

EMRAS II

WG 5:

Radionuclide Transfer to wildlife

Objectives

This document is primarily intended to provide IAEA Member States with generic transfer parameter values for use in assessment of radiation exposure to wildlife as a consequence of planned and existing exposure situations. As an equilibrium approach is given, these data are not directly applicable in the early phases in emergency situations.

Database

Responsibilities:

Tamara Yankovich (SRC) – Freshwater

Justin Brown (NRPA) – Marine

CEH – Terrestrial/Estuarine

David Copplestone (EA) - On-line database

Derivation of values in tables

$$CR_{\text{wo-soil}} = \frac{\text{Activity concentration in whole organism (Bq kg}^{-1} \text{ fresh weight)}}{\text{Activity concentration in soil (Bq kg}^{-1} \text{ dry weight)}}$$

$$CR_{\text{wo-water}} = \frac{\text{Activity concentration in whole organism (Bq kg}^{-1} \text{ fresh weight)}}{\text{Activity concentration in water (Bq l}^{-1} \text{)}}$$

At equilibrium



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Journal of Environmental Radioactivity

journal homepage: www.elsevier.com/locate/jenvrad



Derivation of transfer parameters for use within the ERICA Tool and the default concentration ratios for terrestrial biota

N.A. Beresford^{a,*}, C.L. Barnett^a, B.J. Howard^a, W.A. Scott^a, J.E. Brown^b, D. Coppleson^c

Started with ERICA database



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Journal of Environmental Radioactivity 99 (2008) 1408–1429

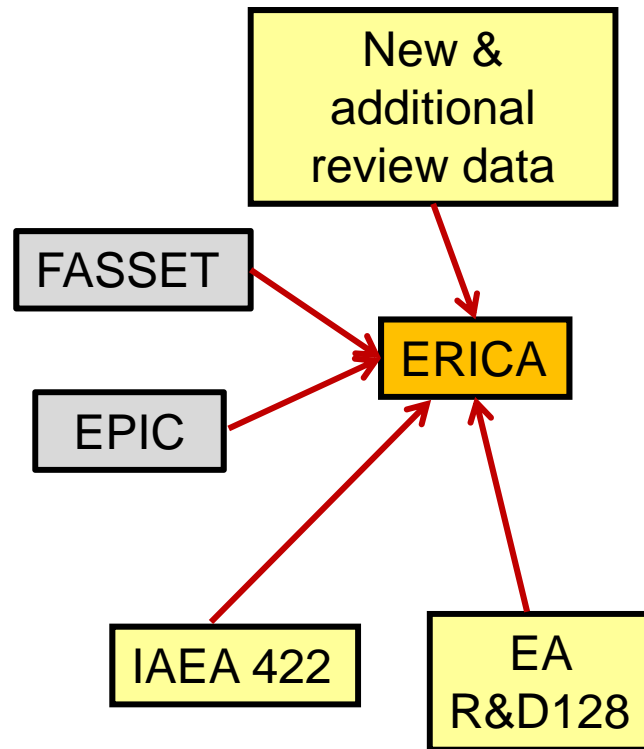
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Transfer of radionuclides in aquatic ecosystems – Default concentration ratios for aquatic biota in the Erica Tool

A. Hosseini^a, H. Thørring^a, J.E. Brown^{a,*}, R. Saxén^b, E. Ilus^b

Database evolution



Ag	Silver
Am	Americium
C	Carbon
Cd	Cadmium
Ce	Cerium
Cl	Chlorine
Cm	Curium
Co	Cobalt
Cs	Caesium
Eu	Europium
H	Tritium
I	Iodine
Mn	Mangenes
Nb	Niobium
Ni	Nickel
Np	Neptunium
P	Phosphorus
Pb	Lead
Po	Polonium
Pu	Plutonium
Ra	Radium
Ru	Ruthenium
S	Sulphur
Sb	Antimony
Se	Selenium
Sr	Strontium
Tc	Technetium
Te	Tellurium
Th	Thorium
U	Uranium
Zr	Zirconium

ERICA Tool Reference Organisms

Marine

Phytoplankton
Macroalgae
Vascular plant
Zooplankton
Polychaete worm
Bivalve mollusc
Crustacean
Benthic fish
Pelagic fish
(Wading) bird
Mammal
Reptile
Sea anemones/true corals

