Using the DCRLs in Practice

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INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION
Registered with the Charity Commission for England and Wales (#1166304)

TG105:
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M. Di Giorgio, Argentina
C. Dowds, UK
G. Hirth, Australia
M. Johansen, Australia
A. Mayall, UK
J. Takala, Canada
T. Yankovich, Canada

Background

- **Heard about the derivation of the DCRLs**
- **Robustness, scientific method, greater transparency**
- **Addressing some of the issues raised since P108 and P124 were published e.g.,**
  - "my species of interest is missing from the RAPs"
  - Bands of orders of magnitude
- **Seen how the revised DCRLs reflect underpinning available data, compare with field and lab data**

Structure of the TG99 report

ICRP

and PUBLICATION 124

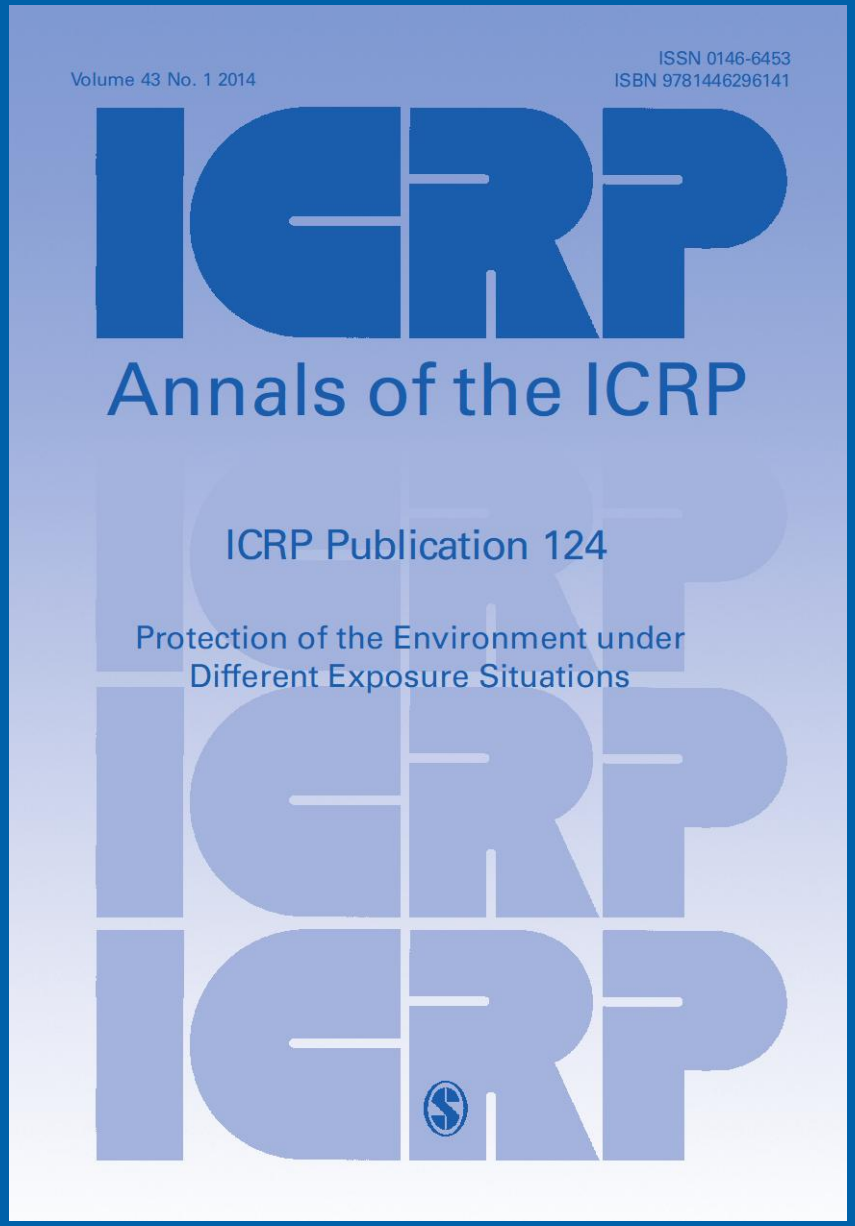
Basic guidance

- **Can continue to use P108 DCRLs but we recommend the TG99 derived values for use**
  - Transparency in underpinning data (and of associated uncertainties)
  - Reproducible method (with associated tool)
  - Complex assessments – more evidence-based evaluation of the benchmarks
  - Flexibility – can derive numbers using the associated tool

- **Publication 124 guidance still applies (with more advice/update coming in the Part 2 (from TG105 activities)**

Will cover

- Review/Reminder of Publication 124 guidance
- Demonstrate how the taxonomic mapping works using examples drawn from TG105 case studies
- Evaluation of effect of using P108 versus TG99 report DCRLs in assessments



Protection at community or ecosystem level

↕

Population status of species typical of the ecosystem – *Representative organisms/species*

