Edinburgh Napier UNIVERSITY

FINDLAY ECOLOGY SERVICES

RZSS BRINGING CONSERVATION TO LIFE

Derek Gow – private zoological collection

Chestnut Centre – private zoological collection

A good monitoring programme considers:

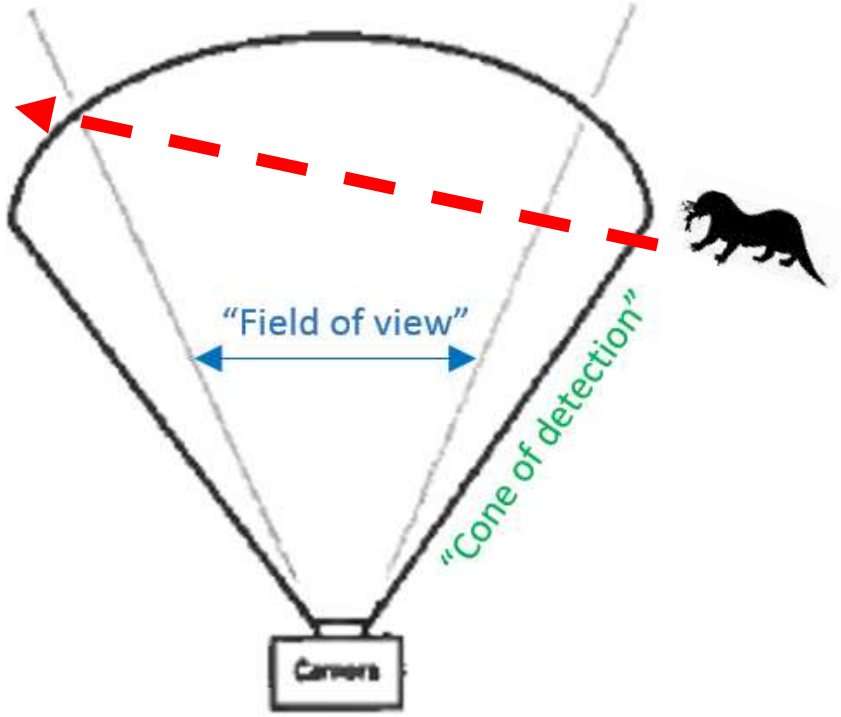
Aims (presence/determining if breeding aso)

- Number of cam traps
- Trapping duration

This will relate to the animals ecology: its density, home-range size and movement patterns to increase the chance that the animal will encounter a cam trap.

PIR detectability – what happens when an animal passes in front of your cam trap?

Expectation of camera-trap



Adapted from van Berkel (2014)

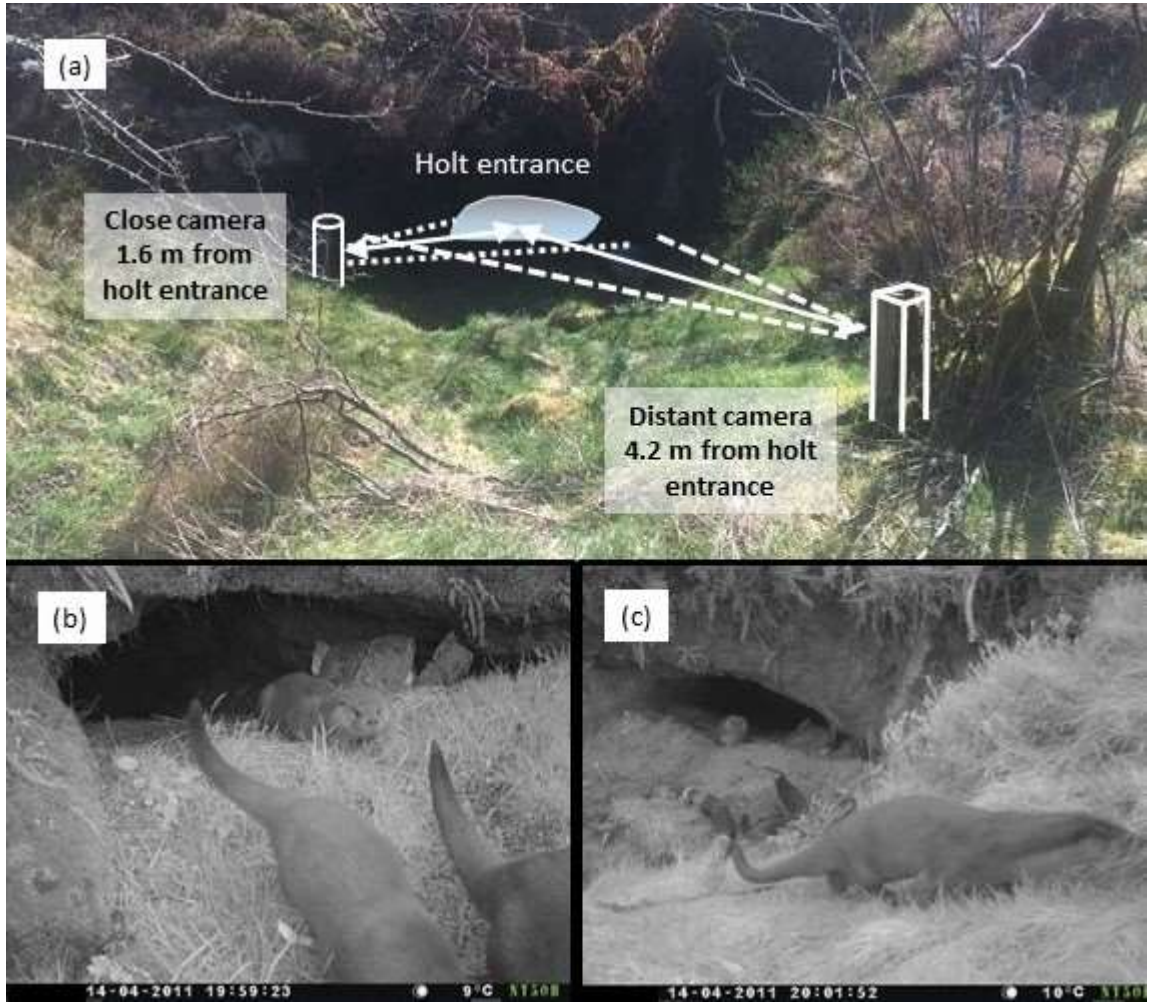
=

An animal passes in front of the camera trap with a **passive infra red motion detector (PIR)**

→

The CT detects the otter and takes a photo or video (successful data capture)

Case Study - analyses of data from a 6 year study of otter activity at a holt in lowland Fife

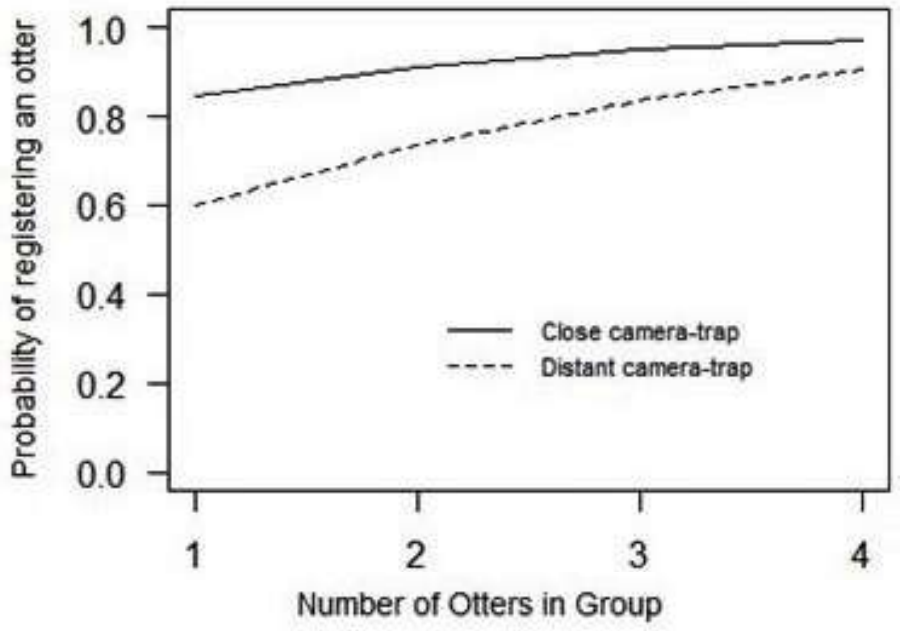


A dual camera-trap set up enabled comparative analyses between the performance of each camera against the other, and against the maximum data from both camera traps.

How did the camera-traps perform?

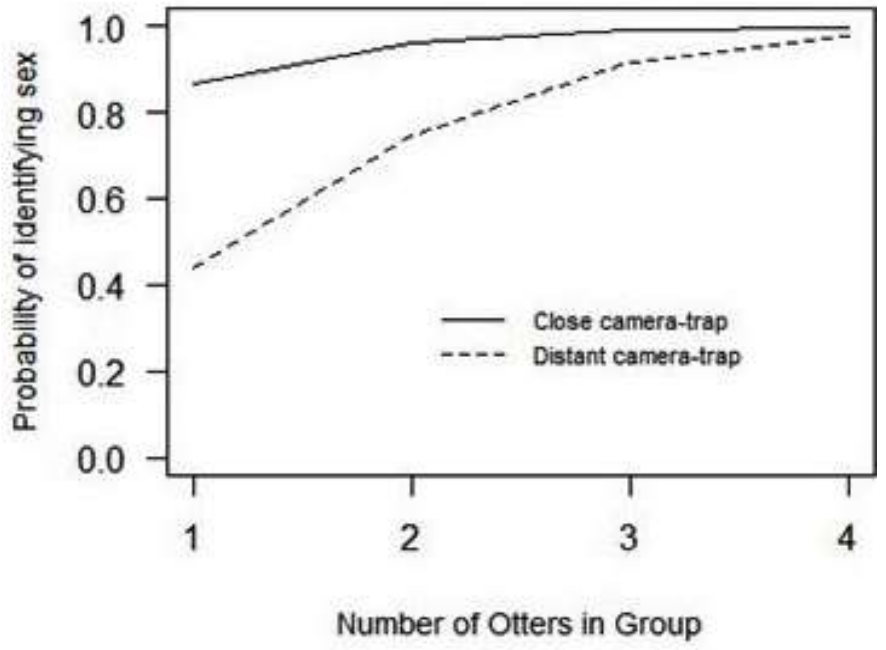
Data capture-when is it good enough?

How important is it to see every pass of every individual?



Type of data – what are your aims?

Do you need to sex animals, hear vocalisation or observe detail of other behaviour?



Findlay, M.A., Briers, R.A., Diamond, N. & White, P.J.C. (2017). Developing an empirical approach to optimal camera-trap deployment at mammal resting sites : evidence from a longitudinal study of an otter Lutra lutra holt. *Eur. J. Wildl. Res.* **63.**

Link to paper http://rdcu.be/zN5l

The question of PIR detectability

Observation: both of the camera-trap positions failed to capture all the known events, but one position consistently out performed the other indicating this wasn't random

Questions:

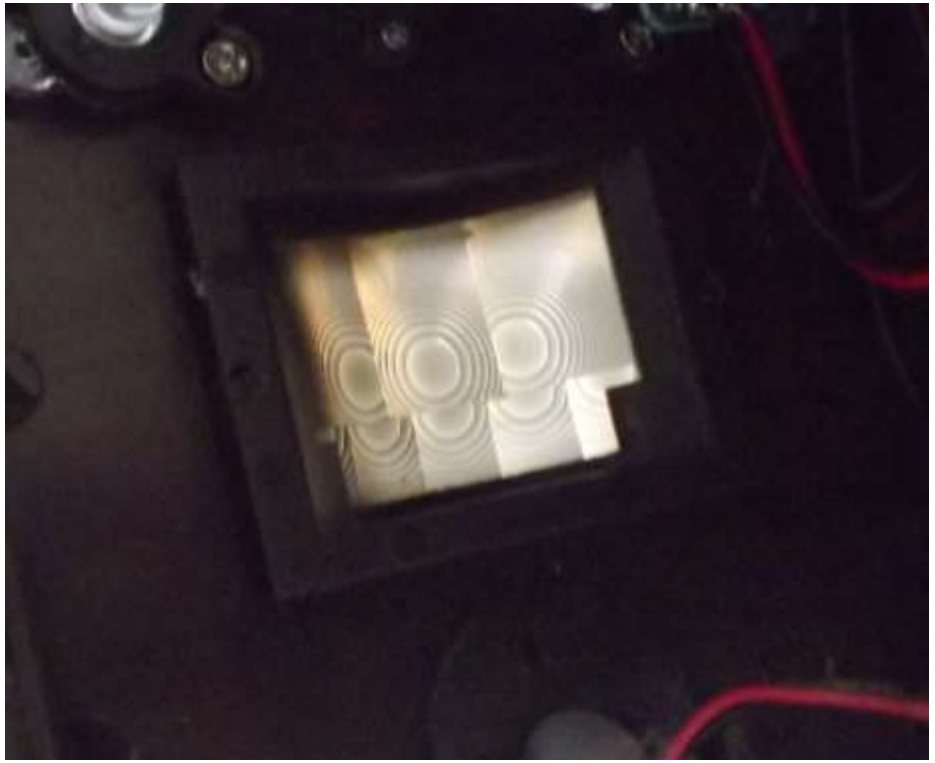
1) Did any passes occur that both camera-traps failed to see?