Freshwater

Phytoplankton
Vascular plant
Zooplankton
Insect larvae
Bi-valve mollusc
Gastropod
Crustacean
Benthic fish
Pelagic fish
Bird
Mammal
Amphibian

Terrestrial

Grasses & Herbs
Shrub
Tree
Lichen & bryophyte
Soil invertebrate (worm)
Gastropod
Flying insect
Mammal (deer)
Mammal (rat)
Bird
Bird egg
Amphibian
Reptile

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**Elements list for all radionuclides
in ICRP-38**

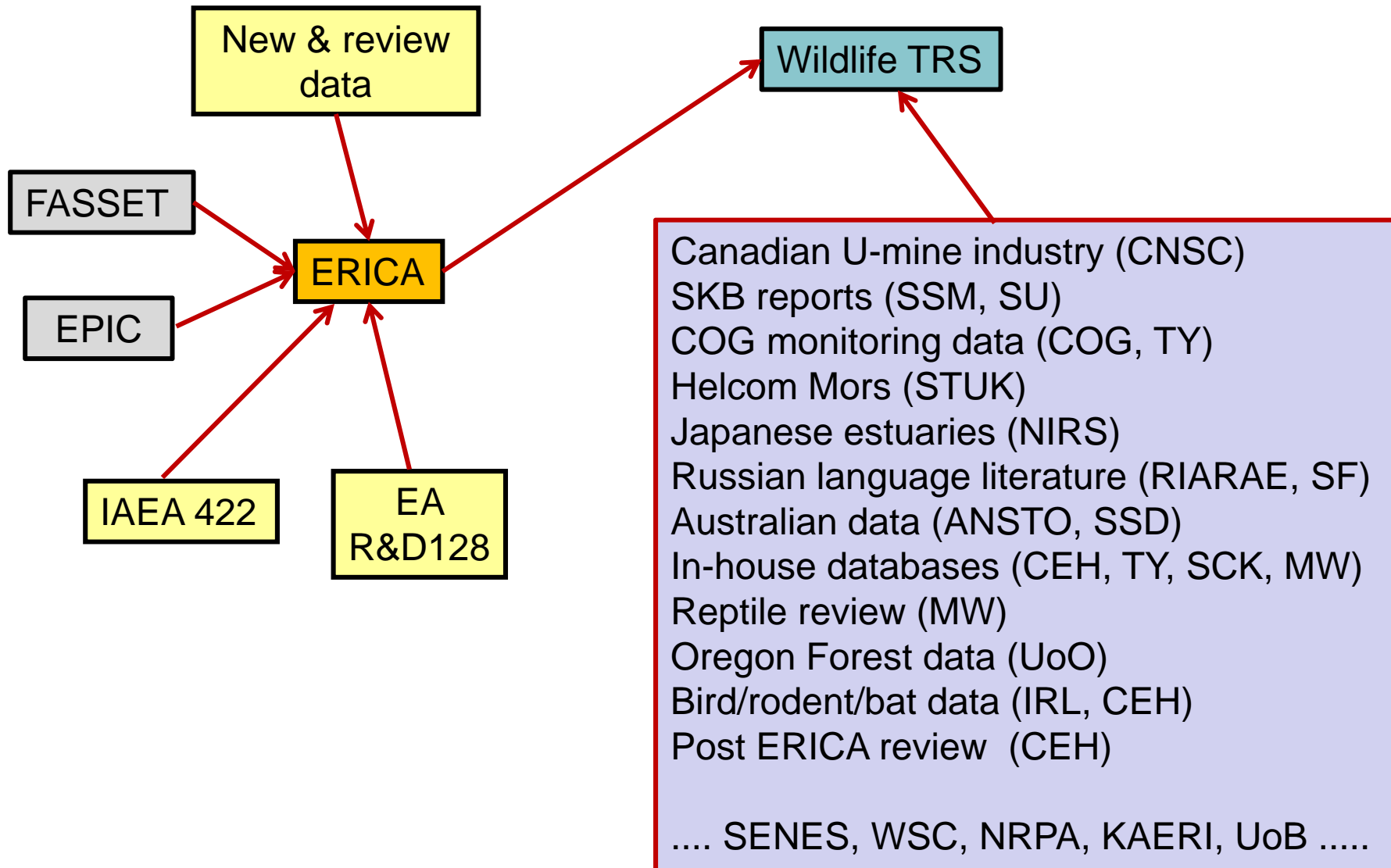
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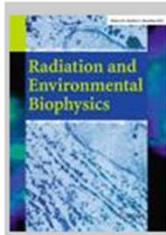
Latin

Nuclide

<http://www.wildlifetransferdatabase.org/>

Database evolution





Radiation and Environmental Biophysics

Volume 1 / 1963 - Volume 49 / 2010

From Volume 1 (1963) to Volume 10 (1973), this journal was published as *Biophysik*.

