had 224 inhabitants (Statistics Norway: ssb.no). Mean annual precipitation for the period 2011–2014 was 1400 mm, ranging between 1100–1700 mm. Since Tjøtta is close to the open ocean, it is highly influenced by sea salt spray, which may be of importance in relation to mobility/uptake of different chemical elements.

- For detailed information regarding bedrock and surficial deposits we refer to NGU.no (http://www.ngu.no/kart-og-data/kartinnsyn)
- Details concerning vegetation cover and land use is available through http://kilden.skogoglandskap.no/map/kilden/index.jsp.
- Weather/climate data for various time scales (e.g. air and soil temperature, amount of precipitation, air humidity and wind speed) is available from http://lmt.bioforsk.no/agrometbase/getweatherdata_new.php.

Unfortunately, any suitable candidate reference Trout (*Salmonidae*) were not found in Tjøtta, so an additional river reference area in the same municipality (Alstahaug) had to be included to cover the whole RAP spectrum (Area B in Figure 2). This river is 4–10 m wide with deep pools and small waterfalls, and originates in the mountains Seven Sisters, going through marshlands, mixed forest and agricultural areas.

[1] See e.g. Liland et al. (2001)

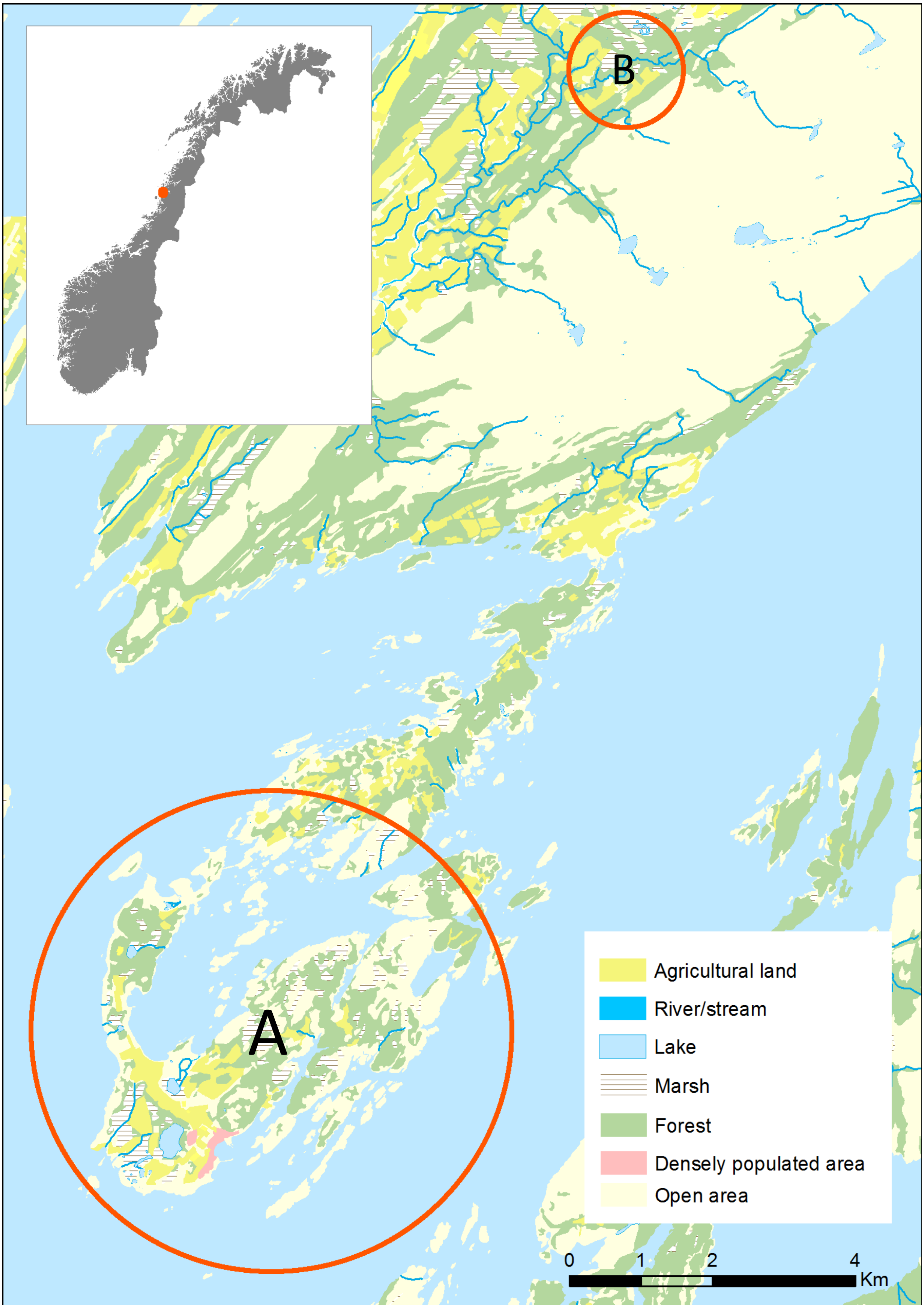


Fig 2: *The two areas in Alstahaug municipality constituting the Tjøtta reference site*

3.2 Biota sampling

3.2.1 *Wavy hair grass – Poaceae (PO)*

Above ground parts of wavy hair grass (*Deschampsia flexuosa*) were gathered from ten forest localities in June 2011 (PO1–PO10). The sampled localities ranged from nutrient poor pine / deciduous to richer spruce/mixed forest, with soils ranging from dry sand to moist organic. At each locality, one representative sample was taken covering the entire sampling area. Very little wavy hair grass was found at sites PO1–PO4 and PO10, probably due to soil nutrient status (the species prefer dry, nutrient poor soil). The ten samples were dried in an oven (50 ° C, 2 days), and subsequently homogenised using a mill/grinder (Retsech grindomix GM 200). Each sample was weighed before and after drying.

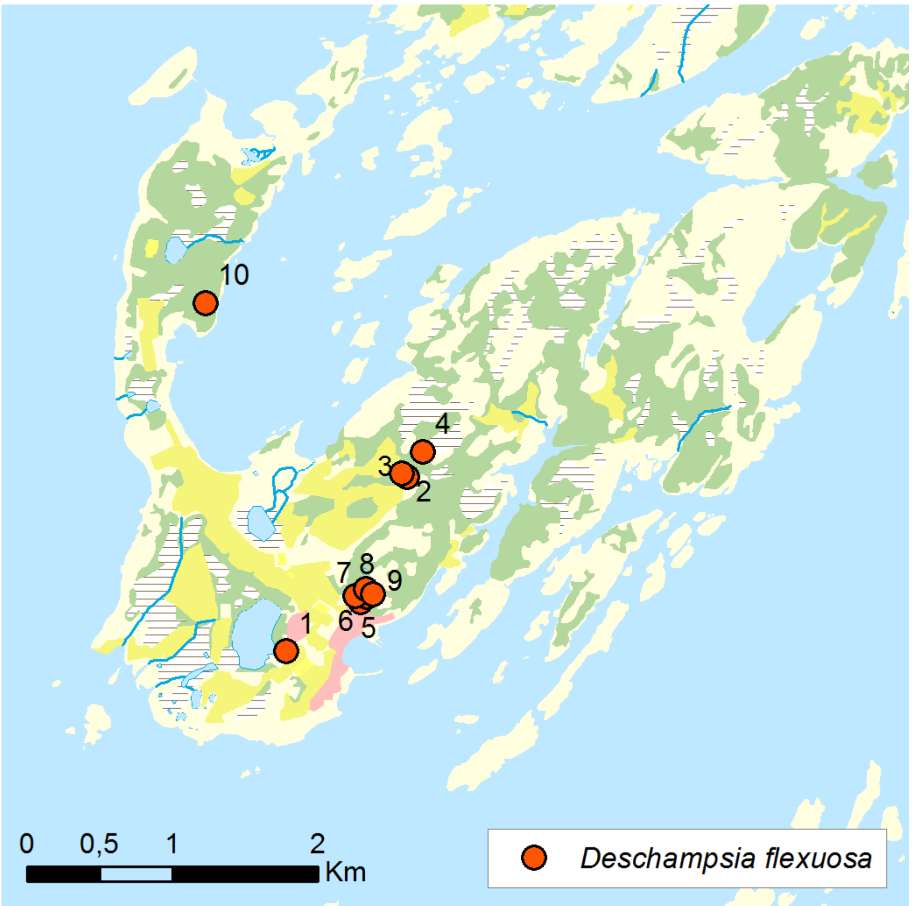


Fig 3: *Sampling localities for wavy hair grass (PO1-PO10)*

3.2.2 Scots pine and Sitka spruce – Pinaceae (PI)

Annual shoots of Sitka spruce (*Picea sitchensis*) or Scots pine (*Pinus sylvestris*) were collected from ten localities in June 2011 (PI1–PI10). At each locality, one representative, bulk sample was taken from many trees covering the entire sampling area. The sampled trees were evenly distributed throughout the locality. The ten samples were dried in an oven (50 ° C, 2 days), and subsequently homogenised using a mill/grinder (Retsech grindomix GM 200). Each sample was weighed before and after drying.

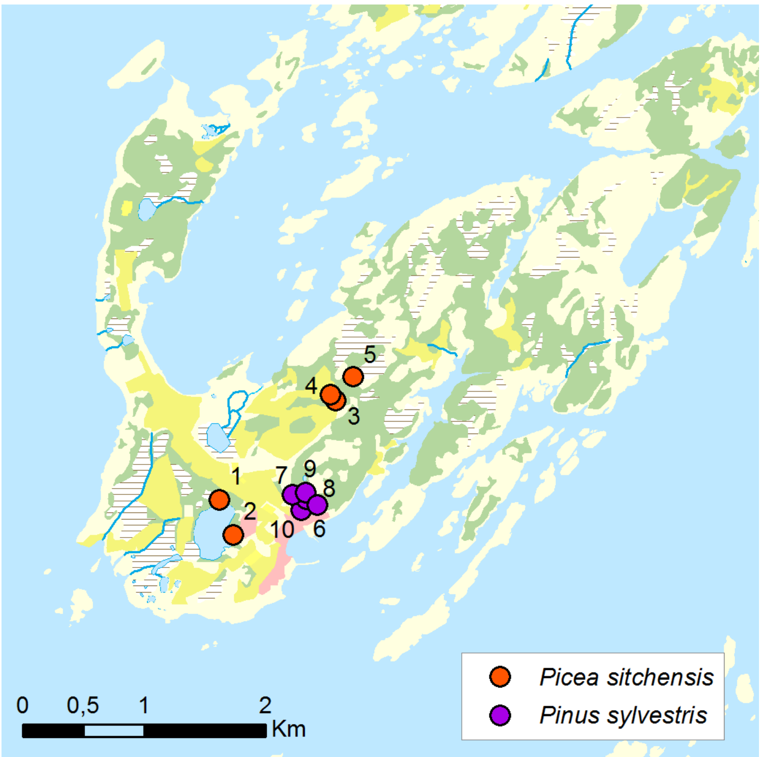


Fig 4: *Sampling localities for Sitka spruce and Scots pine (PI1-PI10)*

Areas with Scots pine were generally rocky with shallow and nutrient poor soil and grass, heather and moss vegetation cover, whereas the Sitka spruce localities were more diverse but with generally richer and deeper soils (see picture below).


Forest localities – Pine at Kalvberghaugen (PI6–PI10) and spruce at Lysløypa (PI5) (photo: NIBIO)

3.2.3 Earthworms – Lumbricidiae (LU)

Various species of earthworms (*Lumbricus rubellus, Lumbricus terrestris, Aporrectodea rosea* and *Aporrectodea calignosa*) were collected at different localities in June and September 2011. All in all, 14 composite samples were prepared (LU1–LU14), ranging in size from 2–40 individuals/specimens (191 individuals all in all). The earthworms were placed on moist paper for one day, to flush out the content of the gastro-intestinal tract, and killed using ethanol (2-3 minutes). Each sample was weighed and frozen (-80 ° C), and then freeze-dried (Labconoco Freezone Plus 4.5l freeze dryer, 2–3 days). The freeze-dried sample was homogenised using a mill/grinder.

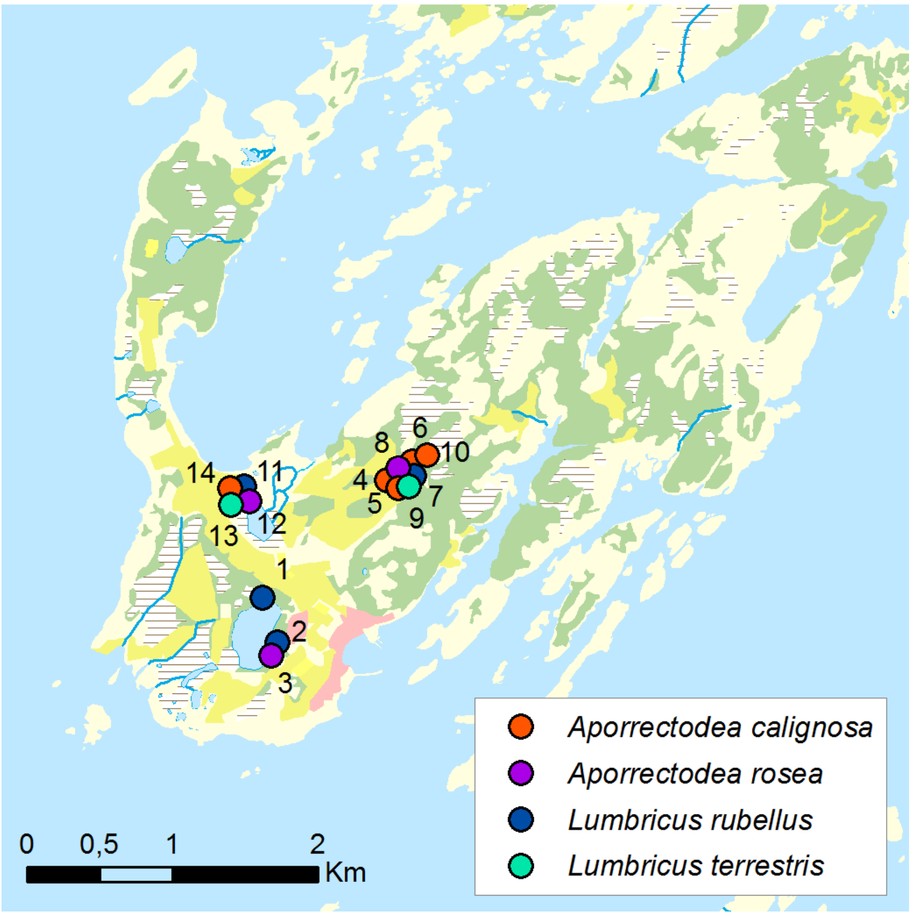


***Fig 5:** Sampling localities for earthworms (LU1-LU14)*

3.2.4 Honey bees – Apidea (AP)

European honey bees (*Apis Mellifera*) were provided by a local beekeeper who has hives at Tjøtta. The bees have an action radius of 3 km, and may therefore cover most parts of Tjøtta during summer.

One composite sample of dead bees lying in the bottom of the cubes was prepared in October 2011. The bees had been dead for a few days before sampling and may therefore be somewhat pre-dried. The sample was weighed and frozen (-80 ° C), and then freeze-dried (Labconoco Freezone Plus 4.5l freeze dryer, 2–3 days). The freeze-dried sample was homogenised using a mill/grinder.

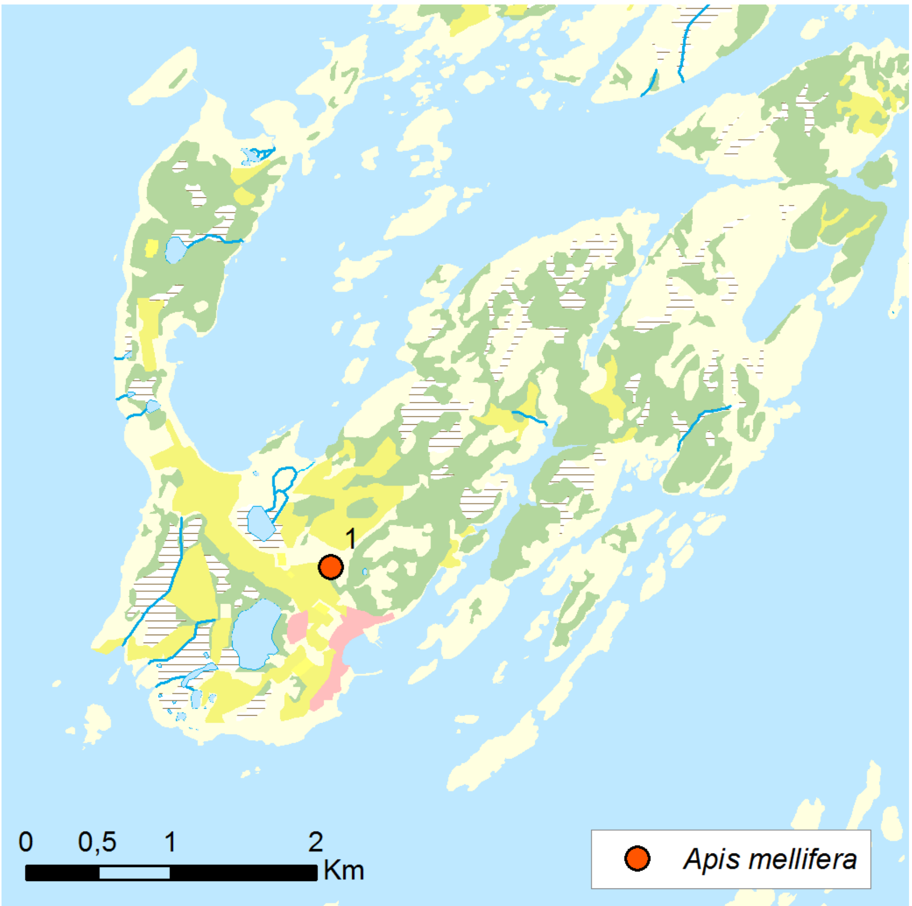


Fig 6: *Sampling locality for bees (AP1).*

3.2.5 House mouse – Muridae (MU)

Various species of mice – bank vole (*Myod glareolus*), vole (*Microtus agrestis*) and House mouse (*Mus musculus*) were caught near an old (abandoned) barn building during the autumn / winter 2011–2012. The animals were caught alive in a clap trap (Ugglan Special) using cheese and salami as bait. The traps were checked 1–2 times daily. The living mice were brought into the laboratory and killed with chloroform. From each mouse, samples of muscle (M), bone (B), liver (L) and gonad (G) were taken out. The muscle sample consisted of thigh muscles of both legs. The bone sample consisted of both femurs. The whole liver was sampled, and the gonad sample consisted of ovaries or testes. The samples were weighed and frozen (-80 ° C). The frozen organ samples were then freeze-dried (Labconoco Freezone Plus 4,5l freeze dryer, 2–3 days). Each individual freeze-dried organ sample was homogenised using a mill/grinder, kept separate in terms of both specimen and type of organ. Since the voles are not part of the Muridae family, only the House mouse samples are included in this report. In total 7 house mice were gathered (MU1–07) – 4 males and 3 females, with live weights between 13–22 g (median: 16 g). Two of the mice were juveniles. For more info about the individual mice, see Appendix 3.

Due to very low weights, in general, only two gonad samples were included in the analyses (from MU3 and MU5). However, the additional gonad materials are available for future analysis.

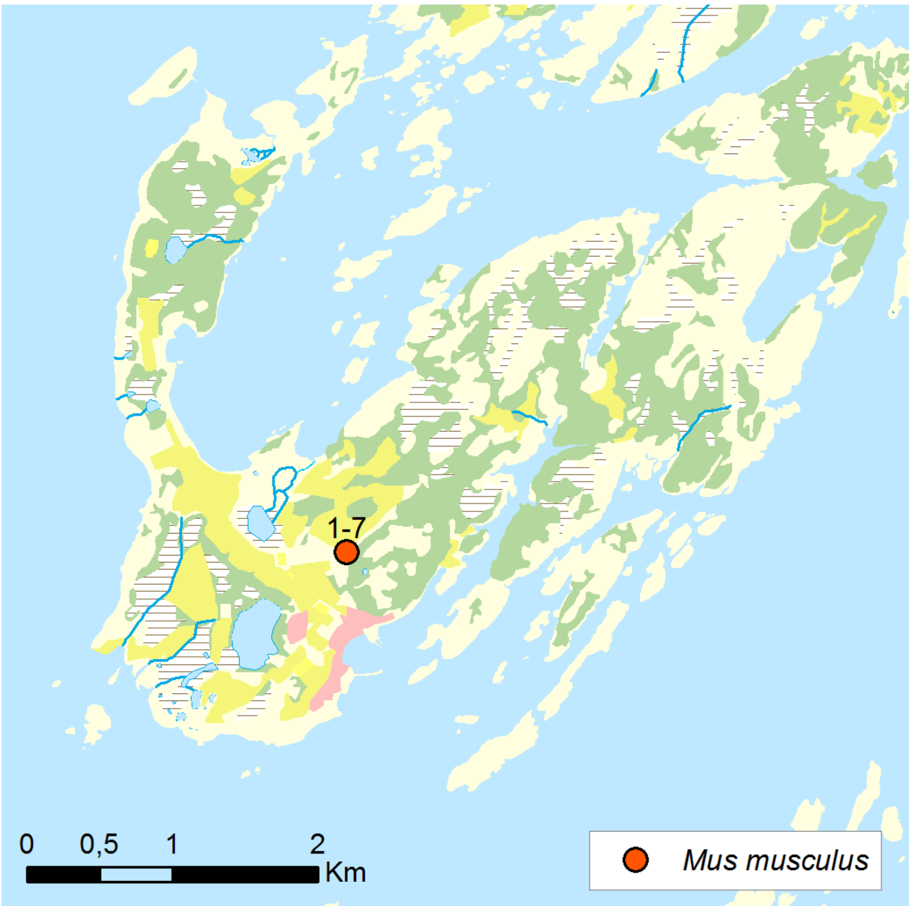


Fig 7: *Sampling locality for mice (MU1-MU7)*

3.2.6 Moose – Cervidae (CE)

Moose (*Alces alces*) were shot in the regular hunt during autumn 2011. The hunters notified when the animal had been shot and Bioforsk personnel collected samples after the moose had been slaughtered (i.e. skinned and with the rumen removed) and hung up. No information about type of weapons or ammunition used to kill the animals are available for this report. In total, eleven moose were considered (CE1-11) – 6 males and 5 females, with live weights between 55–300 kg (median: 150 kg). 4 of the moose were juveniles (i.e. 6 months old calves). For more info about the individual moose, see Appendix 3.

From each animal, samples of muscle (M), bone (B), liver (L) and gonad (G) were removed. The muscle sample consisted of portions of the diaphragm. The bone sample consisted of parts of the femur. In all cases, only parts of the liver were sampled, and the gonad sample consisted of ovaries or testes. The liver was not sampled for CE9, and gonads were not sampled for CE5, CE6 and CE10 (and not included in the analyses for CE8). The samples were weighed and frozen (-80 ° C). The frozen organ samples were then freeze-dried (Labconoco Freezone Plus 4.5l freeze dryer, 2–3 days). Each individual freeze-dried organ sample was homogenised using a mill/grinder, kept separate in terms of both specimen and type of organ.

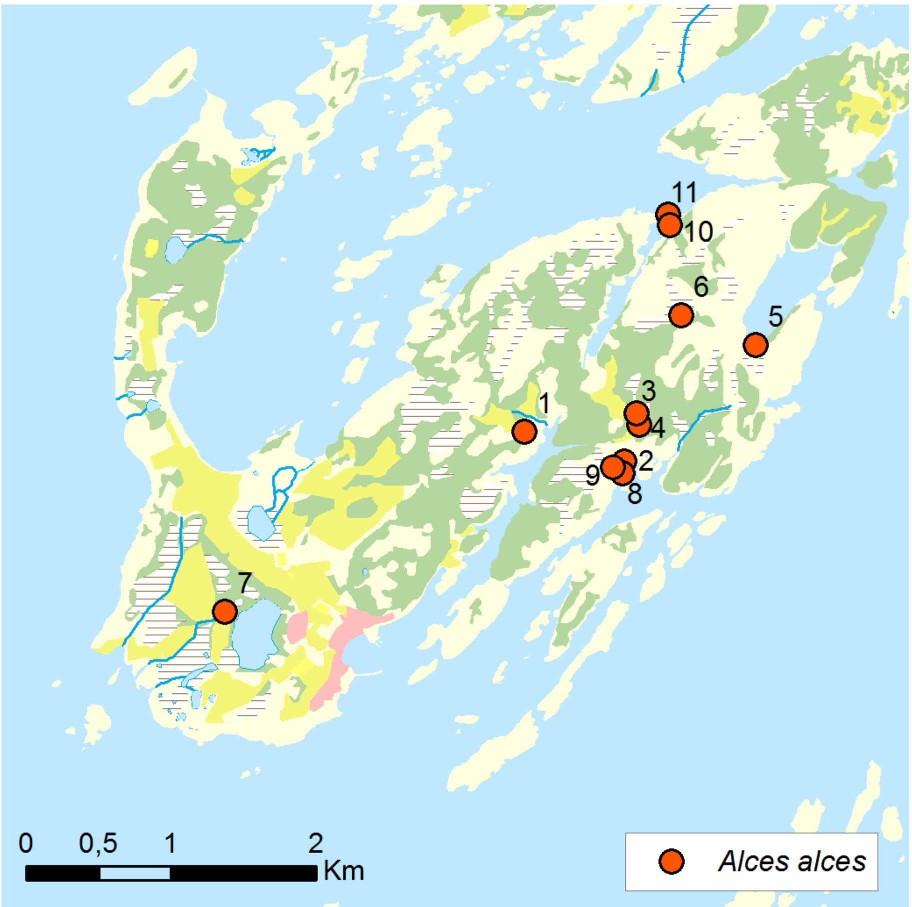


Fig 8: *Sampling localities for moose (CE1-CE11)*

3.2.7 Ducks – Anatidae (AN)

Three species of duck – mallard (*Anas platyrhynchos*), tufted duck (*Aythya fuligula*) and common teal (*Anas crecca*) – were shot at different localities during June–September 2011 using shotgun (bismuth calibre 12) or lounge rifle (calibre 0.22 with lead bullet). In total, eleven ducks were killed (AN1-11) – 7 males and 4 females, with live weights between 320–1100 g (median: 760 g). For more info about the individual ducks, see Appendix 3.

From each duck, samples of muscle (M), bone (B), liver (L) and gonad (G) removed. The muscle sample consisted of thigh muscles of both legs. The bone sample consisted of both femurs. The whole liver was sampled, and the gonad sample consisted of ovaries or testes. The samples were weighed and frozen (-80 ° C). The frozen organ samples were then freeze-dried (Labconoco Freezone Plus 4,5l freeze dryer, 2–3 days). Each individual freeze-dried organ sample was homogenised using a mill/grinder, kept separate in terms of both specimen and type of organ. For AN8, gonads were not included in the analyses due to very low sample weight.

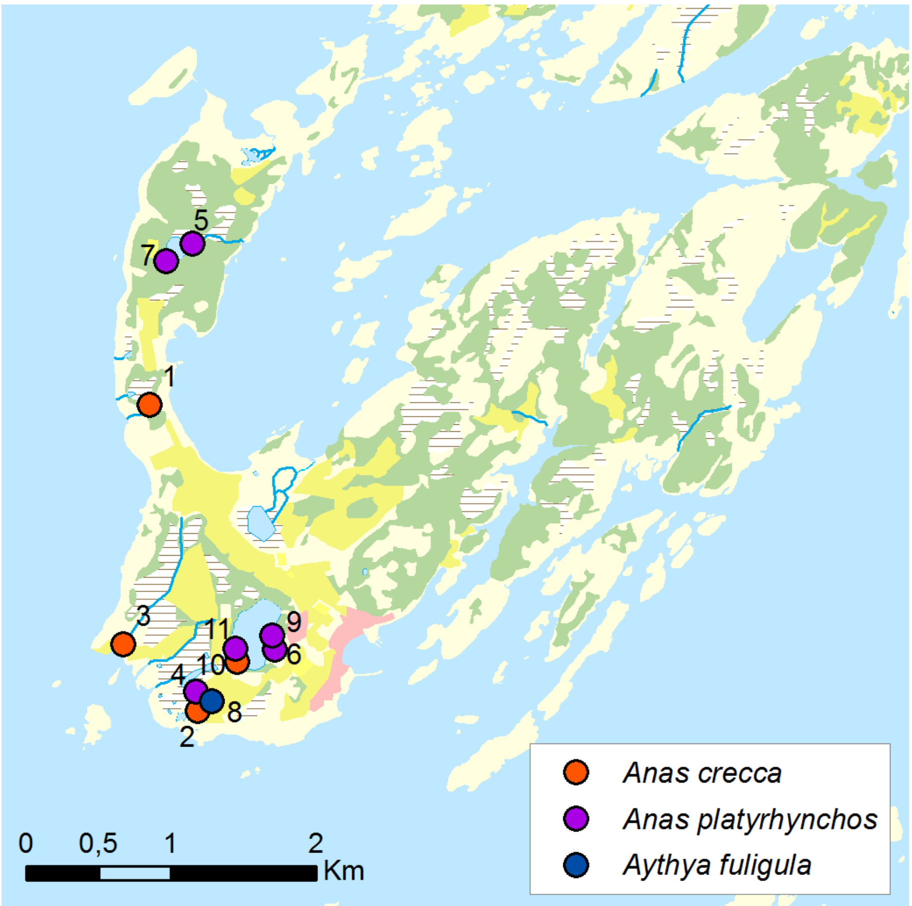


***Fig 9:** Sampling localities for ducks (AN1-AN11)*

3.2.8 Common frog – Ranidae (RA)

Common frog (*Rana temporaria*) was caught using net at different localities during June–September 2011. Ten specimens – 6 males and 4 females, with live weights ranging from 4 to 64 g were gathered (median: 26 g) (RA01-RA10). Four of the frogs were juveniles. For more info about the individual frogs, see Appendix 3.

Frog sampling at Eiriksjordet (RA5) (Photo: NIBIO)

All frogs were euthanized in the laboratory using chloroform. From each frog, samples of muscle (M), bone (B), liver (L) and gonad (G) were taken out – eggs from two of the females were gathered separately (E1). The muscle sample consisted of thigh muscles of both legs. The bone sample consisted of both femurs. The whole liver was sampled, and the gonad sample consisted of ovaries or testes. In addition, spawn of eggs (E2) and tadpoles (TAD) were collected from various ponds during spring 2012 (RA11–RA20). All samples were weighed and frozen (-80 ° C). The frozen organ samples were then freeze-dried (Labconoco Freezone Plus 4.5l freeze dryer, 2–3 days). Each individual freeze-dried sample was homogenised using a mill/grinder, kept separate in terms of location/specimen and – where applicable – type of organ. Due to very low sample weights, in general, only three gonad samples were included in the analyses (RA1+2, RA3 and RA9). However, eggs from RA4 and RA5 are relevant here as well. Additional gonad materials is available for future analysis.

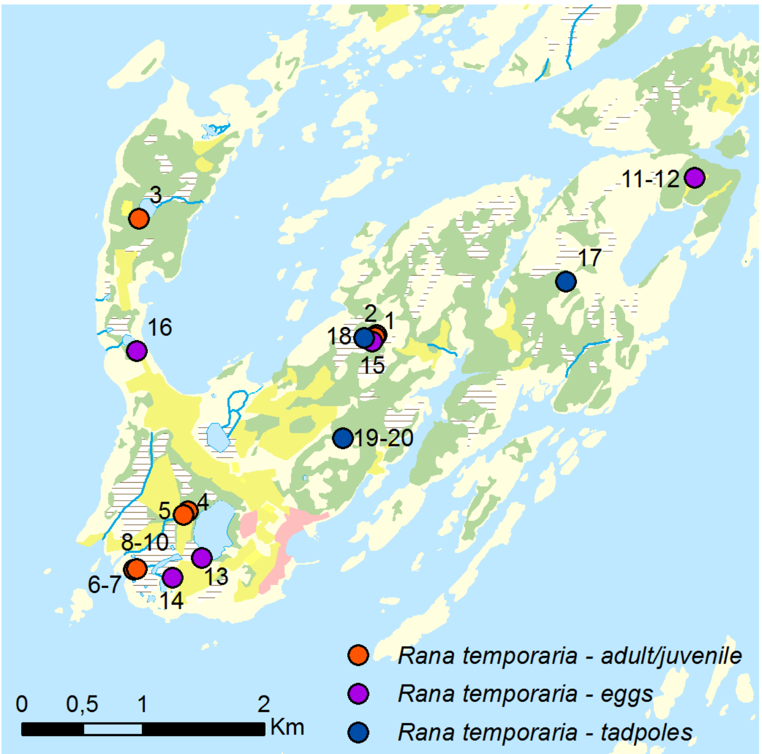


Fig 10: *Sampling localities for various life stages of common frog*

3.2.9 Brown trout – Salmonidae (SA)

Brown trout (*Salmo trutta*) were caught by pupils from a local school using a rod with a hook and worm as bait in a deep pool far up the river (Area B). Personnel from Bioforsk attended and supervised during fishing. The trout were caught in two rounds: 24 specimens in September 2011 and 14 specimens in November 2012. For the present report, however, only a selection of the sampled fish have been included (the rest were not analysed due to time and economic constraints). Ten of the larger fish were picked out – 5 males and 5 females, with live weights ranging from 29 to 94 g (median: 40 g). For more info about the individual trout, see Appendix 3.

From each fish, samples of muscle (M), bone (B), liver (L) and gonad (G) were taken out. The muscle sample consisted of the entire fillet on each side of the spine. The bone sample consisted of the whole spine, without head and tail fin. The whole liver was sampled, and the gonad sample consisted of eggs or sperm found in the abdominal cavity. The samples were weighed and frozen (-80 ° C). The frozen organ samples were then freeze-dried (Labconoco Freezone Plus 4,5l freeze dryer, 2–3 days). Each individual freeze-dried organ sample was homogenised using a mill/grinder, kept separate in terms of both specimen and type of organ.

Due to very low weights, in general, only two gonad samples were included (SA1 and SA2). However, additional materials are available for future analysis.

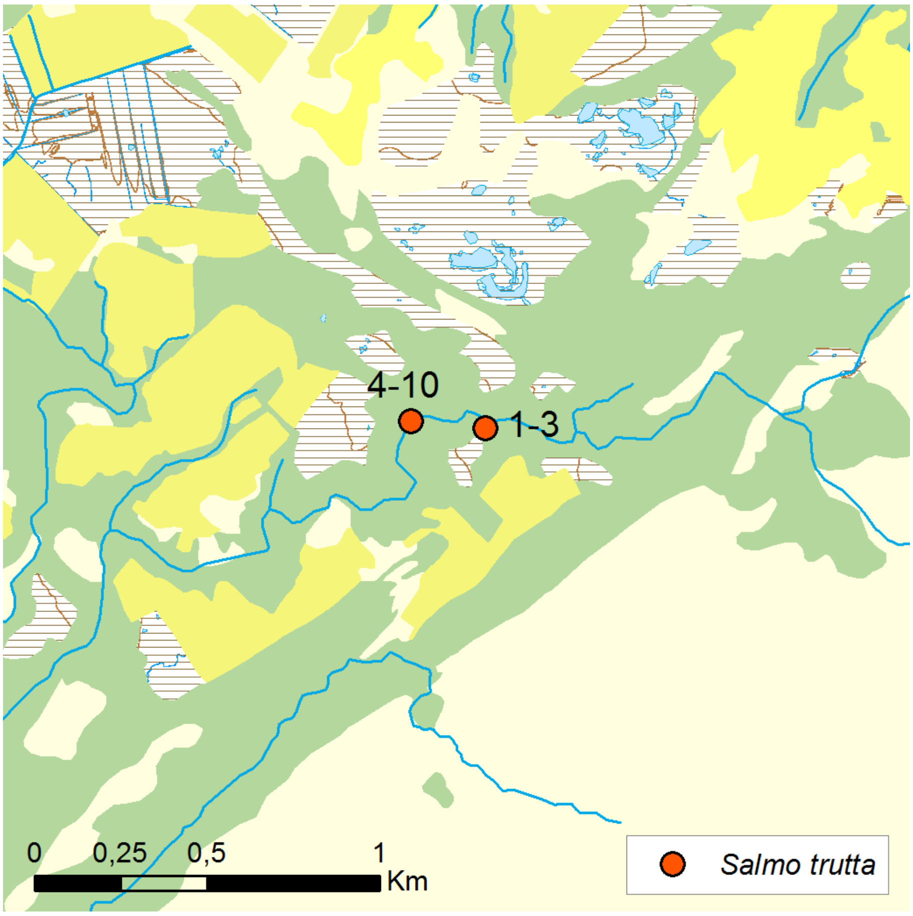


Fig 11: *Sampling sites for salmon (SA1-10) in area B (see Fig 2)*

3.2.10 Bladder wrack – Fucaceae (FU)

Bladder wrack (*Fucus vesiculosus)* was collected from ten localities in July 2011. Each sample was picked at the beach at low tide (see picture), and consisted of the whole seaweed. The sampled material was taken out evenly over the entire area and merged into one composite sample per locality.

Bladder wrack at low tide (Vika, FU1–FU2) (Photo: NIBIO)

The ten samples (FU1–FU10) were dried in an oven (50 ° C, 3 days), and subsequently homogenised using a mill/grinder (Retsech grindomix GM 200). Each sample was weighed before and after drying.

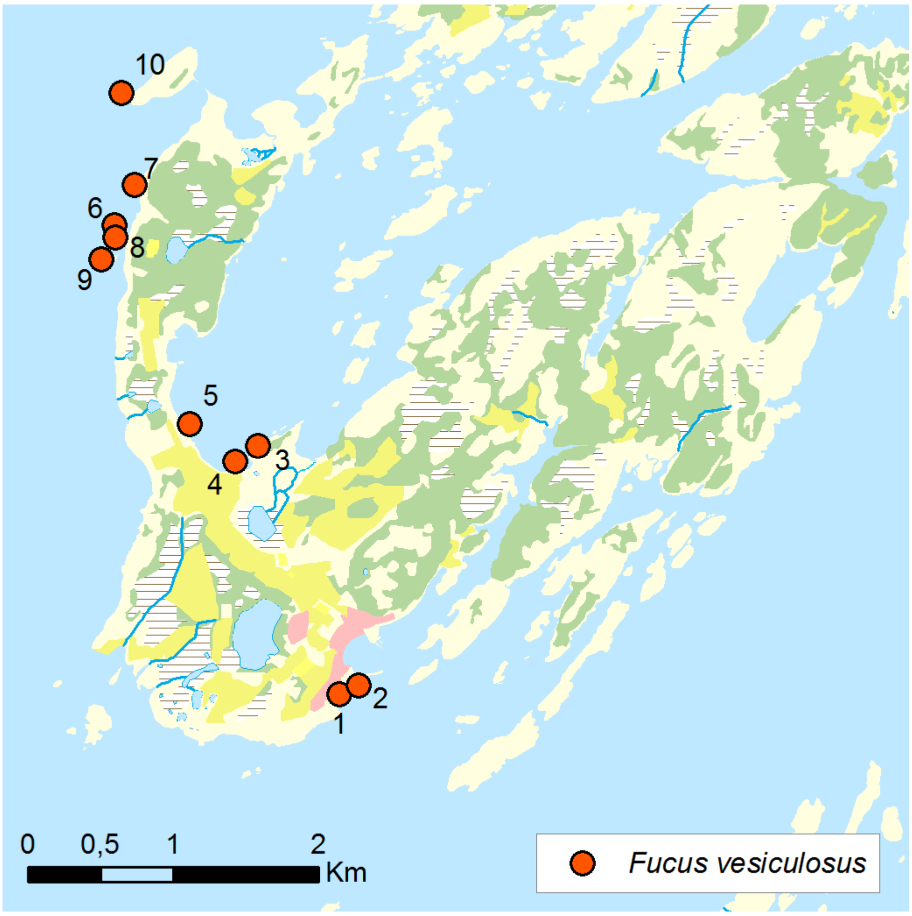


Fig 12: *Sampling localities of brown sea weed (FU1-FU10)*

3.2.11 Edible crab – Cancridae (CA)

Crabs (*Cancer pagurus*) were gathered by a local fisherman. The crabs were caught with traps in the fjord between Tjøtta and Mindland during October 2011. In total, ten crabs were gathered (CA1-10) – 7 males and 3 females, with live weights between 440–930 g (median: 680 g). For more info about the individual crabs, see Appendix 3.

From each crab, all soft tissues (including claw muscles) were pooled and referred to as the "soft tissue" (ST) sample, and the carapace plus parts of shells from claws and feet became the "hard tissues" (HT) sample. Both sample types were weighed before freezing (-80 ° C). The frozen samples were then freeze-dried (Labconoco Freezone Plus 4.5l freeze dryer, 2–3 days). Each individual freeze-dried sample was homogenised using a mill/grinder and kept separate in terms of both specimen and type of organ.

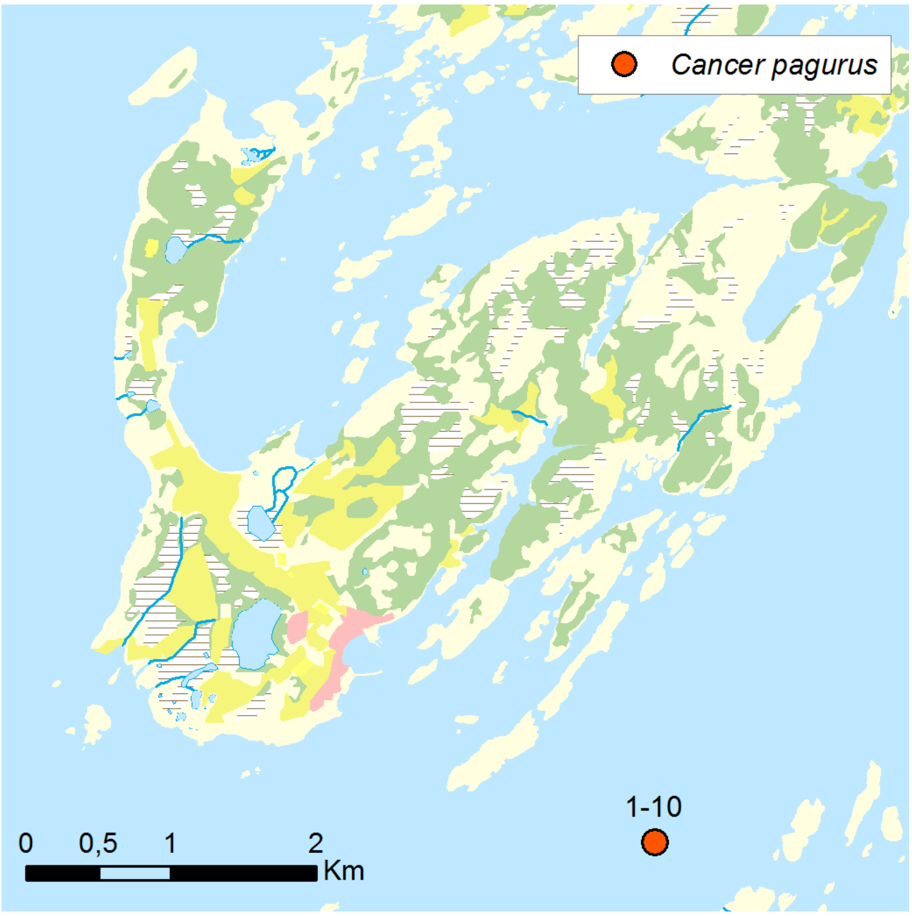


Fig 13: *Approximate sampling area for crabs (CA1-CA10)*

3.2.12 Plaice – Pleuronectidae (PL)

Plaice (*Pleuronectes platessa*) was caught in the fjord between Tjøtta and Mindland (see map) in August –September 2011 by the same fisherman who delivered crabs. Ten specimens – 6 males and 4 females, with live weights ranging from 460 to 1500 g were collected (median: 760 g) (PL01-PL10). For more info about the individual plaice, see Appendix 3.

From each fish, samples of muscle (M), bone (B), liver (L) and gonad (G) were removed. The muscle sample consisted of the entire fillet on each side of the spine. The bone sample consisted of the whole spine, without head and tail fin. The whole liver was sampled, and the gonad sample consisted of eggs or sperm found in the abdominal cavity. The samples were weighed and frozen (-80 ° C). The frozen organ samples were then freeze-dried (Labconoco Freezone Plus 4,5l freeze dryer, 2–3 days). Each individual freeze-dried organ sample was homogenised using a mill/grinder, kept separate in terms of both specimen and type of organ.

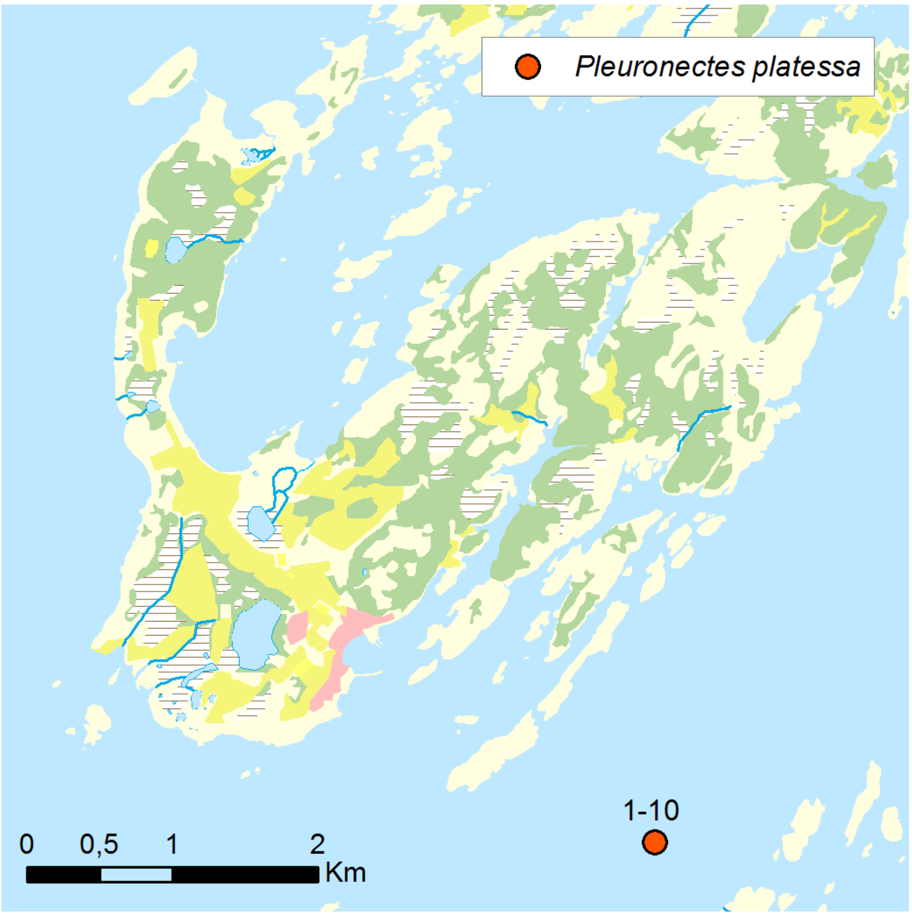


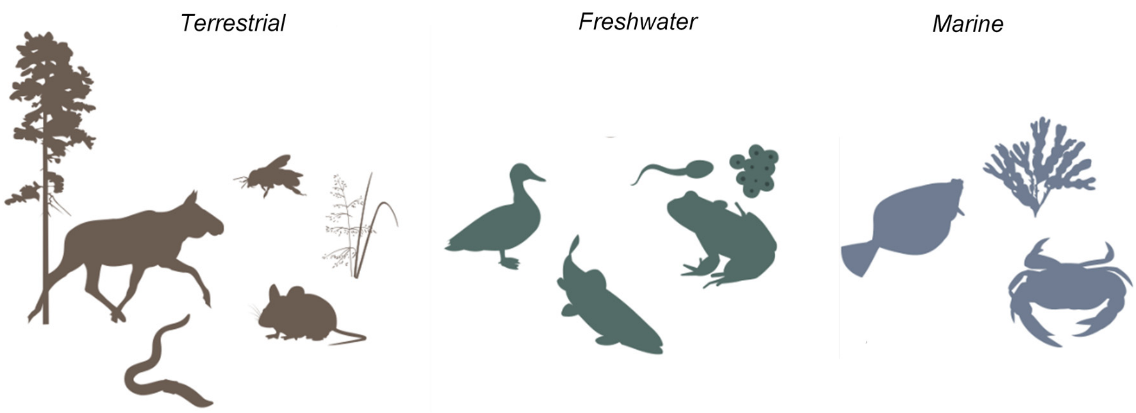
Fig 14: *Approximate sampling area for plaice (PL1-PL10)*

3.2.13 Summary of sampled species

The various species sampled in this project are summarised in Table 3 including Latin names and RAP family to which the sampled biota belong.

Table 3: *Overview of species sampled in the TRAP project*

Ecosystem	RAP (Family)	Species (lat.)	Species (eng.)
Terrestrial	*Poaceae*	*Deschampsia flexuosa*	Wavy hair grass
	Pinaceae	*Picea sitchensis*	Sitka spruce
		Pinus sylvestris	Scots pine
	Lumbricidiae	*Lumbricus rubellus*	Red earthworm
		Aporrectodea rosea	Rosy-tipped worm
		Aporrectodea calignosa	Grey worm
		Lumbricus terrestris	Common earthworm
	Apidea	*Apis mellifera*	Western honey bee
	Muridae	*Mus musculus*	House mouse
	Cervidae	*Alces alces*	Moose
Freshwater	*Anatidae*	*Anas crecca*	Eurasian teal
		Anas platyrhynchos	Mallard
		Aythya fuligula	Tufted duck
	Ranidae	*Rana temporaria*	Common frog
	Salmonidae	*Salmo trutta*	Brown trout
Marine	*Fucaceae*	*Fucus vesiculosus*	Bladder wrack
	Cancridae	*Cancer pagurus*	Edible crab
	Pleuronectidae	*Pleuronectes platessa*	Plaice



3.3 Soil sampling

Topsoil (0–10 cm) was collected close to sampling locations of relevant RAPs using an earth auger and a small shovel. Sampling was undertaken in June – September 2011 and September–October 2012. For each locality, one composite sample was prepared by mixing 5 sub-samples of soil. In total, samples were gathered from 23 localities covering different types of soil – from dry sandy soil to wet bog (T1–T23). Nutrient status also differed (from poor to rich). At a few sites the soil contained seashell sand (T5, T22) – probably added as a soil improvement agent. For more information about the individual soils sites, we refer the reader to Appendix 4.

The wet soil samples were dried in aluminium containers (about 15x25 cm) in a drying cabinet (40°C, 4–6 days – depending on moisture content). The samples were sieved using a normal kitchen sieve (2 mm).

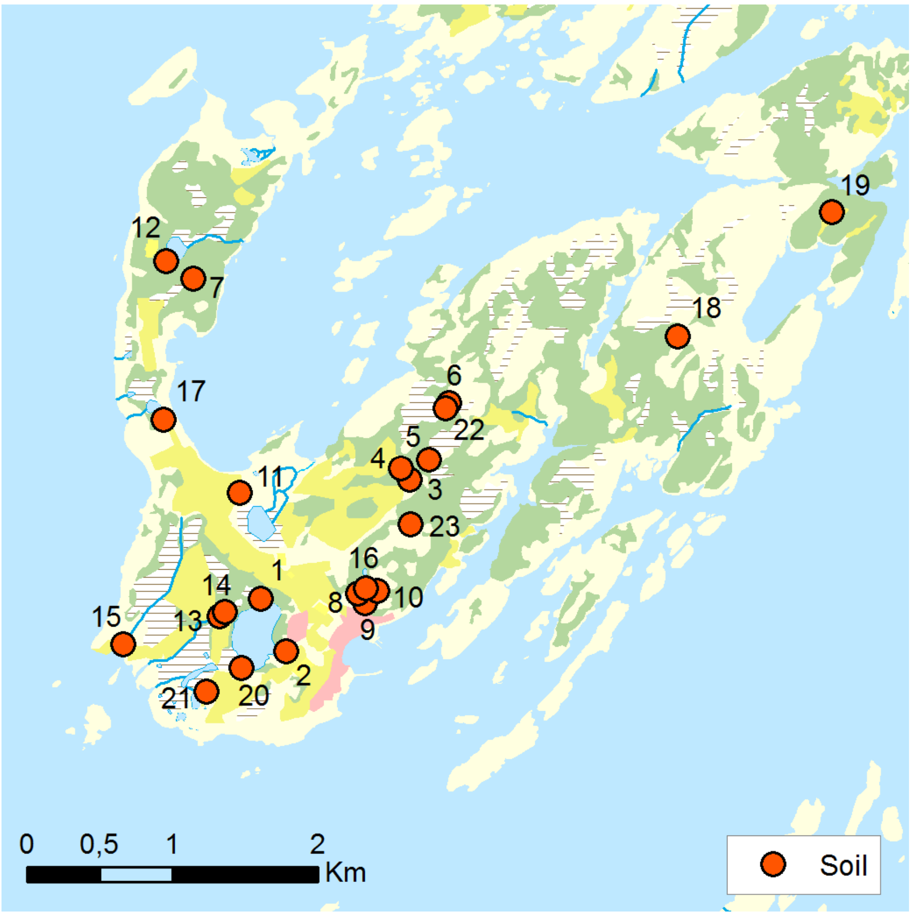


Fig 15: *Soil sampling localities (T1–T23)*

3.4 Water sampling

Seawater and freshwater samples were collected using a bucket. Before sampling the bucket was washed 2-3 times in water from the locality. Three water samples were collected from each locality (about 500 ml per sample). The three water samples were then mixed to a pooled sample per locality. A small portion of the bulk sample was taken out for measuring pH and salinity (seawater) and conductivity (freshwater) using a mobile pH / conductivity meter (Phenomenal PC 50). The remaining part of the bulk sample was vacuum filtered (0.45µm) (vacuum pump Edwards 5), and filled in acid washed bottles (200 ml per sample). The filtration system was rinsed with sample water before the sampling bottles were filled. Each sample of 200 ml, was then added HCl (12M, 0.5 ml) for conservation (pH <2) and shaken. The pipettes were rinsed in 12M HCl before use. For practical reasons, vacuum filtration and acidification of samples were performed in the laboratory, it therefore took approximately 30-45 min from sampling to filtration.

The location of the freshwater and seawater sampling localities are shown in Fig. 16 and Fig. 17, respectively. For additional information, we refer the reader to Appendix 5 (Freshwater) and Appendix 6 (Seawater).

Gjerdevatnet lake (F2) and Markvollelva river (F7+8, F16) (Photos: NIBIO).

Sundet (M3, M4) (Photo: NIBIO).

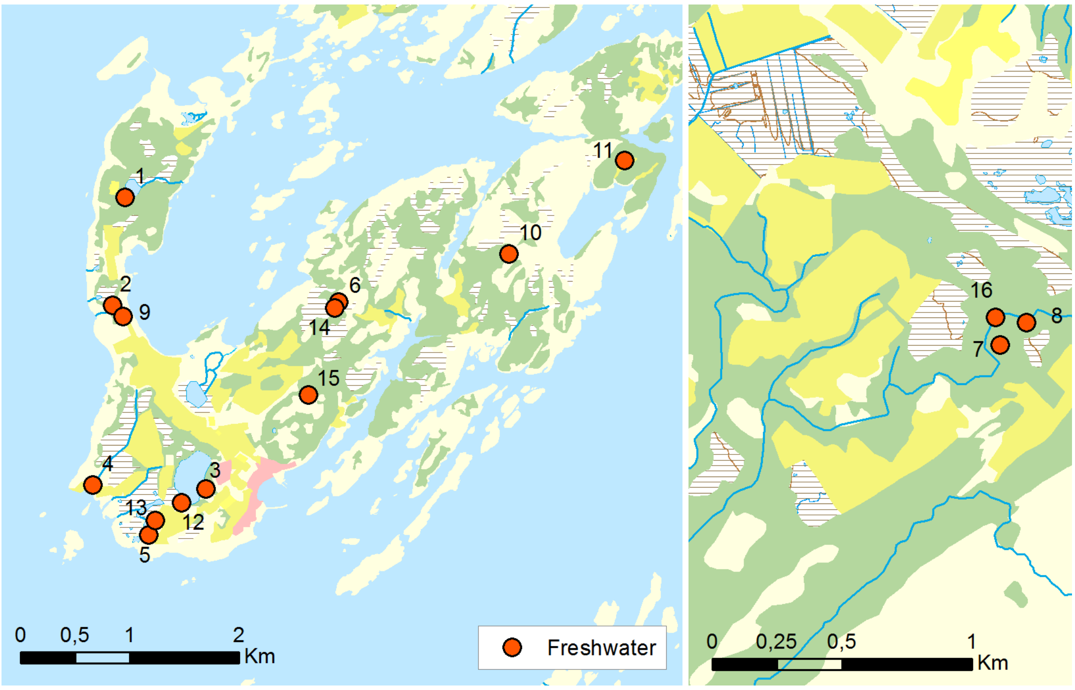


Fig 16: *Tjøtta (Area A) and Markvollelva (area B) – freshwater localities sampled in October–November 2011 (F1–F8), and in September–November 2012 (F9–F16).*

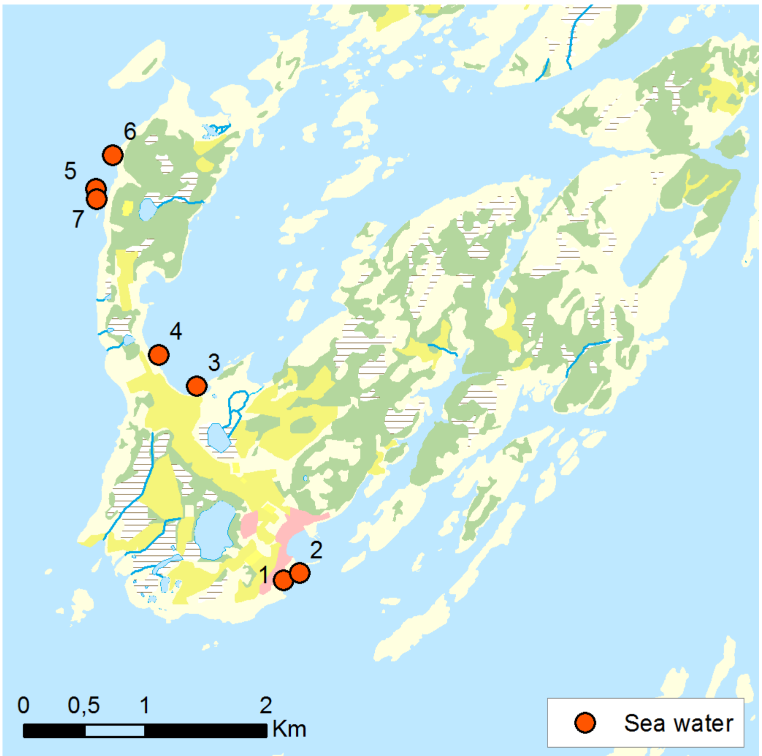


Fig 17: *Tjøtta (Area A) – seawater sampling localities (M1-M7) sampled in late October 2011*

4 Quantitative analyses

4.1 Sample digestion and chemical analysis for ICP-MS

Approximately 0.25 g sample material[2] was digested in nitric acid (ultrapure) under high pressure and temperature using an UltraClave III or IV (Milestone Ltd.). For soil samples, concentrated acid was used, whereas 1:1 (v/v) concentrated nitric acid and deionised water was sufficient for biota samples. All soil and biota samples were diluted – using deionised water from a MilliQ apparatus – to 0.6M HNO_3. Water samples were acidified to a total strength of 0.1M HNO_3 using concentrated nitric acid (ultrapure).

All samples were analysed at NTNU by sector field inductively coupled mass spectrometry (ICP-MS). Further description of the method used at NTNU can be found in Nordløkken et al. (2015). The elements determined are shown in Figure 18 a–d.

4.2 Additional sample preparation and analyses

All plants (PO, PI), bees (AP) and soil samples were also analysed using gamma spectrometry (High Purity Germanium detectors) to determine radionuclides such as ^{137}Cs, ^{40}K and ^{226}Ra. To allow for ingrowth of ^{222}Rn and progeny in connection with Ra determination, containers were sealed using aluminium foil and left for 3 weeks prior to radionuclide determination.

Loss on ignition (LOI) for all soil samples was determined by measuring weight loss after heating pre-dried soil (105°C, 6 h) to 550 °C in a furnace overnight. Soil pH was determined in a mixture of soil and purified water after overnight storage (15h); soil/water ratio was 1:10.

4.3 Analytical precision ICP-MS

For results above detection limit (DL), the analytical precision (relative standard deviation for three replicates per sample/result) was generally <5 %. All in all, about 13 % of the 19 000 results were below DL. However, if beryllium (Be), iridium (Ir) and platinum (Pt) are excluded, this number is reduced to <10%.

An overview of element data for freshwater, seawater, soil and biota, respectively, is shown below. Elements without colour coding were not determined in the analyses. **Bold font** elements are those on the ICRP list. See Appendices 3–6 for details regarding the fraction of data below DL for individual elements in various materials/media.

[2] Sample weight was generally 0.2–0.3 g, but for animals such as mice, frogs and trout – some of the liver or gonad samples were very small (even below 0.02–0.10 g). In a few cases, composite samples were prepared e.g. RA-1+2.

Soil (a)

H																		He
Li	Be												B	C	N	O	F	Ne
Na	Mg												Al	Si	P	S	Cl	Ar
K	Ca		Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr		Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn						

Lanthanoids*	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Actinoids**	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

Freshwater (b):

H																		He
Li	Be												B	C	N	O	F	Ne
Na	Mg												Al	Si	P	S	Cl	Ar
K	Ca		Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr		Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn						

Lanthanoids*	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Actinoids**	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

Seawater (c):

H																		He
Li	Be												B	C	N	O	F	Ne
Na	Mg												Al	Si	P	S	Cl	Ar
K	Ca		Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr		Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn						

Lanthanoids*	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Actinoids**	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

Biota (d):

H																		He
Li	Be												B	C	N	O	F	Ne
Na	Mg												Al	Si	P	S	Cl	Ar
K	Ca		Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr		Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn						

Lanthanoids*	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Actinoids**	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

Fig 18: *Overview of available data for soil (a), freshwater (b), sea water (c) and biota (d). Green: No data below DL. Yellow: Some data below DL. Red: All (or most) data below DL.*

4.4 Analytical accuracy of ICP-MS

To check the accuracy of the methods two approaches were used: Standard Reference Materials (SRM) and comparison with other analytical methods (i.e. Neutron Activation Analysis). The latter was included because some of the samples had already been analysed using this method in a pre-project (Hertel-Aas, 2013).

4.4.1 *Standard reference materials (SRM)*

In order to monitor the efficiency of the sample digestion and correctness of the element analyses, 2–3 samples of SRM, as similar as possible to the type of material digested in a specific series, was included in each of the 10 series digested. The following reference materials were used:

Plant materials:

- 1575 - Pine needles, NIST
- NCS ZC73014 - Tea, NCS

Animal materials:

- 1486 - Bone meal, NIST
- Dolt 4 - Fish Liver, NRC-CNRC
- Dorm 3 - Fish Protein, NRC-CNRC
- 1577b - Bovine Liver, NIST

Soil:

- 2709a - San Joaquin soil, NIST

An overview of available SRM element data for biota are shown in Fig. 19.

H																		He
Li	Be												B	C	N	O	F	Ne
Na	Mg												Al	Si	P	S	Cl	Ar
K	Ca		Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr		Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**	Lr	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn						

Lanthanoids*	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Actinoids**	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No

Fig 19: *Overview of standard reference materials (SRM) for biota. Green: More than one type of SRM. Yellow: One type of SRM or (non-certified) information values given. Red: No data available*

As evident from Appendix 1, most analytical data for biota SRMs were within the range of the certified value (or did not deviate beyond ± 10% of the mean of the SRM value). However, for some element-SRM combinations larger discrepancies between measured and reported values for SRM were evident, but only in a few cases the measured value was lower than 70% of the reported value – for instance for Si (ca. 25% for Tea), Th (ca. 60% for Pine needles and Tea) and Zn (around 60% for Bone meal). The latter case is due to a possible matrix interference in ICP-MS (there seems to be a similar, but less pronouced pattern for Fe, Mg, Pb and (non-certified) Cu).