↕

Key **biological parameters** affecting population status of typical species (effect endpoints)

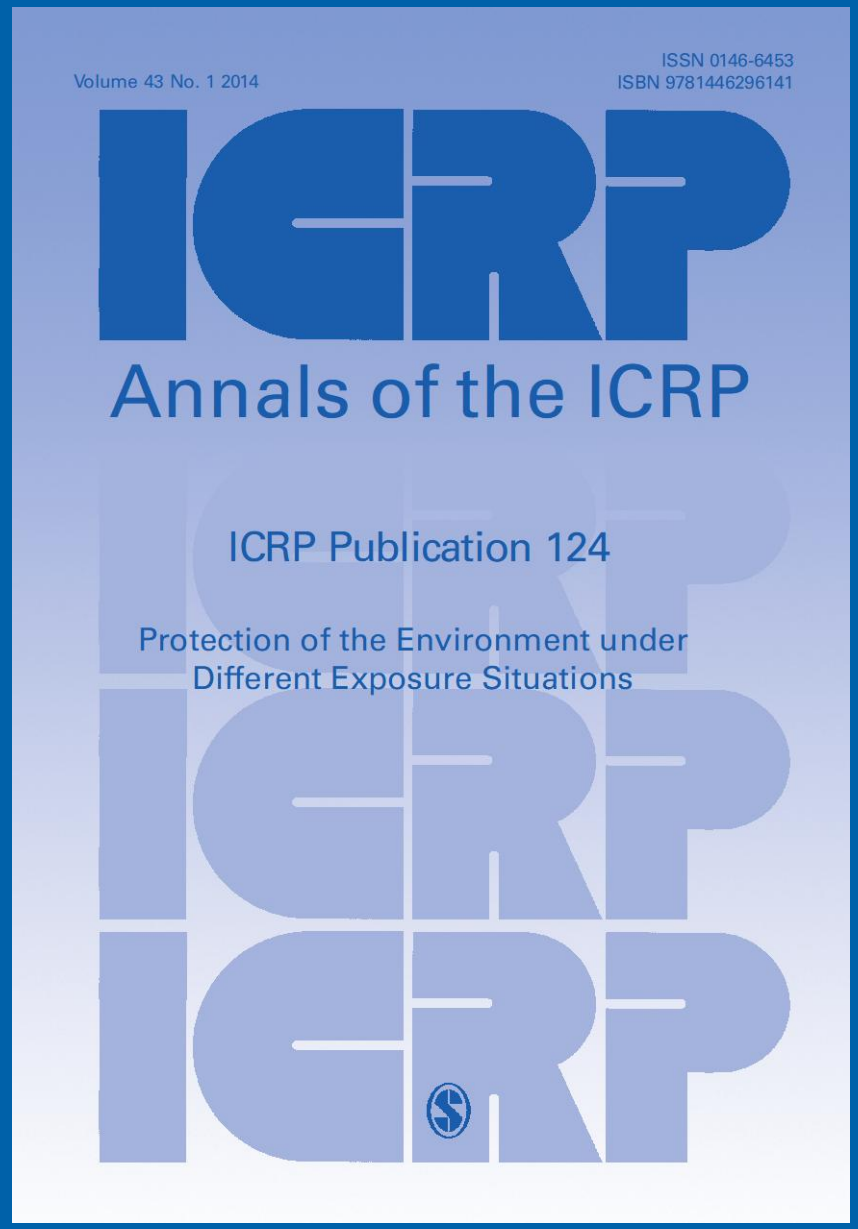
↕

Derived Consideration Reference Levels based on **dose rates likely to affect** such biological parameters