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Volume 49, Number 4 / November 2010

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Wildlife groups - eg terrestrial

Broad group	Available subcategories	Potential appropriate ICRP RAP
Amphibian	-	Frog
Arachnid	-	-
Arthropod	Arthropod - Carnivorous	
	Arthropod - Detritivorous	
	Arthropod - Herbivorous	Bee
Bird		Duck
	Bird - Carnivorous	Duck
	Bird - Herbivorous	Duck
	Bird - Omnivorous	Duck
Annelid		Earthworm
Fern	-	-
Fungi	-	
	Fungi - Mycorrhizal	-
	Fungi - Parasitic	-
	Fungi - Saprophytic	-
Gastropod	-	-
Lichens and Bryophytes	-	-
Mammal		Rat or Deer
	Mammal - Carnivorous	Rat
	Mammal - Herbivorous ¹	Rat or Deer
	Mammal - Omnivorous	Rat
	Mammal - Marsupial ²	-
	Mammal - Rangifer spp.	-
Reptile	-	-
	Reptile - Carnivorous	-
	Reptile - Herbivorous	-
Grasses and herbs	-	-
	Grasses	Wild Grass
	Herbs ³	-
Shrub	-	-
Tree	-	-
	Tree - Coniferous	Pine Tree
	Tree - Broadleaf	-

Data entries

In total approximately 50,000 entries comprising 87,000 CR_{wo} values from 520 sources:

Ecosystem	Entries	Values
Estuarine (water)	3259	4190
Estuarine (terrestrial)	119	141
Freshwater	30825	42878
$CR_{wo-water}$	10441	16814
Marine	3441	10229
Terrestrial	12276	29848

Marine

Radionuclide	Macroalgae	Mollusc	Phytoplankton	Fish	Crustacean	zooplankton	Mammal	Sea Anemones/True Coral	Polychaete Worm	Vascular plants	Bird	Reptile
Cs	≥100	≥100	>10<20	≥100	≥100	>20<100	≥100	n≤10	>20<100	n≤10	>20<100	
Co	≥100	>20<100	>20<100	>20<100	>10<20	>20<100	>10<20	n≤10	n≤10	n≤10		
Sr	≥100	>20<100	>20<100	≥100	>20<100	>10<20	>20<100	n≤10	n≤10	n≤10		
Pu	≥100	≥100	>20<100	≥100	>10<20	n≤10	>20<100	n≤10	n≤10			
Ag	>10<20	>10<20	>10<20	n≤10		n≤10	>10<20	n≤10	n≤10			
Cd	>20<100	>20<100	>20<100	n≤10	n≤10	n≤10	≥100	n≤10	n≤10			
Po	>20<100	>20<100	>20<100	>20<100	>20<100	>20<100	n≤10	n≤10	n≤10			
Zr	>20<100	n≤10	n≤10	n≤10	n≤10	n≤10		n≤10		n≤10		
Ce	>20<100	n≤10	>10<20	n≤10	n≤10	n≤10		n≤10	n≤10	n≤10		
P	n≤10	n≤10	n≤10	>20<100		n≤10	>10<20	n≤10	n≤10			
Pb	>20<100	>20<100	>20<100	>20<100	>10<20	>10<20	≥100					
U	>20<100	>20<100	>10<20	n≤10		n≤10		>20<100		n≤10		
Am	>20<100	>20<100	>10<20	>20<100	n≤10			n≤10				
Ra	n≤10	>20<100	n≤10	>20<100	>10<20	n≤10						
Se	>20<100	n≤10	>20<100				≥100	n≤10	n≤10			
S	n≤10	n≤10	n≤10		n≤10	n≤10	>10<20	n≤10	n≤10			
I	>20<100	n≤10	n≤10		n≤10	n≤10	n≤10			n≤10		
Np	>20<100	>10<20	>10<20		n≤10	n≤10						
Ru	>20<100	n≤10	n≤10	n≤10		n≤10		n≤10				
Th	n≤10	n≤10	>20<100	n≤10		n≤10						
Cl	>20<100		n≤10	n≤10	n≤10		n≤10					
Sb	>20<100	n≤10				>10<20		n≤10				
Tc	≥100	>20<100	>10<20		≥100							
Cm	>20<100	>10<20	n≤10									
Eu	n≤10	n≤10	n≤10	n≤10								
Te			>10<20									
Mn												
Nb												
Ni												

