

# The ICRP's approach to protection of the living environment under different exposure situations

October 22-24, 2013 . Abu Dhabi, UAE

R.J. Pentreath, C-M. Larsson, D. Copplestone  
University of Plymouth, ARPANSA, University of Stirling

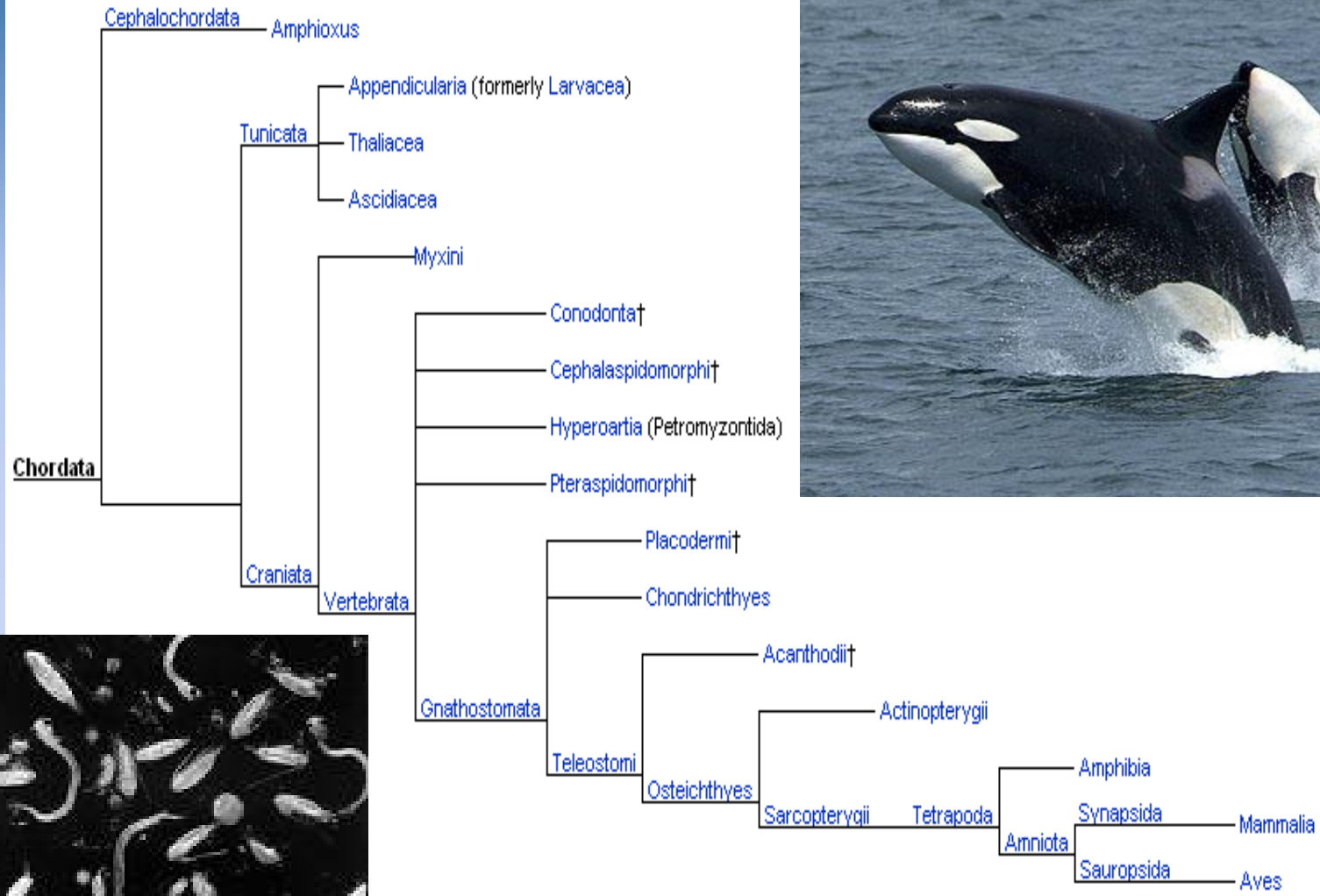
# Questions that arise are

- What are the protection objectives?
- Which exposure situation?
- What animals and plants are of interest?
- What biological effects of radiation are of relevance?
- What dose do they receive?
- What is the relationship between dose and effect on these animals and plants;
- How do we know that the original protection objectives have been met?

# ICRP103 (2007)

(30) ....aim is...preventing and reducing the frequency of deleterious radiation effects to a level where they would have negligible impact on the maintenance of **biological diversity**, the **conservation of species**, or the health and status of **natural habitats, communities and ecosystems**.