The generally largest discrepancies between measured and reported values for SRM are found for San Joaquin soil. However, for many soils, it is well know that the acid digest fraction of many elements does not necessary represent the total amount. The (main) reason for this is that many silcate minerals (e.g. quartz and some feldspars) are not soluble in hot nitric acid. Obvious examples in this respect from Appendix 1 are Na (where 4% is acid soluble) and K (where 14% is acid soluble). However, the biological relevance of elements bound in this “residual” fraction is low (since even under extreme ambient chemical conditions the element remains unextractable). In fact, it is a moot point whether the acid digest geochemical phase of elements is a suitable representative of the bioavailable fraction. It probably is not – a better representation should, in principle, be exchangeable or soluble concentrations in soil.

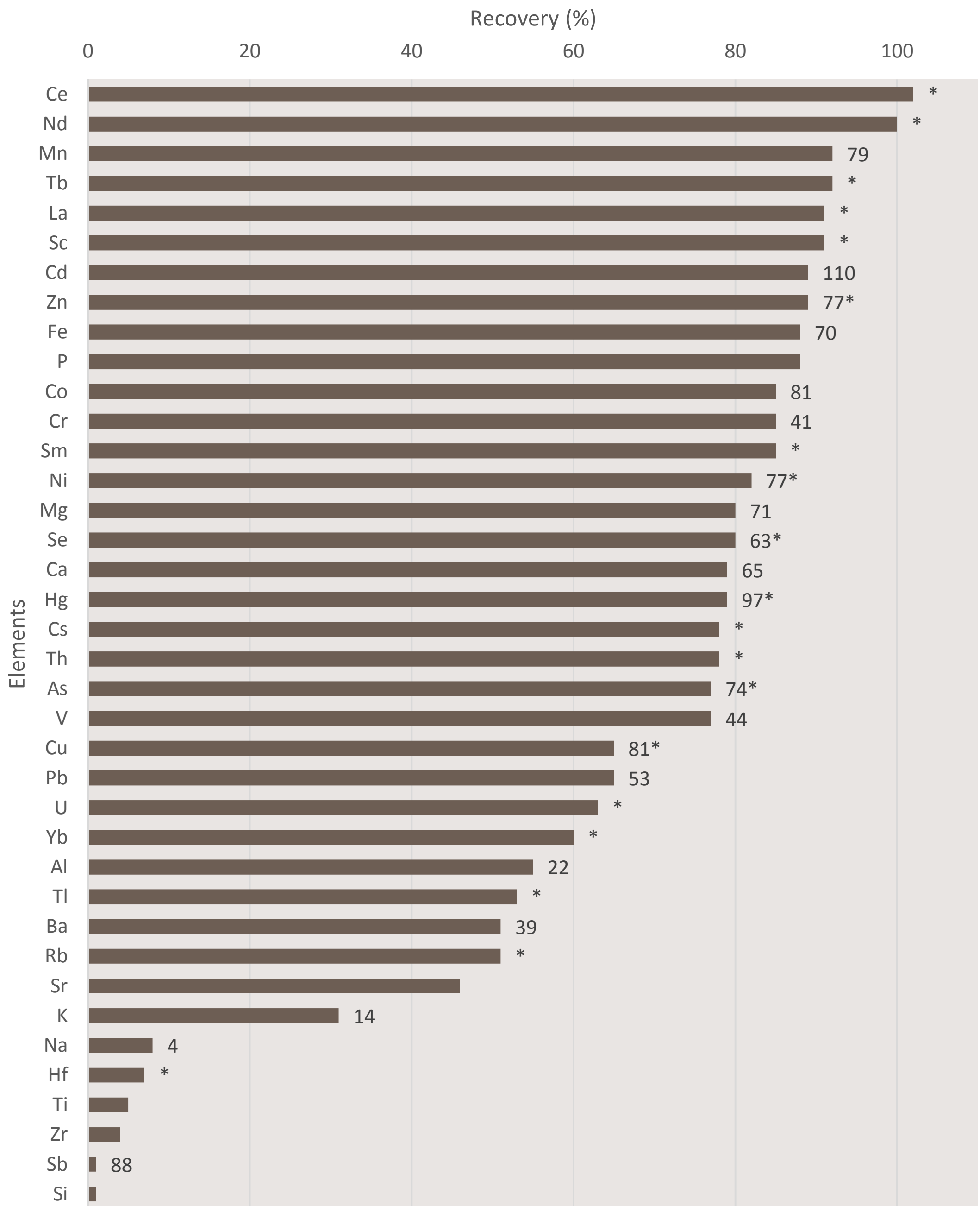


Fig. 20: *Ratios of measured vs reported concentrations of elements in 2709a - San Joaquin soil (NIST). Numbers on the right refer to reported acid soluble fraction. *Only information value (not certified).*

Nevertheless, as evident from Fig. 20, the acid digest fraction seems to be fairly representative of the total for most elements where data is available. Note also the slightly higher extractability using our digestion method for most elements compared with reported acid soluble fraction. Besides Na and K, the elements Hf, Ti, Zr and Sb also show very low acid extractability from the SRM soil (Fig. 20). The low measured concentration of Sb is somewhat surprising considering the high reported acid solubility (88%). This could be due to some kind of methodical issue, but this is contradicted by the fact that the measured Sb concentrations in biota SRMs are generally highly accurate.

4.4.2 Comparison with other analytical methods

SRM does not necessarily cover the same concentration range, elements and sample types relevant for our study. Since some of the same samples had already been analysed using Neutron Activation Analysis (NAA) we decided to compare results and include this as supplementary information in this report. Since no SRM was used in connection with the NAA analyses, results must be used with care. Nonetheless, NAA results confirming the ICP-MS data is at least an indication analytical quality. Only data above DL was included in the comparison. Available data for biota is shown in Fig. 21, and details are given in Appendix 2.

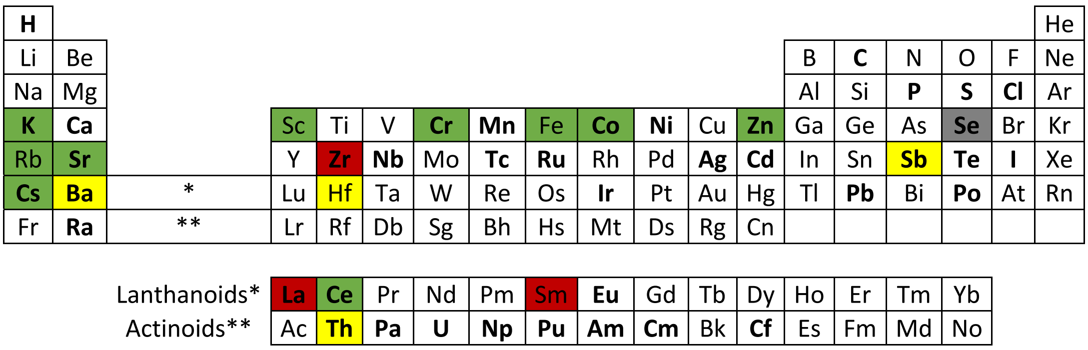


Fig 21: *Overview of available NAA data for biota. Green: More than one RAP / several parts of RAPs. Yellow: Some data. Red: Limited data (NAA below DL). Grey: Should not be included (NAA not plausible).*

Results for Ba, Ce, Co, Sr, Fe and Zn showed a good match between the two methods with average ratios between 0.7 and 1.3 – or even 0.9–1.1 in many cases. Overall, this was also the case for Cs, Rb, Cr and Sc but here deviations for some samples types were observed, in most cases this was likely due to low concentrations (near DL for either ICP-MS or NAA). Also biota concentrations of Sb had a ICP/NAA ratio close to 1, even though the amount of data were limited. Se showed a good match between methods for soil, but for biota the measured concentration of the element was considerably lower for NAA. This could be due to loss of selenium during sample preparation e.g. ashing (note here that the soil was not ashed). The match between NAA and ICP-MS was generally poor for Hf and Zr (<0.1–0.2), whereas ratios for La, Sm and Th were slightly better ranging between 0.3–0.6. However, as evident from Appendix 2, only very limited data were available for all these elements.

The possible matrix interferences in ICP-MS reported for SRM Bone Meal in the previous sections is supported by the NAA data for crab shell (CA HT) – with lower observed ratios for Fe (0.64) and Zn (0.54). Yet a decision was made not to perform any data corrections.

Potassium-40 results from gamma spectrometry (HPGe) have been used to generate total K in biota, using natural isotopic ratios, and these data show good agreement with ICP-MS data with ICP/HPGe ratios very close to 1.

Since NAA gives the total content of elements in soil it may be fruitful to also compare these results with the acid digest fraction from ICP-MS (assuming that the NAA results are correct). This is also the case for K in soil (derived from HPGe K-40 data). Comparison of soil data is shown in Table 4.

Table 4: *Ratios of acid digest elements (ICP-MS) and total concentrations from NAA for soil samples T1–T16. Only results above detection limit has been included. In the case of potassium, soil samples T17–T21 are also included. Total K in soil has been derived from HPGe ^{40}K data (not NAA).*

Element	N	Median	Min	Max
Sm	15	1.21	0.73	2.15
Ce	16	1.07	0.84	1.30
Se	13	0.83	0.64	1.92
La	16	0.94	0.77	1.38
Th	16	0.89	0.35	1.70
Cs	16	0.79	0.68	1.10
Zn	16	0.73	0.51	0.98
Fe	16	0.70	0.32	1.02
Co	16	0.66	0.50	0.97
Sc	16	0.67	0.29	0.98
Rb	15	0.60	0.21	1.07
Cr	16	0.61	0.22	0.89
Yb	14	0.51	0.12	0.75
Sr	16	0.35	0.12	1.02
K	23	0.36	0.07	0.89
Ba	9	0.31	0.07	0.53
Sb	4	0.07	0.04	0.51
Hf	15	0.09	0.02	0.60
Zr	7	0.04	0.02	0.07

As was the case for SRM soil, the extractability of Sb was low, especially for soil samples with low organic matter content (as given by LOI). However, only 4 samples were above detection limit for both methods ICP-MS and NAA.

5 Data treatment

5.1 Derivation of whole body concentrations

As described in the Introduction (Section 1.5), the standard procedure for presenting information on transfer to wildlife in the context of environmental risk assessments, is to define CRs in terms of whole body activity concentrations. This focus on activity concentrations that are representative of an entire organism, as oppose to particular organs within that organism, reflects the type of information that is usually available for the purpose of contextualizing wildlife exposures. A large proportion of published data on the effects of ionizing radiation pertains to whole organism exposures (IAEA, 2014), and is conducive neither to detailed interpretation in terms of the dose response for organ exposures nor to the definition of radiosensitivity for those organs (Yankovich et al., 2010).

For many of the organisms considered within this report the above consideration is not an issue because elemental concentrations are naturally defined in terms of the whole organism – consider for example wavy hair grass, honey bees and bladder wrack. However, for mice, moose, ducks, frogs (excluding eggs and tadpoles), trout, crabs and plaice, data have been categorized in relation to organs/body parts. There is a requirement therefore to convert the available information for these animals into a format that is compatible with the standard used for wildlife risk assessments and with that used for other organisms covered in the report. For this purpose, the following equation was used:

$$C_b = \sum_o C_o \times R_o \times m_o \qquad \text{(eq. 2)}$$

Where:
C_b = concentration of an element for the whole-body of the organism 'b' (µg/g, fresh weight)
C_o = concentration of an element in organ or tissue 'o' (µg/g, dry weight)
R_o = dry weight to fresh weight conversion factor for organ 'o'
m_o = relative mass of organ 'o' (see text for more information)

Information regarding C_o are given in Appendix 3. However, due to the large amount of data only summary statistics are included in this report. Values for R_o and m_0 for different organisms/tissues used are summarized in Table 5.

Table 5: *Dry weight to fresh weight conversion factors (R_o) and relative mass of various organs (m_0). Note that m_0 has been derived from fractional masses of various organs/body parts summarized in Appendix 8 (Table A8.1), assuming that muscles, bone and liver represent the whole organism. For R_o median values for all available specimens has been used (to minimize the risk of random errors).*

RAP	O	R_o	m_o
AN	M	2.3E-01	4.55E-01
AN	B	4.4E-01	4.55E-01
AN	L	2.5E-01	9.09E-02
AN	G	2.0E-01	0
AP		8.9E-01*	1
CA	ST	3.1E-01	2.50E-01
CA	HT	5.9E-01	7.50E-01
CE	M	2.7E-01	8.40E-01
CE	B	2.6E-01	1.18E-01
CE	L	2.5E-01	4.20E-02
CE	G	2.0E-01	0
FU		3.0E-02	1
LU		1.9E-01	1
MU	M	2.9E-01	8.40E-01
MU	B	3.3E-01	1.18E-01
MU	L	2.8E-01	4.20E-02
MU	G	4.1E-01	0
PI		2.7E-01	1
PL	M	2.0E-01	8.23E-01
PL	B	2.9E-01	1.65E-01
PL	L	2.5E-01	1.27E-02
PL	G	2.2E-01	0
PO		1.6E-01	1
RA	M	2.3E-01	7.14E-01
RA	B	4.0E-01	2.14E-01
RA	L	3.3E-01	7.14E-02
RA	G	4.6E-01	0
RA	E1	4.4E-01	0
RA	E2	5.5E-03	1
RA	TAD	3.2E-02	1
SA	M	2.1E-01	8.23E-01
SA	B	3.1E-01	1.65E-01
SA	L	5.6E-01	1.27E-02
SA	G	3.2E-01	0

* Since dead bees were slightly pre-dried when sampled, the R_o shown here are likely to be too high. Data from Barnett et al. (2013) report the dry matter content of bumblebees (*Bombus Spp.*) to be 0.35–0.40 (average: 0.37).

5.2 Derivation of concentration ratios

Element specific whole body concentration ratios ($CR_{b,X}$) have been derived using eq. 1 (as specified in Section 1.5) in combination with eq. 2. Due to the extensive amount of data, a detailed description of all relevant RAP and soil/water combinations could not be included in this report. However, an overview of soil, fresh water and seawater samples used to generate $CR_{b,X}$ for the different RAPs is summarised in Table 6. Note that two sets of $CR_{b,X}$ have been derived for ducks (*Anatidae)* and frogs (*Ranidae)* using freshwater or soil concentrations.

For more information about soil, freshwater and seawater data used to generate $CR_{b,X}$ we refer to Appendix 4, 5 and 6, respectively.

Table 6: *Soil or water data (X = T, F or M) used in the derivation of concentration ratios for various RAPs*

RAP (Family)	Life-stage	Soil (T)	Freshwater (F)	Sea water (M)
Anatidae	-	T2, T12, T15, T17, T21	F1–F5	-
Apidea	-	(T1–T23)*	-	-
Cancridae	-	-	-	(M1, M2)*
Cervidae	Adult/calf	(T1–T23)*	-	-
Fucaceae	-	-	-	M1–M7
Lumbricidiae	-	T1–T5, T11	-	-
Muridae	Adult/juvenile	(T8–T10, T16, T23)*	-	-
Pinaceae	-	T1–T5, T8–T10, T16	-	-
Pleuronectidae	-	-	-	(M1, M2)*
Poaceae	-	T2–T5, T7–T10, T16	-	-
Ranidae	Adult/juvenile frog	T6, T12–T15	F1, F3, F4, F6	-
	Spawn of eggs	-	F9, F11–F14	-
	Tadpoles	-	F10, F14, F15	-
Salmonidae		-	F7+8, F16	-

*See main text below for more information

In most cases, one sample of a particular RAP was linked with a soil or water sample from a specific locality. However, for some of the RAPs soil or water data from more than one locality had to be used for all individual samples. This approach was taken to reflect large home ranges:

- Moose (*Cervidae*) is likely to have been grazing most parts of Tjøtta (and even neighbouring islands) days or weeks before they were hunted. Consequently, all soil samples (T1-T23) are considered relevant for CE1–CE11.
- Bees (*Apidae*) have an action radius of ca 3 km. Therefore, all soil samples within this circle are relevant for AP1.

In other cases, it was not possible to get water samples from the exact location of the RAP sampling:

- Crabs (*Cancridae*) and plaice (*Pleuronatidae*) were collected by a local fisherman. The nearest seawater sites were chosen in these cases (M1 and M2).
- Unfortunately, no specific soil sample is available for the mice site (MU1). Consequently, data from five soil sites – all a few hundred metres away were used for *Muridae* CR derivation (T8-10, T16, and T23).

A modified version of eq. 1 was used for the cases where soil or water data from more than one site was used to generate $CR_{b,X}$:

$$CR_{b,X} = \frac{C_b}{AMC_X} \quad \text{(eq. 3)}$$

Where:
C_b= concentration of an element for the whole-body of organism b (µg/g, fresh weight)
AMC_X= arithmetic mean concentration of an element in medium x – i.e. soil (dry weight), freshwater or sea water (µg/g)

5.3 Summary statistics

For a particular element, the arithmetic mean (AM) of $CR_{b,X}$ for all specimens/samples *i* of an organism was calculated using:

$$AM = \frac{1}{n}\sum_{i=1}^{n} CR_{b,X,i} \quad \text{(eq. 4)}$$

For the cases where individual media concentrations were used the CR arithmetic standard deviation (ASD) was calculated using:

$$ASD = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(CR_{b,X,i} - AM)^2} \quad \text{(eq. 5)}$$

The following equation was used for the CRs where the soil or water data represented an arithmetic mean (in order to include variability in media concentrations):

$$ASD = \frac{AM_b}{AM_x}\sqrt{\beta_b^2 + \beta_X^2} \quad \text{(eq. 6)}$$

Eq. 6 is a simplified version of the original equation, which is obtained upon the application of the first order Taylor expansion. Here it has been assumed that the covariance between concentration in biota and media is negligible.

β is defined as follows:

$$\beta = \frac{ASD}{AM} \quad \text{(eq. 7)}$$

Geometric mean (GM) and standard deviation (GSD) was calculated from AM and ASD using:

$$GM = \frac{AM}{\sqrt{\beta^2+1}} \quad \text{(eq. 8)}$$

$$GSD = \exp\sqrt{\ln(\beta^2 + 1)}\,) \quad \text{(eq. 9)}$$

5.4 Treatment of data below detection limit

Prior to the derivation of summary statistics, all data below the element and sample specific detection limit (DL) were replaced with values equal to ½ of the relevant DL. Although more robust methods are available for dealing with values below DL (Wood et al., 2011), their complexity and concomitant requirement for protracted analysis implementation obviated their inclusion in this report. The simple method applied is considered to suffice. Substituted data have been treated as "real" values in the derivation of statistical data.

In Appendix 3, no summary statistics except median is reported for an element where ≥50 % of the data for a tissue category is below DL. Consequently, for e.g. vertebrates – where the whole body concentration is based on levels in different tissues – we have as a general rule included summary statistics in Section 6.1 if the sums of cases for muscles (M), bone (b) and liver (l) above DL exceeds 50%. Still, in cases where one particular tissue/organ is by far the main contributor to the whole body concentration, an even higher percentage of data below DL have been accepted. For example, all bone data and all except one muscle value for silver in *Ranidae* were below the detection limit. However, all liver samples were above. Since Ag in liver is the main contributor to the whole body concentration, it is still reasonable to include statistical information for silver for *Ranidae*, even though only 37 % of the tissue data were above DL.

5.5 Outliers and extreme cases

Some of the reported RAP tissue concentrations are clearly outside the range of which we expect them to be – e.g. when compared to similar samples from the same area. A detailed statistical examination of all (raw) data was not performed for this report, only simple screening and subsequent removal of the most obvious cases from the statistical data. However, the removed outliers are included and separately identified in Appendix 3. Important examples are:

- Very high levels of Pb, Bi and Sb in muscle samples of moose CE9 and CE10, most likely from ammunition used to hunt the animal.
- High levels of different rare earth elements and actinides in wavy hair grass – either PO9 or PO10 probably due to contamination from soil (CR for these elements are low and this increases the importance of surficial contamination).
- High levels of Al, Au, Ce, Co, Cr, Er, Fe, Ho, La, Li, Nd, Ni, Pr, Sc, Sm, Sn, Tb, Ti, V, Y and Yb in frog RA3 muscle sample most likely due to contamination.

Prior to the calculation of whole body CR summary statistics for vertebrates, cases such as those presented above, were substituted with the median concentration in muscles for the other samples/specimens e.g. median muscle values of Pb in moose CE1–C8 and CE11 were used for CE9 and CE10.

Note that information regarding substitution of contaminated samples of muscle, bone or liver for vertebrates is not included in the whole body CR summary statistics presented in Section 6.1, but are only identified in Appendix 3. Extreme cases for other RAPs are identified and excluded in Section 6.1.

Some additional data were excluded from the summary statistics of Section 6.1 due to anomalous concentrations in soil or water, resulting in very high impact of a single sample on the data variability for a particular RAP-element combination. The most obvious example concern soil based CRs for frogs (Table 15), where very high whole body CRs of suite of elements – including Cs – were observed for frog RA1+2. As evident from Appendix 6, concentrations of Cs in RA1+2 tissues are not very different from those of other frogs. However, the soil concentration at the relevant site (T6) is very low compared to other frog sites (T12-T15).

It should be emphasised that such removal of CR data is subjective (and might even be controversial). We have therefore included the identified outliers / extreme cases for the user to make his/her own judgement whether to use or exclude.

6 Results

This section is divided in four parts:

- **Section 6.1** summarises the stable element $CR_{b,X}$ for all 12 reference animals and plants (including life-stages for frogs). For ducks and frogs separate tables referring to soil and water $CR_{b,X}$ are presented. $CR_{b,X}$ referring to soil, freshwater and sea water are specified as follows:

  Soil ➔ $\boldsymbol{CR_{b,T}}$
  Freshwater ➔ $\boldsymbol{CR_{b,F}}$
  Seawater ➔ $\boldsymbol{CR_{b,M}}$

- Similar data regarding $CR_{b,X}$ for additional radionuclides in plants (PO, PI) and bees (AP) are shown **Section 6.2**.

- A short summary of the data for all RAPs plus information about the importance of various organs/tissues for the element specific $CR_{b,X}$ for vertebrates (MU, CE, AN, RA, SA, PL) and crabs (CA) are provided in **Section 6.3**.

- Finally, a short case explores the use of stable Cs-133 as an analogue for radioactive Cs-137 (**Section 6.4**).

6.1 CR summary tables for RAPs

6.1.1 Poaceae (PO)

Table 7: *$CR_{b,T}$ fresh weight plants / dry weight soil.*

Element	AM	ASD	GM	GSD	Med	N	
Ag	-	-	-	-	6.2E-03	10	[1]
Al	3.5E-04	2.4E-04	2.9E-04	1.9	3.5E-04	10	
As	7.1E-04	3.7E-04	6.3E-04	1.6	7.5E-04	10	
Au	1.5E-01	1.3E-01	1.1E-01	2.1	9.7E-02	10	
B	1.8E-01	8.9E-02	1.7E-01	1.6	1.8E-01	10	
Ba	1.7E-02	9.9E-03	1.5E-02	1.7	1.5E-02	10	
Be	-	-	-	-	1.2E-03	10	[1]
Bi	1.7E-03	1.4E-03	1.3E-03	2.0	1.2E-03	10	
Ca	5.6E-02	6.0E-02	3.8E-02	2.4	3.0E-02	10	
Cd	1.2E-02	6.1E-03	1.0E-02	1.6	1.3E-02	10	
Ce	1.7E-04	1.1E-04	1.5E-04	1.8	1.4E-04	9	2.2E-03 [2a]
Co	5.7E-03	4.3E-03	4.6E-03	2.0	6.0E-03	10	
Cr	-	-	-	-	3.5E-04	10	[1]
Cs	2.1E-01	2.5E-01	1.4E-01	2.6	1.3E-01	10	
Cu	6.1E-02	3.5E-02	5.2E-02	1.7	5.5E-02	10	
Er	1.7E-04	1.8E-04	1.2E-04	2.3	1.0E-04	9	2.2E-03 [2b]
Fe	9.8E-04	6.0E-04	8.4E-04	1.7	1.1E-03	10	
Ga	3.5E-04	2.8E-04	2.8E-04	2.0	3.2E-04	10	
Hf	-	-	-	-	8.2E-04	10	[1]
Hg	9.1E-03	7.3E-03	7.1E-03	2.0	6.3E-03	10	
Ho	1.5E-04	1.4E-04	1.1E-04	2.2	7.8E-05	9	9.3E-04 [2b]
K	1.9E+00	1.3E+00	1.6E+00	1.8	1.8E+00	10	
La	2.0E-04	1.5E-04	1.6E-04	2.0	1.4E-04	9	3.4E-03 [2a]
Li	4.1E-03	4.7E-03	2.7E-03	2.5	1.8E-03	10	
Lu	1.9E-04	2.1E-04	1.3E-04	2.4	9.5E-05	9	1.0E-02 [2b]
Mg	7.6E-02	6.1E-02	5.9E-02	2.0	6.4E-02	10	
Mn	3.3E-01	3.5E-01	2.3E-01	2.4	2.6E-01	10	
Mo	4.0E-01	3.5E-01	3.0E-01	2.1	2.3E-01	10	
Na	5.4E-02	3.7E-02	4.5E-02	1.9	4.0E-02	10	
Nd	1.5E-04	1.0E-04	1.3E-04	1.8	1.1E-04	9	1.8E-03 [2a]
Ni	5.3E-02	4.2E-02	4.1E-02	2.0	5.9E-02	10	
P	3.2E-01	8.2E-02	3.1E-01	1.3	3.2E-01	10	
Pb	8.2E-04	5.3E-04	6.8E-04	1.8	7.7E-04	10	
Pr	1.7E-04	1.2E-04	1.3E-04	1.9	1.2E-04	9	2.4E-03 [2a]
Rb	1.1E+00	7.4E-01	8.8E-01	1.9	9.6E-01	10	
S	9.7E-02	7.0E-02	7.8E-02	1.9	7.1E-02	10	
Sb	1.6E-01	1.7E-01	1.0E-01	2.4	8.2E-02	10	
Sc	2.1E-04	2.3E-04	1.5E-04	2.4	1.7E-04	9	1.7E-03 [2b]
Se	-	-	-	-	1.0E-03	10	[1]
Si	3.8E-01	1.7E-01	3.4E-01	1.5	3.2E-01	10	
Sm	2.0E-04	2.0E-04	1.4E-04	2.3	1.1E-04	10	
Sn	1.2E-02	1.4E-02	8.3E-03	2.4	9.0E-03	10	
Sr	2.0E-02	1.7E-02	1.6E-02	2.1	1.5E-02	10	
Tb	1.7E-04	1.3E-04	1.4E-04	1.9	1.1E-04	10	
Th	1.4E-04	1.4E-04	1.0E-04	2.2	1.1E-04	9	2.6E-03 [2a]
Ti	1.2E-03	9.5E-04	9.1E-04	2.0	9.0E-04	10	
Tl	8.3E-03	7.0E-03	6.3E-03	2.1	8.2E-03	10	
Tm	-	-	-	-	8.6E-05	9	[1]
U	1.9E-04	1.3E-04	1.5E-04	1.9	2.0E-04	10	
V	4.0E-04	3.4E-04	3.0E-04	2.1	3.2E-04	10	
Y	1.7E-04	1.6E-04	1.2E-04	2.2	9.4E-05	9	1.0E-03 [2b]
Yb	1.6E-04	1.3E-04	1.2E-04	2.0	1.0E-04	9	7.2E-03 [2b]
Zn	2.3E-01	1.9E-01	1.7E-01	2.1	1.5E-01	10	
Zr	-	-	-	-	1.3E-04	10	[1]

Comments to the data:

[1] Typical value – best estimates from available data (Section 5.4)

[2] Shown data for PO9 (a) and PO10 (b) excluded (Section 5.5)

6.1.2 *Pinaceae (PI)*

Table 8: CRb,T (fresh weight plants / dry weight soil)

Element	AM	ASD	GM	GSD	Med	N	
Ag	-	-	-	-	1.2E-02	10	[1]
Al	3.2E-03	3.2E-03	2.2E-03	2.3	2.1E-03	10	
As	-	-	-	-	5.8E-04	10	[1]
Au	-	-	-	-	1.7E-02	10	[1]
B	6.8E-01	2.7E-01	6.3E-01	1.5	7.5E-01	10	
Ba	4.4E-02	5.4E-02	2.8E-02	2.6	2.7E-02	10	
Be	-	-	-	-	2.1E-03	10	[1]
Bi	9.4E-03	1.2E-02	5.8E-03	2.7	4.3E-03	10	
Ca	1.1E-01	1.2E-01	7.9E-02	2.4	6.7E-02	10	
Cd	8.0E-02	7.1E-02	6.0E-02	2.1	5.7E-02	10	
Ce	1.2E-04	9.2E-05	9.8E-05	1.9	9.8E-05	10	
Co	2.3E-02	3.1E-02	1.4E-02	2.7	1.1E-02	10	
Cr	-	-	-	-	6.9E-04	10	[1]
Cs	3.4E-01	3.8E-01	2.3E-01	2.5	1.5E-01	10	
Cu	1.9E-01	1.0E-01	1.7E-01	1.6	1.7E-01	10	
Er	1.7E-04	1.7E-04	1.2E-04	2.3	9.6E-05	10	
Fe	1.1E-03	7.6E-04	8.8E-04	1.9	1.1E-03	10	
Ga	3.9E-04	3.9E-04	2.7E-04	2.3	2.3E-04	10	
Hf	-	-	-	-	1.4E-03	10	[1]
Hg	2.0E-02	2.4E-02	1.3E-02	2.5	1.1E-02	9	3.2E-01 [2]
Ho	1.3E-04	1.2E-04	9.8E-05	2.1	9.7E-05	10	
K	1.9E+00	1.3E+00	1.6E+00	1.8	1.7E+00	10	
La	1.3E-04	9.7E-05	1.1E-04	1.9	1.1E-04	10	
Li	3.3E-03	4.2E-03	2.1E-03	2.6	1.4E-03	10	
Lu	2.2E-04	2.3E-04	1.5E-04	2.4	1.2E-04	10	
Mg	1.3E-01	1.0E-01	1.0E-01	2.0	1.2E-01	10	
Mn	1.7E-01	1.3E-01	1.3E-01	2.0	1.1E-01	10	
Mo	5.9E-02	3.5E-02	5.0E-02	1.7	5.1E-02	10	
Na	6.2E-02	5.0E-02	4.9E-02	2.0	3.7E-02	10	
Nd	1.2E-04	7.9E-05	9.5E-05	1.9	9.9E-05	10	
Ni	1.2E-01	1.2E-01	8.6E-02	2.3	8.5E-02	10	
P	7.0E-01	1.6E-01	6.8E-01	1.3	6.9E-01	10	
Pb	2.3E-04	1.4E-04	2.0E-04	1.8	1.8E-04	10	
Pr	1.3E-04	9.6E-05	1.0E-04	2.0	1.0E-04	10	
Rb	1.6E+00	1.1E+00	1.4E+00	1.8	1.6E+00	10	
S	1.8E-01	1.3E-01	1.4E-01	2.0	1.3E-01	10	
Sb	2.2E-01	3.2E-01	1.2E-01	2.9	6.2E-02	10	
Sc	1.8E-04	1.4E-04	1.5E-04	1.9	1.6E-04	10	
Se	-	-	-	-	1.6E-03	10	[1]
Si	2.5E-02	1.6E-02	2.1E-02	1.8	2.0E-02	10	
Sm	1.2E-04	8.1E-05	9.5E-05	1.9	1.0E-04	10	
Sn	-	-	-	-	4.2E-03	10	[1]
Sr	4.6E-02	3.8E-02	3.5E-02	2.1	3.2E-02	10	
Tb	1.3E-04	9.8E-05	1.1E-04	1.9	1.2E-04	10	
Th	1.2E-04	1.1E-04	8.8E-05	2.2	6.7E-05	10	
Ti	1.0E-03	5.4E-04	9.1E-04	1.6	9.8E-04	10	
Tl	5.3E-03	3.8E-03	4.3E-03	1.9	4.2E-03	10	
Tm	-	-	-	-	1.2E-04	10	[1]
U	1.8E-04	1.5E-04	1.4E-04	2.1	1.4E-04	10	
V	3.3E-04	3.2E-04	2.4E-04	2.2	2.3E-04	10	
Y	1.4E-04	1.3E-04	1.1E-04	2.2	8.1E-05	10	
Yb	2.1E-04	2.0E-04	1.5E-04	2.2	1.2E-04	10	
Zn	5.1E-01	4.6E-01	3.8E-01	2.2	3.1E-01	10	
Zr	-	-	-	-	1.2E-04	10	[1]

Comments to the data:

Note that only the annual shoots are considered (not the whole tree)

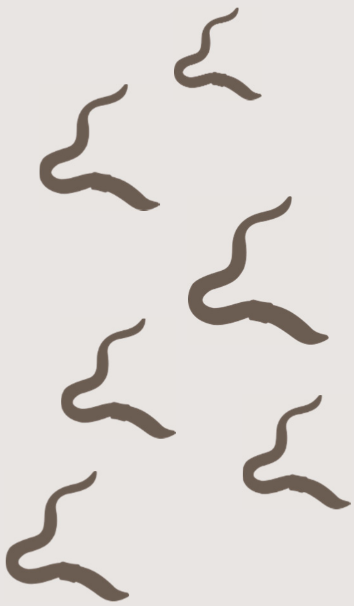
[1] Typical value – best estimates from available data (Section 5.4)

[2] Shown value for PI1 excluded (Section 5.5)

6.1.3 Lumbricidiae (LU)

Table 9: *$CR_{b,T}$ fresh weight earthworm / dry weight soil*

Element	AM	ASD	GM	GSD	Med	N
Ag	3.3E-01	3.3E-01	2.3E-01	2.3	2.8E-01	14
Al	1.7E-02	1.3E-02	1.4E-02	2.0	1.2E-02	14
As	1.9E-01	9.6E-02	1.7E-01	1.6	1.9E-01	14
Au	2.8E-01	2.2E-01	2.2E-01	2.0	2.4E-01	14
B	3.1E-02	1.4E-02	2.8E-02	1.5	3.1E-02	14
Ba	4.1E-02	2.9E-02	3.4E-02	1.9	4.4E-02	14
Be	2.1E-02	1.2E-02	1.8E-02	1.7	2.1E-02	14
Bi	1.9E-02	1.6E-02	1.4E-02	2.1	1.2E-02	14
Ca	4.1E-02	2.4E-02	3.6E-02	1.7	4.1E-02	14
Cd	6.8E+00	4.6E+00	5.6E+00	1.9	5.3E+00	14
Ce	1.6E-02	1.4E-02	1.2E-02	2.1	1.2E-02	14
Co	9.6E-02	4.4E-02	8.8E-02	1.5	8.4E-02	14
Cr	4.2E-02	5.2E-02	2.6E-02	2.6	1.9E-02	14
Cs	1.9E-02	1.1E-02	1.6E-02	1.7	1.7E-02	14
Cu	1.5E-01	8.3E-02	1.3E-01	1.7	1.3E-01	14
Er	1.7E-02	1.5E-02	1.3E-02	2.1	1.2E-02	14
Fe	1.7E-02	1.3E-02	1.3E-02	2.0	1.1E-02	14
Ga	1.6E-02	1.5E-02	1.2E-02	2.1	9.7E-03	14
Hf	5.8E-03	4.0E-03	4.7E-03	1.9	5.3E-03	14
Hg	5.1E+00	5.1E+00	3.6E+00	2.3	3.2E+00	14
Ho	1.7E-02	1.4E-02	1.3E-02	2.1	1.2E-02	14
K	8.8E-01	6.5E-01	7.1E-01	1.9	6.9E-01	14
La	1.8E-02	1.4E-02	1.4E-02	2.0	1.5E-02	14
Li	1.7E-02	1.4E-02	1.3E-02	2.0	1.5E-02	14
Lu	1.8E-02	1.6E-02	1.4E-02	2.1	1.2E-02	14
Mg	4.8E-02	1.6E-02	4.6E-02	1.4	4.8E-02	14
Mn	2.2E-02	1.6E-02	1.8E-02	1.9	1.6E-02	14
Mo	2.6E+00	2.1E+00	2.0E+00	2.0	1.9E+00	14
Na	1.2E+00	4.2E-01	1.2E+00	1.4	1.1E+00	14
Nd	1.6E-02	1.4E-02	1.2E-02	2.1	1.3E-02	14
Ni	2.5E-02	1.8E-02	2.0E-02	1.9	1.8E-02	14
P	1.9E+00	4.8E-01	1.8E+00	1.3	1.8E+00	14
Pb	6.6E-02	5.8E-02	5.0E-02	2.1	4.1E-02	14
Pr	1.6E-02	1.4E-02	1.2E-02	2.1	1.3E-02	14
Rb	1.2E-01	7.8E-02	1.0E-01	1.8	1.0E-01	14
S	1.9E+00	1.0E+00	1.7E+00	1.7	1.6E+00	14
Sb	1.8E+00	1.5E+00	1.3E+00	2.1	1.4E+00	14
Sc	1.6E-02	1.4E-02	1.2E-02	2.2	9.5E-03	14
Se	3.2E+00	2.2E+00	2.6E+00	1.9	2.8E+00	14
Si	6.2E-01	3.3E-01	5.5E-01	1.6	6.6E-01	14
Sm	1.5E-02	1.4E-02	1.2E-02	2.2	1.2E-02	14
Sn	1.3E-01	1.0E-01	1.1E-01	1.9	1.2E-01	14
Sr	3.4E-02	2.3E-02	2.8E-02	1.9	3.1E-02	14
Tb	1.6E-02	1.4E-02	1.2E-02	2.1	1.2E-02	14
Th	1.6E-02	1.4E-02	1.2E-02	2.1	1.2E-02	14
Ti	1.0E-01	7.5E-02	8.5E-02	1.9	9.9E-02	14
Tl	7.8E-02	4.2E-02	6.8E-02	1.7	6.8E-02	14
Tm	1.8E-02	1.5E-02	1.3E-02	2.1	1.2E-02	14
U	4.4E-02	2.9E-02	3.7E-02	1.8	3.3E-02	14
V	1.8E-02	1.4E-02	1.4E-02	2.0	1.3E-02	14
Y	1.7E-02	1.4E-02	1.3E-02	2.1	1.2E-02	14
Yb	1.8E-02	1.5E-02	1.3E-02	2.1	1.1E-02	14
Zn	1.5E+00	8.8E-01	1.3E+00	1.7	1.3E+00	14
Zr	4.1E-03	3.1E-03	3.3E-03	2.0	3.0E-03	14



6.1.4 Apidea (AP)

Table 10: *$CR_{b,T}$ fresh weight bees / dry weight soil*

Element	AM	ASD	GM	GSD	N	Med
Ag	1.8E-01	9.5E-02	1.6E-01	1.6	1	1.8E-01
Al	2.3E-02	1.5E-02	1.9E-02	1.8	1	2.3E-02
As	1.3E-02	1.0E-02	1.0E-02	2.0	1	1.3E-02
Au	6.6E-01	5.5E-01	5.1E-01	2.1	1	6.6E-01
B	1.5E+00	1.0E+00	1.2E+00	1.9	1	1.5E+00
Ba	7.6E-02	4.2E-02	6.6E-02	1.7	1	7.6E-02
Be	2.6E-02	1.7E-02	2.2E-02	1.8	1	2.6E-02
Bi	5.5E-02	3.8E-02	4.5E-02	1.9	1	5.5E-02
Ca	4.1E-02	6.8E-02	2.2E-02	3.1	1	4.1E-02
Cd	2.4E-01	1.3E-01	2.1E-01	1.7	1	2.4E-01
Ce	4.5E-03	2.8E-03	3.8E-03	1.8	1	4.5E-03
Co	5.7E-02	4.5E-02	4.4E-02	2.0	1	5.7E-02
Cr	2.7E-02	2.1E-02	2.1E-02	2.0	1	2.7E-02
Cs	3.3E-01	2.4E-01	2.7E-01	1.9	1	3.3E-01
Cu	3.7E+00	2.5E+00	3.0E+00	1.9	1	3.7E+00
Er	4.1E-03	2.7E-03	3.4E-03	1.8	1	4.1E-03
Fe	1.3E-02	9.0E-03	1.1E-02	1.8	1	1.3E-02
Ga	1.2E-02	9.1E-03	1.0E-02	1.9	1	1.2E-02
Hf	1.9E-02	1.2E-02	1.6E-02	1.8	1	1.9E-02
Hg	7.9E-02	5.3E-02	6.5E-02	1.9	1	7.9E-02
Ho	4.5E-03	2.9E-03	3.8E-03	1.8	1	4.5E-03
K	6.2E+00	3.5E+00	5.4E+00	1.7	1	6.2E+00
La	4.5E-03	3.4E-03	3.6E-03	1.9	1	4.5E-03
Li	2.1E-02	1.9E-02	1.5E-02	2.2	1	2.1E-02
Lu	4.8E-03	3.4E-03	3.9E-03	1.9	1	4.8E-03
Mg	2.9E-01	1.7E-01	2.5E-01	1.7	1	2.9E-01
Mn	1.1E+00	8.1E-01	8.4E-01	2.0	1	1.1E+00
Mo	2.1E+00	1.2E+00	1.9E+00	1.7	1	2.1E+00
Na	1.9E+00	8.8E-01	1.7E+00	1.6	1	1.9E+00
Nd	4.3E-03	2.8E-03	3.6E-03	1.8	1	4.3E-03
Ni	2.7E-02	2.1E-02	2.1E-02	2.0	1	2.7E-02
P	1.0E+01	3.8E+00	9.5E+00	1.4	1	1.0E+01
Pb	2.0E-02	6.5E-03	1.9E-02	1.4	1	2.0E-02
Pr	4.4E-03	3.0E-03	3.6E-03	1.9	1	4.4E-03
Rb	1.1E+00	7.9E-01	9.4E-01	1.9	1	1.1E+00
S	2.6E+00	1.7E+00	2.2E+00	1.8	1	2.6E+00
Sb	1.4E+00	2.9E+00	5.9E-01	3.7	1	1.4E+00
Sc	4.0E-03	2.6E-03	3.3E-03	1.8	1	4.0E-03
Se	8.4E-02	3.9E-02	7.7E-02	1.5	1	8.4E-02
Si	5.7E-01	6.2E-02	5.7E-01	1.1	1	5.7E-01
Sm	4.1E-03	2.4E-03	3.6E-03	1.7	1	4.1E-03
Sn	7.5E-01	7.2E-01	5.4E-01	2.2	1	7.5E-01
Sr	2.1E-02	2.9E-02	1.3E-02	2.8	1	2.1E-02
Tb	4.2E-03	2.4E-03	3.7E-03	1.7	1	4.2E-03
Th	2.1E-03	1.4E-03	1.8E-03	1.8	1	2.1E-03
Ti	3.4E-02	1.1E-02	3.2E-02	1.4	1	3.4E-02
Tl	2.3E-01	1.2E-01	2.0E-01	1.7	1	2.3E-01
Tm	4.7E-03	3.2E-03	3.9E-03	1.9	1	4.7E-03
U	5.1E-03	3.5E-03	4.2E-03	1.9	1	5.1E-03
V	6.0E-03	3.9E-03	5.1E-03	1.8	1	6.0E-03
Y	4.5E-03	3.0E-03	3.7E-03	1.8	1	4.5E-03
Yb	4.0E-03	2.8E-03	3.3E-03	1.9	1	4.0E-03
Zn	3.6E+00	2.2E+00	3.1E+00	1.7	1	3.6E+00
Zr	1.8E-02	1.1E-02	1.6E-02	1.8	1	1.8E-02

Comments to the data:

Note that only one composite sample for bees was collected, so ASD/GSD here is solely due to element variability in soils considered (Section 5.2)

The dead bees were slightly pre-dried when sampled, therefore the CRs shown here are possibly too high (Section 5.1)

6.1.5 Muridae (MU)

***Table 11:** $CR_{b,T}$ fresh weight mice / dry weight soil*

Element	AM	ASD	GM	GSD	Med	N	
Ag	-	-	-	-	1.5E-02	7	[1]
Al	3.8E-04	4.2E-04	2.6E-04	2.4	3.7E-04	7	
As	6.4E-03	3.3E-03	5.6E-03	1.6	5.5E-03	7	
Au	1.1E-01	7.7E-02	8.5E-02	1.9	7.9E-02	7	
B	-	-	-	-	1.5E-02	7	[1]
Ba	1.6E-02	8.2E-03	1.5E-02	1.6	1.4E-02	7	
Be	-	-	-	-	4.3E-03	7	[1]
Bi	1.4E-03	1.4E-03	9.9E-04	2.3	1.4E-03	6	8.4E-02 [2]
Ca	1.2E+00	2.0E+00	6.0E-01	3.2	1.2E+00	7	
Cd	9.6E-03	6.9E-03	7.9E-03	1.9	8.8E-03	7	
Ce	2.7E-04	2.1E-04	2.1E-04	2.0	2.6E-04	7	
Co	5.1E-03	2.6E-03	4.6E-03	1.6	5.1E-03	7	
Cr	8.6E-03	1.0E-02	5.4E-03	2.6	6.3E-03	7	
Cs	1.4E-01	1.2E-01	1.0E-01	2.2	1.3E-01	7	
Cu	2.2E-01	7.1E-02	2.1E-01	1.4	2.0E-01	7	
Er	3.6E-04	4.0E-04	2.4E-04	2.5	3.0E-04	7	
Fe	7.6E-03	4.8E-03	6.4E-03	1.8	7.3E-03	7	
Ga	3.4E-04	4.3E-04	2.0E-04	2.7	3.1E-04	7	
Hf	5.6E-03	6.9E-03	3.5E-03	2.6	5.2E-03	7	
Hg	4.8E-02	8.3E-02	2.4E-02	3.2	1.1E-02	7	
Ho	3.3E-04	3.2E-04	2.4E-04	2.2	3.0E-04	7	
K	3.2E+00	9.8E-01	3.1E+00	1.3	3.2E+00	7	
La	3.3E-04	2.5E-04	2.6E-04	2.0	3.2E-04	7	
Li	3.9E-03	3.8E-03	2.7E-03	2.3	4.1E-03	7	
Lu	-	-	-	-	2.0E-04	7	[1]
Mg	3.2E-01	8.9E-02	3.0E-01	1.3	3.1E-01	7	
Mn	4.8E-03	3.7E-03	3.8E-03	2.0	4.5E-03	7	
Mo	2.6E-01	1.2E-01	2.4E-01	1.5	2.6E-01	7	
Na	2.2E+00	1.2E+00	2.0E+00	1.6	2.2E+00	7	
Nd	2.3E-04	1.7E-04	1.9E-04	1.9	2.6E-04	7	
Ni	9.1E-03	6.3E-03	7.5E-03	1.9	8.0E-03	7	
P	7.8E+00	2.0E+00	7.5E+00	1.3	7.9E+00	7	
Pb	1.2E-02	7.6E-03	1.0E-02	1.8	1.0E-02	7	
Pr	2.5E-04	1.8E-04	2.0E-04	1.9	2.6E-04	7	
Rb	1.5E+00	8.9E-01	1.3E+00	1.7	1.1E+00	7	
S	1.6E+00	6.6E-01	1.5E+00	1.5	1.6E+00	7	
Sb	4.0E-02	4.4E-02	2.7E-02	2.4	3.6E-02	7	
Sc	4.3E-04	3.3E-04	3.4E-04	2.0	3.9E-04	7	
Se	1.6E-01	6.3E-02	1.5E-01	1.5	1.8E-01	7	
Si	1.6E-02	9.6E-03	1.3E-02	1.8	1.3E-02	7	
Sm	1.9E-04	1.2E-04	1.6E-04	1.8	2.0E-04	7	
Sn	6.9E-02	6.4E-02	5.1E-02	2.2	7.1E-02	7	
Sr	8.6E-02	1.3E-01	4.7E-02	3.0	9.3E-02	7	
Tb	2.2E-04	1.4E-04	1.8E-04	1.8	2.3E-04	7	
Th	1.2E-04	9.4E-05	1.0E-04	2.0	1.4E-04	7	
Ti	1.9E-03	1.3E-03	1.5E-03	1.9	1.3E-03	7	
Tl	2.4E-02	1.2E-02	2.2E-02	1.6	2.1E-02	7	
Tm	-	-	-	-	3.6E-04	7	[1]
U	4.1E-04	4.4E-04	2.8E-04	2.4	2.7E-04	7	
V	7.2E-04	8.1E-04	4.8E-04	2.5	7.4E-04	7	
Y	3.6E-04	3.7E-04	2.5E-04	2.4	2.8E-04	7	
Yb	4.4E-04	5.8E-04	2.6E-04	2.7	2.6E-04	7	
Zn	1.3E+00	5.8E-01	1.2E+00	1.5	1.4E+00	7	
Zr	4.6E-03	5.9E-03	2.8E-03	2.7	3.8E-03	7	

Comments to the data:

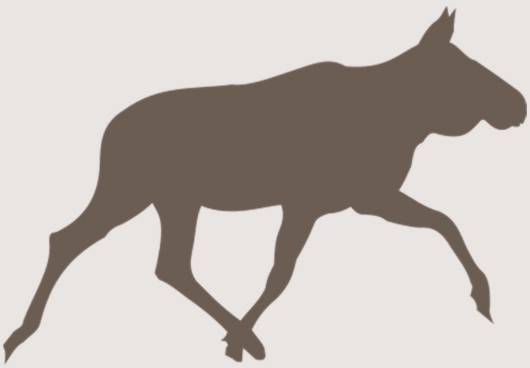
[1] Typical value – best estimates from available data (Section 5.4)

[2] Shown value for MU6 excluded (Section 5.5)

6.1.6 Cervidae (CE)

Table 12: *$CR_{b,T}$ fresh weight moose / dry weight soil*

Element	AM	ASD	GM	GSD	Med	N	
Ag	-	-	-	-	2.0E-02	11	[1]
Al	6.5E-04	8.3E-04	4.0E-04	2.7	3.5E-04	11	
As	1.0E-03	1.5E-03	5.8E-04	2.9	5.2E-04	11	
Au	1.0E-01	1.0E-01	7.2E-02	2.3	8.4E-02	11	
B	3.9E-02	3.6E-02	2.8E-02	2.2	3.8E-02	11	
Ba	4.3E-02	2.6E-02	3.7E-02	1.7	4.2E-02	11	
Be	-	-	-	-	1.5E-03	11	[1]
Bi	1.1E-03	9.4E-04	7.8E-04	2.2	8.7E-04	11	
Ca	2.5E-01	4.1E-01	1.3E-01	3.1	2.5E-01	11	
Cd	5.5E-02	3.6E-02	4.7E-02	1.8	5.8E-02	11	
Ce	2.8E-04	3.6E-04	1.7E-04	2.7	2.0E-04	11	
Co	5.8E-03	5.7E-03	4.2E-03	2.3	4.8E-03	11	
Cr	4.4E-03	4.2E-03	3.2E-03	2.2	3.6E-03	11	
Cs	7.4E-02	5.9E-02	5.8E-02	2.0	7.8E-02	11	
Cu	3.0E-01	2.3E-01	2.4E-01	2.0	3.0E-01	11	
Er	3.0E-04	3.8E-04	1.9E-04	2.6	1.6E-04	11	
Fe	3.8E-03	3.0E-03	3.0E-03	2.0	3.5E-03	11	
Ga	4.8E-04	6.3E-04	2.9E-04	2.7	2.4E-04	11	
Hf	-	-	-	-	8.5E-04	11	[1]
Hg	-	-	-	-	4.8E-03	11	[1]
Ho	3.1E-04	3.9E-04	1.9E-04	2.6	1.6E-04	11	
K	1.3E+00	7.5E-01	1.2E+00	1.7	1.3E+00	11	
La	3.0E-04	3.8E-04	1.8E-04	2.7	2.3E-04	11	
Li	6.6E-03	6.8E-03	4.6E-03	2.3	5.9E-03	11	
Lu	2.9E-04	3.6E-04	1.9E-04	2.6	1.5E-04	11	
Mg	7.0E-02	4.2E-02	6.0E-02	1.7	6.9E-02	11	
Mn	2.6E-03	2.5E-03	1.9E-03	2.3	2.1E-03	11	
Mo	2.5E-01	1.7E-01	2.1E-01	1.8	2.3E-01	11	
Na	1.6E+00	8.2E-01	1.4E+00	1.6	1.4E+00	11	
Nd	2.8E-04	3.5E-04	1.7E-04	2.7	1.7E-04	11	
Ni	9.5E-03	8.4E-03	7.1E-03	2.1	7.9E-03	11	
P	5.1E+00	2.0E+00	4.8E+00	1.4	5.2E+00	11	
Pb	1.7E-03	1.5E-03	1.3E-03	2.1	1.2E-03	11	
Pr	2.7E-04	3.4E-04	1.7E-04	2.7	1.7E-04	11	
Rb	7.4E-01	5.2E-01	6.0E-01	1.9	7.1E-01	11	
S	8.0E-01	5.2E-01	6.8E-01	1.8	8.3E-01	11	
Sb	5.2E-02	1.1E-01	2.2E-02	3.7	4.8E-02	11	
Sc	4.8E-04	5.3E-04	3.2E-04	2.5	3.1E-04	11	
Se	7.8E-02	4.1E-02	6.9E-02	1.6	8.8E-02	11	
Si	5.0E-02	3.2E-02	4.2E-02	1.8	3.5E-02	11	
Sm	2.8E-04	3.5E-04	1.7E-04	2.6	1.6E-04	11	
Sn	2.1E-02	3.1E-02	1.2E-02	2.9	1.1E-02	11	
Sr	3.4E-02	4.6E-02	2.0E-02	2.8	3.4E-02	11	
Tb	3.1E-04	3.9E-04	1.9E-04	2.7	1.3E-04	11	
Th	1.9E-04	2.6E-04	1.1E-04	2.8	7.5E-05	11	
Ti	3.0E-03	2.6E-03	2.2E-03	2.2	1.9E-03	11	
Tl	7.9E-03	6.6E-03	6.1E-03	2.1	7.8E-03	11	
Tm	-	-	-	-	2.1E-04	11	[1]
U	1.9E-04	2.2E-04	1.2E-04	2.5	1.1E-04	11	
V	5.2E-04	6.1E-04	3.4E-04	2.5	3.0E-04	11	
Y	2.9E-04	3.7E-04	1.8E-04	2.7	1.3E-04	11	
Yb	3.0E-04	3.9E-04	1.9E-04	2.7	1.4E-04	11	
Zn	1.1E+00	7.1E-01	9.6E-01	1.8	1.1E+00	11	
Zr	3.1E-04	3.7E-04	2.0E-04	2.6	2.0E-04	11	



Comments to the data:

[1] Typical value – best estimates from available data (Section 5.4)

6.1.7 Anatidae (AN)

Table 13: *$CR_{b,T}$ fresh weight ducks / dry weight soil*

Element	AM	ASD	GM	GSD	Med	N	
Ag	1.1E-01	1.1E-01	8.2E-02	2.2	6.3E-02	11	
Al	1.2E-04	1.1E-04	8.5E-05	2.2	6.9E-05	10	1.4E-03 [1]
As	5.5E-03	3.7E-03	4.5E-03	1.9	4.8E-03	11	
Au	1.0E-01	1.0E-01	7.2E-02	2.3	8.4E-02	11	
B	3.2E-02	2.9E-02	2.3E-02	2.2	1.8E-02	11	
Ba	1.0E-01	7.6E-02	8.3E-02	1.9	1.0E-01	11	
Be	-	-	-	-	1.6E-03	11	[2]
Bi	5.9E-04	4.0E-04	4.9E-04	1.8	4.3E-04	10	5.2E-03 [1]
Ca	2.8E+00	1.1E+00	2.6E+00	1.4	3.1E+00	11	
Cd	4.5E-02	5.3E-02	3.0E-02	2.5	1.2E-02	11	
Ce	1.6E-04	1.7E-04	1.1E-04	2.4	8.1E-05	10	1.5E-03 [1]
Co	1.8E-03	1.2E-03	1.5E-03	1.8	1.3E-03	11	
Cr	1.2E-03	1.6E-03	7.4E-04	2.7	7.4E-04	11	
Cs	1.9E-02	1.3E-02	1.5E-02	1.9	1.9E-02	11	
Cu	5.8E-01	4.3E-01	4.7E-01	1.9	5.0E-01	11	
Er	2.5E-04	2.5E-04	1.8E-04	2.3	1.3E-04	11	
Fe	3.1E-03	1.0E-03	3.0E-03	1.4	3.5E-03	11	
Ga	1.9E-04	2.6E-04	1.1E-04	2.8	1.3E-04	11	
Hf	-	-	-	-	1.7E-03	11	[2]
Hg	5.4E-01	6.0E-01	3.6E-01	2.5	3.2E-01	11	
Ho	2.7E-04	2.8E-04	1.9E-04	2.3	1.1E-04	11	
K	9.1E-01	1.3E-01	9.0E-01	1.2	8.5E-01	11	
La	3.7E-04	5.3E-04	2.1E-04	2.9	1.1E-04	11	
Li	3.2E-03	2.9E-03	2.4E-03	2.2	2.6E-03	11	
Lu	2.6E-04	2.1E-04	2.0E-04	2.0	1.3E-04	11	
Mg	1.1E-01	2.8E-02	1.1E-01	1.3	1.1E-01	11	
Mn	4.4E-03	2.6E-03	3.7E-03	1.7	3.5E-03	11	
Mo	3.4E-01	1.3E-01	3.2E-01	1.5	2.9E-01	11	
Na	2.0E+00	2.6E-01	2.0E+00	1.1	2.0E+00	11	
Nd	3.1E-04	4.4E-04	1.8E-04	2.9	8.7E-05	11	
Ni	1.1E-03	9.9E-04	8.6E-04	2.1	8.3E-04	10	1.4E-02 [1]
P	1.7E+01	6.3E+00	1.6E+01	1.4	1.6E+01	11	
Pb	5.2E-03	4.6E-03	3.9E-03	2.1	2.5E-03	11	
Pr	3.1E-04	4.4E-04	1.8E-04	2.9	9.1E-05	11	
Rb	3.8E-01	2.1E-01	3.3E-01	1.7	3.5E-01	11	
S	7.6E-01	4.4E-01	6.6E-01	1.7	6.3E-01	11	
Sb	5.1E-01	5.7E-01	3.4E-01	2.5	2.3E-01	11	
Sc	3.5E-04	1.9E-04	3.1E-04	1.6	2.6E-04	11	
Se	3.0E-01	1.7E-01	2.6E-01	1.7	2.6E-01	11	
Si	9.4E-03	6.1E-03	7.9E-03	1.8	9.4E-03	10	9.7E-02 [1]
Sm	2.6E-04	3.5E-04	1.6E-04	2.7	7.9E-05	11	
Sn	-	-	-	-	6.8E-03	10	[2]
Sr	6.3E-01	2.6E-01	5.9E-01	1.5	6.9E-01	11	
Tb	2.5E-04	2.8E-04	1.7E-04	2.4	1.1E-04	11	
Th	1.5E-04	1.4E-04	1.1E-04	2.2	1.1E-04	11	
Ti	8.5E-04	1.1E-03	5.2E-04	2.7	4.3E-04	11	
Tl	7.6E-03	3.6E-03	6.9E-03	1.6	7.6E-03	11	
Tm	-	-	-	-	2.1E-04	11	[2]
U	2.6E-03	2.8E-03	1.7E-03	2.4	1.6E-03	11	
V	2.8E-04	2.5E-04	2.0E-04	2.2	1.6E-04	11	
Y	2.8E-04	2.7E-04	2.0E-04	2.3	1.3E-04	11	
Yb	2.5E-04	2.5E-04	1.7E-04	2.3	1.1E-04	11	
Zn	9.8E-01	4.6E-01	8.9E-01	1.6	9.1E-01	11	
Zr	-	-	-	-	2.1E-04	11	[2]

Comments to the data:

[1] Shown value for AN1 excluded (Section 5.5)

[2] Typical value – best estimates from available data (Section 5.4)

***Table 14:** $CR_{b,F}$ fresh weight ducks / freshwater*

Element	AM	ASD	GM	GSD	Med	N	
Ag	3.5E+02	3.9E+02	2.3E+02	2.5	2.3E+02	11	
Al	8.4E+01	8.2E+01	6.0E+01	2.3	5.5E+01	10	1.3E+03 [1a]
As	7.2E+01	7.8E+01	4.9E+01	2.4	5.2E+01	11	
Au	2.2E+01	2.9E+01	1.4E+01	2.7	6.3E+00	11	
B	1.7E+01	1.2E+01	1.3E+01	1.9	1.6E+01	11	
Ba	1.0E+03	5.9E+02	8.8E+02	1.7	6.7E+02	11	
Be	-	-	-	-	1.4E+02	11	[2], [3]
Bi	8.7E+01	6.3E+01	7.1E+01	1.9	8.0E+01	11	
Ca	2.1E+03	1.0E+03	1.8E+03	1.6	2.0E+03	11	
Cd	3.5E+03	5.1E+03	2.0E+03	2.9	6.9E+02	11	
Ce	4.8E+01	7.3E+01	2.6E+01	3.0	1.6E+01	10	7.9E+02 [1b]
Co	1.7E+02	1.4E+02	1.3E+02	2.0	1.2E+02	11	
Cr	2.4E+02	2.8E+02	1.5E+02	2.5	1.5E+02	11	
Cs	1.7E+03	7.8E+02	1.6E+03	1.5	1.5E+03	11	
Cu	2.6E+03	2.9E+03	1.8E+03	2.4	1.2E+03	11	
Er	2.3E+01	2.1E+01	1.7E+01	2.2	1.9E+01	10	2.7E+02 [1b]
Fe	8.3E+02	8.7E+02	5.7E+02	2.4	5.6E+02	11	
Ga	2.7E+02	3.7E+02	1.6E+02	2.8	1.5E+02	11	
Hf	-	-	-	-	2.2E+02	11	[2]
Hg	4.3E+03	5.6E+03	2.6E+03	2.7	2.2E+03	11	
Ho	2.9E+01	2.7E+01	2.1E+01	2.2	1.8E+01	10	3.0E+02 [1b]
K	1.3E+03	5.7E+02	1.2E+03	1.5	1.5E+03	11	
La	3.8E+01	5.1E+01	2.2E+01	2.8	1.4E+01	10	8.5E+02 [1b]
Li	5.1E+01	4.2E+01	4.0E+01	2.0	4.1E+01	11	
Lu	2.7E+01	2.7E+01	1.9E+01	2.3	2.0E+01	11	
Mg	1.5E+02	7.6E+01	1.3E+02	1.6	1.1E+02	11	
Mn	5.9E+02	6.7E+02	3.9E+02	2.5	3.8E+02	11	
Mo	6.2E+02	2.3E+02	5.8E+02	1.4	6.2E+02	11	
Na	9.9E+01	2.8E+01	9.5E+01	1.3	8.4E+01	11	
Nd	3.0E+01	3.7E+01	1.9E+01	2.6	1.4E+01	10	6.2E+02 [1b]
Ni	3.5E+01	5.1E+01	2.0E+01	2.9	1.2E+01	11	
P	1.8E+06	1.8E+06	1.3E+06	2.3	1.7E+06	11	
Pb	3.0E+02	2.8E+02	2.2E+02	2.2	1.7E+02	11	
Pr	3.0E+01	3.9E+01	1.9E+01	2.7	1.3E+01	10	5.5E+02 [1b]
Rb	3.3E+03	1.6E+03	3.0E+03	1.6	3.6E+03	11	
S	8.9E+02	1.9E+02	8.7E+02	1.2	8.9E+02	11	
Sb	1.6E+01	8.4E+00	1.4E+01	1.6	1.5E+01	11	
Sc	4.6E+02	5.8E+02	2.8E+02	2.7	3.0E+02	11	
Se	2.9E+03	8.4E+02	2.7E+03	1.3	2.8E+03	11	[3]
Si	6.9E+00	5.0E+00	5.6E+00	1.9	5.1E+00	10	1.7E+02 [1a]
Sm	2.4E+01	3.1E+01	1.5E+01	2.7	1.3E+01	10	4.0E+02 [1b]
Sn	-	-	-	-	1.6E+00	10	[2]
Sr	5.0E+02	2.5E+02	4.5E+02	1.6	4.9E+02	11	
Tb	2.7E+01	3.1E+01	1.8E+01	2.5	1.6E+01	10	3.4E+02 [1b]
Th	5.2E+01	6.8E+01	3.1E+01	2.7	2.4E+01	11	
Ti	1.2E+02	1.0E+02	9.2E+01	2.1	9.4E+01	10	2.0E+03 [1a]
Tl	5.0E+02	3.0E+02	4.3E+02	1.7	4.6E+02	11	
Tm	-	-	-	-	2.1E+01	10	[2]
U	5.1E+01	5.8E+01	3.3E+01	2.5	3.4E+01	11	
V	1.0E+04	1.3E+04	6.1E+03	2.7	5.5E+03	11	
Y	3.0E+01	2.9E+01	2.1E+01	2.3	1.7E+01	10	3.5E+02 [1b]
Yb	3.2E+01	4.4E+01	1.9E+01	2.8	1.8E+01	11	
Zn	5.0E+02	2.5E+02	4.5E+02	1.6	4.9E+02	11	
Zr	-	-	-	-	-	-	[4]

Comments to the data:

[1] Shown values for AN1 (a) and AN7 (b) excluded (Section 5.5)

[2] Typical value – best estimates from available data (Section 5.4)

[3] All freshwater data <DL (Appendix 5)

[4] No freshwater data. Concentrations in biota available from Appendix 3.

