

# **Transfer of radionuclides to wildlife within the ICRP system of protection**

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Panel Discussion

Joint IES-ICRP Symposium  
Aomori, Japan, October 4, 2016

David Copplestone  
Secretary, ICRP Committee 5

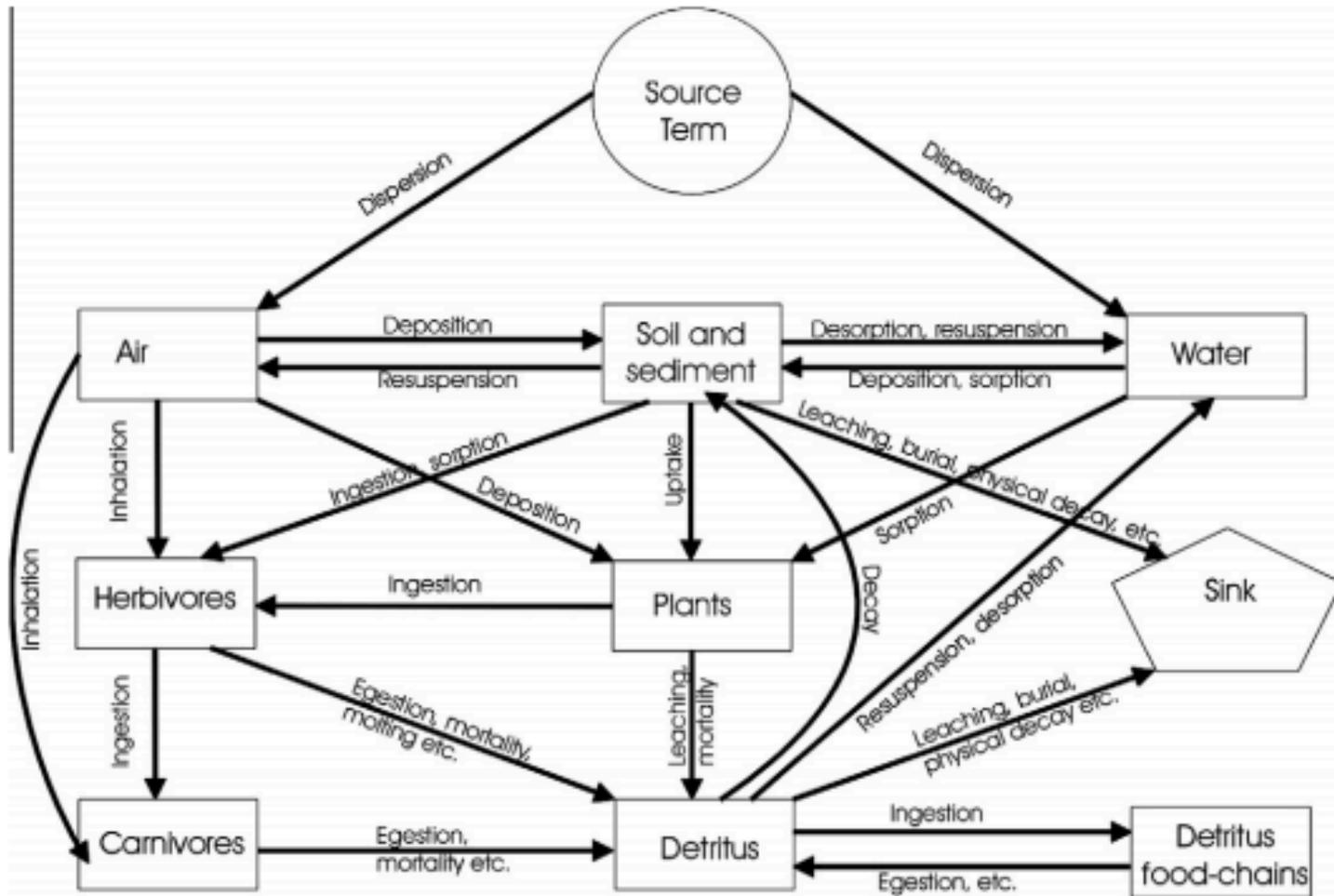