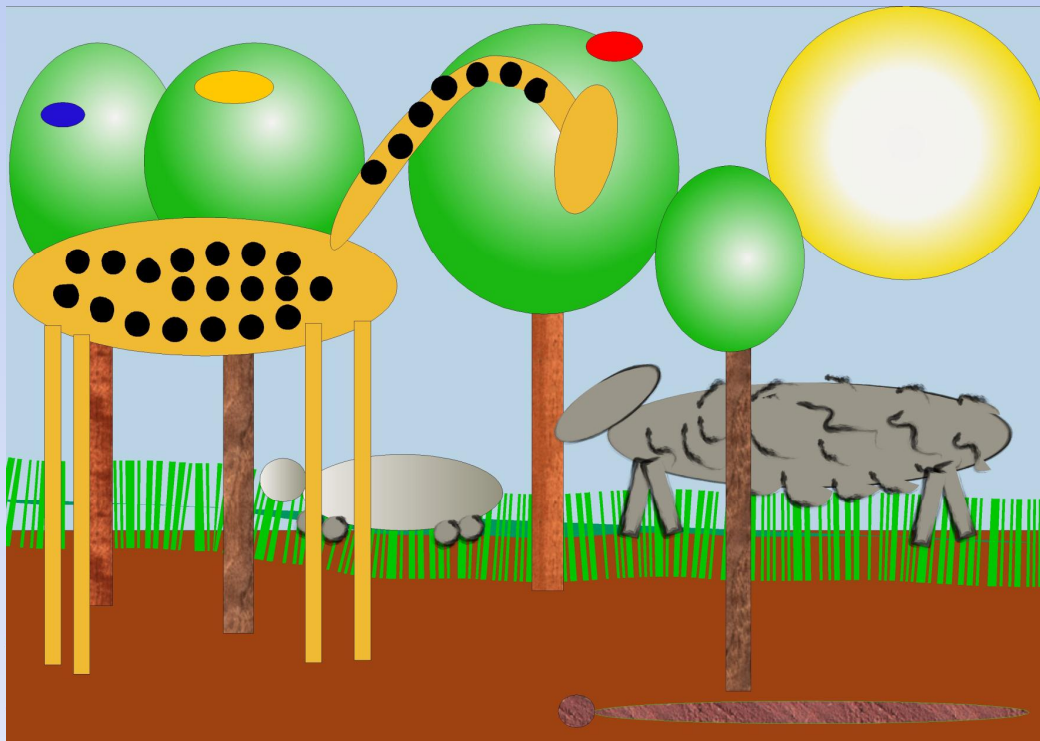
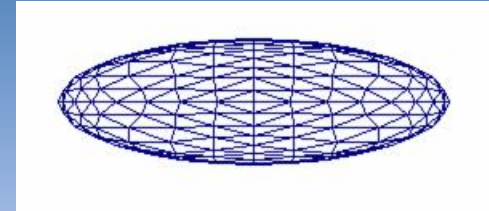
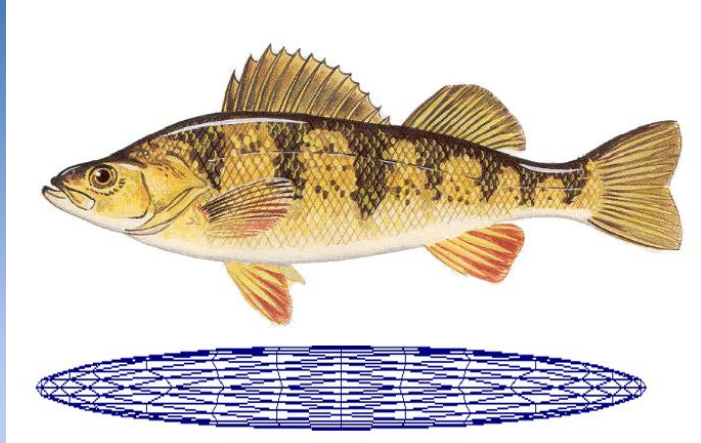
# Phylogeny