↕

Reference Animals and Plants

ICRP Table 4.2



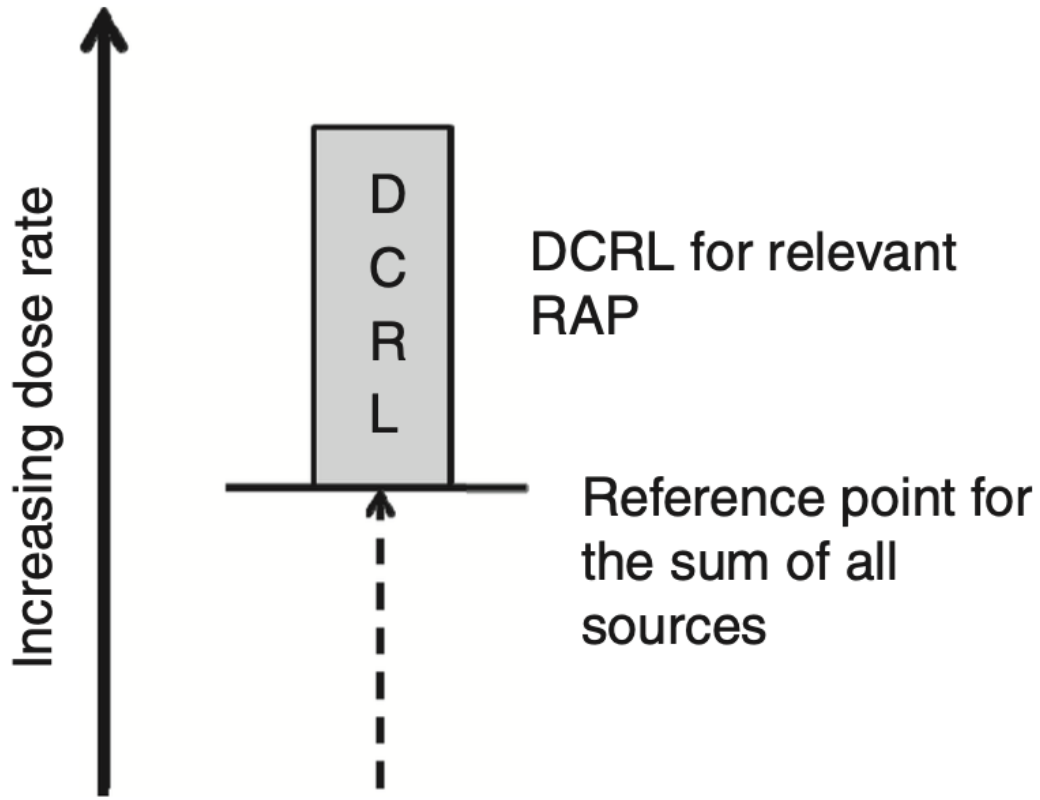
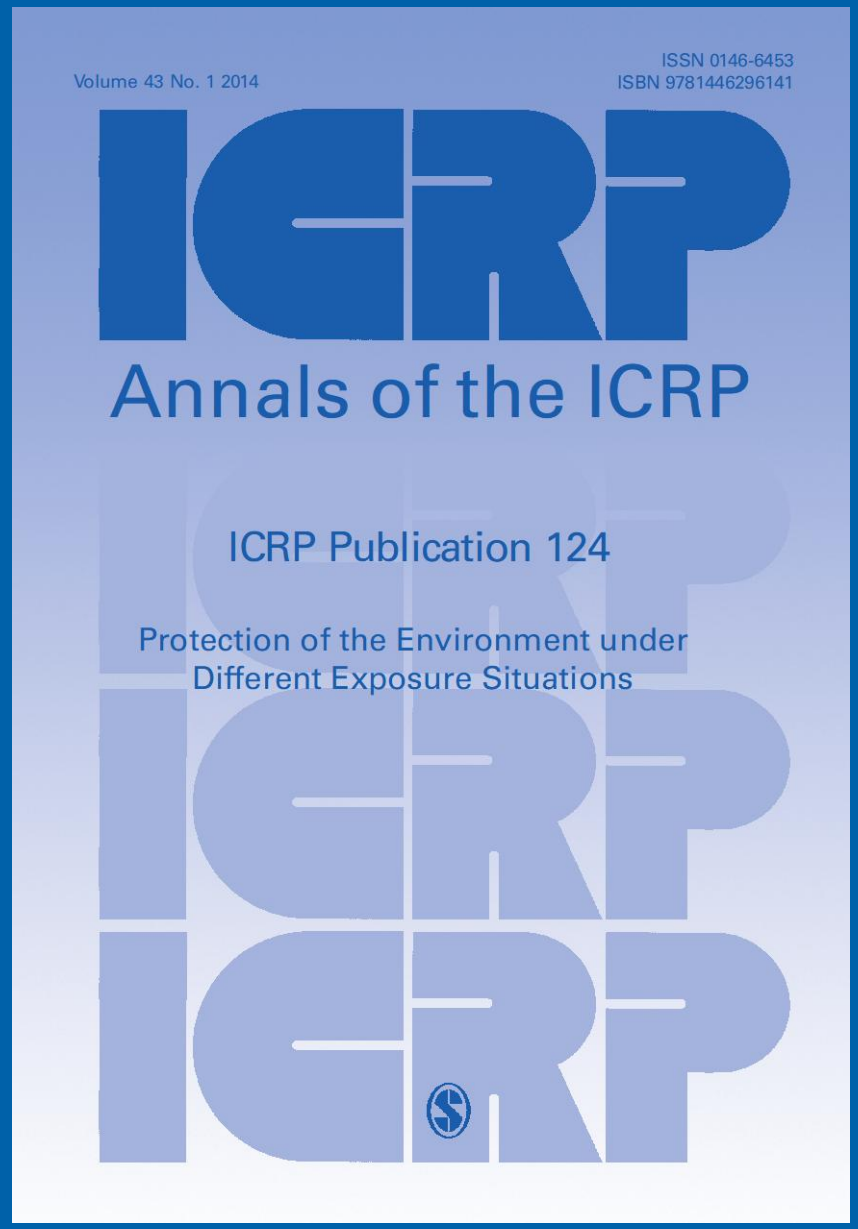


Fig. 3.2. Relationship between Derived Consideration Reference Levels (DCRLs) and sources under planned exposure situations. RAPs, Reference Animals and Plants.