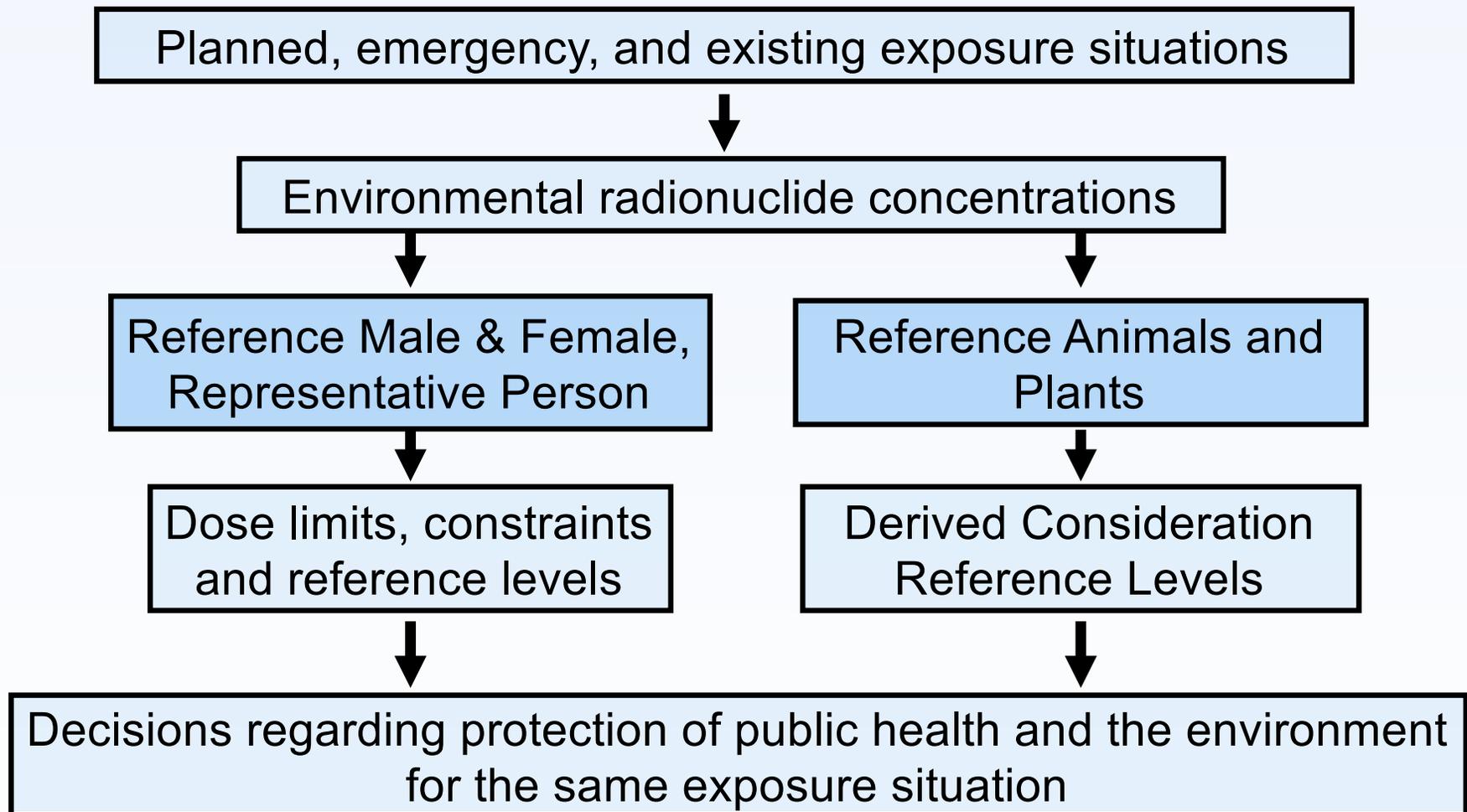
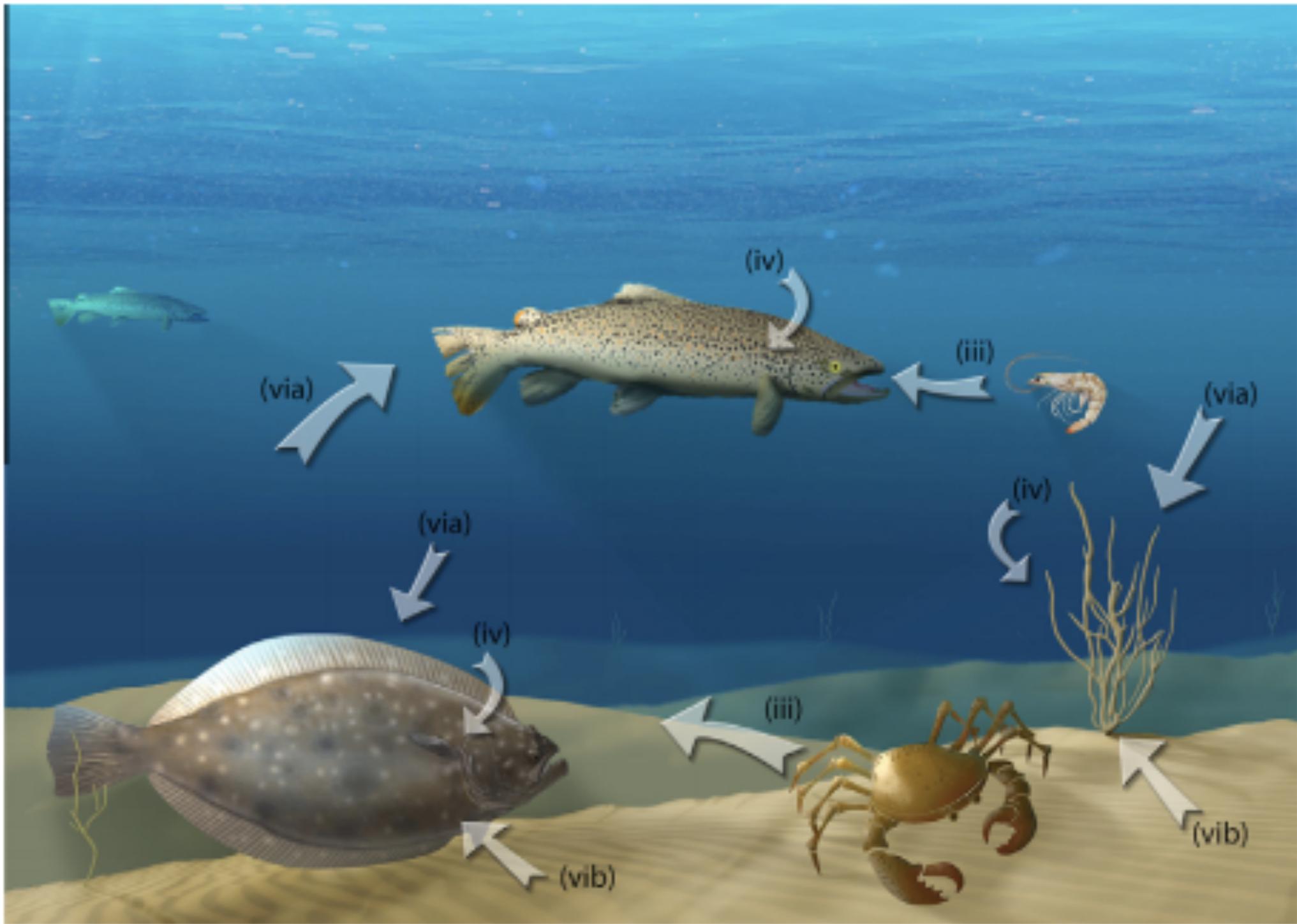
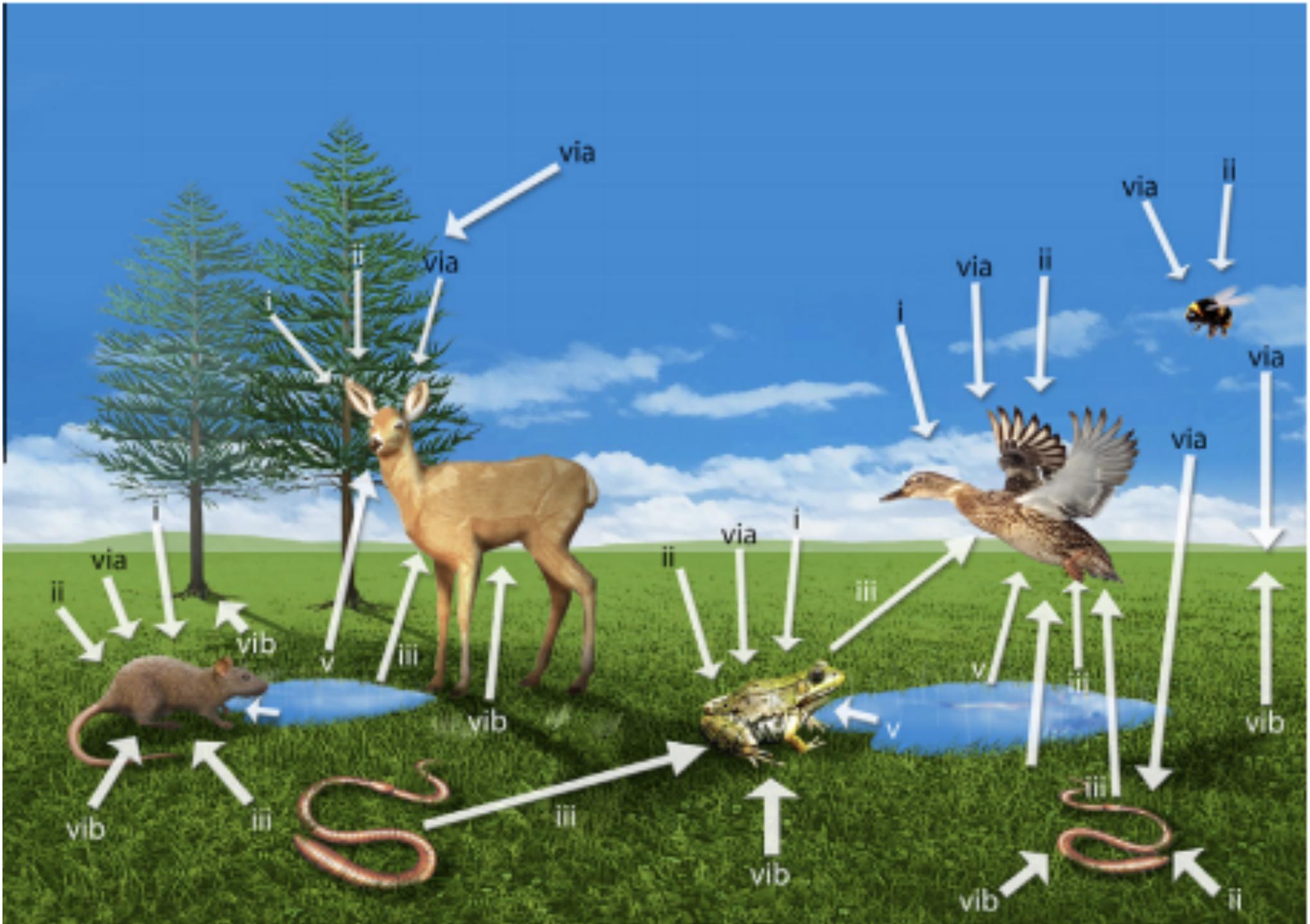