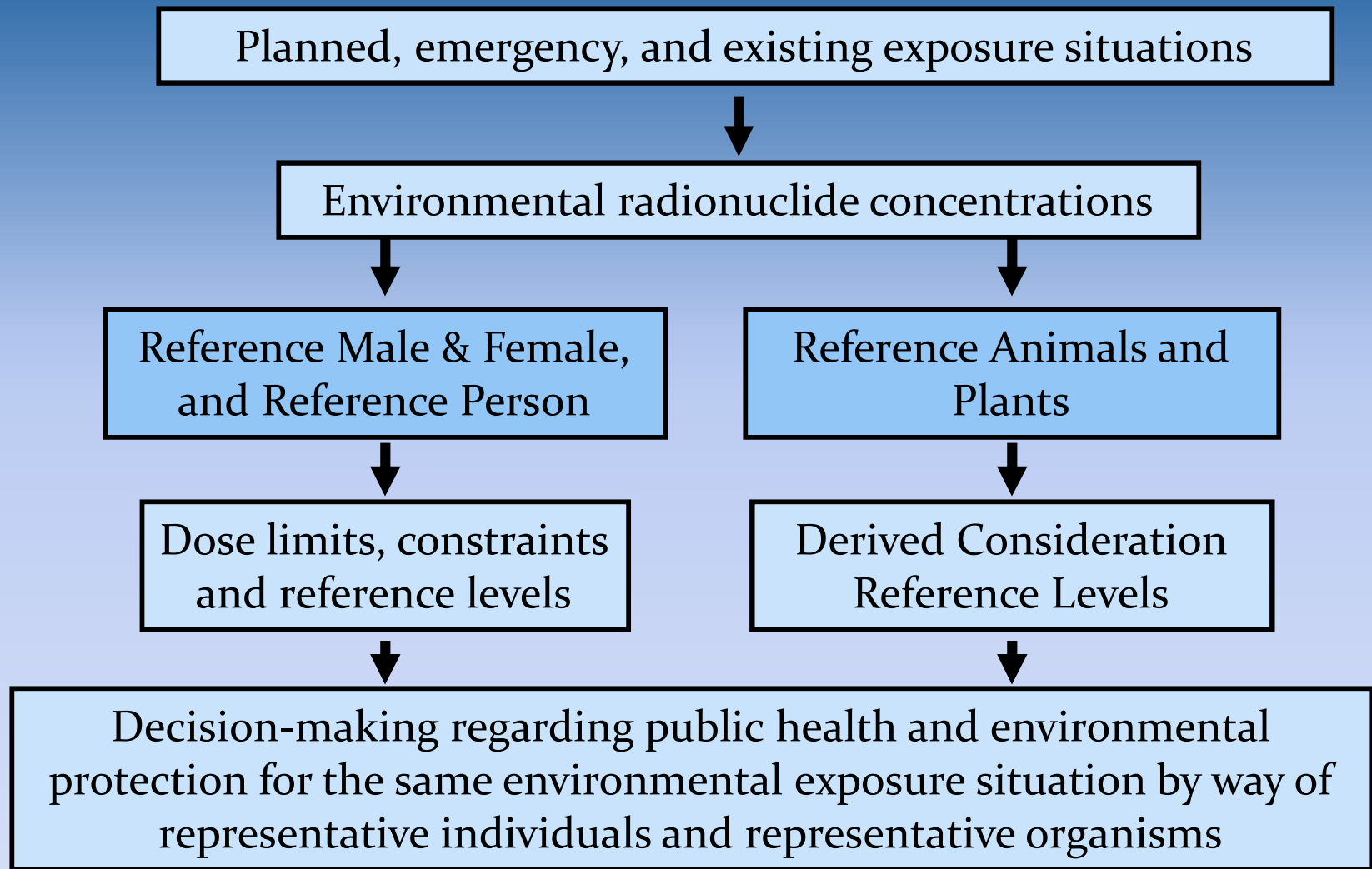
# Biological effects of relevance

- Early mortality;
- Some forms of morbidity;
- Impairment of reproductive capacity by either reduced fertility or fecundity; and
- Induction of chromosomal damage

# Dosimetry



So how do we apply this...



