

# APPLYING BRS & KNOWLEDGE GAPS

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# OUTLINE

- › **Brief overview of sonar systems**
- › **3S - BRS data gaps**
- › **Main challenges to extend BRS experiments for Naval purpose**

# SONAR SYSTEMS & FREQUENCIES USED

## USN:

- › LFA-Surtass,            0.2 – 0.5 kHz
- › MF, mid-frequency    2 – 10 kHz
  - › AN/SQS-53C        3 – 3.5 kHz
  - › AN/SQS-56        6 – 9 kHz

## 3S:

- › LFAS                    1 – 2 kHz
- › MFAS                    6 – 7 kHz

- › Helicopter sonars not included here

# SONAR SYSTEMS - CONFIGURATIONS

› Hull mounted

› Towed



UK

NL



## AN/SQS-53C

### › USS Arleigh Burke



› <https://www.sinodefenceforum.com/plan-type-052-052b-class-destroyers.t5571/page-370>

# TOWED LFAS SYSTEMS

## › Many systems

- › CAPTAS
- › ACTAS
- › MAPS
- › other

## › Many nations

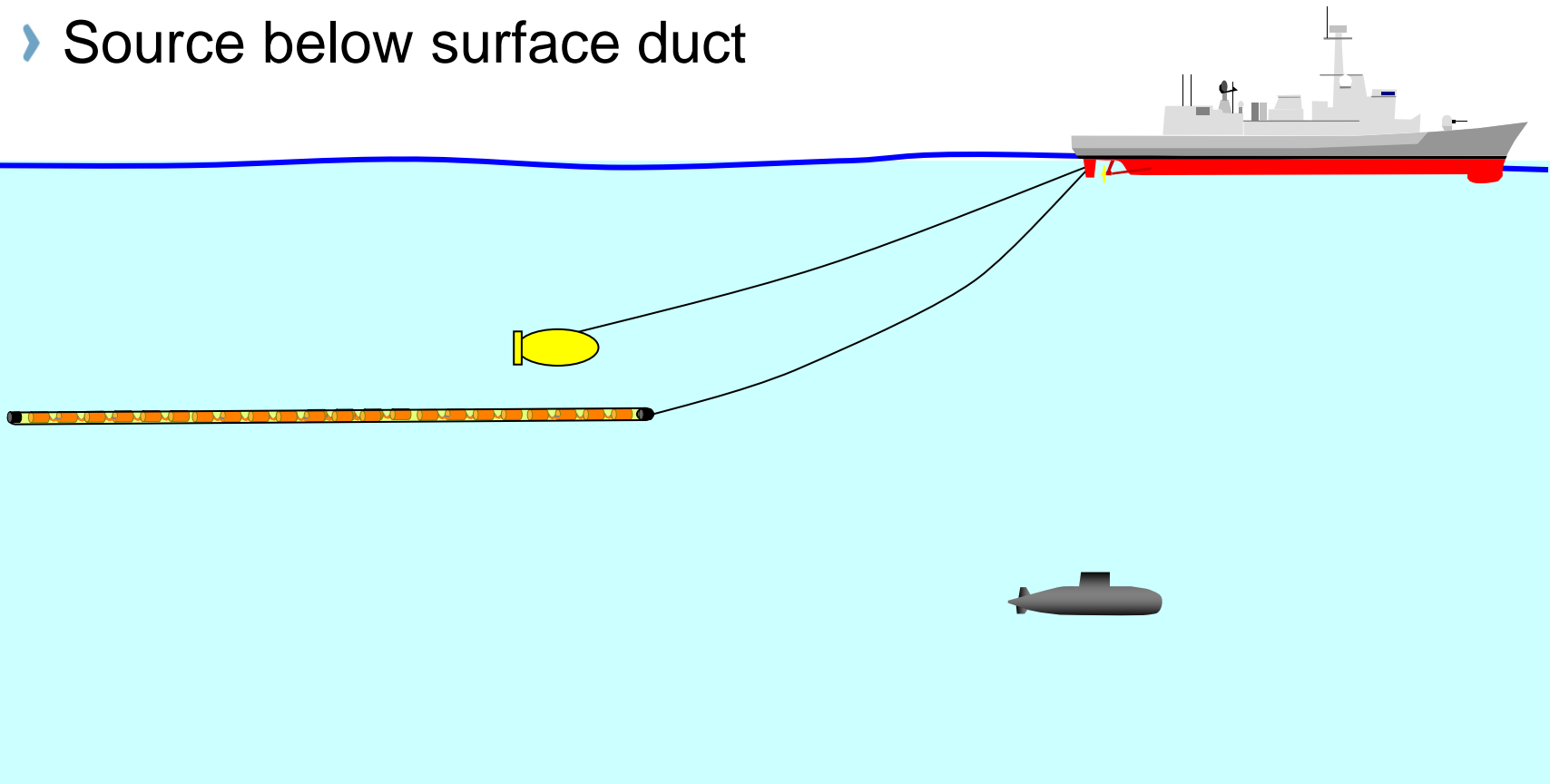
- › UK, FR, NOR, NL, ITA, GER, RAN..
- › But also:
  - › Thailand, India, Egypt,
  - › Morocco, UAE, Saudi Arabia
  - › Malaysia, Chile, etc.

Richard Scott, May 2015 issue

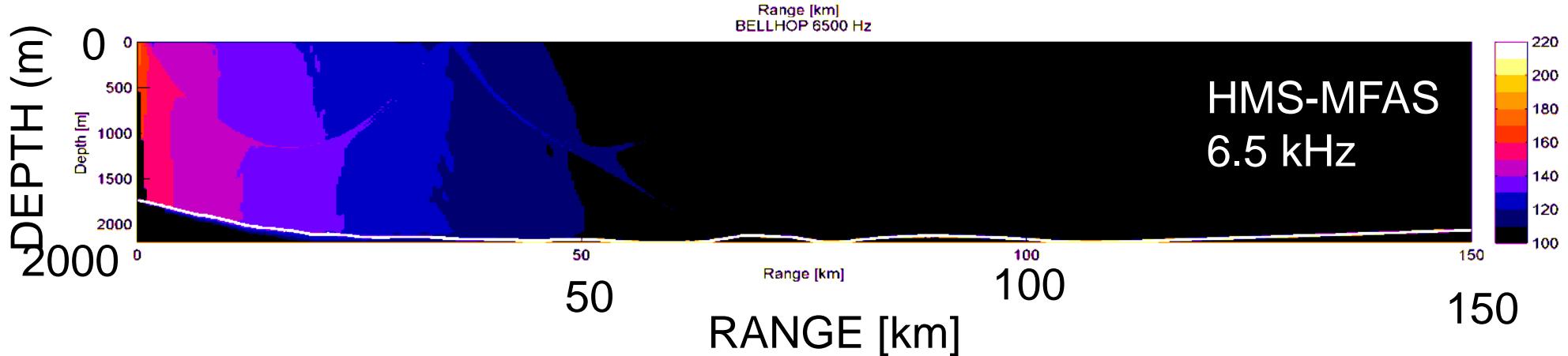
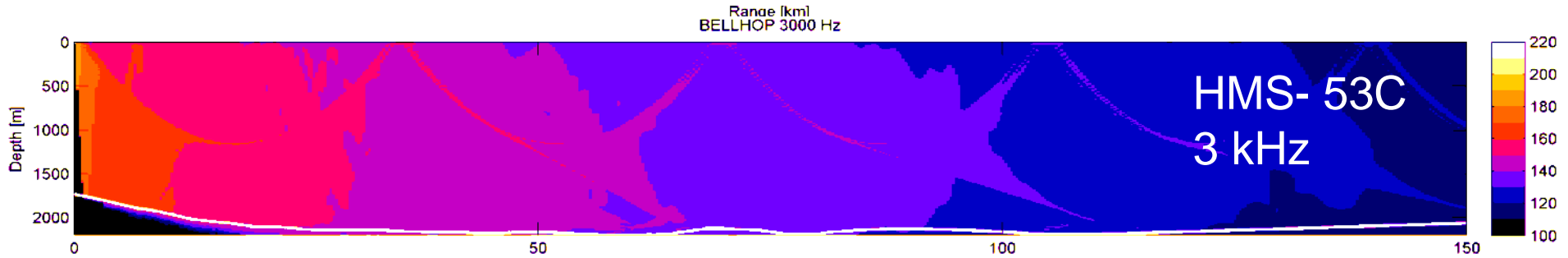
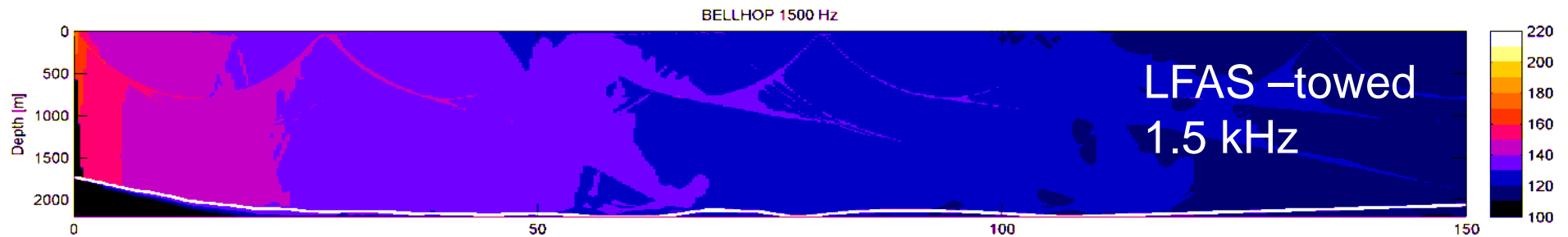


## TOWED SYSTEMS

- › Frequency slightly lower than 53C
- › Source below surface duct



# SPL MAPS FOR DIFFERENT SONARS (UNCLASS. SL, JAN MAYEN EXAMPLE)





# TAKE HOME MESSAGE ON SONAR SYSTEMS

- › Source Level (SL) is not the only parameter
  - › Frequency and tow-depth are important to include
- › Towed systems are operational worldwide

## 3S DATA GAPS

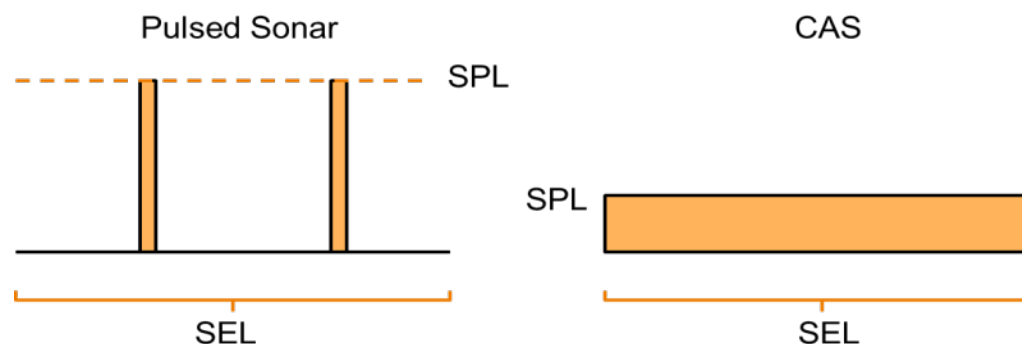
- **3S project has contributed to major improvement of our understanding of environmental effects of sonar.**
- We have identified four important data gaps, which will also greatly increase the value of the existing data.

Research gap 1: Confirmation of sensitivity in apparently sensitive species (n=1)

Research gap 2: Is received level or proximity the main response driver?

Research gap 3: What is the effect of exposure duration?

Research gap 4: What is the effects of future CAS versus pulsed sonars?



# PULSED VS. CONTINUOUS ACTIVE SONAR -CAS

## PULSED



### Conventional Pulsed Sonar

Short pulsed signal followed by long listening time

Duty cycles up to 5-10 %

Full source level

## CAS



### Continuous Active Sonar

Continuous signal

Duty cycle up to 90-100 %

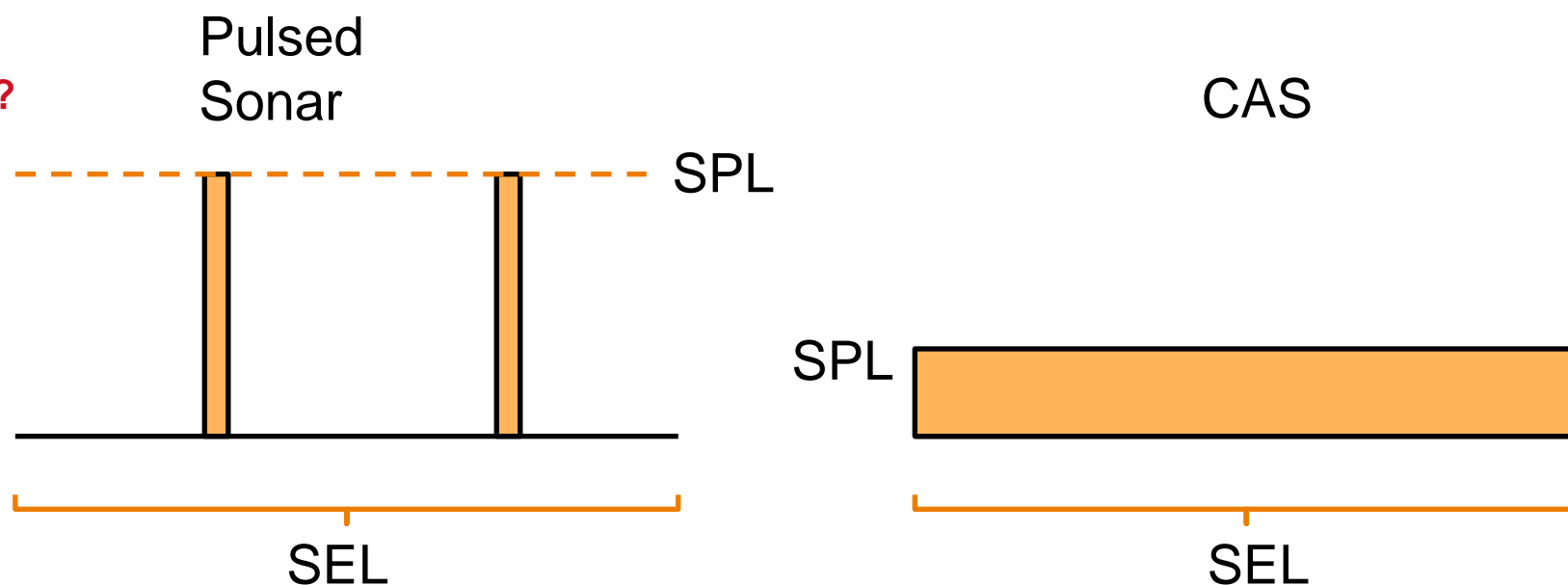
Reduced source level

## RELEVANT METRICS ?

- › **Sound Pressure Level (SPL) =  $10\log_{10}$  ( Mean Square Pressure ) over the pulse duration**
- › **Sound Exposure Level (SEL) =  $10\log_{10}$  ( Total Transmitted Energy ) over a specified time window**

› **Duty Cycle**

› **Masking?**



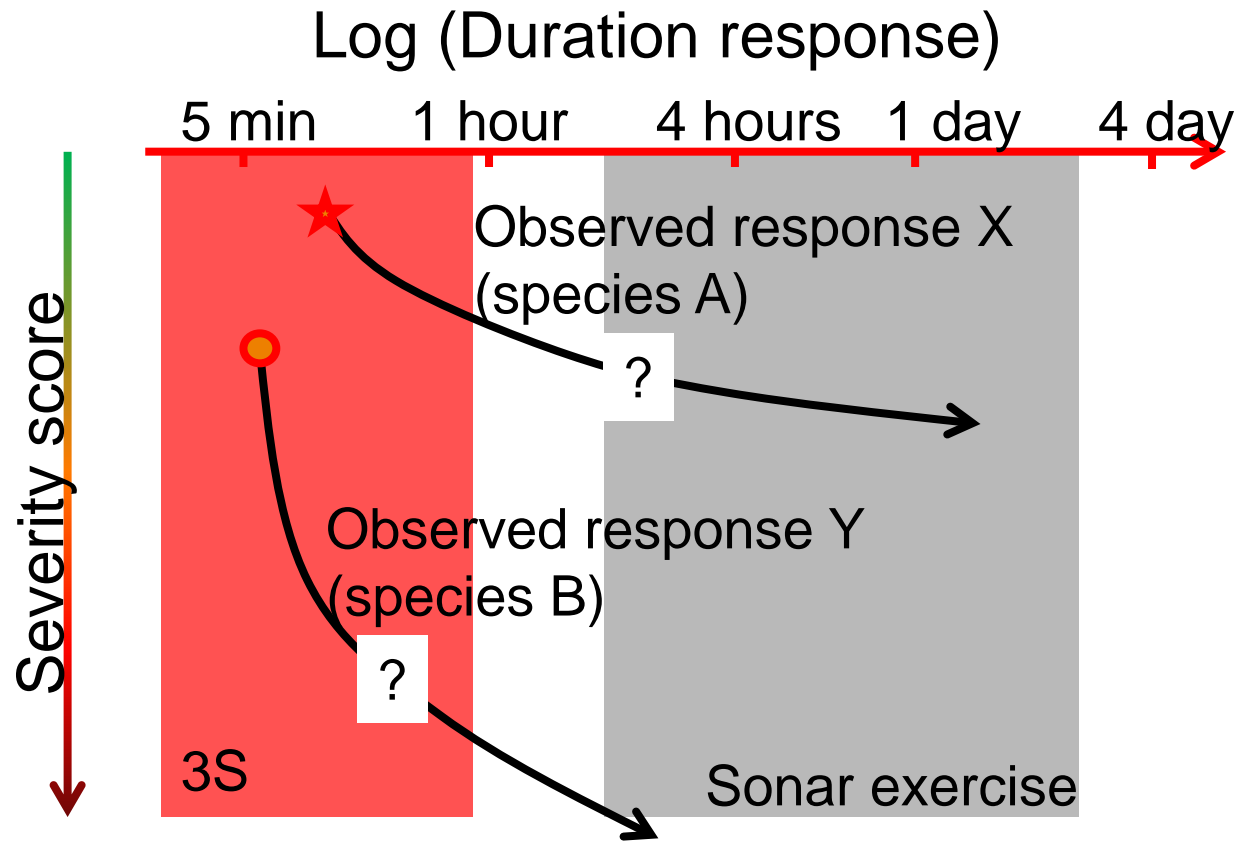
## STATUS CAS

- › CAS processing proved to be very successful

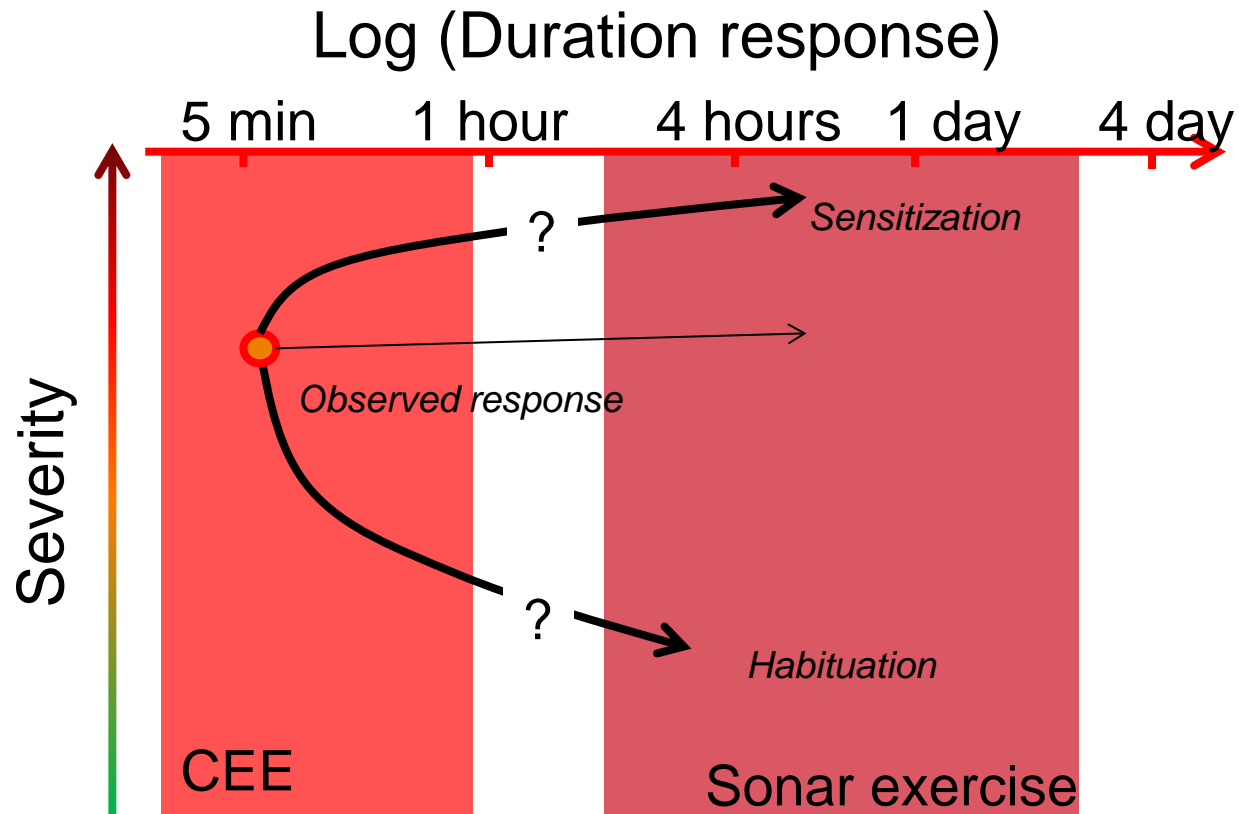
### **Implication**

Increased interest and possible future operational use means that **environmental impact needs to be evaluated**

# EXTRAPOLATING TO OPERATIONAL DURATION



# EXTRAPOLATING 2



TO BE CONTINUED

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Photo: Eirik Grønningsæter/WildNature.no/FFI/3S Project



# PROGRAMME

## › **Today: Session 4**

- › Applying BRS into management tools – von Benda-Beckmann
- › Using BRS-data for regulation documents – Henderson
- › Is using ramp-up useful ?– Wensveen

## › **Tomorrow:**

- › Additional science input
- › Naval context of 8 nations + industry (IOGP)