Biota Modelling Working Group (WG4) Objectives

To improve Member State's capabilities for protection of the environment by comparing and validating models being used, or developed, for biota dose assessment (that may be used) as part of regulatory process of licensing and compliance monitoring of authorised releases of radionuclides

- Consider ICRP C5 output(s) & IAEA transfer handbook

Workplan & agreed activities (Jan'09)

- Interim 2 d meeting July 2009 (IAEA Vienna)
- Scenarios/exercises:
  - U mine, Canada – scenario to be presented to BMG July 2009 (interim results for Jan. 2010)
  - Waste trenches, Australia – scenario to be presented to BMG Jan. 2010
  - Wetland, Sweden – outline scenario to be presented to BMG Jan. 2010
  - DCC benchmarking exercise – results July 2010
- Overview of dynamic modelling – requirements & capabilities [chapter for final report]
- Assessment of heterogeneous distribution of radionuclides in media

‘Exercise 3’

Purpose:

Compare unweighted internal and external absorbed dose rates assuming 1 Bq kg^{-1} in organism & 1 Bq $unit^{-1}$ media respectively

Radionuclides considered – those from ICRP ‘RAP’ report (+^{55}Fe)

^{3}H, ^{14}C, ^{32}P, ^{33}P, ^{35}S, ^{36}Cl, ^{40}K, ^{45}Ca, ^{51}Cr, ^{54}Mn, ^{55}Fe, ^{57}Co, ^{58}Co, ^{60}Co, ^{59}Ni, ^{63}Ni, ^{65}Zn, ^{75}Se, ^{79}Se, ^{89}Sr, ^{90}Sr, ^{95}Zr, ^{94}Nb, ^{95}Nb, ^{99}Tc, ^{103}Ru, ^{106}Ru, ^{110m}Ag, ^{109}Cd, ^{124}Sb, ^{125}Sb, ^{129m}Te, ^{132}Te, ^{125}I, ^{129}I, ^{131}I, ^{134}Cs, ^{135}Cs, ^{136}Cs, ^{137}Cs, ^{140}Ba, ^{140}La, ^{141}Ce, ^{144}Ce, ^{152}Eu, ^{154}Eu, ^{155}Eu, ^{192}Ir, ^{210}Pb, ^{210}Po, ^{226}Ra, ^{228}Ra, ^{227}Th, ^{228}Th, ^{229}Th, ^{230}Th, ^{231}Th, ^{232}Th, ^{234}Th, ^{231}Pa, ^{233}U, ^{234}U, ^{235}U, ^{238}U, ^{237}Np, ^{238}Pu, ^{239}Pu, ^{240}Pu, ^{241}Pu, ^{241}Am, ^{242}Cm, ^{243}Cm, ^{244}Cm, ^{252}Cf

Did not include noble gases (Ar, Kr Rn) which had been requested by some group members

