

TG 99: Reference Animals and Plants Monographs

TG 99 is a joint task group between Committee 1 and Committee 4 dealing with improvements in the field of radiological protection of the environment. The goal is to review and update data and methods to improve the use and practicality of the ICRP Reference Animals and Plants when applying the system of radiological protection of the environment in planned, emergency and existing exposure situations.

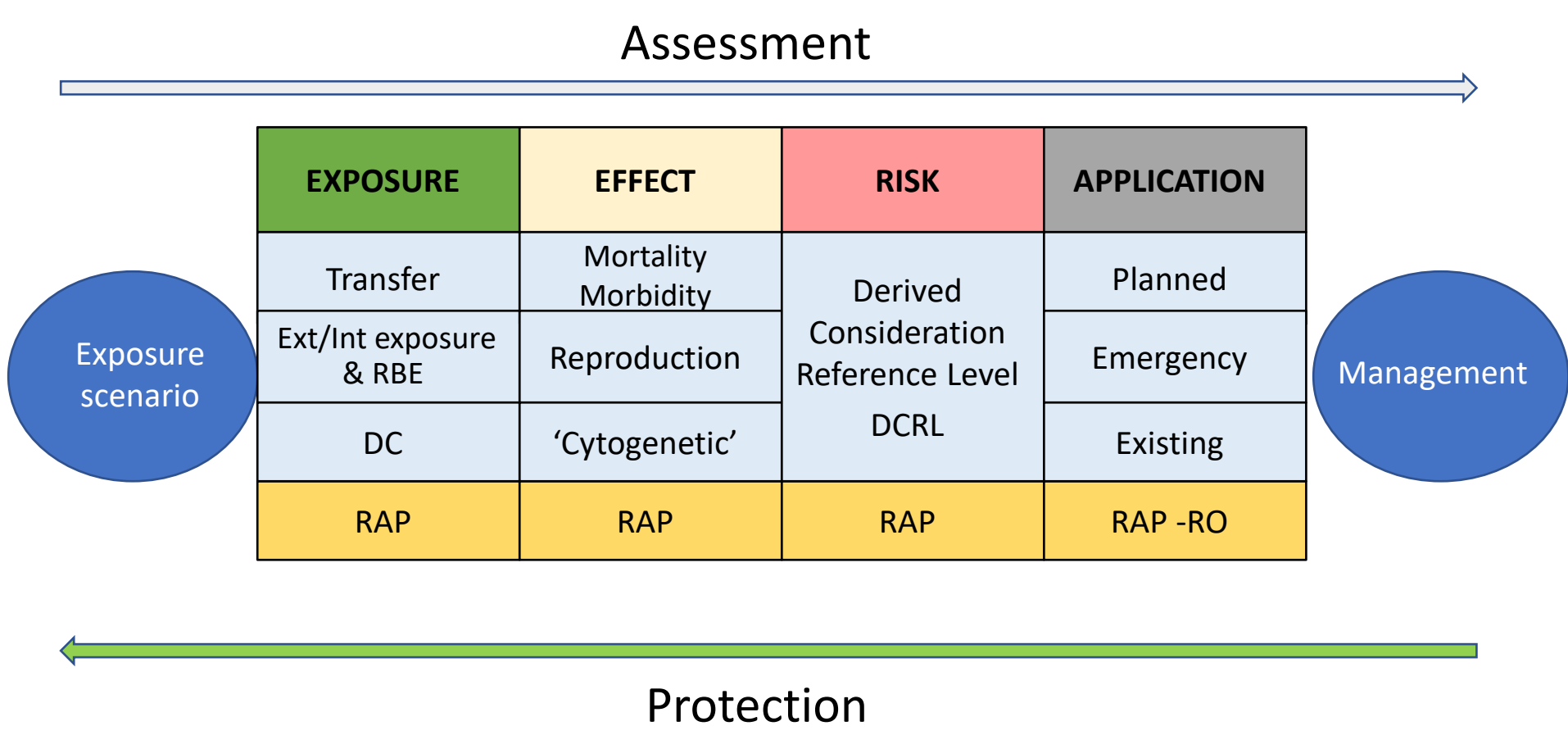


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► How is the system now regarding the protection of the environment?

In ICRP publication 108, **Reference Animals and Plants (RAPs)** are a set of 12 « entities » described at the taxonomic family level, typical of flora or fauna in particular ecosystems (terrestrial, freshwater and marine). RAPs as well as their related **Derived Consideration Reference Levels** are key concepts in the ICRP system of radiological protection.



Wildlife group	Ecosystem ¹	RAP	DCRL, mGy d ⁻¹ (shaded)		
			0.1-1	1-10	10-100
Large terrestrial mammals	T	Deer			
Small terrestrial mammals	T	Rat			
Aquatic birds	F, M	Duck			
Large terrestrial plants	T	Pine tree			
Amphibians	F, T	Frog			
Pelagic fish	F, M	Trout			
Benthic fish	F, M	Flatfish			
Small terrestrial plant	T	Grass			
Seaweeds	M	Brown seaweed			
Terrestrial insects	T	Bee			
Crustacean	F, M	Crab			
Terrestrial annelids	T	Earthworm			

► What are the key issues TG-99 is solving?