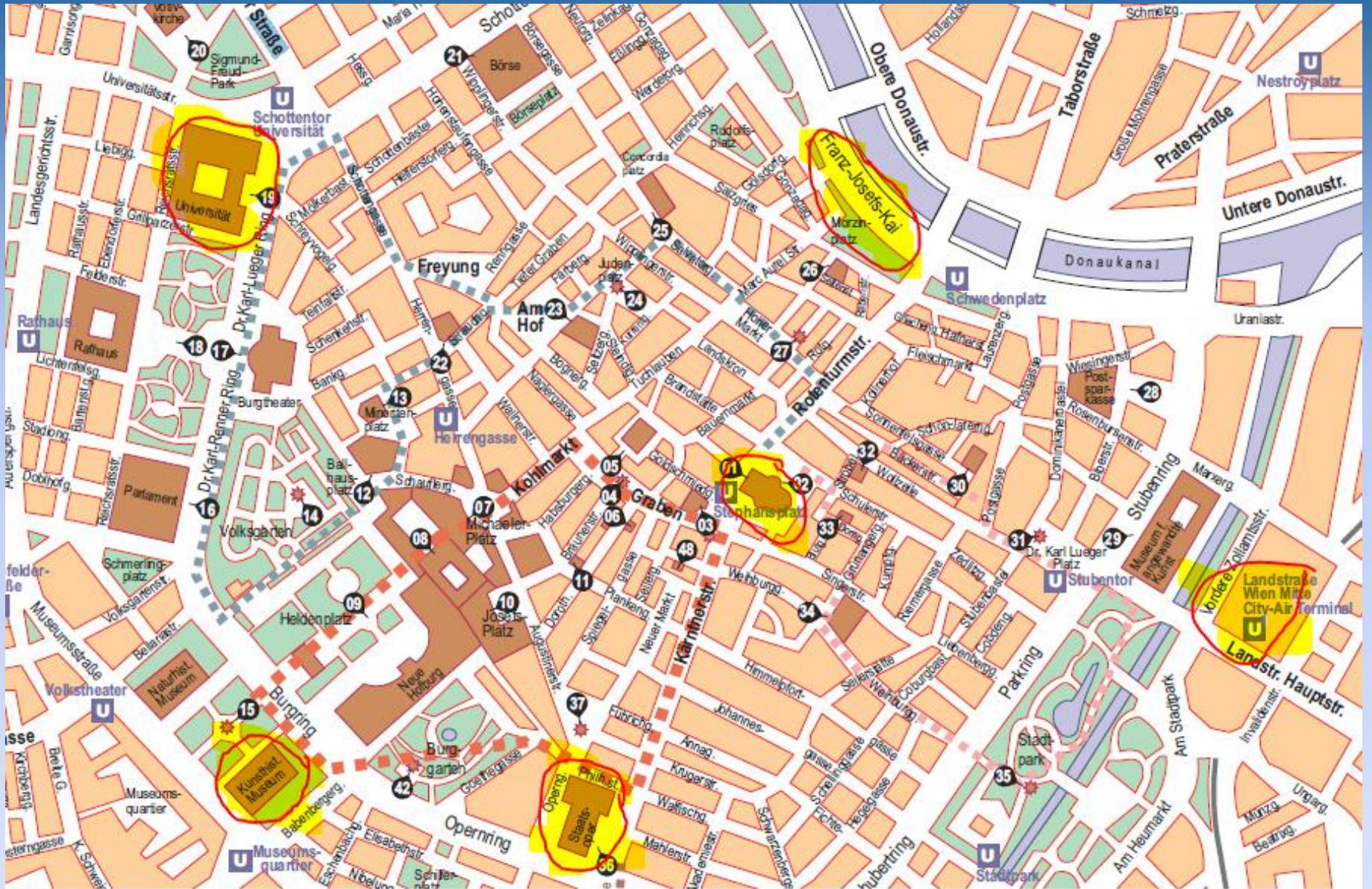


# ICRP 108 (2008)



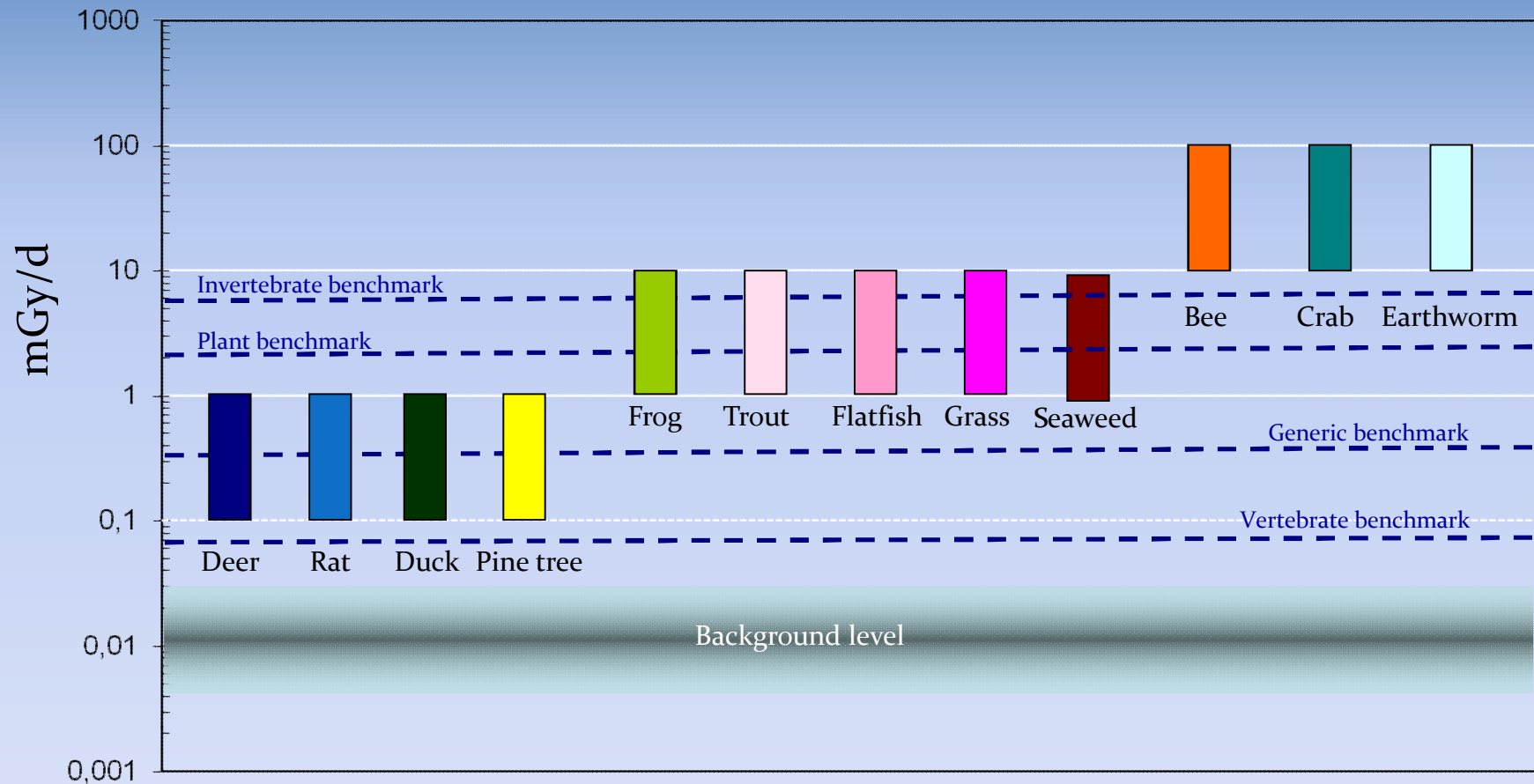
<b>WILDLIFE GROUP</b>	<b>RAP</b>
Large terrestrial mammals	Deer
Small terrestrial mammals	Rat
Aquatic birds	Duck
Amphibians	Frog
Freshwater pelagic fish	Trout
Marine fish	Flatfish
Terrestrial insects	Bee
Marine crustaceans	Crab
Terrestrial annelids	Earthworm
Large terrestrial plants	Pine tree
Small terrestrial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





# ICRP 108 (2008)

## Derived Consideration Reference Levels, DCRLs



Benchmarks from other studies/systems  
-----