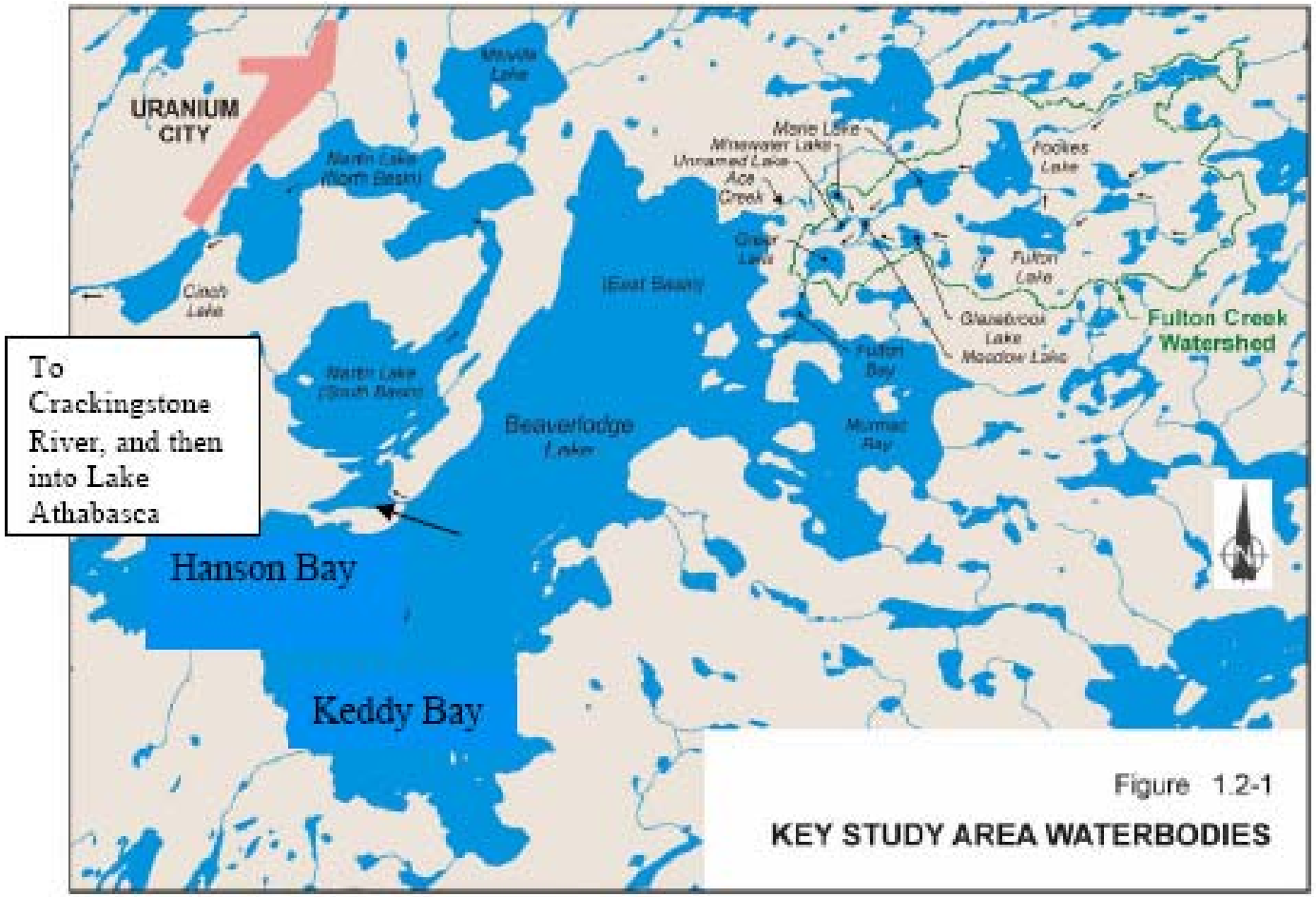






Model	Participant
RESRAD-BIOTA [‘basics’]	Sunita Kamboj (ANL, USA)
RESRAD-BIOTA [available software]	Mike Wood (Liverpool, UK)
EA R&D128 [‘basics’]	Jordi Vives i Battle (WSC, UK)
EA R&D128 [available spreadsheets]	Laura Newsome (EA, UK)
EA R&D128 [analogue approach]	Laura Newsome (EA, UK)
EDEN	Karine Beaugelin-Seiller (IRSN, France)
EPIC DOSES3D	Ali Hosseini (NRPA, Norway)
ICRP RAP report	Nick Beresford (CEH)
K-Biota	Dong-Kwon Keum (KAERI)
SUJB	Jan Horyna (SUJB)
VIC	Susumu Ryufuku (VIC)
DosDimEco	Geert Olyslaegers (SCK·CEN)
ERICA [default]	Laura Newsome (EA)/Hildegarde Vandenhove (SCK·CEN)
ERICA [create organism]	Mat Johansen (ANSTO)

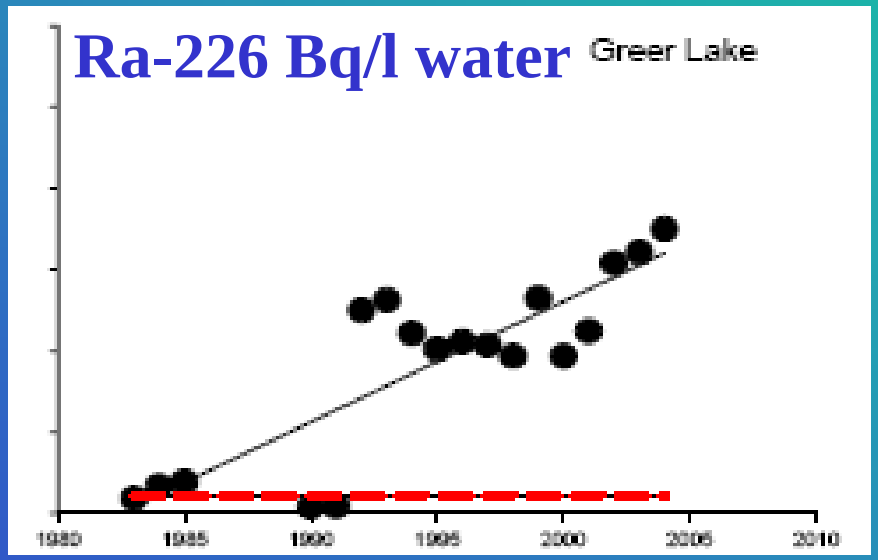
Beaverlodge uranium mine (CNSC)