ICRP Publication 124



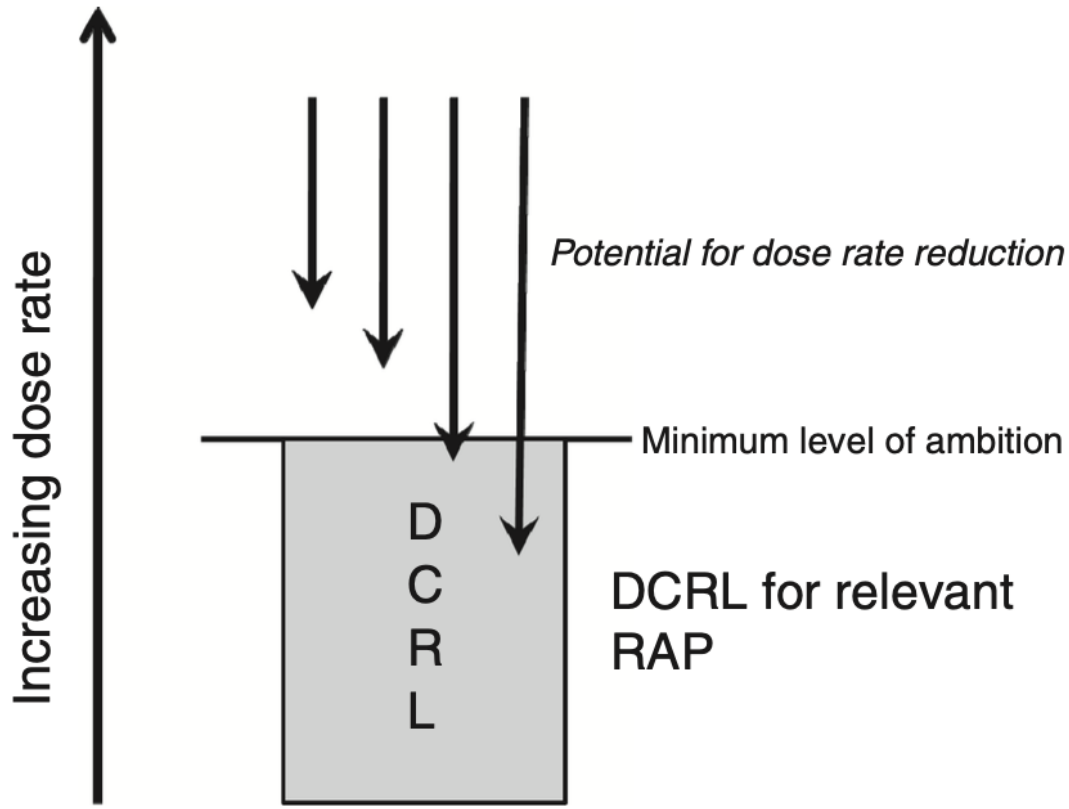
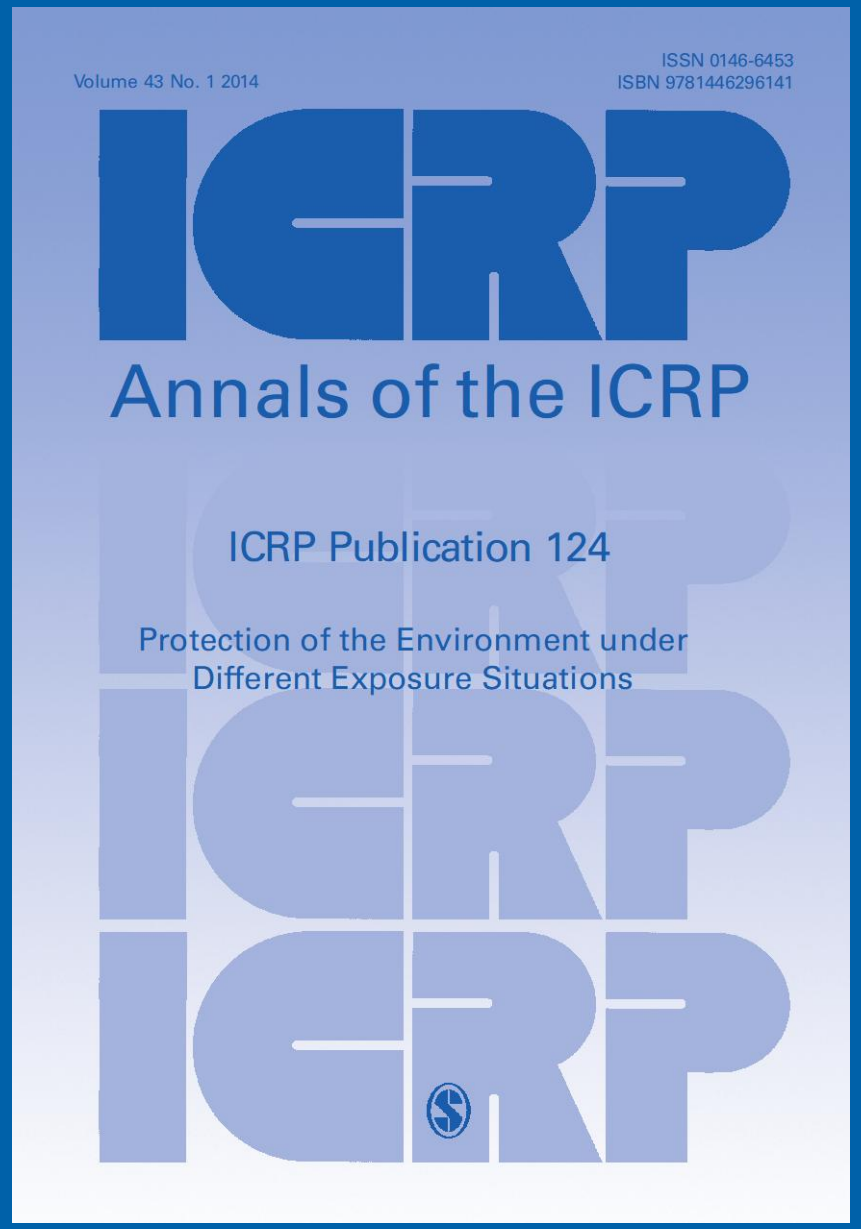