## Selection of DCRLs

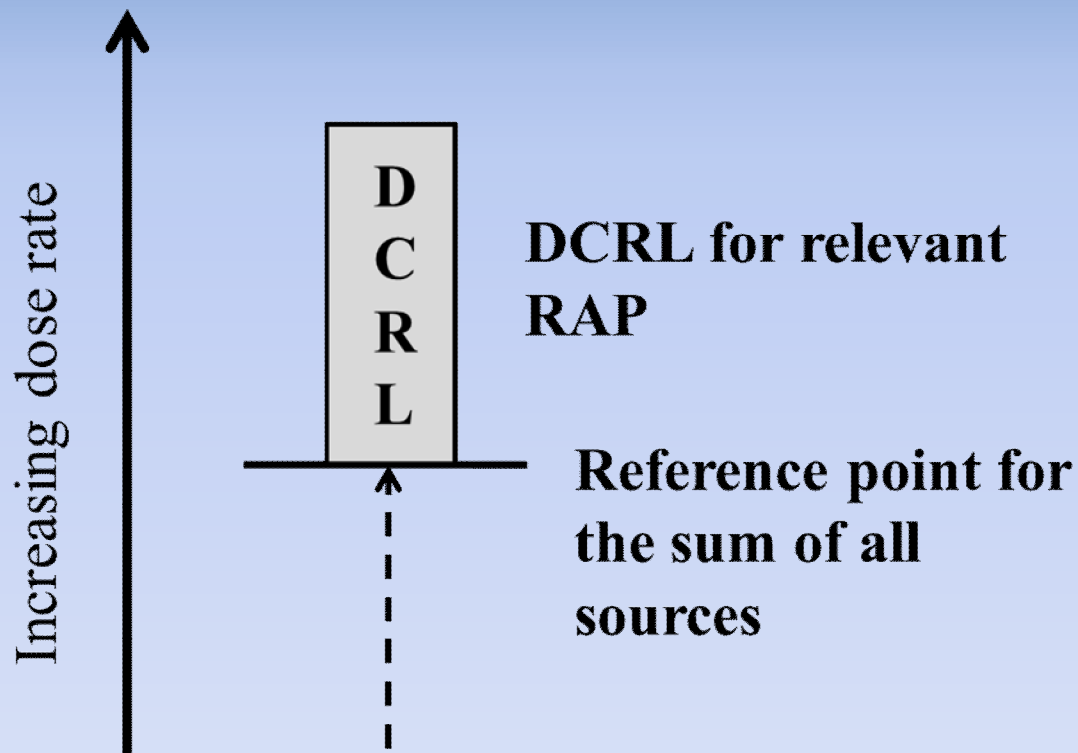
<b>Dose rate (mGy d<sup>-1</sup>)</b>	<b><u>Reference Deer</u></b>	<b><u>Reference Flatfish</u></b>
100 - 1000	Reduction in lifespan due to various causes.	Some mortality expected in larvae and hatchlings
10 - 100	Increased morbidity. Possible reduced lifespan. Reduced reproductive success.	Reduced reproductive success
1 - 10	Potential for reduced reproductive success	Possible reduced reproductive success due to reduced fertility
0.1 - 1	Very low probability of various effects	No information
0.01 - 0.1	No observed effects.	No information
< 0.01	Natural background	Natural background