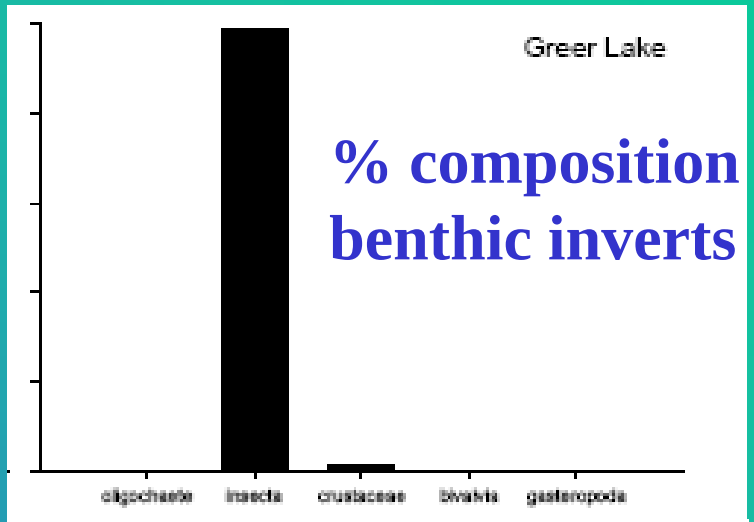


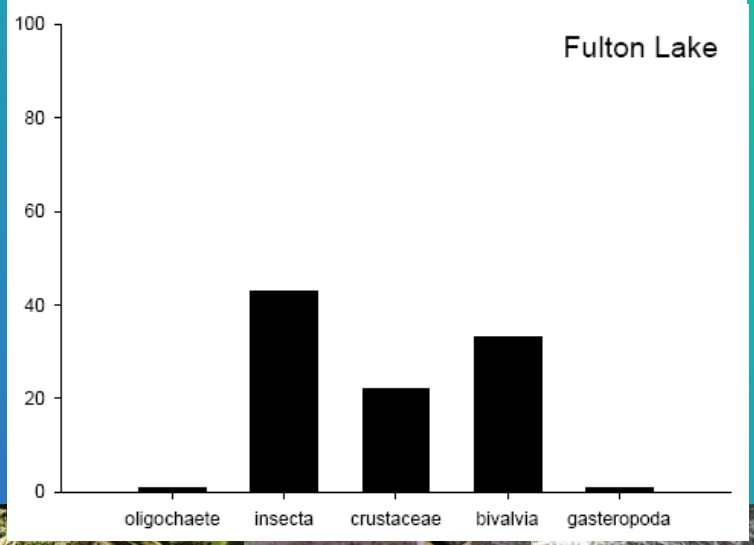
Beaverlodge

- Sediment, water & fish data available over a number of years [enables model-data comparison]
- Reduced invertebrate populations/effects in fish/multi-contaminants – interaction with WG6
- Provide informed opinion on real issue