Fig. 3.3. Relationship between Derived Consideration Reference Levels (DCRLs) and ambition to reduce exposures in existing exposure situations. RAPs, Reference Animals and Plants.

ICRP Publication 124



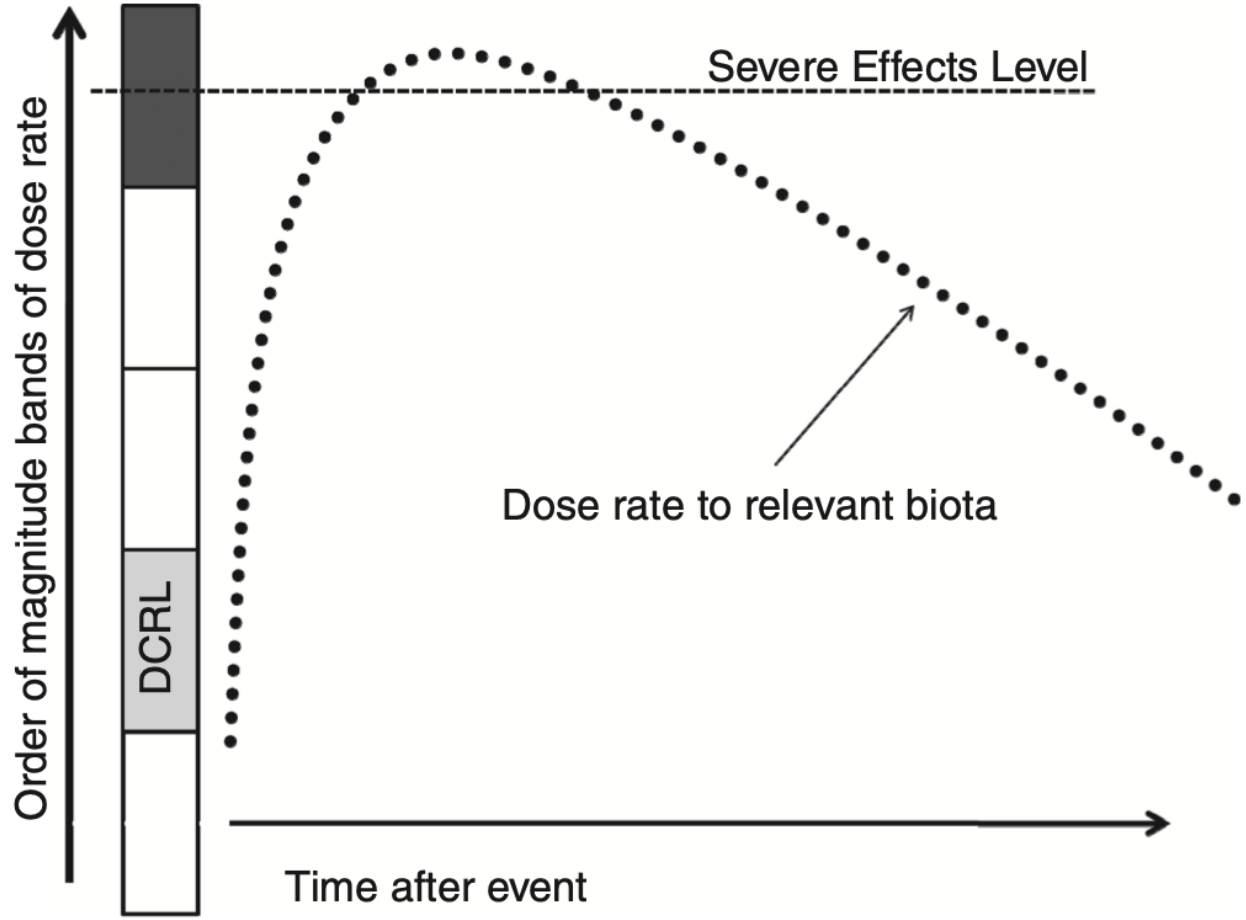


Fig. 4.3. Potential use of severe-effects bands, relative to Derived Consideration Reference Levels, to relate exposure of relevant biota following an accidental or emergency release of radionuclides into the environment.

ICRP Publication 124

Task Group 105

Focused on Applicability of the RAP approach

Testing the approach (including the DCRLs) in various scenarios using case studies

Will provide guidance on the practical application of the DCRLs (building on Publication 124)

Provide advice on complex environmental assessments

Considering the environment when applying the System of Radiological Protection Part 2: Integration within the system, including practical use of Derived Consideration Reference Levels"

- Aims of TG105 report:
  - **Protection of people and the environment** (under each exposure situation)
  - Use of **multi-criteria** decision making
  - **Application** of DCRLs
  - Use of monitoring **data**
  - **Uncertainty** in the assessment

- Ultimately the aim is to "**do more good than harm**"

RAP_{Family}	$DCRL_{Family}$	Band	$RAP_{Class\ or\ Phylum}$	$DCRL_{Class\ or\ Phylum}$	Broad Groups