# Planned exposures

Dose rate (mGy d <sup>-1</sup> )	<u>Reference Deer</u>	<u>Reference Flatfish</u>
100 - 1000	Reduction in lifespan due to various causes.	Some mortality expected in larvae and hatchlings
10 - 100	Increased morbidity. Possible reduced lifespan. Reduced reproductive success.	Reduced reproductive success
1 - 10	Potential for reduced reproductive success	Possible reduced reproductive success due to reduced fertility
0.1 - 1	Very low probability of various effects	No information
0.01 - 0.1	No observed effects.	No information
< 0.01	Natural background	Natural background

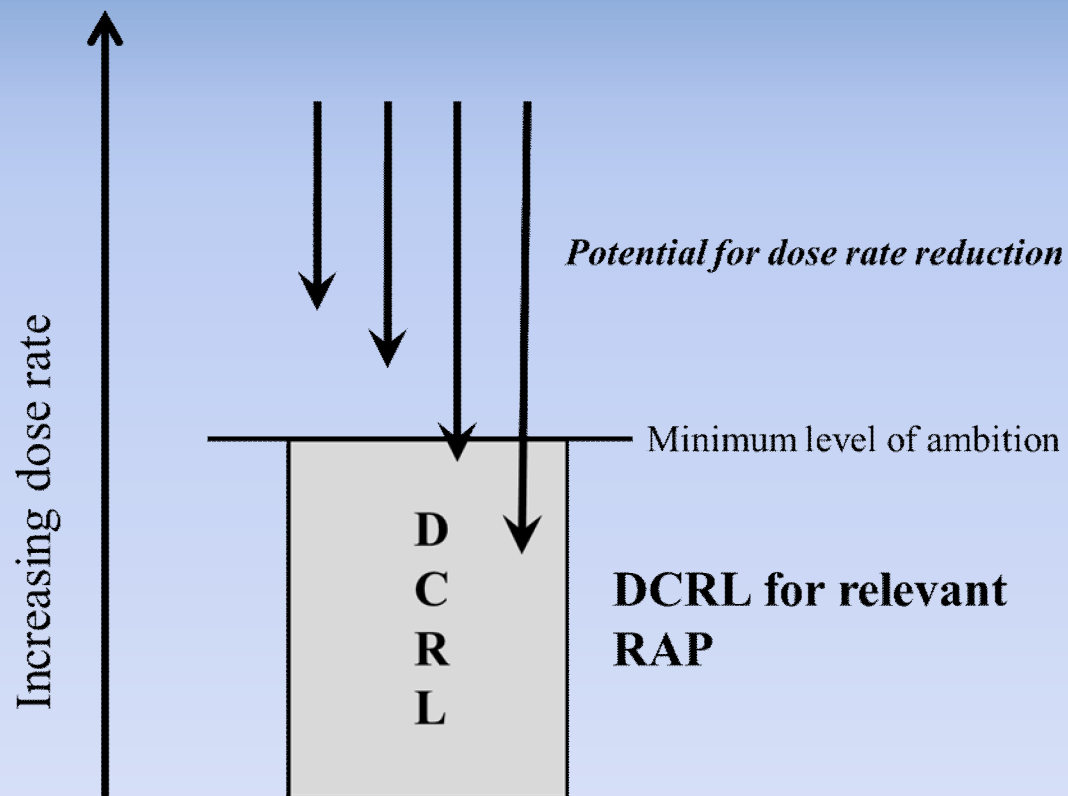
# ICRP 124 (in press)