6.1.8 Ranidae (RA)

Table 15: *$CR_{b,T}$ fresh weight adult (or juvenile frogs) / dry weight soil*

Element	AM	ASD	GM	GSD	Med	N	
Ag	1.3E-01	1.6E-01	8.0E-02	2.7	3.6E-02	9	
Al	8.4E-05	3.4E-05	7.8E-05	1.5	8.1E-05	8	1.5E-03 [1a]
As	9.2E-03	6.5E-03	7.5E-03	1.9	8.7E-03	9	
Au	9.1E-01	1.3E+00	5.3E-01	2.8	5.5E-01	9	
B	1.5E-02	8.2E-03	1.3E-02	1.7	1.3E-02	9	
Ba	1.6E-02	1.7E-02	1.1E-02	2.4	1.1E-02	9	
Be	-	-	-	-	1.9E-03	8	[2]
Bi	1.5E-03	6.3E-04	1.4E-03	1.5	1.3E-03	8	2.8E-02 [1a]
Ca	5.0E-01	1.9E-01	4.7E-01	1.4	5.0E-01	9	
Cd	3.4E-02	4.2E-02	2.2E-02	2.6	1.8E-02	9	
Ce	1.8E-04	2.7E-04	1.0E-04	2.9	5.6E-05	9	
Co	3.6E-03	4.2E-03	2.3E-03	2.5	2.0E-03	9	
Cr	3.7E-03	2.8E-03	2.9E-03	2.0	3.4E-03	8	7.4E-02 [1a]
Cs	3.2E-02	1.0E-02	3.0E-02	1.4	2.8E-02	8	8.7E-01 [1a]
Cu	5.0E-01	6.2E-01	3.2E-01	2.6	1.8E-01	9	
Er	4.5E-05	2.4E-05	3.9E-05	1.7	3.8E-05	8	8.1E-04 [1a]
Fe	1.2E-03	4.6E-04	1.1E-03	1.5	1.1E-03	9	
Ga	-	-	-	-	1.1E-04	8	[2]
Hf	-	-	-	-	2.5E-03	8	[2]
Hg	2.0E-01	1.7E-01	1.5E-01	2.1	1.6E-01	8	6.7E+00 [1b]
Ho	6.0E-05	4.3E-05	4.9E-05	1.9	4.5E-05	8	8.2E-04 [1a]
K	1.1E+00	9.6E-02	1.1E+00	1.1	1.1E+00	8	1.4E+01 [1a]
La	2.1E-04	3.1E-04	1.2E-04	2.9	7.7E-05	9	
Li	1.2E-03	5.8E-04	1.1E-03	1.6	1.4E-03	8	2.7E-02 [1a]
Lu	-	-	-	-	3.9E-05	8	[2]
Mg	1.0E-01	9.5E-02	7.7E-02	2.2	6.7E-02	9	
Mn	1.8E-02	8.3E-03	1.6E-02	1.6	1.8E-02	8	2.7E-01 [1a]
Mo	9.8E-02	3.5E-02	9.2E-02	1.4	8.0E-02	9	
Na	2.1E+00	1.7E+00	1.7E+00	2.0	1.5E+00	9	
Nd	1.8E-04	2.5E-04	1.1E-04	2.8	6.2E-05	9	
Ni	4.5E-04	1.5E-04	4.3E-04	1.4	4.5E-04	8	3.6E-02 [1a]
P	5.2E+00	2.5E+00	4.7E+00	1.6	4.1E+00	9	
Pb	1.1E-03	8.6E-04	8.4E-04	2.0	8.6E-04	9	
Pr	1.9E-04	2.7E-04	1.1E-04	2.9	6.0E-05	9	
Rb	3.9E-01	7.1E-02	3.9E-01	1.2	3.7E-01	8	8.7E+00 [1a]
S	8.0E-01	9.6E-01	5.1E-01	2.6	3.8E-01	9	
Sb	4.5E-01	3.7E-01	3.5E-01	2.0	4.3E-01	9	
Sc	1.0E-04	1.9E-05	1.0E-04	1.2	1.0E-04	8	3.2E-03 [1a]
Se	1.7E-01	1.3E-01	1.4E-01	1.9	1.3E-01	9	
Si	1.4E-01	1.8E-01	8.3E-02	2.7	1.1E-01	9	
Sm	1.9E-04	2.6E-04	1.1E-04	2.8	4.9E-05	9	
Sn	1.5E-02	1.0E-02	1.2E-02	1.9	1.3E-02	9	
Sr	7.4E-02	2.5E-02	7.0E-02	1.4	7.1E-02	9	
Tb	1.6E-04	2.3E-04	8.8E-05	2.9	4.1E-05	9	
Th	5.7E-04	7.1E-04	3.6E-04	2.6	1.5E-04	9	
Ti	6.2E-04	5.8E-04	4.5E-04	2.2	5.0E-04	9	
Tl	2.1E-02	2.3E-02	1.4E-02	2.4	1.2E-02	9	
Tm	-	-	-	-	9.2E-05	8	[2]
U	4.2E-04	3.0E-04	3.4E-04	1.9	2.6E-04	9	
V	3.3E-04	3.3E-04	2.3E-04	2.3	1.9E-04	9	
Y	5.5E-05	3.5E-05	4.6E-05	1.8	4.4E-05	8	5.0E-04 [1a]
Yb	3.6E-05	1.4E-05	3.4E-05	1.4	3.9E-05	8	7.1E-04 [1a]
Zn	3.9E-01	1.7E-01	3.5E-01	1.5	3.0E-01	9	
Zr	2.3E-03	3.0E-03	1.4E-03	2.7	1.2E-03	9	

Comments to the data:

[1] Shown values for RA1+2 (a) and RA4 (b) excluded (Section 5.5)

[2] Typical value – best estimates from available data (Section 5.4)

Table 16: *$CR_{b,F}$ fresh weight adult (or juvenile frogs) / freshwater*

Element	AM	ASD	GM	GSD	Med	N	
Ag	3.0E+02	4.4E+02	1.7E+02	2.9	1.2E+02	9	
Al	2.5E+01	1.7E+01	2.0E+01	1.9	1.9E+01	9	
As	1.4E+02	7.4E+01	1.3E+02	1.6	1.3E+02	9	
Au	4.2E+01	5.8E+01	2.5E+01	2.8	2.1E+01	9	
B	1.2E+01	7.1E+00	1.0E+01	1.7	9.1E+00	9	
Ba	1.7E+02	1.1E+02	1.4E+02	1.8	1.3E+02	9	
Be	-	-	-	-	1.3E+02	9	[1], [2]
Bi	1.3E+02	6.2E+01	1.2E+02	1.6	1.2E+02	8	1.7E+03 [3a]
Ca	5.3E+02	2.2E+02	4.9E+02	1.5	4.7E+02	9	
Cd	2.0E+03	2.4E+03	1.3E+03	2.5	8.6E+02	9	
Ce	9.3E+00	1.1E+01	6.0E+00	2.6	6.2E+00	9	
Co	2.1E+02	1.9E+02	1.5E+02	2.2	1.1E+02	9	
Cr	5.2E+02	3.5E+02	4.3E+02	1.8	5.4E+02	9	
Cs	2.5E+03	1.2E+03	2.2E+03	1.6	1.9E+03	9	
Cu	1.6E+03	1.6E+03	1.1E+03	2.3	9.1E+02	9	
Er	5.0E+00	5.9E+00	3.2E+00	2.6	2.5E+00	9	
Fe	1.8E+02	1.5E+02	1.3E+02	2.1	1.0E+02	9	
Ga	1.3E+02	1.3E+02	8.7E+01	2.4	8.6E+01	9	
Hf	-	-	-	-	1.9E+02	9	[1]
Hg	1.3E+03	6.4E+02	1.1E+03	1.6	1.2E+03	9	
Ho	5.8E+00	6.0E+00	4.0E+00	2.4	3.9E+00	9	
K	2.2E+03	9.7E+02	2.0E+03	1.5	1.9E+03	9	
La	8.6E+00	1.0E+01	5.6E+00	2.5	5.3E+00	9	
Li	1.2E+01	7.6E+00	1.0E+01	1.8	1.0E+01	9	
Lu	-	-	-	-	2.1E+00	9	[1]
Mg	1.0E+02	3.4E+01	9.7E+01	1.4	8.2E+01	9	
Mn	1.5E+03	1.1E+03	1.2E+03	1.9	9.2E+02	9	
Mo	1.9E+02	6.3E+01	1.9E+02	1.4	1.8E+02	8	2.2E+03 [3a]
Na	8.7E+01	5.8E+01	7.3E+01	1.8	6.2E+01	9	
Nd	7.4E+00	8.4E+00	4.9E+00	2.5	5.2E+00	9	
Ni	7.6E+00	3.6E+00	6.9E+00	1.6	7.2E+00	8	2.7E+02 [3a]
P	5.8E+05	4.2E+05	4.7E+05	1.9	3.6E+05	9	
Pb	4.2E+01	3.0E+01	3.4E+01	1.9	3.3E+01	9	
Pr	7.6E+00	9.0E+00	4.9E+00	2.6	4.6E+00	9	
Rb	3.7E+03	1.1E+03	3.6E+03	1.3	3.8E+03	9	
S	1.3E+03	1.1E+03	1.0E+03	2.1	8.7E+02	9	
Sb	1.9E+01	1.5E+01	1.5E+01	2.0	1.1E+01	9	
Sc	7.6E+01	7.0E+01	5.6E+01	2.2	3.6E+01	9	
Se	1.2E+03	4.4E+02	1.1E+03	1.4	9.0E+02	9	[3]
Si	1.0E+02	9.9E+01	7.6E+01	2.2	8.9E+01	9	
Sm	6.9E+00	7.0E+00	4.8E+00	2.3	4.7E+00	9	
Sn	7.1E+00	6.2E+00	5.3E+00	2.1	5.5E+00	9	
Sr	1.0E+02	3.8E+01	9.5E+01	1.4	9.9E+01	9	
Tb	5.7E+00	5.4E+00	4.1E+00	2.2	4.3E+00	9	
Th	2.2E+01	1.9E+01	1.7E+01	2.1	1.6E+01	8	1.5E+03 [3b]
Ti	8.5E+01	4.5E+01	7.5E+01	1.6	6.9E+01	9	
Tl	1.1E+03	1.3E+03	7.4E+02	2.5	5.4E+02	9	
Tm	-	-	-	-	3.3E+00	9	[1]
U	8.3E+00	9.9E+00	5.4E+00	2.6	4.6E+00	9	
V	3.2E+03	2.2E+03	2.7E+03	1.9	3.5E+03	9	
Y	5.1E+00	4.8E+00	3.8E+00	2.2	3.5E+00	9	
Yb	4.2E+00	5.0E+00	2.7E+00	2.6	1.3E+00	9	
Zn	1.0E+02	3.8E+01	9.5E+01	1.4	9.9E+01	9	
Zr	-	-	-	-	-	-	[4]

Comments to the data:

[1] Typical value – best estimates from available data (Section 5.4)

[2] All freshwater data <DL (Appendix 5)

[3] Shown data for RA1+2 (a) and RA3 (b) are excluded (Section 5.5).

[4] No freshwater data. Concentrations in biota available from Appendix 3.

Table 17: *$CR_{b,F}$ fresh weight spawn of eggs / freshwater*

Element	AM	ASD	GM	GSD	Med	N	
Ag	4.5E+00	3.2E+00	3.7E+00	1.9	3.8E+00	6	
Al	5.0E+01	5.8E+01	3.2E+01	2.5	1.4E+01	6	
As	2.8E+00	1.8E+00	2.4E+00	1.8	2.6E+00	6	
Au	2.3E+00	2.1E+00	1.7E+00	2.2	1.4E+00	6	
B	1.5E+00	9.1E-01	1.2E+00	1.8	1.5E+00	6	
Ba	3.9E+00	2.3E+00	3.3E+00	1.7	3.6E+00	6	
Be	1.3E+01	1.1E+01	9.4E+00	2.2	9.0E+00	6	[1]
Bi	4.4E+01	3.1E+01	3.6E+01	1.9	4.5E+01	6	
Ca	1.7E+00	9.5E-01	1.5E+00	1.7	1.6E+00	6	
Cd	1.5E+01	9.0E+00	1.2E+01	1.8	1.4E+01	6	
Ce	1.8E+01	1.8E+01	1.2E+01	2.3	7.9E+00	6	
Co	1.1E+01	9.1E+00	8.0E+00	2.1	7.9E+00	6	
Cr	2.0E+01	1.7E+01	1.6E+01	2.0	1.5E+01	6	
Cs	3.0E+01	2.6E+01	2.3E+01	2.1	2.3E+01	6	
Cu	2.1E+01	8.4E+00	1.9E+01	1.5	2.4E+01	6	
Er	7.4E+00	5.5E+00	5.9E+00	2.0	5.7E+00	6	
Fe	1.7E+01	1.9E+01	1.2E+01	2.4	1.0E+01	6	
Ga	1.0E+02	1.2E+02	6.4E+01	2.6	2.9E+01	6	
Hf	1.6E+01	1.5E+01	1.2E+01	2.2	1.3E+01	6	
Hg	9.4E+00	5.3E+00	8.2E+00	1.7	7.3E+00	6	
Ho	8.6E+00	6.7E+00	6.7E+00	2.0	5.6E+00	6	
K	2.1E+01	1.5E+01	1.8E+01	1.9	2.0E+01	6	
La	1.4E+01	1.3E+01	9.8E+00	2.3	8.2E+00	6	
Li	1.3E+00	1.1E+00	1.0E+00	2.1	9.0E-01	6	
Lu	5.8E+00	3.3E+00	5.1E+00	1.7	5.9E+00	6	
Mg	1.7E+00	6.1E-01	1.6E+00	1.4	1.9E+00	6	
Mn	1.3E+01	1.6E+01	8.1E+00	2.6	8.6E+00	6	
Mo	1.4E+01	8.5E+00	1.2E+01	1.7	1.3E+01	6	
Na	1.2E+00	5.2E-01	1.2E+00	1.5	1.3E+00	6	
Nd	1.1E+01	1.0E+01	8.4E+00	2.2	6.8E+00	6	
Ni	4.4E+00	2.9E+00	3.7E+00	1.8	3.8E+00	6	
P	3.9E+03	1.5E+03	3.6E+03	1.5	3.8E+03	6	
Pb	1.2E+01	9.6E+00	8.9E+00	2.1	8.3E+00	5	5.1+02 [2]
Pr	1.2E+01	1.1E+01	8.8E+00	2.2	6.8E+00	6	
Rb	2.1E+01	1.2E+01	1.9E+01	1.7	1.8E+01	6	
S	3.9E+01	4.2E+01	2.6E+01	2.4	2.3E+01	6	
Sb	2.0E+00	1.0E+00	1.7E+00	1.6	2.0E+00	6	
Sc	2.8E+01	1.9E+01	2.3E+01	1.9	2.8E+01	6	
Se	6.3E+01	1.6E+01	6.2E+01	1.3	6.1E+01	6	[1]
Si	7.8E+00	5.8E+00	6.3E+00	1.9	6.4E+00	6	
Sm	1.1E+01	9.7E+00	8.3E+00	2.1	6.4E+00	6	
Sn	1.2E+00	6.3E-01	1.1E+00	1.6	1.2E+00	6	
Sr	1.4E+00	7.3E-01	1.3E+00	1.6	1.3E+00	6	
Tb	9.9E+00	7.7E+00	7.9E+00	2.0	6.6E+00	6	
Th	1.9E+01	1.6E+01	1.5E+01	2.1	1.1E+01	6	
Ti	1.6E+02	1.6E+02	1.2E+02	2.3	8.2E+01	6	
Tl	6.9E+01	5.6E+01	5.4E+01	2.0	5.7E+01	6	
Tm	7.1E+00	5.0E+00	5.8E+00	1.9	5.9E+00	6	
U	7.8E+00	9.4E+00	5.0E+00	2.6	4.4E+00	6	
V	1.6E+03	1.6E+03	1.2E+03	2.2	1.1E+03	6	
Y	8.1E+00	6.7E+00	6.3E+00	2.0	5.5E+00	6	
Yb	6.5E+00	4.2E+00	5.5E+00	1.8	5.6E+00	6	
Zn	1.4E+00	7.3E-01	1.3E+00	1.6	1.3E+00	6	
Zr	-	-	-	-	-	-	[2]

Comments to the data:

[1] All freshwater data <DL (Appendix 5)

[2] Shown value for RA12 excluded (Section 5.5)

[3] No freshwater data. Concentrations in biota available from Appendix 3.

Table 18: *$CR_{b,F}$ fresh weight tadpoles / freshwater*

Element	AM	ASD	GM	GSD	Med	N	
Ag	7.7E+01	3.3E+01	7.0E+01	1.5	8.6E+01	4	
Al	8.9E+02	1.4E+03	4.9E+02	3.0	2.8E+02	4	
As	6.2E+01	5.3E+00	6.2E+01	1.1	6.2E+01	4	
Au	1.6E+01	6.8E+00	1.5E+01	1.5	1.5E+01	4	
B	5.4E+00	2.8E+00	4.8E+00	1.6	5.0E+00	4	
Ba	1.4E+02	9.6E+01	1.1E+02	1.9	1.0E+02	4	
Be	3.3E+02	3.1E+02	2.4E+02	2.2	2.7E+02	4	
Bi	5.2E+02	1.6E+02	5.0E+02	1.4	5.0E+02	4	
Ca	1.0E+02	7.5E+01	8.3E+01	1.9	1.1E+02	4	
Cd	5.8E+02	6.5E+02	3.9E+02	2.5	3.0E+02	4	
Ce	8.3E+02	1.4E+03	4.4E+02	3.1	2.1E+02	4	
Co	2.3E+02	2.2E+02	1.7E+02	2.2	2.0E+02	4	
Cr	3.1E+02	3.1E+02	2.2E+02	2.3	2.0E+02	4	
Cs	2.2E+02	1.7E+02	1.7E+02	2.0	1.7E+02	4	
Cu	3.4E+02	1.4E+01	3.4E+02	1.0	3.4E+02	4	
Er	3.0E+02	3.5E+02	2.0E+02	2.5	2.0E+02	4	
Fe	2.1E+02	1.9E+02	1.5E+02	2.2	2.1E+02	4	
Ga	1.5E+03	2.0E+03	8.6E+02	2.8	6.2E+02	4	
Hf	6.3E+02	6.1E+02	4.6E+02	2.2	4.3E+02	4	
Hg	2.7E+02	9.0E+01	2.6E+02	1.4	2.9E+02	4	
Ho	3.8E+02	4.9E+02	2.3E+02	2.7	1.9E+02	4	
K	5.0E+02	4.9E+02	3.6E+02	2.3	3.5E+02	4	
La	7.7E+02	1.3E+03	4.0E+02	3.1	2.0E+02	4	
Li	3.2E+01	4.8E+01	1.7E+01	3.0	8.3E+00	4	
Lu	2.8E+02	2.6E+02	2.0E+02	2.2	2.8E+02	4	
Mg	5.1E+01	5.2E+01	3.6E+01	2.3	3.2E+01	4	
Mn	2.7E+02	4.0E+02	1.5E+02	2.9	1.1E+02	4	
Mo	4.1E+02	1.3E+02	3.9E+02	1.4	4.2E+02	4	
Na	1.0E+02	1.4E+01	9.9E+01	1.1	1.0E+02	4	
Nd	6.4E+02	9.7E+02	3.5E+02	3.0	2.2E+02	4	
Ni	1.6E+02	1.3E+02	1.2E+02	2.1	1.3E+02	4	
P	2.5E+04	2.0E+04	2.0E+04	2.0	2.3E+04	4	
Pb	2.9E+02	3.1E+02	2.0E+02	2.4	1.7E+02	4	
Pr	6.6E+02	1.0E+03	3.6E+02	3.0	2.1E+02	4	
Rb	5.7E+02	5.4E+02	4.1E+02	2.2	3.9E+02	4	
S	5.1E+02	7.0E+01	5.1E+02	1.1	4.9E+02	4	
Sb	4.0E+01	1.6E+01	3.7E+01	1.5	3.8E+01	4	
Sc	2.7E+03	2.5E+03	1.9E+03	2.2	2.2E+03	4	
Se	4.7E+02	5.5E+01	4.7E+02	1.1	4.7E+02	4	[1]
Si	1.9E+02	9.5E+01	1.7E+02	1.6	1.9E+02	4	
Sm	6.3E+02	9.3E+02	3.5E+02	2.9	2.4E+02	4	
Sn	3.9E+01	1.4E+01	3.7E+01	1.4	4.1E+01	4	
Sr	3.5E+01	2.5E+01	2.9E+01	1.9	3.8E+01	4	
Tb	5.3E+02	8.0E+02	2.9E+02	3.0	1.8E+02	4	
Th	1.2E+03	1.3E+03	7.8E+02	2.5	7.7E+02	4	
Ti	2.7E+03	3.3E+03	1.7E+03	2.6	1.6E+03	4	
Tl	7.0E+02	5.4E+02	5.5E+02	2.0	7.1E+02	4	
Tm	2.8E+02	2.9E+02	2.0E+02	2.3	2.3E+02	4	
U	3.4E+02	1.0E+02	3.3E+02	1.3	3.0E+02	4	
V	7.2E+04	7.4E+04	5.1E+04	2.3	5.8E+04	4	
Y	2.9E+02	3.5E+02	1.9E+02	2.6	1.8E+02	4	
Yb	3.0E+02	2.9E+02	2.1E+02	2.3	2.6E+02	4	
Zn	3.5E+01	2.5E+01	2.9E+01	1.9	3.8E+01	4	
Zr	-	-	-	-	-	-	[2]

Comments to the data:

[1] All freshwater data <DL (Appendix 5)

[2] No freshwater data. Concentrations in biota available from Appendix 3.

6.1.9 Salmonidae (SA)

Table 19: *$CR_{b,F}$ fresh weight salmon / freshwater*

Element	AM	ASD	GM	GSD	Med	N	
Ag	2.0E+03	2.1E+03	1.3E+03	2.4	9.4E+02	10	
Al	6.4E+01	5.6E+01	4.8E+01	2.1	4.6E+01	10	
As	2.5E+03	1.4E+03	2.2E+03	1.7	2.2E+03	10	
Au	2.3E+01	1.4E+01	2.0E+01	1.7	1.8E+01	10	
B	-	-	-	-	7.6E+00	10	[1]
Ba	1.5E+02	7.0E+01	1.4E+02	1.6	1.3E+02	10	
Be	-	-	-	-	1.0E+02	10	[1]
Bi	1.3E+02	1.2E+02	9.5E+01	2.2	7.6E+01	10	
Ca	4.6E+03	1.5E+03	4.4E+03	1.4	4.4E+03	10	
Cd	4.1E+03	2.3E+03	3.5E+03	1.7	3.5E+03	10	
Ce	1.8E+01	6.3E+00	1.7E+01	1.4	1.7E+01	10	
Co	7.2E+02	2.4E+02	6.9E+02	1.4	6.6E+02	10	
Cr	2.9E+02	1.3E+02	2.6E+02	1.6	2.7E+02	10	
Cs	6.2E+03	1.9E+03	5.9E+03	1.3	6.0E+03	10	
Cu	3.8E+02	3.3E+02	2.9E+02	2.1	2.4E+02	10	
Er	1.2E+01	7.8E+00	1.0E+01	1.8	1.1E+01	10	
Fe	2.9E+02	5.9E+01	2.8E+02	1.2	2.8E+02	10	
Ga	2.8E+02	2.3E+02	2.1E+02	2.0	2.0E+02	10	[2]
Hf	-	-	-	-	2.2E+02	10	[1]
Hg	7.7E+03	3.4E+03	7.1E+03	1.5	6.8E+03	10	
Ho	1.3E+01	8.0E+00	1.1E+01	1.8	1.1E+01	10	
K	2.2E+04	5.2E+03	2.2E+04	1.3	2.0E+04	10	
La	2.1E+01	5.2E+00	2.1E+01	1.3	2.1E+01	10	
Li	1.1E+01	6.8E+00	9.5E+00	1.7	9.2E+00	10	
Lu	1.3E+01	9.3E+00	1.1E+01	1.9	1.0E+01	10	
Mg	9.1E+02	2.2E+02	8.9E+02	1.3	7.8E+02	10	
Mn	7.0E+02	5.1E+02	5.7E+02	1.9	4.7E+02	10	
Mo	9.8E+01	1.4E+01	9.7E+01	1.1	1.0E+02	10	
Na	1.6E+02	6.0E+01	1.5E+02	1.4	1.3E+02	10	
Nd	1.2E+01	3.8E+00	1.1E+01	1.4	1.1E+01	10	
Ni	4.7E+01	1.5E+01	4.5E+01	1.4	4.3E+01	10	
P	9.1E+05	8.5E+04	9.0E+05	1.1	9.2E+05	10	
Pb	6.1E+01	3.2E+01	5.4E+01	1.6	4.9E+01	10	
Pr	1.2E+01	3.8E+00	1.2E+01	1.4	1.2E+01	10	
Rb	1.8E+04	4.4E+03	1.8E+04	1.3	1.7E+04	10	
S	6.5E+03	5.3E+02	6.5E+03	1.1	6.4E+03	10	
Sb	1.2E+01	3.7E+00	1.2E+01	1.3	1.3E+01	10	
Sc	3.8E+02	3.3E+02	2.8E+02	2.1	2.2E+02	10	
Se	1.0E+04	2.5E+03	1.0E+04	1.3	1.0E+04	10	[2]
Si	3.9E+01	2.4E+01	3.4E+01	1.7	3.2E+01	10	
Sm	1.0E+01	5.1E+00	9.1E+00	1.6	8.5E+00	10	
Sn	2.9E+00	1.1E+00	2.8E+00	1.4	2.8E+00	10	
Sr	1.6E+03	5.1E+02	1.6E+03	1.4	1.6E+03	10	
Tb	9.4E+00	5.2E+00	8.2E+00	1.7	7.7E+00	10	
Th	4.7E+01	2.7E+01	4.1E+01	1.7	3.6E+01	10	
Ti	2.7E+02	2.0E+02	2.1E+02	1.9	2.1E+02	10	
Tl	5.2E+03	1.3E+03	5.0E+03	1.3	4.6E+03	10	
Tm	1.7E+01	1.0E+01	1.4E+01	1.8	1.3E+01	10	
U	1.3E+01	5.1E+00	1.2E+01	1.5	1.2E+01	10	
V	7.7E+03	3.6E+03	7.0E+03	1.6	7.6E+03	10	
Y	1.1E+01	6.1E+00	9.3E+00	1.7	9.2E+00	10	
Yb	1.5E+01	1.1E+01	1.3E+01	1.9	1.2E+01	10	
Zn	1.6E+03	5.1E+02	1.6E+03	1.4	1.6E+03	10	
Zr	-	-	-	-	-	-	[3]

Comments to the data:

[1] Typical value – best estimates from available data (see Section 5.4)

[2] All sea water data <DL (Appendix 5)

[3] No freshwater data. Concentrations in biota available from Appendix 3

6.1.10 Fucaceae (FU)

Table 20: *$CR_{b,M}$ fresh weight Brown seaweed / sea water*

Element	AM	ASD	GM	GSD	Med	N	
Ag	-	-	-	-	-	-	[1]
Al	5.1E+02	4.7E+02	3.7E+02	2.2	2.9E+02	10	
As	6.9E+02	1.6E+02	6.7E+02	1.3	6.7E+02	10	
Au	-	-	-	-	-	-	[1]
B	1.2E+00	9.0E-02	1.2E+00	1.1	1.3E+00	10	[2]
Ba	5.3E+01	1.0E+01	5.2E+01	1.2	5.1E+01	10	
Be	-	-	-	-	-	-	[1]
Bi	9.4E+00	3.1E+00	9.0E+00	1.4	1.0E+01	10	
Ca	3.7E+00	2.1E+00	3.2E+00	1.7	2.6E+00	10	[2]
Cd	1.0E+03	1.8E+02	1.0E+03	1.2	1.0E+03	10	[3]
Ce	3.5E+02	2.5E+02	2.9E+02	1.9	3.1E+02	10	
Co	6.9E+02	4.0E+02	6.0E+02	1.7	5.4E+02	10	
Cr	3.6E+02	2.6E+02	2.9E+02	1.9	2.8E+02	10	
Cs	7.3E+00	2.4E+00	6.9E+00	1.4	6.6E+00	10	
Cu	8.3E+01	6.4E+01	6.6E+01	2.0	6.7E+01	10	
Er	4.5E+02	3.9E+02	3.4E+02	2.1	2.9E+02	10	
Fe	3.4E+02	2.8E+02	2.6E+02	2.1	2.7E+02	10	
Ga	-	-	-	-	-	-	[1]
Hf	-	-	-	-	-	-	[1]
Hg	-	-	-	-	-	-	[1]
Ho	3.6E+02	3.8E+02	2.5E+02	2.4	1.9E+02	10	
K	2.6E+00	3.4E-01	2.5E+00	1.1	2.5E+00	10	[2]
La	-	-	-	-	-	-	[1]
Li	1.8E-01	4.2E-02	1.8E-01	1.3	1.7E-01	10	[2]
Lu	2.3E+02	1.8E+02	1.8E+02	2.0	1.6E+02	10	
Mg	2.4E-01	2.5E-02	2.4E-01	1.1	2.4E-01	10	[2]
Mn	1.1E+03	5.2E+02	1.0E+03	1.6	1.0E+03	10	
Mo	7.7E-01	3.1E-01	7.1E-01	1.5	7.7E-01	10	
Na	1.2E-01	1.5E-02	1.1E-01	1.1	1.1E-01	10	[2]
Nd	2.9E+02	1.7E+02	2.5E+02	1.7	2.5E+02	10	
Ni	3.0E+02	1.4E+02	2.8E+02	1.5	2.8E+02	10	
P	2.2E+03	4.5E+02	2.1E+03	1.2	2.1E+03	10	
Pb	6.4E+01	4.5E+01	5.3E+01	1.9	5.1E+01	10	
Pr	3.1E+02	2.1E+02	2.6E+02	1.8	2.8E+02	10	
Rb	3.1E+00	5.8E-01	3.1E+00	1.2	3.2E+00	10	
S	9.1E-01	8.6E-02	9.0E-01	1.1	9.0E-01	10	
Sb	2.5E+00	5.8E-01	2.4E+00	1.3	2.2E+00	10	
Sc	-	-	-	-	-	-	[1]
Se	-	-	-	-	-	-	[1]
Si	1.8E+02	1.7E+02	1.3E+02	2.2	1.2E+02	10	
Sm	2.3E+02	1.4E+02	2.0E+02	1.8	1.8E+02	10	
Sn	2.8E+01	1.9E+01	2.4E+01	1.8	2.3E+01	10	[3]
Sr	3.7E+00	6.8E-01	3.7E+00	1.2	3.4E+00	10	
Tb	3.0E+02	2.7E+02	2.2E+02	2.2	1.8E+02	10	
Th	1.5E+02	9.9E+01	1.3E+02	1.8	1.3E+02	10	
Ti	-	-	-	-	-	-	[1]
Tl	1.6E+01	6.2E+00	1.5E+01	1.4	1.5E+01	10	
Tm	6.5E+02	8.8E+02	3.9E+02	2.8	3.4E+02	10	
U	9.1E+00	1.3E+00	9.0E+00	1.2	9.1E+00	10	
V	1.3E+05	1.2E+05	1.0E+05	2.2	8.8E+04	10	
Y	1.7E+02	1.3E+02	1.4E+02	1.9	1.2E+02	10	
Yb	3.9E+02	2.9E+02	3.2E+02	1.9	3.4E+02	10	
Zn	3.7E+00	6.8E-01	3.7E+00	1.2	3.4E+00	10	
Zr	-	-	-	-	-	-	[1]

Comments to the data:

[1] No seawater data. Concentrations in biota available from Appendix 3

[2] Seawater data estimated (Appendix 6)

[3] All sea water data <DL (Appendix 6)

6.1.11 *Cancridae (CA)*

Table 21: *$CR_{b,M}$ fresh weight crabs / sea water*

Element	AM	ASD	GM	GSD	Med	N	
Ag	-	-	-	-	-	-	[1]
Al	2.6E+03	1.2E+03	2.3E+03	1.6	2.1E+03	10	
As	7.3E+03	2.3E+03	7.0E+03	1.4	7.9E+03	10	
Au	-	-	-	-	-	-	[1]
B	1.2E+00	2.9E-01	1.2E+00	1.3	1.1E+00	10	[2]
Ba	4.7E+02	5.5E+01	4.7E+02	1.1	4.7E+02	10	
Be	-	-	-	-	-	-	[1]
Bi	7.6E+01	2.6E+01	7.1E+01	1.4	6.5E+01	10	
Ca	3.7E+02	2.3E+01	3.7E+02	1.1	3.8E+02	10	[2]
Cd	1.5E+05	6.4E+04	1.4E+05	1.5	1.2E+05	10	[3]
Ce	2.2E+03	8.7E+02	2.0E+03	1.5	1.8E+03	10	
Co	1.5E+03	2.8E+02	1.5E+03	1.2	1.5E+03	10	
Cr	1.0E+03	7.0E+02	8.7E+02	1.8	9.6E+02	10	
Cs	2.2E+01	4.3E+00	2.2E+01	1.2	2.3E+01	10	
Cu	1.2E+04	5.9E+03	1.1E+04	1.6	1.2E+04	10	
Er	1.5E+03	5.4E+02	1.4E+03	1.4	1.4E+03	10	
Fe	1.7E+03	6.1E+02	1.6E+03	1.4	1.4E+03	10	
Ga	-	-	-	-	-	-	[1]
Hf	-	-	-	-	-	-	[1]
Hg	-	-	-	-	-	-	[1]
Ho	1.8E+03	1.7E+03	1.3E+03	2.2	1.7E+03	10	
K	5.1E+00	7.1E-01	5.0E+00	1.1	5.3E+00	10	[2]
La	-	-	-	-	-	-	[1]
Li	1.6E+01	2.0E+00	1.6E+01	1.1	1.5E+01	10	[2]
Lu	7.9E+02	4.0E+02	7.0E+02	1.6	7.3E+02	10	
Mg	5.3E+00	3.6E-01	5.3E+00	1.1	5.3E+00	10	[2]
Mn	4.6E+03	1.8E+03	4.3E+03	1.5	4.8E+03	10	
Mo	5.2E+00	8.9E-01	5.1E+00	1.2	5.2E+00	10	
Na	6.8E-01	1.4E-01	6.7E-01	1.2	6.4E-01	10	[2]
Nd	1.6E+03	5.4E+02	1.5E+03	1.4	1.3E+03	10	
Ni	6.4E+02	3.1E+02	5.8E+02	1.6	5.4E+02	10	
P	4.8E+05	6.2E+04	4.7E+05	1.1	4.9E+05	10	
Pb	1.6E+03	6.1E+02	1.5E+03	1.5	1.5E+03	10	
Pr	1.9E+03	6.2E+02	1.8E+03	1.4	1.6E+03	10	
Rb	5.1E+00	6.5E-01	5.1E+00	1.1	5.2E+00	10	
S	2.4E+00	2.4E-01	2.3E+00	1.1	2.3E+00	10	
Sb	6.9E+00	1.3E+00	6.7E+00	1.2	6.9E+00	10	
Sc	-	-	-	-	-	-	[1]
Se	-	-	-	-	-	-	[1]
Si	1.0E+03	4.7E+02	9.4E+02	1.5	8.6E+02	10	
Sm	1.4E+03	5.9E+02	1.3E+03	1.5	1.2E+03	10	
Sn	1.7E+02	5.4E+01	1.6E+02	1.4	1.7E+02	10	[3]
Sr	1.9E+02	9.8E+00	1.9E+02	1.1	1.9E+02	10	
Tb	1.4E+03	8.5E+02	1.2E+03	1.7	1.3E+03	10	
Th	7.4E+02	3.5E+02	6.7E+02	1.6	6.2E+02	10	
Ti	-	-	-	-	-	-	[1]
Tl	1.1E+02	2.5E+01	1.0E+02	1.3	1.1E+02	10	
Tm	1.2E+03	9.9E+02	9.4E+02	2.0	1.1E+03	10	
U	6.3E+00	3.4E+00	5.6E+00	1.7	5.4E+00	10	
V	4.2E+05	3.2E+05	3.3E+05	2.0	4.3E+05	10	
Y	8.2E+02	2.0E+02	8.0E+02	1.3	8.2E+02	10	
Yb	1.3E+03	5.4E+02	1.2E+03	1.5	1.2E+03	10	
Zn	1.9E+02	9.8E+00	1.9E+02	1.1	1.9E+02	10	
Zr	-	-	-	-	-	-	[1]

Comments to the data:

[1] No seawater data. Concentrations in biota available from Appendix 3

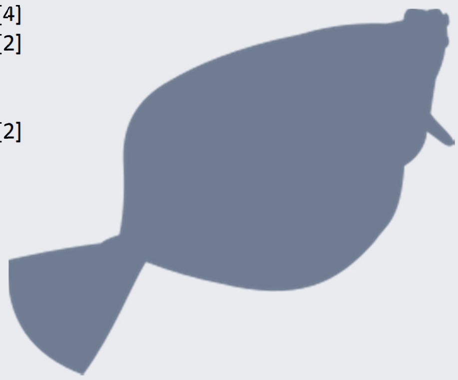
[2] Seawater data estimated (see Appendix 6)

[3] All sea water data <DL (Appendix 6)

6.1.12 *Pleuronectidae (PL)*

Table 22: *$CR_{b,M}$ fresh weight plaice / sea water.*

Element	AM	ASD	GM	GSD	Med	N	
Ag	-	-	-	-	-	-	[1]
Al	8.4E+01	7.0E+01	6.5E+01	2.1	6.8E+01	10	
As	1.4E+04	7.3E+03	1.3E+04	1.6	1.4E+04	10	
Au	-	-	-	-	-	-	[1]
B	9.3E-02	3.8E-02	8.6E-02	1.5	7.9E-02	10	[2]
Ba	2.0E+01	6.5E+00	1.9E+01	1.4	1.9E+01	10	
Be	-	-	-	-	-	-	[1]
Bi	1.8E+02	5.4E+01	1.8E+02	1.3	1.6E+02	10	
Ca	1.5E+01	1.1E+00	1.5E+01	1.1	1.5E+01	10	[2]
Cd	2.0E+02	1.7E+02	1.5E+02	2.1	1.5E+02	10	[3]
Ce	3.5E+01	1.7E+01	3.1E+01	1.6	3.3E+01	10	
Co	1.7E+02	4.6E+01	1.6E+02	1.3	1.7E+02	10	
Cr	1.2E+02	1.5E+02	7.5E+01	2.6	6.2E+01	10	
Cs	3.7E+01	7.4E+00	3.6E+01	1.2	3.5E+01	10	
Cu	3.4E+02	1.5E+02	3.1E+02	1.5	3.0E+02	10	
Er	3.5E+01	3.7E+01	2.5E+01	2.3	1.7E+01	10	
Fe	1.5E+02	7.0E+01	1.3E+02	1.6	1.3E+02	10	
Ga	-	-	-	-	-	-	[1]
Hf	-	-	-	-	-	-	[1]
Hg	-	-	-	-	-	-	[1]
Ho	4.2E+01	5.2E+01	2.6E+01	2.6	2.8E+01	10	
K	1.1E+01	6.1E-01	1.1E+01	1.1	1.1E+01	10	[2]
La	-	-	-	-	-	-	[1]
Li	3.3E-01	5.7E-02	3.2E-01	1.2	3.3E-01	10	[2]
Lu	-	-	-	-	1.0E+01	10	[4]
Mg	2.6E-01	3.0E-02	2.6E-01	1.1	2.6E-01	10	[2]
Mn	3.6E+02	1.8E+02	3.3E+02	1.6	3.3E+02	10	
Mo	6.7E-01	5.5E-01	5.2E-01	2.0	4.5E-01	10	
Na	1.4E-01	3.4E-02	1.4E-01	1.3	1.3E-01	10	[2]
Nd	2.5E+01	1.4E+01	2.2E+01	1.7	2.2E+01	10	
Ni	8.8E+01	7.8E+01	6.6E+01	2.1	5.9E+01	10	
P	3.4E+05	3.6E+04	3.3E+05	1.1	3.4E+05	10	
Pb	3.8E+02	2.3E+02	3.2E+02	1.8	3.0E+02	10	
Pr	2.7E+01	1.4E+01	2.5E+01	1.6	2.4E+01	10	
Rb	6.1E+00	5.1E-01	6.1E+00	1.1	6.2E+00	10	
S	2.4E+00	1.7E-01	2.4E+00	1.1	2.3E+00	10	
Sb	2.9E+00	7.4E-01	2.8E+00	1.3	2.7E+00	10	
Sc	-	-	-	-	-	-	[1]
Se	-	-	-	-	-	-	[1]
Si	4.8E+01	3.5E+01	3.9E+01	1.9	3.7E+01	10	
Sm	2.3E+01	1.7E+01	1.9E+01	1.9	1.8E+01	10	
Sn	1.7E+02	7.8E+01	1.5E+02	1.6	1.7E+02	10	[3]
Sr	2.7E+00	4.4E-01	2.7E+00	1.2	2.6E+00	10	
Tb	3.1E+01	3.2E+01	2.2E+01	2.3	2.1E+01	10	
Th	7.0E+00	3.7E+00	6.1E+00	1.7	6.3E+00	10	
Ti	-	-	-	-	-	-	[1]
Tl	1.6E+01	4.0E+00	1.6E+01	1.3	1.5E+01	10	
Tm	-	-	-	-	2.1E+01	10	[4]
U	1.4E+00	9.3E-01	1.1E+00	1.9	1.1E+00	10	
V	5.4E+04	5.0E+04	3.9E+04	2.2	4.8E+04	10	
Y	1.6E+01	1.4E+01	1.2E+01	2.1	8.9E+00	10	
Yb	3.2E+01	3.1E+01	2.3E+01	2.3	2.0E+01	10	
Zn	2.7E+00	4.4E-01	2.7E+00	1.2	2.6E+00	10	
Zr	-	-	-	-	-	-	[1]



Comments to the data:

[1] No seawater data. Concentrations in biota available from Appendix 3

[2] Sea water data estimated (Appendix 6)

[3] All sea water data <DL (Appendix 6)

[4] Typical value – best estimates from available data (see Section 5.4)

6.2 CRs for additional radionuclides

The concentration ratios of ^{137}Cs, ^{226}Ra and ^{40}K in grass, pine/spruce and bees determined using HPGe gamma spectrometry are shown in the following tables.

Table 23: *Poaceae – $CR_{b,T}$ fresh weight plants / dry weight soil*

Nuclide	AM	ASD	GM	GSD	Med	N
Cs-137	3.0E-01	1.4E-01	2.7E-01	1.6	3.4E-01	10
K-40	8.7E-01	7.8E-01	6.4E-01	2.2	5.3E-01	10
Ra-226	3.0E-02	1.6E-02	2.6E-02	1.7	2.1E-02	10

Table 24: *Pinaceae – $CR_{b,T}$ fresh weight plants / dry weight soil*

Nuclide	AM	ASD	GM	GSD	Med	N
Cs-137	6.2E-01	5.3E-01	4.8E-01	2.1	6.0E-01	10
K-40	7.5E-01	5.4E-01	6.1E-01	1.9	4.5E-01	10
Ra-226	6.3E-02	4.4E-02	5.2E-02	1.9	5.3E-02	10

Table 25: *Apidea – $CR_{b,T}$ fresh weight bees / dry weight soil*

Nuclide	AM	ASD	GM	GSD	Med	N	Comments
Cs-137	9.9E-01	4.5E-01	9.0E-01	1.5	9.9E-01	1	
K-40	1.8E+00	1.2E+00	1.5E+00	1.8	1.8E+00	1	
Ra-226	6.5E-02	4.1E-02	5.5E-02	1.8	6.5E-02	1	<DL

6.3 Comments and main findings

In the following, we will sum some main findings from Tables 7–25. We have focussed on certain elements or groups of elements: Alkali metals (K, Rb, Cs), Alkaline earth metals (Ca, Sr, Ba), rare earth elements (i.e. lanthanides + Sc, Y, Lu), and actinides (U, Th). Other elements of particular importance for a specific RAP are also included. For the sake of simplicity, we have used geometric means (GM) and geometric standard deviations (GSD) throughout. Moreover, we have included element distributions showing which tissue contributes the most to a specific CR for all vertebrates (plus crabs). Note that this contribution depends on both freshweight concentration in relevant tissues and the relative mass of various organs (m_0) (Section 5.1). Remember also that only muscles, bone and liver was used in the derivation of whole body CRs for vertebrates (and soft and hard tissues for crabs).

6.3.1 Poaceae (PO)

- CR variability (GSD) for grass samples PO1–PO10 ranged from 1.3 to 2.6 for different elements (average: 2.0), with the highest variability found for Cs and the lowest for P.
- Soil to plant average CRs ranged four orders of magnitude, from 1.0 x 10^{-4} (Th) to 1.6 (K).
- In general, the transfer of rare earths and actinides are very low (CR <2 x 10^{-4}). Consequently, surface contamination from soil can be an important additional source to plant contamination from these elements.
- Transfer of alkali metals are generally high, particularly K (as mentioned above). The CR of stable Cs (0.14) is approximately an order of magnitude lower than for K. The average CR of radioactive Cs-137 mainly from the Chernobyl accident is slightly higher than for the stable analogue (0.27). The variability is, however, considerably higher for stable Cs as demonstrated in Section 6.5.
- Regarding alkaline earth metals, the average transfer of Ca, Sr and Ba is quite similar – 0.038, 0.016 and 0.015, respectively. Ra-226, determined using gamma spectrometry, show slightly higher average CR than its biogeochemical analogue Ba (0.026), but this difference may well be attributable to methodological issues (e.g. due to the low levels of Ra-226). Note here that soil concentrations of Ra-226 is total content, whereas Ba refers to acid soluble fraction.

Elements with average CR ≥0.1 (decreasing order):
K, Rb, Si, P, Mo, Mn, Zn, B, Cs, Au, Sb

6.3.2 Pinaceae (PI)

- For pine and spruce, CR variability (GSD) for samples PI1–PI10 range from 1.3 to 2.9 for different elements (average: 2.1), with the highest variability found for Sb and the lowest for P.
- Soil to plant average CRs range four orders of magnitude, from 8.8 x 10^{-5} (Th) to 1.6 (K).
- In general, the transfer of rare earths and actinides are very low (CR <2 x 10^{-4}). Consequently, surface contamination from soil or dust can be an important additional source to plant contamination from these elements.
- Transfer of alkali elements are generally high, particularly K (as mentioned above). The transfer of stable Cs (0.23) is almost an order of magnitude lower than for K. The average CR of radioactive Cs-137 mainly from the Chernobyl accident is slightly higher than for the stable analogue (0.48), the variability is however higher for stable Cs.
- Regarding alkaline earth elements, the average transfer of Ca, Sr and Ba is quite similar – 0.079, 0.035 and 0.028, respectively. Ra-226, determined using gamma spectrometry, show slightly higher average CR than its biogeochemical analogue Ba (0.052), but this difference may well be due to methodological issues (e.g. due to low levels of Ra-226). Note that soil concentrations of Ra-226 is total content, whereas Ba refers to acid soluble fraction.
- Additionally, differences in uptake between spruce and pine is a matter of discussion for this RAP.

Elements with average CR ≥0.1 (decreasing order):
K, Rb, P, B, Zn, Cs, Cu, S, Mn, Sb, Mg

6.3.3 Lumbricidae (LU)

- CR variability (GSD) for earthworm samples LU1–LU14 range from 1.3 to 2.6 for different elements (average: 2.0), with the highest variability found for Cr and the lowest for P.
- Soil to animal average CRs range three orders of magnitude, from 0.0033 (Zr) to 5.6 (Cd).
- Uptake of alkali metals decrease in the order: K (0.71), Rb (0.10), Cs (0.016), whereas CRs for alkaline earths seems to be quite similar for Ca, Sr and Ba (0.028–0.036).
- The CRs of rare earths and actinides range between 0.012 (Th)–0.037 (U), which is the same order of magnitude as e.g. Cs and Sr. In fact, most element CRs range between 0.01–0.1.
- Residual soil (not properly flushed out from the gastro-intestinal tract) may have had an influence of the results for earthworms.

Elements with average CR ≥0.1 (decreasing order):
Cd, Hg, Se, Mo, P, S, Sb, Zn, Na, K, Si, Ag, Au, As, Cu, Sn, Rb
Note the very high CRs of toxic heavy metals such as Cd and Hg – 5.6 and 3.6, respectively.

6.3.4 *Apidea (AP)*

Remember that only one composite sample was collected for this RAP, so CR variability originates from soil levels at different localities.

- CR variability (GSD) range from 1.1 to 3.7 for different elements (average: 1.8), with the highest variability found for Sb and the lowest for Si.
- Soil to animal average CRs range almost four orders of magnitude, from 0.0018 (Th) to 9.5 (P).
- In general, the CRs of rare earths and actinides are low – ranging from 0.0018 (Th) to 0.0042 (U).
- Uptake of alkali elements decreasing in the order: K (5.4), Rb (0.94), Cs (0.27). The average CR of radioactive Cs-137 mainly from the Chernobyl accident (0.90) is more than three times higher than for the stable analogue.
- CRs for alkaline earth elements are rather similar for Ca and Sr (0.022 and 0.013, respectively), but higher for Ba (0.066). Ra-226 measured by gamma spectrometry (HPGe) were below detection limit (i.e. CR<0.13).

Elements with average CR ≥0.1 (decreasing order):
P, K, Zn, Cu, S, Mo, Na, B, Rb, Mn, Sb, Si, Sn, Au, Cs, Mg, Cd, Tl, Ag

6.3.5 *Muridae (MU)*

- For mice MU1–MU7, CR variability (GSD) range from 1.3 to 3.2 for different elements (average: 1.9). The highest variability was found for Hg and the lowest for K, Mg, P.
- Soil to plant average CR range four orders of magnitude, from 1.0×10^{-4} (Th) to 7.5 (P).
- In general, the CRs of rare earths and actinides are very low (1×10^{-4} – 3×10^{-4}).
- Regarding alkali elements, CRs decreases in the order K (3.1), Rb (1.3) and Cs (0.10).
- For alkaline earth metals CRs decreases in the order Ca (0.60), Sr (0.047), Ba (0.015).
- As shown in table 26, element concentrations in bone contribute most to the CR of Ba, Ca and Sr, whereas liver concentrations are most important for Mo. Particularly for Cs, K and S muscle concentrations dominates the CR.

Elements with average CR ≥0.1 (decreasing order):
P, K, Na, S, Rb, Zn, Ca, Mg, Mo, Cu, Se, Cs

Table 26: *Element distribution showing which tissue contributing the most to a specific* $CR_{b,X}$

% of CR	Muscle (M)	Bone (B)	Liver (L)
≥90	Cs, K, S		
80-89	Cu, Hg, Rb, Tl, Hf, Zr		
70-79	Al, As, Ce, Cr, Ga, La, Mg, Na, Nd, Pr, Se, Si, Sm, Tb, Th, Y, Yb		
60-69	Co, Er, Fe, Ho, Li, Mn, Ni, P, Sb, Au, Sc, Ti, U, V, Zn	Ba	
50-59	Bi	Ca, Sr	Mo

No tissues contributed more than 50% for the elements Cd, Pb and Sn.

6.3.6 Cervidae (CE)

- For moose CE1–CE11, CR variability (GSD) range from 1.4 to 3.7 for different elements (average: 2.3), with the highest variability found for Sb and the lowest for P.
- Soil to animal average CR range four orders of magnitude, from 1.1×10^{-4} (Th) to 4.8 (P).
- In general, the CRs of rare earths and actinides are very low (1×10^{-4} – 3×10^{-4}).
- CRs for alkali metals decreases as follows: K (1.2), Rb (0.60) and Cs (0.058).
- For alkaline earths CRs decreases in the order Ca (0.13), Ba (0.037) and Sr (0.020).
- As shown in Table 27, the concentration in bone is the major contributor to the whole body CRs of Ba, Ca, Ni and Sr. Liver concentrations is most important for Mo and Cd. Particularly for elements Cs, K, Rb, S, Sb, Sn and Zn muscle dominates the CR.
- Note the difference in bone contribution to the whole body CR for Ca, Sr and Ba between mouse (Table 26) and moose (Table 27).

Elements with average CR ≥0.1 (decreasing order):

P, Na, K, Zn, S, Rb, Cu, Mo, Ca

Table 27: *Element distribution showing which tissue contributing the most to a specific* $CR_{b,X}$

% of CR	Muscle (M)	Bone (B)	Liver (L)
≥90	Cs, K, Rb, S, Sb, Sn, Zn	Ba, Ca, Ni, Sr	
80-89	As, Fe, Se, Tl, Au	Cr, Sc	
70-79	Na, U	Si, V	Mo
60-69	B, Cu, Ho, Mn, Pb, Pr, Y, Yb	Al, P	
50-59	Bi, Ce, Er, La, Lu, Mg, Nd, Sm, Tb, Th	Ga, Li, Ti, Zr	Cd

No tissues contributed more than 50% for Co

6.3.7 *Anatidae (AN)*

Soil:

- CR variability (GSD) for ducks AN1–AN11 range from 1.1 to 2.9 for different elements (average: 2.1), with the highest variability found for rare earths (La, Nd, Pr), and the lowest for Na.
- Soil to animal average CR range more than five orders of magnitude, from 8.5 x 10^{-5} (Al) to 16 (P).
- The CRs of rare earths and actinides are very low, ranging between 1.1 x 10^{-4} (Th) – 1.7 x 10^{-3} (U).
- For alkaline elements, CRs decreases in the order K (0.90), Rb (0.33) and Cs (0.015), whereas CRs for alkaline earths Ca, Sr and Ba, are 2.5, 0.59 and 0.083, respectively.

Elements with average CR ≥0.1 (decreasing order):

P, Ca, Na, K, Zn, S, Sr, Cu, Hg, Sb, Rb, Mo, Se, Mg

Freshwater:

- CR variability (GSD) range from 1.2 to 3.0 for different elements (average: 2.3). The highest variability was found for Ce and the lowest for S.
- Average CRs range more than five orders of magnitude, from 5.6 (Si) to 1 300 000 (P).
- The average CR of rare earths (excluding Sc) and actinides lies in the range 15–33. The CR of Sc was about ten times higher (280).
- CRs of most alkaline and alkaline earth elements are high, decreasing in the order Rb (3000), Ca (1800), Cs (1600), K (1200), Ba (880), Sr (450).

Elements with average CR ≥1000 (decreasing order):

P, V, Rb, Se, Hg, Cd, Ca, Cu, Cs, K

Note that P is 200 times higher than the next on the list (V)

- As shown in Table 28, the concentration in bone was the main contributor to the whole body CRs for most elements. Liver was most important for Cd, Ag and Mo. Only for a few elements including Cs, K and Rb, muscle concentrations dominates the CR.

Table 28: *Element distribution showing which tissue contributing the most to a specific* $CR_{b,X}$

% of CR	Muscle (M)	Bone (B)	Liver (L)
≥90		Al, Ba, Ca, Cr, Er, Ho, Li, Lu, P, Pb, Sc, Sr, Tb, Th, Ti, U, V, Y, Yb	
80-89		B, Ce, Ga, La, Mn, Nd, Ni, Pr, Si, Sm, Zn	
70-79	Cs, K	Mg, Na, Sb, Au	Cd
60-69	Rb, S		Ag, Mo
50-59	Cu, Hg, Se	As, Bi, Co, Tl	

No tissues contributed more than 50% for Fe

6.3.8 Ranidae (RA)

Soil:

- CR variability (GSD) for adult/juvenile frogs RA1–RA10 range from 1.1 to 2.9 for different elements (average: 2.0), with the highest variability found for some rare earths (Ce, La, Pr and Tb) and the lowest for K.
- Soil to animal average CR range more than five orders of magnitude, from 3.4 x 10^{-5} (Yb) to 4.7 (P).
- In general, the CRs of rare earths are very low, being below 1 x 10^{-4}. CR for actinides U and Th are slightly higher, but still very low (around 3.5 x 10^{-4}).
- Regarding alkali elements, CRs decreases in the order K (1.1), Rb (0.39) and Cs (0.030), whereas alkaline earths CRs decreases as follows: Ca (0.47), Sr (0.070) and Ba (0.011).

Elements with average CR ≥0.1 (decreasing order):

P, Na, K, Au, S, Ca, Rb, Sb, Zn, Cu, Hg, Se

Freshwater:

- CR variability (GSD) for samples RA1–RA10 range from 1.3 to 2.9 for different elements (average: 2.0), with the highest variability found for Ag and the lowest for Rb.
- Average CRs range more than five orders of magnitude, from 2.7 (Yb) to 470 000 (P).
- The average CR of rare earths (excluding Sc) and actinides lies in the range 2.7–17. Most elements having CRs<10. However, the CR of Sc was 56.
- CRs of most alkali elements are high, decreasing in the order Rb (3600), Cs (2200) and K (2000). Alkaline earth CRs were lower: Ca (490), Ba (140) and Sr (95).

Elements with average CR ≥1000 (decreasing order):

P, Rb, V, Cs, K, Cd, Mn, Cu, Hg, Se, S

Note that P is more than 100 times higher than the next on the list (Rb)

- As shown in Table 29, bone concentration was particularly important for Ca, but also for several other elements. Liver was the main contributor to the CRs of Cu, Ag and Cd. Note the "muscle dominance" for Si and Th.

Table 29: *Element distribution showing which tissue contributing the most to a specific* $CR_{b,X}$

% of CR	Muscle (M)	Bone (B)	Liver (L)
≥90	Si, Th	Ca	
80-89	Zr	Sr, Mn	Cu
70-79	Al, Cr, Cs, Ga, Hg, Ho, K, Rb, S, Tb, Ti	Ba	Ag
60-69	As, Bi, Er, La, Nd, Ni, Pr, Sb, Sm, Au, Sn, Tl	P, Pb, U	
50-59	B, Ce, Mg, Se, V, Yb	Li, Na, Sc	Cd

No tissues contributed more than 50% for Co, Fe, Mo, Y, Zn

Tadpoles:

- CR variability (GSD) for tadpole samples RA17–RA20 range from 1.0 to 3.1 for different elements (average: 2.2). The highest variability was found for Ce and lowest for Cu.
- Freshwater to animal average CRs range four orders of magnitude, from 4.8 (B) to 51 000 (V).
- CRs of alkali metals decreasing in the order: Rb (410), K (360), Cs (170), while the respective values for alkaline earth elements were 83, 29 and 110 for Ca, Sr and Ba, respectively.
- In general, the CRs of rare earths and actinides range between 190–1900. Sc having the highest CR.
- For most elements, CR ranged between 100–000.

Elements with average CR ≥1000 (decreasing order): V, P, Sc, Ti

Frogspawn:

- CR variability (GSD) for samples RA11–RA16 range from 1.3 to 2.6 for different elements (average: 2.0), with the highest variability found for Ga, Mn and U.
- Freshwater to animal average CRs range three orders of magnitude, from 1.0 (Li) to 3600 (P).
- CRs of K, Rb and Cs were rather similar, ranging between 18 and 23.
- Low CRs for alkaline earths, particularly Ca (1.5) and Sr (1.3). Slightly higher CR for Ba (3.3).
- The CRs of rare earths and actinides also ranged between 5 and 23 (U to Sc). In fact, most elements showed values below 10.
- The generally low CRs for frog eggs is likely due to the very low dry to fresh weight conversion factor of 0.0055 as compared to tadpoles (0.032) and adult frogs.

Elements with average CR ≥1000 (decreasing order): P, V

6.3.9 Salmonidae (SA)

- CR variability (GSD) for trout SA1–SA10 range from 1.1 to 2.4 for different elements (average: 1.6), with the highest variability found for Ag and the lowest for P, Mo, S.
- Average CRs range more than six orders of magnitude, from 2.8 (Sn) to 900 000 (P).
- The average CR of rare earths (Sc excluded) and actinides lies in the range 8.2–41. For Sc the CR seems to be higher (280).
- CRs of K, Rb and Cs were very high – 22 000, 18 000 and 5900, respectively.
- Lower, but still high, CRs for alkaline earths – decreasing in the order Ca (4400), Sr (1600) and Ba (140).

Elements with average CR ≥1000 (decreasing order):

P, K, Rb, Se, Hg, V, S, Cs, Tl, Ca, Cd, As, Sr, Zn, Ag

- As shown in Table 30, concentrations in bone is the main contributor to the whole body CR particularly for Ca and Sr, but also for half a dozen other elements. Liver concentrations contributed most to the CRs of Ag, Cu, La, Ce, Nd, Pr and Sc.
- Note the trend of lanthanides in Table 30. Smaller elements tend to be more concentrated in liver (La, Ce, Nd, Pr), whereas the largest ones are mainly found in muscles (Tm, Yb). For the in-between elements Er, Ho, Sm and Tb, none of the three tissues contributed more than 50% to the whole body CR.

Table 30: *Element distribution showing which tissue contributing the most to a specific* $CR_{b,X}$

% of CR	Muscle (M)	Bone (B)	Liver (L)
≥90		Ca, Sr	Ag
80-89	As, Cs, Hg, K, Mg, Rb, S	Ba	
70-79	Sb, Se	Mn, U	Cu
60-69	Na, Si, Au	Pb	La
50-59	Al, Bi, Ga, Li, Ni, P, Sn, Th, Ti, Tl, Tm, V, Yb	Cd, Cr, Y, Zn	Ce, Nd, Pr, Sc

No tissues contributed more than 50% for Co, Er, Fe, Ho, Lu, Mo, Sm, Tb

6.3.10 Fucaceae (FU)

- For bladder wrack, CR variability (GSD) for samples FU1–FU10 range from 1.1 to 2.8 for different elements (average: 1.7), with the highest variability found for Tm.
- Average CRs range six orders of magnitude, from 0.11 (Na) to 100 000 (V).
- The CR of most rare earths and actinides lies in the range 130–390, an exception being U where the respective value is only 9.0.
- CRs of alkali and alkaline earth elements are generally low (due to the high levels usually found in seawater), with CRs <10 for K, Rb, Ca, Sr and Cs, while Ba being slightly higher (52).

Elements with average CR ≥1000 (decreasing order):

V, P, Cd, Mn

Note that CR of V is 50 times higher than the next on the list (P)

6.3.11 Cancridae (CA)

- For crabs, CR variability (GSD) for samples CA1–CA10 range from 1.1 to 2.2 for different elements (average: 1.4), with the highest variability found for Ho.
- Average CRs range almost six orders of magnitude, from 0.67 (Na) to 470 000 (P).
- The average CR of most rare earths and actinides lies in the range 670–2000, an exception being U where the respective value is only 5.6.
- CRs of most alkali and alkaline earth elements are generally low – around 5 for K, Rb and Mg, 22 for Cs, and 370, 190 and 470, for Ca, Sr and Ba, respectively.

Elements with average CR ≥1000 (decreasing order):

P, V, Cd, Cu, As, Mn, Al, Ce, Pr, Fe, Co, Nd, Pb, Er, Ho, Sm, Tb, Yb

Note the high CR of Cd (140 000) – this value could even be higher since the water concentration of Cd were below detection limit

- As shown in Table 31, the soft tissue concentrations is the main contributor to the whole body CR for elements Cd, Zn, Mo and U, only.

Table 31: *Element distribution showing which tissue contributing the most to a specific* $CR_{b,X}$

% of CR	Hard tissues (HT)	Soft tissues (ST)
≥90	Al, B, Ba, Ca, Ce, Li, Mg, Mn, Nd, Pb, Si, Sm, Sr, Tb, Th, Yb	
80-89	Cr, Cs, Er, Fe, Ho, Lu, Na, P, Pr, Tl, Tm, Y	Cd
70-79	Sb, Sn, V	
60-69	K, Rb, S	Zn
50-59	As, Bi, Co, Cu, Ni	Mo, U

6.3.12 Pleuronectidae (PL)

- CR variability (GSD) for plaice PL1–PL10 range from 1.1 to 2.6 for different elements (average: 1.6), with the he highest variability found for Cr and Ho.
- Average CRs range more than six orders of magnitude, from 0.086 (B) to 330 000 (P).
- The average CR of rare earths lies in the range 12–31, while actinides show even lower values – 1.1 and 6.1 for U and Th, respectively.
- CRs of most alkali and alkaline earth elements are also low, with CRs decreasing in the order Cs (36), Ba (19), Ca (15), K (11), Rb (6.1) and Sr (2.7).