Duck	4-40	<	Birds	100-300	Vertebrates 10-100
Trout, Flat Fish	40-400	<	Fish	70-200	
Deer, Rat	4-40	<	Mammals	20-60	
Frog	40-400	-	Amphibians	No data	
Bee	400-4000	-	Insects	No data	Invertebrates 70-700
Crab	400-4000	>	Crustaceans	100-400	
Earthworm	400-4000	>	Worms	100-500	
Pine Tree	4-40	<	Conifers	70-300	Plants 60-600
Wild Grass	40-400	<	Grasses and Monocots	200-1000	
None		-	Shrubs, trees not coniferous, dicots	200-600	
Brown Seaweed	40-400	-	Brown Algae	No data	

TG99 consultation report Table 4.7

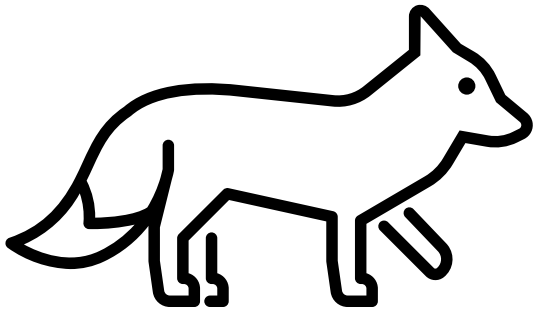
HIGHER LOWER

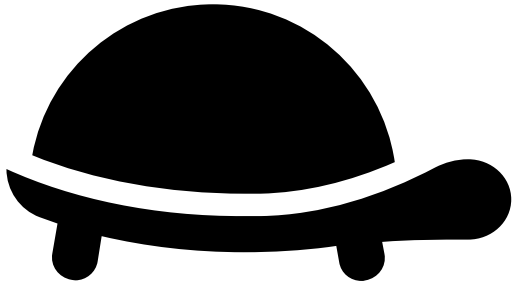
$RAP_{Class\ or\ Phylum}$	P108 DCRLs	TG99 DCRLs	Case study 1		Case study 2		Case study 3	
			$P108_{DCRLs}$	$TG99_{DCRLs}$	$P108_{DCRLs}$	$TG99_{DCRLs}$	$P108_{DCRLs}$	$TG99_{DCRLs}$
Mammals	4-40	20-60	HIGHER	HIGHER	HIGHER	HIGHER	HIGHER	HIGHER
Birds	4-40	90-200	HIGHER	LOWER			HIGHER	LOWER
Conifers	4-40	70-300			HIGHER	LOWER		
Fish	40-400	70-200						
Shrubs, trees not coniferous, dicots	-	200-600		LOWER		LOWER		HIGHER
Grasses and Monocots	40-400	300-1000	LOWER	LOWER	LOWER	LOWER	LOWER	LOWER
Crustaceans	400-4000	100-400						
Worms	400-4000	50-100	LOWER	HIGHER	LOWER	HIGHER		
Vertebrates	-	10-100		HIGHER		HIGHER		HIGHER
Invertebrates	-	70-700		LOWER		LOWER		LOWER
Plants	-	60-600		HIGHER		HIGHER		LOWER