Application in planned exposure situations





# ICRP 124 (in press)

## Application in existing exposure situations



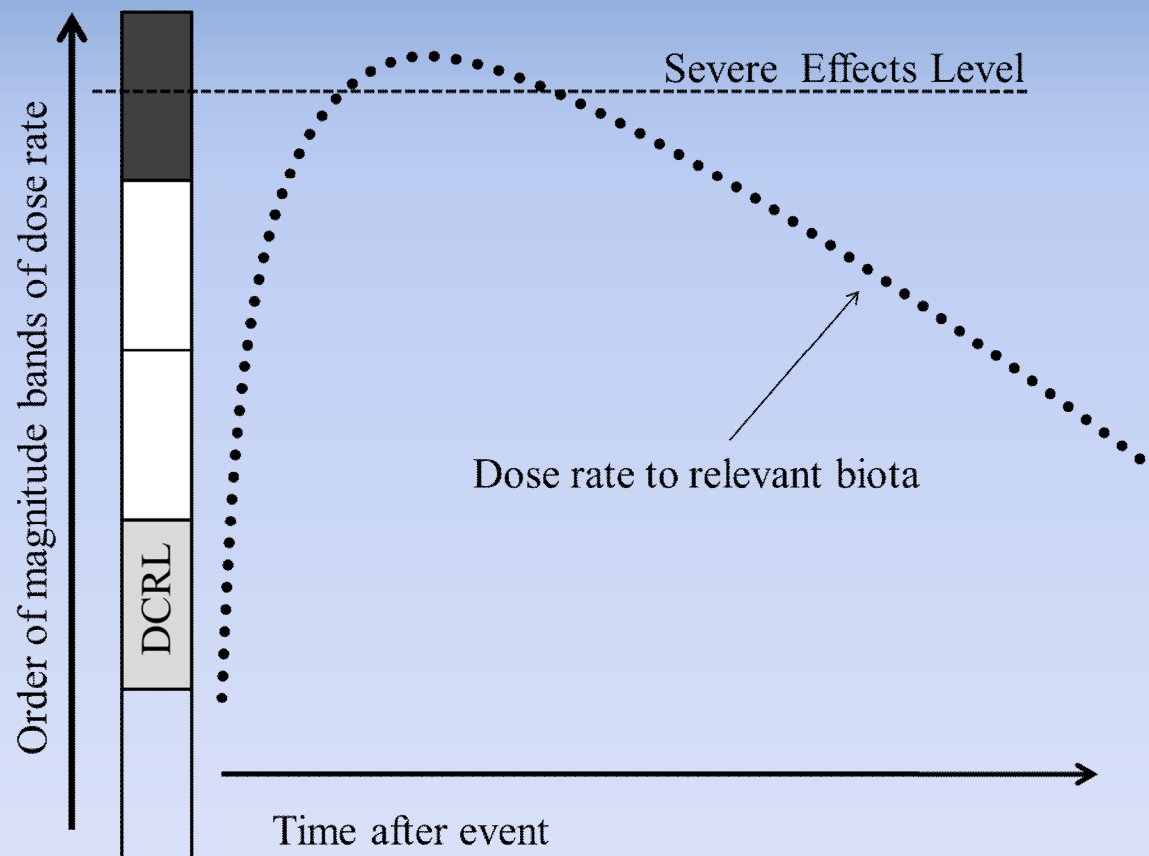


# Accidents and emergencies

Dose rate (mGy d <sup>-1</sup> )	<u>Reference Deer</u>	<u>Reference Flatfish</u>
100 - 1000	Reduction in lifespan due to various causes.	Some mortality expected in larvae and hatchlings 
10 - 100 	Increased morbidity. Possible reduced lifespan. Reduced reproductive success.	Reduced reproductive success
1 - 10	Potential for reduced reproductive success	Possible reduced reproductive success due to reduced fertility
0.1 - 1	Very low probability of various effects	No information
0.01 - 0.1	No observed effects.	No information
< 0.01	Natural background	Natural background