n≤10
 n>10<20
 n>20<100
 n≥100

Freshwater

Radionuclide	Fish	Vascular plant	Mollusc	Reptile	Algae	Phytoplankton	Crustacean	Insect larvae	Insect	Zooplankton	Mammal	Amphibian
Cs	n>100	n>100	n>20<100	n>20<100	n>20<100	n>20<100	n>20<100	n>10<20	n>10<20	n>20<100		
Sr	n>100	n>100	n>20<100	n>20<100	n>20<100	n>20<100	n>10<20			n>10<20		
Am	n>10<20	n>20<100	n>20<100	n>10<20	n>10<20			n>10<20	n>10<20			
Cm	n>10<20	n>20<100	n>20<100	n>10<20	n>10<20			n>10<20	n>10<20			
Pu	n>20<100	n>20<100	n>20<100	n>10<20	n>10<20			n>10<20	n>10<20			
Ra	n>100	n>20<100	n>100	n>10<20		n>20<100	n>10<20				n>20<100	
Ce	n>100	n>10<20	n>10<20	n>10<20	n>10<20	n>20<100						
Co	n>100	n>100	n>10<20	n>20<100	n>10<20	n>20<100						
Mn	n>100	n>20<100	n>10<20	n>20<100	n>10<20						n>10<20	
U	n>100	n>100	n>10<20	n>10<20		n>20<100	n>10<20					
Pb	n>100	n>20<100	n>20<100	n>10<20			n>10<20					n>10<20
Cd	n>20<100	n>10<20	n>10<20	n>10<20		n>20<100						
Po	n>100	n>20<100	n>100	n>10<20			n>10<20	n>10<20				
Sb	n>100	n>10<20	n>10<20	n>10<20				n>10<20				
Se	n>100	n>10<20	n>10<20	n>10<20	n>10<20			n>10<20		n>10<20		
I	n>100	n>20<100	n>10<20	n>10<20	n>10<20							
Ni	n>100	n>20<100	n>10<20	n>10<20								
Th	n>20<100	n>20<100		n>10<20		n>20<100						
Zr	n>20<100	n>10<20	n>10<20	n>10<20		n>10<20						
Eu	n>20<100	n>10<20	n>10<20									
Ru	n>10<20				n>10<20	n>20<100						
Cl	n>10<20	n>10<20										
P	n>100					n>20<100						
Np		n>10<20			n>10<20							
S						n>20<100						
Tc	n>10<20											
Te	n>10<20											
Ag												
Nb												

n≤10
 n>10<20
 n>20<100
 n≥100

Terrestrial

Radionuclide	Grasses & Herbs	Shrub	Lichens & Bryophytes	Annelid	Tree	Mammal	Mollusc	Arthropod	Bird	Reptile	Amphibian	Arachnid
Cs	purple	purple	purple	orange	purple	purple	brown	purple	purple	purple	purple	brown
Pb	purple	purple	purple	brown	brown	purple	brown	purple	purple	brown	brown	yellow
Am	brown	orange	yellow	orange	white	purple	orange	brown	yellow	orange	brown	brown
Sr	purple	purple	purple	yellow	purple	purple	yellow	brown	brown	brown	brown	white
Cd	purple	brown	brown	purple	white	purple	brown	purple	white	white	yellow	brown
Pu	brown	yellow	yellow	white	white	purple	orange	purple	brown	brown	orange	brown
Ni	purple	purple	purple	brown	yellow	yellow	yellow	yellow	white	yellow	white	white
U	purple	purple	purple	yellow	purple	brown	white	yellow	brown	brown	white	white
Po	brown	purple	purple	yellow	brown	brown	white	white	yellow	orange	white	white
Ru	purple	purple	purple	white	brown	brown	orange	brown	brown	white	white	white
Mn	white	purple	brown	yellow	yellow	yellow	yellow	white	white	yellow	white	white
Th	purple	purple	purple	white	brown	brown	white	white	brown	orange	white	white
Cl	brown	brown	yellow	orange	orange	white	brown	brown	white	white	white	white
Co	yellow	purple	brown	white	yellow	brown	white	orange	white	white	white	white
Se	purple	brown	orange	yellow	white	orange	yellow	white	white	white	white	white
Sb	yellow	yellow	yellow	yellow	white	white	yellow	white	white	white	white	white
Ce	yellow	brown	yellow	white	yellow	white	white	white	white	white	white	white
Eu	yellow	orange	white	yellow	yellow	white	white	white	white	white	white	white
I	brown	white	white	orange	white	white	orange	brown	white	white	white	white
Tc	brown	yellow	white	white	white	white	white	white	yellow	white	yellow	white
Ag	orange	yellow	orange	white	white	white	white	white	white	white	white	white
Cm	yellow	white	white	white	yellow	white	white	yellow	white	white	white	white
Zr	white	brown	white	white	white	white	white	white	white	white	white	white
Nb	white	white	white	yellow	white	white	white	white	white	white	white	white
Np	white	white	white	white	white	white	white	white	white	white	white	white
P	white	white	white	white	white	white	white	white	white	white	white	white
S	white	white	white	white	white	white	white	white	white	white	white	white
Te	white	white	white	white	white	white	white	white	white	white	white	white

n≤10
 n>10<20
 n>20<100
 n≥100

Estuarine

Radionuclide	Mollusc	Crustacean	Fish	vascular plants	Macroalgae	Phytoplankton	Zooplankton	Bird
Pb	Dark Brown	Orange	Orange	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
Cd	Dark Brown	Orange	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
Mn	Dark Brown	Orange	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
Ni	Dark Brown	Orange	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
P	Dark Brown	Light Yellow	Dark Brown	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
S	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Cr	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Sr	Dark Brown	Dark Brown	Dark Brown	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
I	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Cl	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Co	Dark Brown	Orange	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
U	Dark Brown	Light Yellow	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
Ce	Dark Brown	Light Yellow	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
Cs	Dark Brown	Dark Brown	Dark Brown	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow
Pu	Light Yellow	Orange	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Eu	Dark Brown	Light Yellow	Light Yellow	Light Yellow	Dark Brown	Light Yellow	Light Yellow	Light Yellow
Am	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Se	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Po	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow
Sb	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow	Light Yellow

Light Yellow n≤10

Orange n>10<20

Dark Brown n≥20

Additional elements

Ag	Silver
Am	Americium
C	Carbon
Cd	Cadmium
Ce	Cerium
Cl	Chlorine
Cm	Curium
Co	Cobalt
Cs	Caesium
Eu	Europium
H	Tritium
I	Iodine
Mn	Mangenesse
Nb	Niobium
Ni	Nickel
Np	Neptunium
P	Phosphorus
Pb	Lead
Po	Polonium
Pu	Plutonium
Ra	Radium
Ru	Ruthenium
S	Sulphur
Sb	Antimony
Se	Selenium
Sr	Strontium
Tc	Technetium
Te	Tellurium
Th	Thorium
U	Uranium
Zr	Zirconium

Additional elements

Ag	Silver
Am	Americium
C	Carbon
Cd	Cadmium
Ce	Cerium
Cl	Chlorine
Cm	Curium

Marine	Ca	Hg	Mg	Na	Zn						
Freshwater	Al	As	B	Ba	Ca	Cr	Cu	Dy	Er	Fe	
	Gd	Ho	Hg	La	Mg	Mo	Na	Nd	Pm	Pr	
	Rb	Sa	Sc	Sn	Ti	Tm	V	Y	Yb	Zn	
Terrestrial	Ac	As	B	Ba	Be	Br	Cr	Cu	Fe	Hf	
	Hg	La	Lu	Mo	Na	Nd	Rb	Sc	Sm	Sn	
	Ta	Tb	Ti	V	W	Yb	Zn				
Estuarine	Al	As	Ba	Br	Ca	Cr	Cu	Dy	Er	Fe	
	Gd	Ho	La	Li	Lu	Mg	Mo	Na	Nd	Pr	
	Rb	Si	Sl	Sm	Tb	Ti	Tm	V	Y	Zn	

Tc	Technetium
Te	Tellurium
Th	Thorium
U	Uranium
Zr	Zirconium

Wildlife subcategories

- In addition wildlife group values for CR_{wo} for subcategories have been presented where possible
 - Sub-category not considered for inclusion if the number of data were <10
 - Number of references also taken into account
- Major wildlife group data include sub-category data
- Some instances where one sub-category contributes all the data for a wildlife group
 - Identified in tables

TABLE 4.1 CONCENTRATION RATIO (CR_{wo-soil}) VALUES FOR WILDLIFE GROUPS IN TERRESTRIAL ECOSYSTEMS

Wildlife group	AM	AMSD	GM	GMSD	Min	Max	N	References
Actinium (Ac)								
Grasses and herbs	2.1E-01	1.8E+00	2.5E-02	7.9E+00	1.9E-01	2.3E-01	240	496
Silver (Ag)								
Grasses and herbs	2.9E+00	3.7E+00	1.8E+00	2.7E+00	2.8E-03	9.8E+00	13	162, 212
Lichens and bryophytes	3.0E-02	3.4E-02	2.0E-02	2.5E+00	1.2E-02	1.3E-01	12	348
Shrub	2.1E-02	9.1E-03	1.9E-02	1.5E+00	1.2E-02	3.3E-02	5	348
Aluminium (Al)								
Lichens and bryophytes	1.1E-01	1.1E-01	7.1E-02	2.4E+00	1.0E-02	4.2E-01	32	348, 355
Shrub	1.9E-02	1.8E-02	1.4E-02	2.2E+00	2.9E-03	1.2E-01	119	347, 348
Americium (Am)								
Amphibian	1.3E-01	3.4E-02	1.3E-01	1.3E+00	1.0E-01	1.5E-01	22	486
Annelid	1.8E-01	3.0E-01	9.0E-02	3.2E+00	5.2E-02	1.1E+00	13	171, 486, 488
Arachnid	5.7E-02	6.2E-02	3.8E-02	2.4E+00	2.2E-02	1.3E-01	20	170, 488
Arthropod	1.1E-01	2.9E-01	4.0E-02	4.2E+00	1.3E-03	2.0E+00	82	170, 172, 223, 382, 407, 488
Arthropod - Detritivorous	9.6E-02	7.5E-02	7.6E-02	2.0E+00	2.0E-02	2.2E-01	29	170, 172, 223, 488
Bird	3.2E-02	1.6E-02	2.8E-02	1.6E+00	1.9E-02	3.8E-02	3	486
Grasses and herbs	1.0E-01	2.9E-01	3.4E-02	4.4E+00	3.6E-03	3.0E-01	65	177, 250, 486
Grasses	1.0E-01	2.9E-01	3.5E-02	4.4E+00	3.6E-03	3.0E-01	63	177, 250, 486
Lichens and bryophytes	1.2E+00	1.7E+00	6.9E-01	2.9E+00	2.0E-01	3.2E+00	3	382, 486
Mammal	3.2E-02	1.0E-01	9.8E-03	4.7E+00	2.6E-04	1.7E-01	139	172, 184, 197, 221, 245, 407, 488
Mammal - Carnivorous	2.1E-02	7.3E-02	5.7E-03	5.0E+00	8.0E-04	4.4E-02	13	197, 488
Mammal - Herbivorous	5.4E-02	2.0E-01	1.4E-02	5.2E+00	2.6E-04	1.7E-01	27	184, 407, 488
Mammal - Omnivorous	3.0E-02	5.4E-02	1.5E-02	3.3E+00	3.7E-04	4.5E-02	84	221, 245, 488
Mammal - Rangifer spp. ⁺	2.0E-01	2.4E-01	1.3E-01	2.6E+00	1.6E-01	2.2E-01	9	197
Mollusc - Gastropod*	1.4E-01	1.4E-01	1.0E-01	2.2E+00	5.1E-02	2.0E-01	13	486, 488