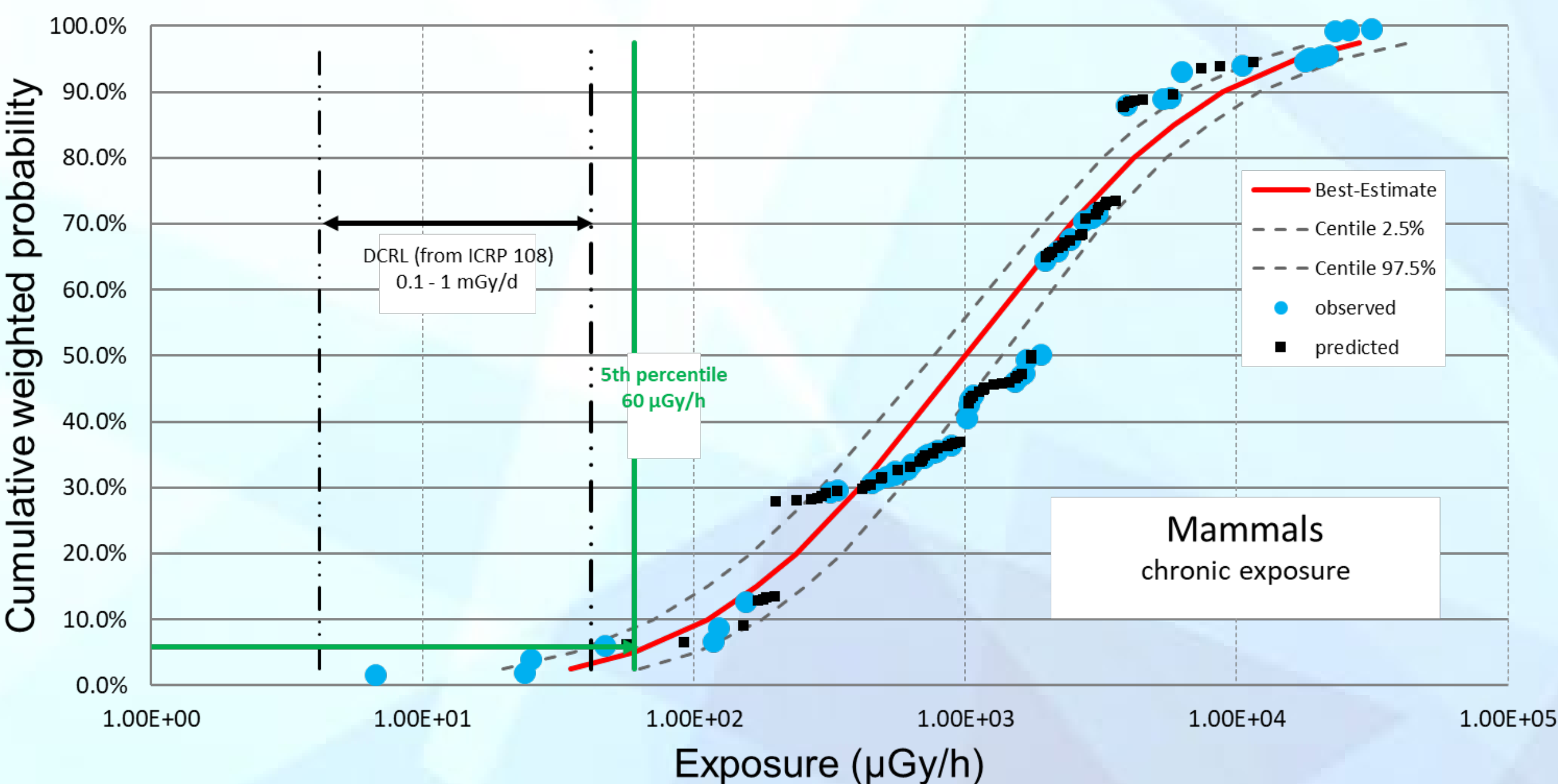
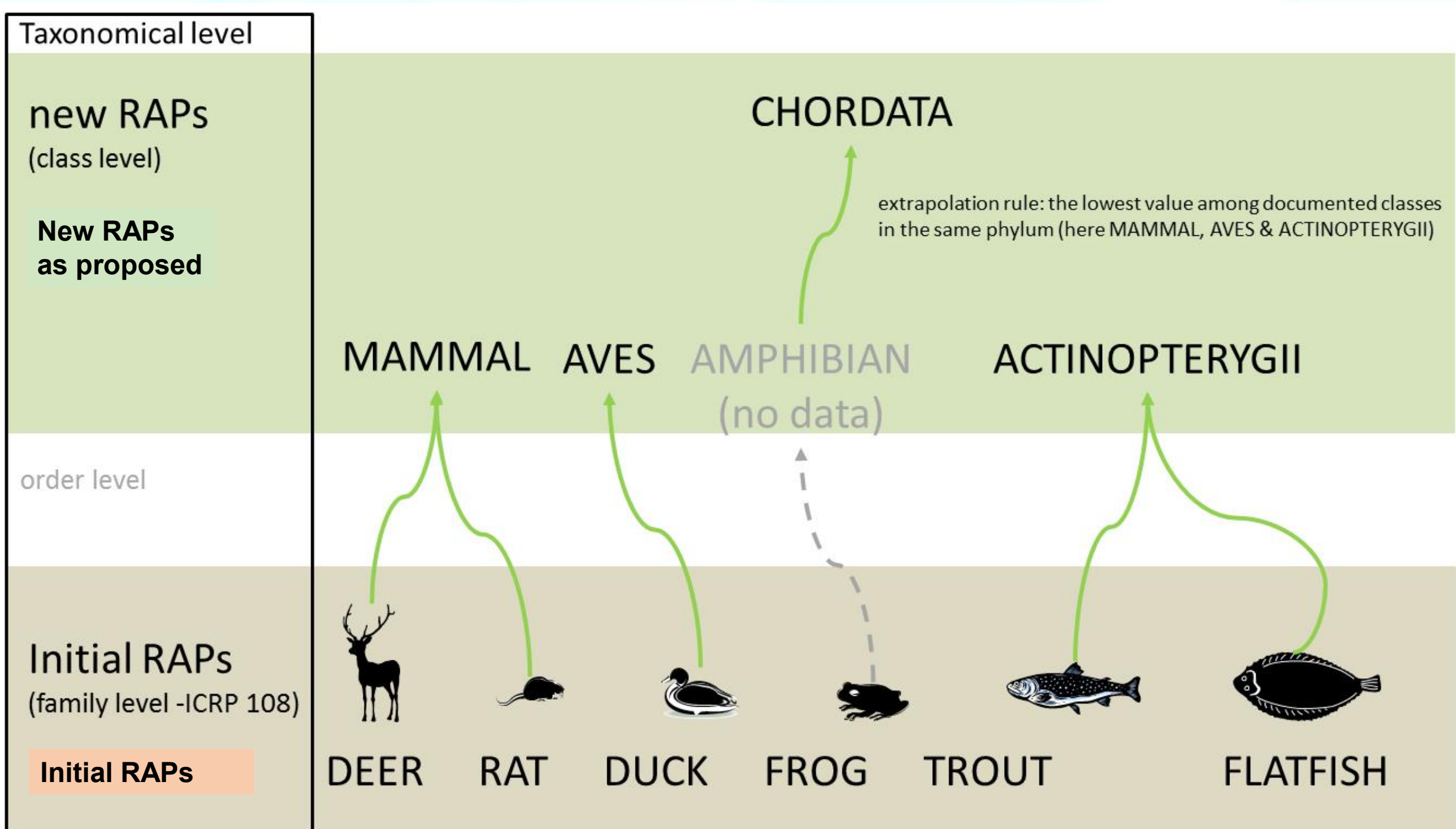
Key issue 1: RAPs representativeness with regard to the actual biodiversity may give rise to practical problems for their application in real ecosystems. Furthermore, the available data on transfer and effects do not support the current RAP definitions.