Case studies are all existing or emergency exposure situations,
All comparisons for the lower boundary of the DCRL band

Using the RAPs

- Representative organism in your assessment
- How do these align to the DCRLs?
- Two examples





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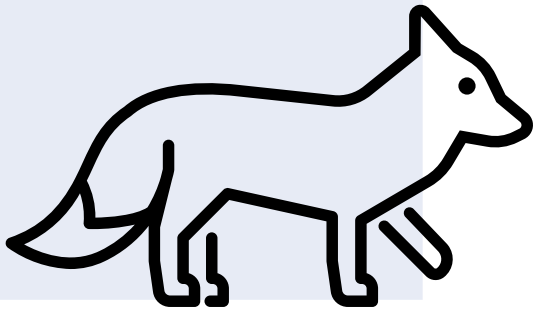

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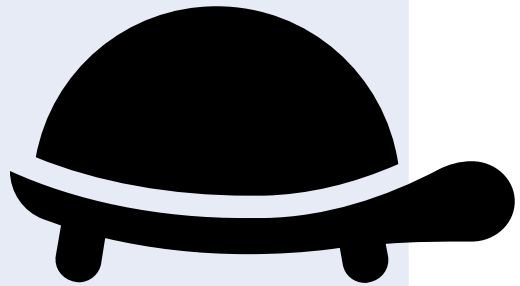

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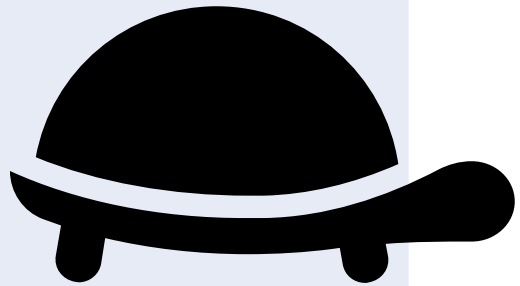

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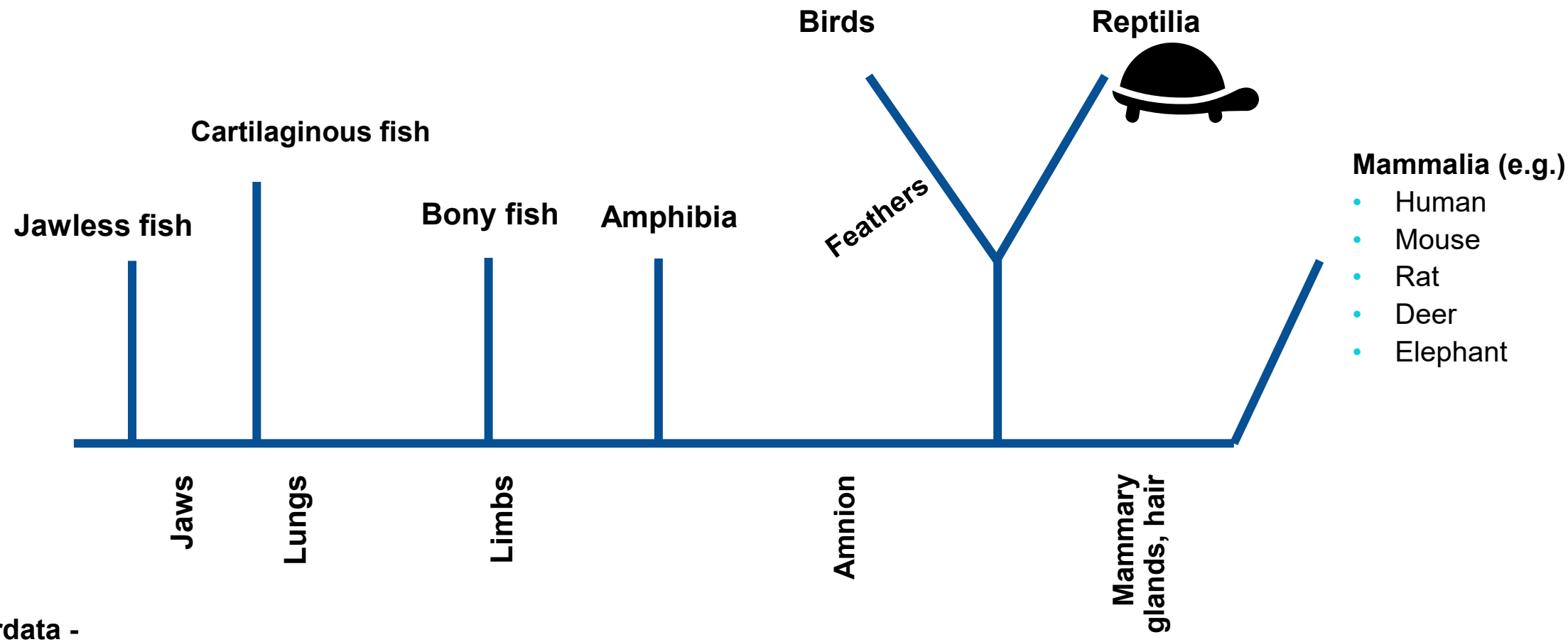