Terrestrial

Final draft - do not quote

Element		ERICA Data			Organism	TRS Data			Ratio
		mean	SD	N		AM	AMSD	N	
Co	Shrub	7.5E-01	5.4E+00	11	Shrub	7.2E-02	8.5E-02	128	0.10
Co	Tree	1.8E-01	1.5E-02	3	Tree	8.7E-03	1.3E-02	7	0.05
Sr	Reptile	1.2E+01	2.4E+01	4	Reptile	3.8E-01	6.1E-01	74	0.03
Po	Shrub	9.9E-02	6.2E-02	14	Shrub	1.3E+00	1.2E+00	448	13.01
Po	Mammal	2.8E-03	1.6E-03	36	Mammal	8.6E-02	2.1E-01	67	31.11
Pb	Soil invertebrate (worm)	2.9E-02	4.4E-02	264	Annelid	5.2E-01	7.5E-01	647	18.15
U	Shrub	7.1E-03	1.4E-02	496	Shrub	2.3E-01	6.4E-01	970	33.29
U	Lichen & bryophytes	7.1E-02		?	Lichen & bryophytes	2.5E+00	4.4E+00	237	35.84
U	Mammal	1.1E-04	1.3E-04	2	Mammal	5.8E-03	6.8E-03	22	54.56
Am	Grasses & Herbs	5.0E-03	5.0E-03	40	Grasses & Herbs	1.0E-01	2.9E-01	65	20.55
Ra	Shrub	2.4E-02	9.0E-03	10	Shrub	1.0E+00	1.6E+00	504	42.24
Th	Shrub	1.6E-02		?	Shrub	2.5E-01	5.6E-01	403	15.42

Lichen and brophytes often high CRwo
 Rangifer high for Cs, Po and Sr
 Cs, Sr, Tc, Zn, Cd high
 Ce, Eu, Pu low

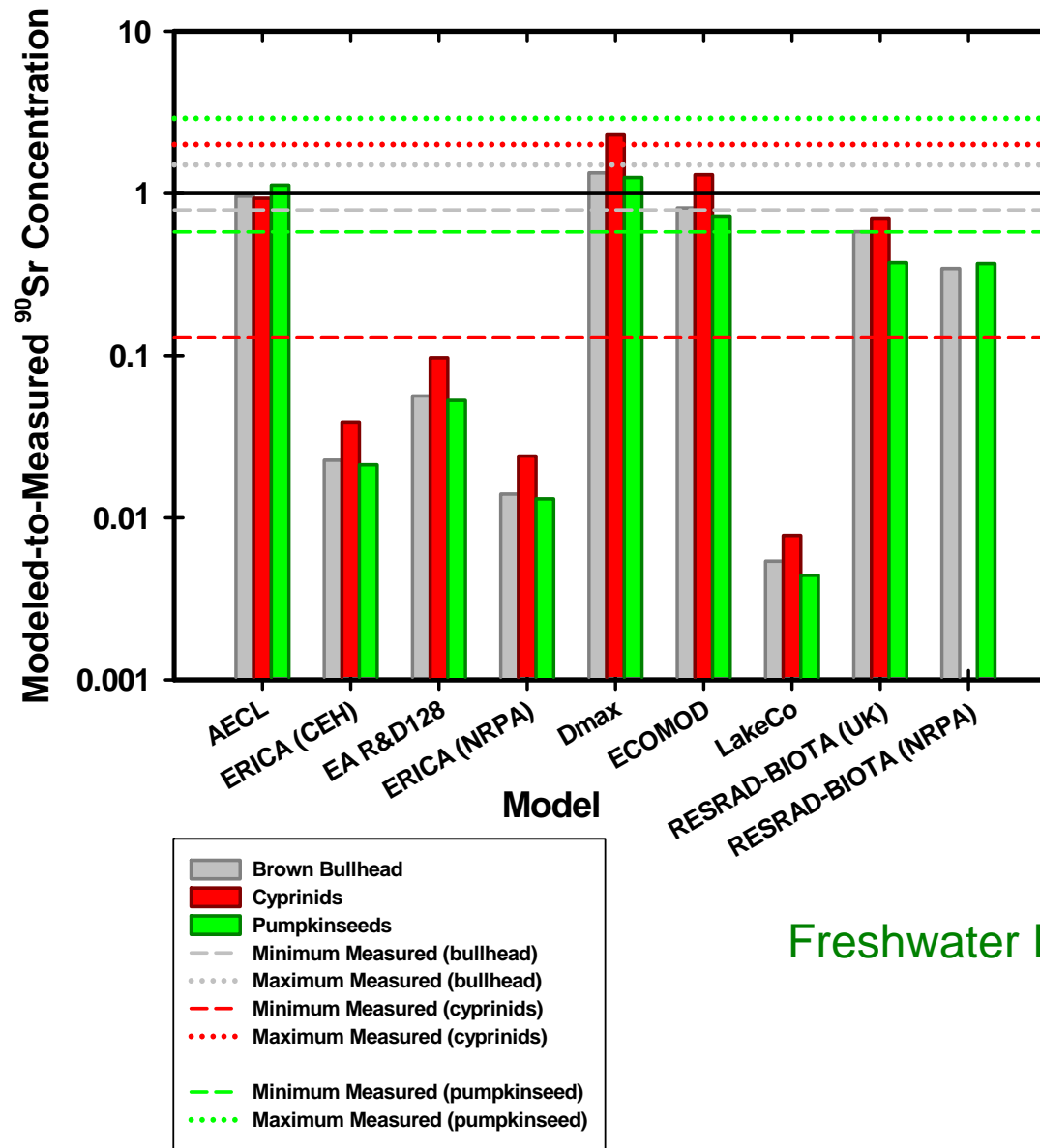


Freshwater

Final draft - do not quote

Element		ERICA Data			Organism	TRS Data			Ratio
		mean	SD	N		AM	AMSD	N	
Cs	Phytoplankton	2.3E+03	5.5E+02	2	Phytoplankton	1.4E+02	1.9E+02	50	0.06
Cs	Zooplankton	1.6E+03	1.9E+03	4	Zooplankton	9.0E+01	6.4E+01	41	0.06
Cs	Gastropod	2.8E+03	3.3E+03	2	Mollusc - Gastropod	1.4E+02	1.2E+02	50	0.05
Sr	Zooplankton	6.0E+01		1	Zooplankton	3.7E+03	7.4E+02	10	61.67
Sr	Benthic fish	1.7E+01	2.3E+01	14	Fish	8.9E+02	5.2E+03	789	52.12
Sr	Pelagic fish	1.7E+01	2.3E+01	14	Fish	8.9E+02	5.2E+03	789	52.12
Cm	Vascular plant	3.0E+02	4.5E+02	3	Vascular plant	2.3E+00	8.0E+00	26	0.01
Cd	Bivalve mollusc	1.0E+04		1	Mollusc - Bivalve	2.8E+05	2.4E+05	3	27.56
Zr	Vascular plant	1.9E+03		2	Vascular plant	4.1E+01	3.5E+01	6	0.02
Ce	Vascular plant	3.0E+03	4.5E+03	4	Vascular plant	1.2E+02	1.0E+02	6	0.04
Ce	Pelagic fish	1.5E+01	1.3E+01	8	Fish	1.6E+02	3.6E+02	276	10.67
Am	Insect larvae	2.0E+04		1	Insect larvae	1.8E+03		15	0.09
Am	Gastropod	1.8E+02	2.9E+01	4	Mollusc - Gastropod	6.3E+03	9.4E+03	50	34.97
Am	Bivalve mollusc	4.7E+02	5.0E+02	3	Mollusc - Bivalve	3.1E+04	4.8E+03	10	65.74
Am	Pelagic fish	1.8E+00		1	Fish	7.6E+02	6.7E+02	17	422.12
Th	Vascular plant	1.3E+03	7.4E+02	5	Vascular plant	1.1E+05	3.6E+05	84	85.71

Po, consistently high
Molluscs often high



Freshwater Fish (Perch Lake)

Marine

Final draft - do not quote

Element		ERICA Data			Organism	TRS Data			Ratio
		mean	SD	N		AM	AMSD	N	
Sr	Mammal	1.6E+01	4.3E+01	23	Mammal	1.6E+02	3.6E+02	33	10.25
Ce	Crustacean	3.4E+03	5.7E+03	3	Crustacean	1.0E+02		2	0.03
I	Bivalve Mollusc	1.4E+01		1	Mollusc	8.8E+03	1.8E+04	8	627.56

Fewer changes compared with ERICA values (tissues specific to wholebody)
 Po, Ag, Zn, Cm consistently high
 Phytoplankton and molluscs high

ICRP report

- TRS and ICRP transfer report using:
 - Same database
 - Data extracted at the same time
- But
 - Reports have different purposes so the CRs reported are likely to be different as they are categorised differently (wildlife group v ICRP Reference Animals and Plants)