Elements with average CR ≥1000 (decreasing order):
P, V, As
Note the gap between the elements above and the other elements (CR<330)

- As shown in Table 32, concentration in bone is the most important contributor to the whole body CR for elements Ca, Sr, Ba, Mn, U, V, Li and P (with decreasing importance). Liver concentration was most important for Cd, only. For the rest of the elements muscle concentration dominates the CR.

Table 32: *Element distribution showing which tissue contributing the most to a specific* $CR_{b,X}$

% of CR	Muscle (M)	Bone (B)	Liver (L)
≥90		Ca	
80-89	Al, As, Bi, Cs, K, Na, Rb, S, Si, Sn	Sr	
70-79	Ce, Ho, Cr, Cu, Mg, Nd, Ni, Pr, Sb, Tl, Yb, Zn	Ba, Mn, U, V	
60-69	Er, Sm, Tb, Th		
50-59	B, Fe, Mo, Pb, Y	Li, P	Cd

No tissues contributed more than 50% for Co

6.4 Case – stable caesium CR as proxy for Cs-137 in grass

In this section, we will use the example of stable Cs (i.e. Cs-133) and radioactive Cs-137 to look more closely into the topic of stable elements as analogues for radionuclides.

Previously, it has been mentioned that the average CR of radioactive Cs-137 for the RAP *Poaceae* is slightly higher than for the stable analogue (within a factor of 2), but that the variability is higher for stable Cs (Section 6.3.1). More specifically, the 95% CI of stable Cs is 0.05–0.37, whereas the 95% CI for Cs-137 is 0.21–0.39. Remember that the CR data presented here refer to the 0–10 cm topsoil (Section 3.3).

In most soils, Cs retention is largely controlled by specific binding to "frayed edge sites" (FES) of micaceous clay minerals such as illite (Cremers et al., 1988; Hird et al., 1996). However, for highly organic soils, FES are negligible, and thus reversible adsorption to humus sites are more important in controlling Cs mobility (Rigol et al., 2002). For these soils, transfer to plants is also expected to be higher. In Fig. 22, we have plotted the two isotopes as a function of soil organic matter content – represented by the loss-on-ignition (LOI) – at grass localities PO1–PO10.

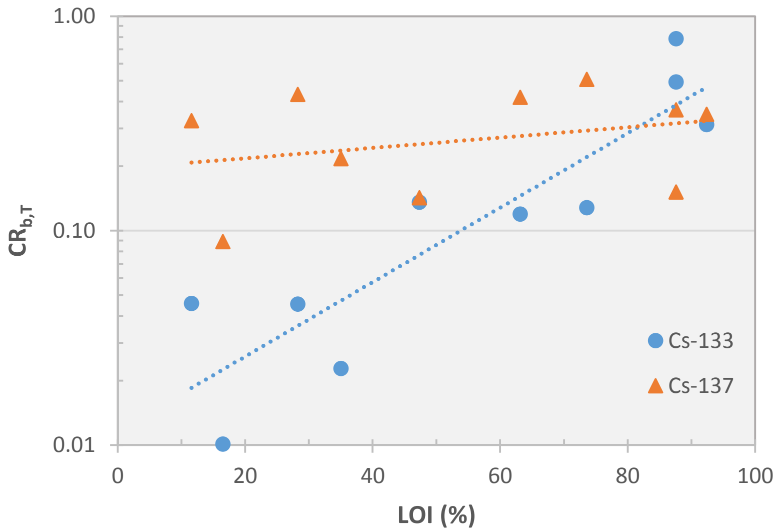


Fig. 22: *$CR_{b,T}$ fresh weight plants / dry weight soil with LOI. Note that the dotted lines represent exponential regression lines.*

As demonstrated by Fig. 22, there seems to be a clear correlation between CR of stable Cs-133 and LOI. In contrast, no such relationship seems evident for Cs-137. This seem surprising, since the isotopes – at least in principle – should behave in the same way. Note that the CRs for the two isotopes are practically the same for highly organic soils (i.e. LOI above 80%). In the following, we will suggest a possible explanation for the observed differences.

Cs-137 and Cs-133 differ with respect to source – the atmosphere and surficial deposits/bedrock, respectively – and this could have a marked influence of the vertical distribution of the two in soil, particularly if specific binding to FES controls Cs mobility in the uppermost soil layer.

Differences in vertical distribution between Cs-137 and Cs-133 has e.g. been observed in a previous project: 'PRECIP' (Norwegian Research Council 181937/S30) (see Thørring et al., 2012 for more info about the project). In PRECIP, these differences were found to be most prominent for mineral soils with a thin humus layer, with the main part of fallout Cs-137 found in the uppermost 3 cm layer. In contrast, natural Cs-133 was rather evenly distributed in the whole 0–12 cm profiles of such soils.

Moreover, both isotopes tended to be uniformly distributed in highly organic soils, most likely due to negligible contributions from FES and small amounts of (Cs-133-containing) mineral materials.

Since many understorey plants take up most of their nutrients from the uppermost 2–3 cm of the humus layer (Ingestad, 1973; Ehlken and Kirchner, 2002), the vertical distribution of Cs isotopes in the 0-10 cm soil layers sampled at Tjøtta will plausibly have an impact on transfer. If we assume that the observations from PRECIP also apply to Tjøtta, and that plant uptake mostly occurs from the 0-3 cm layer, the CRs for mineral soil sites at Tjøtta should be higher for Cs-137 than for Cs-133, whereas no difference should be expected for highly organic soil. This is in line with the observations in Fig. 21, and give a plausible explanation for the observed lack of correlation between Cs-137 and LOI.

Note that different plant availability of Cs-137 and Cs-133 in the root zone could be an additional factor that might explain different uptake. However, results from PRECIP indicate that the two isotopes follow similar patterns in this respect (at least for the 0-3 cm layer).

7 Further use of data from TRAP

The extensive database presented within this project provides a detailed characterisation of a broad-suite elemental composition of ecosystem components and concomitant concentration ratios. This information may provide, in turn, the basis for testing numerous hypothesis related to the transfer of elements in the environment. Some topical suggestions are provided in the following.

7.1 Test of approaches to providing missing transfer parameters

The adoption of surrogate (or analogue) values to generate CR values in cases where direct empirical data are absent (or poorly characterised) has been the subject of considerable study in the radioecological community (ICRP, 2009; Higley 2010; Tagami and Uchida 2010; Willey 2010; Brown et al., 2013). Drawing on this and other information, the latest version of the ERICA Tool used for environmental impact assessments for radioactivity (Brown et al., 2016), includes a list of commonly used available CR gap filling approaches. Of particular relevance, in light of what might be tested using the Tjøtta dataset is:

- CR data for a taxonomically similar plant or animal as a surrogate for organisms with no data
- CR data for elements with a similar biogeochemistry as a surrogate for a missing value

With regards the former, the hypothesis that might be tested could vary from the simple, e.g. mammal CR data provide suitable proxies for other homeotherms, through to more complicated analyses regarding, for example taxonomic and/or phylogenetic factors. In such a way, we might explore the questions of whether bioaccumulation characteristics differ between plant and animal taxa and whether the degree of difference increases with their period of evolutionary divergence. Examples in the published literature are given by the work of Willey et al. (2010) and Jeffree et al., (2012). Similarly, the hypothesis to be tested in relation to biogeochemical analogues for missing CR values might vary from the simple 'using elements from the same periodic group or series provide efficacious results' through to more advanced treatments wherein the geochemical behavior of elements are accounted for. By way of example, Higley (2010) suggested that simply using group placement in the periodic table as a means to estimate CR values has limited utility and that ionic potential may be used as an alternative to group chemical properties in estimating (surrogate) transfer factors.

7.2 Novel and advanced statistical approaches

The TRAP database also provides a good opportunity to investigate transfer of various elements in the environment in light of additional information that may be found in or between data. To make use of this extra information/ knowledge novel and advanced statistical approaches can be used. Hierarchical Bayesian is such an approach.

In general the Bayesian approach makes use of both prior knowledge and empirical data when estimating the parameters of a model. Allowing for all available information to be considered this approach has higher potential to reduce the uncertainty of the parameter estimations as compared to when only empirical data is used. The advantage of this approach becomes clearer in cases where the number of available data is limited or the model we use is quite complex.

The Hierarchical Bayesian framework incorporates complexity by allowing the problem to be dissected into levels as well as stochasticity. In addition to empirical data (which is the only input used in standard analysis approaches), more information can be incorporated in each level. A model can be constructed of several levels to reflect involving parameters (known or unknown), processes and/ hyper-parameters. In this way, we are able to study complex relationships in space, time, and among individuals or groups; e.g. soil types, elements/ radioisotopes, plant species or organisms (Clark, 2005).

As a suggestion regarding further use of the TRAP data, the Bayesian approach can be applied to synthesise information from different sources. For instance, data/ knowledge from stable elements can be used in making better inferences about parameters related to radioisotopes of interest. Use can be made of biogeochemical analogues or any other shared properties in a group of Elements/ radionuclides/ biota to investigate the whole group at once in relation to a specific parameter.

8 Conclusions

The aim of this report was to describe the Norwegian ICRP reference site at Tjøtta/Alstahaug and sum up all "Reference animals and plants" (RAP) - element data from the site. Note that we consider detailed discussions on findings, or identification of important parameters for CR variability etc. to fall outside of the scope of the report.

In brief, the data gathered concern all 12 RAPs, including different life-stages for frogs (eggs, tadpoles and juvenile/adult frogs). Whole-body concentration ratios (CR) for up to 54 elements were provided for terrestrial and freshwater RAPs (PO, PI, LU, AP, MU, CE, AN, RA, SA), and up to 43 elements for marine RAPs (FU, CA, PL). The reason for the smaller amount of transfer data for the marine ecosystem, was the lack of seawater data for some elements (Ag, Au, Be, Ga, Hf, Hg, La, Sc, Se, Ti, Zr) due to the analytical method used.

The elements included in our study cover most of the elements on the ICRP list. Still, important elements on the list were – for various reasons – not a part of our study. The list of those not determined includes transuranium elements (Am, Cf, Cm, Np, Pu), Cl, I, Po and Tc. Some of these could be measured at a later stage if considered necessary.

Comparison of results from TRAP with data from similar investigations in other areas within or outside Norway was beyond the scope of the report. However, site-specific CR values from the present study will be compared with other available CR data e.g. through the work within the ongoing EC-COMET project (Contract Number: Fission-2012-3.4.1-604794). Thus, the datasets collated from Tjøtta and other related sites will potentially serve as 'points of reference' consistent with other components of the ICRP's nascent system on environmental protection.

The key contention that CR values based on stable elements do indeed provide suitable proxy CR values for radioisotopes remains to be thoroughly tested. This is an assumption that has been adopted by numerous earlier collations on transfer factors (IAEA, 2004; IAEA, 2010; IAEA, 2014) with little provision in the way of exploring the actual efficacy of the approach. As the limited case – using caesium plant data from the Tjøtta site show (Section 6.4), it is important to investigate similarities and differences in soil-plant concentration ratios between radionuclides and their stable analogues, and try to identify in which cases the stable element is a good analogue for the radionuclide, when it is not – and why.

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Appendix 1 – Standard reference materials

Element	Reference material	Certified		Reported	Uncertainty	Measured	SD	N
Ag	Dolt 4 - Fish Liver, NRC-CNRC	Yes		9.3E-01	7.0E-02	7.9E-01	2.4E-02	4
Ag	Dorm 3 - Fish Protein, NRC-CNRC	No		4.0E-02		2.2E-02		1
Ag	1577b - Bovine Liver, NIST	Yes		3.9E-02	7.0E-03	4.2E-02	1.4E-03	4
Al	1486 - Bone meal, NIST	No	<	1.0E+00		9.8E-01	1.1E-01	4
Al	Dolt 4 - Fish Liver, NRC-CNRC	No		2.0E+02		1.9E+02	5.0E+01	4
Al	Dorm 3 - Fish Protein, NRC-CNRC	No		1.7E+03		1.5E+03		1
Al	1575 - Pine needles, NIST	Yes		5.5E+02	3.0E+01	5.4E+02	5.5E+00	3
Al	1577b - Bovine Liver, NIST	No		3.0E+00		9.0E-01	3.6E-01	4
Al	NCS ZC73014 - Tea, NCS	Yes		9.4E+02	9.0E+01	7.2E+02		1
Al	2709a - San Joaquin soil, NIST	Yes		7.4E+04	1.6E+03	4.1E+04		1
As	1486 - Bone meal, NIST	No		6.0E-03		7.8E-03	2.1E-03	4
As	Dolt 4 - Fish Liver, NRC-CNRC	Yes		9.7E+00	6.2E-01	8.9E+00	2.8E-01	4
As	Dorm 3 - Fish Protein, NRC-CNRC	Yes		6.9E+00	3.0E-01	6.6E+00		1
As	1575 - Pine needles, NIST	Yes		2.1E-01	4.0E-02	2.0E-01	8.5E-03	3
As	1577b - Bovine Liver, NIST	No		5.0E-02		4.8E-02	2.8E-03	4
As	NCS ZC73014 - Tea, NCS	Yes		9.0E-02	1.0E-02	7.6E-02		1
As	2709a - San Joaquin soil, NIST	No		1.1E+01	3.0E-01	8.5E+00		1
B	NCS ZC73014 - Tea, NCS	Yes		1.4E+01	1.0E+00	1.4E+01		1
Ba	NCS ZC73014 - Tea, NCS	Yes		9.6E+00	5.0E-01	8.2E+00		1
Ba	2709a - San Joaquin soil, NIST	Yes		9.8E+02	2.8E+01	5.0E+02		1
Be	NCS ZC73014 - Tea, NCS	Yes		1.0E-02	2.0E-03	8.0E-03		1
Bi	NCS ZC73014 - Tea, NCS	Yes		1.8E-02	2.0E-03	1.6E-02		1
Ca	1486 - Bone meal, NIST	Yes		2.7E+05	2.4E+03	2.8E+05	8.5E+03	4
Ca	Dolt 4 - Fish Liver, NRC-CNRC	No		6.8E+02		7.0E+02	2.3E+01	4
Ca	1575 - Pine needles, NIST	Yes		4.1E+03	2.0E+02	4.2E+03	2.7E+02	3
Ca	1577b - Bovine Liver, NIST	Yes		1.2E+02	4.0E+00	1.2E+02	6.1E+00	4
Ca	NCS ZC73014 - Tea, NCS	Yes		3.3E+03	8.0E+01	3.1E+03		1
Ca	2709a - San Joaquin soil, NIST	Yes		1.9E+04	9.0E+02	1.5E+04		1
Cd	1486 - Bone meal, NIST	No		3.0E-03		3.2E-03	1.2E-03	4
Cd	Dolt 4 - Fish Liver, NRC-CNRC	Yes		2.4E+01	8.0E-01	2.5E+01	3.4E-01	4
Cd	Dorm 3 - Fish Protein, NRC-CNRC	Yes		2.9E-01	2.0E-02	3.0E-01		1
Cd	1575 - Pine needles, NIST	No	<	5.0E-01		1.8E-01	1.3E-02	3
Cd	1577b - Bovine Liver, NIST	Yes		5.0E-01	3.0E-02	5.2E-01	1.6E-02	4
Cd	NCS ZC73014 - Tea, NCS	Yes		6.2E-02	4.0E-03	6.5E-02		1
Cd	2709a - San Joaquin soil, NIST	Yes		3.7E-01	2.0E-03	3.3E-01		1
Ce	1575 - Pine needles, NIST	No		4.0E-01		2.6E-01	5.8E-03	3
Ce	NCS ZC73014 - Tea, NCS	Yes		3.9E-01	5.0E-02	3.8E-01		1
Ce	2709a - San Joaquin soil, NIST	No		4.2E+01	1.0E+00	4.3E+01		1
Co	Dolt 4 - Fish Liver, NRC-CNRC	No		2.5E-01		2.4E-01	5.8E-03	4
Co	1575 - Pine needles, NIST	No		1.0E-01		1.2E-01	0.0E+00	2
Co	1577b - Bovine Liver, NIST	No		2.5E-01		2.3E-01	4.9E-03	4
Co	NCS ZC73014 - Tea, NCS	Yes		2.2E-01	2.0E-02	2.1E-01		1
Co	2709a - San Joaquin soil, NIST	Yes		1.3E+01	2.0E-01	1.1E+01		1
Cr	Dolt 4 - Fish Liver, NRC-CNRC	No		1.4E+00		1.3E+00	1.4E-01	4
Cr	Dorm 3 - Fish Protein, NRC-CNRC	Yes		1.9E+00	1.7E-01	1.8E+00		1
Cr	1575 - Pine needles, NIST	Yes		2.6E+00	2.0E-01	2.5E+00	1.5E-01	3
Cr	NCS ZC73014 - Tea, NCS	Yes		4.5E-01	1.0E-01	2.2E-01		1
Cr	2709a - San Joaquin soil, NIST	Yes		1.3E+02	9.0E+00	1.1E+02		1

Element	Reference material	Certified	Reported	Uncertainty	Measured	SD	N
Cs	NCS ZC73014 - Tea, NCS	Yes	3.2E-01	6.0E-02	2.8E-01		1
Cs	2709a - San Joaquin soil, NIST	No	5.0E+00	1.0E-01	3.9E+00		1
Cu	1486 - Bone meal, NIST	No	8.0E-01		5.7E-01	2.6E-02	4
Cu	Dolt 4 - Fish Liver, NRC-CNRC	Yes	3.1E+01	1.1E+00	3.2E+01	6.4E-01	4
Cu	Dorm 3 - Fish Protein, NRC-CNRC	Yes	1.6E+01	6.3E-01	1.5E+01		1
Cu	1575 - Pine needles, NIST	Yes	3.0E+00	3.0E-01	2.9E+00	8.0E-02	3
Cu	1577b - Bovine Liver, NIST	Yes	1.6E+02	8.0E+00	1.6E+02	2.3E+00	4
Cu	NCS ZC73014 - Tea, NCS	Yes	1.9E+01	7.0E-01	1.8E+01		1
Cu	2709a - San Joaquin soil, NIST	No	3.4E+01	5.0E-01	2.2E+01		1
Er	NCS ZC73014 - Tea, NCS	Yes	1.4E-02	4.0E-03	1.3E-02		1
Fe	1486 - Bone meal, NIST	Yes	9.9E+01	8.0E+00	7.6E+01	1.7E+00	4
Fe	Dolt 4 - Fish Liver, NRC-CNRC	Yes	1.8E+03	7.5E+01	1.7E+03	3.5E+01	4
Fe	Dorm 3 - Fish Protein, NRC-CNRC	Yes	3.5E+02	2.0E+01	3.2E+02		1
Fe	1575 - Pine needles, NIST	Yes	2.0E+02	1.0E+01	2.0E+02	1.3E+01	3
Fe	1577b - Bovine Liver, NIST	Yes	1.8E+02	1.5E+01	1.9E+02	7.5E+00	4
Fe	NCS ZC73014 - Tea, NCS	Yes	2.4E+02	1.8E+01	2.2E+02		1
Fe	2709a - San Joaquin soil, NIST	Yes	3.4E+04	7.0E+02	3.0E+04		1
Hf	NCS ZC73014 - Tea, NCS	No	1.7E-01		1.6E-02		1
Hf	2709a - San Joaquin soil, NIST	No	4.0E+00		2.7E-01		1
Hg	Dolt 4 - Fish Liver, NRC-CNRC	Yes	2.6E+00	2.2E-01	2.1E+00	1.5E-01	4
Hg	Dorm 3 - Fish Protein, NRC-CNRC	Yes	3.8E-01	6.0E-02	3.2E-01		1
Hg	1575 - Pine needles, NIST	Yes	1.5E-01	5.0E-02	1.2E-01	2.5E-02	3
Hg	1577b - Bovine Liver, NIST	No	3.0E-03		3.7E-03	6.0E-04	3
Hg	NCS ZC73014 - Tea, NCS	Yes	3.8E-03	8.0E-04	4.0E-03		1
Hg	2709a - San Joaquin soil, NIST	No	9.0E-01	2.0E-01	7.1E-01		1
Ho	NCS ZC73014 - Tea, NCS	Yes	5.4E-03	1.2E-03	4.4E-03		1
K	1486 - Bone meal, NIST	Yes	4.1E+02	4.0E+00	3.8E+02	3.0E+00	4
K	Dolt 4 - Fish Liver, NRC-CNRC	No	9.8E+03		9.1E+03	4.3E+02	4
K	1575 - Pine needles, NIST	Yes	3.7E+03	2.0E+02	3.7E+03	8.1E+01	3
K	1577b - Bovine Liver, NIST	Yes	9.9E+03	2.0E+01	1.0E+04	3.3E+02	4
K	NCS ZC73014 - Tea, NCS	Yes	1.6E+04	7.0E+02	1.6E+04		1
K	2709a - San Joaquin soil, NIST	Yes	2.1E+04	6.0E+02	6.5E+03		1
La	1575 - Pine needles, NIST	No	2.0E-01		1.3E-01	1.1E-02	3
La	NCS ZC73014 - Tea, NCS	Yes	2.5E-01	2.0E-02	2.0E-01		1
La	2709a - San Joaquin soil, NIST	No	2.2E+01	4.0E-01	2.0E+01		1
Li	NCS ZC73014 - Tea, NCS	Yes	1.4E-01	2.0E-02	1.3E-01		1
Lu	NCS ZC73014 - Tea, NCS	Yes	3.0E-03	8.0E-04	2.4E-03		1
Mg	1486 - Bone meal, NIST	Yes	4.7E+03	1.7E+02	3.4E+03	3.0E+02	4
Mg	Dolt 4 - Fish Liver, NRC-CNRC	No	1.5E+03		1.4E+03	7.4E+01	4
Mg	1577b - Bovine Liver, NIST	Yes	6.0E+02	2.8E+01	6.1E+02	1.6E+01	4
Mg	NCS ZC73014 - Tea, NCS	Yes	1.9E+03	1.1E+02	1.7E+03		1
Mg	2709a - San Joaquin soil, NIST	Yes	1.5E+04	2.0E+02	1.2E+04		1
Mn	1486 - Bone meal, NIST	No	1.0E+00		1.0E+00	1.2E-02	4
Mn	Dorm 3 - Fish Protein, NRC-CNRC	No	4.6E+00		2.9E+00		1
Mn	1575 - Pine needles, NIST	Yes	6.8E+02	1.5E+01	6.7E+02	2.5E+01	3
Mn	1577b - Bovine Liver, NIST	Yes	1.1E+01	1.7E+00	1.0E+01	2.5E-01	4
Mn	NCS ZC73014 - Tea, NCS	Yes	5.0E+02	2.0E+01	4.7E+02		1
Mn	2709a - San Joaquin soil, NIST	Yes	5.3E+02	1.8E+01	4.9E+02		1
Mo	Dolt 4 - Fish Liver, NRC-CNRC	No	1.0E+00		1.0E+00	3.1E-02	4
Mo	1577b - Bovine Liver, NIST	Yes	3.5E+00	3.0E-01	3.6E+00	6.2E-02	4
Mo	NCS ZC73014 - Tea, NCS	Yes	4.0E-02	1.2E-02	2.0E-02		1

Element	Reference material	Certified	Reported	Uncertainty	Measured	SD	N
Na	1486 - Bone meal, NIST	No	5.0E+03		5.1E+03	1.3E+02	4
Na	Dolt 4 - Fish Liver, NRC-CNRC	No	6.8E+03		6.7E+03	2.6E+02	4
Na	1577b - Bovine Liver, NIST	Yes	2.4E+03	6.0E+01	2.4E+03	9.9E+01	4
Na	NCS ZC73014 - Tea, NCS	Yes	9.0E+01	1.0E+01	7.2E+01		1
Na	2709a - San Joaquin soil, NIST	Yes	1.2E+04	3.0E+02	9.3E+02		1
Nd	NCS ZC73014 - Tea, NCS	Yes	1.5E-01	2.0E-02	1.4E-01		1
Nd	2709a - San Joaquin soil, NIST	No	1.7E+01		1.7E+01		1
Ni	Dolt 4 - Fish Liver, NRC-CNRC	Yes	9.7E-01	1.1E-01	1.1E+00	9.4E-02	4
Ni	Dorm 3 - Fish Protein, NRC-CNRC	Yes	1.3E+00	2.4E-01	1.2E+00		1
Ni	1575 - Pine needles, NIST	No	3.5E+00		2.4E+00	1.8E-01	3
Ni	NCS ZC73014 - Tea, NCS	Yes	3.4E+00	3.0E-01	3.1E+00		1
Ni	2709a - San Joaquin soil, NIST	No	8.5E+01	2.0E+00	7.0E+01		1
P	1486 - Bone meal, NIST	Yes	1.2E+05	1.9E+03	1.2E+05	2.1E+03	4
P	1575 - Pine needles, NIST	Yes	1.2E+03	2.0E+02	1.3E+03	2.9E+01	3
P	1577b - Bovine Liver, NIST	Yes	1.1E+04	3.0E+02	1.2E+04	2.1E+02	4
P	NCS ZC73014 - Tea, NCS	Yes	4.5E+03	3.0E+02	4.6E+03		1
P	2709a - San Joaquin soil, NIST	Yes	6.9E+02	1.3E+01	6.1E+02		1
Pb	1486 - Bone meal, NIST	Yes	1.3E+00	1.4E-02	9.7E-01	4.7E-02	4
Pb	Dolt 4 - Fish Liver, NRC-CNRC	Yes	1.6E-01	4.0E-02	1.6E-01	2.4E-02	4
Pb	Dorm 3 - Fish Protein, NRC-CNRC	Yes	4.0E-01	5.0E-02	4.0E-01		1
Pb	1575 - Pine needles, NIST	Yes	1.1E+01	5.0E-01	1.0E+01	8.7E-02	3
Pb	1577b - Bovine Liver, NIST	Yes	1.3E-01	4.0E-03	1.1E-01	3.2E-03	4
Pb	NCS ZC73014 - Tea, NCS	Yes	1.5E+00	2.0E-01	1.4E+00		1
Pb	2709a - San Joaquin soil, NIST	Yes	1.7E+01	1.0E-01	1.1E+01		1
Pr	NCS ZC73014 - Tea, NCS	Yes	4.2E-02	4.0E-03	3.9E-02		1
Rb	1575 - Pine needles, NIST	Yes	1.2E+01	1.0E-01	1.1E+01	2.9E-01	3
Rb	1577b - Bovine Liver, NIST	Yes	1.4E+01	1.1E+00	1.3E+01	4.0E-01	4
Rb	NCS ZC73014 - Tea, NCS	Yes	1.2E+02	5.0E+00	1.1E+02		1
Rb	2709a - San Joaquin soil, NIST	No	9.9E+01	3.0E+00	5.0E+01		1
S	1577b - Bovine Liver, NIST	Yes	7.9E+03	6.0E+01	7.8E+03	1.2E+02	4
S	NCS ZC73014 - Tea, NCS	Yes	3.0E+03	3.0E+02	2.9E+03		1
Sb	1575 - Pine needles, NIST	No	2.0E-01		1.6E-01	5.3E-03	3
Sb	1577b - Bovine Liver, NIST	No	3.0E-03		3.5E-03	8.0E-04	4
Sb	NCS ZC73014 - Tea, NCS	Yes	2.2E-02	6.0E-03	1.9E-02		1
Sb	2709a - San Joaquin soil, NIST	Yes	1.6E+00	6.0E-02	9.7E-03		1
Sc	1575 - Pine needles, NIST	No	3.0E-02		3.4E-02	1.2E-03	3
Sc	NCS ZC73014 - Tea, NCS	No	2.3E-02		2.2E-02		1
Sc	2709a - San Joaquin soil, NIST	No	1.1E+01	1.0E-01	1.0E+01		1
Se	1486 - Bone meal, NIST	No	1.3E-01		1.4E-01	5.8E-03	4
Se	Dolt 4 - Fish Liver, NRC-CNRC	Yes	8.3E+00	1.3E+00	8.3E+00	2.0E-01	4
Se	Dorm 3 - Fish Protein, NRC-CNRC	No	3.3E+00		3.7E+00		1
Se	1577b - Bovine Liver, NIST	Yes	7.3E-01	6.0E-02	7.4E-01	2.5E-02	4
Se	NCS ZC73014 - Tea, NCS	Yes	9.8E-02	8.0E-03	1.0E-01		1
Se	2709a - San Joaquin soil, NIST	No	1.5E+00		1.2E+00		1
Si	NCS ZC73014 - Tea, NCS	Yes	9.9E+02	8.0E+01	2.5E+02		1
Si	2709a - San Joaquin soil, NIST	Yes	3.0E+05	4.0E+03	1.5E+03		1
Sm	NCS ZC73014 - Tea, NCS	Yes	2.9E-02	3.0E-03	2.4E-02		1
Sm	2709a - San Joaquin soil, NIST	No	4.0E+00		3.4E+00		1
Sn	Dolt 4 - Fish Liver, NRC-CNRC	No	1.7E-01		1.6E-01	9.7E-03	4
Sn	Dorm 3 - Fish Protein, NRC-CNRC	Yes	6.6E-02	1.2E-02	6.6E-02		1
Sr	1486 - Bone meal, NIST	Yes	2.6E+02	7.0E+00	2.3E+02	5.2E+00	4

Element	Reference material	Certified	Reported	Uncertainty	Measured	SD	N
Sr	Dolt 4 - Fish Liver, NRC-CNRC	No	5.5E+00		5.4E+00	1.4E-01	4
Sr	1575 - Pine needles, NIST	Yes	4.8E+00	2.0E-01	4.4E+00	1.5E-01	3
Sr	1577b - Bovine Liver, NIST	Yes	1.4E-01	1.0E-03	1.3E-01	4.5E-03	4
Sr	NCS ZC73014 - Tea, NCS	Yes	9.1E+00	1.2E+00	6.7E+00		1
Sr	2709a - San Joaquin soil, NIST	Yes	2.4E+02	6.0E+00	1.1E+02		1
Tb	NCS ZC73014 - Tea, NCS	Yes	4.5E-03	7.0E-04	3.4E-03		1
Tb	2709a - San Joaquin soil, NIST	No	5.0E-01		4.6E-01		1
Th	1575 - Pine needles, NIST	Yes	3.7E-02	3.0E-03	2.3E-02	1.4E-03	3
Th	NCS ZC73014 - Tea, NCS	Yes	3.8E-02	1.2E-02	2.0E-02		1
Th	2709a - San Joaquin soil, NIST	No	1.1E+01	2.0E-01	8.6E+00		1
Ti	NCS ZC73014 - Tea, NCS	No	1.4E+01		7.7E+00		1
Ti	2709a - San Joaquin soil, NIST	Yes	3.4E+03	7.0E+01	1.6E+02		1
Tl	1575 - Pine needles, NIST	No	5.0E-02		4.5E-02	7.9E-04	3
Tl	NCS ZC73014 - Tea, NCS	No	5.0E-02		4.1E-02		1
Tl	2709a - San Joaquin soil, NIST	No	5.8E-01	1.0E-02	3.1E-01		1
Tm	NCS ZC73014 - Tea, NCS	Yes	2.6E-03	1.0E-03	2.2E-03		1
U	1575 - Pine needles, NIST	Yes	2.0E-02	4.0E-03	1.4E-02	4.2E-04	3
U	NCS ZC73014 - Tea, NCS	Yes	1.0E-02	2.0E-03	9.1E-03		1
U	2709a - San Joaquin soil, NIST	No	3.2E+00	5.0E-02	2.0E+00		1
V	Dolt 4 - Fish Liver, NRC-CNRC	No	6.0E-01		7.7E-01	1.8E-01	4
V	1577b - Bovine Liver, NIST	No	1.2E-01		1.1E-01	2.8E-03	4
V	NCS ZC73014 - Tea, NCS	Yes	1.7E-01	3.0E-02	1.4E-01		1
V	2709a - San Joaquin soil, NIST	Yes	1.1E+02	1.1E+01	8.5E+01		1
Y	NCS ZC73014 - Tea, NCS	Yes	2.3E-01	3.0E-02	1.9E-01		1
Yb	NCS ZC73014 - Tea, NCS	Yes	1.8E-02	4.0E-03	1.5E-02		1
Yb	2709a - San Joaquin soil, NIST	No	2.0E+00		1.2E+00		1
Zn	1486 - Bone meal, NIST	Yes	1.5E+02	1.6E+01	9.2E+01	3.6E+00	4
Zn	Dolt 4 - Fish Liver, NRC-CNRC	Yes	1.2E+02	6.0E+00	1.2E+02	4.0E+00	4
Zn	Dorm 3 - Fish Protein, NRC-CNRC	Yes	5.1E+01	3.1E+00	5.2E+01		1
Zn	1577b - Bovine Liver, NIST	Yes	1.3E+02	1.6E+01	1.3E+02	1.0E+00	4
Zn	NCS ZC73014 - Tea, NCS	Yes	5.1E+01	2.0E+00	5.0E+01		1
Zn	2709a - San Joaquin soil, NIST	No	1.0E+02	4.0E+00	8.9E+01		1
Zr	2709a - San Joaquin soil, NIST	Yes	2.0E+02	4.6E+01	7.5E+00		1

Appendix 2 – Comparison of analytical methods

Concentrations (µg/kg, DW) in samples measured using ICP-MS and NAA. Medians for each category are shown. Raw data are available in a separate database.

Element	Category		n	Median ICP-MS (µg/g, DW)	Median NAA (µg/g, DW)	ICP-MS/NAA ratio
Ba	PI		5	1.1E+01	9.9E+00	1.1E+00
Ba	PO		3	4.2E+00	4.5E+00	9.3E-01
Ba	Soil		9	6.2E+01	2.1E+02	2.9E-01
Ce	AP		1	2.0E-01	1.2E-01	1.7E+00
Ce	CA	ST	9	2.1E-01	1.6E-01	1.3E+00
Ce	CA	HT	9	2.0E-01	2.4E-01	8.4E-01
Ce	CE	M	3	8.4E-02	7.5E-02	1.1E+00
Ce	CE	L	1	1.2E-01	1.1E-01	1.1E+00
Ce	FU		10	6.1E-01	8.7E-01	7.0E-01
Ce	PI		2	2.0E-02	2.2E-02	9.1E-01
Ce	PO		9	4.0E-02	3.1E-02	1.3E+00
Ce	Soil		16	3.7E+01	3.4E+01	1.1E+00
Co	AN	M	10	2.7E-02	2.5E-02	1.0E+00
Co	AN	L	1	3.5E-02	7.8E-02	4.5E-01
Co	AP		1	2.7E-01	2.6E-01	1.0E+00
Co	CA	ST	10	2.7E-01	2.2E-01	1.3E+00
Co	CA	HT	10	4.6E-02	6.2E-02	7.5E-01
Co	CE	M	11	3.9E-02	3.7E-02	1.1E+00
Co	CE	B	11	1.9E-01	1.8E-01	1.1E+00
Co	CE	L	10	5.4E-01	4.5E-01	1.2E+00
Co	CE	G	1	4.4E-02	4.8E-02	9.1E-01
Co	FU		10	1.0E+00	1.3E+00	8.1E-01
Co	PI		10	8.4E-02	8.4E-02	1.0E+00
Co	PL	M	9	1.4E-02	1.7E-02	8.4E-01
Co	PL	B	6	8.7E-03	7.8E-03	1.1E+00
Co	PO		10	6.0E-02	5.8E-02	1.0E+00
Co	Soil		16	4.3E+00	6.4E+00	6.7E-01
Cr	AN	M	3	5.0E-02	1.6E-01	3.1E-01
Cr	AP		1	1.0E+00	1.1E+00	9.3E-01
Cr	CA	ST	9	2.0E-01	1.7E-01	1.2E+00
Cr	CA	HT	10	2.7E-01	3.7E-01	7.4E-01
Cr	CE	M	7	1.3E-01	4.9E-01	2.7E-01
Cr	CE	B	11	3.7E+00	3.7E+00	1.0E+00
Cr	CE	L	4	5.3E-02	3.1E-01	1.7E-01
Cr	CE	G	1	1.3E-01	8.1E-01	1.6E-01
Cr	FU		10	1.8E+00	1.9E+00	9.4E-01
Cr	PL	M	5	1.4E-01	6.8E-02	2.0E+00
Cr	PL	B	3	6.3E-02	2.4E-01	2.6E-01
Cr	PO		2	7.8E-02	9.1E-02	8.6E-01
Cr	Soil		16	3.6E+01	5.1E+01	7.0E-01
Cs	AN	M	10	1.8E-01	1.8E-01	1.0E+00
Cs	AN	L	1	5.5E-02	1.3E-01	4.4E-01
Cs	AP		1	3.8E-01	3.7E-01	1.0E+00
Cs	CA	ST	10	1.3E-02	2.9E-02	4.5E-01

Element	Category		n	Median ICP-MS (µg/g, DW)	Median NAA (µg/g, DW)	ICP-MS/NAA ratio
Cs	CA	HT	10	9.9E-03	3.9E-02	2.5E-01
Cs	CE	M	11	3.3E-01	2.8E-01	1.2E+00
Cs	CE	B	11	1.1E-01	8.4E-02	1.3E+00
Cs	CE	L	10	2.3E-01	2.3E-01	1.0E+00
Cs	CE	G	1	1.4E-01	1.4E-01	9.8E-01
Cs	FU		10	5.1E-02	6.9E-02	7.4E-01
Cs	PI		10	4.2E-01	3.3E-01	1.3E+00
Cs	PL	M	9	4.6E-02	4.6E-02	1.0E+00
Cs	PL	B	6	2.3E-02	2.9E-02	7.9E-01
Cs	PO		10	3.8E-01	3.7E-01	1.0E+00
Cs	Soil		16	1.3E+00	1.5E+00	8.6E-01
Fe	AN	M	10	2.0E+02	1.7E+02	1.1E+00
Fe	AN	L	1	5.6E+02	1.1E+03	5.2E-01
Fe	AP		1	2.0E+02	2.0E+02	1.0E+00
Fe	CA	ST	10	9.0E+01	7.7E+01	1.2E+00
Fe	CA	HT	10	6.8E+01	1.1E+02	6.4E-01
Fe	CE	M	11	1.7E+02	1.7E+02	1.0E+00
Fe	CE	B	11	1.4E+02	1.7E+02	8.5E-01
Fe	CE	L	10	3.6E+02	3.1E+02	1.2E+00
Fe	CE	G	1	9.8E+01	1.0E+02	9.8E-01
Fe	FU		10	3.3E+02	3.7E+02	9.0E-01
Fe	PI		10	2.4E+01	2.3E+01	1.0E+00
Fe	PL	M	9	9.8E+00	1.1E+01	8.6E-01
Fe	PL	B	6	1.1E+01	9.9E+00	1.1E+00
Fe	PO		10	3.3E+01	3.5E+01	9.5E-01
Fe	Soil		16	1.4E+04	1.9E+04	7.3E-01
Hf	CA	ST	1	1.6E-03	2.7E-02	6.1E-02
Hf	CA	HT	9	1.8E-03	2.7E-02	6.6E-02
Hf	CE	M	1	1.1E-03	1.1E-02	9.9E-02
Hf	FU		10	8.8E-03	3.6E-02	2.4E-01
Hf	Soil		15	2.0E-01	2.2E+00	9.3E-02
La	FU		2	5.9E-01	2.1E+00	2.9E-01
La	Soil		16	1.7E+01	2.0E+01	8.8E-01
Rb	AN	M	10	3.7E+01	3.3E+01	1.1E+00
Rb	AN	L	1	2.2E+01	4.4E+01	5.1E-01
Rb	AP		1	1.5E+01	1.3E+01	1.1E+00
Rb	CA	ST	10	2.0E+00	2.2E+00	9.3E-01
Rb	CA	HT	9	7.4E-01	2.4E+00	3.1E-01
Rb	CE	M	11	3.4E+01	2.7E+01	1.3E+00
Rb	CE	B	5	1.6E+00	1.5E+00	1.0E+00
Rb	CE	L	10	5.2E+01	4.3E+01	1.2E+00
Rb	CE	G	1	3.1E+01	3.0E+01	1.0E+00
Rb	FU		10	8.9E+00	1.1E+01	8.3E-01
Rb	PI		10	3.3E+01	2.9E+01	1.1E+00
Rb	PL	M	9	3.0E+00	3.8E+00	8.0E-01
Rb	PL	B	6	1.6E+00	1.7E+00	9.6E-01
Rb	PO		10	3.9E+01	3.7E+01	1.1E+00
Rb	Soil		15	1.6E+01	2.9E+01	5.4E-01
Sb	CA	ST	1	2.4E-02	1.8E-02	1.4E+00
Sb	CE	M	2	9.9E-01	8.8E-01	1.1E+00
Sb	FU		1	3.3E-02	3.2E-02	1.0E+00

Element	Category		n	Median ICP-MS (µg/g, DW)	Median NAA (µg/g, DW)	ICP-MS/NAA ratio
Sb	Soil		4	3.4E-02	4.3E-01	7.9E-02
Sc	AN	M	2	1.1E-03	7.8E-04	1.4E+00
Sc	AP		1	2.2E-02	2.4E-02	9.2E-01
Sc	CA	ST	10	1.0E-02	1.1E-02	9.6E-01
Sc	CA	HT	10	2.8E-02	4.0E-02	7.1E-01
Sc	CE	M	6	4.6E-03	6.4E-03	7.3E-01
Sc	CE	B	11	4.0E-02	3.1E-02	1.3E+00
Sc	CE	L	1	1.1E-03	2.3E-03	4.8E-01
Sc	CE	G	1	1.6E-03	3.4E-03	4.7E-01
Sc	FU		10	1.2E-01	1.3E-01	9.3E-01
Sc	PI		8	1.7E-03	1.7E-03	9.8E-01
Sc	PL	M	5	2.6E-03	3.5E-03	7.4E-01
Sc	PL	B	1	4.7E-03	5.0E-04	9.4E+00
Sc	PO		10	2.0E-03	3.0E-03	6.8E-01
Sc	Soil		16	5.6E+00	8.6E+00	6.5E-01
Se	AN	M	4	1.5E+00	5.5E-02	2.7E+01
Se	AN	L	1	1.8E+00	3.7E-01	5.0E+00
Se	CA	ST	9	3.3E+00	2.4E-01	1.4E+01
Se	CA	HT	10	4.5E-01	3.8E-01	1.2E+00
Se	CE	M	2	3.3E-01	2.0E-02	1.6E+01
Se	CE	L	6	8.0E-01	8.1E-02	1.0E+01
Se	CE	G	1	7.3E-01	9.7E-02	7.6E+00
Se	FU		6	1.0E-01	5.1E-02	2.1E+00
Se	PL	M	3	2.1E+00	8.5E-02	2.4E+01
Se	PL	B	3	9.5E-01	2.9E-01	3.3E+00
Se	Soil		13	1.0E+00	1.1E+00	9.1E-01
Sm	FU		6	5.6E-02	1.5E-01	3.9E-01
Sm	Soil		15	3.1E+00	2.5E+00	1.2E+00
Sr	CA	ST	10	1.5E+02	1.2E+02	1.2E+00
Sr	CA	HT	10	2.7E+03	2.8E+03	9.6E-01
Sr	CE	B	11	1.8E+02	1.7E+02	1.1E+00
Sr	FU		10	7.4E+02	8.2E+02	9.0E-01
Sr	PI		5	2.4E+01	2.8E+01	8.7E-01
Sr	PL	M	9	1.3E+01	1.2E+01	1.0E+00
Sr	PL	B	6	3.2E+02	2.6E+02	1.2E+00
Sr	PO		7	4.7E+00	7.2E+00	6.5E-01
Sr	Soil		16	9.8E+01	2.9E+02	3.3E-01
Th	CE	M	1	1.2E-02	3.3E-02	3.7E-01
Th	FU		9	7.0E-02	1.2E-01	5.8E-01
Th	Soil		16	3.4E+00	4.0E+00	8.6E-01
Yb	Soil		14	1.2E+00	2.3E+00	5.1E-01
Zn	AN	M	10	3.6E+01	3.2E+01	1.1E+00
Zn	AN	L	1	7.2E+01	1.3E+02	5.7E-01
Zn	AP		1	1.3E+02	1.1E+02	1.2E+00
Zn	CA	ST	10	1.8E+02	1.4E+02	1.3E+00
Zn	CA	HT	10	2.0E+01	3.8E+01	5.4E-01
Zn	CE	M	11	1.5E+02	1.1E+02	1.3E+00
Zn	CE	B	11	6.1E+01	8.0E+01	7.7E-01
Zn	CE	L	10	8.5E+01	6.6E+01	1.3E+00
Zn	CE	G	1	4.2E+01	4.0E+01	1.0E+00
Zn	FU		10	1.4E+01	1.8E+01	7.7E-01

Element	Category		n	Median ICP-MS (µg/g, DW)	Median NAA (µg/g, DW)	ICP-MS/NAA ratio
Zn	PI		10	3.3E+01	3.0E+01	1.1E+00
Zn	PL	M	9	2.8E+01	2.2E+01	1.2E+00
Zn	PL	B	5	3.2E+01	3.0E+01	1.1E+00
Zn	PO		10	2.6E+01	2.4E+01	1.1E+00
Zn	Soil		16	2.9E+01	4.1E+01	7.2E-01
Zr	FU		10	2.7E-01	1.1E+01	2.5E-02
Zr	Soil		7	2.3E+00	1.0E+02	2.3E-02

Appendix 3 – Biota

Details regarding individual vertebrates and crabs sampled at Tjøtta

RAP	Date	Sex	Age	Live weight (g)		Comments
AN1	22.8.11	M	Adult	5.8E+02		Length: Not specified
AN2	27.9.11	M	Adult	5.2E+02		Lenght: 41 cm
AN3	6.10.11	M	Adult	3.2E+02		Length: 33 cm
AN4	18.9.11	F	Adult	9.8E+02		Length: Not specified
AN5	1.9.11	M	Adult	7.6E+02		Length: 47 cm
AN6	7.9.11	F	Adult	7.8E+02		Length: 48 cm
AN7	7.9.11	F	Adult	1.1E+03		Length: 50 cm
AN8	-	M	Adult	7.9E+02		Length: 43 cm. Had tapeworm
AN9	31.8.11	M	Adult	7.6E+02		Length: 50 cm. Infected with liver fluke
AN10	29.8.11	M	Adult	5.2E+02		Round weight. Length: 39 cm
AN11	29.8.11	F	Adult	9.3E+02		Round weight. Length: 50 cm
CA01	26.9.11	F	Adult	7.8E+02		
CA02	26.9.11	M	Adult	8.2E+02		
CA03	26.9.11	F	Adult	5.9E+02		
CA04	26.9.11	M	Adult	5.8E+02		
CA05	26.9.11	F	Adult	7.5E+02		
CA06	26.9.11	M	Adult	8.1E+02		
CA07	26.9.11	M	Adult	6.2E+02		
CA08	26.9.11	M	Juvenile	4.4E+02		
CA09	26.9.11	M	Adult	5.7E+02		
CA10	26.9.11	M	Adult	9.3E+02		
CE01	25.9.11	F	Adult	1.4E+05	*	1.5 years
CE02	26.9.11	F	Adult	2.0E+05	*	Mother of CE8 and CE9
CE03	27.9.11	F	Adult	1.5E+05	*	1.5 years. Slaughter weight
CE04	27.9.11	F	Adult	1.9E+05	*	Mother of CE10 and CE11
CE05	25.9.11	M	Adult	3.0E+05	*	Antlers with 14 spiers
CE06	25.9.11	M	Adult	2.6E+05	*	Antlers with 8 spiers
CE07	26.9.11	M	Adult	2.5E+05	*	Antlers with 11 spiers
CE08	26.9.11	M	Juvenile	5.5E+04	*	6 months, CE8 and CE9 are siblings, mother: CE2
CE09	26.9.11	M	Juvenile	6.0E+04	*	6 months, CE8 and CE9 are siblings, mother: CE2
CE10	27.9.11	F	Juvenile	6.5E+04	*	6 months, CE10 and CE11 are siblings, mother: CE4
CE11	27.9.11	M	Juvenile	6.5E+04	*	6 months, CE10 and CE11 are siblings, mother: CE4
MU01	24.11.11	M	Adult	1.8E+01		Body: 9 cm, tail: 9 cm
MU02	8.12.11	F	Adult	2.2E+01		Body: 9 cm, tail: 9 cm
MU03	22.12.11	M	Juvenile	1.6E+01		Body: 7.5 cm, tail: 7 cm
MU04	4.1.12	M	Juvenile	1.3E+01		Body: 7 cm, tail: 7 cm
MU05	9.10.12	M	Adult	1.8E+01		Body: 7 cm, tail: 10 cm
MU06	17.10.12	F	Adult	1.3E+01		Body: 7 cm, tail: 7 cm
MU07	8.11.12	F	Adult	1.4E+01		Body: 7 cm, tail: 8 cm
PL01	27.9.11	F	Adult	1.5E+03		
PL02	27.9.11	F	Adult	7.9E+02		
PL03	27.9.11	M	Adult	4.7E+02		
PL04	27.9.11	F	Adult	9.7E+02		
PL05	27.9.11	M	Adult	6.1E+02		
PL06	27.9.11	M	Adult	7.2E+02		
PL07	27.9.11	M	Adult	4.6E+02		

RAP	Date	Sex	Age	Live weight (g)	Comments
PL08	27.9.11	M	Adult	5.5E+02	
PL09	27.9.11	M	Adult	8.7E+02	
PL10	27.9.11	F	Adult	9.1E+02	
RA01	30.6.11	M	Juvenile	4.0E+00	Frog very tiny, composite sample with RA2
RA02	30.6.11	M	Juvenile	4.1E+00	Frog very tiny, composite sample with RA1
RA03	31.8.11	M	Adult	2.1E+01	
RA04	13.9.11	F	Adult	6.4E+01	Lots of eggs (sampled separately)
RA05	13.9.11	F	Adult	3.9E+01	Lots of eggs (sampled separately)
RA06	13.9.11	M	Adult	3.1E+01	
RA07	13.9.11	M	Adult	3.3E+01	
RA08	13.9.11	F	Juvenile	1.5E+01	
RA09	13.9.11	M	Adult	3.2E+01	
RA10	13.9.11	F	Juvenile	1.7E+01	
SA01	8.9.11	M	Adult	9.4E+01	
SA02	8.9.11	M	Adult	6.6E+01	
SA03	8.9.11	F	Adult	4.1E+01	
SA04	14.11.12	F	Adult	3.6E+01	
SA05	17.11.12	F	Adult	3.9E+01	
SA06	17.11.12	M	Adult	3.8E+01	
SA07	17.11.12	M	Adult	3.4E+01	
SA08	17.11.12	M	Adult	4.4E+01	
SA09	17.11.12	F	Adult	2.9E+01	
SA10	17.11.12	F	Adult	4.2E+01	

*Slaughter weight

Element concentrations in various RAP tissues

The following Tables are a summary of all dry weight concentration data for each RAP-tissue category. Abbreviations are described in the main text (Section 5.3), with the exception of "n<DL" that indicate the number of data for a particular category below detection limit. The total number of data is referred to as N. Data have been sorted according to element (in alphabetic order).

If the ratio of n<DL/N is equal to 0.5 or higher, all statistical data except median has been excluded (see Section 5.4). These data have been marked in red.

Ag (silver)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	1.6E-02	2.5E-02	8.4E-03	3.0	7.0E-03	11	2	2.0E-03	8.7E-02
AN	B					2.0E-03	11	7		
AN	L	1.9E-01	3.5E-01	9.3E-02	3.3	8.8E-02	11	0	1.8E-02	1.2E+00
AN	G	2.8E-02	3.0E-02	1.9E-02	2.4	1.7E-02	10	3	4.1E-03	1.0E-01
AP		1.0E-02		1.0E-02		1.0E-02	1	0		
CA	ST	1.7E+00	1.3E+00	1.4E+00	2.0	1.1E+00	10	0	6.2E-01	4.2E+00
CA	HT	2.0E-01	9.8E-02	1.8E-01	1.6	1.8E-01	10	0	4.6E-02	3.5E-01
CE	M					2.1E-03	11	8		
CE	B					2.0E-03	11	11		
CE	L	3.8E-02	3.8E-02	2.7E-02	2.3	2.7E-02	10	0	7.0E-03	1.4E-01
CE	G	6.5E-03	4.8E-03	5.2E-03	1.9	5.1E-03	7	3	1.9E-03	1.2E-02
FU		3.3E-02	4.6E-03	3.3E-02	1.1	3.4E-02	10	0	2.4E-02	3.8E-02
LU		8.3E-02	8.1E-02	5.9E-02	2.3	6.4E-02	14	0	2.2E-02	3.4E-01
MU	M					2.5E-03	7	7		
MU	B					2.9E-03	7	6		
MU	L					2.6E-03	7	7		
MU	G					7.9E-03	2	1		
PI						2.1E-03	10	6		
PL	M					1.9E-03	10	10		
PL	B					1.9E-03	10	10		
PL	L	7.4E-02	6.8E-02	5.4E-02	2.2	4.3E-02	10	0	6.9E-03	1.7E-01
PL	G	7.1E-03	4.3E-03	6.1E-03	1.7	6.9E-03	10	4	2.1E-03	1.8E-02
PO						1.9E-03	10	10		
RA	M					2.0E-03	9	8		
RA	B					2.9E-03	9	9		
RA	L	1.5E-01	1.1E-01	1.2E-01	1.9	1.1E-01	9	0	6.5E-02	4.2E-01
RA	G					1.4E-02	3	2		
RA	E1	1.1E-02	4.7E-03	1.0E-02	1.5	1.1E-02	2	0	7.9E-03	1.5E-02
RA	E2	1.2E-02	3.1E-03	1.2E-02	1.3	1.1E-02	6	0	9.4E-03	1.8E-02
RA	TAD	2.7E-02	6.0E-03	2.6E-02	1.2	2.7E-02	4	0	2.2E-02	3.2E-02
SA	M					2.0E-03	10	9		
SA	B	1.0E-02	1.6E-02	5.2E-03	3.1	5.1E-03	10	4	1.7E-03	5.6E-02
SA	L	4.4E+00	2.2E+00	3.9E+00	1.6	3.9E+00	10	0	1.9E+00	9.4E+00
SA	G	7.8E-03	3.5E-03	7.1E-03	1.5	7.8E-03	2	0	5.3E-03	1.0E-02

Al (aluminium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	8.0E-01	7.5E-01	5.9E-01	2.2	4.6E-01	10	1	7.9E-02	2.3E+00	1.8E+01*
AN	B	8.0E+00	8.4E+00	5.5E+00	2.4	3.8E+00	10	0	1.5E+00	2.5E+01	8.2E+01*
AN	L	2.0E+00	2.0E+00	1.5E+00	2.3	7.7E-01	10	0	4.9E-01	5.4E+00	1.9E+01*
AN	G	9.0E+01	1.2E+02	5.4E+01	2.8	5.0E+01	10	0	1.8E+00	3.9E+02	
AP		3.2E+02		3.2E+02		3.2E+02	1	0			
CA	ST	6.3E+01	6.5E+01	4.4E+01	2.3	3.2E+01	10	0	1.2E+01	2.0E+02	
CA	HT	1.0E+02	4.8E+01	9.1E+01	1.6	7.9E+01	10	0	5.0E+01	1.8E+02	
CE	M	2.4E+01	3.8E+01	1.2E+01	3.1	4.9E+00	11	0	9.8E-01	1.1E+02	
CE	B	9.1E+01	4.9E+01	8.0E+01	1.7	8.0E+01	11	0	3.1E+01	2.1E+02	
CE	L	2.0E+00	2.1E+00	1.3E+00	2.4	9.5E-01	10	0	3.5E-01	6.3E+00	
CE	G	1.2E+01	9.3E+00	9.5E+00	2.0	9.6E+00	7	0	1.6E+00	2.7E+01	
FU		4.6E+02	3.4E+02	3.8E+02	1.9	3.9E+02	10	0	4.2E+01	1.0E+03	
LU		1.9E+03	1.4E+03	1.5E+03	1.9	1.6E+03	14	0	4.2E+01	4.1E+03	
MU	M	1.1E+01	6.3E+00	9.0E+00	1.7	1.0E+01	7	0	3.4E+00	1.9E+01	
MU	B	2.0E+01	1.0E+01	1.8E+01	1.6	2.0E+01	7	0	7.9E+00	3.7E+01	
MU	L	1.7E+00	1.3E+00	1.3E+00	2.0	9.7E-01	7	1	1.0E-01	3.9E+00	
MU	G	7.6E+00	5.7E+00	6.0E+00	2.0	7.6E+00	2	0	3.5E+00	1.2E+01	
PI		5.5E+01	4.2E+01	4.4E+01	2.0	5.7E+01	10	0	9.1E+00	1.1E+02	
PL	M	7.7E+00	6.0E+00	6.0E+00	2.0	6.5E+00	10	0	1.4E+00	1.7E+01	
PL	B	6.0E+00	7.6E+00	3.7E+00	2.7	3.2E+00	10	0	1.1E+00	2.6E+01	
PL	L	1.5E+01	2.6E+01	7.5E+00	3.2	2.5E+00	10	0	6.7E-01	8.1E+01	
PL	G	3.2E+00	3.4E+00	2.1E+00	2.4	2.4E+00	10	1	2.9E-01	1.1E+01	
PO		1.8E+01	2.1E+01	1.2E+01	2.5	9.5E+00	10	0	6.8E+00	7.4E+01	
RA	M	5.0E+00	1.9E+00	4.7E+00	1.4	4.9E+00	8	0	2.5E+00	8.0E+00	3.8E+02**
RA	B	4.2E+00	4.8E+00	2.7E+00	2.5	1.9E+00	9	0	1.3E+00	1.4E+01	
RA	L	2.2E+00	3.4E+00	1.2E+00	3.0	1.2E+00	9	0	3.9E-01	1.1E+01	
RA	G	1.6E+00	1.3E+00	1.2E+00	2.0	1.2E+00	3	0	5.8E-01	3.0E+00	
RA	E1	1.5E+00	1.0E-02	1.5E+00	1.0	1.5E+00	2	0	1.5E+00	1.5E+00	
RA	E2	3.1E+02	2.9E+02	2.2E+02	2.2	1.9E+02	6	0	3.3E+01	7.1E+02	
RA	TAD	1.9E+03	7.6E+02	1.7E+03	1.5	1.7E+03	4	0	1.2E+03	2.9E+03	
SA	M	1.1E+01	1.0E+01	7.8E+00	2.2	6.4E+00	10	0	2.0E+00	3.1E+01	
SA	B	3.1E+01	2.6E+01	2.4E+01	2.1	1.9E+01	10	0	4.9E+00	7.6E+01	
SA	L	1.6E+01	2.2E+01	9.4E+00	2.8	8.8E+00	10	0	3.8E+00	7.8E+01	
SA	G	5.9E+00	6.2E+00	4.0E+00	2.4	5.9E+00	2	0	1.4E+00	1.0E+01	

Comments: *AN1, **RA3

As (arsenic)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	8.5E-02	1.0E-01	5.4E-02	2.6	5.1E-02	11	0	7.4E-03	3.8E-01	
AN	B	9.1E-02	1.1E-01	5.8E-02	2.6	4.2E-02	11	1	2.3E-03	3.3E-01	
AN	L	6.3E-02	4.8E-02	5.0E-02	2.0	5.6E-02	11	0	8.3E-03	1.9E-01	
AN	G	1.4E-01	1.4E-01	9.8E-02	2.3	1.1E-01	10	0	2.6E-02	5.0E-01	
AP		4.0E-02		4.0E-02		4.0E-02	1	0			
CA	ST	6.0E+01	2.5E+01	5.5E+01	1.5	5.1E+01	10	0	3.4E+01	1.1E+02	
CA	HT	1.2E+01	4.9E+00	1.1E+01	1.5	1.3E+01	10	0	4.8E+00	1.9E+01	
CE	M	1.2E-02	1.6E-02	7.0E-03	2.8	5.8E-03	11	4	2.4E-03	5.3E-02	
CE	B					2.7E-03	11	6			
CE	L					2.6E-03	10	6			
CE	G	1.3E-02	1.0E-02	1.1E-02	2.0	1.4E-02	6	2	2.3E-03	2.5E-02	2.2E-01*
FU		3.2E+01	5.9E+00	3.1E+01	1.2	3.2E+01	10	0	1.9E+01	4.3E+01	
LU		2.8E+00	2.4E+00	2.2E+00	2.1	1.9E+00	14	0	2.7E-01	8.6E+00	
MU	M	2.2E-02	1.2E-02	2.0E-02	1.6	1.7E-02	7	0	1.2E-02	4.4E-02	
MU	B	4.8E-02	3.5E-02	3.8E-02	1.9	2.9E-02	7	0	1.8E-02	1.1E-01	
MU	L	3.1E-02	2.7E-02	2.4E-02	2.1	2.5E-02	7	1	3.3E-03	8.4E-02	
MU	G	3.7E-02	2.4E-02	3.1E-02	1.8	3.7E-02	2	0	2.0E-02	5.4E-02	
PI						2.5E-03	10	7			
PL	M	1.0E+02	5.1E+01	9.2E+01	1.6	1.0E+02	10	0	4.4E+01	1.9E+02	
PL	B	4.9E+01	2.3E+01	4.4E+01	1.6	4.8E+01	10	0	1.8E+01	8.2E+01	
PL	L	3.1E+01	1.6E+01	2.7E+01	1.6	2.9E+01	10	0	1.3E+01	6.8E+01	
PL	G	4.9E+01	2.2E+01	4.4E+01	1.5	4.6E+01	10	0	2.3E+01	9.5E+01	
PO		7.1E-03	5.3E-03	5.7E-03	1.9	5.8E-03	10	2	2.3E-03	2.1E-02	
RA	M	1.8E-01	1.2E-01	1.5E-01	1.8	1.7E-01	9	1	2.0E-02	4.5E-01	
RA	B	1.4E-01	1.7E-01	8.6E-02	2.6	7.1E-02	9	1	2.2E-02	5.8E-01	
RA	L	3.1E-01	3.3E-01	2.1E-01	2.4	1.5E-01	9	0	6.7E-02	1.0E+00	
RA	G	7.4E-02	4.5E-02	6.3E-02	1.8	5.8E-02	3	1	3.9E-02	1.2E-01	
RA	E1	5.5E-02	3.0E-02	4.8E-02	1.7	5.5E-02	2	0	3.4E-02	7.6E-02	
RA	E2	1.9E-01	1.5E-01	1.5E-01	2.0	1.9E-01	6	0	4.1E-02	4.6E-01	
RA	TAD	3.6E-01	3.4E-02	3.5E-01	1.1	3.5E-01	4	0	3.2E-01	4.0E-01	
SA	M	6.5E-01	5.0E-01	5.1E-01	2.0	4.5E-01	10	0	1.7E-01	1.7E+00	
SA	B	3.0E-01	1.6E-01	2.7E-01	1.7	2.8E-01	10	0	1.1E-01	6.4E-01	
SA	L	1.1E-01	6.4E-02	1.0E-01	1.7	1.0E-01	10	0	3.7E-02	2.5E-01	
SA	G	1.4E-01	3.8E-02	1.3E-01	1.3	1.4E-01	2	0	1.1E-01	1.7E-01	

Comments: *CE9

Au (gold)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	2.0E-03	2.4E-03	1.2E-03	2.6	1.0E-03	11	0	7.0E-04	8.6E-03	
AN	B	5.4E-03	7.2E-03	3.3E-03	2.7	1.4E-03	11	0	5.3E-04	1.9E-02	
AN	L	1.3E-03	9.0E-04	1.1E-03	1.8	1.1E-03	11	0	4.8E-04	3.5E-03	
AN	G	1.9E-03	9.0E-04	1.7E-03	1.6	1.6E-03	9	0	1.1E-03	4.1E-03	3.1E-02*
AP		2.3E-03		2.3E-03		2.3E-03	1	0			
CA	ST	2.3E-03	1.7E-03	1.8E-03	1.9	1.7E-03	10	0	6.6E-04	5.7E-03	
CA	HT	8.3E-04	3.1E-04	7.7E-04	1.4	6.9E-04	10	0	4.4E-04	1.4E-03	
CE	M	1.0E-03	3.5E-04	9.8E-04	1.4	9.4E-04	11	0	7.3E-04	1.9E-03	
CE	B	1.6E-03	8.1E-04	1.4E-03	1.6	1.5E-03	10	0	7.0E-04	3.4E-03	1.6E-02**
CE	L					3.0E-04	10	5			
CE	G	1.7E-03	1.4E-03	1.4E-03	2.0	9.9E-04	7	0	6.0E-04	4.1E-03	
FU		2.3E-03	1.3E-03	2.0E-03	1.7	1.6E-03	10	0	1.3E-03	5.2E-03	
LU		3.1E-03	2.8E-03	2.4E-03	2.1	2.2E-03	14	0	1.1E-03	1.2E-02	
MU	M	1.2E-03	5.4E-04	1.1E-03	1.6	1.0E-03	7	0	5.2E-04	2.0E-03	
MU	B	4.2E-03	3.1E-03	3.4E-03	1.9	3.0E-03	7	0	2.0E-03	1.0E-02	
MU	L	1.1E-03	2.6E-04	1.0E-03	1.3	1.0E-03	7	0	7.9E-04	1.6E-03	
MU	G					1.1E-03	2	1			
PI						1.6E-04	10	8			
PL	M	1.6E-03	1.4E-03	1.2E-03	2.1	1.0E-03	10	0	3.5E-04	4.8E-03	
PL	B	1.8E-03	4.5E-04	1.7E-03	1.3	1.7E-03	10	0	1.3E-03	2.7E-03	
PL	L	4.7E-03	3.7E-03	3.7E-03	2.0	3.9E-03	10	0	1.3E-03	1.4E-02	
PL	G	4.4E-03	2.6E-03	3.8E-03	1.7	3.6E-03	10	0	1.4E-03	9.8E-03	
PO		2.5E-03	1.6E-03	2.1E-03	1.8	2.0E-03	10	0	3.5E-04	5.5E-03	
RA	M	3.9E-03	3.2E-03	3.1E-03	2.0	2.7E-03	8	0	7.5E-04	1.0E-02	4.4E-02***
RA	B	1.3E-02	2.6E-02	5.6E-03	3.6	1.6E-03	9	0	7.9E-04	8.2E-02	
RA	L	7.8E-04	6.1E-04	6.1E-04	2.0	6.0E-04	9	4	2.1E-04	2.1E-03	
RA	G					6.1E-04	3	3			
RA	E1	1.9E-03	1.2E-03	1.6E-03	1.8	1.9E-03	2	0	1.1E-03	2.8E-03	
RA	E2	1.1E-02	8.0E-03	8.6E-03	1.9	9.7E-03	6	0	2.4E-03	2.3E-02	
RA	TAD	1.0E-02	3.4E-03	9.6E-03	1.4	8.7E-03	4	0	8.0E-03	1.5E-02	
SA	M	1.5E-03	8.3E-04	1.4E-03	1.7	1.3E-03	10	0	5.3E-04	3.1E-03	
SA	B	2.2E-03	8.0E-04	2.1E-03	1.4	2.3E-03	10	0	1.1E-03	3.7E-03	
SA	L	1.6E-03	5.9E-04	1.5E-03	1.4	1.4E-03	10	0	8.3E-04	2.6E-03	
SA	G	1.2E-03	6.4E-04	1.1E-03	1.6	1.2E-03	2	0	7.8E-04	1.7E-03	

Comments: *AN2, **CE10, ***RA3

B (boron)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M					8.6E-02	11	7	7.6E-02	1.5E+00
AN	B	1.0E+00	8.7E-01	7.9E-01	2.1	8.6E-01	11	2	8.4E-02	3.1E+00
AN	L					8.5E-02	11	9	8.2E-02	1.5E+00
AN	G	1.2E+00	1.9E+00	6.4E-01	3.0	5.3E-01	10	0	2.3E-01	6.4E+00
AP		1.3E+01		1.3E+01		1.3E+01	1	0		
CA	ST	4.0E+00	2.0E+00	3.6E+00	1.6	3.4E+00	10	0	2.8E+00	9.6E+00
CA	HT	8.3E+00	1.9E+00	8.1E+00	1.3	7.5E+00	10	0	6.5E+00	1.2E+01
CE	M	9.4E-01	7.6E-01	7.3E-01	2.0	9.4E-01	11	1	8.5E-02	2.8E+00
CE	B	2.7E+00	4.7E-01	2.7E+00	1.2	2.9E+00	11	0	1.9E+00	3.4E+00
CE	L	7.5E-01	6.0E-01	5.9E-01	2.0	8.0E-01	10	3	8.5E-02	2.1E+00
CE	G	1.0E+00	7.5E-01	8.0E-01	2.0	9.0E-01	7	1	8.0E-02	2.2E+00
FU		1.2E+02	1.6E+01	1.2E+02	1.1	1.2E+02	10	0	8.7E+01	1.4E+02
LU		1.0E+00	7.1E-01	8.2E-01	1.9	6.7E-01	14	0	3.5E-01	2.3E+00
MU	M					1.1E-01	7	5		
MU	B	5.8E-01	2.1E-01	5.5E-01	1.4	5.7E-01	7	0	3.2E-01	8.7E-01
MU	L					1.2E-01	7	6		
MU	G	3.3E-01	1.5E-01	3.0E-01	1.5	3.3E-01	2	1	2.2E-01	4.3E-01
PI		1.0E+01	1.6E+00	1.0E+01	1.2	1.0E+01	10	0	7.0E+00	1.3E+01
PL	M	1.1E+00	5.8E-01	9.6E-01	1.6	8.1E-01	10	0	5.0E-01	2.2E+00
PL	B	2.5E+00	6.6E-01	2.4E+00	1.3	2.3E+00	10	0	1.8E+00	3.9E+00
PL	L	1.0E+00	4.6E-01	9.4E-01	1.5	9.1E-01	10	0	5.2E-01	2.0E+00
PL	G	5.6E+00	3.6E+00	4.7E+00	1.8	4.3E+00	10	0	1.3E+00	1.2E+01
PO		4.9E+00	8.7E-01	4.8E+00	1.2	4.8E+00	10	0	3.9E+00	6.6E+00
RA	M	4.4E-01	1.2E-01	4.3E-01	1.3	4.1E-01	9	1	3.1E-01	7.0E-01
RA	B	8.2E-01	2.5E-01	7.8E-01	1.3	8.3E-01	9	1	4.2E-01	1.3E+00
RA	L	3.2E-01	2.9E-01	2.3E-01	2.2	2.6E-01	9	4	9.8E-02	1.1E+00
RA	G	1.2E+00	1.4E+00	7.7E-01	2.5	7.1E-01	3	1	1.1E-01	2.7E+00
RA	E1	1.7E+00	5.8E-01	1.6E+00	1.4	1.7E+00	2	0	1.3E+00	2.1E+00
RA	E2	2.9E+00	1.7E+00	2.5E+00	1.7	2.3E+00	6	0	9.8E-01	5.8E+00
RA	TAD	1.6E+00	2.7E-01	1.6E+00	1.2	1.5E+00	4	0	1.3E+00	1.9E+00
SA	M					8.5E-02	10	8		
SA	B					8.8E-02	10	10		
SA	L					2.3E-01	10	10		
SA	G					8.2E-02	2	2		

Ba (barium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	7.4E-02	1.0E-01	4.2E-02	2.9	2.9E-02	11	0	1.5E-02	3.6E-01	
AN	B	3.1E+01	2.1E+01	2.6E+01	1.9	2.9E+01	11	0	9.1E+00	7.9E+01	
AN	L	5.8E-02	4.8E-02	4.4E-02	2.1	4.8E-02	10	0	2.3E-02	1.9E-01	9.2E-01*
AN	G	2.3E+00	3.2E+00	1.4E+00	2.8	1.1E+00	10	0	1.1E-01	9.1E+00	
AP		3.8E+00		3.8E+00		3.8E+00	1	0			
CA	ST	5.9E-01	3.4E-01	5.1E-01	1.7	4.6E-01	10	0	3.4E-01	1.4E+00	
CA	HT	6.8E+00	7.2E-01	6.8E+00	1.1	6.8E+00	10	0	5.9E+00	8.3E+00	
CE	M	3.2E-01	3.1E-01	2.3E-01	2.3	2.1E-01	11	0	6.5E-02	9.4E-01	
CE	B	6.1E+01	1.5E+01	6.0E+01	1.3	6.1E+01	11	0	3.7E+01	9.4E+01	
CE	L	1.5E-01	1.1E-01	1.2E-01	1.9	1.2E-01	10	0	6.9E-02	4.3E-01	
CE	G	3.8E-01	2.9E-01	3.0E-01	2.0	2.5E-01	7	0	8.2E-02	9.5E-01	
FU		1.1E+01	2.4E+00	1.1E+01	1.2	1.0E+01	10	0	6.8E+00	1.5E+01	
LU		8.4E+00	5.7E+00	6.9E+00	1.9	7.0E+00	14	0	6.4E-01	1.7E+01	
MU	M	6.8E-01	4.4E-01	5.7E-01	1.8	5.8E-01	7	0	2.0E-01	1.4E+00	
MU	B	7.6E+00	2.3E+00	7.3E+00	1.4	7.0E+00	7	0	5.7E+00	1.3E+01	
MU	L	3.1E-02	2.3E-02	2.5E-02	1.9	2.1E-02	7	0	1.5E-02	6.5E-02	
MU	G	9.8E-02	8.2E-02	7.5E-02	2.1	9.8E-02	2	0	4.0E-02	1.6E-01	
PI		6.1E+00	7.2E+00	4.0E+00	2.5	2.6E+00	10	0	1.4E-01	1.8E+01	
PL	M	1.9E-01	7.8E-02	1.7E-01	1.5	1.8E-01	10	0	7.3E-02	3.5E-01	
PL	B	2.1E+00	7.4E-01	2.0E+00	1.4	2.0E+00	10	0	1.1E+00	3.4E+00	
PL	L	1.2E-01	1.1E-01	8.9E-02	2.1	6.6E-02	9	0	2.8E-02	2.9E-01	1.6E+00**
PL	G	8.4E-02	6.4E-02	6.7E-02	2.0	6.2E-02	10	0	1.6E-02	1.8E-01	
PO		3.6E+00	1.8E+00	3.2E+00	1.6	3.4E+00	10	0	1.6E+00	8.1E+00	
RA	M	1.7E+00	1.2E+00	1.4E+00	1.9	1.3E+00	9	0	7.1E-01	4.2E+00	
RA	B	5.6E+00	1.9E+00	5.3E+00	1.4	4.6E+00	9	0	3.5E+00	8.2E+00	
RA	L	2.9E-01	3.2E-01	1.9E-01	2.4	1.5E-01	9	0	7.4E-02	1.1E+00	
RA	G	4.0E+00	4.3E+00	2.7E+00	2.4	2.5E+00	3	0	5.4E-01	8.8E+00	
RA	E1	1.1E+00	8.9E-01	8.7E-01	2.0	1.1E+00	2	0	4.8E-01	1.7E+00	
RA	E2	3.8E+00	2.5E+00	3.1E+00	1.8	3.3E+00	6	0	9.1E-01	7.6E+00	
RA	TAD	1.3E+01	4.2E+00	1.2E+01	1.4	1.1E+01	4	0	9.7E+00	1.9E+01	
SA	M	1.4E-01	7.7E-02	1.2E-01	1.7	1.2E-01	10	0	5.4E-02	3.0E-01	
SA	B	1.8E+00	8.3E-01	1.6E+00	1.6	1.5E+00	10	0	9.2E-01	3.2E+00	
SA	L	7.6E-02	4.0E-02	6.7E-02	1.6	8.5E-02	9	0	2.8E-02	1.4E-01	7.7E-01***
SA	G	5.6E-02	3.6E-02	4.8E-02	1.8	5.6E-02	2	0	3.1E-02	8.2E-02	

Comments: *AN1, **PL7, **SA4

Be (beryllium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M					1.7E-03	11	10		
AN	B					1.6E-03	11	11		
AN	L					1.7E-03	11	10		
AN	G					2.9E-03	10	8		
AP		9.0E-03		9.0E-03		9.0E-03	1	0		
CA	ST					1.7E-03	10	9		
CA	HT					2.7E-03	10	5		
CE	M					1.7E-03	11	10		
CE	B					1.8E-03	11	6		
CE	L					1.7E-03	10	9		
CE	G					1.7E-03	7	6		
FU		1.5E-02	1.1E-02	1.2E-02	2.0	1.3E-02	10	1	1.6E-03	3.3E-02
LU		6.3E-02	4.0E-02	5.3E-02	1.8	6.8E-02	14	1	3.9E-03	1.2E-01
MU	M					2.1E-03	7	7		
MU	B					2.5E-03	7	5		
MU	L					2.2E-03	7	7		
MU	G					4.1E-03	2	2		
PI						1.6E-03	10	10		
PL	M					1.6E-03	10	9		
PL	B					1.7E-03	10	8		
PL	L					1.7E-03	10	7		
PL	G					1.9E-03	10	10		
PO						1.6E-03	10	10		
RA	M					1.7E-03	9	8		
RA	B					2.4E-03	9	9		
RA	L					2.1E-03	9	8		
RA	G					6.1E-03	3	3		
RA	E1					1.6E-03	2	2		
RA	E2	9.2E-03	8.3E-03	6.9E-03	2.2	6.6E-03	6	2	1.7E-03	2.1E-02
RA	TAD	9.7E-02	6.9E-02	7.9E-02	1.9	6.5E-02	4	0	5.9E-02	2.0E-01
SA	M					1.7E-03	10	10		
SA	B					1.8E-03	10	6		
SA	L					4.6E-03	10	10		
SA	G					1.6E-03	2	2		

Bi (bismuth)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	3.3E-04	3.0E-04	2.4E-04	2.2	2.5E-04	11	4	8.9E-05	1.1E-03	
AN	B	3.7E-04	3.3E-04	2.8E-04	2.1	2.8E-04	11	3	9.7E-05	1.2E-03	
AN	L	1.1E-03	1.7E-03	5.5E-04	3.1	5.4E-04	11	3	1.0E-04	6.0E-03	
AN	G	1.3E-03	1.1E-03	1.1E-03	2.0	9.5E-04	10	0	3.7E-04	3.5E-03	
AP		9.1E-03		9.1E-03		9.1E-03	1	0			
CA	ST	7.2E-03	1.8E-03	7.0E-03	1.3	6.8E-03	10	0	4.7E-03	1.0E-02	
CA	HT	1.8E-03	8.3E-04	1.6E-03	1.6	1.3E-03	10	0	1.0E-03	3.6E-03	
CE	M	4.3E-04	3.4E-04	3.3E-04	2.0	2.6E-04	9	2	9.7E-05	9.0E-04	1.1E-02, 9.2E-03*
CE	B	2.1E-03	9.0E-04	1.9E-03	1.5	1.9E-03	11	0	8.4E-04	4.3E-03	
CE	L	4.8E-04	2.7E-04	4.2E-04	1.7	3.7E-04	10	0	2.3E-04	1.1E-03	
CE	G	2.0E-03	2.2E-03	1.4E-03	2.4	1.2E-03	7	0	3.5E-04	5.2E-03	
FU		4.4E-03	1.8E-03	4.1E-03	1.5	3.5E-03	10	0	2.4E-03	7.7E-03	
LU		1.6E-02	1.1E-02	1.3E-02	1.9	1.6E-02	14	0	2.0E-03	3.5E-02	
MU	M	5.2E-04	2.2E-04	4.8E-04	1.5	5.5E-04	6	1	1.2E-04	7.2E-04	1.2E-02**
MU	B	2.4E-03	2.1E-03	1.8E-03	2.1	2.0E-03	6	0	7.2E-04	6.4E-03	2.8E-01**
MU	L	1.3E-03	1.5E-03	8.1E-04	2.6	5.2E-04	7	0	2.7E-04	4.3E-03	
MU	G	1.6E-03	2.0E-03	1.0E-03	2.6	1.6E-03	2	1	2.2E-04	3.1E-03	
PI		3.4E-03	4.1E-03	2.2E-03	2.6	1.9E-03	10	0	5.0E-04	1.1E-02	
PL	M	1.7E-02	4.9E-03	1.7E-02	1.3	1.5E-02	10	0	1.1E-02	2.7E-02	
PL	B	7.4E-03	1.7E-03	7.2E-03	1.3	7.4E-03	10	0	4.7E-03	9.8E-03	
PL	L	2.0E-02	9.2E-03	1.9E-02	1.5	1.9E-02	10	0	8.6E-03	4.1E-02	
PL	G	1.1E-02	4.3E-03	9.9E-03	1.5	1.1E-02	10	0	4.7E-03	1.9E-02	
PO		1.3E-03	1.3E-03	9.3E-04	2.3	1.0E-03	10	0	4.1E-04	4.9E-03	
RA	M	2.3E-03	3.2E-03	1.3E-03	2.8	7.3E-04	9	0	3.2E-04	8.4E-03	
RA	B	1.0E-03	1.7E-03	5.6E-04	3.1	3.7E-04	9	2	1.2E-04	5.3E-03	
RA	L	1.2E-03	1.5E-03	7.6E-04	2.6	6.9E-04	9	0	3.1E-04	5.2E-03	
RA	G	1.3E-03	1.7E-03	8.2E-04	2.7	3.6E-04	3	1	3.3E-04	3.3E-03	
RA	E1	9.2E-05	3.1E-06	9.2E-05	1.0	9.2E-05	2	2	9.0E-05	9.4E-05	
RA	E2	6.7E-03	3.1E-03	6.1E-03	1.6	6.5E-03	6	0	2.2E-03	1.2E-02	
RA	TAD	3.6E-02	6.4E-03	3.5E-02	1.2	3.8E-02	4	0	2.8E-02	4.1E-02	
SA	M	4.7E-04	6.0E-04	2.9E-04	2.7	3.3E-04	10	3	9.6E-05	2.1E-03	
SA	B	8.3E-04	6.8E-04	6.4E-04	2.0	6.9E-04	10	1	1.0E-04	2.5E-03	
SA	L	7.7E-04	4.2E-04	6.7E-04	1.7	7.1E-04	10	2	2.2E-04	1.6E-03	
SA	G	5.0E-04	3.3E-04	4.2E-04	1.8	5.0E-04	2	0	2.7E-04	7.4E-04	

Comments: *CE9 and CE10, **MU6

Ca (calcium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	3.7E+02	3.9E+02	2.6E+02	2.4	1.9E+02	11	0	1.3E+02	1.3E+03	
AN	B	1.7E+05	3.8E+04	1.7E+05	1.2	1.8E+05	11	0	9.8E+04	2.2E+05	
AN	L	1.9E+02	1.5E+02	1.5E+02	2.0	1.5E+02	10	0	1.1E+02	6.2E+02	3.9E+03*
AN	G	5.8E+03	6.3E+03	3.9E+03	2.4	1.4E+03	10	0	3.7E+02	1.4E+04	
AP		1.3E+03		1.3E+03		1.3E+03	1	0			
CA	ST	1.2E+04	3.7E+03	1.1E+04	1.4	1.1E+04	10	0	6.4E+03	1.7E+04	
CA	HT	2.5E+05	1.6E+04	2.5E+05	1.1	2.5E+05	10	0	2.2E+05	2.8E+05	
CE	M	4.3E+02	2.5E+02	3.7E+02	1.7	4.7E+02	11	0	1.4E+02	9.8E+02	
CE	B	2.3E+05	2.7E+04	2.2E+05	1.1	2.3E+05	11	0	1.6E+05	2.6E+05	
CE	L	1.9E+02	7.7E+01	1.8E+02	1.5	1.9E+02	10	0	8.9E+01	3.8E+02	
CE	G	5.3E+02	2.5E+02	4.7E+02	1.6	4.9E+02	7	0	1.8E+02	9.5E+02	
FU		3.1E+04	1.5E+04	2.8E+04	1.6	2.3E+04	10	0	1.4E+04	5.3E+04	
LU		4.2E+03	2.6E+03	3.6E+03	1.7	3.4E+03	14	0	1.3E+03	1.0E+04	
MU	M	1.0E+04	5.4E+03	8.9E+03	1.7	1.3E+04	7	0	2.8E+03	1.6E+04	
MU	B	1.2E+05	7.1E+03	1.2E+05	1.1	1.2E+05	7	0	1.1E+05	1.3E+05	
MU	L	1.4E+02	2.2E+01	1.4E+02	1.2	1.4E+02	7	0	1.0E+02	1.7E+02	
MU	G	2.8E+02	1.2E+02	2.6E+02	1.5	2.8E+02	2	0	2.0E+02	3.7E+02	
PI		1.5E+03	7.0E+02	1.3E+03	1.6	1.2E+03	10	0	7.9E+02	3.1E+03	
PL	M	2.1E+03	7.9E+02	1.9E+03	1.4	2.1E+03	10	0	6.7E+02	3.1E+03	
PL	B	8.9E+04	6.9E+03	8.9E+04	1.1	9.1E+04	10	0	7.8E+04	9.7E+04	
PL	L	1.1E+03	1.2E+03	7.3E+02	2.4	5.7E+02	10	0	3.3E+02	3.9E+03	
PL	G	1.5E+03	1.3E+03	1.1E+03	2.1	9.1E+02	10	0	5.4E+02	4.8E+03	
PO		9.4E+02	2.9E+02	9.0E+02	1.4	8.6E+02	10	0	7.5E+02	1.7E+03	
RA	M	5.1E+03	3.9E+03	4.1E+03	2.0	4.9E+03	9	0	5.2E+02	1.3E+04	
RA	B	9.2E+04	9.8E+03	9.2E+04	1.1	9.7E+04	9	0	7.7E+04	1.0E+05	
RA	L	1.6E+02	1.1E+02	1.3E+02	1.8	1.3E+02	9	0	7.2E+01	4.0E+02	
RA	G	9.3E+02	1.4E+03	5.3E+02	2.9	1.7E+02	3	0	1.3E+02	2.5E+03	
RA	E1	3.1E+02	3.2E+01	3.0E+02	1.1	3.1E+02	2	0	2.8E+02	3.3E+02	
RA	E2	8.0E+03	3.2E+03	7.4E+03	1.5	8.8E+03	6	0	3.2E+03	1.1E+04	
RA	TAD	5.9E+03	8.1E+02	5.8E+03	1.1	6.2E+03	4	0	4.7E+03	6.5E+03	
SA	M	1.4E+03	8.5E+02	1.2E+03	1.7	1.2E+03	10	0	8.0E+02	3.7E+03	
SA	B	4.5E+04	1.8E+04	4.1E+04	1.5	4.2E+04	10	0	2.2E+04	8.3E+04	
SA	L	3.0E+02	1.1E+02	2.9E+02	1.4	3.0E+02	10	0	1.4E+02	5.2E+02	
SA	G	2.5E+02	4.2E+01	2.5E+02	1.2	2.5E+02	2	0	2.2E+02	2.8E+02	

Comments: *AN1

Cd (cadmium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	1.6E-02	2.5E-02	8.4E-03	3.1	3.0E-03	11	2	2.3E-04	8.0E-02
AN	B	7.4E-03	8.3E-03	4.9E-03	2.5	5.0E-03	11	0	2.5E-03	3.2E-02
AN	L	5.4E-01	6.6E-01	3.4E-01	2.6	1.5E-01	11	0	4.2E-02	2.0E+00
AN	G	2.4E+00	4.7E+00	1.1E+00	3.5	4.2E-01	10	0	1.5E-02	1.5E+01
AP		9.6E-02		9.6E-02		9.6E-02	1	0		
CA	ST	2.5E+01	1.2E+01	2.3E+01	1.6	1.9E+01	10	0	1.4E+01	4.8E+01
CA	HT	6.8E-01	3.5E-01	6.0E-01	1.6	5.1E-01	10	0	4.0E-01	1.4E+00
CE	M	3.9E-02	2.7E-02	3.2E-02	1.9	3.9E-02	11	0	9.2E-03	8.1E-02
CE	B	4.7E-03	2.4E-03	4.2E-03	1.6	4.3E-03	11	0	2.2E-03	1.0E-02
CE	L	1.0E+00	5.2E-01	9.2E-01	1.6	9.0E-01	10	0	4.8E-01	2.0E+00
CE	G	5.9E-02	4.4E-02	4.7E-02	1.9	6.0E-02	7	0	1.6E-02	1.2E-01
FU		5.1E-01	8.7E-02	5.0E-01	1.2	5.0E-01	10	0	3.8E-01	6.5E-01
LU		7.7E+00	4.4E+00	6.7E+00	1.7	6.3E+00	14	0	1.7E+00	1.7E+01
MU	M	6.0E-03	4.3E-03	4.8E-03	1.9	4.1E-03	7	0	2.4E-03	1.5E-02
MU	B	2.3E-02	1.7E-02	1.9E-02	1.9	1.5E-02	7	0	8.2E-03	5.7E-02
MU	L	5.9E-02	4.3E-02	4.8E-02	1.9	4.2E-02	7	0	2.0E-02	1.4E-01
MU	G	1.6E-02	1.4E-02	1.2E-02	2.1	1.6E-02	2	0	6.3E-03	2.6E-02
PI		7.1E-02	3.8E-02	6.3E-02	1.6	6.8E-02	10	0	5.0E-03	1.3E-01
PL	M	4.8E-03	2.1E-03	4.3E-03	1.5	4.2E-03	10	0	2.4E-03	8.4E-03
PL	B	5.8E-03	4.2E-03	4.6E-03	1.9	4.5E-03	10	0	1.9E-03	1.4E-02
PL	L	6.2E-01	7.6E-01	3.9E-01	2.6	3.1E-01	10	0	1.4E-01	2.7E+00
PL	G	3.5E-02	2.1E-02	3.0E-02	1.7	3.0E-02	10	0	5.9E-03	6.7E-02
PO		2.1E-02	8.6E-03	2.0E-02	1.5	2.0E-02	10	0	9.9E-03	3.9E-02
RA	M	1.4E-02	9.3E-03	1.2E-02	1.8	1.1E-02	9	0	6.7E-03	3.7E-02
RA	B	2.7E-02	1.2E-02	2.5E-02	1.5	2.6E-02	9	0	1.1E-02	4.4E-02
RA	L	3.1E-01	2.2E-01	2.6E-01	1.9	2.5E-01	9	0	6.4E-02	7.2E-01
RA	G	6.1E-01	5.0E-01	4.7E-01	2.1	8.3E-01	3	0	3.5E-02	9.6E-01
RA	E1	1.3E-02	1.0E-02	9.8E-03	2.0	1.3E-02	2	0	5.5E-03	2.0E-02
RA	E2	2.2E-02	9.8E-03	2.0E-02	1.5	2.1E-02	6	0	1.1E-02	3.5E-02
RA	TAD	2.1E-01	1.1E-01	1.8E-01	1.7	2.4E-01	4	0	5.0E-02	2.9E-01
SA	M	2.3E-02	2.1E-02	1.7E-02	2.2	1.8E-02	10	0	9.0E-03	8.1E-02
SA	B	2.7E-01	1.5E-01	2.3E-01	1.7	2.7E-01	10	0	6.5E-02	5.8E-01
SA	L	1.2E+00	5.8E-01	1.1E+00	1.6	1.0E+00	10	0	5.3E-01	2.4E+00
SA	G	1.3E-01	1.5E-02	1.3E-01	1.1	1.3E-01	2	0	1.2E-01	1.4E-01

Ce (cerium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	1.5E-03	9.6E-04	1.3E-03	1.8	1.3E-03	10	0	4.5E-04	3.4E-03	2.5E-02*
AN	B	3.9E-02	3.5E-02	2.9E-02	2.2	2.0E-02	11	0	5.9E-03	1.1E-01	
AN	L	4.3E-02	4.6E-02	2.9E-02	2.4	2.6E-02	11	0	4.3E-03	1.4E-01	
AN	G	1.2E-01	1.5E-01	6.9E-02	2.7	5.5E-02	10	0	4.8E-03	5.0E-01	
AP		2.0E-01		2.0E-01		2.0E-01	1	0			
CA	ST	1.9E-01	1.4E-01	1.6E-01	1.9	1.7E-01	10	0	6.1E-02	5.4E-01	
CA	HT	2.6E-01	1.2E-01	2.3E-01	1.5	2.1E-01	10	0	1.5E-01	5.2E-01	
CE	M	3.9E-02	5.5E-02	2.3E-02	2.8	2.2E-02	11	0	3.1E-03	1.9E-01	
CE	B	6.8E-02	3.7E-02	6.0E-02	1.7	6.1E-02	11	0	2.4E-02	1.5E-01	
CE	L	3.4E-02	4.2E-02	2.1E-02	2.6	1.3E-02	10	0	6.8E-03	1.2E-01	
CE	G	2.9E-02	1.7E-02	2.5E-02	1.7	2.9E-02	7	0	7.2E-03	5.2E-02	
FU		7.7E-01	4.6E-01	6.7E-01	1.7	6.1E-01	10	0	2.4E-01	1.8E+00	
LU		4.9E+00	3.8E+00	3.8E+00	2.0	4.2E+00	14	0	1.5E-01	1.2E+01	
MU	M	2.4E-02	1.2E-02	2.2E-02	1.6	2.5E-02	7	0	1.2E-02	4.0E-02	
MU	B	8.5E-02	7.9E-02	6.2E-02	2.2	5.7E-02	7	0	2.5E-02	2.5E-01	
MU	L	8.5E-03	5.4E-03	7.2E-03	1.8	6.4E-03	7	0	2.9E-03	1.7E-02	
MU	G	1.6E-02	1.6E-02	1.2E-02	2.2	1.6E-02	2	0	5.4E-03	2.8E-02	
PI		1.3E-02	5.4E-03	1.2E-02	1.5	1.3E-02	10	0	6.9E-03	2.4E-02	
PL	M	9.4E-03	5.2E-03	8.2E-03	1.7	8.2E-03	10	0	2.6E-03	1.8E-02	
PL	B	8.6E-03	6.5E-03	6.8E-03	2.0	6.2E-03	10	0	2.7E-03	2.3E-02	
PL	L	2.5E-02	1.9E-02	2.0E-02	2.0	1.8E-02	10	0	1.0E-02	7.1E-02	
PL	G	1.2E-02	1.1E-02	8.9E-03	2.2	9.7E-03	10	1	6.8E-04	3.5E-02	
PO		3.7E-02	1.9E-02	3.3E-02	1.6	3.8E-02	9	0	1.5E-02	7.4E-02	9.2E-01**
RA	M	2.2E-02	3.1E-02	1.2E-02	2.9	8.3E-03	8	0	2.1E-03	9.6E-02	4.4E-01***
RA	B	1.0E-02	1.3E-02	6.6E-03	2.6	4.8E-03	9	0	2.3E-03	3.4E-02	
RA	L	7.7E-03	5.3E-03	6.3E-03	1.9	5.3E-03	9	0	3.1E-03	1.6E-02	
RA	G	2.4E-03	1.7E-03	2.0E-03	1.8	2.8E-03	3	2	6.5E-04	3.9E-03	
RA	E1	5.1E-03	1.4E-03	4.9E-03	1.3	5.1E-03	2	0	4.1E-03	6.1E-03	
RA	E2	6.6E-01	5.7E-01	5.0E-01	2.1	5.1E-01	6	0	1.1E-01	1.6E+00	
RA	TAD	9.4E+00	5.4E+00	8.2E+00	1.7	7.3E+00	4	0	5.8E+00	1.7E+01	
SA	M	1.2E-02	8.1E-03	1.0E-02	1.8	8.5E-03	10	0	3.1E-03	2.6E-02	
SA	B	4.4E-02	2.7E-02	3.7E-02	1.8	3.9E-02	10	0	1.1E-02	8.5E-02	
SA	L	4.7E-01	2.9E-01	4.0E-01	1.8	3.8E-01	10	0	1.7E-01	1.1E+00	
SA	G	5.6E-03	3.7E-03	4.7E-03	1.8	5.6E-03	2	0	3.0E-03	8.2E-03	

Comments: *AN1, **PO9, ***RA3

Co (cobalt)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	2.4E-02	8.1E-03	2.3E-02	1.4	2.5E-02	11	0	1.2E-02	3.6E-02	
AN	B	2.8E-02	1.5E-02	2.4E-02	1.7	2.5E-02	11	0	6.4E-03	6.0E-02	
AN	L	6.1E-02	1.9E-02	5.8E-02	1.4	5.7E-02	11	0	3.5E-02	9.8E-02	
AN	G	1.9E-01	1.0E-01	1.7E-01	1.6	1.9E-01	10	0	6.5E-02	4.2E-01	
AP		2.7E-01		2.7E-01		2.7E-01	1	0			
CA	ST	2.7E-01	6.2E-02	2.7E-01	1.2	2.7E-01	10	0	1.8E-01	3.7E-01	
CA	HT	5.4E-02	1.6E-02	5.2E-02	1.3	4.6E-02	10	0	3.9E-02	8.0E-02	
CE	M	5.8E-02	4.9E-02	4.4E-02	2.1	3.9E-02	11	0	2.1E-02	1.9E-01	
CE	B	2.0E-01	8.3E-02	1.9E-01	1.5	1.9E-01	11	0	9.3E-02	4.1E-01	
CE	L	5.3E-01	3.0E-01	4.6E-01	1.7	5.4E-01	10	0	1.8E-01	1.1E+00	
CE	G	6.3E-02	2.8E-02	5.7E-02	1.5	6.8E-02	7	0	2.6E-02	9.6E-02	
FU		1.1E+00	3.0E-01	1.0E+00	1.3	1.0E+00	10	0	7.1E-01	1.5E+00	
LU		3.6E+00	1.6E+00	3.3E+00	1.5	3.2E+00	14	0	8.8E-01	6.7E+00	
MU	M	1.9E-02	5.9E-03	1.8E-02	1.4	1.8E-02	7	0	1.1E-02	3.0E-02	
MU	B	2.8E-02	7.1E-03	2.7E-02	1.3	2.5E-02	7	0	2.0E-02	3.9E-02	
MU	L	1.2E-01	3.1E-02	1.2E-01	1.3	1.3E-01	7	0	8.1E-02	1.5E-01	
MU	G	7.6E-02	6.1E-02	5.9E-02	2.0	7.6E-02	2	0	3.3E-02	1.2E-01	
PI		1.3E-01	1.2E-01	9.4E-02	2.2	8.4E-02	10	0	6.1E-03	4.3E-01	
PL	M	1.5E-02	5.4E-03	1.4E-02	1.4	1.3E-02	10	0	9.0E-03	2.6E-02	
PL	B	1.1E-02	4.2E-03	1.0E-02	1.5	1.0E-02	10	0	6.9E-03	2.0E-02	
PL	L	6.3E-01	2.9E-01	5.8E-01	1.6	5.9E-01	10	0	1.8E-01	1.1E+00	
PL	G	1.8E-01	1.5E-01	1.4E-01	2.1	1.2E-01	10	0	5.5E-02	5.4E-01	
PO		5.8E-02	1.5E-02	5.7E-02	1.3	6.0E-02	10	0	2.9E-02	8.1E-02	
RA	M	3.2E-02	1.0E-02	3.0E-02	1.4	2.8E-02	8	0	2.4E-02	4.9E-02	5.4E-01*
RA	B	3.7E-02	2.2E-02	3.1E-02	1.7	3.4E-02	9	0	1.7E-02	9.2E-02	
RA	L	2.2E-01	9.0E-02	2.1E-01	1.5	2.0E-01	9	0	1.3E-01	3.8E-01	
RA	G	1.1E-01	2.3E-02	1.1E-01	1.2	1.1E-01	3	0	8.5E-02	1.3E-01	
RA	E1	6.0E-02	5.7E-03	5.9E-02	1.1	6.0E-02	2	0	5.6E-02	6.4E-02	
RA	E2	2.1E-01	1.4E-01	1.7E-01	1.8	2.1E-01	6	0	5.4E-02	3.9E-01	
RA	TAD	9.8E-01	6.2E-01	8.3E-01	1.8	7.0E-01	4	0	6.2E-01	1.9E+00	
SA	M	5.9E-02	1.9E-02	5.6E-02	1.4	5.5E-02	10	0	3.5E-02	1.0E-01	
SA	B	1.7E-01	5.1E-02	1.6E-01	1.3	1.7E-01	10	0	1.1E-01	2.5E-01	
SA	L	3.1E-01	2.2E-01	2.5E-01	1.9	2.4E-01	10	0	1.3E-01	9.2E-01	
SA	G	3.7E-01	1.3E-01	3.4E-01	1.4	3.7E-01	2	0	2.7E-01	4.6E-01	

Comments: *RA3

Cr (chromium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M						11	7			
AN	B	2.4E-01	2.7E-01	1.6E-01	2.5	1.1E-01	11	0	4.9E-02	9.9E-01	
AN	L						11	9			
AN	G	4.5E-01	5.5E-01	2.8E-01	2.6	1.9E-01	10	1	2.9E-02	1.7E+00	
AP		1.0E+00		1.0E+00		1.0E+00	1	0			
CA	ST	2.3E-01	1.5E-01	2.0E-01	1.8	2.0E-01	10	0	9.3E-02	5.1E-01	
CA	HT	3.2E-01	1.2E-01	3.0E-01	1.5	2.7E-01	10	0	1.7E-01	5.1E-01	
CE	M	1.6E-01	2.0E-01	1.0E-01	2.6	7.6E-02	11	4	2.1E-02	5.8E-01	
CE	B	3.8E+00	1.8E+00	3.4E+00	1.6	3.7E+00	11	0	1.5E+00	8.4E+00	
CE	L					2.3E-02	10	6			
CE	G	1.9E-01	1.3E-01	1.5E-01	1.9	1.6E-01	6	0	5.8E-02	4.1E-01	3.2E+00*
FU		2.1E+00	1.5E+00	1.7E+00	1.9	1.8E+00	10	0	4.3E-01	4.5E+00	
LU		1.3E+01	1.7E+01	7.7E+00	2.7	5.3E+00	14	0	3.2E-01	6.1E+01	
MU	M	3.5E-01	2.0E-01	3.0E-01	1.7	2.6E-01	7	0	2.2E-01	7.9E-01	
MU	B	6.9E-01	5.4E-01	5.5E-01	2.0	4.5E-01	7	0	2.3E-01	1.7E+00	
MU	L					3.4E-02	7	4			
MU	G	4.4E-01	5.5E-01	2.7E-01	2.6	4.4E-01	2	1	4.8E-02	8.2E-01	
PI						2.1E-02	10	9			
PL	M					3.3E-02	10	5			
PL	B	6.6E-02	3.5E-02	5.9E-02	1.6	5.9E-02	10	2	2.1E-02	1.3E-01	
PL	L					2.2E-02	10	6			
PL	G					4.7E-02	10	6			
PO						2.1E-02	10	8			
RA	M	7.2E-01	5.6E-01	5.7E-01	2.0	7.2E-01	8	0	1.5E-01	1.5E+00	9.6E+00**
RA	B	2.4E-01	2.0E-01	1.8E-01	2.1	2.0E-01	8	0	7.7E-02	7.1E-01	2.4E+00***
RA	L					3.1E-02	9	8			
RA	G					7.9E-02	3	3			
RA	E1					1.4E-01	2	1			
RA	E2	1.4E+00	1.2E+00	1.1E+00	2.1	1.2E+00	6	0	2.6E-01	3.4E+00	
RA	TAD	2.7E+00	1.8E+00	2.3E+00	1.8	2.0E+00	4	0	1.4E+00	5.3E+00	
SA	M					3.7E-02	10	5			
SA	B	1.4E-01	8.4E-02	1.2E-01	1.7	1.2E-01	10	1	2.3E-02	2.9E-01	
SA	L					6.0E-02	10	8			
SA	G					2.1E-02	2	2			

Comments: *CE, **RA3, ***RA6

Cs (caesium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	1.9E-01	1.2E-01	1.5E-01	1.8	1.7E-01	11	0	2.1E-02	4.6E-01
AN	B	3.3E-02	2.5E-02	2.7E-02	1.9	2.4E-02	11	0	1.0E-02	1.0E-01
AN	L	5.7E-02	3.2E-02	5.0E-02	1.7	6.0E-02	11	0	6.9E-03	1.0E-01
AN	G	1.3E-01	5.9E-02	1.2E-01	1.5	1.4E-01	10	0	4.2E-02	2.3E-01
AP		3.8E-01		3.8E-01		3.8E-01	1	0		
CA	ST	1.5E-02	5.4E-03	1.4E-02	1.4	1.3E-02	10	0	1.0E-02	2.8E-02
CA	HT	1.0E-02	2.7E-03	9.7E-03	1.3	9.9E-03	10	0	6.1E-03	1.4E-02
CE	M	3.2E-01	1.1E-01	3.0E-01	1.4	3.3E-01	11	0	1.9E-01	5.4E-01
CE	B	1.1E-01	5.0E-02	1.0E-01	1.5	1.1E-01	11	0	4.7E-02	2.4E-01
CE	L	2.5E-01	1.4E-01	2.1E-01	1.7	2.3E-01	10	0	7.3E-02	4.4E-01
CE	G	1.3E-01	3.2E-02	1.3E-01	1.3	1.5E-01	7	0	7.1E-02	1.6E-01
FU		5.7E-02	2.1E-02	5.4E-02	1.4	5.1E-02	10	0	3.0E-02	9.2E-02
LU		1.5E-01	8.6E-02	1.3E-01	1.7	1.5E-01	14	0	1.7E-02	2.7E-01
MU	M	2.3E-01	1.4E-01	1.9E-01	1.8	2.1E-01	7	0	7.7E-02	5.1E-01
MU	B	6.4E-02	3.9E-02	5.4E-02	1.8	5.2E-02	7	0	2.7E-02	1.4E-01
MU	L	9.2E-02	9.9E-02	6.2E-02	2.4	5.8E-02	7	0	3.1E-02	3.1E-01
MU	G	7.5E-02	2.9E-02	6.9E-02	1.5	7.5E-02	2	0	5.4E-02	9.6E-02
PI		4.4E-01	2.4E-01	3.9E-01	1.6	4.2E-01	10	0	9.4E-02	9.0E-01
PL	M	4.7E-02	9.8E-03	4.6E-02	1.2	4.4E-02	10	0	3.9E-02	7.2E-02
PL	B	2.5E-02	5.0E-03	2.5E-02	1.2	2.6E-02	10	0	1.9E-02	3.4E-02
PL	L	2.3E-02	9.0E-03	2.1E-02	1.5	2.3E-02	10	0	1.4E-02	4.5E-02
PL	G	4.5E-02	4.9E-03	4.4E-02	1.1	4.6E-02	10	0	3.6E-02	5.0E-02
PO		4.4E-01	2.6E-01	3.8E-01	1.7	3.8E-01	10	0	1.1E-01	1.0E+00
RA	M	2.3E-01	8.6E-02	2.2E-01	1.4	2.0E-01	9	0	1.1E-01	3.9E-01
RA	B	9.9E-02	5.0E-02	8.8E-02	1.6	8.3E-02	9	0	4.0E-02	1.8E-01
RA	L	8.8E-02	4.5E-02	7.8E-02	1.6	7.9E-02	9	0	3.5E-02	1.8E-01
RA	G	2.2E-01	2.0E-01	1.7E-01	2.1	1.3E-01	3	0	8.8E-02	4.5E-01
RA	E1	8.7E-02	5.4E-02	7.3E-02	1.8	8.7E-02	2	0	4.8E-02	1.3E-01
RA	E2	1.4E-01	1.1E-01	1.1E-01	2.0	1.2E-01	6	0	3.8E-02	3.0E-01
RA	TAD	2.2E-01	9.5E-02	2.0E-01	1.5	2.0E-01	4	0	1.3E-01	3.6E-01
SA	M	2.7E-01	7.4E-02	2.6E-01	1.3	2.7E-01	10	0	1.7E-01	4.1E-01
SA	B	1.7E-01	5.5E-02	1.6E-01	1.4	1.5E-01	10	0	9.0E-02	2.6E-01
SA	L	1.9E-01	9.5E-02	1.7E-01	1.6	1.6E-01	10	0	1.1E-01	4.3E-01
SA	G	8.6E-02	2.5E-02	8.3E-02	1.3	8.6E-02	2	0	6.9E-02	1.0E-01

Cu (copper)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	2.2E+01	1.2E+01	1.9E+01	1.7	2.0E+01	11	0	6.3E+00	4.9E+01
AN	B	1.8E+00	1.4E+00	1.5E+00	2.0	1.4E+00	11	0	6.3E-01	5.6E+00
AN	L	6.9E+01	6.4E+01	5.0E+01	2.2	5.0E+01	11	0	7.8E+00	2.0E+02
AN	G	2.3E+01	1.9E+01	1.8E+01	2.1	2.0E+01	10	0	7.6E+00	7.2E+01
AP		3.2E+01		3.2E+01		3.2E+01	1	0		
CA	ST	6.3E+01	5.5E+01	4.8E+01	2.1	4.5E+01	10	0	1.8E+01	1.9E+02
CA	HT	8.2E+00	4.3E+00	7.2E+00	1.6	6.7E+00	10	0	2.4E+00	1.6E+01
CE	M	6.2E+00	2.0E+00	5.9E+00	1.4	6.4E+00	11	0	3.7E+00	1.1E+01
CE	B	3.0E-01	1.0E-01	2.8E-01	1.4	3.0E-01	11	0	1.9E-01	4.8E-01
CE	L	8.8E+01	5.8E+01	7.3E+01	1.8	7.9E+01	10	0	1.7E+01	2.1E+02
CE	G	3.1E+00	1.5E+00	2.8E+00	1.6	2.6E+00	7	0	1.4E+00	5.4E+00
FU		2.1E+00	1.4E+00	1.8E+00	1.9	1.8E+00	10	0	1.1E+00	6.0E+00
LU		5.3E+00	1.3E+00	5.1E+00	1.3	5.2E+00	14	0	2.4E+00	7.0E+00
MU	M	5.2E+00	9.2E-01	5.2E+00	1.2	5.0E+00	7	0	4.2E+00	6.7E+00
MU	B	2.9E+00	7.9E-01	2.8E+00	1.3	2.7E+00	7	0	2.1E+00	4.5E+00
MU	L	1.5E+01	3.1E+00	1.4E+01	1.2	1.4E+01	7	0	1.2E+01	2.0E+01
MU	G	4.3E+00	2.0E+00	4.0E+00	1.5	4.3E+00	2	0	3.0E+00	5.7E+00
PI		4.5E+00	1.4E+00	4.3E+00	1.3	4.9E+00	10	0	1.6E+00	6.6E+00
PL	M	1.1E+00	5.9E-01	9.4E-01	1.7	9.1E-01	10	0	5.0E-01	2.6E+00
PL	B	5.5E-01	8.5E-02	5.4E-01	1.2	5.4E-01	10	0	4.1E-01	7.0E-01
PL	L	9.4E+00	5.9E+00	8.0E+00	1.8	6.2E+00	10	0	3.6E+00	1.9E+01
PL	G	6.6E+00	5.2E+00	5.2E+00	2.0	3.3E+00	10	0	2.5E+00	1.7E+01
PO		2.4E+00	4.0E-01	2.4E+00	1.2	2.3E+00	10	0	1.7E+00	3.1E+00
RA	M	2.5E+00	2.3E-01	2.5E+00	1.1	2.5E+00	9	0	2.3E+00	3.1E+00
RA	B	1.6E+00	4.8E-01	1.5E+00	1.3	1.4E+00	9	0	1.0E+00	2.5E+00
RA	L	1.0E+02	6.9E+01	8.7E+01	1.8	8.5E+01	9	0	6.2E+01	2.9E+02
RA	G	1.2E+01	1.6E+01	7.4E+00	2.7	3.5E+00	3	0	2.3E+00	3.1E+01
RA	E1	9.1E+00	2.6E-01	9.1E+00	1.0	9.1E+00	2	0	8.9E+00	9.3E+00
RA	E2	1.1E+01	1.9E+00	1.1E+01	1.2	1.1E+01	6	0	7.9E+00	1.3E+01
RA	TAD	3.7E+01	9.7E+00	3.5E+01	1.3	3.8E+01	4	0	2.6E+01	4.5E+01
SA	M	1.9E+00	3.0E-01	1.8E+00	1.2	1.8E+00	10	0	1.6E+00	2.5E+00
SA	B	1.4E+00	2.0E-01	1.4E+00	1.2	1.3E+00	10	0	1.2E+00	1.8E+00
SA	L	1.4E+02	7.0E+01	1.2E+02	1.6	1.3E+02	10	0	5.4E+01	3.1E+02
SA	G	1.3E+00	1.7E-01	1.3E+00	1.1	1.3E+00	2	0	1.2E+00	1.5E+00

Er (erbium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					3.0E-05	10	6			
AN	B	1.6E-03	1.4E-03	1.2E-03	2.1	1.2E-03	11	0	2.4E-04	4.7E-03	
AN	L	4.4E-04	4.5E-04	3.1E-04	2.3	2.2E-04	11	0	6.6E-05	1.2E-03	
AN	G	5.2E-03	4.9E-03	3.8E-03	2.2	4.0E-03	10	0	1.2E-04	1.5E-02	
AP		5.4E-03		5.4E-03		5.4E-03	1	0			
CA	ST	6.6E-03	4.9E-03	5.3E-03	1.9	5.0E-03	10	0	2.1E-03	1.8E-02	
CA	HT	9.0E-03	3.4E-03	8.4E-03	1.4	7.7E-03	10	0	5.4E-03	1.4E-02	
CE	M	1.3E-03	1.7E-03	7.5E-04	2.8	4.2E-04	11	0	6.4E-05	5.6E-03	
CE	B	2.7E-03	1.6E-03	2.3E-03	1.8	2.3E-03	11	0	7.1E-04	5.8E-03	
CE	L	1.9E-04	1.4E-04	1.5E-04	2.0	1.3E-04	10	1	3.0E-05	4.4E-04	
CE	G	7.4E-04	5.7E-04	5.9E-04	2.0	6.1E-04	7	0	1.3E-04	1.6E-03	
FU		4.6E-02	4.4E-02	3.3E-02	2.2	3.0E-02	10	0	1.1E-02	1.6E-01	
LU		1.8E-01	1.6E-01	1.3E-01	2.1	1.1E-01	14	0	5.5E-03	4.2E-01	
MU	M	3.3E-04	1.5E-04	3.1E-04	1.5	3.3E-04	6	0	1.4E-04	5.4E-04	2.2E-03*
MU	B	1.2E-03	5.5E-04	1.1E-03	1.5	1.3E-03	7	0	4.9E-04	1.9E-03	
MU	L	1.1E-04	4.1E-05	9.8E-05	1.5	1.1E-04	6	1	4.0E-05	1.5E-04	1.1E-03*
MU	G	4.4E-04	5.2E-04	2.9E-04	2.5	4.4E-04	2	1	7.9E-05	8.1E-04	
PI		3.4E-04	1.5E-04	3.1E-04	1.5	3.0E-04	10	0	1.7E-04	5.4E-04	
PL	M	5.0E-04	6.1E-04	3.2E-04	2.6	2.2E-04	10	0	6.4E-05	1.8E-03	
PL	B	3.4E-04	3.3E-04	2.4E-04	2.3	2.8E-04	10	0	1.0E-04	1.2E-03	
PL	L	1.2E-03	2.1E-03	5.7E-04	3.3	2.4E-04	10	0	7.0E-05	6.8E-03	
PL	G	3.6E-04	3.1E-04	2.8E-04	2.1	3.8E-04	10	2	5.0E-05	1.1E-03	
PO		5.6E-04	2.8E-04	5.1E-04	1.6	4.9E-04	9	0	2.5E-04	1.2E-03	1.9E-02**
RA	M	3.1E-04	2.7E-04	2.3E-04	2.2	2.1E-04	8	0	8.5E-05	8.7E-04	1.6E-02***
RA	B	3.0E-04	3.4E-04	2.0E-04	2.5	1.7E-04	9	2	3.7E-05	1.0E-03	
RA	L	1.8E-04	1.3E-04	1.4E-04	1.9	1.6E-04	9	3	3.4E-05	3.7E-04	
RA	G					1.1E-04	3	3			
RA	E1	1.7E-04	4.0E-05	1.6E-04	1.3	1.7E-04	2	0	1.4E-04	1.9E-04	
RA	E2	2.8E-02	2.9E-02	2.0E-02	2.3	1.8E-02	6	0	2.9E-03	8.1E-02	
RA	TAD	1.6E-01	1.3E-01	1.3E-01	2.0	1.1E-01	4	0	7.4E-02	3.5E-01	
SA	M	6.5E-04	5.1E-04	5.1E-04	2.0	4.0E-04	10	0	1.2E-04	1.7E-03	
SA	B	2.8E-03	3.0E-03	1.9E-03	2.4	1.7E-03	10	0	5.3E-04	1.0E-02	
SA	L	2.3E-03	3.3E-03	1.3E-03	2.9	1.4E-03	10	0	4.9E-04	1.1E-02	
SA	G	3.7E-04	3.4E-04	2.7E-04	2.2	3.7E-04	2	0	1.3E-04	6.1E-04	

Comments: *MU6, **PO10, ***RA3

Fe (iron)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	1.9E+02	5.8E+01	1.8E+02	1.4	1.9E+02	11	0	1.1E+02	2.9E+02	
AN	B	6.7E+01	2.9E+01	6.2E+01	1.5	7.2E+01	11	0	2.8E+01	1.2E+02	
AN	L	7.8E+02	6.4E+02	6.0E+02	2.1	7.9E+02	11	0	1.1E+02	2.5E+03	
AN	G	5.6E+02	2.6E+02	5.1E+02	1.6	5.0E+02	10	0	2.5E+02	1.0E+03	
AP		2.0E+02		2.0E+02		2.0E+02	1	0			
CA	ST	1.0E+02	3.7E+01	9.7E+01	1.4	9.0E+01	10	0	6.5E+01	1.7E+02	
CA	HT	8.0E+01	3.1E+01	7.4E+01	1.5	6.8E+01	10	0	4.3E+01	1.4E+02	
CE	M	1.8E+02	8.6E+01	1.7E+02	1.6	1.7E+02	11	0	1.0E+02	4.3E+02	
CE	B	1.6E+02	7.0E+01	1.4E+02	1.5	1.4E+02	11	0	7.2E+01	3.3E+02	
CE	L	3.8E+02	1.1E+02	3.7E+02	1.3	3.6E+02	10	0	2.3E+02	5.6E+02	
CE	G	7.8E+01	2.5E+01	7.4E+01	1.4	7.4E+01	7	0	4.3E+01	1.1E+02	
FU		3.9E+02	2.6E+02	3.2E+02	1.8	3.3E+02	10	0	6.6E+01	7.8E+02	
LU		2.0E+03	1.4E+03	1.7E+03	1.9	1.7E+03	14	0	1.9E+02	4.3E+03	
MU	M	1.2E+02	1.9E+01	1.2E+02	1.2	1.3E+02	7	0	9.6E+01	1.5E+02	
MU	B	1.2E+02	2.0E+01	1.1E+02	1.2	1.1E+02	7	0	8.8E+01	1.5E+02	
MU	L	1.0E+03	2.8E+02	9.9E+02	1.3	1.0E+03	7	0	6.6E+02	1.4E+03	
MU	G	1.1E+02	6.1E+01	9.9E+01	1.7	1.1E+02	2	0	6.9E+01	1.6E+02	
PI		2.3E+01	4.4E+00	2.3E+01	1.2	2.4E+01	10	0	1.5E+01	2.8E+01	
PL	M	1.2E+01	7.8E+00	1.0E+01	1.8	9.5E+00	10	0	4.9E+00	3.0E+01	
PL	B	1.5E+01	7.7E+00	1.4E+01	1.6	1.4E+01	10	0	7.6E+00	3.3E+01	
PL	L	3.4E+02	9.3E+01	3.3E+02	1.3	3.6E+02	10	0	1.9E+02	5.1E+02	
PL	G	7.2E+01	2.4E+01	6.8E+01	1.4	6.5E+01	10	0	4.2E+01	1.1E+02	
PO		4.4E+01	3.4E+01	3.4E+01	2.0	3.3E+01	10	0	2.5E+01	1.4E+02	
RA	M	4.6E+01	6.3E+00	4.5E+01	1.1	4.6E+01	8	0	3.9E+01	5.7E+01	5.8E+02*
RA	B	3.2E+01	9.6E+00	3.1E+01	1.3	3.0E+01	9	0	2.0E+01	4.9E+01	
RA	L	2.3E+02	1.1E+02	2.1E+02	1.6	2.2E+02	9	0	1.4E+02	5.2E+02	
RA	G	1.2E+02	9.4E+01	9.7E+01	2.0	7.1E+01	3	0	6.5E+01	2.3E+02	
RA	E1	1.2E+02	7.3E+00	1.2E+02	1.1	1.2E+02	2	0	1.1E+02	1.3E+02	
RA	E2	5.6E+02	4.4E+02	4.4E+02	2.0	5.3E+02	6	0	1.1E+02	1.3E+03	
RA	TAD	1.9E+03	2.2E+03	1.2E+03	2.6	8.1E+02	4	0	5.9E+02	5.2E+03	
SA	M	2.4E+01	8.4E+00	2.2E+01	1.4	2.0E+01	10	0	1.4E+01	3.8E+01	
SA	B	6.7E+01	3.6E+01	5.9E+01	1.7	6.1E+01	10	0	2.3E+01	1.4E+02	
SA	L	4.9E+02	1.6E+02	4.7E+02	1.4	4.6E+02	10	0	3.1E+02	7.8E+02	
SA	G	5.1E+01	2.2E+01	4.7E+01	1.5	5.1E+01	2	0	3.5E+01	6.6E+01	

Comments: *RA3

Ga (gallium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					7.0E-04	11	10			
AN	B	4.1E-03	5.6E-03	2.4E-03	2.8	2.2E-03	11	2	6.4E-04	2.0E-02	
AN	L	1.7E-03	1.3E-03	1.3E-03	2.0	1.5E-03	11	5	6.7E-04	4.8E-03	
AN	G	2.1E-02	2.6E-02	1.3E-02	2.6	1.3E-02	10	3	6.4E-04	8.3E-02	
AP		6.1E-02		6.1E-02		6.1E-02	1	0			
CA	ST	1.5E-02	1.4E-02	1.1E-02	2.2	8.7E-03	10	0	2.9E-03	4.5E-02	
CA	HT	2.4E-02	1.2E-02	2.2E-02	1.6	1.9E-02	10	0	1.3E-02	4.8E-02	
CE	M	6.5E-03	1.0E-02	3.6E-03	3.0	1.7E-03	11	5	6.8E-04	3.0E-02	
CE	B	2.1E-02	1.0E-02	1.8E-02	1.6	1.9E-02	11	0	8.0E-03	4.6E-02	
CE	L					7.0E-04	10	9			
CE	G	3.6E-03	2.0E-03	3.2E-03	1.7	3.6E-03	7	1	7.2E-04	6.2E-03	
FU		1.1E-01	8.2E-02	8.9E-02	1.9	9.0E-02	10	0	1.3E-02	2.5E-01	
LU		6.3E-01	4.8E-01	5.1E-01	2.0	5.8E-01	14	0	1.8E-02	1.3E+00	
MU	M	3.4E-03	2.2E-03	2.9E-03	1.8	3.2E-03	7	2	8.6E-04	6.1E-03	
MU	B	7.2E-03	3.4E-03	6.5E-03	1.6	6.8E-03	7	0	3.1E-03	1.2E-02	
MU	L					9.2E-04	7	7			
MU	G	4.1E-03	3.6E-03	3.0E-03	2.1	4.1E-03	2	1	1.5E-03	6.6E-03	
PI		2.3E-03	1.0E-03	2.1E-03	1.5	2.5E-03	10	2	6.6E-04	3.8E-03	
PL	M	2.3E-03	1.7E-03	1.9E-03	1.9	1.8E-03	10	3	6.5E-04	5.1E-03	
PL	B	2.1E-03	1.4E-03	1.8E-03	1.8	1.8E-03	10	2	6.5E-04	5.0E-03	
PL	L					1.1E-03	10	5			
PL	G					1.2E-03	10	7			
PO		4.8E-03	2.8E-03	4.1E-03	1.7	3.5E-03	10	0	2.5E-03	1.2E-02	
RA	M	2.4E-03	1.5E-03	2.0E-03	1.8	2.3E-03	8	2	7.0E-04	5.7E-03	8.4E-02*
RA	B					1.2E-03	9	7			
RA	L					8.5E-04	9	9			
RA	G					2.5E-03	3	3			
RA	E1					6.4E-04	2	2			
RA	E2	7.9E-02	7.1E-02	5.9E-02	2.2	5.4E-02	6	0	1.0E-02	1.7E-01	
RA	TAD	7.3E-01	4.0E-01	6.4E-01	1.7	6.0E-01	4	0	4.2E-01	1.3E+00	
SA	M	3.3E-03	3.5E-03	2.3E-03	2.4	1.9E-03	10	3	6.9E-04	1.2E-02	
SA	B	7.4E-03	5.5E-03	6.0E-03	1.9	4.1E-03	10	0	2.1E-03	1.8E-02	
SA	L					2.7E-03	10	5			
SA	G					2.1E-03	2	1			

Comments: *RA3

Hf (hafnium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M					4.3E-04	11	11		
AN	B	2.1E-03	1.9E-03	1.6E-03	2.2	1.9E-03	11	5	3.9E-04	5.5E-03
AN	L					4.3E-04	11	11		
AN	G					7.7E-04	10	7		
AP		3.5E-03		3.5E-03		3.5E-03	1	0		
CA	ST					4.3E-04	10	9		
CA	HT	1.9E-03	6.7E-04	1.8E-03	1.4	1.8E-03	10	0	8.7E-04	3.0E-03
CE	M					4.3E-04	11	10		
CE	B	1.1E-03	5.9E-04	9.4E-04	1.7	1.2E-03	11	4	4.3E-04	2.1E-03
CE	L					4.3E-04	10	10		
CE	G					4.2E-04	7	7		
FU		9.6E-03	5.3E-03	8.4E-03	1.7	8.8E-03	10	0	3.0E-03	1.9E-02
LU		7.5E-03	5.5E-03	6.0E-03	1.9	5.5E-03	14	0	1.0E-03	1.7E-02
MU	M	1.6E-03	1.2E-03	1.3E-03	1.9	1.6E-03	7	3	5.3E-04	3.3E-03
MU	B	1.5E-03	1.2E-03	1.2E-03	2.0	1.1E-03	7	2	5.7E-04	4.2E-03
MU	L					5.7E-04	7	7		
MU	G					1.0E-03	2	2		
PI						4.1E-04	10	10		
PL	M					4.1E-04	10	9		
PL	B					4.2E-04	10	8		
PL	L					4.2E-04	10	9		
PL	G					4.8E-04	10	10		
PO						4.2E-04	10	10		
RA	M	3.8E-03	3.0E-03	3.0E-03	2.0	3.5E-03	9	1	1.3E-03	1.1E-02
RA	B					6.2E-04	9	9		
RA	L					5.2E-04	9	9		
RA	G					1.6E-03	3	3		
RA	E1					4.0E-04	2	2		
RA	E2	4.9E-03	3.5E-03	4.0E-03	1.9	4.5E-03	6	0	9.3E-04	9.4E-03
RA	TAD	1.8E-02	6.0E-03	1.7E-02	1.4	1.9E-02	4	0	9.9E-03	2.4E-02
SA	M					4.3E-04	10	9		
SA	B					4.4E-04	10	10		
SA	L					1.2E-03	10	10		
SA	G					4.1E-04	2	2		

Hg (mercury)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	2.3E-01	2.6E-01	1.5E-01	2.5	1.2E-01	11	0	1.1E-02	7.6E-01
AN	B	3.6E-02	5.0E-02	2.1E-02	2.8	2.8E-02	11	2	1.2E-03	1.7E-01
AN	L	4.5E-01	4.5E-01	3.1E-01	2.3	2.8E-01	11	0	3.2E-02	1.3E+00
AN	G	3.0E-01	2.9E-01	2.2E-01	2.3	2.7E-01	10	0	2.1E-02	1.0E+00
AP		7.9E-03		7.9E-03		7.9E-03	1	0		
CA	ST	1.2E-01	8.1E-02	1.0E-01	1.8	9.5E-02	10	0	6.1E-02	3.4E-01
CA	HT	1.1E-02	5.3E-03	1.0E-02	1.6	8.9E-03	10	0	5.2E-03	2.1E-02
CE	M					1.4E-03	11	10		
CE	B					1.4E-03	11	11		
CE	L	7.8E-03	4.8E-03	6.6E-03	1.8	7.5E-03	10	1	1.4E-03	1.8E-02
CE	G	4.5E-03	1.6E-03	4.3E-03	1.4	4.2E-03	7	1	2.0E-03	6.8E-03
FU		8.3E-03	2.4E-03	8.0E-03	1.3	8.2E-03	10	0	5.7E-03	1.4E-02
LU		5.7E-01	3.8E-01	4.8E-01	1.8	5.5E-01	14	0	6.3E-02	1.5E+00
MU	M	2.1E-02	3.4E-02	1.1E-02	3.1	4.5E-03	7	3	1.7E-03	9.4E-02
MU	B	1.1E-02	1.2E-02	7.3E-03	2.5	5.4E-03	7	1	2.2E-03	3.6E-02
MU	L	3.8E-02	5.9E-02	2.1E-02	3.0	1.2E-02	7	0	7.7E-03	1.7E-01
MU	G	7.8E-03	6.8E-03	5.9E-03	2.1	7.8E-03	2	1	3.0E-03	1.3E-02
PI		5.0E-03	1.6E-03	4.7E-03	1.4	4.7E-03	10	0	2.8E-03	7.9E-03
PL	M	1.0E-01	5.6E-02	9.2E-02	1.7	9.6E-02	10	0	4.4E-02	2.2E-01
PL	B	5.3E-02	2.3E-02	4.9E-02	1.5	5.4E-02	10	0	1.9E-02	8.3E-02
PL	L	8.7E-02	5.8E-02	7.2E-02	1.8	6.3E-02	10	0	4.2E-02	2.3E-01
PL	G	3.5E-02	1.5E-02	3.2E-02	1.5	3.3E-02	10	0	1.7E-02	5.8E-02
PO		3.9E-03	1.5E-03	3.6E-03	1.4	3.7E-03	10	1	1.3E-03	6.9E-03
RA	M	7.0E-02	3.8E-02	6.1E-02	1.7	6.5E-02	9	1	1.1E-02	1.4E-01
RA	B	2.7E-02	1.6E-02	2.3E-02	1.7	2.9E-02	9	2	2.7E-03	5.8E-02
RA	L	7.4E-02	4.2E-02	6.4E-02	1.7	5.7E-02	9	1	1.7E-02	1.6E-01
RA	G					2.1E-02	3	2		
RA	E1	1.5E-02	7.2E-04	1.5E-02	1.0	1.5E-02	2	0	1.5E-02	1.6E-02
RA	E2	1.1E-02	3.8E-03	1.1E-02	1.4	1.1E-02	6	0	6.5E-03	1.6E-02
RA	TAD	5.6E-02	1.9E-02	5.3E-02	1.4	6.1E-02	4	0	2.9E-02	7.3E-02
SA	M	1.4E-01	6.6E-02	1.2E-01	1.6	1.6E-01	10	0	1.6E-02	2.1E-01
SA	B	1.1E-01	4.7E-02	9.8E-02	1.5	1.2E-01	10	0	1.2E-02	1.7E-01
SA	L	9.6E-02	7.3E-02	7.7E-02	2.0	1.0E-01	10	0	1.1E-02	2.2E-01
SA	G	3.3E-02	3.5E-03	3.3E-02	1.1	3.3E-02	2	0	3.1E-02	3.6E-02

Ho (holmium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					2.0E-05	11	7			
AN	B	5.9E-04	5.1E-04	4.5E-04	2.1	3.3E-04	11	0	1.1E-04	1.7E-03	
AN	L	1.7E-04	1.6E-04	1.2E-04	2.3	8.8E-05	11	0	4.0E-05	5.0E-04	
AN	G	1.9E-03	1.8E-03	1.4E-03	2.2	1.3E-03	10	0	9.4E-05	5.7E-03	
AP		2.1E-03		2.1E-03		2.1E-03	1	0			
CA	ST	2.5E-03	1.8E-03	2.0E-03	1.9	2.0E-03	10	0	8.5E-04	7.1E-03	
CA	HT	3.3E-03	1.2E-03	3.0E-03	1.4	2.8E-03	10	0	1.8E-03	5.0E-03	
CE	M	4.6E-04	6.3E-04	2.7E-04	2.8	1.7E-04	11	4	1.9E-05	2.0E-03	
CE	B	8.7E-04	5.7E-04	7.2E-04	1.8	7.1E-04	11	0	2.5E-04	2.0E-03	
CE	L	9.3E-05	6.8E-05	7.5E-05	1.9	7.0E-05	10	2	2.0E-05	2.2E-04	
CE	G	2.8E-04	2.1E-04	2.2E-04	2.0	2.4E-04	7	0	7.3E-05	6.0E-04	
FU		1.5E-02	1.2E-02	1.2E-02	2.1	1.1E-02	10	0	4.2E-03	4.6E-02	
LU		6.1E-02	5.3E-02	4.6E-02	2.1	4.0E-02	14	0	2.0E-03	1.4E-01	
MU	M	2.3E-04	2.2E-04	1.6E-04	2.3	1.7E-04	7	0	7.6E-05	7.0E-04	
MU	B	4.8E-04	2.2E-04	4.3E-04	1.5	4.5E-04	7	0	1.7E-04	7.5E-04	
MU	L	8.1E-05	9.7E-05	5.2E-05	2.6	5.5E-05	7	3	2.5E-05	3.0E-04	
MU	G	1.6E-04	5.8E-05	1.5E-04	1.4	1.6E-04	2	0	1.2E-04	2.0E-04	
PI		1.1E-04	6.2E-05	9.4E-05	1.7	9.4E-05	10	1	2.1E-05	2.4E-04	
PL	M	1.8E-04	1.9E-04	1.3E-04	2.3	1.2E-04	10	1	2.0E-05	5.5E-04	
PL	B	1.5E-04	1.5E-04	1.0E-04	2.4	9.9E-05	10	0	4.9E-05	5.7E-04	
PL	L	3.8E-04	6.3E-04	1.9E-04	3.2	8.5E-05	10	0	5.0E-05	2.0E-03	
PL	G	1.6E-04	9.7E-05	1.3E-04	1.8	1.4E-04	10	2	2.4E-05	3.1E-04	
PO		2.1E-04	1.1E-04	1.9E-04	1.7	2.0E-04	9	0	7.3E-05	4.5E-04	2.8E-03*
RA	M	1.4E-04	1.3E-04	1.1E-04	2.1	9.9E-05	8	1	2.0E-05	3.4E-04	5.7E-03**
RA	B					3.9E-05	9	6			
RA	L	1.3E-04	1.6E-04	8.7E-05	2.5	8.3E-05	9	0	5.1E-05	5.4E-04	
RA	G					7.2E-05	3	2			
RA	E1	5.0E-05	1.1E-05	4.9E-05	1.2	5.0E-05	2	0	4.2E-05	5.8E-05	
RA	E2	9.4E-03	9.6E-03	6.6E-03	2.3	5.9E-03	6	0	1.2E-03	2.7E-02	
RA	TAD	6.3E-02	4.6E-02	5.1E-02	1.9	4.5E-02	4	0	3.1E-02	1.3E-01	
SA	M	2.4E-04	1.9E-04	1.9E-04	2.0	1.5E-04	10	0	5.1E-05	6.1E-04	
SA	B	9.8E-04	9.1E-04	7.2E-04	2.2	6.8E-04	10	0	1.7E-04	3.2E-03	
SA	L	8.4E-04	1.1E-03	5.0E-04	2.7	5.1E-04	10	0	1.6E-04	3.9E-03	
SA	G	1.1E-04	6.9E-05	8.8E-05	1.8	1.1E-04	2	0	5.7E-05	1.5E-04	

Comments: *RA3, **PO10

Ir (iridium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M					1.1E-04	11	11		
AN	B					1.1E-04	11	11		
AN	L					1.1E-04	11	11		
AN	G					1.5E-04	10	10		
AP						1.1E-04	1	1		
CA	ST					1.2E-04	10	10		
CA	HT					1.1E-04	10	10		
CE	M					1.1E-04	11	11		
CE	B					1.1E-04	11	11		
CE	L					1.1E-04	10	10		
CE	G					1.1E-04	7	7		
FU						1.1E-04	10	10		
LU						1.2E-04	14	14		
MU	M					1.4E-04	7	7		
MU	B					1.7E-04	7	7		
MU	L					1.5E-04	7	7		
MU	G					2.8E-04	2	2		
PI						1.1E-04	10	10		
PL	M					1.1E-04	10	10		
PL	B					1.1E-04	10	10		
PL	L					1.1E-04	10	10		
PL	G					1.3E-04	10	10		
PO						1.1E-04	10	10		
RA	M					1.2E-04	9	9		
RA	B					1.7E-04	9	9		
RA	L					1.4E-04	9	9		
RA	G					4.1E-04	3	3		
RA	E1					1.1E-04	2	2		
RA	E2					1.1E-04	6	6		
RA	TAD					1.2E-04	4	4		
SA	M					1.1E-04	10	10		
SA	B					1.2E-04	10	10		
SA	L					3.2E-04	10	10		
SA	G					1.1E-04	2	2		

K (potassium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	1.5E+04	1.3E+03	1.5E+04	1.1	1.5E+04	11	0	1.3E+04	1.8E+04
AN	B	2.8E+03	7.6E+02	2.7E+03	1.3	2.8E+03	11	0	1.4E+03	4.1E+03
AN	L	5.4E+03	4.1E+02	5.3E+03	1.1	5.3E+03	11	0	4.8E+03	6.2E+03
AN	G	1.2E+04	1.4E+03	1.2E+04	1.1	1.2E+04	10	0	9.7E+03	1.5E+04
AP		1.3E+04		1.3E+04		1.3E+04	1	0		
CA	ST	6.5E+03	2.2E+03	6.1E+03	1.4	5.6E+03	10	0	4.9E+03	1.2E+04
CA	HT	2.2E+03	4.6E+02	2.1E+03	1.2	2.3E+03	10	0	1.2E+03	2.7E+03
CE	M	1.1E+04	1.1E+03	1.1E+04	1.1	1.0E+04	11	0	9.4E+03	1.2E+04
CE	B	3.8E+02	1.3E+02	3.6E+02	1.4	3.6E+02	11	0	2.0E+02	5.9E+02
CE	L	9.4E+03	1.5E+03	9.3E+03	1.2	9.2E+03	10	0	6.7E+03	1.2E+04
CE	G	7.6E+03	3.2E+03	7.0E+03	1.5	6.3E+03	7	0	3.2E+03	1.2E+04
FU		2.2E+04	3.2E+03	2.1E+04	1.2	2.1E+04	10	0	1.7E+04	2.7E+04
LU		7.3E+03	1.1E+03	7.2E+03	1.2	7.4E+03	14	0	4.6E+03	8.8E+03
MU	M	1.4E+04	9.8E+02	1.4E+04	1.1	1.4E+04	7	0	1.3E+04	1.5E+04
MU	B	5.3E+03	7.3E+02	5.3E+03	1.1	5.4E+03	7	0	4.0E+03	6.4E+03
MU	L	1.1E+04	7.6E+02	1.1E+04	1.1	1.1E+04	7	0	9.5E+03	1.2E+04
MU	G	1.1E+04	3.4E+03	1.0E+04	1.4	1.1E+04	2	0	8.5E+03	1.3E+04
PI		8.4E+03	2.0E+03	8.1E+03	1.3	8.2E+03	10	0	5.9E+03	1.1E+04
PL	M	1.7E+04	9.7E+02	1.7E+04	1.1	1.7E+04	10	0	1.5E+04	1.9E+04
PL	B	8.9E+03	1.0E+03	8.9E+03	1.1	9.0E+03	10	0	7.4E+03	1.1E+04
PL	L	8.1E+03	2.8E+03	7.7E+03	1.4	8.1E+03	10	0	4.7E+03	1.4E+04
PL	G	1.7E+04	1.3E+03	1.7E+04	1.1	1.7E+04	10	0	1.5E+04	1.9E+04
PO		1.4E+04	2.6E+03	1.3E+04	1.2	1.4E+04	10	0	9.3E+03	1.8E+04
RA	M	1.4E+04	9.5E+02	1.4E+04	1.1	1.4E+04	9	0	1.3E+04	1.5E+04
RA	B	6.8E+03	1.5E+03	6.7E+03	1.2	7.0E+03	9	0	4.4E+03	1.0E+04
RA	L	8.2E+03	1.6E+03	8.1E+03	1.2	7.7E+03	9	0	6.2E+03	1.2E+04
RA	G	1.4E+04	5.1E+03	1.3E+04	1.4	1.5E+04	3	0	8.4E+03	1.8E+04
RA	E1	6.2E+03	4.5E+02	6.2E+03	1.1	6.2E+03	2	0	5.9E+03	6.5E+03
RA	E2	3.9E+03	8.9E+02	3.8E+03	1.3	3.6E+03	6	0	3.2E+03	5.5E+03
RA	TAD	1.2E+04	2.3E+03	1.2E+04	1.2	1.2E+04	4	0	1.0E+04	1.4E+04
SA	M	2.1E+04	1.3E+03	2.1E+04	1.1	2.1E+04	10	0	1.8E+04	2.2E+04
SA	B	1.3E+04	1.5E+03	1.3E+04	1.1	1.4E+04	10	0	1.1E+04	1.5E+04
SA	L	1.2E+04	1.0E+03	1.2E+04	1.1	1.2E+04	10	0	1.1E+04	1.4E+04
SA	G	1.1E+04	2.8E+02	1.1E+04	1.0	1.1E+04	2	0	1.1E+04	1.1E+04

La (lanthanum)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	9.2E-04	4.8E-04	8.1E-04	1.6	9.1E-04	10	1	1.9E-04	1.7E-03	1.3E-02*
AN	B	2.5E-02	2.1E-02	1.9E-02	2.1	1.2E-02	11	0	4.0E-03	5.6E-02	
AN	L	2.7E-02	3.0E-02	1.8E-02	2.4	1.6E-02	11	0	2.3E-03	9.1E-02	
AN	G	6.3E-02	8.3E-02	3.8E-02	2.7	2.4E-02	10	0	3.5E-03	2.8E-01	
AP		1.0E-01		1.0E-01		1.0E-01	1	0			
CA	ST	1.6E-01	1.1E-01	1.3E-01	1.8	1.3E-01	10	0	6.7E-02	4.4E-01	
CA	HT	1.3E-01	4.6E-02	1.3E-01	1.4	1.1E-01	10	0	1.0E-01	2.5E-01	
CE	M	2.1E-02	2.7E-02	1.3E-02	2.7	9.6E-03	11	0	1.4E-03	9.1E-02	
CE	B	3.2E-02	1.8E-02	2.8E-02	1.7	2.8E-02	11	0	1.1E-02	7.3E-02	
CE	L	2.5E-02	3.2E-02	1.6E-02	2.7	9.3E-03	10	0	5.6E-03	9.1E-02	
CE	G	1.6E-02	7.9E-03	1.4E-02	1.6	1.7E-02	7	0	4.3E-03	2.4E-02	
FU		4.2E-01	2.1E-01	3.7E-01	1.6	3.4E-01	10	0	1.7E-01	8.8E-01	
LU		2.3E+00	1.8E+00	1.9E+00	2.0	2.1E+00	14	0	1.3E-01	5.7E+00	
MU	M	1.4E-02	7.5E-03	1.3E-02	1.6	1.5E-02	7	0	7.4E-03	2.8E-02	
MU	B	4.7E-02	4.0E-02	3.6E-02	2.1	3.4E-02	7	0	1.5E-02	1.3E-01	
MU	L	5.6E-03	3.3E-03	4.8E-03	1.7	4.3E-03	7	0	2.3E-03	1.1E-02	
MU	G	2.1E-02	2.4E-02	1.4E-02	2.5	2.1E-02	2	0	3.6E-03	3.8E-02	
PI		7.3E-03	2.9E-03	6.8E-03	1.5	6.6E-03	10	0	3.7E-03	1.3E-02	
PL	M	4.5E-03	2.0E-03	4.1E-03	1.5	4.5E-03	10	0	1.9E-03	7.3E-03	
PL	B	4.4E-03	2.3E-03	3.9E-03	1.6	3.9E-03	10	0	2.2E-03	9.6E-03	
PL	L	1.9E-02	1.0E-02	1.7E-02	1.7	1.6E-02	10	0	1.0E-02	3.9E-02	
PL	G	7.8E-03	6.5E-03	6.0E-03	2.1	7.2E-03	10	1	7.5E-04	2.1E-02	
PO		2.1E-02	1.2E-02	1.8E-02	1.7	2.3E-02	9	0	7.1E-03	4.7E-02	5.0E-01**
RA	M	1.1E-02	1.3E-02	7.3E-03	2.5	5.6E-03	8	0	1.8E-03	4.2E-02	2.3E-01***
RA	B	6.5E-03	7.7E-03	4.1E-03	2.6	3.2E-03	9	0	1.5E-03	2.1E-02	
RA	L	4.7E-03	3.2E-03	3.9E-03	1.8	3.0E-03	9	0	1.9E-03	1.1E-02	
RA	G					2.1E-03	3	2			
RA	E1	3.4E-03	9.9E-04	3.2E-03	1.3	3.4E-03	2	0	2.7E-03	4.1E-03	
RA	E2	3.9E-01	3.7E-01	2.8E-01	2.2	2.7E-01	6	0	6.6E-02	1.1E+00	
RA	TAD	4.5E+00	2.4E+00	4.0E+00	1.6	3.7E+00	4	0	2.7E+00	8.0E+00	
SA	M	7.0E-03	3.8E-03	6.1E-03	1.7	5.5E-03	10	0	2.3E-03	1.3E-02	
SA	B	3.2E-02	1.7E-02	2.9E-02	1.6	3.1E-02	10	0	1.0E-02	6.4E-02	
SA	L	6.8E-01	3.8E-01	6.0E-01	1.7	5.7E-01	10	0	2.4E-01	1.4E+00	
SA	G	4.4E-03	2.1E-03	4.0E-03	1.6	4.4E-03	2	0	2.9E-03	5.9E-03	

Comments: *AN1, **PO9, ***RA3

Li (lithium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					3.0E-03	11	10			
AN	B	1.4E-01	1.3E-01	1.1E-01	2.1	9.0E-02	11	0	1.4E-02	3.9E-01	
AN	L					3.0E-03	11	10			
AN	G	4.2E-02	4.9E-02	2.7E-02	2.5	2.3E-02	10	2	4.0E-03	1.6E-01	
AP		1.5E-01		1.5E-01		1.5E-01	1	0			
CA	ST	4.3E-01	4.4E-01	3.0E-01	2.3	2.9E-01	10	0	1.9E-01	1.6E+00	
CA	HT	4.5E+00	5.3E-01	4.5E+00	1.1	4.4E+00	10	0	4.0E+00	5.5E+00	
CE	M	9.7E-02	7.7E-02	7.6E-02	2.0	7.9E-02	11	0	2.4E-02	2.6E-01	
CE	B	7.0E-01	1.3E-01	6.8E-01	1.2	6.9E-01	11	0	5.1E-01	9.7E-01	
CE	L	8.8E-02	7.2E-02	6.8E-02	2.0	8.4E-02	10	0	1.0E-02	2.2E-01	
CE	G	8.3E-02	6.6E-02	6.5E-02	2.0	7.5E-02	7	0	1.9E-02	2.2E-01	
FU		7.0E-01	2.1E-01	6.7E-01	1.3	6.1E-01	10	0	4.7E-01	1.0E+00	
LU		1.1E+00	9.1E-01	8.7E-01	2.0	9.3E-01	14	0	3.7E-02	2.5E+00	
MU	M	1.0E-02	5.3E-03	9.2E-03	1.6	1.0E-02	7	2	3.7E-03	1.8E-02	
MU	B	4.0E-02	1.3E-02	3.8E-02	1.4	3.7E-02	7	0	2.6E-02	5.7E-02	
MU	L					4.0E-03	7	7			
MU	G					7.2E-03	2	2			
PI		1.2E-02	7.2E-03	1.1E-02	1.7	1.0E-02	10	1	3.1E-03	2.7E-02	
PL	M	1.1E-01	2.7E-02	1.1E-01	1.3	1.1E-01	10	0	7.8E-02	1.5E-01	
PL	B	5.1E-01	1.0E-01	5.0E-01	1.2	5.1E-01	10	0	3.7E-01	7.1E-01	
PL	L	8.7E-02	3.3E-02	8.1E-02	1.4	7.4E-02	10	0	5.9E-02	1.6E-01	
PL	G	2.2E-01	7.7E-02	2.1E-01	1.4	2.3E-01	10	0	1.2E-01	3.5E-01	
PO		2.5E-02	1.3E-02	2.2E-02	1.6	2.1E-02	10	0	1.4E-02	5.9E-02	
RA	M	1.8E-02	7.9E-03	1.6E-02	1.5	1.7E-02	8	1	6.0E-03	3.3E-02	1.8E-01*
RA	B	4.7E-02	1.7E-02	4.4E-02	1.4	5.2E-02	9	0	1.4E-02	6.6E-02	
RA	L					7.9E-03	9	5			
RA	G					1.4E-02	3	2			
RA	E1					2.8E-03	2	2			
RA	E2	2.2E-01	1.3E-01	1.9E-01	1.8	2.0E-01	6	0	7.0E-02	4.2E-01	
RA	TAD	2.0E-01	5.2E-02	2.0E-01	1.3	1.9E-01	3	0	1.6E-01	2.6E-01	3.0E+00**
SA	M	8.7E-03	7.4E-03	6.6E-03	2.1	6.4E-03	10	4	3.0E-03	2.5E-02	
SA	B	2.3E-02	1.1E-02	2.0E-02	1.6	2.3E-02	10	0	7.1E-03	3.6E-02	
SA	L					9.5E-03	10	7			
SA	G	1.0E-02	1.4E-04	1.0E-02	1.0	1.0E-02	2	0	1.0E-02	1.0E-02	

Comments: *RA3, **RA17

Lu (lutetium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					2.0E-05	11	10			
AN	B	2.2E-04	1.8E-04	1.8E-04	2.0	1.5E-04	11	0	5.3E-05	6.0E-04	
AN	L					2.1E-05	11	6			
AN	G	7.0E-04	6.8E-04	5.1E-04	2.3	6.3E-04	10	2	1.8E-05	2.1E-03	
AP		8.1E-04		8.1E-04		8.1E-04	1	0			
CA	ST	7.3E-04	5.7E-04	5.8E-04	2.0	5.8E-04	10	0	1.9E-04	1.9E-03	
CA	HT	1.1E-03	5.0E-04	9.8E-04	1.6	9.1E-04	10	0	5.0E-04	1.8E-03	
CE	M	1.5E-04	2.0E-04	9.3E-05	2.7	5.5E-05	11	5	1.9E-05	6.5E-04	
CE	B	3.5E-04	2.1E-04	3.0E-04	1.8	3.1E-04	11	0	1.0E-04	8.6E-04	
CE	L					2.0E-05	10	9			
CE	G	8.9E-05	7.2E-05	6.9E-05	2.0	6.8E-05	7	3	1.9E-05	1.9E-04	
FU		6.5E-03	6.5E-03	4.6E-03	2.3	4.2E-03	10	0	1.8E-03	2.4E-02	
LU		2.4E-02	2.2E-02	1.7E-02	2.2	1.4E-02	14	0	6.3E-04	5.7E-02	
MU	M					2.5E-05	7	5			
MU	B	1.5E-04	9.5E-05	1.2E-04	1.8	1.4E-04	7	1	3.2E-05	3.4E-04	
MU	L					2.6E-05	7	6			
MU	G					7.3E-05	2	1			
PI		4.7E-05	2.0E-05	4.4E-05	1.5	5.6E-05	10	3	1.9E-05	7.1E-05	
PL	M					2.0E-05	10	6			
PL	B	8.3E-05	5.3E-05	7.0E-05	1.8	6.8E-05	10	1	1.9E-05	2.1E-04	
PL	L	8.7E-05	1.1E-04	5.4E-05	2.7	4.5E-05	9	4	1.9E-05	3.6E-04	2.1E-03*
PL	G					4.9E-05	10	5			
PO		7.6E-05	4.3E-05	6.6E-05	1.7	7.8E-05	9	1	2.0E-05	1.4E-04	1.1E-02**
RA	M					2.1E-05	8	7			
RA	B					3.5E-05	9	7			
RA	L					2.4E-05	9	9			
RA	G					7.2E-05	3	3			
RA	E1					1.8E-05	2	2			
RA	E2	4.2E-03	4.0E-03	3.0E-03	2.2	3.3E-03	6	0	4.1E-04	1.1E-02	
RA	TAD	1.8E-02	1.6E-02	1.3E-02	2.1	1.1E-02	4	0	8.3E-03	4.1E-02	
SA	M	6.7E-05	5.6E-05	5.2E-05	2.1	5.0E-05	10	4	1.9E-05	1.8E-04	
SA	B	3.3E-04	3.8E-04	2.1E-04	2.5	1.9E-04	10	0	5.0E-05	1.3E-03	
SA	L	1.1E-04	5.6E-05	9.7E-05	1.6	1.3E-04	9	4	4.0E-05	2.1E-04	1.6E-03***
SA	G					3.5E-05	2	1			

Comments: *PL6, **PO10, ***SA4

Mg (magnesium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	1.1E+03	5.7E+01	1.1E+03	1.1	1.1E+03	11	0	1.0E+03	1.2E+03
AN	B	1.9E+03	4.7E+02	1.9E+03	1.3	2.1E+03	11	0	1.1E+03	2.6E+03
AN	L	4.1E+02	3.5E+01	4.0E+02	1.1	4.1E+02	11	0	3.5E+02	4.6E+02
AN	G	9.2E+02	2.2E+02	9.0E+02	1.3	8.5E+02	10	0	6.5E+02	1.3E+03
AP		1.3E+03		1.3E+03		1.3E+03	1	0		
CA	ST	2.1E+03	9.3E+02	1.9E+03	1.5	1.7E+03	10	0	1.6E+03	4.6E+03
CA	HT	1.1E+04	6.5E+02	1.1E+04	1.1	1.1E+04	10	0	1.0E+04	1.2E+04
CE	M	7.3E+02	1.1E+02	7.2E+02	1.2	7.0E+02	11	0	6.1E+02	1.0E+03
CE	B	3.6E+03	3.7E+02	3.5E+03	1.1	3.5E+03	11	0	3.0E+03	4.2E+03
CE	L	5.6E+02	1.3E+02	5.5E+02	1.3	5.6E+02	10	0	3.9E+02	8.9E+02
CE	G	3.6E+02	1.5E+02	3.4E+02	1.5	3.2E+02	7	0	1.4E+02	5.6E+02
FU		6.6E+03	1.0E+03	6.5E+03	1.2	6.3E+03	10	0	5.7E+03	8.9E+03
LU		1.5E+03	5.1E+02	1.4E+03	1.4	1.3E+03	14	0	8.2E+02	2.3E+03
MU	M	1.1E+03	1.2E+02	1.1E+03	1.1	1.1E+03	7	0	9.8E+02	1.3E+03
MU	B	1.8E+03	1.4E+02	1.8E+03	1.1	1.9E+03	7	0	1.5E+03	2.0E+03
MU	L	7.2E+02	1.2E+02	7.1E+02	1.2	6.7E+02	7	0	6.0E+02	9.3E+02
MU	G	5.5E+02	2.1E+02	5.2E+02	1.4	5.5E+02	2	0	4.1E+02	7.0E+02
PI		8.1E+02	6.8E+01	8.1E+02	1.1	8.0E+02	10	0	7.3E+02	9.1E+02
PL	M	1.1E+03	1.4E+02	1.1E+03	1.1	1.0E+03	10	0	8.7E+02	1.3E+03
PL	B	1.3E+03	1.2E+02	1.3E+03	1.1	1.3E+03	10	0	1.2E+03	1.6E+03
PL	L	1.2E+03	3.8E+02	1.1E+03	1.4	1.2E+03	10	0	5.3E+02	1.8E+03
PL	G	3.0E+03	1.8E+03	2.5E+03	1.8	2.7E+03	10	0	1.1E+03	6.8E+03
PO		7.8E+02	1.4E+02	7.6E+02	1.2	7.5E+02	10	0	6.4E+02	1.1E+03
RA	M	1.2E+03	3.2E+02	1.1E+03	1.3	1.1E+03	9	0	9.8E+02	2.0E+03
RA	B	1.6E+03	1.8E+02	1.6E+03	1.1	1.7E+03	9	0	1.4E+03	1.9E+03
RA	L	5.6E+02	1.4E+02	5.4E+02	1.3	5.1E+02	9	0	4.2E+02	8.9E+02
RA	G	6.8E+02	3.8E+02	6.0E+02	1.7	6.0E+02	3	0	3.5E+02	1.1E+03
RA	E1	1.0E+03	2.6E+02	9.7E+02	1.3	1.0E+03	2	0	8.2E+02	1.2E+03
RA	E2	1.5E+03	6.2E+02	1.3E+03	1.5	1.3E+03	6	0	7.7E+02	2.5E+03
RA	TAD	1.9E+03	8.2E+02	1.8E+03	1.5	1.6E+03	4	0	1.4E+03	3.2E+03
SA	M	1.4E+03	3.2E+01	1.4E+03	1.0	1.4E+03	10	0	1.4E+03	1.5E+03
SA	B	1.0E+03	6.5E+01	1.0E+03	1.1	1.0E+03	10	0	9.8E+02	1.2E+03
SA	L	6.5E+02	2.9E+01	6.5E+02	1.0	6.5E+02	10	0	6.1E+02	6.9E+02
SA	G	7.1E+02	4.2E+01	7.1E+02	1.1	7.1E+02	2	0	6.8E+02	7.4E+02

Mn (manganese)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	1.3E+00	4.4E-01	1.2E+00	1.4	1.2E+00	11	0	6.5E-01	2.1E+00	
AN	B	7.6E+00	3.8E+00	6.8E+00	1.6	6.4E+00	11	0	3.2E+00	1.5E+01	
AN	L	6.6E+00	3.2E+00	5.9E+00	1.6	5.8E+00	11	0	3.4E+00	1.5E+01	
AN	G	1.6E+01	1.6E+01	1.1E+01	2.3	1.0E+01	10	0	3.1E+00	5.1E+01	
AP		3.5E+02		3.5E+02		3.5E+02	1	0			
CA	ST	6.5E+00	1.6E+00	6.3E+00	1.3	6.0E+00	10	0	4.3E+00	9.6E+00	
CA	HT	1.3E+01	5.4E+00	1.2E+01	1.5	1.3E+01	10	0	5.6E+00	2.2E+01	
CE	M	2.4E+00	2.0E+00	1.8E+00	2.1	1.7E+00	11	0	7.4E-01	6.5E+00	
CE	B	3.6E+00	1.3E+00	3.4E+00	1.4	3.5E+00	11	0	2.1E+00	6.7E+00	
CE	L	1.0E+01	5.1E+00	9.4E+00	1.6	1.3E+01	10	0	2.3E+00	1.6E+01	
CE	G	1.2E+00	4.5E-01	1.1E+00	1.4	1.3E+00	7	0	4.4E-01	1.8E+00	
FU		7.6E+01	1.6E+01	7.5E+01	1.2	7.6E+01	10	0	5.4E+01	1.0E+02	
LU		5.9E+01	4.9E+01	4.5E+01	2.1	4.3E+01	14	0	3.6E+00	1.6E+02	
MU	M	1.1E+00	2.8E-01	1.0E+00	1.3	1.0E+00	7	0	7.1E-01	1.5E+00	
MU	B	1.6E+00	2.6E-01	1.6E+00	1.2	1.7E+00	7	0	1.3E+00	2.0E+00	
MU	L	4.1E+00	8.2E-01	4.1E+00	1.2	4.3E+00	7	0	3.0E+00	5.5E+00	
MU	G	2.5E+00	1.5E+00	2.1E+00	1.8	2.5E+00	2	0	1.4E+00	3.6E+00	
PI		7.9E+01	6.0E+01	6.3E+01	2.0	4.9E+01	10	0	1.7E+01	1.9E+02	
PL	M	7.0E-01	2.2E-01	6.7E-01	1.4	6.8E-01	10	0	3.7E-01	1.1E+00	
PL	B	8.0E+00	4.8E+00	6.9E+00	1.7	6.7E+00	10	0	4.4E+00	2.1E+01	
PL	L	2.6E+00	9.6E-01	2.5E+00	1.4	2.7E+00	10	0	1.3E+00	4.2E+00	
PL	G	2.0E+00	5.9E-01	2.0E+00	1.3	1.8E+00	10	0	1.5E+00	3.2E+00	
PO		1.9E+02	6.2E+01	1.8E+02	1.4	1.9E+02	10	0	8.8E+01	3.0E+02	
RA	M	6.8E+00	4.2E+00	5.8E+00	1.8	5.7E+00	9	0	1.5E+00	1.3E+01	
RA	B	7.2E+01	3.1E+01	6.6E+01	1.5	7.8E+01	9	0	2.1E+01	1.3E+02	
RA	L	9.8E+00	2.9E+00	9.4E+00	1.3	9.4E+00	9	0	6.3E+00	1.5E+01	
RA	G	4.7E+00	4.2E+00	3.5E+00	2.1	2.4E+00	3	0	2.2E+00	9.6E+00	
RA	E1	6.0E+00	2.5E+00	5.6E+00	1.5	6.0E+00	2	0	4.3E+00	7.8E+00	
RA	E2	1.3E+01	5.5E+00	1.2E+01	1.5	1.4E+01	5	0	6.8E+00	2.1E+01	2.2E+02*
RA	TAD	4.5E+01	3.6E+01	3.5E+01	2.0	2.9E+01	4	0	2.4E+01	1.0E+02	
SA	M	1.2E+00	3.5E-01	1.2E+00	1.3	1.2E+00	10	0	6.5E-01	2.0E+00	
SA	B	2.0E+01	1.3E+01	1.7E+01	1.8	1.6E+01	10	0	9.6E+00	5.2E+01	
SA	L	6.9E+00	2.8E+00	6.4E+00	1.5	6.0E+00	10	0	4.1E+00	1.3E+01	
SA	G	2.8E+00	1.1E+00	2.6E+00	1.5	2.8E+00	2	0	2.0E+00	3.6E+00	

Comments: *RA14

Mo (molybdenum)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	7.0E-02	3.8E-02	6.2E-02	1.7	6.3E-02	11	0	1.7E-02	1.5E-01
AN	B	7.5E-02	2.7E-02	7.1E-02	1.4	7.3E-02	11	0	3.2E-02	1.3E-01
AN	L	1.6E+00	4.3E-01	1.5E+00	1.3	1.7E+00	11	0	8.5E-01	2.3E+00
AN	G	1.7E+00	1.1E+00	1.4E+00	1.8	1.7E+00	10	0	1.7E-01	2.9E+00
AP		5.4E-01		5.4E-01		5.4E-01	1	0		
CA	ST	3.3E-01	1.0E-01	3.2E-01	1.4	3.3E-01	10	0	2.1E-01	5.5E-01
CA	HT	4.3E-02	1.1E-02	4.1E-02	1.3	3.9E-02	10	0	3.1E-02	6.3E-02
CE	M	8.2E-02	8.7E-02	5.6E-02	2.4	5.0E-02	11	0	2.9E-02	3.1E-01
CE	B	5.2E-02	1.6E-02	4.9E-02	1.4	5.0E-02	11	0	3.3E-02	8.6E-02
CE	L	3.5E+00	1.3E+00	3.2E+00	1.4	3.3E+00	10	0	1.9E+00	6.2E+00
CE	G	7.4E-02	5.2E-02	6.1E-02	1.9	6.7E-02	7	0	2.7E-02	1.9E-01
FU		2.1E-01	9.2E-02	1.9E-01	1.5	2.1E-01	10	0	3.5E-02	3.5E-01
LU		1.1E+00	8.7E-01	8.4E-01	2.0	7.8E-01	14	0	3.6E-01	3.6E+00
MU	M	1.1E-01	1.4E-02	1.1E-01	1.1	1.1E-01	7	0	9.1E-02	1.3E-01
MU	B	1.6E-01	3.4E-02	1.6E-01	1.2	1.5E-01	7	0	1.3E-01	2.1E-01
MU	L	2.8E+00	3.5E-01	2.8E+00	1.1	2.6E+00	7	0	2.5E+00	3.3E+00
MU	G	4.5E-01	1.6E-01	4.2E-01	1.4	4.5E-01	2	0	3.4E-01	5.6E-01
PI		3.9E-02	2.1E-02	3.5E-02	1.7	4.6E-02	10	1	4.2E-03	7.1E-02
PL	M	2.4E-02	2.8E-02	1.6E-02	2.5	1.4E-02	10	0	9.4E-03	9.9E-02
PL	B	2.5E-02	4.9E-03	2.5E-02	1.2	2.5E-02	10	0	1.9E-02	3.3E-02
PL	L	1.9E-01	6.1E-02	1.9E-01	1.4	2.1E-01	10	0	1.0E-01	2.9E-01
PL	G	4.2E-02	1.5E-02	4.0E-02	1.4	4.5E-02	10	0	2.2E-02	7.0E-02
PO		4.0E-01	4.0E-01	2.8E-01	2.3	3.1E-01	10	0	1.3E-01	1.5E+00
RA	M	5.9E-02	2.9E-02	5.3E-02	1.6	5.3E-02	9	0	3.9E-02	1.3E-01
RA	B	5.3E-02	3.4E-02	4.4E-02	1.8	3.9E-02	9	1	2.9E-02	1.4E-01
RA	L	5.5E-01	2.4E-01	5.0E-01	1.5	4.8E-01	9	0	3.1E-01	1.1E+00
RA	G	1.3E+00	1.9E+00	6.9E-01	3.0	2.0E-01	3	0	9.0E-02	3.5E+00
RA	E1	8.5E-02	1.7E-03	8.5E-02	1.0	8.5E-02	2	0	8.3E-02	8.6E-02
RA	E2	1.4E-01	6.4E-02	1.3E-01	1.5	1.5E-01	6	0	4.6E-02	2.2E-01
RA	TAD	4.7E-01	1.8E-01	4.4E-01	1.4	4.7E-01	4	0	2.6E-01	6.9E-01
SA	M	2.3E-02	8.7E-03	2.1E-02	1.4	2.1E-02	10	0	1.6E-02	4.6E-02
SA	B	4.6E-02	1.1E-02	4.5E-02	1.3	4.5E-02	10	0	3.3E-02	7.1E-02
SA	L	6.2E-01	1.6E-01	6.0E-01	1.3	5.9E-01	10	0	4.4E-01	9.3E-01
SA	G	4.0E-02	4.4E-03	4.0E-02	1.1	4.0E-02	2	0	3.7E-02	4.3E-02

Na (sodium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	2.7E+03	7.7E+02	2.6E+03	1.3	2.7E+03	11	0	1.7E+03	4.1E+03
AN	B	4.9E+03	6.9E+02	4.9E+03	1.1	5.1E+03	11	0	3.7E+03	6.3E+03
AN	L	2.3E+03	6.0E+02	2.2E+03	1.3	2.2E+03	11	0	1.5E+03	3.9E+03
AN	G	6.6E+03	9.6E+02	6.6E+03	1.2	6.8E+03	10	0	4.6E+03	7.6E+03
AP		1.3E+03		1.3E+03		1.3E+03	1	0		
CA	ST	1.6E+04	1.2E+04	1.3E+04	2.0	1.2E+04	10	0	8.3E+03	4.9E+04
CA	HT	9.1E+03	5.1E+02	9.1E+03	1.1	9.2E+03	10	0	8.3E+03	1.0E+04
CE	M	3.4E+03	1.0E+03	3.3E+03	1.3	3.1E+03	11	0	2.4E+03	5.7E+03
CE	B	5.3E+03	4.7E+02	5.3E+03	1.1	5.3E+03	11	0	4.2E+03	5.8E+03
CE	L	3.5E+03	1.3E+03	3.2E+03	1.4	3.1E+03	10	0	2.0E+03	6.7E+03
CE	G	6.8E+03	3.1E+03	6.2E+03	1.6	5.5E+03	7	0	3.5E+03	1.1E+04
FU		2.6E+04	5.2E+03	2.6E+04	1.2	2.5E+04	10	0	2.1E+04	3.9E+04
LU		4.0E+03	1.1E+03	3.9E+03	1.3	3.7E+03	14	0	2.4E+03	6.3E+03
MU	M	2.8E+03	7.7E+02	2.7E+03	1.3	2.8E+03	7	0	2.0E+03	4.3E+03
MU	B	4.9E+03	4.6E+02	4.9E+03	1.1	4.9E+03	7	0	4.1E+03	5.5E+03
MU	L	4.4E+03	9.8E+02	4.2E+03	1.2	4.5E+03	7	0	2.5E+03	5.7E+03
MU	G	4.5E+03	2.7E+03	3.9E+03	1.7	4.5E+03	2	0	2.6E+03	6.4E+03
PI		1.1E+02	7.5E+01	9.5E+01	1.8	9.3E+01	10	0	3.0E+01	2.3E+02
PL	M	5.1E+03	1.3E+03	5.0E+03	1.3	4.9E+03	10	0	3.7E+03	7.9E+03
PL	B	4.5E+03	8.9E+02	4.4E+03	1.2	4.2E+03	10	0	3.6E+03	6.6E+03
PL	L	4.7E+03	1.9E+03	4.3E+03	1.5	4.3E+03	10	0	2.4E+03	8.8E+03
PL	G	9.7E+03	3.1E+03	9.2E+03	1.4	9.4E+03	10	0	5.6E+03	1.6E+04
PO		1.6E+02	7.9E+01	1.4E+02	1.6	1.3E+02	10	0	8.2E+01	3.3E+02
RA	M	2.8E+03	1.2E+03	2.5E+03	1.5	2.4E+03	9	0	1.8E+03	5.8E+03
RA	B	5.3E+03	4.4E+02	5.2E+03	1.1	5.2E+03	9	0	4.8E+03	6.0E+03
RA	L	2.3E+03	7.0E+02	2.2E+03	1.3	2.2E+03	9	0	1.6E+03	4.0E+03
RA	G	3.2E+03	1.6E+03	2.9E+03	1.6	2.4E+03	3	0	2.1E+03	5.1E+03
RA	E1	1.5E+03	2.3E+02	1.4E+03	1.2	1.5E+03	2	0	1.3E+03	1.6E+03
RA	E2	4.8E+03	9.8E+02	4.7E+03	1.2	4.9E+03	6	0	3.5E+03	5.8E+03
RA	TAD	2.6E+04	2.5E+03	2.5E+04	1.1	2.5E+04	4	0	2.4E+04	2.9E+04
SA	M	1.9E+03	2.8E+02	1.9E+03	1.2	1.9E+03	10	0	1.5E+03	2.4E+03
SA	B	2.6E+03	4.0E+02	2.6E+03	1.2	2.4E+03	10	0	2.2E+03	3.3E+03
SA	L	4.0E+03	1.3E+03	3.8E+03	1.4	3.5E+03	10	0	3.1E+03	7.5E+03
SA	G	4.5E+03	4.7E+02	4.5E+03	1.1	4.5E+03	2	0	4.2E+03	4.9E+03

Nd (neodynium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	6.5E-04	3.4E-04	5.7E-04	1.6	5.4E-04	10	0	2.5E-04	1.2E-03	9.0E-03*
AN	B	2.0E-02	1.8E-02	1.5E-02	2.2	9.9E-03	11	0	2.9E-03	5.1E-02	
AN	L	1.9E-02	2.1E-02	1.3E-02	2.5	1.1E-02	11	0	1.8E-03	6.2E-02	
AN	G	5.5E-02	7.5E-02	3.3E-02	2.8	2.7E-02	10	0	2.1E-03	2.5E-01	
AP		8.4E-02		8.4E-02		8.4E-02	1	0			
CA	ST	1.0E-01	6.6E-02	8.5E-02	1.8	9.3E-02	10	0	4.0E-02	2.7E-01	
CA	HT	1.2E-01	4.6E-02	1.1E-01	1.4	9.8E-02	10	0	7.9E-02	2.2E-01	
CE	M	1.6E-02	2.3E-02	9.6E-03	2.8	9.1E-03	11	0	1.1E-03	7.7E-02	
CE	B	3.3E-02	1.8E-02	2.9E-02	1.7	2.9E-02	11	0	1.2E-02	7.4E-02	
CE	L	1.0E-02	1.1E-02	6.8E-03	2.4	5.5E-03	10	0	2.2E-03	3.7E-02	
CE	G	1.1E-02	6.4E-03	9.4E-03	1.7	1.1E-02	7	0	3.5E-03	2.0E-02	
FU		4.0E-01	2.0E-01	3.6E-01	1.6	3.3E-01	10	0	1.6E-01	8.5E-01	
LU		2.1E+00	1.7E+00	1.6E+00	2.1	1.7E+00	14	0	6.9E-02	5.4E+00	
MU	M	9.1E-03	4.4E-03	8.2E-03	1.6	1.0E-02	7	0	4.7E-03	1.6E-02	
MU	B	2.9E-02	1.9E-02	2.4E-02	1.8	2.4E-02	7	0	9.6E-03	6.4E-02	
MU	L	3.7E-03	2.4E-03	3.1E-03	1.8	3.0E-03	7	0	1.4E-03	7.1E-03	
MU	G	3.9E-03	2.2E-03	3.4E-03	1.7	3.9E-03	2	0	2.4E-03	5.4E-03	
PI		5.5E-03	2.1E-03	5.2E-03	1.5	5.5E-03	10	0	2.8E-03	1.0E-02	
PL	M	4.3E-03	2.9E-03	3.5E-03	1.9	3.5E-03	10	0	1.2E-03	1.1E-02	
PL	B	4.1E-03	3.3E-03	3.2E-03	2.0	2.8E-03	10	0	1.7E-03	1.2E-02	
PL	L	1.2E-02	9.1E-03	9.9E-03	1.9	9.0E-03	10	0	4.5E-03	3.3E-02	
PL	G	5.4E-03	4.5E-03	4.2E-03	2.1	4.2E-03	10	0	7.5E-04	1.3E-02	
PO		1.4E-02	7.5E-03	1.2E-02	1.6	1.5E-02	9	0	4.9E-03	2.7E-02	2.3E-01**
RA	M	9.4E-03	1.3E-02	5.4E-03	2.9	3.7E-03	8	0	1.2E-03	4.1E-02	1.9E-01***
RA	B	5.0E-03	6.2E-03	3.1E-03	2.6	2.1E-03	9	0	1.2E-03	1.7E-02	
RA	L	4.1E-03	3.2E-03	3.2E-03	2.0	2.2E-03	9	0	1.6E-03	9.8E-03	
RA	G	2.5E-03	2.5E-03	1.7E-03	2.3	1.7E-03	3	1	4.8E-04	5.3E-03	
RA	E1	2.5E-03	8.7E-04	2.4E-03	1.4	2.5E-03	2	0	1.9E-03	3.1E-03	
RA	E2	3.4E-01	3.3E-01	2.5E-01	2.2	2.2E-01	6	0	5.1E-02	9.1E-01	
RA	TAD	4.0E+00	2.4E+00	3.4E+00	1.8	3.0E+00	4	0	2.3E+00	7.6E+00	
SA	M	5.9E-03	3.9E-03	4.9E-03	1.8	4.1E-03	10	0	1.7E-03	1.4E-02	
SA	B	2.3E-02	1.4E-02	2.0E-02	1.7	2.2E-02	10	0	6.7E-03	4.8E-02	
SA	L	2.4E-01	1.4E-01	2.1E-01	1.7	2.0E-01	10	0	8.1E-02	5.5E-01	
SA	G	2.5E-03	1.6E-03	2.1E-03	1.8	2.5E-03	2	0	1.3E-03	3.6E-03	

Comments: *AN1, **PO9, ***RA3

Ni (nickel)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	2.1E-02	2.1E-02	1.4E-02	2.3	1.2E-02	11	1	4.4E-03	7.4E-02	
AN	B	1.1E-01	1.7E-01	6.3E-02	3.0	5.7E-02	11	0	2.4E-02	6.1E-01	
AN	L	4.9E-02	6.6E-02	2.9E-02	2.8	1.7E-02	11	1	4.2E-03	2.3E-01	
AN	G	3.1E-01	4.8E-01	1.7E-01	3.0	1.1E-01	10	0	3.1E-02	1.5E+00	
AP		3.0E-01		3.0E-01		3.0E-01	1	0			
CA	ST	1.0E+00	9.7E-01	7.2E-01	2.3	7.7E-01	10	0	3.6E-01	3.6E+00	
CA	HT	2.4E-01	7.3E-02	2.3E-01	1.4	2.1E-01	10	0	1.5E-01	3.7E-01	
CE	M	7.0E-02	8.5E-02	4.4E-02	2.6	3.6E-02	11	0	1.0E-02	2.7E-01	
CE	B	2.6E+00	1.2E+00	2.4E+00	1.5	2.5E+00	11	0	1.2E+00	5.9E+00	
CE	L	2.6E-02	1.3E-02	2.3E-02	1.6	1.9E-02	10	0	1.4E-02	5.3E-02	
CE	G	2.7E-01	3.3E-01	1.7E-01	2.6	1.2E-01	7	0	2.2E-02	8.7E-01	
FU		3.6E+00	9.0E-01	3.4E+00	1.3	3.4E+00	10	0	2.5E+00	5.3E+00	
LU		1.9E+00	1.6E+00	1.4E+00	2.1	1.2E+00	14	0	1.8E-01	5.0E+00	
MU	M	8.6E-02	6.6E-02	6.8E-02	2.0	6.2E-02	7	0	5.0E-02	2.4E-01	
MU	B	2.5E-01	1.2E-01	2.3E-01	1.6	2.7E-01	7	0	7.9E-02	4.5E-01	
MU	L	3.6E-02	3.7E-02	2.6E-02	2.3	2.5E-02	7	0	1.1E-02	1.2E-01	
MU	G	4.4E-01	3.8E-01	3.4E-01	2.1	4.4E-01	2	0	1.7E-01	7.2E-01	
PI		1.6E+00	9.6E-01	1.3E+00	1.8	1.6E+00	10	0	9.2E-02	2.9E+00	
PL	M	1.3E-01	1.3E-01	9.0E-02	2.3	8.0E-02	10	0	5.1E-02	4.6E-01	
PL	B	5.7E-02	2.2E-02	5.3E-02	1.5	5.6E-02	10	0	1.9E-02	9.9E-02	
PL	L	3.1E-01	1.1E-01	2.9E-01	1.4	2.8E-01	10	0	1.4E-01	5.4E-01	
PL	G	2.6E-01	1.5E-01	2.3E-01	1.7	2.2E-01	10	0	9.8E-02	4.9E-01	
PO		1.2E+00	4.3E-01	1.1E+00	1.4	1.0E+00	10	0	5.7E-01	1.8E+00	
RA	M	8.7E-02	1.6E-01	4.2E-02	3.4	3.5E-02	8	0	1.6E-02	4.8E-01	6.8E+00*
RA	B	4.8E-02	5.2E-02	3.2E-02	2.4	3.0E-02	9	0	1.4E-02	1.7E-01	
RA	L	3.5E-02	1.3E-02	3.3E-02	1.4	3.0E-02	9	1	2.5E-02	5.8E-02	
RA	G	1.3E-01	1.9E-01	7.5E-02	2.9	2.9E-02	3	1	1.6E-02	3.5E-01	
RA	E1	2.2E-02	1.6E-03	2.2E-02	1.1	2.2E-02	2	0	2.1E-02	2.3E-02	
RA	E2	9.8E-01	7.1E-01	7.9E-01	1.9	9.0E-01	6	0	2.5E-01	1.8E+00	
RA	TAD	2.3E+00	5.8E-01	2.2E+00	1.3	2.2E+00	4	0	1.8E+00	3.1E+00	
SA	M	2.4E-02	8.5E-03	2.2E-02	1.4	2.1E-02	9	0	1.4E-02	4.1E-02	1.1E+00**
SA	B	6.3E-02	2.3E-02	5.9E-02	1.4	6.9E-02	10	0	2.8E-02	8.9E-02	
SA	L	7.5E-02	2.2E-02	7.2E-02	1.3	7.3E-02	10	0	4.7E-02	1.1E-01	
SA	G	4.0E-02	5.7E-03	4.0E-02	1.2	4.0E-02	2	0	3.6E-02	4.4E-02	

Comments: *RA3, **SA2

P (phosphorus)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	1.1E+04	6.1E+02	1.1E+04	1.1	1.1E+04	11	0	9.8E+03	1.2E+04
AN	B	8.0E+04	1.5E+04	7.9E+04	1.2	8.2E+04	11	0	4.9E+04	9.8E+04
AN	L	6.4E+03	5.9E+02	6.4E+03	1.1	6.3E+03	11	0	5.5E+03	7.7E+03
AN	G	1.4E+04	3.3E+03	1.3E+04	1.3	1.3E+04	10	0	9.9E+03	1.9E+04
AP		1.1E+04		1.1E+04		1.1E+04	1	0		
CA	ST	1.2E+04	2.5E+03	1.2E+04	1.2	1.2E+04	10	0	8.2E+03	1.6E+04
CA	HT	1.1E+04	9.3E+02	1.0E+04	1.1	1.1E+04	10	0	8.9E+03	1.1E+04
CE	M	6.6E+03	6.3E+02	6.6E+03	1.1	6.5E+03	11	0	5.8E+03	8.2E+03
CE	B	1.0E+05	1.1E+04	1.0E+05	1.1	1.0E+05	11	0	7.7E+04	1.1E+05
CE	L	1.1E+04	1.6E+03	1.1E+04	1.2	1.2E+04	10	0	8.3E+03	1.3E+04
CE	G	5.6E+03	2.3E+03	5.1E+03	1.5	4.5E+03	7	0	2.1E+03	8.6E+03
FU		8.5E+02	1.6E+02	8.3E+02	1.2	8.0E+02	10	0	6.9E+02	1.2E+03
LU		8.6E+03	1.4E+03	8.5E+03	1.2	8.6E+03	14	0	5.2E+03	1.1E+04
MU	M	1.3E+04	2.9E+03	1.3E+04	1.2	1.4E+04	7	0	9.6E+03	1.7E+04
MU	B	6.0E+04	3.9E+03	6.0E+04	1.1	6.0E+04	7	0	5.5E+04	6.4E+04
MU	L	1.1E+04	1.5E+03	1.1E+04	1.1	1.0E+04	7	0	9.5E+03	1.4E+04
MU	G	8.6E+03	3.0E+03	8.1E+03	1.4	8.6E+03	2	0	6.5E+03	1.1E+04
PI		2.1E+03	3.0E+02	2.1E+03	1.2	2.0E+03	10	0	1.7E+03	2.6E+03
PL	M	1.0E+04	4.8E+02	1.0E+04	1.0	1.0E+04	10	0	9.0E+03	1.1E+04
PL	B	4.8E+04	3.1E+03	4.8E+04	1.1	4.8E+04	10	0	4.3E+04	5.2E+04
PL	L	9.2E+03	3.3E+03	8.6E+03	1.4	9.8E+03	10	0	5.1E+03	1.5E+04
PL	G	1.7E+04	1.3E+03	1.7E+04	1.1	1.7E+04	10	0	1.5E+04	1.9E+04
PO		1.6E+03	3.5E+02	1.6E+03	1.2	1.6E+03	10	0	9.2E+02	2.1E+03
RA	M	1.1E+04	1.7E+03	1.1E+04	1.2	1.1E+04	9	0	9.2E+03	1.5E+04
RA	B	4.8E+04	5.1E+03	4.8E+04	1.1	4.9E+04	9	0	4.1E+04	5.7E+04
RA	L	8.8E+03	2.1E+03	8.5E+03	1.3	8.2E+03	9	0	7.0E+03	1.3E+04
RA	G	1.2E+04	5.2E+03	1.1E+04	1.5	1.5E+04	3	0	6.1E+03	1.6E+04
RA	E1	1.5E+04	3.1E+01	1.5E+04	1.0	1.5E+04	2	0	1.5E+04	1.5E+04
RA	E2	8.8E+03	4.7E+02	8.8E+03	1.1	8.8E+03	6	0	8.1E+03	9.4E+03
RA	TAD	1.2E+04	5.6E+02	1.2E+04	1.0	1.2E+04	4	0	1.1E+04	1.2E+04
SA	M	1.3E+04	4.2E+02	1.3E+04	1.0	1.3E+04	10	0	1.3E+04	1.4E+04
SA	B	3.0E+04	7.9E+03	3.0E+04	1.3	2.9E+04	10	0	2.1E+04	4.7E+04
SA	L	1.3E+04	1.1E+03	1.3E+04	1.1	1.3E+04	10	0	1.1E+04	1.5E+04
SA	G	4.6E+04	1.9E+03	4.6E+04	1.0	4.6E+04	2	0	4.5E+04	4.8E+04

Pb (lead)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	2.5E-02	3.4E-02	1.5E-02	2.7	7.9E-03	11	1	1.1E-03	1.2E-01	
AN	B	5.1E-01	4.6E-01	3.8E-01	2.2	2.6E-01	11	0	1.0E-01	1.5E+00	
AN	L	7.0E-02	1.1E-01	3.7E-02	3.1	2.8E-02	11	0	8.5E-03	3.8E-01	
AN	G	1.6E-01	1.4E-01	1.2E-01	2.1	1.2E-01	9	0	3.3E-02	4.3E-01	6.0E+00*
AP		4.4E-01		4.4E-01		4.4E-01	1	0			
CA	ST	1.3E-01	6.1E-02	1.2E-01	1.6	1.1E-01	10	0	7.3E-02	2.5E-01	
CA	HT	3.3E-01	1.3E-01	3.0E-01	1.5	3.0E-01	10	0	1.4E-01	5.4E-01	
CE	M	1.3E-01	1.4E-01	9.2E-02	2.4	8.0E-02	9	0	8.8E-03	3.8E-01	1.2E+02, 8.5E+01**
CE	B	2.1E-01	1.1E-01	1.8E-01	1.7	1.8E-01	11	0	7.9E-02	4.8E-01	
CE	L	3.3E-02	2.5E-02	2.7E-02	2.0	2.7E-02	10	0	1.6E-02	1.0E-01	
CE	G	1.2E-01	1.1E-01	8.4E-02	2.2	7.2E-02	7	0	9.2E-03	2.7E-01	
FU		2.3E-01	1.4E-01	2.0E-01	1.7	1.8E-01	10	0	9.0E-02	5.0E-01	
LU		6.8E+00	7.1E+00	4.7E+00	2.4	4.0E+00	14	0	4.8E-01	2.6E+01	
MU	M	6.8E-01	5.2E-01	5.4E-01	2.0	5.3E-01	7	0	1.4E-01	1.7E+00	
MU	B	4.0E+00	2.1E+00	3.5E+00	1.6	3.2E+00	7	0	1.8E+00	8.2E+00	
MU	L	1.4E+00	9.3E-01	1.1E+00	1.9	9.2E-01	7	0	4.3E-01	3.1E+00	
MU	G	4.8E-01	5.6E-01	3.1E-01	2.5	4.8E-01	2	0	8.4E-02	8.7E-01	
PI		1.8E-02	8.7E-03	1.6E-02	1.6	1.7E-02	10	0	8.4E-03	3.8E-02	
PL	M	1.2E-01	8.6E-02	1.0E-01	1.9	9.0E-02	10	0	1.6E-02	2.5E-01	
PL	B	3.3E-01	2.4E-01	2.7E-01	1.9	3.0E-01	10	0	9.2E-02	9.4E-01	
PL	L	2.9E-01	2.0E-01	2.4E-01	1.9	2.4E-01	10	0	7.6E-02	7.1E-01	
PL	G	6.3E-02	4.6E-02	5.1E-02	1.9	4.6E-02	10	0	2.3E-02	1.7E-01	
PO		1.2E-01	8.3E-02	9.5E-02	1.9	9.0E-02	10	0	4.7E-02	3.1E-01	
RA	M	4.3E-02	4.5E-02	3.0E-02	2.4	2.6E-02	9	1	2.0E-03	1.4E-01	
RA	B	9.2E-02	9.1E-02	6.5E-02	2.3	5.2E-02	9	0	2.4E-02	3.1E-01	
RA	L	1.5E-02	1.6E-02	1.1E-02	2.4	8.2E-03	9	1	2.9E-03	4.6E-02	
RA	G	3.9E-02	4.9E-02	2.4E-02	2.7	1.1E-02	3	0	1.0E-02	9.6E-02	
RA	E1	1.5E-02	6.6E-04	1.5E-02	1.0	1.5E-02	2	0	1.4E-02	1.5E-02	
RA	E2	7.1E-01	4.5E-01	5.9E-01	1.8	6.4E-01	5	0	2.0E-01	1.2E+00	2.1E+01***
RA	TAD	5.5E+00	2.3E+00	5.1E+00	1.5	6.2E+00	4	0	2.3E+00	7.5E+00	
SA	M	4.6E-02	1.7E-02	4.3E-02	1.4	5.1E-02	10	0	1.6E-02	7.0E-02	
SA	B	3.5E-01	2.3E-01	2.9E-01	1.8	2.4E-01	10	0	1.7E-01	8.8E-01	
SA	L	1.2E-01	6.4E-02	1.1E-01	1.6	9.3E-02	10	0	6.9E-02	2.3E-01	
SA	G	2.9E-02	6.6E-03	2.8E-02	1.3	2.9E-02	2	0	2.4E-02	3.4E-02	

Comments: *AN1, **CE10 and CE9, *** RA12

Pr (prasedynium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	2.0E-04	9.5E-05	1.8E-04	1.6	2.0E-04	10	0	6.3E-05	3.2E-04	2.6E-03*
AN	B	5.0E-03	4.4E-03	3.8E-03	2.1	2.5E-03	11	0	7.5E-04	1.3E-02	
AN	L	5.1E-03	5.6E-03	3.4E-03	2.4	2.9E-03	11	0	5.1E-04	1.6E-02	
AN	G	1.4E-02	1.9E-02	8.2E-03	2.8	6.7E-03	10	0	5.4E-04	6.2E-02	
AP		2.3E-02		2.3E-02		2.3E-02	1	0			
CA	ST	2.9E-02	1.8E-02	2.4E-02	1.8	2.6E-02	10	0	1.2E-02	7.6E-02	
CA	HT	3.2E-02	1.3E-02	2.9E-02	1.5	2.6E-02	10	0	2.1E-02	6.1E-02	
CE	M	4.3E-03	5.8E-03	2.5E-03	2.8	2.7E-03	11	0	1.8E-04	1.9E-02	
CE	B	8.3E-03	4.6E-03	7.2E-03	1.7	7.7E-03	11	0	2.6E-03	1.9E-02	
CE	L	3.0E-03	3.4E-03	2.0E-03	2.5	1.5E-03	10	0	7.4E-04	1.1E-02	
CE	G	3.2E-03	1.9E-03	2.8E-03	1.7	3.5E-03	7	0	9.1E-04	5.7E-03	
FU		1.0E-01	5.4E-02	9.3E-02	1.6	8.5E-02	10	0	4.1E-02	2.2E-01	
LU		5.3E-01	4.3E-01	4.1E-01	2.0	4.6E-01	14	0	1.9E-02	1.4E+00	
MU	M	2.5E-03	1.1E-03	2.3E-03	1.5	2.7E-03	7	0	1.3E-03	4.2E-03	
MU	B	8.0E-03	5.6E-03	6.5E-03	1.9	7.0E-03	7	0	2.4E-03	1.9E-02	
MU	L	9.5E-04	6.2E-04	7.9E-04	1.8	7.8E-04	7	0	3.4E-04	2.0E-03	
MU	G	1.2E-03	8.1E-04	9.7E-04	1.9	1.2E-03	2	0	6.1E-04	1.8E-03	
PI		1.6E-03	6.1E-04	1.4E-03	1.5	1.5E-03	10	0	8.1E-04	2.9E-03	
PL	M	1.1E-03	6.4E-04	9.2E-04	1.7	9.0E-04	10	0	3.4E-04	2.4E-03	
PL	B	1.1E-03	8.7E-04	8.4E-04	2.0	8.1E-04	10	0	4.1E-04	3.0E-03	
PL	L	3.3E-03	2.3E-03	2.7E-03	1.9	2.5E-03	10	0	1.3E-03	8.5E-03	
PL	G	1.6E-03	1.4E-03	1.2E-03	2.1	1.4E-03	10	1	1.1E-04	3.9E-03	
PO		3.9E-03	2.1E-03	3.5E-03	1.6	4.0E-03	9	0	1.5E-03	7.8E-03	8.0E-02**
RA	M	2.5E-03	3.4E-03	1.4E-03	2.8	1.0E-03	8	0	2.4E-04	1.1E-02	5.0E-02***
RA	B	1.4E-03	1.7E-03	8.4E-04	2.7	5.7E-04	9	0	3.3E-04	5.2E-03	
RA	L	9.7E-04	7.0E-04	7.9E-04	1.9	6.2E-04	9	0	3.5E-04	2.0E-03	
RA	G	3.3E-04	1.9E-04	2.8E-04	1.7	4.1E-04	3	2	1.1E-04	4.7E-04	
RA	E1	6.4E-04	2.1E-04	6.1E-04	1.4	6.4E-04	2	0	4.9E-04	7.8E-04	
RA	E2	8.9E-02	8.5E-02	6.4E-02	2.2	5.8E-02	6	0	1.3E-02	2.4E-01	
RA	TAD	1.0E+00	6.3E-01	8.8E-01	1.8	7.7E-01	4	0	6.2E-01	2.0E+00	
SA	M	1.5E-03	9.9E-04	1.3E-03	1.8	1.1E-03	10	0	4.5E-04	3.3E-03	
SA	B	6.2E-03	3.6E-03	5.4E-03	1.7	6.0E-03	10	0	1.5E-03	1.3E-02	
SA	L	7.2E-02	4.3E-02	6.2E-02	1.7	5.9E-02	10	0	2.4E-02	1.6E-01	
SA	G	7.6E-04	5.1E-04	6.3E-04	1.8	7.6E-04	2	0	4.0E-04	1.1E-03	

Comments: *AN1, **PO9, ***RA3

Pt (platinum)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M					1.1E-04	11	9		
AN	B					1.0E-04	11	9		
AN	L					1.1E-04	11	7		
AN	G					1.5E-04	10	8		
AP		4.4E-04		4.4E-04		4.4E-04	1	0		
CA	ST					1.1E-04	10	7		
CA	HT					1.0E-04	10	10		
CE	M					1.1E-04	11	9		
CE	B					1.1E-04	11	11		
CE	L					1.1E-04	10	7		
CE	G					1.1E-04	7	6		
FU						1.0E-04	10	9		
LU						1.1E-04	14	14		
MU	M					1.3E-04	7	6		
MU	B					1.7E-04	7	5		
MU	L					1.4E-04	7	7		
MU	G					2.6E-04	2	2		
PI						1.0E-04	10	10		
PL	M					1.0E-04	10	9		
PL	B					1.0E-04	10	8		
PL	L					1.1E-04	10	7		
PL	G					1.2E-04	10	9		
PO						1.0E-04	10	9		
RA	M					1.1E-04	9	9		
RA	B					1.5E-04	9	7		
RA	L					1.3E-04	9	9		
RA	G					3.8E-04	3	3		
RA	E1					9.8E-05	2	2		
RA	E2					1.1E-04	6	4		
RA	TAD					1.1E-04	4	4		
SA	M					1.1E-04	10	10		
SA	B					1.1E-04	10	7		
SA	L					2.9E-04	10	10		
SA	G					1.0E-04	2	2		

Has been excluded from further data treatment

Rb (rubidium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	4.0E+01	2.4E+01	3.4E+01	1.7	3.4E+01	11	0	6.6E+00	1.0E+02
AN	B	7.5E+00	4.8E+00	6.3E+00	1.8	5.8E+00	11	0	1.4E+00	1.8E+01
AN	L	2.2E+01	1.5E+01	1.8E+01	1.9	2.2E+01	11	0	2.7E+00	5.7E+01
AN	G	4.4E+01	2.9E+01	3.6E+01	1.8	4.0E+01	10	0	6.1E+00	1.1E+02
AP		1.5E+01		1.5E+01		1.5E+01	1	0		
CA	ST	2.2E+00	7.2E-01	2.1E+00	1.4	2.0E+00	10	0	1.6E+00	4.1E+00
CA	HT	7.3E-01	1.5E-01	7.2E-01	1.2	7.3E-01	10	0	5.0E-01	9.6E-01
CE	M	3.6E+01	5.2E+00	3.6E+01	1.2	3.4E+01	11	0	2.8E+01	4.6E+01
CE	B	1.1E+00	4.8E-01	1.1E+00	1.5	1.1E+00	11	0	4.9E-01	2.0E+00
CE	L	5.0E+01	1.3E+01	4.8E+01	1.3	5.2E+01	10	0	3.1E+01	6.6E+01
CE	G	2.8E+01	1.2E+01	2.5E+01	1.5	2.4E+01	7	0	9.8E+00	4.4E+01
FU		9.1E+00	1.6E+00	9.0E+00	1.2	8.9E+00	10	0	6.8E+00	1.2E+01
LU		7.7E+00	2.0E+00	7.4E+00	1.3	7.7E+00	14	0	4.3E+00	1.2E+01
MU	M	2.9E+01	1.3E+01	2.6E+01	1.6	2.2E+01	7	0	1.7E+01	5.5E+01
MU	B	1.1E+01	4.4E+00	1.0E+01	1.5	1.0E+01	7	0	6.7E+00	1.9E+01
MU	L	3.4E+01	1.5E+01	3.1E+01	1.5	2.8E+01	7	0	2.1E+01	6.4E+01
MU	G	2.2E+01	1.0E+01	2.0E+01	1.5	2.2E+01	2	0	1.5E+01	3.0E+01
PI		3.3E+01	9.0E+00	3.1E+01	1.3	3.3E+01	10	0	2.0E+01	4.7E+01
PL	M	3.0E+00	2.7E-01	3.0E+00	1.1	3.0E+00	10	0	2.6E+00	3.5E+00
PL	B	1.6E+00	1.6E-01	1.6E+00	1.1	1.6E+00	10	0	1.3E+00	1.9E+00
PL	L	1.9E+00	6.2E-01	1.8E+00	1.4	2.0E+00	10	0	1.0E+00	3.1E+00
PL	G	3.5E+00	2.9E-01	3.5E+00	1.1	3.5E+00	10	0	2.9E+00	3.8E+00
PO		3.5E+01	8.8E+00	3.4E+01	1.3	3.9E+01	10	0	1.2E+01	4.1E+01
RA	M	2.9E+01	4.5E+00	2.8E+01	1.2	2.8E+01	9	0	2.5E+01	3.7E+01
RA	B	1.2E+01	3.3E+00	1.2E+01	1.3	1.2E+01	9	0	7.6E+00	1.9E+01
RA	L	2.7E+01	5.9E+00	2.6E+01	1.2	2.7E+01	9	0	1.8E+01	3.8E+01
RA	G	2.7E+01	1.1E+01	2.5E+01	1.5	2.7E+01	3	0	1.6E+01	3.8E+01
RA	E1	1.0E+01	1.4E+00	1.0E+01	1.1	1.0E+01	2	0	9.4E+00	1.1E+01
RA	E2	8.8E+00	4.1E+00	8.0E+00	1.6	8.9E+00	6	0	4.4E+00	1.5E+01
RA	TAD	2.6E+01	7.5E+00	2.5E+01	1.3	2.4E+01	4	0	1.9E+01	3.6E+01
SA	M	3.6E+01	4.5E+00	3.6E+01	1.1	3.7E+01	10	0	2.8E+01	4.3E+01
SA	B	2.4E+01	4.5E+00	2.3E+01	1.2	2.5E+01	10	0	1.5E+01	2.9E+01
SA	L	2.8E+01	4.7E+00	2.7E+01	1.2	2.8E+01	10	0	2.0E+01	3.7E+01
SA	G	1.9E+01	3.7E+00	1.8E+01	1.2	1.9E+01	2	0	1.6E+01	2.1E+01

S (sulphur)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	9.3E+03	5.4E+02	9.3E+03	1.1	9.1E+03	11	0	8.7E+03	1.0E+04
AN	B	2.7E+03	7.6E+02	2.6E+03	1.3	2.7E+03	11	0	1.5E+03	3.8E+03
AN	L	4.8E+03	5.3E+02	4.8E+03	1.1	4.9E+03	11	0	3.9E+03	5.6E+03
AN	G	8.6E+03	8.2E+02	8.6E+03	1.1	8.7E+03	10	0	7.5E+03	9.6E+03
AP		6.4E+03		6.4E+03		6.4E+03	1	0		
CA	ST	1.1E+04	1.9E+03	1.1E+04	1.2	1.0E+04	10	0	9.4E+03	1.6E+04
CA	HT	2.7E+03	6.3E+02	2.6E+03	1.3	2.7E+03	10	0	1.8E+03	3.6E+03
CE	M	7.3E+03	7.5E+02	7.2E+03	1.1	7.6E+03	11	0	5.9E+03	8.1E+03
CE	B	7.8E+02	1.2E+02	7.7E+02	1.2	7.4E+02	11	0	6.4E+02	1.0E+03
CE	L	7.5E+03	9.4E+02	7.5E+03	1.1	8.1E+03	10	0	5.8E+03	8.6E+03
CE	G	4.5E+03	2.1E+03	4.1E+03	1.5	4.3E+03	7	0	2.3E+03	7.4E+03
FU		2.4E+04	2.8E+03	2.4E+04	1.1	2.5E+04	10	0	2.0E+04	3.0E+04
LU		7.9E+03	1.4E+03	7.8E+03	1.2	8.3E+03	14	0	3.9E+03	9.4E+03
MU	M	1.2E+04	1.3E+03	1.2E+04	1.1	1.2E+04	7	0	1.0E+04	1.4E+04
MU	B	5.7E+03	6.7E+02	5.7E+03	1.1	5.7E+03	7	0	4.5E+03	6.5E+03
MU	L	9.5E+03	7.9E+02	9.5E+03	1.1	9.6E+03	7	0	8.1E+03	1.1E+04
MU	G	8.4E+03	4.1E+03	7.5E+03	1.6	8.4E+03	2	0	5.5E+03	1.1E+04
PI		8.7E+02	1.1E+02	8.7E+02	1.1	8.6E+02	10	0	6.8E+02	1.0E+03
PL	M	1.1E+04	8.0E+02	1.1E+04	1.1	1.0E+04	10	0	1.0E+04	1.2E+04
PL	B	5.7E+03	5.1E+02	5.7E+03	1.1	5.8E+03	10	0	4.9E+03	6.7E+03
PL	L	7.7E+03	2.5E+03	7.4E+03	1.4	7.8E+03	10	0	4.5E+03	1.3E+04
PL	G	1.4E+04	1.6E+03	1.4E+04	1.1	1.4E+04	10	0	1.2E+04	1.6E+04
PO		8.3E+02	1.0E+02	8.2E+02	1.1	8.3E+02	10	0	6.3E+02	1.0E+03
RA	M	7.7E+03	1.9E+02	7.7E+03	1.0	7.7E+03	9	0	7.5E+03	8.0E+03
RA	B	5.0E+03	4.2E+02	4.9E+03	1.1	4.9E+03	9	0	4.3E+03	5.6E+03
RA	L	5.1E+03	1.4E+03	4.9E+03	1.3	4.8E+03	9	0	3.9E+03	8.2E+03
RA	G	5.0E+03	1.9E+03	4.7E+03	1.4	5.2E+03	3	0	3.1E+03	6.8E+03
RA	E1	6.3E+03	6.7E+01	6.3E+03	1.0	6.3E+03	2	0	6.2E+03	6.3E+03
RA	E2	1.1E+04	6.1E+02	1.1E+04	1.1	1.1E+04	6	0	1.0E+04	1.2E+04
RA	TAD	7.6E+03	7.0E+02	7.6E+03	1.1	7.8E+03	4	0	6.6E+03	8.2E+03
SA	M	1.1E+04	6.8E+02	1.1E+04	1.1	1.1E+04	10	0	1.0E+04	1.2E+04
SA	B	6.7E+03	5.9E+02	6.7E+03	1.1	6.8E+03	10	0	5.5E+03	7.7E+03
SA	L	8.8E+03	1.3E+03	8.7E+03	1.2	8.9E+03	10	0	7.0E+03	1.1E+04
SA	G	4.1E+03	3.2E+01	4.1E+03	1.0	4.1E+03	2	0	4.1E+03	4.1E+03

Sb (antimony)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					5.2E-04	11	6			
AN	B	2.5E-03	1.5E-03	2.1E-03	1.7	1.8E-03	11	1	5.3E-04	5.6E-03	
AN	L	2.3E-03	1.3E-03	2.0E-03	1.7	2.1E-03	11	1	5.0E-04	5.0E-03	
AN	G	9.0E-03	1.1E-02	5.5E-03	2.7	4.8E-03	10	0	1.8E-03	4.0E-02	
AP		3.9E-02		3.9E-02		3.9E-02	1	0			
CA	ST	1.3E-02	4.8E-03	1.2E-02	1.4	1.1E-02	10	0	7.7E-03	2.4E-02	
CA	HT	5.3E-03	1.2E-03	5.2E-03	1.2	5.3E-03	10	0	3.7E-03	7.4E-03	
CE	M	5.5E-03	2.8E-03	4.9E-03	1.6	5.0E-03	9	0	1.6E-03	1.2E-02	1.2E+00, 7.4E-01*
CE	B	2.1E-03	2.8E-03	1.3E-03	2.7	1.2E-03	11	5	4.8E-04	1.0E-02	
CE	L	2.2E-03	1.2E-03	1.9E-03	1.7	1.7E-03	10	1	5.3E-04	3.9E-03	
CE	G	5.9E-03	3.4E-03	5.1E-03	1.7	6.7E-03	7	0	1.1E-03	1.0E-02	
FU		3.5E-02	1.1E-02	3.3E-02	1.3	3.5E-02	10	0	2.2E-02	5.3E-02	
LU		1.7E-02	8.8E-03	1.5E-02	1.6	1.7E-02	14	0	5.3E-03	3.3E-02	
MU	M	1.9E-03	9.0E-04	1.7E-03	1.6	2.0E-03	7	2	6.4E-04	2.9E-03	
MU	B	6.7E-03	7.2E-03	4.5E-03	2.4	4.2E-03	7	0	3.2E-03	2.3E-02	
MU	L	1.8E-03	6.6E-04	1.7E-03	1.4	1.7E-03	7	1	8.0E-04	2.8E-03	
MU	G					2.9E-03	2	1			
PI		1.7E-03	7.6E-04	1.5E-03	1.5	1.5E-03	10	1	5.0E-04	3.3E-03	
PL	M	6.1E-03	2.2E-03	5.7E-03	1.4	5.7E-03	10	0	1.9E-03	9.5E-03	
PL	B	7.9E-03	2.2E-03	7.6E-03	1.3	8.4E-03	10	0	3.9E-03	1.1E-02	
PL	L	9.5E-03	2.5E-03	9.1E-03	1.3	9.9E-03	10	0	5.2E-03	1.4E-02	
PL	G	1.1E-02	5.3E-03	9.4E-03	1.6	9.7E-03	10	0	3.9E-03	1.9E-02	
PO		3.2E-03	8.9E-04	3.1E-03	1.3	2.9E-03	10	0	2.5E-03	5.5E-03	
RA	M	2.7E-03	1.8E-03	2.3E-03	1.8	2.4E-03	9	2	6.6E-04	6.4E-03	
RA	B	3.2E-03	3.2E-03	2.2E-03	2.3	1.9E-03	9	2	6.1E-04	1.0E-02	
RA	L	2.2E-03	2.1E-03	1.6E-03	2.2	1.8E-03	9	4	6.0E-04	6.4E-03	
RA	G					1.9E-03	3	3			
RA	E1	2.9E-03	7.4E-04	2.9E-03	1.3	2.9E-03	2	0	2.4E-03	3.5E-03	
RA	E2	2.1E-02	1.4E-02	1.8E-02	1.8	2.1E-02	6	0	4.4E-03	4.5E-02	
RA	TAD	6.3E-02	2.7E-02	5.8E-02	1.5	6.1E-02	4	0	3.2E-02	9.7E-02	
SA	M	1.5E-03	5.4E-04	1.4E-03	1.4	1.5E-03	10	2	5.2E-04	2.2E-03	
SA	B	1.9E-03	9.5E-04	1.7E-03	1.6	1.9E-03	10	2	5.3E-04	3.5E-03	
SA	L					1.7E-03	10	7			
SA	G	1.3E-03	2.1E-04	1.3E-03	1.2	1.3E-03	2	0	1.1E-03	1.4E-03	

Comments: *RA10 and RA9

Sc (scandium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					4.0E-04	11	8			
AN	B	1.1E-02	4.0E-03	1.0E-02	1.4	9.9E-03	11	0	6.2E-03	2.0E-02	
AN	L	1.0E-03	6.8E-04	8.2E-04	1.9	9.7E-04	11	4	3.8E-04	2.4E-03	
AN	G	2.0E-02	2.1E-02	1.4E-02	2.4	1.3E-02	10	1	3.6E-04	6.0E-02	
AP		2.2E-02		2.2E-02		2.2E-02	1	0			
CA	ST	1.9E-02	1.8E-02	1.3E-02	2.3	1.0E-02	10	0	3.4E-03	5.5E-02	
CA	HT	3.5E-02	1.3E-02	3.2E-02	1.5	2.8E-02	10	0	2.2E-02	5.7E-02	
CE	M	5.2E-03	8.7E-03	2.6E-03	3.2	1.3E-03	11	4	3.8E-04	2.9E-02	
CE	B	3.9E-02	1.7E-02	3.6E-02	1.5	4.0E-02	11	0	2.0E-02	7.9E-02	
CE	L					4.0E-04	10	8			
CE	G	2.5E-03	1.4E-03	2.1E-03	1.7	2.4E-03	7	1	4.1E-04	5.0E-03	
FU		1.4E-01	1.0E-01	1.2E-01	1.9	1.2E-01	10	0	2.2E-02	3.2E-01	
LU		6.6E-01	6.1E-01	4.9E-01	2.2	3.8E-01	14	0	7.7E-03	1.7E+00	
MU	M	2.8E-03	2.1E-03	2.3E-03	1.9	2.0E-03	7	0	1.7E-03	7.5E-03	
MU	B	8.0E-03	2.7E-03	7.6E-03	1.4	8.6E-03	7	0	5.1E-03	1.2E-02	
MU	L					5.3E-04	7	6			
MU	G	3.8E-03	3.9E-03	2.7E-03	2.3	3.8E-03	2	1	1.1E-03	6.6E-03	
PI		1.6E-03	1.0E-03	1.4E-03	1.8	1.5E-03	10	2	3.8E-04	4.0E-03	
PL	M					6.0E-04	10	5			
PL	B	4.5E-03	1.4E-03	4.3E-03	1.4	4.2E-03	10	0	3.3E-03	8.0E-03	
PL	L	5.7E-03	8.6E-03	3.1E-03	3.0	1.7E-03	10	4	3.6E-04	2.6E-02	
PL	G	1.4E-03	7.8E-04	1.2E-03	1.7	1.1E-03	10	4	3.5E-04	2.8E-03	
PO		2.5E-03	1.3E-03	2.3E-03	1.6	1.9E-03	9	0	1.6E-03	5.1E-03	8.4E-02*
RA	M	2.1E-03	9.0E-04	1.9E-03	1.5	1.7E-03	8	1	1.1E-03	3.4E-03	1.2E-01**
RA	B	4.7E-03	4.2E-03	3.5E-03	2.2	3.3E-03	9	0	2.7E-03	1.6E-02	
RA	L					4.9E-04	9	9			
RA	G					1.4E-03	3	3			
RA	E1					3.7E-04	2	2			
RA	E2	9.2E-02	8.7E-02	6.7E-02	2.2	5.1E-02	6	0	9.6E-03	2.2E-01	
RA	TAD	6.1E-01	4.9E-01	4.8E-01	2.0	4.1E-01	4	0	2.8E-01	1.3E+00	
SA	M	2.8E-03	2.2E-03	2.2E-03	2.0	1.7E-03	10	0	8.3E-04	7.0E-03	
SA	B	9.2E-03	7.8E-03	7.0E-03	2.1	6.3E-03	10	0	2.7E-03	2.5E-02	
SA	L					1.4E-03	9	5			
SA	G	1.0E-03	8.8E-04	7.5E-04	2.1	1.0E-03	2	1	3.8E-04	1.6E-03	

Comments: *PO10, **RA3

Se (selenium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	1.4E+00	3.4E-01	1.3E+00	1.3	1.4E+00	11	0	9.3E-01	2.1E+00
AN	B	3.8E-01	1.8E-01	3.4E-01	1.6	3.4E-01	11	0	1.9E-01	7.8E-01
AN	L	2.3E+00	8.6E-01	2.2E+00	1.4	2.4E+00	11	0	1.0E+00	3.9E+00
AN	G	3.3E+00	9.9E-01	3.2E+00	1.3	3.7E+00	10	0	1.8E+00	4.3E+00
AP		8.4E-02		8.4E-02		8.4E-02	1	0		
CA	ST	3.4E+00	5.3E-01	3.3E+00	1.2	3.3E+00	10	0	2.7E+00	4.5E+00
CA	HT	4.9E-01	2.1E-01	4.5E-01	1.5	4.5E-01	10	0	2.0E-01	8.7E-01
CE	M	2.7E-01	7.9E-02	2.6E-01	1.3	2.9E-01	11	0	1.4E-01	3.8E-01
CE	B	3.1E-02	5.5E-03	3.0E-02	1.2	3.1E-02	11	0	2.3E-02	4.0E-02
CE	L	7.8E-01	2.9E-01	7.3E-01	1.4	6.8E-01	10	0	4.2E-01	1.4E+00
CE	G	3.7E-01	1.9E-01	3.2E-01	1.6	2.9E-01	7	0	1.8E-01	7.3E-01
FU		7.6E-02	3.7E-02	6.9E-02	1.6	7.8E-02	10	0	3.1E-02	1.3E-01
LU		9.4E+00	5.5E+00	8.2E+00	1.7	9.1E+00	14	0	1.1E+00	2.3E+01
MU	M	4.6E-01	1.2E-01	4.5E-01	1.3	5.2E-01	7	0	2.6E-01	6.1E-01
MU	B	3.8E-01	7.9E-02	3.7E-01	1.2	3.9E-01	7	0	2.6E-01	5.2E-01
MU	L	2.7E+00	9.4E-01	2.6E+00	1.4	3.0E+00	7	0	9.1E-01	3.6E+00
MU	G	2.0E+00	5.1E-01	2.0E+00	1.3	2.0E+00	2	0	1.7E+00	2.4E+00
PI						5.9E-03	10	10		
PL	M	2.2E+00	1.8E+00	1.7E+00	2.0	1.7E+00	10	0	1.3E+00	7.4E+00
PL	B	1.3E+00	1.0E+00	1.0E+00	2.0	9.7E-01	10	0	6.7E-01	4.1E+00
PL	L	5.8E+00	1.7E+00	5.6E+00	1.3	5.4E+00	10	0	3.5E+00	9.2E+00
PL	G	3.7E+00	8.9E-01	3.6E+00	1.3	3.3E+00	10	0	2.8E+00	5.8E+00
PO						6.1E-03	10	8		
RA	M	3.9E-01	1.4E-01	3.7E-01	1.4	3.1E-01	9	0	2.8E-01	5.8E-01
RA	B	2.6E-01	8.9E-02	2.5E-01	1.4	2.3E-01	9	0	1.6E-01	4.1E-01
RA	L	1.1E+00	5.4E-01	1.0E+00	1.6	9.1E-01	9	0	6.1E-01	2.1E+00
RA	G	1.5E+00	3.4E-01	1.5E+00	1.2	1.6E+00	3	0	1.1E+00	1.7E+00
RA	E1	1.3E+00	4.5E-01	1.3E+00	1.4	1.3E+00	2	0	1.0E+00	1.7E+00
RA	E2	1.1E+00	2.8E-01	1.1E+00	1.3	1.1E+00	6	0	7.9E-01	1.5E+00
RA	TAD	1.4E+00	1.7E-01	1.4E+00	1.1	1.4E+00	4	0	1.2E+00	1.6E+00
SA	M	4.0E+00	8.8E-01	3.9E+00	1.2	4.0E+00	10	0	2.3E+00	5.6E+00
SA	B	2.8E+00	5.6E-01	2.8E+00	1.2	2.9E+00	10	0	1.9E+00	3.6E+00
SA	L	2.5E+01	1.5E+01	2.1E+01	1.8	2.1E+01	10	0	1.1E+01	6.4E+01
SA	G	1.8E+00	5.9E-02	1.8E+00	1.0	1.8E+00	2	0	1.8E+00	1.9E+00

Si (silicon)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	1.6E+01	1.9E+01	1.1E+01	2.5	1.0E+01	11	3	3.4E+00	6.8E+01	
AN	B	2.6E+01	2.2E+01	2.0E+01	2.1	1.9E+01	10	2	3.3E+00	6.9E+01	3.2E+02*
AN	L	1.3E+01	1.6E+01	8.2E+00	2.6	7.6E+00	11	5	3.4E+00	5.7E+01	
AN	G	2.5E+02	3.2E+02	1.5E+02	2.7	1.5E+02	10	2	3.3E+00	1.1E+03	
AP		4.6E+02		4.6E+02		4.6E+02	1	0			
CA	ST	1.6E+02	1.5E+02	1.1E+02	2.2	8.8E+01	10	0	3.7E+01	4.7E+02	
CA	HT	2.6E+02	1.1E+02	2.4E+02	1.5	2.1E+02	10	0	1.4E+02	4.6E+02	
CE	M	7.1E+01	8.9E+01	4.4E+01	2.6	3.0E+01	11	0	1.0E+01	2.5E+02	
CE	B	6.5E+02	3.0E+02	5.9E+02	1.6	6.3E+02	11	0	2.6E+02	1.4E+03	
CE	L	1.4E+01	8.6E+00	1.2E+01	1.8	1.1E+01	10	0	7.3E+00	3.4E+01	
CE	G	4.3E+01	2.6E+01	3.7E+01	1.7	4.5E+01	7	1	3.7E+00	7.9E+01	
FU		1.1E+03	7.2E+02	8.7E+02	1.9	8.9E+02	10	0	9.1E+01	2.4E+03	
LU		2.6E+03	1.4E+03	2.3E+03	1.7	2.7E+03	14	0	1.1E+02	4.2E+03	
MU	M	3.3E+01	2.2E+01	2.8E+01	1.8	2.6E+01	7	1	4.5E+00	6.4E+01	
MU	B	6.3E+01	3.3E+01	5.5E+01	1.6	5.1E+01	7	0	3.1E+01	1.3E+02	
MU	L	2.0E+01	1.5E+01	1.6E+01	1.9	2.2E+01	7	2	4.8E+00	4.5E+01	
MU	G	3.0E+01	1.8E+01	2.6E+01	1.7	3.0E+01	2	0	1.7E+01	4.3E+01	
PI		6.4E+01	3.9E+01	5.5E+01	1.8	4.8E+01	10	0	2.5E+01	1.3E+02	
PL	M	2.8E+01	1.8E+01	2.4E+01	1.8	2.3E+01	10	0	8.7E+00	5.9E+01	
PL	B	2.3E+01	2.4E+01	1.5E+01	2.4	1.0E+01	10	3	3.4E+00	6.5E+01	
PL	L	5.5E+01	5.6E+01	3.9E+01	2.3	3.9E+01	10	0	8.5E+00	1.8E+02	
PL	G	1.9E+01	9.9E+00	1.7E+01	1.6	1.6E+01	10	2	6.0E+00	4.0E+01	
PO		1.7E+03	6.9E+02	1.5E+03	1.5	1.6E+03	10	0	9.6E+02	3.4E+03	
RA	M	5.2E+02	6.4E+02	3.3E+02	2.6	4.5E+02	9	1	2.6E+01	2.1E+03	
RA	B					5.5E+00	9	7			
RA	L	3.3E+01	3.4E+01	2.3E+01	2.3	1.6E+01	9	4	4.4E+00	1.1E+02	
RA	G					1.3E+01	3	3			
RA	E1	7.5E+00	4.1E-01	7.5E+00	1.1	7.5E+00	2	0	7.2E+00	7.8E+00	
RA	E2	1.2E+03	1.1E+03	8.5E+02	2.2	9.5E+02	6	0	2.3E+02	3.0E+03	
RA	TAD	3.1E+03	5.7E+02	3.0E+03	1.2	3.1E+03	4	0	2.4E+03	3.7E+03	
SA	M	4.2E+01	2.9E+01	3.5E+01	1.8	3.7E+01	10	0	1.2E+01	8.7E+01	
SA	B	7.8E+01	5.7E+01	6.3E+01	1.9	5.9E+01	10	0	1.6E+01	1.8E+02	
SA	L	3.9E+01	5.1E+01	2.3E+01	2.7	2.1E+01	10	3	7.1E+00	1.8E+02	
SA	G	1.7E+01	2.0E+01	1.1E+01	2.5	1.7E+01	2	1	3.4E+00	3.1E+01	

Comments: *AN1

Sm (samarium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					8.9E-05	10	6			
AN	B	3.7E-03	3.4E-03	2.7E-03	2.2	1.9E-03	11	0	6.2E-04	9.4E-03	
AN	L	2.6E-03	2.7E-03	1.8E-03	2.4	1.7E-03	11	0	2.1E-04	7.6E-03	
AN	G	9.8E-03	1.3E-02	6.0E-03	2.7	5.3E-03	10	0	4.3E-04	4.3E-02	
AP		1.6E-02		1.6E-02		1.6E-02	1	0			
CA	ST	1.8E-02	1.1E-02	1.5E-02	1.8	1.7E-02	10	0	6.5E-03	4.6E-02	
CA	HT	2.3E-02	8.9E-03	2.2E-02	1.4	2.0E-02	10	0	1.5E-02	4.1E-02	
CE	M	3.4E-03	4.7E-03	2.0E-03	2.8	1.8E-03	11	0	2.1E-04	1.6E-02	
CE	B	5.8E-03	3.2E-03	5.1E-03	1.7	5.5E-03	11	0	2.8E-03	1.3E-02	
CE	L	1.2E-03	1.5E-03	8.0E-04	2.5	6.8E-04	10	0	3.8E-04	5.3E-03	
CE	G	1.7E-03	1.2E-03	1.4E-03	1.9	1.3E-03	7	0	2.9E-04	3.4E-03	
FU		7.5E-02	3.9E-02	6.6E-02	1.6	6.1E-02	10	0	2.8E-02	1.6E-01	
LU		3.9E-01	3.3E-01	3.0E-01	2.1	3.3E-01	14	0	1.1E-02	1.1E+00	
MU	M	1.4E-03	6.6E-04	1.3E-03	1.5	1.3E-03	7	0	7.2E-04	2.5E-03	
MU	B	4.4E-03	1.7E-03	4.1E-03	1.5	4.3E-03	7	0	1.8E-03	6.7E-03	
MU	L	5.5E-04	2.5E-04	5.0E-04	1.6	5.7E-04	7	0	2.5E-04	8.6E-04	
MU	G	6.7E-04	6.2E-04	4.9E-04	2.2	6.7E-04	2	1	2.3E-04	1.1E-03	
PI		1.1E-03	3.4E-04	1.0E-03	1.4	9.6E-04	10	0	6.4E-04	1.6E-03	
PL	M	8.6E-04	6.9E-04	6.7E-04	2.0	6.8E-04	10	0	2.3E-04	2.5E-03	
PL	B	9.8E-04	6.7E-04	8.0E-04	1.9	7.3E-04	10	0	3.1E-04	2.2E-03	
PL	L	2.0E-03	1.8E-03	1.5E-03	2.2	1.3E-03	10	0	4.9E-04	5.9E-03	
PL	G	9.4E-04	7.2E-04	7.5E-04	2.0	7.7E-04	10	2	1.5E-04	2.3E-03	
PO		3.9E-03	4.8E-03	2.5E-03	2.6	2.4E-03	10	0	1.0E-03	1.7E-02	
RA	M	2.1E-03	2.8E-03	1.3E-03	2.7	6.5E-04	8	0	2.0E-04	8.4E-03	3.8E-02*
RA	B	7.8E-04	1.2E-03	4.4E-04	2.9	4.3E-04	9	4	1.1E-04	3.8E-03	
RA	L	8.8E-04	1.1E-03	5.5E-04	2.6	3.7E-04	9	1	1.3E-04	3.5E-03	
RA	G	1.2E-03	1.5E-03	7.8E-04	2.6	4.3E-04	3	1	3.2E-04	2.9E-03	
RA	E1	5.3E-04	3.4E-04	4.4E-04	1.8	5.3E-04	2	0	2.9E-04	7.6E-04	
RA	E2	6.3E-02	6.1E-02	4.6E-02	2.2	4.0E-02	6	0	8.6E-03	1.6E-01	
RA	TAD	7.2E-01	4.3E-01	6.2E-01	1.7	5.6E-01	4	0	4.1E-01	1.4E+00	
SA	M	1.3E-03	9.8E-04	1.0E-03	2.0	8.4E-04	10	0	3.6E-04	3.3E-03	
SA	B	5.0E-03	3.1E-03	4.2E-03	1.8	5.0E-03	10	0	8.3E-04	1.1E-02	
SA	L	2.2E-02	1.4E-02	1.8E-02	1.8	1.9E-02	10	0	6.4E-03	5.2E-02	
SA	G	7.4E-04	3.7E-04	6.6E-04	1.6	7.4E-04	2	0	4.8E-04	1.0E-03	

Comments: *RA3

Sn (Tin)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					1.3E-03	11	8			
AN	B					1.3E-03	10	6			
AN	L					1.3E-03	11	7			
AN	G	1.0E-02	8.9E-03	7.8E-03	2.1	6.2E-03	10	1	4.3E-03	3.2E-02	
AP		1.3E-01		1.3E-01		1.3E-01	1	0			
CA	ST	1.3E-02	8.4E-03	1.1E-02	1.8	1.2E-02	10	0	6.1E-03	3.5E-02	
CA	HT	7.0E-03	2.7E-03	6.5E-03	1.5	6.6E-03	10	0	3.5E-03	1.2E-02	
CE	M	1.4E-02	1.6E-02	9.1E-03	2.5	7.6E-03	11	4	1.3E-03	4.6E-02	
CE	B	5.5E-03	4.7E-03	4.1E-03	2.1	5.2E-03	11	2	1.2E-03	1.8E-02	
CE	L					2.2E-03	10	5			
CE	G	2.2E-02	1.9E-02	1.6E-02	2.1	1.9E-02	7	1	1.2E-03	5.4E-02	
FU		2.3E-02	1.6E-02	1.9E-02	1.8	1.9E-02	10	0	6.5E-03	5.1E-02	
LU		6.2E-02	4.7E-02	5.0E-02	2.0	4.9E-02	14	0	8.9E-03	1.6E-01	
MU	M	1.7E-02	8.6E-03	1.5E-02	1.6	1.8E-02	7	0	5.7E-03	3.1E-02	
MU	B	1.1E-01	1.1E-01	7.8E-02	2.3	1.1E-01	7	0	1.6E-02	3.1E-01	
MU	L	9.3E-02	8.9E-02	6.7E-02	2.2	1.0E-01	7	0	5.3E-03	2.7E-01	
MU	G	3.1E-02	1.6E-03	3.1E-02	1.1	3.1E-02	2	0	3.0E-02	3.2E-02	
PI						1.3E-03	10	6			
PL	M	2.0E-02	9.0E-03	1.8E-02	1.5	2.0E-02	10	0	7.8E-03	3.8E-02	
PL	B	1.2E-02	7.5E-03	1.0E-02	1.8	9.5E-03	10	0	3.8E-03	2.7E-02	
PL	L	6.8E-02	4.8E-02	5.6E-02	1.9	6.3E-02	10	0	2.2E-02	1.8E-01	
PL	G	3.9E-02	2.4E-02	3.3E-02	1.8	3.5E-02	10	0	7.2E-03	7.4E-02	
PO		5.6E-03	4.1E-03	4.5E-03	1.9	4.8E-03	10	2	1.3E-03	1.5E-02	
RA	M	7.4E-03	4.9E-03	6.2E-03	1.8	7.9E-03	8	3	1.3E-03	1.3E-02	1.6E-01*
RA	B	1.2E-02	2.0E-02	6.1E-03	3.2	3.8E-03	9	4	1.5E-03	6.2E-02	
RA	L					1.9E-03	9	7			
RA	G					1.7E-02	3	2			
RA	E1					2.4E-03	2	1			
RA	E2	1.0E-01	5.9E-02	8.6E-02	1.7	9.0E-02	6	0	1.8E-02	1.9E-01	
RA	TAD	4.8E-01	1.9E-01	4.4E-01	1.5	4.4E-01	4	0	2.9E-01	7.4E-01	
SA	M	2.5E-03	1.3E-03	2.3E-03	1.6	2.7E-03	10	4	1.2E-03	4.5E-03	
SA	B	6.4E-03	3.5E-03	5.6E-03	1.7	6.1E-03	10	1	1.3E-03	1.2E-02	
SA	L					3.6E-03	10	10			
SA	G					1.2E-03	2	2			

Comments: *RA3

Sr (strontium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	7.4E-01	9.3E-01	4.6E-01	2.7	3.0E-01	11	0	1.5E-01	2.7E+00	
AN	B	2.7E+02	1.4E+02	2.3E+02	1.6	2.6E+02	11	0	3.8E+01	5.7E+02	
AN	L	4.0E-01	3.9E-01	2.9E-01	2.2	3.0E-01	10	0	1.5E-01	1.5E+00	7.9E+00*
AN	G	1.4E+01	1.6E+01	8.7E+00	2.6	4.7E+00	10	0	6.9E-01	4.3E+01	
AP		4.1E+00		4.1E+00		4.1E+00	1	0			
CA	ST	1.5E+02	3.3E+01	1.4E+02	1.3	1.5E+02	10	0	1.0E+02	1.9E+02	
CA	HT	2.7E+03	1.5E+02	2.7E+03	1.1	2.7E+03	10	0	2.5E+03	3.0E+03	
CE	M	1.2E+00	1.3E+00	7.8E-01	2.5	7.0E-01	11	0	2.0E-01	4.7E+00	
CE	B	1.8E+02	3.6E+01	1.8E+02	1.2	1.8E+02	11	0	1.1E+02	2.3E+02	
CE	L	4.0E-01	5.6E-01	2.4E-01	2.8	2.2E-01	10	0	1.2E-01	2.0E+00	
CE	G	1.5E+00	1.0E+00	1.2E+00	1.9	1.5E+00	7	0	4.2E-01	3.4E+00	
FU		7.4E+02	8.4E+01	7.3E+02	1.1	7.4E+02	10	0	6.2E+02	9.1E+02	
LU		2.2E+01	1.5E+01	1.9E+01	1.8	1.8E+01	14	0	6.0E+00	5.3E+01	
MU	M	8.2E+00	5.0E+00	7.0E+00	1.8	1.0E+01	7	0	2.6E+00	1.4E+01	
MU	B	9.5E+01	1.4E+01	9.4E+01	1.2	9.4E+01	7	0	7.5E+01	1.2E+02	
MU	L	1.5E-01	4.7E-02	1.4E-01	1.4	1.4E-01	7	0	8.7E-02	2.1E-01	
MU	G	6.4E-01	3.8E-01	5.5E-01	1.7	6.4E-01	2	0	3.7E-01	9.0E-01	
PI		1.4E+01	1.6E+01	9.6E+00	2.4	7.3E+00	10	0	1.3E+00	4.6E+01	
PL	M	1.2E+01	5.2E+00	1.1E+01	1.5	1.3E+01	10	0	3.8E+00	2.2E+01	
PL	B	3.4E+02	5.8E+01	3.3E+02	1.2	3.3E+02	10	0	2.5E+02	4.4E+02	
PL	L	7.4E+00	5.3E+00	6.0E+00	1.9	5.2E+00	10	0	3.2E+00	2.0E+01	
PL	G	1.3E+01	8.9E+00	1.0E+01	1.9	9.8E+00	10	0	5.2E+00	3.3E+01	
PO		4.6E+00	2.1E+00	4.2E+00	1.5	4.3E+00	10	0	2.7E+00	9.7E+00	
RA	M	7.1E+00	4.7E+00	6.0E+00	1.8	7.4E+00	9	0	7.2E-01	1.5E+01	
RA	B	1.1E+02	1.5E+01	1.1E+02	1.1	1.1E+02	9	0	9.6E+01	1.4E+02	
RA	L	3.9E-01	4.0E-01	2.7E-01	2.4	2.9E-01	9	0	1.8E-01	1.4E+00	
RA	G	1.7E+00	2.3E+00	1.0E+00	2.7	5.4E-01	3	0	2.6E-01	4.3E+00	
RA	E1	5.2E-01	5.6E-02	5.1E-01	1.1	5.2E-01	2	0	4.8E-01	5.6E-01	
RA	E2	3.8E+01	1.8E+01	3.4E+01	1.6	3.9E+01	6	0	1.6E+01	6.0E+01	
RA	TAD	1.7E+01	2.0E+00	1.6E+01	1.1	1.6E+01	4	0	1.4E+01	1.9E+01	
SA	M	2.7E+00	2.2E+00	2.1E+00	2.0	2.0E+00	10	0	1.2E+00	8.8E+00	
SA	B	9.3E+01	3.2E+01	8.8E+01	1.4	8.2E+01	10	0	4.9E+01	1.5E+02	
SA	L	7.3E-01	2.7E-01	6.8E-01	1.4	7.6E-01	10	0	3.2E-01	1.2E+00	
SA	G	5.1E-01	1.1E-01	5.0E-01	1.2	5.1E-01	2	0	4.3E-01	5.9E-01	

Comments: *AN1

Tb (terbium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					2.0E-05	11	8			
AN	B	5.1E-04	4.1E-04	4.0E-04	2.0	2.9E-04	11	0	6.7E-05	1.3E-03	
AN	L	1.9E-04	1.8E-04	1.4E-04	2.2	1.3E-04	11	0	3.9E-05	5.3E-04	
AN	G	1.4E-03	1.6E-03	9.4E-04	2.5	1.0E-03	10	0	8.2E-05	5.5E-03	
AP		2.0E-03		2.0E-03		2.0E-03	1	0			
CA	ST	2.3E-03	1.6E-03	1.9E-03	1.8	2.0E-03	10	0	8.8E-04	6.5E-03	
CA	HT	3.0E-03	1.0E-03	2.9E-03	1.4	2.8E-03	10	0	2.0E-03	4.9E-03	
CE	M	4.6E-04	6.5E-04	2.7E-04	2.8	1.5E-04	11	4	1.9E-05	2.1E-03	
CE	B	8.0E-04	4.6E-04	7.0E-04	1.7	7.3E-04	11	0	2.9E-04	1.8E-03	
CE	L	1.3E-04	1.2E-04	9.3E-05	2.2	1.0E-04	10	2	1.9E-05	4.4E-04	
CE	G	2.9E-04	1.9E-04	2.4E-04	1.8	2.3E-04	7	0	8.2E-05	5.4E-04	
FU		1.1E-02	6.4E-03	9.6E-03	1.7	9.3E-03	10	0	3.6E-03	2.2E-02	
LU		5.3E-02	4.4E-02	4.0E-02	2.1	4.1E-02	14	0	1.4E-03	1.3E-01	
MU	M	1.9E-04	9.9E-05	1.7E-04	1.6	2.0E-04	7	0	6.7E-05	3.1E-04	
MU	B	4.9E-04	2.0E-04	4.6E-04	1.5	5.4E-04	7	0	2.1E-04	7.7E-04	
MU	L	7.1E-05	4.2E-05	6.1E-05	1.7	7.1E-05	7	2	2.4E-05	1.5E-04	
MU	G					1.0E-04	2	1			
PI		1.4E-04	5.7E-05	1.3E-04	1.5	1.4E-04	10	0	6.1E-05	2.4E-04	
PL	M	1.6E-04	1.7E-04	1.1E-04	2.4	9.5E-05	10	1	2.0E-05	5.6E-04	
PL	B	1.3E-04	9.4E-05	1.1E-04	1.9	1.2E-04	10	0	4.1E-05	3.8E-04	
PL	L	2.6E-04	3.5E-04	1.6E-04	2.7	9.6E-05	10	0	7.2E-05	1.1E-03	
PL	G	1.5E-04	1.2E-04	1.2E-04	2.0	1.3E-04	10	3	3.0E-05	3.8E-04	
PO		3.7E-04	2.9E-04	2.9E-04	2.0	2.9E-04	10	0	1.4E-04	1.1E-03	
RA	M	1.8E-04	2.3E-04	1.1E-04	2.7	8.4E-05	8	1	4.3E-05	7.3E-04	4.9E-03*
RA	B					3.0E-05	9	7			
RA	L	1.1E-04	1.1E-04	8.3E-05	2.2	6.6E-05	9	4	2.3E-05	3.0E-04	
RA	G	1.9E-04	1.1E-04	1.7E-04	1.7	1.6E-04	3	1	9.9E-05	3.1E-04	
RA	E1	6.8E-05	3.2E-05	6.2E-05	1.6	6.8E-05	2	0	4.6E-05	9.1E-05	
RA	E2	8.4E-03	8.0E-03	6.0E-03	2.2	5.2E-03	6	0	1.3E-03	2.2E-02	
RA	TAD	7.8E-02	4.5E-02	6.8E-02	1.7	6.2E-02	4	0	4.5E-02	1.4E-01	
SA	M	2.1E-04	1.5E-04	1.7E-04	1.9	1.5E-04	10	0	7.3E-05	5.5E-04	
SA	B	8.0E-04	5.3E-04	6.6E-04	1.8	7.5E-04	10	0	1.4E-04	1.7E-03	
SA	L	1.2E-03	9.1E-04	9.3E-04	2.0	8.6E-04	10	0	3.2E-04	3.1E-03	
SA	G	1.5E-04	9.0E-05	1.3E-04	1.8	1.5E-04	2	0	8.4E-05	2.1E-04	

Comments: *RA3

Th (thorium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	2.9E-04	3.6E-04	1.8E-04	2.6	1.6E-04	11	2	5.6E-05	1.1E-03	
AN	B	2.4E-03	1.6E-03	2.0E-03	1.8	2.2E-03	11	0	1.3E-04	5.2E-03	
AN	L	9.9E-04	9.9E-04	7.0E-04	2.3	6.1E-04	11	5	2.8E-04	3.5E-03	
AN	G	1.3E-02	1.7E-02	8.1E-03	2.7	4.1E-03	10	0	1.1E-03	4.7E-02	
AP		8.4E-03		8.4E-03		8.4E-03	1	0			
CA	ST	8.1E-03	7.1E-03	6.2E-03	2.1	7.1E-03	10	0	1.2E-03	2.4E-02	
CA	HT	2.5E-02	1.3E-02	2.2E-02	1.6	2.2E-02	10	0	1.1E-02	5.1E-02	
CE	M	2.5E-03	3.6E-03	1.4E-03	2.9	7.9E-04	11	0	2.1E-04	1.2E-02	
CE	B	3.8E-03	1.8E-03	3.4E-03	1.6	3.4E-03	11	0	2.0E-03	7.3E-03	
CE	L	3.1E-04	2.0E-04	2.6E-04	1.8	2.4E-04	10	0	1.2E-04	7.8E-04	
CE	G	1.5E-03	1.1E-03	1.2E-03	1.9	1.4E-03	7	0	3.0E-04	3.5E-03	
FU		7.8E-02	5.1E-02	6.5E-02	1.8	6.3E-02	10	0	1.5E-02	1.9E-01	
LU		4.7E-01	3.8E-01	3.7E-01	2.0	4.3E-01	14	0	1.0E-02	1.1E+00	
MU	M	1.4E-03	5.5E-04	1.3E-03	1.5	1.3E-03	7	0	6.3E-04	2.2E-03	
MU	B	3.0E-03	1.5E-03	2.7E-03	1.6	2.6E-03	7	0	1.1E-03	5.3E-03	
MU	L	2.0E-04	1.2E-04	1.7E-04	1.8	2.6E-04	7	3	6.7E-05	3.6E-04	
MU	G	1.7E-02	9.5E-03	1.5E-02	1.7	1.7E-02	2	0	1.0E-02	2.4E-02	
PI		1.0E-03	8.6E-04	7.8E-04	2.1	8.5E-04	10	3	2.8E-04	2.9E-03	
PL	M	3.8E-04	2.3E-04	3.3E-04	1.7	3.0E-04	10	1	5.6E-05	8.8E-04	
PL	B	8.6E-04	7.9E-04	6.3E-04	2.2	5.1E-04	10	0	3.2E-04	2.7E-03	
PL	L	1.9E-03	2.2E-03	1.2E-03	2.6	9.4E-04	10	4	1.2E-04	6.8E-03	
PL	G	5.8E-04	2.8E-04	5.2E-04	1.6	5.1E-04	10	1	2.1E-04	1.1E-03	
PO		2.2E-03	2.7E-03	1.4E-03	2.6	1.4E-03	9	0	7.8E-04	9.2E-03	8.1E-02*
RA	M	6.8E-03	9.0E-03	4.1E-03	2.7	2.5E-03	9	2	9.1E-04	2.7E-02	
RA	B	8.3E-04	1.4E-03	4.2E-04	3.2	2.9E-04	9	3	6.5E-05	4.4E-03	
RA	L	9.6E-04	8.7E-04	7.1E-04	2.2	9.5E-04	9	4	2.7E-04	3.0E-03	
RA	G	8.4E-04	1.1E-03	5.1E-04	2.7	2.0E-04	3	1	1.9E-04	2.1E-03	
RA	E1	2.4E-04	5.3E-05	2.3E-04	1.2	2.4E-04	2	0	2.0E-04	2.7E-04	
RA	E2	6.7E-02	5.7E-02	5.1E-02	2.1	5.0E-02	6	0	7.9E-03	1.4E-01	
RA	TAD	8.7E-01	5.9E-01	7.2E-01	1.8	6.1E-01	4	0	5.0E-01	1.7E+00	
SA	M	1.1E-03	9.0E-04	8.2E-04	2.1	6.7E-04	10	0	2.3E-04	3.1E-03	
SA	B	3.0E-03	2.3E-03	2.4E-03	2.0	1.9E-03	10	0	8.0E-04	8.2E-03	
SA	L	2.9E-03	3.3E-03	1.9E-03	2.5	1.1E-03	10	0	6.6E-04	9.1E-03	
SA	G	5.8E-04	1.8E-04	5.5E-04	1.3	5.8E-04	2	0	4.5E-04	7.0E-04	

Comments: *PO9

Ti (titanium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					3.0E-02	10	7			
AN	B	4.0E-01	3.3E-01	3.0E-01	2.1	2.8E-01	10	0	1.0E-01	1.1E+00	4.7E+00*
AN	L	1.8E-01	2.2E-01	1.1E-01	2.6	9.1E-02	11	3	2.9E-02	7.0E-01	
AN	G	3.9E+00	4.0E+00	2.8E+00	2.3	3.0E+00	10	0	1.4E-01	1.1E+01	
AP		7.1E+00		7.1E+00		7.1E+00	1	0			
CA	ST	4.9E+00	4.4E+00	3.6E+00	2.2	3.0E+00	10	0	1.2E+00	1.5E+01	
CA	HT	8.8E+00	4.0E+00	8.1E+00	1.5	7.3E+00	10	0	4.8E+00	1.6E+01	
CE	M	1.6E+00	2.0E+00	9.6E-01	2.7	4.5E-01	11	1	3.0E-02	5.6E+00	
CE	B	6.9E+00	3.2E+00	6.2E+00	1.6	6.3E+00	11	0	2.6E+00	1.4E+01	
CE	L	1.6E-01	2.1E-01	9.2E-02	2.8	6.8E-02	10	4	3.0E-02	6.1E-01	
CE	G	1.0E+00	6.0E-01	8.7E-01	1.7	1.0E+00	7	0	1.5E-01	2.0E+00	
FU		2.9E+01	2.2E+01	2.3E+01	2.0	2.2E+01	10	0	3.1E+00	7.2E+01	
LU		1.4E+02	1.1E+02	1.1E+02	2.0	1.1E+02	14	0	7.0E+00	3.4E+02	
MU	M	8.9E-01	7.5E-01	6.8E-01	2.1	5.5E-01	7	0	3.2E-01	2.5E+00	
MU	B	2.5E+00	2.5E+00	1.8E+00	2.3	1.8E+00	7	0	6.9E-01	8.0E+00	
MU	L					4.3E-02	7	4			
MU	G	4.8E-01	3.9E-01	3.7E-01	2.0	4.8E-01	2	0	2.0E-01	7.5E-01	
PI		6.9E-01	3.4E-01	6.2E-01	1.6	6.2E-01	10	0	2.4E-01	1.3E+00	
PL	M	9.2E-01	1.3E+00	5.4E-01	2.8	4.7E-01	10	0	8.9E-02	4.3E+00	
PL	B	4.2E-01	4.3E-01	2.9E-01	2.3	3.4E-01	10	1	2.9E-02	1.6E+00	
PL	L	6.2E-01	9.8E-01	3.3E-01	3.1	1.2E-01	10	2	2.8E-02	2.8E+00	
PL	G	2.7E-01	2.5E-01	2.0E-01	2.2	1.7E-01	10	2	5.0E-02	7.8E-01	
PO		1.3E+00	1.1E+00	1.1E+00	2.0	9.5E-01	10	0	4.7E-01	3.9E+00	
RA	M	3.8E-01	1.9E-01	3.3E-01	1.6	4.2E-01	8	0	7.9E-02	6.3E-01	2.5E+01**
RA	B	3.7E-01	4.8E-01	2.2E-01	2.7	1.5E-01	9	0	9.5E-02	1.5E+00	
RA	L					6.9E-02	9	5			
RA	G					1.1E-01	3	3			
RA	E1	1.6E-01	2.8E-02	1.6E-01	1.2	1.6E-01	2	0	1.4E-01	1.8E-01	
RA	E2	2.3E+01	1.9E+01	1.7E+01	2.1	1.2E+01	6	0	7.3E+00	4.8E+01	
RA	TAD	2.4E+02	1.8E+02	1.9E+02	2.0	1.6E+02	4	0	1.2E+02	5.1E+02	
SA	M	7.2E-01	5.8E-01	5.6E-01	2.0	4.6E-01	10	0	1.2E-01	2.1E+00	
SA	B	1.7E+00	1.2E+00	1.4E+00	1.9	1.3E+00	10	0	5.0E-01	3.7E+00	
SA	L	9.9E-01	1.4E+00	5.8E-01	2.8	4.4E-01	10	0	1.7E-01	4.7E+00	
SA	G	2.1E-01	2.0E-01	1.5E-01	2.3	2.1E-01	2	0	6.4E-02	3.5E-01	

Comments: *AN1, **RA3

Tl (thallium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	5.8E-03	3.9E-03	4.8E-03	1.8	5.1E-03	11	0	1.2E-03	1.5E-02
AN	B	4.6E-03	2.0E-03	4.2E-03	1.5	4.5E-03	11	0	2.1E-03	8.1E-03
AN	L	6.2E-03	5.7E-03	4.6E-03	2.2	4.1E-03	11	0	2.2E-03	2.2E-02
AN	G	3.3E-02	3.0E-02	2.4E-02	2.2	2.1E-02	10	0	7.0E-03	1.0E-01
AP		4.1E-02		4.1E-02		4.1E-02	1	0		
CA	ST	2.6E-03	1.7E-03	2.2E-03	1.8	1.8E-03	10	0	1.5E-03	6.9E-03
CA	HT	2.5E-03	5.9E-04	2.4E-03	1.3	2.3E-03	10	0	1.8E-03	3.2E-03
CE	M	4.8E-03	3.2E-03	4.0E-03	1.8	4.7E-03	11	0	1.0E-03	1.3E-02
CE	B	2.5E-03	9.0E-04	2.3E-03	1.4	2.3E-03	11	0	1.4E-03	4.7E-03
CE	L	1.3E-02	9.2E-03	1.1E-02	1.9	1.3E-02	10	0	1.8E-03	2.9E-02
CE	G	3.7E-03	2.3E-03	3.1E-03	1.8	3.2E-03	7	0	1.5E-03	8.6E-03
FU		6.4E-03	2.7E-03	5.9E-03	1.5	5.6E-03	10	0	2.7E-03	1.1E-02
LU		6.3E-02	2.6E-02	5.8E-02	1.5	6.6E-02	14	0	2.4E-02	1.1E-01
MU	M	7.7E-03	3.1E-03	7.2E-03	1.5	6.9E-03	7	0	3.7E-03	1.3E-02
MU	B	6.3E-03	2.1E-03	6.0E-03	1.4	5.5E-03	7	0	3.6E-03	9.3E-03
MU	L	7.0E-03	3.5E-03	6.3E-03	1.6	5.8E-03	7	0	3.1E-03	1.2E-02
MU	G	6.8E-03	3.9E-04	6.8E-03	1.1	6.8E-03	2	0	6.6E-03	7.1E-03
PI		2.2E-03	1.4E-03	1.9E-03	1.8	2.0E-03	10	0	6.2E-04	5.0E-03
PL	M	8.7E-04	2.1E-04	8.5E-04	1.3	8.2E-04	10	0	6.2E-04	1.3E-03
PL	B	9.0E-04	3.1E-04	8.5E-04	1.4	8.8E-04	10	0	5.7E-04	1.7E-03
PL	L	3.2E-03	1.4E-03	2.9E-03	1.5	2.7E-03	10	0	1.3E-03	5.5E-03
PL	G	3.5E-03	2.1E-03	3.0E-03	1.8	2.9E-03	10	0	1.5E-03	8.6E-03
PO		5.9E-03	4.7E-03	4.6E-03	2.0	4.6E-03	10	0	1.0E-03	1.4E-02
RA	M	1.5E-02	9.7E-03	1.3E-02	1.8	1.3E-02	9	0	9.0E-03	4.1E-02
RA	B	1.4E-02	1.5E-02	9.6E-03	2.4	9.6E-03	9	0	6.3E-03	5.3E-02
RA	L	2.4E-02	2.6E-02	1.7E-02	2.4	1.6E-02	9	0	7.4E-03	9.2E-02
RA	G	5.1E-02	5.2E-02	3.6E-02	2.3	2.1E-02	3	0	2.1E-02	1.1E-01
RA	E1	9.3E-02	2.1E-02	9.1E-02	1.2	9.3E-02	2	0	7.9E-02	1.1E-01
RA	E2	5.3E-02	2.2E-02	4.9E-02	1.5	5.1E-02	6	0	3.0E-02	8.8E-02
RA	TAD	1.0E-01	6.2E-02	9.0E-02	1.7	7.8E-02	4	0	6.6E-02	2.0E-01
SA	M	4.9E-02	1.1E-02	4.8E-02	1.2	4.7E-02	10	0	3.9E-02	7.6E-02
SA	B	4.5E-02	8.8E-03	4.4E-02	1.2	4.4E-02	10	0	3.7E-02	6.5E-02
SA	L	7.0E-01	2.8E-01	6.5E-01	1.5	6.1E-01	10	0	3.9E-01	1.2E+00
SA	G	4.8E-02	3.3E-03	4.8E-02	1.1	4.8E-02	2	0	4.5E-02	5.0E-02

Tm (thulium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M					4.9E-05	11	11		
AN	B	2.4E-04	1.9E-04	1.8E-04	2.1	2.4E-04	11	4	4.9E-05	6.5E-04
AN	L					5.0E-05	11	8		
AN	G	7.4E-04	6.9E-04	5.4E-04	2.2	6.7E-04	10	4	4.5E-05	2.1E-03
AP		8.7E-04		8.7E-04		8.7E-04	1	0		
CA	ST	8.5E-04	6.5E-04	6.7E-04	2.0	6.5E-04	10	0	2.4E-04	2.3E-03
CA	HT	1.2E-03	5.2E-04	1.1E-03	1.5	1.1E-03	10	0	6.4E-04	2.0E-03
CE	M					5.3E-05	11	6		
CE	B	4.0E-04	2.2E-04	3.5E-04	1.7	3.6E-04	11	0	1.1E-04	8.5E-04
CE	L					5.0E-05	10	10		
CE	G					7.4E-05	7	4		
FU		6.6E-03	6.7E-03	4.7E-03	2.3	4.2E-03	10	0	1.6E-03	2.5E-02
LU		2.5E-02	2.2E-02	1.9E-02	2.2	1.6E-02	14	0	7.8E-04	5.9E-02
MU	M					6.2E-05	7	6		
MU	B	2.0E-04	1.1E-04	1.8E-04	1.7	2.3E-04	7	2	5.8E-05	3.5E-04
MU	L					6.6E-05	7	6		
MU	G					1.2E-04	2	2		
PI						4.8E-05	10	10		
PL	M					4.8E-05	10	8		
PL	B					4.8E-05	10	8		
PL	L					4.9E-05	9	7		
PL	G					9.6E-05	10	7		
PO						5.0E-05	9	5		
RA	M					5.0E-05	8	8		
RA	B					7.2E-05	9	9		
RA	L					6.1E-05	9	9		
RA	G					1.8E-04	3	3		
RA	E1					4.6E-05	2	2		
RA	E2	4.0E-03	3.9E-03	2.8E-03	2.3	2.8E-03	6	0	4.3E-04	1.1E-02
RA	TAD	2.0E-02	1.7E-02	1.6E-02	2.1	1.3E-02	4	0	9.6E-03	4.6E-02
SA	M					7.7E-05	10	5		
SA	B	4.3E-04	4.7E-04	2.9E-04	2.4	2.6E-04	10	1	5.1E-05	1.6E-03
SA	L					1.6E-04	10	7		
SA	G					8.5E-05	2	1		

U (uranium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	3.4E-04	2.3E-04	2.8E-04	1.8	3.4E-04	11	2	6.8E-05	7.8E-04
AN	B	2.3E-02	2.3E-02	1.6E-02	2.3	1.2E-02	11	0	3.1E-03	7.8E-02
AN	L	1.8E-03	1.3E-03	1.4E-03	1.9	1.6E-03	11	0	5.3E-04	4.9E-03
AN	G	7.1E-03	7.8E-03	4.8E-03	2.4	3.9E-03	10	0	2.3E-03	2.8E-02
AP		9.0E-03		9.0E-03		9.0E-03	1	0		
CA	ST	1.2E-01	9.0E-02	9.1E-02	2.0	8.2E-02	10	0	3.8E-02	3.3E-01
CA	HT	1.9E-02	6.5E-03	1.8E-02	1.4	1.9E-02	10	0	1.2E-02	3.4E-02
CE	M	1.1E-03	1.2E-03	7.7E-04	2.4	5.6E-04	11	0	1.5E-04	3.9E-03
CE	B	1.4E-03	6.6E-04	1.2E-03	1.6	1.2E-03	11	0	6.2E-04	2.8E-03
CE	L					1.1E-04	10	5		
CE	G	2.1E-03	1.4E-03	1.8E-03	1.8	2.7E-03	7	0	2.9E-04	4.0E-03
FU		7.7E-01	1.4E-01	7.6E-01	1.2	7.6E-01	10	0	5.9E-01	1.0E+00
LU		4.2E-01	3.5E-01	3.3E-01	2.1	3.6E-01	14	0	5.8E-02	1.4E+00
MU	M	1.4E-03	1.6E-03	9.4E-04	2.5	8.7E-04	7	0	5.9E-04	5.0E-03
MU	B	2.8E-03	9.1E-04	2.7E-03	1.4	2.3E-03	7	0	1.9E-03	4.2E-03
MU	L	3.3E-04	2.4E-04	2.7E-04	1.9	2.7E-04	7	1	9.7E-05	8.3E-04
MU	G	6.3E-04	1.9E-04	6.0E-04	1.4	6.3E-04	2	0	5.0E-04	7.7E-04
PI		5.2E-04	2.2E-04	4.8E-04	1.5	5.7E-04	10	1	6.5E-05	7.5E-04
PL	M	4.1E-03	2.4E-03	3.5E-03	1.7	3.2E-03	10	0	1.3E-03	1.0E-02
PL	B	6.4E-02	4.7E-02	5.2E-02	1.9	5.2E-02	10	0	2.2E-02	1.8E-01
PL	L	1.4E-02	1.1E-02	1.1E-02	2.0	1.3E-02	10	0	3.1E-03	4.2E-02
PL	G	1.1E-02	9.8E-03	7.9E-03	2.2	9.2E-03	10	0	2.8E-03	3.5E-02
PO		1.2E-03	6.8E-04	1.0E-03	1.7	1.0E-03	10	0	5.2E-04	2.8E-03
RA	M	2.2E-03	2.2E-03	1.6E-03	2.3	1.6E-03	9	0	5.6E-04	7.5E-03
RA	B	4.1E-03	3.3E-03	3.2E-03	2.0	3.3E-03	9	0	8.5E-04	1.1E-02
RA	L	1.7E-03	1.7E-03	1.2E-03	2.3	9.4E-04	9	0	4.7E-04	4.8E-03
RA	G	9.1E-04	1.2E-03	5.6E-04	2.7	2.5E-04	3	1	2.2E-04	2.3E-03
RA	E1	4.3E-04	1.0E-04	4.2E-04	1.3	4.3E-04	2	0	3.6E-04	5.0E-04
RA	E2	4.9E-02	3.0E-02	4.2E-02	1.8	5.7E-02	6	0	1.1E-02	9.0E-02
RA	TAD	6.3E-01	1.3E-01	6.1E-01	1.2	6.6E-01	4	0	4.6E-01	7.4E-01
SA	M	2.4E-03	1.1E-03	2.2E-03	1.5	2.2E-03	10	0	9.2E-04	4.0E-03
SA	B	4.0E-02	3.6E-02	3.0E-02	2.2	2.7E-02	10	0	1.6E-02	1.3E-01
SA	L	9.9E-03	5.2E-03	8.7E-03	1.6	9.7E-03	10	0	3.1E-03	1.7E-02
SA	G	3.7E-03	1.1E-03	3.5E-03	1.3	3.7E-03	2	0	2.9E-03	4.4E-03