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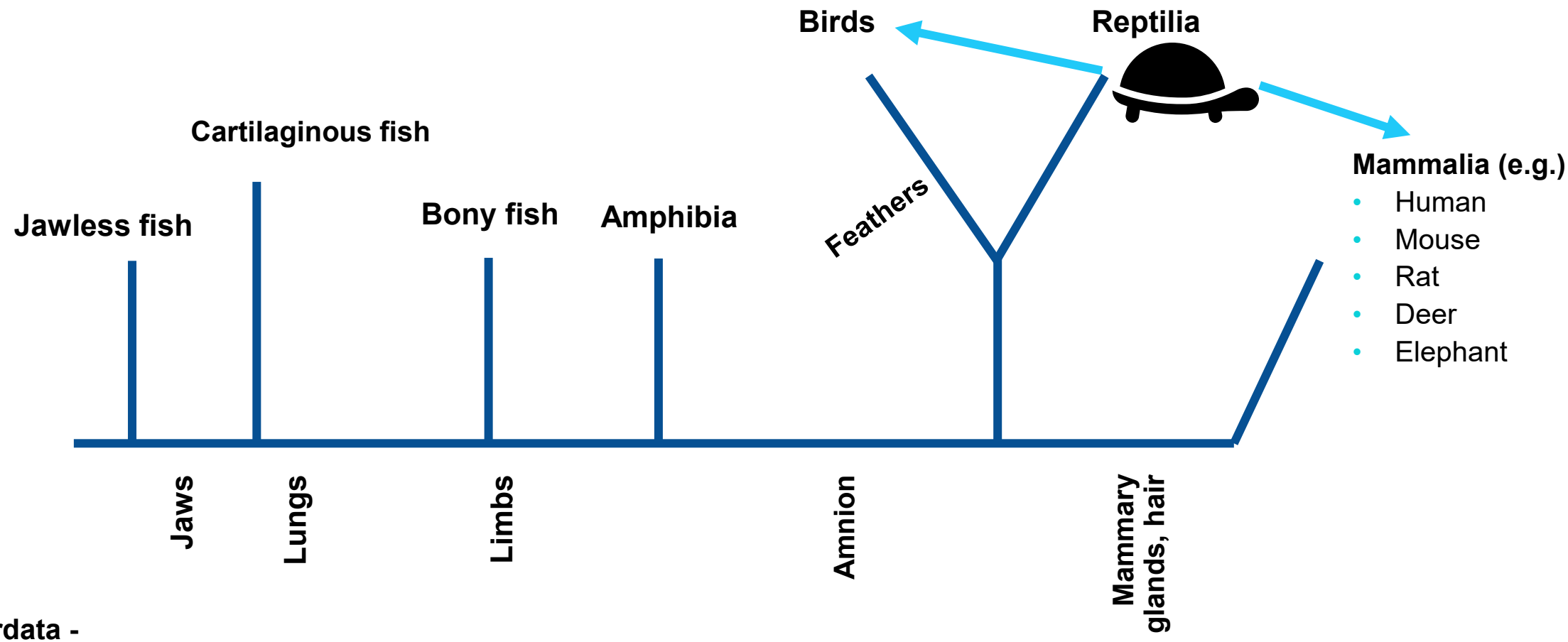

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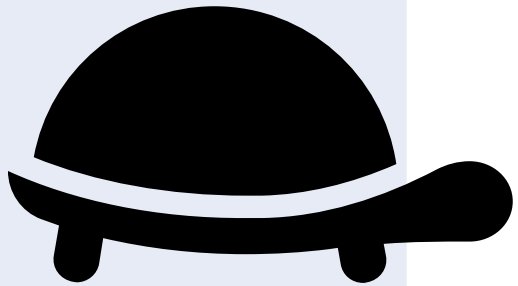

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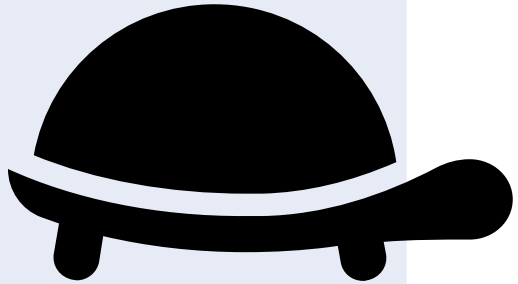

Impact of new DCRLs

- **Greater flexibility in mapping representative species to DCRLs**
- **Adaptability** to more **complex assessments**
- **Higher** TG99 DCRL **bands** for the **more radiosensitive** taxonomic groupings, should provide more realistic assessment outputs
- **Reduction** in the TG99 DCRLs for **less radiosensitive** taxonomic groupings, these are unlikely to change assessment outputs

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