New definition proposed: *Reference Animals and Plants are defined as hypothetical entities, with anatomical, physiological, and life-history properties defined at the required level of taxonomy (e.g., species, genus, family) to relate exposure to dose and to understand the effects at the level of population. Effects and transfers are summarised at the taxonomic level of class.*

Key issue 2: The Derived Consideration Reference Levels are crucial benchmarks in the ICRP approach of risk assessment for non-human species. These are used as recommended reference values for animals or plants groups (e.g., mammals, fish). As such they need to be justified transparently and derived according to a systematic, robust and reproducible methodology. Clear advice on how the DCRLs should be used in assessments is also required.

New definition proposed: *a dose rate above which there is for a given taxonomic class a defined chance of deleterious effects of ionising radiation occurring to individuals of species that may lead to consequences at the population level. For planned exposure situations, this value would not be normally exceeded unless justifiable for overriding socio-economical reasons. For existing exposure situations, a specific DCRL can be identified with stakeholders depending upon the overall management objectives and the prevailing exposure circumstances, to be used as a point of reference within the optimisation output.*

These two new definitions are implemented by the TG, developing extrapolation methods and updating underlying data



How to read and use this Endpoints Sensitivity Distribution?

At a dose rate of **X** μGy/h, there is **Y**% chance of having morbidity, mortality and/or reproduction effect of more than 10% for mammals

OR

Y% of endpoints will exceed 10% effect for a dose (rate) of **X** μGy/h

Provisional endpoints sensitivity distribution (ESD) for mammals where all observed and predicted effect data are represented. On this, it is suggested to derive DCRL for planned exposure situations in a systematic way through the selection of a given percentile (e.g., 5th percentile of the distribution as widely used for chemicals – application of an uncertainty factor to the best estimate is under consideration)

How the initial definition and the proposed one relate to each other – example for a subset of RAPs