Fig. 1.1. Processes affecting radionuclide behaviour in ecosystems. Based on: Whicker, F.W., Schultz, V., 1982. Radiecology: Nuclear Energy and the Environment, Vol. 1. CRC Press, Boca Raton, FL.

# Parallel pathways







# ICRP 108



<b>WILDLIFE GROUP</b>	<b>RAP</b>
Large terrestrial mammals	Deer
Small terrestrial mammals	Rat
Aquatic birds	Duck
Amphibians	Frog
Freshwater pelagic fish	Trout
Marine fish	Flatfish
Terrestrial insects	Bee
Marine crustaceans	Crab
Terrestrial annelids	Earthworm
Large terrestrial plants	Pine tree
Small terrestrial plants	Wild grass
Seaweeds	Brown seaweed

# Radionuclides considered

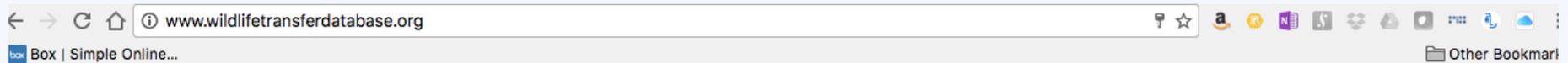
Table 1.1. Elements and their radioisotopes considered in this report.

Element		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	Manganese	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

# Options

- **Concentration ratios (biota/media – air, water, soil, sediment etc.)**
- **Allometry/biological scaling**
- **Guidance**

# Wildlife Transfer Database



International Atomic Energy Agency & International Union  
of Radioecologists

Wildlife Transfer Parameter Database

Help

If you are not registered, [Register Now](#)

If you have forgotten your login details please email us and we will send you a reminder ([Password Reminder](#))

User Name

Password

Login

This database collates data to provide parameter values for use in environmental radiological assessments to estimate the transfer of radioactivity to wildlife. The database has been updated today (12/12/13). Full details of the update will be made available soon. There may be some minor changes with the data over the next few weeks as further evaluation of the changed data takes place. If you have any queries please contact us at the [wildlifetransfer@gmail.com](mailto:wildlifetransfer@gmail.com) address. We will put a note here when the database update is complete.

The database was started to aid both:

- i) the International Atomic Energy Agency (IAEA) in the production of a handbook on wildlife transfer parameters (IAEA Technical Report Series now in press); and
- ii) the derivation of transfer parameter values for the International Commission on Radiological Protection's (ICRP) list of Reference Animals and Plants (RAPs) (ICRP Publication 114).

The database has been designed and supported by the following organisations:

- Environment Agency, England and Wales
- Norwegian Radiation Protection Authority, Norway
- Centre for Ecology and Hydrology, NERC, UK
- University of Stirling, UK
- The STAR Radioecology Network of Excellence

# ICRP 108



Family level so some have a few, some lots of species

Where no data, used wildlife group from database

<b>WILDLIFE GROUP</b>	<b>RAP</b>
<b>Large terrestrial mammals</b>	<b>Deer</b>
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<b>Terrestrial annelids</b>	<b>Earthworm</b>
<b>Large terrestrial plants</b>	<b>Pine tree</b>
<b>Small terrestrial plants</b>	<b>Wild grass</b>
<b>Seaweeds</b>	<b>Brown seaweed</b>

# Guidance

- Use an available CR value for an organism of similar taxonomy within a given ecosystem for the radionuclide under assessment (preferred option)
- Use an available CR value for a similar Reference Organism within a given ecosystem for the radionuclide under assessment (preferred option)
- Use an available CR value for the given Reference Organism for an element of similar biogeochemistry. Use an available CR value for biogeochemically similar elements for organisms of similar taxonomy
- Use an available CR value for biogeochemically similar elements available for a similar Reference Organism
- Use allometric relationships, or other modelling approaches, to derive appropriate CRs. Assume the highest available CR (least preferred option)
- Use the CR for the same organism in a different ecosystem (least preferred option).

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