V (vanadium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					1.8E-03	11	7			
AN	B	5.6E-02	5.0E-02	4.2E-02	2.1	3.7E-02	11	0	1.0E-02	1.6E-01	
AN	L	2.4E-02	1.9E-02	1.8E-02	2.0	1.5E-02	11	1	1.7E-03	5.2E-02	
AN	G	1.8E-01	1.8E-01	1.3E-01	2.3	1.1E-01	10	0	2.1E-02	5.7E-01	
AP		2.2E-01		2.2E-01		2.2E-01	1	0			
CA	ST	7.9E-01	3.8E-01	7.1E-01	1.6	7.2E-01	10	0	3.0E-01	1.5E+00	
CA	HT	3.4E-01	1.2E-01	3.2E-01	1.4	2.8E-01	10	0	2.2E-01	5.6E-01	
CE	M	4.1E-02	6.8E-02	2.1E-02	3.2	9.5E-03	11	4	1.7E-03	2.2E-01	
CE	B	2.5E-01	1.2E-01	2.3E-01	1.6	2.3E-01	11	0	9.8E-02	5.5E-01	
CE	L	1.1E-02	1.4E-02	7.1E-03	2.6	5.0E-03	10	4	1.8E-03	4.0E-02	
CE	G	2.1E-02	1.4E-02	1.7E-02	1.8	2.8E-02	7	1	1.8E-03	3.8E-02	
FU		1.5E+00	9.3E-01	1.3E+00	1.8	1.2E+00	10	0	4.8E-01	3.1E+00	
LU		5.2E+00	4.4E+00	4.0E+00	2.1	3.8E+00	14	0	2.2E-01	1.3E+01	
MU	M	2.6E-02	1.1E-02	2.4E-02	1.5	3.0E-02	7	0	8.3E-03	4.0E-02	
MU	B	8.6E-02	9.8E-02	5.7E-02	2.5	4.1E-02	7	0	3.1E-02	3.0E-01	
MU	L	5.1E-02	5.3E-02	3.5E-02	2.4	3.3E-02	7	0	6.6E-03	1.7E-01	
MU	G	1.9E-02	1.1E-02	1.6E-02	1.7	1.9E-02	2	0	1.1E-02	2.6E-02	
PI		1.2E-02	4.5E-03	1.2E-02	1.4	1.3E-02	10	0	5.2E-03	1.8E-02	
PL	M	4.5E-02	3.8E-02	3.5E-02	2.1	3.4E-02	10	0	9.5E-03	1.3E-01	
PL	B	4.0E-01	2.5E-01	3.4E-01	1.8	3.3E-01	10	0	1.3E-01	1.0E+00	
PL	L	3.0E-01	1.8E-01	2.6E-01	1.7	2.4E-01	10	0	8.3E-02	6.5E-01	
PL	G	1.3E-01	7.3E-02	1.1E-01	1.7	1.1E-01	10	0	4.9E-02	2.4E-01	
PO		3.4E-02	2.9E-02	2.6E-02	2.1	2.2E-02	10	0	1.5E-02	1.1E-01	
RA	M	5.1E-02	8.0E-02	2.7E-02	3.1	2.6E-02	8	1	7.4E-03	2.5E-01	9.8E-01*
RA	B	1.6E-02	1.5E-02	1.1E-02	2.2	1.1E-02	9	3	3.1E-03	4.4E-02	
RA	L	6.3E-02	6.0E-02	4.5E-02	2.2	3.5E-02	9	0	1.4E-02	1.6E-01	
RA	G	3.9E-02	5.6E-02	2.2E-02	2.9	6.4E-03	3	1	5.5E-03	1.0E-01	
RA	E1	3.3E-03	2.4E-03	2.7E-03	1.9	3.3E-03	2	1	1.6E-03	5.0E-03	
RA	E2	7.2E-01	5.9E-01	5.6E-01	2.0	5.8E-01	6	0	1.1E-01	1.5E+00	
RA	TAD	5.1E+00	4.1E+00	4.0E+00	2.0	3.5E+00	4	0	2.3E+00	1.1E+01	
SA	M	6.7E-02	9.1E-02	3.9E-02	2.8	4.7E-02	10	0	8.6E-03	3.2E-01	
SA	B	1.6E-01	1.1E-01	1.3E-01	1.9	1.3E-01	10	0	4.0E-02	4.3E-01	
SA	L	7.5E-02	5.5E-02	6.1E-02	1.9	5.2E-02	10	0	1.9E-02	1.6E-01	
SA	G	3.2E-02	2.3E-02	2.5E-02	1.9	3.2E-02	2	0	1.5E-02	4.8E-02	

Comments: *RA3

Y (yttrium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M	4.1E-04	1.9E-04	3.7E-04	1.6	3.6E-04	10	0	1.8E-04	7.9E-04	6.3E-03*
AN	B	1.8E-02	1.4E-02	1.4E-02	2.0	9.5E-03	11	0	3.2E-03	4.7E-02	
AN	L	4.4E-03	4.5E-03	3.1E-03	2.3	2.4E-03	11	0	5.7E-04	1.2E-02	
AN	G	4.6E-02	4.6E-02	3.3E-02	2.3	3.2E-02	10	0	1.3E-03	1.5E-01	
AP		6.4E-02		6.4E-02		6.4E-02	1	0			
CA	ST	8.4E-02	5.9E-02	6.9E-02	1.9	7.0E-02	10	0	3.4E-02	2.4E-01	
CA	HT	1.1E-01	3.1E-02	1.1E-01	1.3	1.1E-01	10	0	7.4E-02	1.6E-01	
CE	M	1.3E-02	1.8E-02	7.7E-03	2.8	5.3E-03	11	0	5.6E-04	5.9E-02	
CE	B	2.4E-02	1.4E-02	2.1E-02	1.7	2.2E-02	11	0	9.1E-03	5.1E-02	
CE	L	2.3E-03	1.9E-03	1.7E-03	2.1	1.5E-03	10	0	7.6E-04	6.8E-03	
CE	G	7.2E-03	5.4E-03	5.8E-03	1.9	5.3E-03	7	0	2.0E-03	1.4E-02	
FU		4.1E-01	3.2E-01	3.2E-01	2.0	2.8E-01	10	0	1.3E-01	1.2E+00	
LU		1.8E+00	1.6E+00	1.3E+00	2.1	1.1E+00	14	0	7.3E-02	4.2E+00	
MU	M	6.5E-03	7.0E-03	4.4E-03	2.4	4.2E-03	7	0	2.0E-03	2.2E-02	
MU	B	1.3E-02	5.8E-03	1.2E-02	1.5	1.6E-02	7	0	5.7E-03	1.9E-02	
MU	L	1.7E-03	2.4E-03	1.0E-03	2.8	1.0E-03	7	0	4.0E-04	7.1E-03	
MU	G	3.6E-03	3.4E-03	2.6E-03	2.2	3.6E-03	2	0	1.2E-03	6.0E-03	
PI		3.2E-03	1.2E-03	3.0E-03	1.4	3.2E-03	10	0	1.4E-03	5.1E-03	
PL	M	4.7E-03	5.3E-03	3.2E-03	2.5	2.2E-03	10	0	8.5E-04	1.5E-02	
PL	B	6.3E-03	3.6E-03	5.5E-03	1.7	5.4E-03	10	0	4.0E-03	1.6E-02	
PL	L	1.0E-02	1.7E-02	5.2E-03	3.1	3.1E-03	10	0	1.4E-03	5.4E-02	
PL	G	4.2E-03	3.1E-03	3.4E-03	1.9	4.0E-03	10	0	8.9E-04	1.1E-02	
PO		6.2E-03	3.0E-03	5.6E-03	1.6	6.4E-03	9	0	3.1E-03	1.3E-02	8.9E-02**
RA	M	3.1E-03	2.7E-03	2.4E-03	2.1	2.3E-03	8	0	7.0E-04	8.6E-03	1.5E-01***
RA	B	3.3E-03	2.4E-03	2.7E-03	1.9	2.0E-03	9	0	1.7E-03	7.9E-03	
RA	L	1.9E-03	1.4E-03	1.5E-03	1.9	1.3E-03	9	0	9.4E-04	5.2E-03	
RA	G	1.4E-03	1.1E-03	1.1E-03	2.0	9.0E-04	3	0	6.0E-04	2.6E-03	
RA	E1	1.4E-03	4.5E-07	1.4E-03	1.0	1.4E-03	2	0	1.4E-03	1.4E-03	
RA	E2	2.7E-01	2.9E-01	1.9E-01	2.4	1.6E-01	6	0	3.7E-02	8.3E-01	
RA	TAD	1.7E+00	1.4E+00	1.4E+00	2.0	1.2E+00	4	0	7.7E-01	3.8E+00	
SA	M	5.9E-03	4.6E-03	4.6E-03	2.0	3.4E-03	10	0	1.1E-03	1.5E-02	
SA	B	2.7E-02	2.2E-02	2.1E-02	2.0	2.1E-02	10	0	6.2E-03	7.8E-02	
SA	L	2.3E-02	2.9E-02	1.4E-02	2.7	1.4E-02	10	0	4.7E-03	1.0E-01	
SA	G	3.5E-03	2.1E-03	2.9E-03	1.8	3.5E-03	2	0	1.9E-03	5.0E-03	

Comments: *AN1, **PO10, ***RA3

Yb (ytterbium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Excluded
AN	M					4.0E-05	11	7			
AN	B	1.4E-03	1.3E-03	1.0E-03	2.2	9.0E-04	11	0	1.9E-04	4.5E-03	
AN	L	3.5E-04	3.8E-04	2.4E-04	2.4	1.8E-04	11	3	3.8E-05	9.9E-04	
AN	G	4.8E-03	4.6E-03	3.4E-03	2.2	4.1E-03	10	1	3.6E-05	1.4E-02	
AP		4.7E-03		4.7E-03		4.7E-03	1	0			
CA	ST	4.9E-03	3.9E-03	3.9E-03	2.0	3.6E-03	10	0	1.2E-03	1.3E-02	
CA	HT	7.7E-03	3.3E-03	7.0E-03	1.5	6.5E-03	10	0	4.0E-03	1.3E-02	
CE	M	1.1E-03	1.5E-03	6.5E-04	2.8	2.9E-04	11	3	3.9E-05	4.8E-03	
CE	B	2.2E-03	1.3E-03	1.9E-03	1.7	1.8E-03	11	0	7.5E-04	4.8E-03	
CE	L	1.5E-04	1.1E-04	1.2E-04	2.0	1.0E-04	10	2	3.9E-05	4.0E-04	
CE	G	6.7E-04	4.7E-04	5.5E-04	1.9	6.7E-04	7	0	1.5E-04	1.3E-03	
FU		4.3E-02	4.5E-02	2.9E-02	2.4	2.7E-02	10	0	1.2E-02	1.6E-01	
LU		1.6E-01	1.5E-01	1.2E-01	2.2	9.7E-02	14	0	5.8E-03	3.9E-01	
MU	M	5.8E-04	8.3E-04	3.3E-04	2.9	2.8E-04	7	0	1.6E-04	2.4E-03	
MU	B	9.9E-04	4.4E-04	9.0E-04	1.5	8.1E-04	7	0	5.5E-04	1.7E-03	
MU	L					5.6E-05	7	5			
MU	G					3.9E-04	2	1			
PI		3.2E-04	1.1E-04	3.0E-04	1.4	3.2E-04	10	0	2.1E-04	5.2E-04	
PL	M	4.4E-04	4.7E-04	3.0E-04	2.4	2.6E-04	10	1	4.0E-05	1.3E-03	
PL	B	3.7E-04	3.2E-04	2.8E-04	2.1	2.8E-04	10	0	1.2E-04	1.2E-03	
PL	L	5.0E-04	8.1E-04	2.6E-04	3.1	2.6E-04	9	2	3.8E-05	2.6E-03	1.1E-02*
PL	G	3.0E-04	2.9E-04	2.2E-04	2.2	1.8E-04	10	4	4.7E-05	8.6E-04	
PO		4.2E-04	1.7E-04	3.9E-04	1.5	4.1E-04	9	0	2.2E-04	7.8E-04	5.5E-02**
RA	M	1.8E-04	1.0E-04	1.6E-04	1.7	2.0E-04	8	2	4.0E-05	3.3E-04	1.5E-02***
RA	B	2.7E-04	3.8E-04	1.6E-04	2.8	1.5E-04	9	2	5.6E-05	1.3E-03	
RA	L	1.8E-04	1.3E-04	1.5E-04	1.9	1.5E-04	9	2	5.6E-05	5.0E-04	
RA	G					1.4E-04	3	3			
RA	E1	1.5E-04	2.7E-05	1.5E-04	1.2	1.5E-04	2	0	1.3E-04	1.7E-04	
RA	E2	2.6E-02	2.6E-02	1.9E-02	2.3	2.0E-02	6	0	2.7E-03	7.3E-02	
RA	TAD	1.2E-01	1.0E-01	9.4E-02	2.1	7.7E-02	4	0	6.0E-02	2.8E-01	
SA	M	5.5E-04	4.6E-04	4.3E-04	2.1	3.6E-04	10	0	8.1E-05	1.3E-03	
SA	B	2.3E-03	3.0E-03	1.4E-03	2.7	1.1E-03	10	0	2.5E-04	9.8E-03	
SA	L	8.4E-04	4.6E-04	7.4E-04	1.7	7.3E-04	9	0	3.8E-04	1.9E-03	9.1E-03****
SA	G	2.7E-04	3.3E-04	1.7E-04	2.6	2.7E-04	2	1	3.8E-05	5.1E-04	

Comments: *PL6, **PO10, ***RA3, ****SA4

Zn (zinc)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M	4.0E+01	7.4E+00	4.0E+01	1.2	3.7E+01	11	0	3.0E+01	5.2E+01
AN	B	1.4E+02	3.9E+01	1.3E+02	1.3	1.3E+02	11	0	8.0E+01	2.1E+02
AN	L	8.4E+01	2.4E+01	8.1E+01	1.3	8.1E+01	11	0	4.5E+01	1.2E+02
AN	G	9.6E+01	2.0E+01	9.4E+01	1.2	1.0E+02	10	0	6.3E+01	1.2E+02
AP		1.3E+02		1.3E+02		1.3E+02	1	0		
CA	ST	1.9E+02	2.6E+01	1.9E+02	1.1	1.8E+02	10	0	1.6E+02	2.3E+02
CA	HT	2.2E+01	8.4E+00	2.1E+01	1.4	2.0E+01	10	0	9.5E+00	3.5E+01
CE	M	1.5E+02	2.9E+01	1.5E+02	1.2	1.5E+02	11	0	1.1E+02	2.0E+02
CE	B	6.2E+01	5.9E+00	6.2E+01	1.1	6.1E+01	11	0	5.3E+01	6.9E+01
CE	L	8.0E+01	3.5E+01	7.3E+01	1.5	8.5E+01	10	0	3.2E+01	1.3E+02
CE	G	4.3E+01	1.8E+01	4.0E+01	1.5	4.2E+01	7	0	2.0E+01	6.9E+01
FU		1.7E+01	7.9E+00	1.6E+01	1.5	1.4E+01	10	0	1.2E+01	3.7E+01
LU		2.5E+02	7.9E+01	2.4E+02	1.4	2.3E+02	14	0	1.3E+02	3.7E+02
MU	M	7.0E+01	1.8E+01	6.8E+01	1.3	7.5E+01	7	0	5.0E+01	9.8E+01
MU	B	1.7E+02	3.4E+01	1.6E+02	1.2	1.6E+02	7	0	1.2E+02	2.2E+02
MU	L	1.5E+02	8.6E+01	1.3E+02	1.7	1.4E+02	7	0	7.8E+01	3.1E+02
MU	G	2.3E+02	2.4E+02	1.6E+02	2.4	2.3E+02	2	0	5.9E+01	3.9E+02
PI		3.3E+01	4.3E+00	3.3E+01	1.1	3.3E+01	10	0	2.6E+01	4.2E+01
PL	M	2.7E+01	5.3E+00	2.6E+01	1.2	2.7E+01	10	0	2.0E+01	3.6E+01
PL	B	3.2E+01	2.5E+00	3.2E+01	1.1	3.2E+01	10	0	2.9E+01	3.7E+01
PL	L	1.1E+02	4.8E+01	9.9E+01	1.5	1.0E+02	10	0	5.4E+01	1.9E+02
PL	G	1.7E+02	9.3E+01	1.5E+02	1.7	1.1E+02	10	0	8.1E+01	3.3E+02
PO		2.6E+01	3.6E+00	2.5E+01	1.2	2.6E+01	10	0	1.9E+01	3.2E+01
RA	M	4.1E+01	4.3E+00	4.1E+01	1.1	4.1E+01	9	0	3.5E+01	4.7E+01
RA	B	7.6E+01	1.4E+01	7.4E+01	1.2	7.3E+01	9	0	6.1E+01	1.1E+02
RA	L	7.7E+01	2.0E+01	7.4E+01	1.3	7.6E+01	9	0	5.7E+01	1.2E+02
RA	G	1.1E+02	8.8E+01	8.3E+01	2.0	7.0E+01	3	0	4.3E+01	2.1E+02
RA	E1	2.2E+02	2.6E+00	2.2E+02	1.0	2.2E+02	2	0	2.2E+02	2.2E+02
RA	E2	1.2E+02	1.1E+01	1.2E+02	1.1	1.3E+02	6	0	1.0E+02	1.3E+02
RA	TAD	1.4E+02	2.2E+01	1.4E+02	1.2	1.4E+02	4	0	1.2E+02	1.7E+02
SA	M	2.8E+01	4.5E+00	2.8E+01	1.2	2.8E+01	10	0	2.2E+01	3.6E+01
SA	B	1.5E+02	2.5E+01	1.4E+02	1.2	1.4E+02	10	0	1.2E+02	2.0E+02
SA	L	1.4E+02	3.1E+01	1.4E+02	1.2	1.4E+02	10	0	9.9E+01	1.9E+02
SA	G	7.1E+01	1.7E+01	6.9E+01	1.3	7.1E+01	2	0	5.9E+01	8.3E+01

Zr (zirconium)

Concentration in RAP tissues (µg/g, dry matter)

RAP		AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
AN	M					1.4E-03	11	10		
AN	B	1.0E-02	7.1E-03	8.2E-03	1.9	8.9E-03	11	1	1.4E-03	2.6E-02
AN	L					1.4E-03	11	10		
AN	G	2.3E-02	2.1E-02	1.7E-02	2.2	1.7E-02	10	1	1.9E-03	5.7E-02
AP		1.3E-01		1.3E-01		1.3E-01	1	0		
CA	ST	1.7E-02	1.7E-02	1.2E-02	2.3	1.1E-02	10	0	5.4E-03	6.4E-02
CA	HT	5.0E-02	1.6E-02	4.7E-02	1.4	4.7E-02	10	0	2.9E-02	7.5E-02
CE	M					1.5E-03	11	6		
CE	B	2.4E-02	8.9E-03	2.2E-02	1.4	2.1E-02	11	0	1.5E-02	4.3E-02
CE	L					1.4E-03	10	10		
CE	G	6.8E-03	4.4E-03	5.8E-03	1.8	8.9E-03	7	2	1.4E-03	1.1E-02
FU		3.0E-01	1.5E-01	2.7E-01	1.6	2.7E-01	10	0	1.1E-01	6.0E-01
LU		2.0E-01	1.7E-01	1.5E-01	2.1	1.5E-01	14	0	2.5E-02	5.6E-01
MU	M	5.4E-02	4.6E-02	4.1E-02	2.1	4.7E-02	7	0	5.2E-03	1.2E-01
MU	B	5.4E-02	5.9E-02	3.6E-02	2.4	3.5E-02	7	0	1.3E-02	1.8E-01
MU	L					1.9E-03	7	6		
MU	G	1.4E-02	6.8E-03	1.3E-02	1.6	1.4E-02	2	0	9.3E-03	1.9E-02
PI						1.4E-03	10	8		
PL	M					2.4E-03	10	5		
PL	B	6.1E-03	3.3E-03	5.3E-03	1.7	5.3E-03	10	1	1.5E-03	1.2E-02
PL	L	7.4E-03	8.6E-03	4.8E-03	2.5	5.1E-03	10	4	1.4E-03	3.0E-02
PL	G					4.4E-03	10	5		
PO						2.3E-03	10	5		
RA	M	5.9E-02	5.4E-02	4.3E-02	2.2	3.6E-02	9	0	1.9E-02	1.9E-01
RA	B	1.8E-02	1.5E-02	1.4E-02	2.1	1.2E-02	9	1	1.7E-03	5.4E-02
RA	L	1.1E-02	1.5E-02	6.2E-03	2.8	5.2E-03	9	3	2.7E-03	5.0E-02
RA	G					5.2E-03	3	3		
RA	E1					1.3E-03	2	2		
RA	E2	1.4E-01	1.0E-01	1.1E-01	2.0	1.2E-01	6	0	1.6E-02	2.6E-01
RA	TAD	4.8E-01	1.2E-01	4.7E-01	1.3	5.1E-01	4	0	3.1E-01	5.9E-01
SA	M	6.4E-03	7.1E-03	4.3E-03	2.5	3.0E-03	10	4	1.4E-03	2.2E-02
SA	B	1.2E-02	5.7E-03	1.0E-02	1.6	1.1E-02	10	0	3.9E-03	2.0E-02
SA	L					6.3E-03	10	5		
SA	G	1.4E-03	1.3E-05	1.4E-03	1.0	1.4E-03	2	2	1.4E-03	1.4E-03

Appendix 4 – Soil

Table A4.1: *Description of sampled soils at Tjøtta*

Site	Soil
T1	Moist top-soil (brown soil)
T2	Moist top-soil (brown soil)
T3	Moist top-soil (brown soil)
T4	Dry, sandy soil
T5	Humus with sea shell sand)
T6	Wet bog (peat)
T7	Moist top-soil (brown soil)
T8	Poor soil (humus with moss)
T9	Poor soil (humus with moss)
T10	Poor soil (humus with moss)
T11	Moist top-soil (brown soil)
T12	Wet bog (peat)
T13	Moist top-soil (brown soil)
T14	Dry, sandy top-soil (brown soil)
T15	Bog
T16	Poor soil (humus with moss)
T17	Moist top-soil (brown soil)
T18	-
T19	-
T20	Moist top-soil (brown soil)
T21	Wet bog
T22	Wet bog
T23	Muddy soil

A4.2: *Physicochemical properties / main components (acid digest). Element data in µg/g (dry weight)*

Site	Humus	pH	LOI (%)	Al	Ca	Fe	K	Mg	Na	S	P
T1	ca. 10 cm	5.32	16.2	1.4E+04	1.1E+04	1.3E+04	2.2E+03	3.7E+03	4.7E+02	8.1E+02	6.9E+02
T2	10-15 cm	5.04	28.2	1.9E+04	1.1E+04	2.0E+04	2.8E+03	5.6E+03	6.8E+02	1.8E+03	1.2E+03
T3	10-15 cm	5.28	11.6	2.6E+04	2.5E+04	3.3E+04	1.3E+03	5.3E+03	5.6E+02	4.6E+02	6.9E+02
T4	ca. 5-8 cm	5.17	35.0	1.9E+04	1.5E+04	2.8E+04	1.8E+03	9.2E+03	5.1E+02	1.3E+03	9.7E+02
T5	ca. 8 cm	7.28	47.3	3.4E+03	1.7E+05	4.1E+03	4.8E+02	5.0E+03	1.3E+03	2.3E+03	9.1E+02
T6	-	6.31	81.1	1.7E+03	4.4E+04	1.1E+04	2.2E+02	9.7E+02	2.4E+02	5.3E+03	8.4E+02
T7	ca.10 cm	6.38	16.5	2.0E+04	2.5E+04	1.7E+04	4.0E+03	5.8E+03	7.6E+02	7.6E+02	6.0E+02
T8	-	3.91	63.1	7.2E+03	1.0E+03	5.4E+03	1.5E+03	8.3E+02	4.0E+02	1.9E+03	8.2E+02
T9	-	3.57	92.4	3.3E+03	1.3E+03	3.6E+03	8.6E+02	1.1E+03	7.3E+02	2.3E+03	7.8E+02
T10	-	3.78	73.6	7.0E+03	8.9E+02	5.3E+03	1.6E+03	9.0E+02	4.3E+02	2.9E+03	8.3E+02
T11	10-15 cm	6.65	12.7	2.0E+04	2.0E+04	2.0E+04	2.8E+03	6.0E+03	6.1E+02	9.4E+02	1.1E+03
T12	8-10 cm	5.91	43.3	1.2E+04	2.5E+04	1.3E+04	2.7E+03	4.0E+03	5.8E+02	3.3E+03	1.2E+03
T13	15-20 cm	5.71	26.0	1.4E+04	1.2E+04	1.5E+04	3.2E+03	5.3E+03	5.2E+02	1.6E+03	1.6E+03
T14	20-30 cm	6.38	10.1	1.7E+04	1.9E+04	1.8E+04	2.2E+03	5.8E+03	6.3E+02	5.4E+02	5.7E+02
T15	-	5.92	43.5	1.2E+04	1.6E+04	1.4E+04	2.7E+03	4.7E+03	5.6E+02	4.8E+03	1.6E+03
T16	-	3.65	87.6	3.3E+03	2.8E+03	3.7E+03	1.0E+03	1.2E+03	3.2E+02	2.2E+03	7.8E+02
T17	15-20 cm	5.19	15.3	1.4E+04	7.6E+03	1.2E+04	2.7E+03	4.2E+03	6.1E+02	8.2E+02	5.3E+02
T18	10-15 cm	3.94	85.0	4.4E+03	3.5E+03	4.1E+03	1.0E+03	1.8E+03	5.2E+02	3.9E+03	8.7E+02
T19	5-10 cm	5.41	27.0	2.6E+04	2.1E+04	2.6E+04	3.3E+03	7.5E+03	5.4E+02	1.6E+03	1.7E+03
T20	10-15 cm	4.12	92.8	2.2E+03	6.1E+03	1.9E+03	9.4E+02	2.0E+03	8.1E+02	3.9E+03	9.0E+02
T21	15-20 cm	5.03	32.0	1.4E+04	1.1E+04	1.6E+04	2.1E+03	4.2E+03	7.2E+02	3.0E+03	1.0E+03
T22	-	6.83	46.9	1.7E+03	1.7E+05	1.8E+03	5.1E+02	3.7E+03	1.4E+03	2.2E+03	5.9E+02
T23	-	4.85	28.1	2.3E+04	2.4E+04	1.2E+04	9.2E+02	1.6E+03	1.9E+02	7.0E+02	4.3E+02

Table A4.3: *Summary data for all elements (µg/g dry weight)*

Element	AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
Ag	5.2E-02	2.8E-02	4.6E-02	1.6	4.6E-02	23	0	1.6E-02	1.1E-01
Al	1.2E+04	8.0E+03	1.0E+04	1.8	1.4E+04	23	0	1.7E+03	2.6E+04
As	2.8E+00	2.2E+00	2.2E+00	2.0	1.8E+00	23	0	9.3E-01	9.4E+00
Au	3.1E-03	2.6E-03	2.4E-03	2.1	2.0E-03	23	0	7.4E-04	1.0E-02
B	7.8E+00	5.6E+00	6.3E+00	1.9	6.1E+00	23	0	3.0E+00	2.4E+01
Ba	4.5E+01	2.5E+01	3.9E+01	1.7	4.5E+01	23	0	1.1E+01	8.3E+01
Be	3.1E-01	2.0E-01	2.6E-01	1.8	2.9E-01	23	0	7.3E-02	8.2E-01
Bi	1.5E-01	1.0E-01	1.2E-01	1.9	1.1E-01	23	0	5.5E-02	4.7E-01
Ca	2.8E+04	4.5E+04	1.4E+04	3.1	1.5E+04	23	0	8.9E+02	1.7E+05
Cd	3.5E-01	1.9E-01	3.1E-01	1.7	3.3E-01	23	0	9.6E-02	8.9E-01
Ce	3.9E+01	2.5E+01	3.3E+01	1.8	3.4E+01	23	0	8.2E+00	9.8E+01
Co	4.2E+00	3.4E+00	3.3E+00	2.0	3.2E+00	23	0	6.0E-01	1.1E+01
Cr	3.4E+01	2.7E+01	2.7E+01	2.0	3.7E+01	23	0	3.8E+00	1.0E+02
Cs	1.0E+00	7.5E-01	8.4E-01	1.9	1.2E+00	23	0	7.6E-02	2.7E+00
Cu	7.6E+00	5.2E+00	6.2E+00	1.9	6.8E+00	23	0	2.1E+00	2.5E+01
Er	1.2E+00	7.9E-01	9.8E-01	1.8	1.1E+00	23	0	1.7E-01	3.6E+00
Fe	1.3E+04	8.7E+03	1.1E+04	1.8	1.3E+04	23	0	1.8E+03	3.3E+04
Ga	4.4E+00	3.2E+00	3.5E+00	1.9	4.6E+00	23	0	5.5E-01	1.2E+01
Hf	1.6E-01	1.0E-01	1.4E-01	1.8	2.0E-01	23	0	2.8E-02	3.5E-01
Hg	8.9E-02	6.0E-02	7.3E-02	1.9	8.8E-02	23	1	2.7E-03	2.2E-01
Ho	4.2E-01	2.7E-01	3.5E-01	1.8	4.0E-01	23	0	6.4E-02	1.2E+00
Ir	-	-	-	-	2.1E-04	23	23	-	-
K	1.9E+03	1.0E+03	1.6E+03	1.7	1.8E+03	23	0	2.2E+02	4.0E+03
La	2.0E+01	1.5E+01	1.6E+01	1.9	1.6E+01	23	0	3.9E+00	6.9E+01
Li	6.6E+00	6.2E+00	4.8E+00	2.2	6.6E+00	23	0	3.6E-01	2.2E+01
Lu	1.5E-01	1.1E-01	1.2E-01	1.9	1.6E-01	23	0	2.2E-02	4.8E-01
Mg	3.9E+03	2.3E+03	3.4E+03	1.7	4.2E+03	23	0	8.3E+02	9.2E+03
Mn	2.9E+02	2.2E+02	2.3E+02	2.0	3.0E+02	23	0	2.0E+01	6.9E+02
Mo	2.3E-01	1.2E-01	2.0E-01	1.7	2.2E-01	23	0	5.5E-02	5.5E-01
Na	6.1E+02	2.8E+02	5.6E+02	1.6	5.6E+02	23	0	1.9E+02	1.4E+03
Nd	1.7E+01	1.1E+01	1.5E+01	1.8	1.5E+01	23	0	3.4E+00	4.7E+01
Ni	1.0E+01	7.6E+00	7.9E+00	2.0	9.4E+00	23	0	1.9E+00	3.1E+01
P	9.2E+02	3.4E+02	8.6E+02	1.4	8.4E+02	23	0	4.3E+02	1.7E+03
Pb	2.0E+01	6.5E+00	1.9E+01	1.4	2.1E+01	23	0	7.1E+00	3.1E+01
Pr	4.6E+00	3.2E+00	3.8E+00	1.9	3.8E+00	23	0	9.2E-01	1.4E+01
Pt	5.3E-04	3.1E-04	4.6E-04	1.7	5.3E-04	23	8	1.9E-04	1.3E-03
Rb	1.2E+01	8.0E+00	9.6E+00	1.9	1.3E+01	23	0	7.1E-01	3.1E+01
S	2.1E+03	1.4E+03	1.8E+03	1.8	1.9E+03	23	0	4.6E+02	5.3E+03
Sb	2.5E-02	5.3E-02	1.1E-02	3.7	3.6E-03	23	6	9.4E-04	1.9E-01
Sc	4.9E+00	3.1E+00	4.1E+00	1.8	5.3E+00	23	0	6.2E-01	1.1E+01
Se	8.8E-01	4.0E-01	8.0E-01	1.5	1.0E+00	23	0	1.8E-01	1.5E+00
Si	7.1E+02	7.7E+01	7.1E+02	1.1	7.3E+02	23	0	5.3E+02	8.4E+02
Sm	3.4E+00	2.0E+00	2.9E+00	1.7	3.1E+00	23	0	6.4E-01	8.0E+00
Sn	1.6E-01	1.5E-01	1.1E-01	2.2	1.0E-01	23	0	5.1E-02	7.1E-01
Sr	1.7E+02	2.3E+02	1.0E+02	2.8	8.4E+01	23	0	1.3E+01	8.8E+02
Tb	4.1E-01	2.4E-01	3.6E-01	1.7	4.0E-01	23	0	7.1E-02	1.1E+00
Th	3.5E+00	2.3E+00	2.9E+00	1.8	3.4E+00	23	0	3.8E-01	8.4E+00
Ti	1.9E+02	5.8E+01	1.8E+02	1.4	1.8E+02	23	0	9.4E+01	3.6E+02
Tl	1.6E-01	8.8E-02	1.4E-01	1.7	1.4E-01	23	0	5.1E-02	3.5E-01
Tm	1.6E-01	1.1E-01	1.3E-01	1.9	1.5E-01	23	0	2.4E-02	5.0E-01
U	1.6E+00	1.1E+00	1.3E+00	1.9	1.3E+00	23	0	3.3E-01	4.4E+00
V	3.2E+01	2.1E+01	2.7E+01	1.8	3.9E+01	23	0	4.6E+00	6.7E+01
Y	1.3E+01	8.6E+00	1.0E+01	1.8	1.2E+01	23	0	1.6E+00	4.1E+01
Yb	1.0E+00	7.2E-01	8.4E-01	1.9	9.7E-01	23	0	1.4E-01	3.2E+00
Zn	3.2E+01	1.9E+01	2.7E+01	1.7	2.8E+01	23	0	5.9E+00	1.0E+02
Zr	6.4E+00	4.0E+00	5.4E+00	1.8	8.2E+00	23	0	1.0E+00	1.4E+01

Appendix 5 – Freshwater

Table A5.1: *Description of sampling sites*

Site	Name	Description
F1	Kråkvikvatnet	Shallow lake
F2	Gjerdevatnet	Small, shallow lake
F3	Storvatnet	Large, shallow lake
F4	-	Pond
F5	Rundvatnet	Small, shallow lake
F6	-	Ditch/pond
F7+8	Markvollelva	Small river
F9	-	Small pond
F10	-	Ditch/pond
F11	-	Shallow pond
F12	-	Small ditch/pond
F13	-	Large pond
F14	-	Small pond
F15	-	Small pond
F16	Markvollelva	Small river

Table A5.2: *Physicochemical properties / main components (0.45µm filtrate). Element concentrations in µg/L. C=conductivity (µS/cm)*

Site	pH	T (°C)	C	Al	Ca	Fe	K	Mg	Na	S	P
F1	8.01	6.0	459	4.1E+00	5.5E+04	1.6E+01	1.4E+03	5.9E+03	1.8E+04	1.8E+03	4.0E+00
F2	8.66	6.6	243	1.4E+01	1.8E+04	7.9E+01	2.9E+03	3.4E+03	1.6E+04	1.4E+03	7.7E+00
F3	8.42	10.6	118	3.4E+01	1.2E+04	8.6E+01	1.3E+03	2.3E+03	1.0E+04	1.5E+03	1.0E+01
F4	7.63	10.3	216	8.4E+01	1.7E+04	1.6E+02	1.8E+03	4.0E+03	1.3E+04	2.1E+03	1.9E+01
F5	7.35	10.3	236	3.6E+01	1.8E+04	1.5E+02	4.3E+03	6.0E+03	1.6E+04	2.7E+03	2.1E+02
F6	7.83	11.4	220	5.3E+01	2.0E+04	1.0E+02	6.7E+02	2.2E+03	6.5E+03	4.5E+02	7.8E+00
F7+8	7.11	7.7	20	7.9E+01	5.7E+02	5.5E+01	1.5E+02	2.5E+02	2.3E+03	3.3E+02	5.4E+00
F9	7.06	17.6	-	2.9E+01	2.7E+04	6.5E+01	2.2E+03	4.9E+03	2.4E+04	1.9E+03	9.1E+00
F10	4.81	14.5	-	2.0E+02	1.1E+03	4.4E+02	3.8E+02	7.9E+02	7.0E+03	3.4E+02	1.0E+01
F11	7.12	15.0	-	2.9E+01	5.7E+04	2.1E+02	5.6E+02	3.6E+03	2.3E+04	3.8E+03	1.3E+01
F12	5.60	13.3	-	1.0E+02	1.0E+04	2.2E+02	4.9E+03	6.9E+03	4.5E+04	6.5E+03	3.4E+01
F13	6.60	12.4	-	8.8E+01	1.4E+04	9.9E+02	1.8E+03	5.5E+03	2.4E+04	1.4E+03	1.5E+01
F14	7.27	10.3	-	1.6E+01	3.7E+04	6.3E+01	6.1E+02	3.8E+03	9.1E+03	4.6E+02	7.5E+00
F15	5.06	10.5	-	5.9E+02	1.8E+03	5.7E+02	2.7E+03	1.6E+03	8.2E+03	5.6E+02	4.7E+01
F16	6.51	7.0	22	4.9E+01	5.2E+02	3.1E+01	2.2E+02	3.8E+02	3.5E+03	3.5E+02	3.9E+00

Table A5.3: *Area A – Element concentrations in sampled freshwater (µg/L)*

Element	AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
Ag	2.2E-02	2.1E-02	1.7E-02	2.2	1.0E-02	13	7	1.0E-02	8.4E-02
Al	9.9E+01	1.6E+02	5.3E+01	3.1	3.6E+01	13	0	4.1E+00	5.9E+02
As	3.6E-01	2.6E-01	2.9E-01	1.9	2.7E-01	13	0	1.5E-01	1.0E+00
Au	4.7E-02	3.0E-02	3.9E-02	1.8	4.0E-02	13	0	1.6E-02	1.3E-01
B	1.4E+01	7.9E+00	1.2E+01	1.7	1.3E+01	13	0	5.1E+00	3.5E+01
Ba	5.0E+00	2.1E+00	4.6E+00	1.5	5.3E+00	13	0	2.0E+00	9.2E+00
Be	-	-	-	-	4.0E-03	13	11	-	-
Bi	1.7E-03	8.2E-04	1.5E-03	1.6	1.3E-03	13	2	5.0E-04	3.0E-03
Ca	2.2E+04	1.8E+04	1.7E+04	2.0	1.8E+04	13	0	1.1E+03	5.7E+04
Cd	1.2E-02	1.3E-02	7.8E-03	2.4	7.1E-03	13	0	2.1E-03	4.7E-02
Ce	7.9E-01	1.2E+00	4.4E-01	3.0	2.8E-01	13	0	1.9E-02	4.3E+00
Co	1.5E-01	1.4E-01	1.1E-01	2.2	1.1E-01	13	0	2.2E-02	4.8E-01
Cr	3.2E-01	1.3E-01	3.0E-01	1.5	3.1E-01	13	0	1.2E-01	5.5E-01
Cs	2.9E-02	2.3E-02	2.2E-02	2.0	2.1E-02	13	0	4.7E-03	7.7E-02
Cu	2.8E+00	1.4E+00	2.5E+00	1.6	2.9E+00	13	0	7.9E-01	5.4E+00
Dy	4.5E-02	5.0E-02	3.0E-02	2.5	2.2E-02	13	0	2.3E-03	1.9E-01
Er	2.3E-02	1.9E-02	1.8E-02	2.1	1.2E-02	13	0	2.0E-03	7.0E-02
Fe	2.4E+02	2.7E+02	1.6E+02	2.5	1.5E+02	13	0	1.6E+01	9.9E+02
Ga	1.5E-02	2.3E-02	8.0E-03	3.0	3.5E-03	13	8	3.5E-03	8.0E-02
Hf	1.9E-03	1.2E-03	1.6E-03	1.8	1.5E-03	13	0	3.8E-04	4.1E-03
Hg	9.4E-03	3.8E-03	8.8E-03	1.5	8.9E-03	13	0	5.2E-03	1.8E-02
Ho	8.3E-03	8.0E-03	5.9E-03	2.3	4.3E-03	13	0	6.5E-04	3.0E-02
Ir	-	-	-	-	2.5E-04	13	13	-	-
K	2.0E+03	1.4E+03	1.6E+03	1.9	1.8E+03	13	0	3.8E+02	4.9E+03
La	4.5E-01	6.3E-01	2.6E-01	2.8	2.0E-01	13	0	1.3E-02	2.3E+00
Li	8.9E-01	5.6E-01	7.5E-01	1.8	8.0E-01	13	0	3.0E-01	2.5E+00
Lu	3.4E-03	2.4E-03	2.8E-03	1.9	2.7E-03	13	0	5.7E-04	7.3E-03
Mg	3.9E+03	1.9E+03	3.5E+03	1.6	3.8E+03	13	0	7.9E+02	6.9E+03
Mn	2.8E+01	4.5E+01	1.5E+01	3.1	4.2E+00	13	0	9.8E-01	1.3E+02
Mo	6.8E-02	4.1E-02	5.9E-02	1.7	5.1E-02	13	0	2.4E-02	1.6E-01
Na	1.7E+04	1.1E+04	1.4E+04	1.8	1.6E+04	13	0	6.5E+03	4.5E+04
Nb	5.9E-03	5.6E-03	4.3E-03	2.2	4.0E-03	13	1	9.0E-04	2.3E-02
Nd	4.0E-01	5.4E-01	2.4E-01	2.8	1.6E-01	13	0	1.3E-02	2.0E+00
Ni	1.2E+00	1.0E+00	9.6E-01	2.0	1.2E+00	13	0	1.9E-01	3.7E+00
P	3.0E+01	5.5E+01	1.5E+01	3.3	1.0E+01	13	0	4.0E+00	2.1E+02
Pb	4.8E-01	3.3E-01	4.0E-01	1.8	3.5E-01	13	0	2.2E-01	1.3E+00
Pr	1.1E-01	1.4E-01	6.2E-02	2.8	4.5E-02	13	0	3.5E-03	5.2E-01
Pt	-	-	-	-	5.0E-04	13	13	-	-
Rb	2.4E+00	1.6E+00	2.0E+00	1.8	2.0E+00	13	0	8.6E-01	6.6E+00
S	1.9E+03	1.7E+03	1.4E+03	2.1	1.5E+03	13	0	3.4E+02	6.5E+03
Sb	5.1E-02	1.4E-02	5.0E-02	1.3	5.0E-02	13	0	2.8E-02	7.2E-02
Sc	1.3E-02	1.1E-02	1.0E-02	2.0	1.0E-02	13	2	2.0E-03	4.1E-02
Se	-	-	-	-	9.6E-02	13	13	-	-
Si	7.8E+02	3.8E+02	7.1E+02	1.6	7.6E+02	13	0	2.9E+02	1.8E+03
Sm	7.3E-02	9.9E-02	4.4E-02	2.8	2.9E-02	13	0	3.9E-03	3.7E-01
Sn	4.0E-01	1.3E-01	3.9E-01	1.4	4.2E-01	13	0	2.6E-01	6.8E-01
Sr	1.3E+02	9.7E+01	1.0E+02	2.0	1.1E+02	13	0	8.4E+00	3.4E+02
Tb	9.1E-03	1.2E-02	5.6E-03	2.7	4.0E-03	13	0	4.8E-04	4.4E-02
Th	3.1E-02	2.8E-02	2.3E-02	2.2	1.9E-02	13	0	3.1E-03	9.8E-02
Ti	2.2E+00	3.1E+00	1.2E+00	2.9	1.1E+00	13	0	2.6E-01	1.1E+01
Tl	5.6E-03	4.6E-03	4.3E-03	2.0	4.4E-03	13	0	1.8E-03	1.8E-02
Tm	3.1E-03	2.3E-03	2.5E-03	1.9	1.9E-03	13	1	2.5E-04	7.4E-03
U	8.0E-02	6.6E-02	6.2E-02	2.1	4.8E-02	13	0	1.4E-02	2.4E-01
V	3.2E-01	2.7E-01	2.4E-01	2.1	1.8E-01	13	0	1.0E-01	1.0E+00
W	3.5E-03	2.3E-03	2.9E-03	1.8	3.4E-03	13	4	1.1E-03	8.7E-03
Y	2.4E-01	2.3E-01	1.7E-01	2.2	1.3E-01	13	0	2.0E-02	8.7E-01
Yb	2.1E-02	1.5E-02	1.7E-02	1.9	1.5E-02	13	0	2.4E-03	4.4E-02
Zn	8.0E+00	7.0E+00	6.0E+00	2.1	5.6E+00	13	0	2.5E+00	2.6E+01

Table A5.4: *Area B – Element concentrations in sampled river water (µg/L)*

Element	AM/Med	N	n<DL	Min	Max
Ag	2.1E-02	2	1	1.0E-02	3.2E-02
Al	6.4E+01	2	0	4.9E+01	7.9E+01
As	5.1E-02	2	0	4.2E-02	6.0E-02
Au	2.3E-02	2	0	1.4E-02	3.3E-02
B	2.6E+00	2	0	2.4E+00	2.7E+00
Ba	7.6E-01	2	0	7.0E-01	8.1E-01
Be	7.0E-03	2	1	4.0E-03	1.0E-02
Bi	1.1E-03	2	1	5.0E-04	1.7E-03
Ca	5.5E+02	2	0	5.2E+02	5.7E+02
Cd	6.4E-03	2	0	5.9E-03	6.8E-03
Ce	4.9E-01	2	0	3.3E-01	6.4E-01
Co	2.9E-02	2	0	2.8E-02	3.0E-02
Cr	6.2E-02	2	0	5.5E-02	6.9E-02
Cs	8.8E-03	2	0	8.2E-03	9.4E-03
Cu	4.0E+00	2	0	2.3E+00	5.8E+00
Dy	5.5E-02	2	0	3.7E-02	7.4E-02
Er	2.6E-02	2	0	1.7E-02	3.4E-02
Fe	4.3E+01	2	0	3.1E+01	5.5E+01
Ga	3.5E-03	2	2	-	-
Hf	4.6E-04	2	0	4.5E-04	4.7E-04
Hg	4.6E-03	2	0	3.0E-03	6.2E-03
Ho	9.4E-03	2	0	5.9E-03	1.3E-02
Ir	2.5E-04	2	2	-	-
K	1.8E+02	2	0	1.5E+02	2.2E+02
La	4.2E-01	2	0	2.8E-01	5.6E-01
Li	2.4E-01	2	0	2.1E-01	2.6E-01
Lu	2.4E-03	2	0	1.7E-03	3.0E-03
Mg	3.2E+02	2	0	2.5E+02	3.8E+02
Mn	1.8E+00	2	0	1.5E+00	2.2E+00
Mo	1.2E-01	2	0	9.3E-02	1.5E-01
Na	2.9E+03	2	0	2.3E+03	3.5E+03
Nb	2.1E-03	2	1	9.0E-04	3.3E-03
Nd	3.9E-01	2	0	2.6E-01	5.2E-01
Ni	1.6E-01	2	0	1.5E-01	1.7E-01
P	4.6E+00	2	0	3.9E+00	5.4E+00
Pb	4.3E-01	2	0	4.3E-01	4.3E-01
Pr	1.0E-01	2	0	7.0E-02	1.4E-01
Pt	8.0E-04	2	1	5.0E-04	1.1E-03
Rb	4.0E-01	2	0	3.2E-01	4.7E-01
S	3.4E+02	2	0	3.3E+02	3.5E+02
Sb	3.0E-02	2	0	2.7E-02	3.2E-02
Sc	3.7E-03	2	1	2.0E-03	5.4E-03
Se	9.6E-02	2	2	-	-
Si	3.2E+02	2	0	2.6E+02	3.8E+02
Sm	7.4E-02	2	0	4.9E-02	9.9E-02
Sn	2.7E-01	2	0	2.5E-01	2.9E-01
Sr	3.1E+00	2	0	3.1E+00	3.1E+00
Tb	1.1E-02	2	0	7.3E-03	1.4E-02
Th	9.0E-03	2	0	6.3E-03	1.2E-02
Ti	9.1E-01	2	0	7.5E-01	1.1E+00
Tl	3.0E-03	2	0	3.0E-03	3.1E-03
Tm	2.9E-03	2	0	1.9E-03	3.8E-03
U	2.1E-01	2	0	1.3E-01	2.8E-01
V	9.6E-02	2	0	7.6E-02	1.2E-01
W	1.1E-03	2	2		
Y	2.8E-01	2	0	1.9E-01	3.7E-01
Yb	1.6E-02	2	0	1.1E-02	2.1E-02
Zn	6.0E+00	2	0	4.6E+00	7.4E+00

Appendix 6 – Sea water

***Table A6.1:** Physicochemical properties / main components in individual samples (0.45µm filtrate)*

Site	pH	Temperature (°C)	Salinity (ppt)
M1	8.01	8.0	25.5
M2	8.01	8.2	25.3
M3	8.05	7.0	19.8
M4	7.96	7.0	19.6
M5	7.94	8.3	23.3
M6	7.93	7.3	24.1
M7	7.87	9.4	22.6

***Table A6.2:** Element concentrations in sampled seawater (measured) (µg/L)*

Element	AM	ASD	GM	GSD	Med	N	n<DL	Min	Max
Al	3.4E+01	1.9E+01	3.0E+01	1.7	2.1E+01	7	0	1.7E+01	5.8E+01
As	1.4E+00	1.3E-01	1.4E+00	1.1	1.4E+00	7	0	1.3E+00	1.6E+00
Ba	6.3E+00	3.9E-01	6.3E+00	1.1	6.3E+00	7	0	5.7E+00	6.7E+00
Bi	1.5E-02	4.1E-03	1.4E-02	1.3	1.5E-02	7	0	8.9E-03	1.9E-02
Cd	-	-	-	-	1.5E-02	7	7	-	-
Ce	7.5E-02	3.0E-02	7.0E-02	1.5	6.0E-02	7	0	4.5E-02	1.1E-01
Co	5.7E-02	3.2E-02	5.0E-02	1.7	4.4E-02	7	0	2.5E-02	9.9E-02
Cr	1.8E-01	7.4E-02	1.7E-01	1.5	1.9E-01	7	0	9.1E-02	2.9E-01
Cs	2.4E-01	2.4E-02	2.4E-01	1.1	2.5E-01	7	0	2.0E-01	2.6E-01
Cu	8.7E-01	4.8E-01	7.6E-01	1.7	7.3E-01	7	0	4.2E-01	1.9E+00
Er	3.0E-03	2.8E-04	3.0E-03	1.1	3.0E-03	7	0	2.8E-03	3.4E-03
Fe	5.1E+01	3.8E+01	4.1E+01	1.9	2.9E+01	7	0	1.4E+01	1.0E+02
Ho	1.5E-03	6.2E-04	1.4E-03	1.5	1.6E-03	7	0	3.5E-04	2.4E-03
Lu	8.4E-04	2.3E-04	8.1E-04	1.3	8.0E-04	7	0	5.5E-04	1.2E-03
Mn	2.3E+00	9.7E-01	2.1E+00	1.5	1.8E+00	7	0	1.2E+00	3.4E+00
Mo	8.1E+00	9.3E-01	8.1E+00	1.1	8.6E+00	7	0	6.6E+00	8.8E+00
Nd	4.4E-02	9.4E-03	4.3E-02	1.2	4.1E-02	7	0	3.5E-02	5.6E-02
Ni	3.8E-01	1.2E-01	3.6E-01	1.4	3.0E-01	7	0	2.6E-01	5.3E-01
P	1.2E+01	1.0E+00	1.2E+01	1.1	1.2E+01	7	0	1.1E+01	1.3E+01
Pb	1.2E-01	5.8E-02	1.1E-01	1.6	1.1E-01	7	0	7.4E-02	2.5E-01
Pr	1.1E-02	3.2E-03	1.1E-02	1.3	8.9E-03	7	0	8.0E-03	1.5E-02
Rb	9.0E+01	9.8E+00	8.9E+01	1.1	9.4E+01	7	0	7.6E+01	9.9E+01
Ru	8.5E-02	2.8E-02	8.0E-02	1.4	7.3E-02	7	0	5.5E-02	1.3E-01
S	8.2E+05	8.3E+04	8.2E+05	1.1	8.6E+05	7	0	6.9E+05	9.0E+05
Sb	4.3E-01	7.4E-02	4.2E-01	1.2	4.6E-01	7	0	3.2E-01	5.1E-01
Si	2.1E+02	6.7E+01	2.0E+02	1.4	2.1E+02	7	0	1.1E+02	2.9E+02
Sm	1.0E-02	2.6E-03	1.0E-02	1.3	9.9E-03	7	0	6.8E-03	1.5E-02
Sn	-	-	-	-	2.5E-02	7	7	-	-
Sr	6.2E+03	6.6E+02	6.1E+03	1.1	6.5E+03	7	0	5.2E+03	6.7E+03
Tb	1.3E-03	3.4E-04	1.3E-03	1.3	1.3E-03	7	0	6.8E-04	1.8E-03
Th	1.6E-02	5.6E-03	1.5E-02	1.4	1.6E-02	7	0	9.2E-03	2.6E-02
Tl	1.2E-02	1.3E-03	1.2E-02	1.1	1.2E-02	7	0	9.7E-03	1.4E-02
Tm	4.2E-04	2.2E-04	3.7E-04	1.6	2.5E-04	7	4	2.5E-04	7.7E-04
U	2.6E+00	2.7E-01	2.6E+00	1.1	2.7E+00	7	0	2.2E+00	2.8E+00
V	1.1E+00	7.3E-02	1.1E+00	1.1	1.1E+00	7	0	9.7E-01	1.2E+00
W	2.7E-02	6.1E-03	2.7E-02	1.2	2.8E-02	7	0	1.9E-02	3.7E-02
Y	7.1E-02	4.0E-03	7.1E-02	1.1	6.9E-02	7	0	6.8E-02	7.8E-02
Yb	3.1E-03	7.8E-04	3.0E-03	1.3	3.1E-03	7	0	2.1E-03	4.5E-03
Zn	3.3E+00	8.6E-01	3.2E+00	1.3	3.1E+00	7	0	2.2E+00	4.9E+00

Table A6.3: *Element concentrations in sampled seawater (derived from general sea water composition and salinity) (µg/L)*

Element	AM	ASD	GM	GSD	Med	N
B	2.9E+03	3.1E+02	2.9E+03	1.1	3.0E+03	7
Ca	2.7E+05	2.8E+04	2.7E+05	1.1	2.7E+05	7
K	2.6E+05	2.7E+04	2.6E+05	1.1	2.7E+05	7
Li	1.2E+02	1.2E+01	1.2E+02	1.1	1.2E+02	7
Mg	8.5E+05	8.9E+04	8.4E+05	1.1	8.6E+05	7
Na	7.0E+06	7.4E+05	7.0E+06	1.1	7.2E+06	7

Note that adjustments of typical ocean concentrations (Bowen, 1979; Millero, 1996) using measured salinity at the Tjøtta marine localities M1–M7 (see A6.1) results in more conservative estimates of CRs.

Appendix 7 – Radionuclide activity concentrations

Table A7.1: *Poaceae (Bq/kg dry weight)*

Nuclide	AM	ASD	GM	GSD	Med	N	n<DL*	Min	Max	Ref. time
Cs-134	1.8E+00	7.5E-01	1.7E+00	1.5	1.6E+00	10	5	1.0E+00	2.9E+00	01.06.2011
Cs-137	8.5E+02	4.3E+02	7.5E+02	1.6	7.6E+02	10	0	2.3E+02	1.9E+03	01.06.2011
K-40	4.1E+02	7.0E+01	4.0E+02	1.2	4.1E+02	10	0	2.7E+02	5.2E+02	01.06.2011
Ra-226	3.2E+00	1.8E+00	2.7E+00	1.7	3.4E+00	10	4	1.1E+00	5.9E+00	01.06.2011

*Detection limits: Cs-134: 2.0–2.5 Bq/kg, Ra-226: 2.1–2.8 Bq/kg

Cs-134 is most likely from the Fukushima accident (plant surface contamination), which occurred a few months before the sampling for this project was performed.

Table A7.2: *Pinaceae (Bq/kg dry weight)*

Nuclide	AM	ASD	GM	GSD	Med	N	n<DL*	Min	Max	Ref. time
Cs-137	9.1E+02	5.6E+02	7.7E+02	1.8	9.6E+02	10	0	9.1E+01	1.7E+03	01.06.2011
K-40	2.5E+02	6.0E+01	2.4E+02	1.3	2.4E+02	10	0	1.7E+02	3.4E+02	01.06.2011
Ra-226	3.9E+00	2.9E+00	3.1E+00	1.9	3.1E+00	10	4	8.0E-01	9.1E+00	01.06.2011

*Detection limit Ra-226: 1.6 –4.1 Bq/kg

Table A7.3: *Apidea (Bq/kg dry weight)*

Nuclide	AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Ref. time
Cs-137	5.8E+02					1	0			01.06.2011
K-40	3.7E+02					1	0			01.06.2011
Ra-226	1.4E+00					1	1			01.06.2011

*Detection limit Ra-226: 2.8 Bq/kg

Table A7.4: *Soil (Bq/kg dry weight)*

Nuclide	AM	ASD	GM	GSD	Med	N	n<DL	Min	Max	Ref. time
Am-241	1.5E+00	4.9E-01	1.5E+00	1.4	1.6E+00	10	0	8.4E-01	2.2E+00	01.06.2011
Cs-137	5.2E+02	2.3E+02	4.7E+02	1.5	4.3E+02	23	0	2.0E+02	1.2E+03	01.06.2011
K-40	1.8E+02	1.2E+02	1.5E+02	1.8	1.7E+02	23	0	1.5E+01	4.4E+02	01.06.2011
Ra-226	1.9E+01	1.2E+01	1.6E+01	1.8	1.8E+01	23	0	3.8E+00	4.7E+01	01.06.2011
Ra-228	1.9E+01	1.1E+01	1.7E+01	1.7	2.0E+01	23	0	2.8E+00	3.8E+01	01.06.2011

Am-241 is probably present in the soil due to decay of Pu-241 from the Chernobyl accident. No Am-241 was detected in any of the RAPs.

Appendix 8 – Mass of organs review

As explained in Yankovich et al. (2010), the total mass of an element in a specific tissue can be estimated – and then used to reconstruct the amount of element in the whole-body of a given type of animal using a '*mass balance*' approach. This requires compilation of data on the concentrations of a given element in a specific tissue and data on the masses of different tissues/organs for the purpose of representing compartment size. The following information is available from the published literature with regards to the fractional mass of organs/body parts studied within this project and for biota for which such data were required for conducting whole body CR derivations.

Cervidae (CE)

Barnett et al. (2014) sampled Roe deer (*Capreolus capreolus*) from a forest ecosystem in the UK. The range in total fresh muscle mass was 36–38 % of live mass, bone comprised 7–8 %, liver 2–3 % and ovaries 0.004–0.006 %. No information was provided on male testes masses.

For marine mammals, in the derivation of whole body CR data for the ERICA Tool (see Brown et al., 2008) the following fractional masses were used: 0.3 (muscle), 0.05 (skeleton), 0.006 (liver), 0.0025 (kidney) and 0.64 for "other" (i.e. remaining body mass fraction not accounted for in the previous categories including gonads, brain etc.).

The fractional masses used by Yankovich et al. (2010) for bone, kidney, liver and muscle in (freshwater) mammals were 0.07, 0.003, 0.013 and 0.914, respectively.

Only parts of moose muscle, bone, liver and gonads were sampled for our project, and no fractional masses could therefore be derived.

Muridae (MU)

Specimens of Wood mouse (*Apodemus sylvaticus*) were also sampled by Barnett et al. (2014). The range in total fresh muscle mass was estimated to be approximately 41–59 % of live mass whilst bone comprised 2–5 %. The method used in this derivation may provide a particularly accurate measure of 'pure' skeletal material because carcasses were placed in a beetle (*Dermestes maculatus*) colony to clean the bone of all soft tissue. However, the most appropriate fractional mass of bone to adopt will clearly depend on the type of samples used in the determination of element composition. For example, if uncleansed bone formed the basis for material measured for elemental content, it would be appropriate to use the fractional mass of uncleansed bone in the derivation of whole body concentrations.

The pelt comprised 13–23 % of live mass and the gastrointestinal tract (including contents) comprised 15–29 %. Other details provided in the article allow approximate % by masses of other organs/body part to be derived. From this Liver comprises 1.1-2.3% body mass; male gonads 0.3-0.6 % body mass and female gonads 0.2-0.5 % body mass.

For mice sampled at Tjøtta, the liver comprised 5.6±1.3%. No data for muscles and bone were available.

Anatidae (AN)

Skwarzec & Fabisiak (2007) provide detailed information on various organs/body parts by percentage live whole body mass in a study of ^{210}Po bioaccumulation in birds. Although strictly speaking the specimens sampled were defined as 'marine birds', the allocation of ecosystem is clearly incidental (simply reflects where the animals happened to be sampled) and any data reported on body component masses for Duck (*Anatidae*) should be or relevance for other ecosystems.

Information is provide in the article for Tufted duck (*Aythya fuligula*), Common eider (*Somateria mollissima*), and Long-tailed duck (*Clangula hyemalis*) all of which fall under the taxonomic classification of *Anatidae*; Approximate organs/body part by percentage live whole body mass are liver 5 %, bone 25 % and muscle 23 %. Information was available for other body components including feathers but no information was presented on the mass of gonads in this paper.

For ducks sampled at Tjøtta, the liver comprised 3±1%. No data for muscles and bone were available.

Ranidae (RA)

Data from Vogiatzis & Loumbourdis (1998) who studied the Marsh frog (*Rana ridibunda*) allow us to place liver at approximately 4 % of total body mass.

In a study concerning the desiccation and rehydration of the Leopard frog (*Rana Pipiens*), Smith and Jackson (1931) presented detailed information on the masses of various organs/body parts for the specimens studied. The following information can be derived from analysis of these data: Approximate organs/body part by percentage live whole body mass were skeleton 16 %, liver 5 %, muscle 49 %, testes 0.13 %

In comparison, the fractional masses (ft) adopted by Yankovich et al. (2010) for bone, liver and muscle in amphibians were 0.03, 0.028 and 0.939, respectively.

For frogs sampled at Tjøtta, the liver comprised 5±1%. No data for muscles and bone were available.

Salmonidae (SA)

Hewett & Jefferies (1978) studied the accumulation of radiocaesiumin Brown trout (Salmo trutta) and in so doing provided details on the masses of various organs within the trout. Organs/body part by percentage live whole body mass approximate to skeleton 8 %, liver 1 % and muscle 63 %.

In comparison, the fractional masses adopted by Yankovich et al. (2010) for bone, liver and muscle in fish were assumed to be 0.1346, 0.0054, and 0.8452, respectively.

For marine fish, in the derivation of whole body CR data for the ERICA Tool (see Brown et al., 2008) the following fractional masses were used: skeleton 0.15; concentrating organ (primarily liver) 0.01; GIT/viscera 0.17 and muscle/flesh 0.27 and "Other" (including gills, gonads, brain etc. not accounted for in the previous categories) 0.4.

For salmon sampled at Tjøtta, the liver comprised 0.95±0.15%. No data for muscles and bone.

Pleuronectidae (PL)

The flatfish plaice (*Pleuronectes platessa*) were also studied by Hewett & Jefferies (1978) in order to quantify accumulation of radiocaesium by this species. Organs/body part by percentage live whole body mass approximate to liver 2 %, skeleton 13 %, muscle 58 %.

For plaice sampled at Tjøtta, the liver comprised 1.4±0.5%. No data for muscles and bone were available.

Cancridae (CA)

For crabs sampled at Tjøtta, the soft tissue comprised 24±3% of the total weight, and the carapace plus parts of shells from claws and legs stood for 20±5%. The residual fraction is assumed to be hard tissues claws and legs.

According to Woll (2005), the fractional mass of soft tissues for a good quality female crab caught in October is 29.5%, where 14.5 % is white tissue, 9.5% brown tissue and 5.5% consist of eggs/roe.

Summary of data

Based on the data/studies presented above the following summary table (Table A8.1) have been constructed for application in the whole body CR calculations.

Table A8.1: *Percentage by body mass of organs/body parts used in calculations*

Organism	**Fractional masses of various organs/body parts**				
	Bone	*Muscle*	*Liver*	*Gonads*	*Other*
Mammal (Rat and Deer)	0.07	0.5	0.025	0.005	0.4
Duck	0.25	0.25	0.05	--	0.45
Frog	0.15	0.5	0.05	--	0.3
Fish (Trout and Flatfish)	0.13	0.65	0.01	--	0.21

For crab we decided to use 0.25 soft tissue and 0.75 hard tissue (since both male and female crabs were included in our study we chose to exclude roe).

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