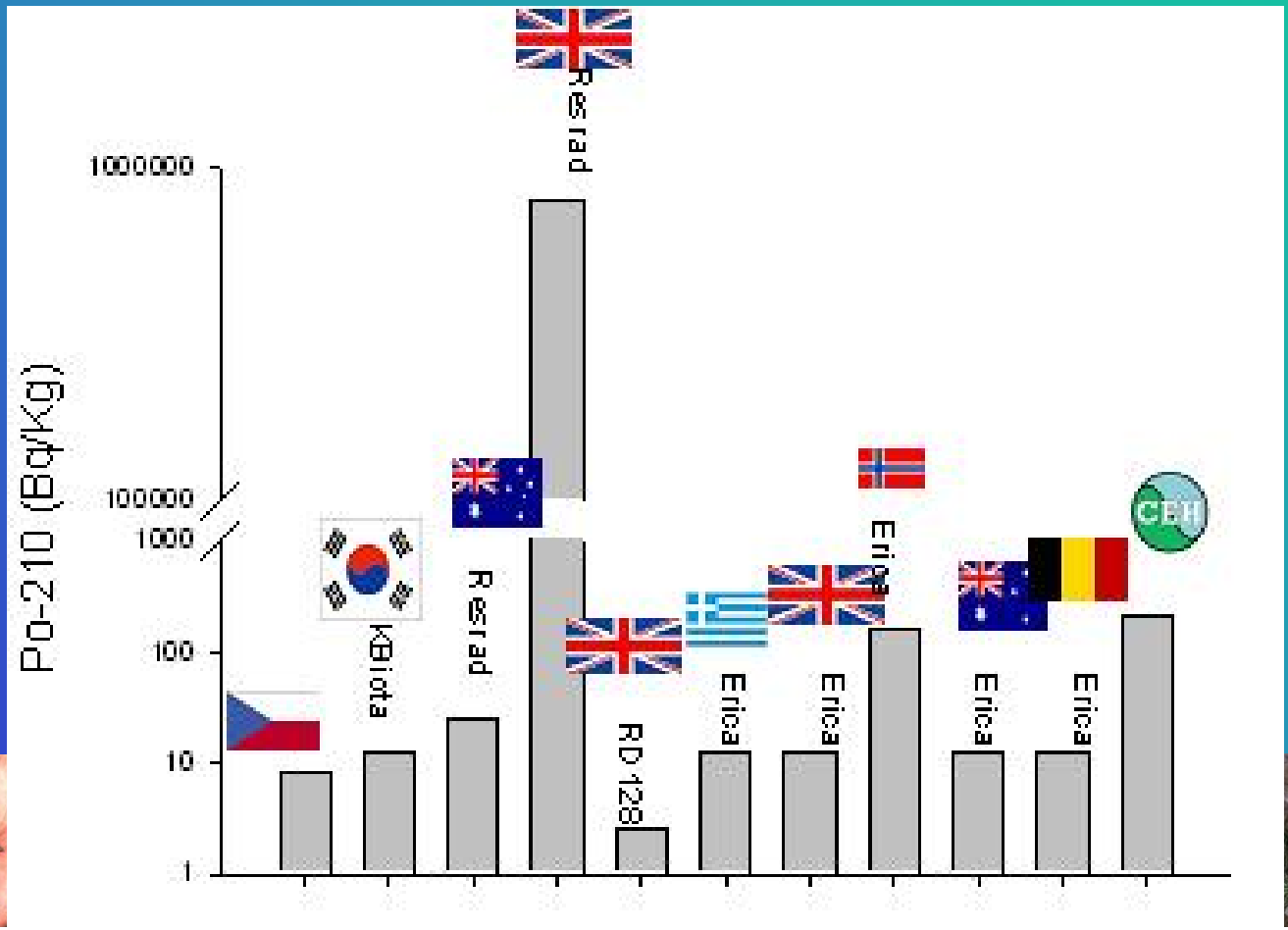
Beaverlodge







- Phase 1:
  - Model-data comparison for fish (Po, Ra)
  - Model:model benthic invertebrates & fish



Little Forest Burial Ground (ANSTO)

- Waste trenches (1960's)
- Radionuclides include: U, ^{3}H, Pu Am, Cs, Sr, Co
- On-going research programme

Wetland (Stockholm Univ.)







Agenda overview

- Tuesday
  - DCC benchmarking
  - Beaverlodge
- Wednesday pm
  - Little Forest scenario
  - Wetlands scenario
  - Combined assessments (WG 1 interaction)

BWG outputs

Yankovich, T.L., Vives i Batlle, J., Vives-Lynch, S., Beresford, N.A., Barnett, C.L., Beaugelin-Seiller, K., Brown, J.E., Cheng, J-J., Copplestone, D., Heling, R., Hosseini, A., Howard, B.J., Kryshev, A.I., Nedveckaite, T., Smith, J.T., Wood, M.D. International model validation exercise on radionuclide transfer and doses to freshwater biota. J. Radiological Prot.

Beresford, N.A., Barnett, C.L., Brown, J.E., Cheng, J-J., Copplestone, D., Gaschak, S., Hosseini, A., Howard, B.J., Kamboj, S., Nedveckaite, T., Olyslaegers, G., Smith, J.T., Vives I Batlle, J., Vives-Lynch, S., Yu, C. Predicting the radiation exposure of terrestrial wildlife in the Chernobyl exclusion zone: an international comparison of approaches. J. Radiological Prot.