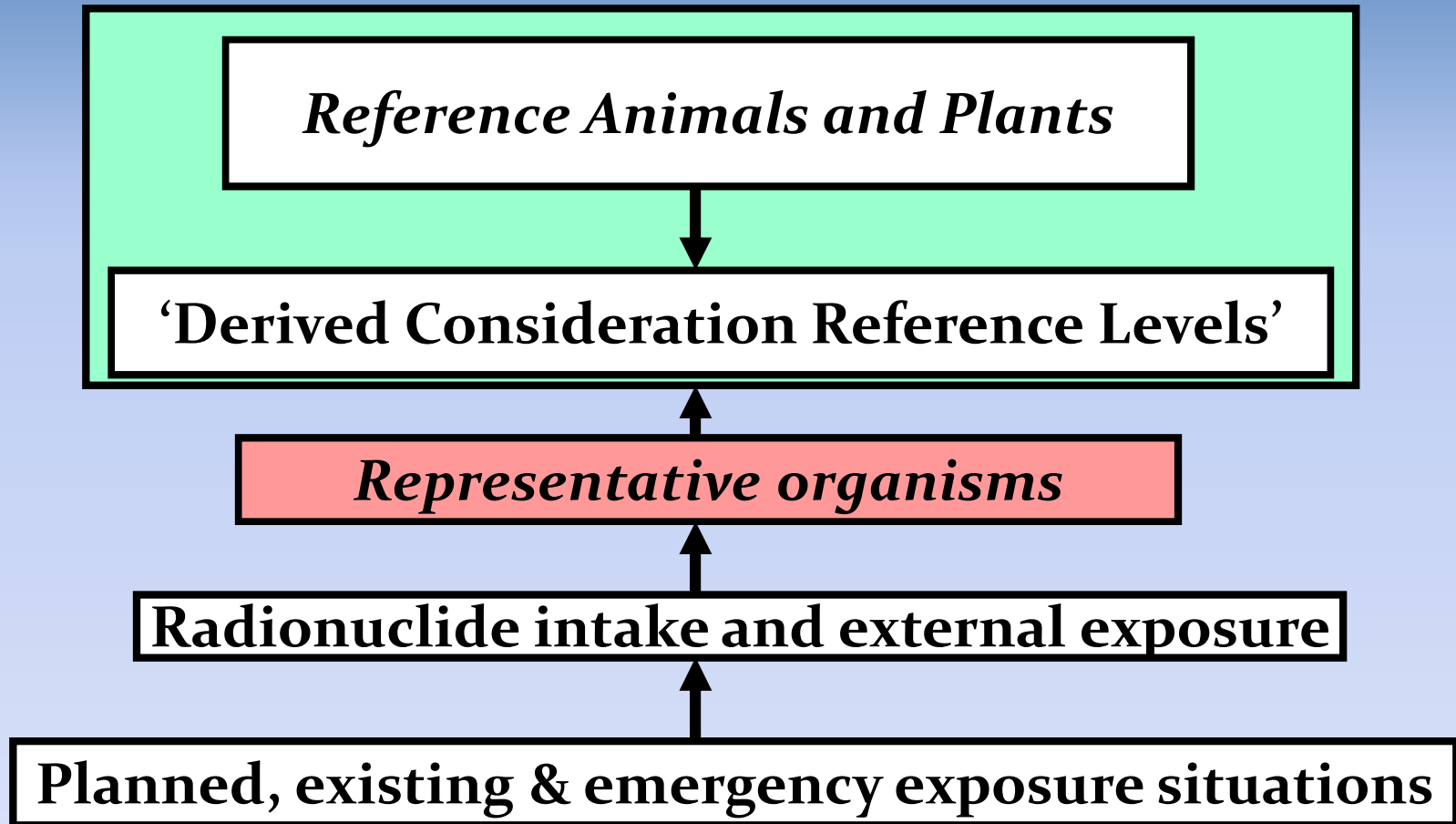
# ICRP 124 (in press)

## Application in emergency exposure situations



# Looking ahead

## Application



# Selection of Representative Organisms (ROs)

- Representative Organisms (ROs) need to be identified to serve as representatives of a particular species, or a group of organisms, in relation to a site-specific assessment, taking account of their assumed location with respect to the source

Planned situations

**Max. concentrations of radionuclides in air, water and 'soil'**

**Authorised Release Rates**

**Representative Persons**

**Representative organisms**

**Dose constraints**

**DCRLs**

# Task Group Participants

- Task Group Members
- R J Pentreath
- J Lochard
- D Cool
- D Coplestone
- P Strand
- M Watanabe
- C-M Larsson
- J Simmonds
- Corresponding Members
- A Janssens
- D Oughton
- E Lazo
- I Outola
- G Pröhl

# ICRP

[www.icrp.org](http://www.icrp.org)

**ICRP**

INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION