Wild seals used for scientific purposes:

Replacement, Reduction and Refinement of capture, handling and marking techniques, as well as post release behaviour and data validity

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SMRU POOL Facility

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ELIZABETH II

Animals (Scientific Procedures) Act 1986



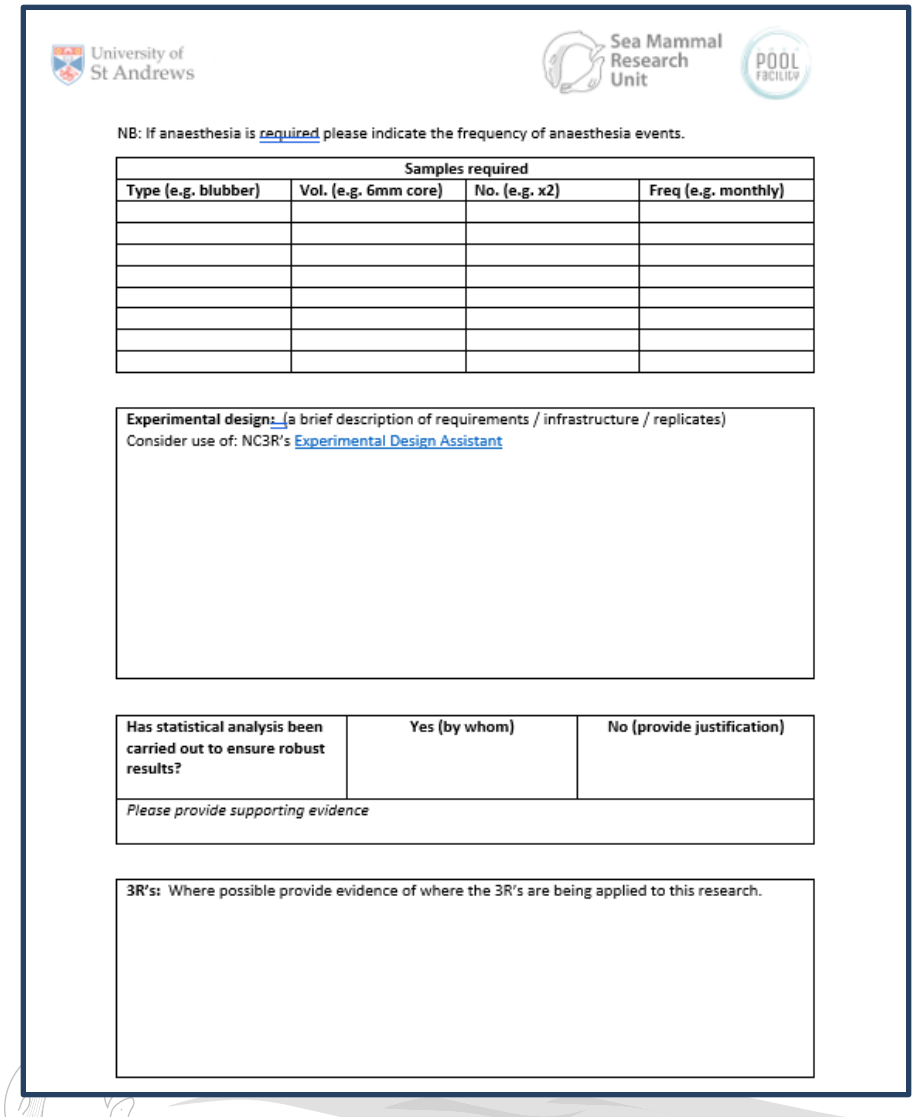
EU Directive 2010/63/eu

- Named Training and Competency Officer
- Named Animal Care and Welfare Officer
- Personal Licence Holder

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3R's: Before the work begins



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POOL FACILITY

NB: If anaesthesia is required please indicate the frequency of anaesthesia events.

Samples required			
Type (e.g. blubber)	**Vol. (e.g. 6mm core)**	**No. (e.g. x2)**	**Freq (e.g. monthly)**

Experimental design: (a brief description of requirements / infrastructure / replicates)
Consider use of: NC3R's Experimental Design Assistant

Has statistical analysis been carried out to ensure robust results?	**Yes (by whom)**	**No (provide justification)**
Please provide supporting evidence		

3R's: Where possible provide evidence of where the 3R's are being applied to this research.

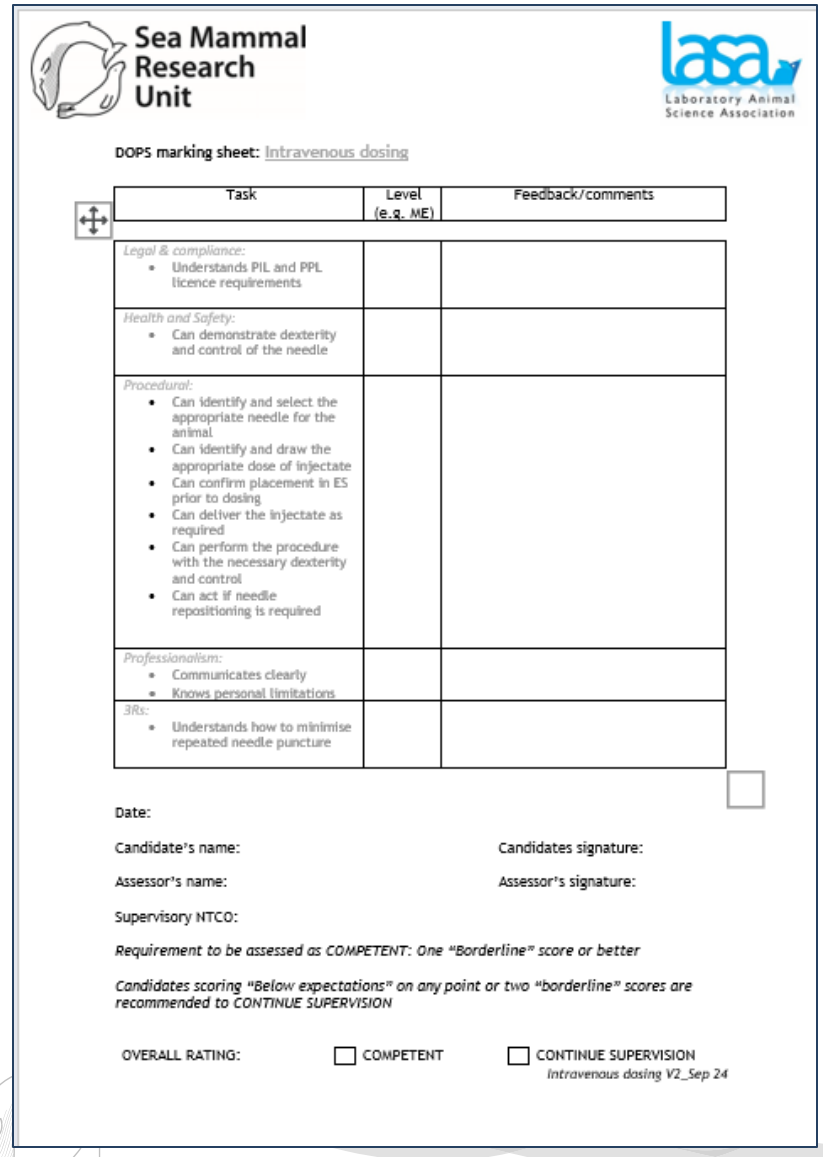
Study plans:

- Where can 3R's be implemented?
- Ensure that the proposed work is covered by the Project Licence (PPL)
- Power analysis carried out where feasible

Scrutinised by:

- PPL holder
- Named Veterinary Surgeon (NVS)
- Named Animal Care and Welfare Officer (NACWO)

3R's: Before the work begins



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lasa Laboratory Animal Science Association

DOPS marking sheet: Intravenous dosing

Task	Level (e.g. ME)	Feedback/comments
Legal & compliance: • Understands PIL and PPL licence requirements		
Health and Safety: • Can demonstrate dexterity and control of the needle		
Procedural: • Can identify and select the appropriate needle for the animal • Can identify and draw the appropriate dose of injectate • Can confirm placement in ES prior to dosing • Can deliver the injectate as required • Can perform the procedure with the necessary dexterity and control • Can act if needle repositioning is required		
Professionalism: • Communicates clearly • Knows personal limitations		
3Rs: • Understands how to minimise repeated needle puncture		

Date:

Candidate's name: Candidates signature:

Assessor's name: Assessor's signature:

Supervisory NTCO:

Requirement to be assessed as COMPETENT: One "Borderline" score or better

Candidates scoring "Below expectations" on any point or two "borderline" scores are recommended to CONTINUE SUPERVISION

OVERALL RATING: ☐ COMPETENT ☐ CONTINUE SUPERVISION

Intravenous dosing V2_Sep 24

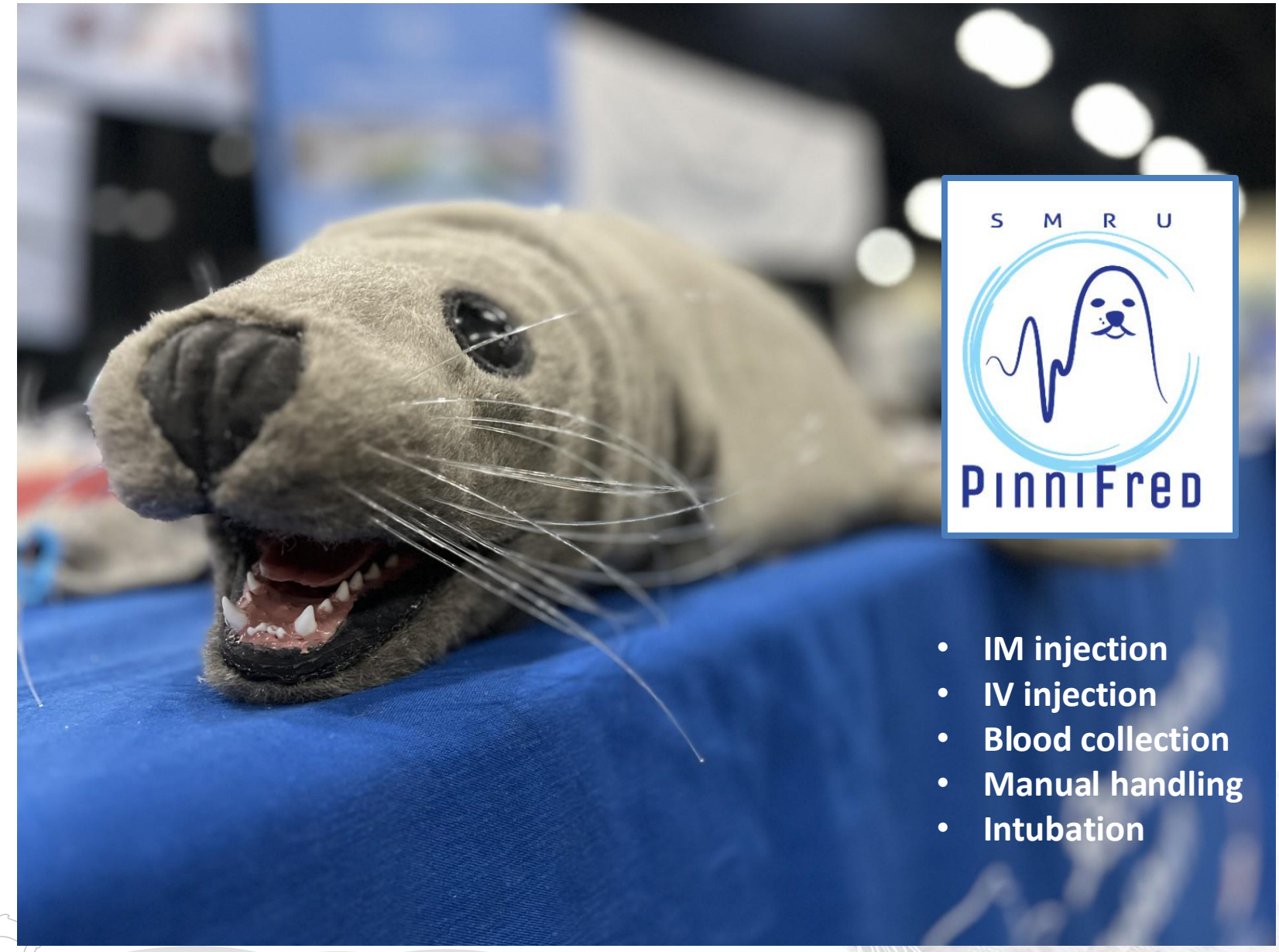
Pre Fieldwork briefing and assessment

For Personal Licence Holders:

- Training of key skills
- Competency Assessment using Direct Observation of Procedures (DOPS)
- Evidence of competency

For non licenced personnel

- Discuss roles
- Update on refinements



- IM injection
- IV injection
- Blood collection
- Manual handling
- Intubation

Capture techniques

- Minimise disturbance to overall population / haul out
- Minimise impact on individual animals (target or non-target)



- Maximise catching potential to
  - achieve scientific outcomes
  - reduce prolonged disturbance

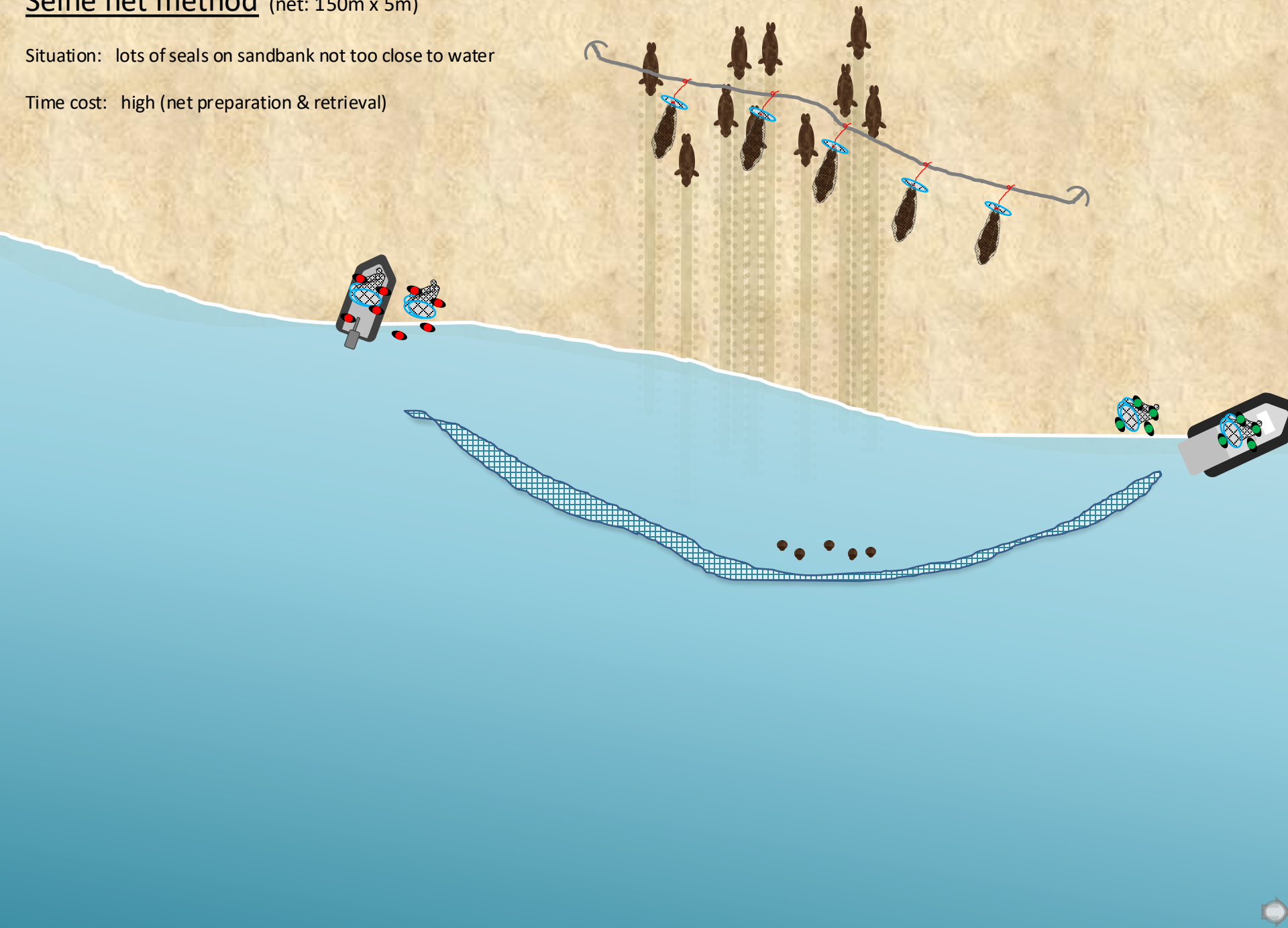
Carried out safely, for both animals and personnel



Seine net method (net: 150m x 5m)

Situation: lots of seals on sandbank not too close to water

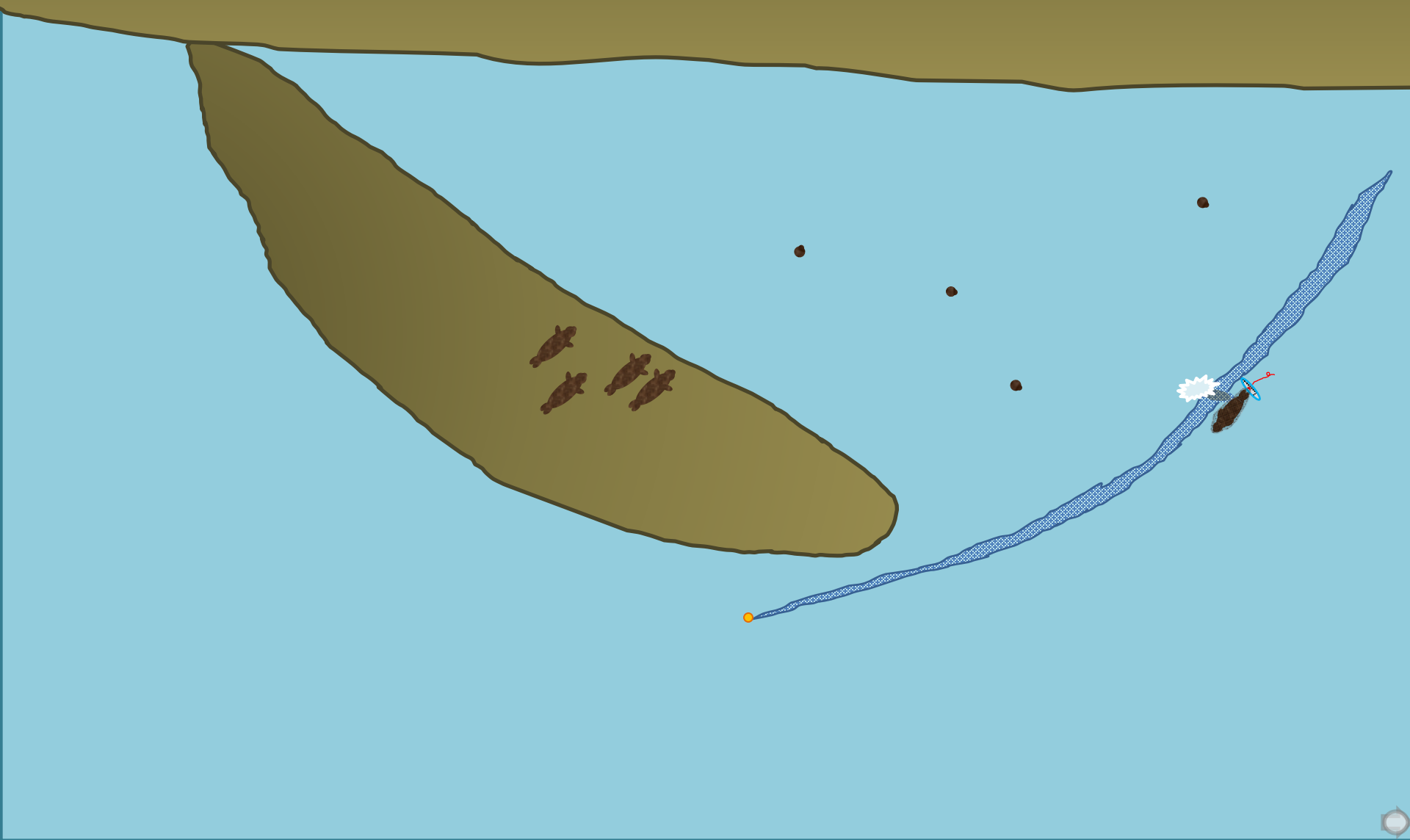
Time cost: high (net preparation & retrieval)



Tangle net method (1 net: 80m x 4m)

Situation: seals fairly close to water, but ideally within an enclosable area

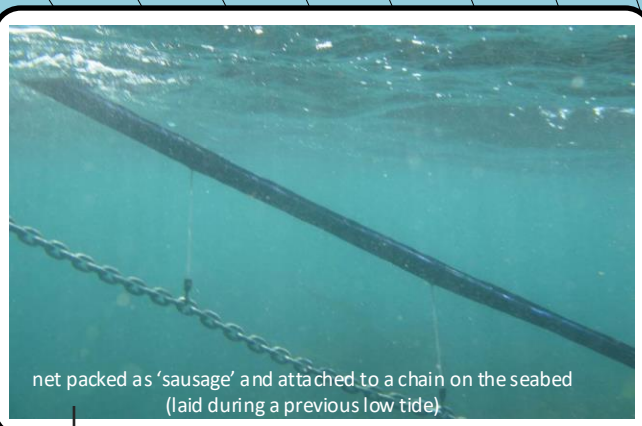
Time cost: medium (nets can be deployed and retrieved fairly quickly)

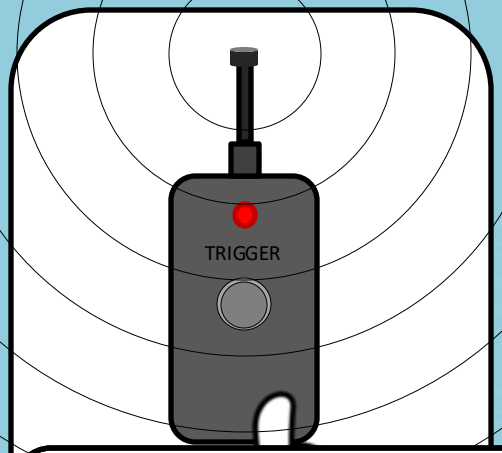


Pop-up net method (1system: 100m x 4m)

Situation: seals too close to water for other nets to be deployed fast enough

Time cost: very high (net preparation, setting & retrieval)





floating buoy with receiver antenna

submerged diving cylinder

Pop-up animation



← sea surface

When a signal is sent to the receiver antenna, the valve on the diving cylinder is automatically opened and the fire hose is rapidly filled with air.

The inflated hose opens the Velcro seal and rises to the surface, and the net (attached to the hose) creates a curtain surrounding the seals.

← Velcro-sealed 'sausage' tightly packed with net attached to a deflated fire hose

← chain on seabed

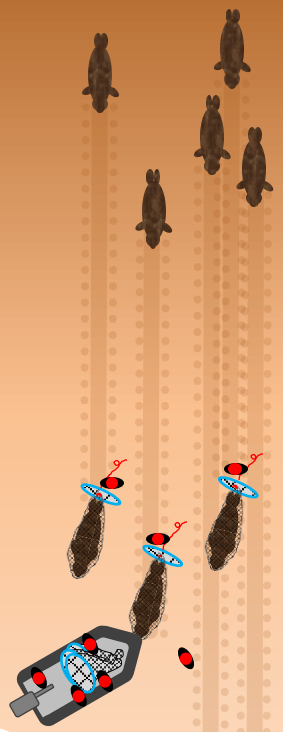


diving cylinder & receiver antenna

Rush & grab method

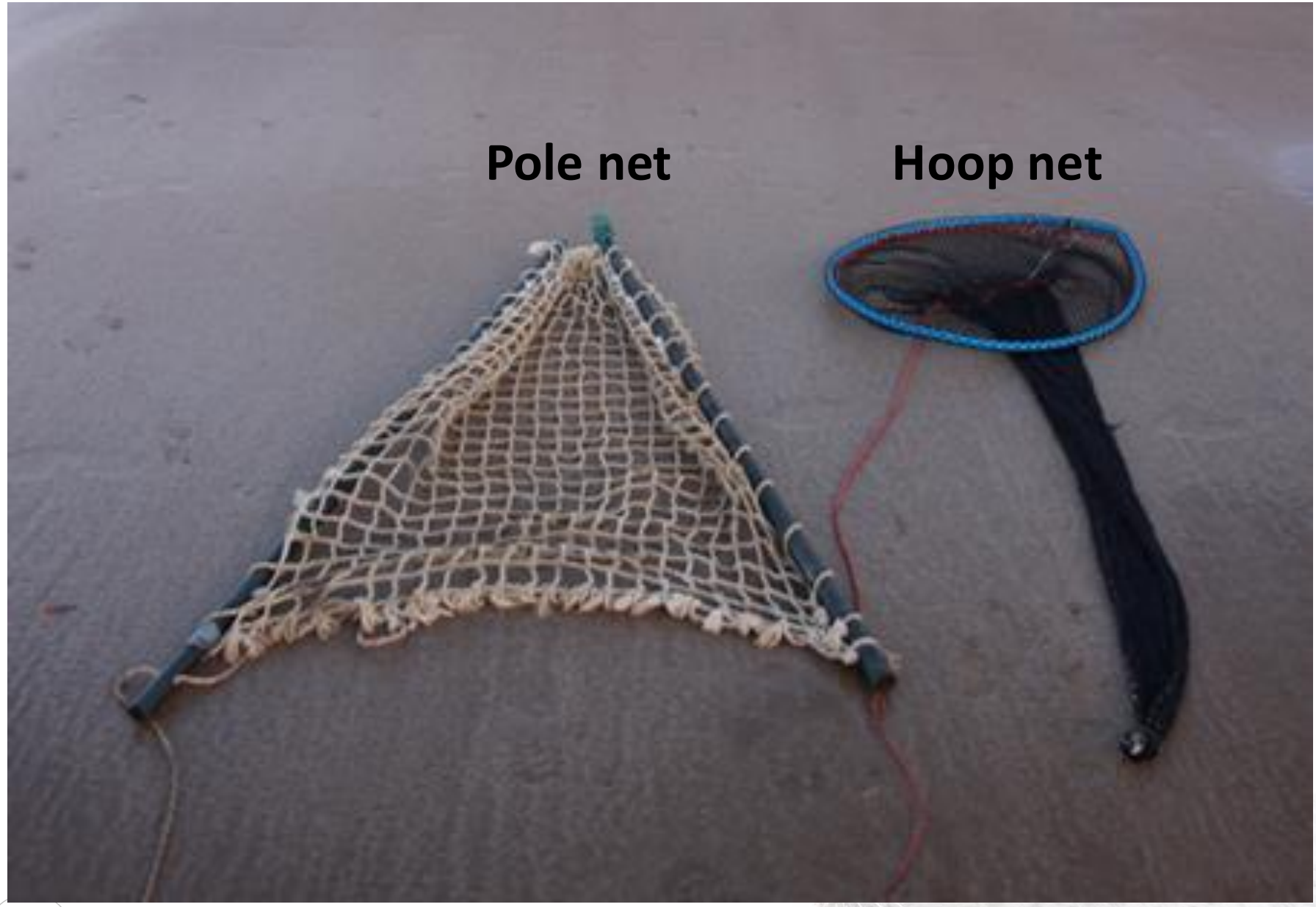
Situation: seals on any substrate not too close to water

Time cost: low (no large nets)





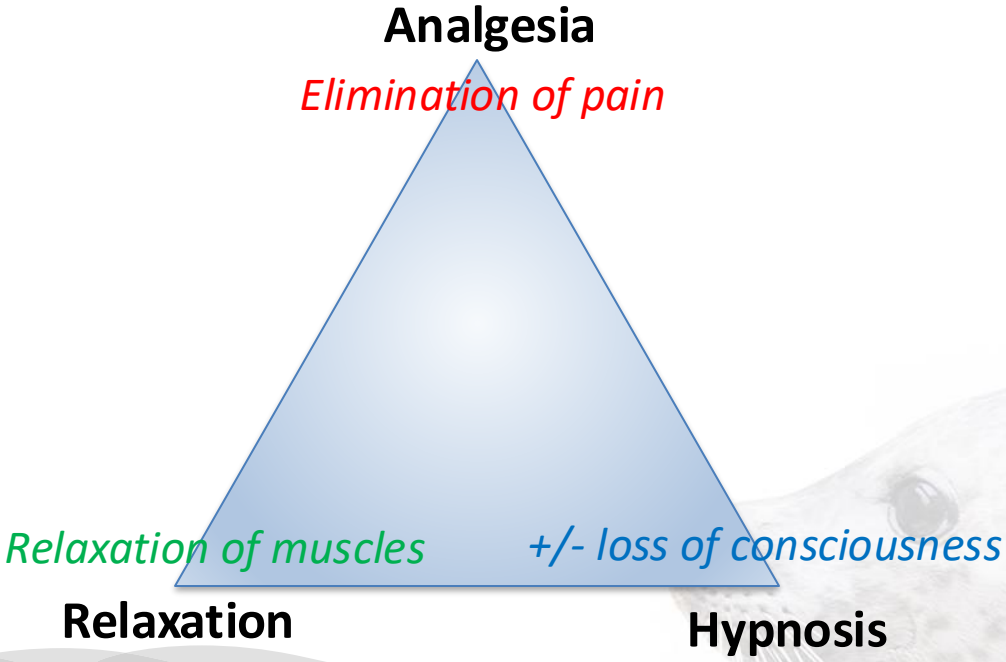



Pole net
Hoop net



Why do we use anaesthesia

- Restraint and immobilization
  - Animal experience
  - Health & safety



Sedation

- IM administration
- Mass estimate dose



"Puts the handbrake on"

- Relaxes and slows the animal

- Better for animal experience
- Facilitates easier handling and IV access

Injectable Anaesthesia



Zoletil

- Fast acting
- Provides c 20 minute working window
- 50/50 mix zolazepam & tiletamine
- Tops up tricky due to differing decay rates of components

Medetomidine / Butorphanol

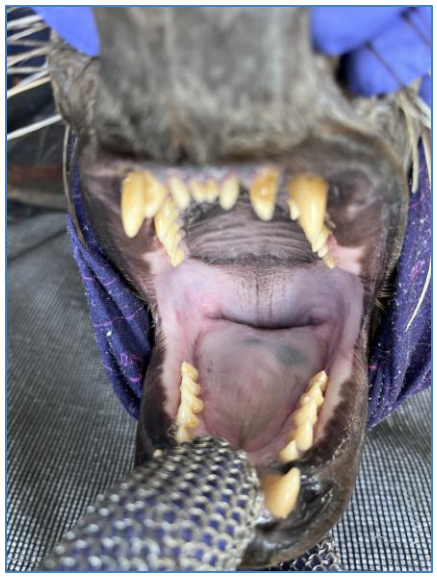
- Provides initial window of c25 minutes
- Slower to act than zoletil
- Can be topped up for prolonged anaesthesia
- Antagonist used to reverse effect of medetomidine



Anaesthesia conditions



Anaesthesia monitoring



Observable metrics

- Breathing rate
- Movement / response to touch
- Pinking of gums / capillary refill
- Position of eyes
- Visual Heart Rate

Additional monitoring

- ECG – Heart rate
- Pulse ox – Saturation
- Capnograph – expired CO2
- Thermometer - Temperature



Marking

- **Flipper tags**
  - **used in some circumstances**

- **Tattoo marking**
  - **Now the default marking technique**







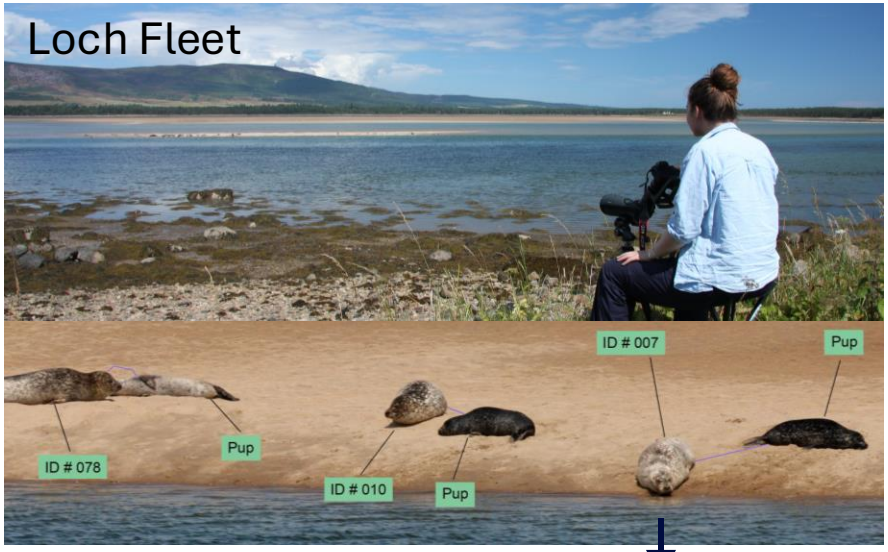
ID# A 044 – 15 months post application

Photo identification (photo-ID)

Vital rates: survival and fecundity



ID #Or094

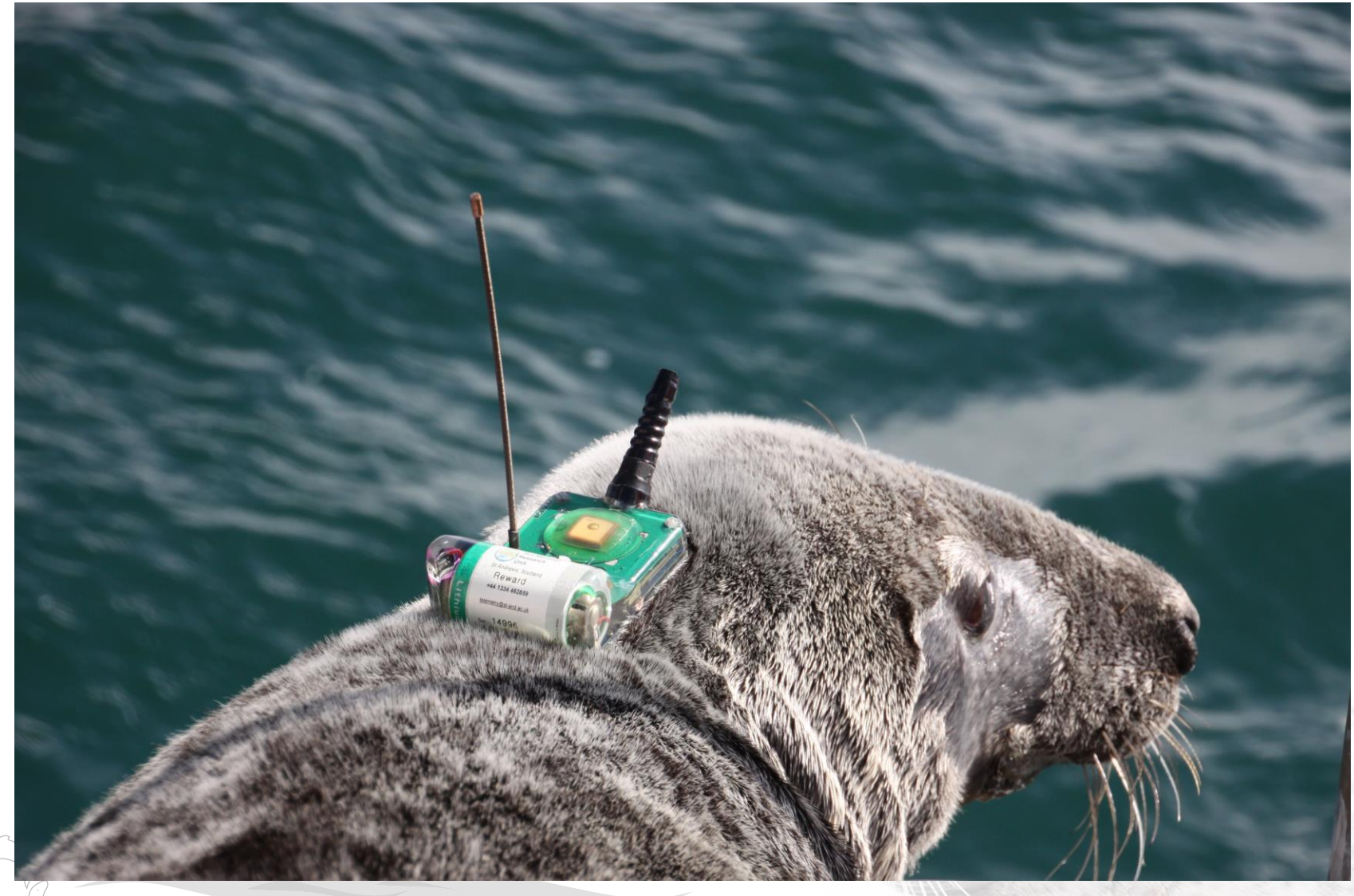


ID #007 - Seen every year since 2006

ID #	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
007	✓	✓	✓	✓	✓	x	✓	✓	✓	✓	x	✓	✓



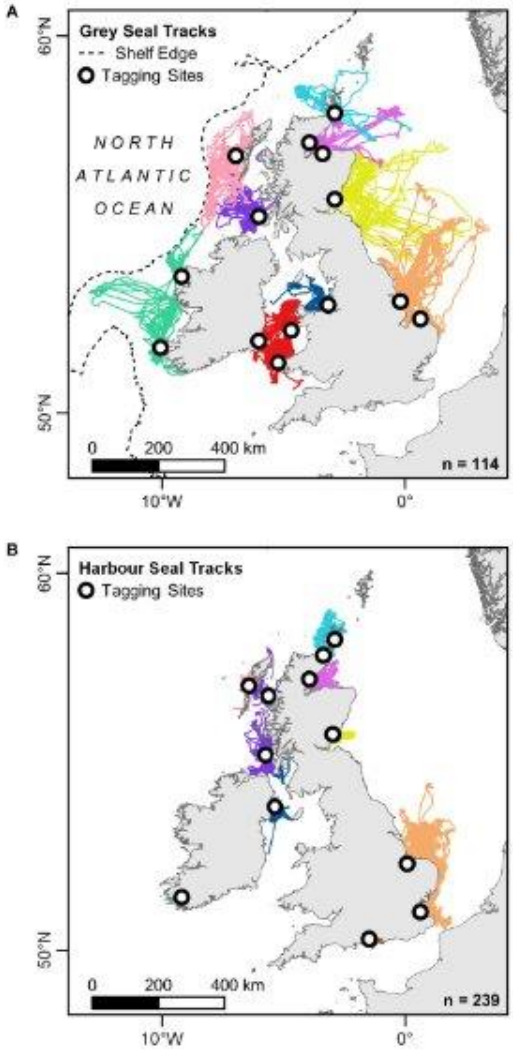
Tagging



Tagging

- Applied to the nape of the animal
- Attached using Loctite 422 superglue
  - Fur cleaned and dried
  - Loctite applied to base of the clean tag
  - Held in place and c1minute to cure
- Tag shed during the annual moult

Post release behaviour



- **First week or first foraging trip may be discarded**
  - Due to: potential alteration in cyclical pattern of haul-out and foraging due to capture
- **Impact of anaesthesia on short term behaviour not fully investigated**
- **Fine scale impact of telemetry device known**
  - Impact on gross behaviour negligible
  - Fecundity impact under investigation

Post release behaviour - Captive



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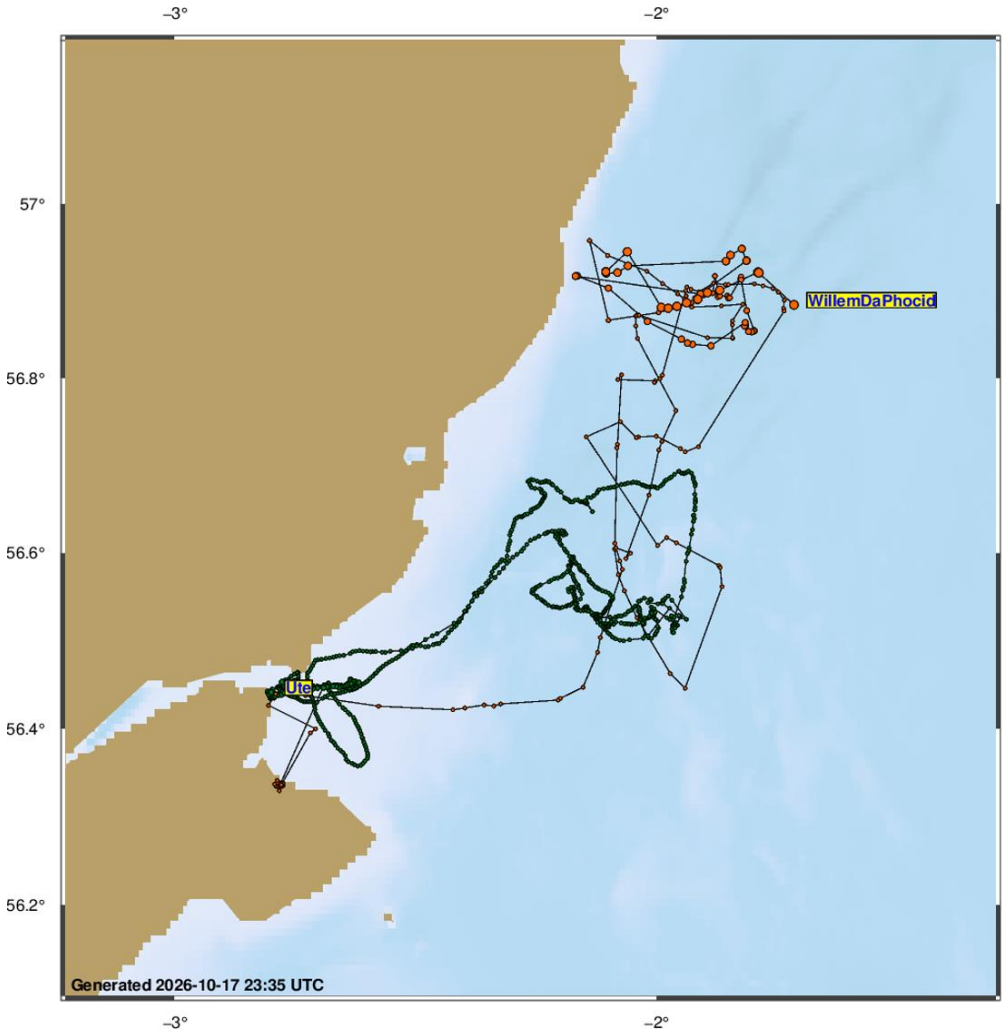




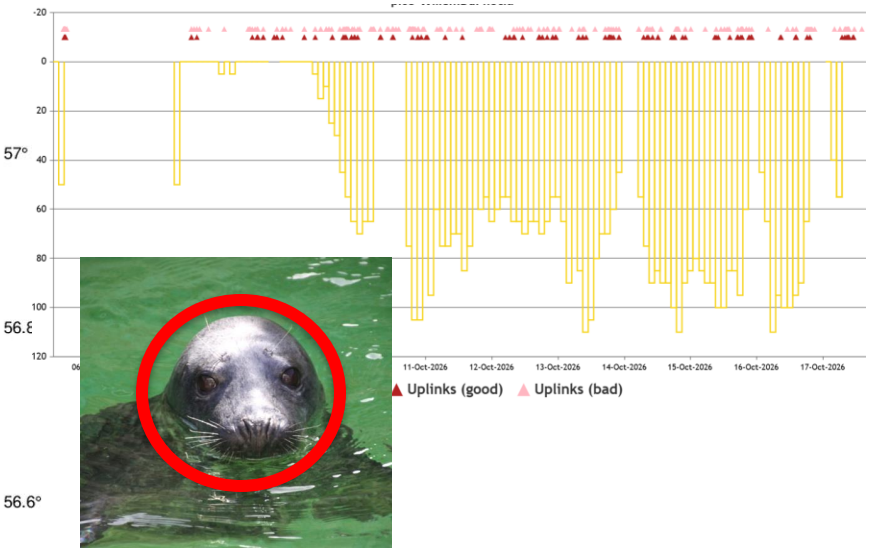
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Class of 2026

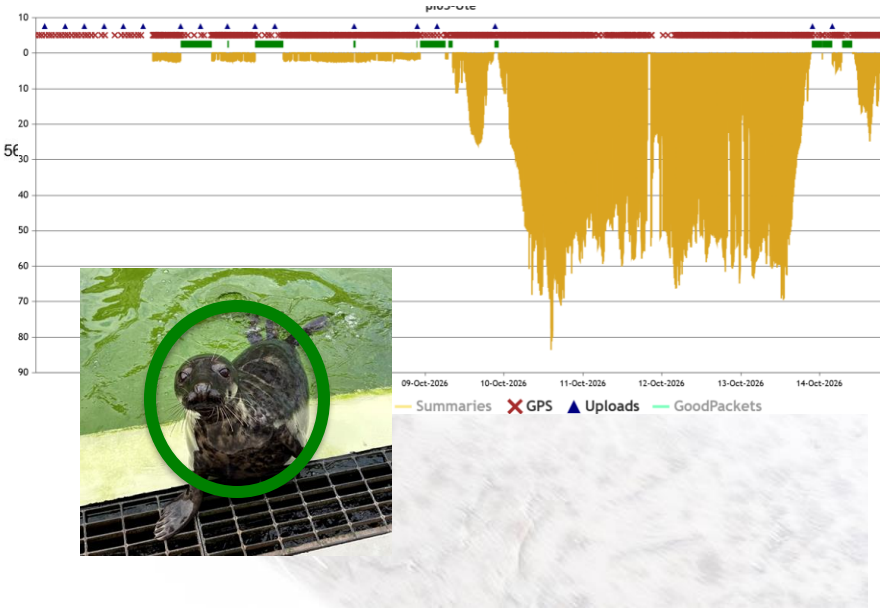
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Willem – Male Juvenile Grey seal



Ute – Female Juvenile Grey seal

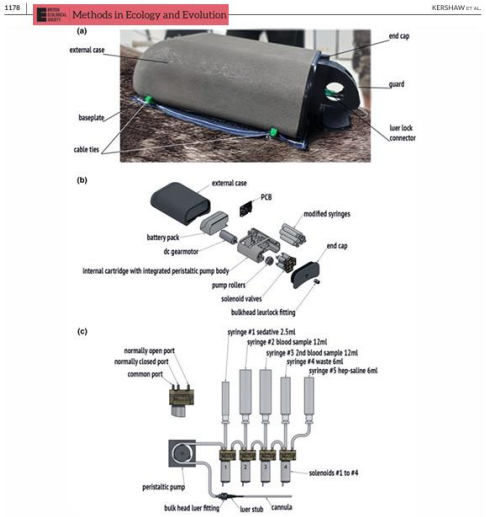


Entered SMRU Facility: **25-6-25**

Released to the wild: **9-10-26**

Remote sedation and sampling





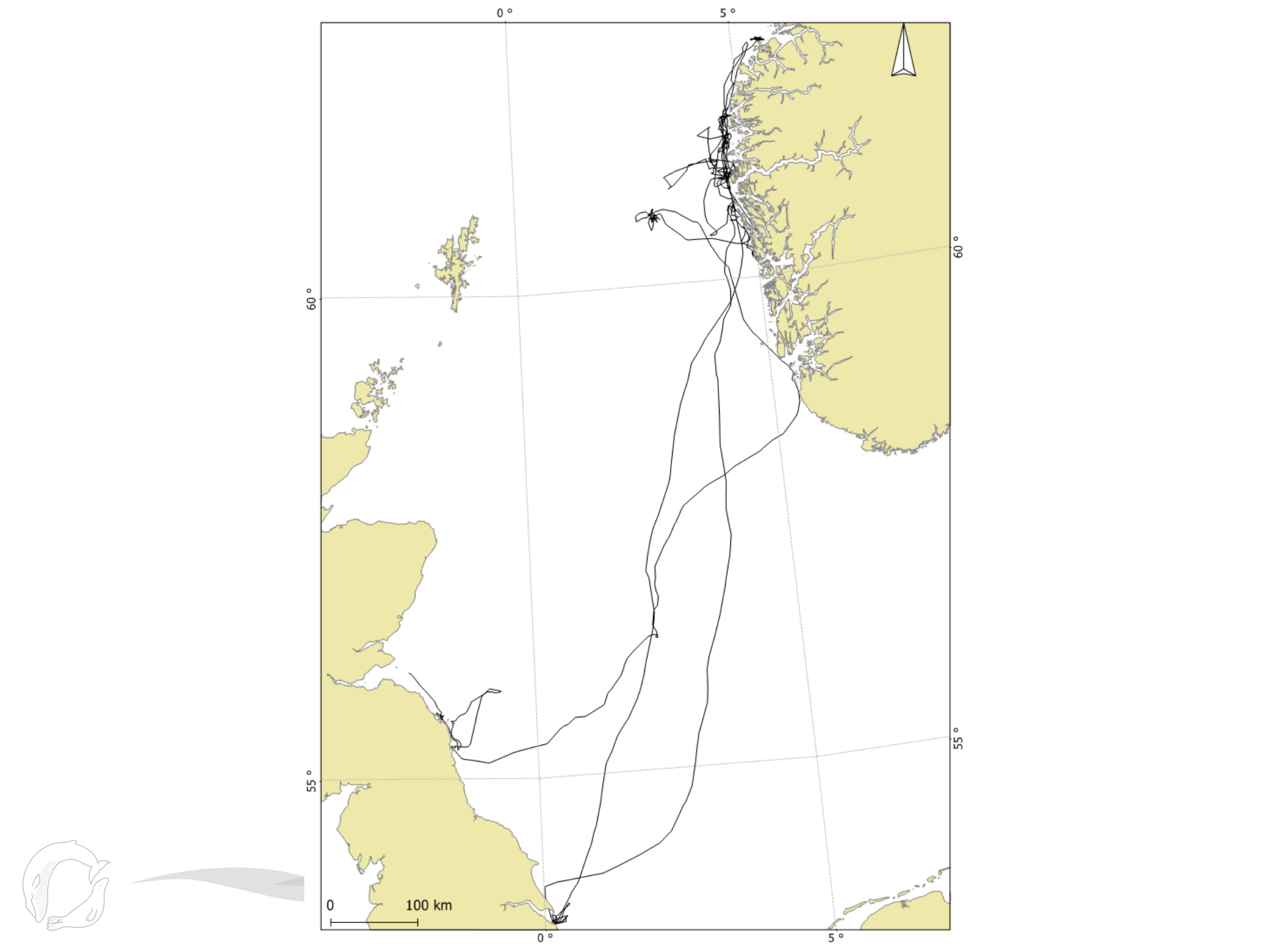
- Remote blood sampling via indwelling IV catheter
  - Administration of compounds
  - Remote anaesthesia
  - Blood sampling
    - Free of handling / anaesthesia impacts

Big 3R's impact!

Future:

- Further development (lab on a chip)
  - controlled testing
  - wild deployment




0 °
5 °
60 °
55 °
0
100 km