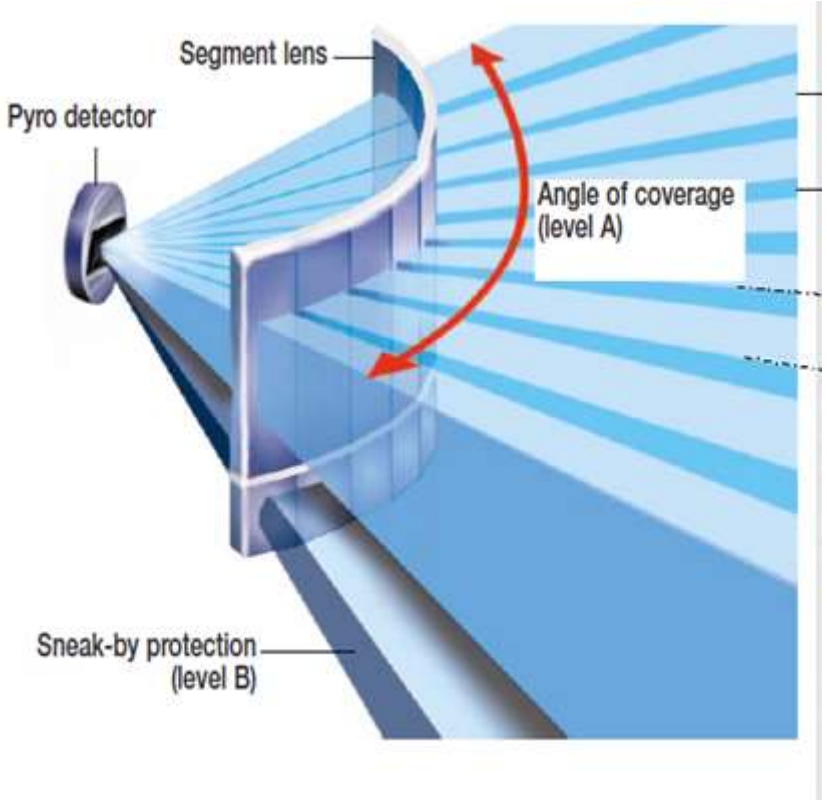
2) What proportion of passes was missed by both CTs?

3) What variables are responsible for the success or failure of a camera-trap to record an animal pass?

4) Do semi-aquatic/riparian mammals have a lower detectability probability than terrestrial mammals?

PIR how does it work?





Bushnell Aggressor Fresnel lens – the compound Fresnel lens **receives** infrared light (8-14 µm) in a series of sectors.

Why does this matter?

Poor CT monitoring likely to lead to:

- deficient results
- erroneous conclusions
- poor impact assessments, mitigation, licensing, abundance estimates
- breaking the law & consequent liability
- impact on protected/rare species

However:
There is no guidance on cam trapping protocols for practising consultants, or statutory authorities

Assessment of our first study: a control was clearly needed

CCTV used as a control to record all otter passes through detection areas of cam-traps

For each otter pass there were three possible outcomes 1) **no trigger** 2) **trigger and no capture** 3) **trigger & capture**

Asian small-clawed otter *Aonyx cinereus* (Hans Hillwaert, CC-BY-SA 3.0)

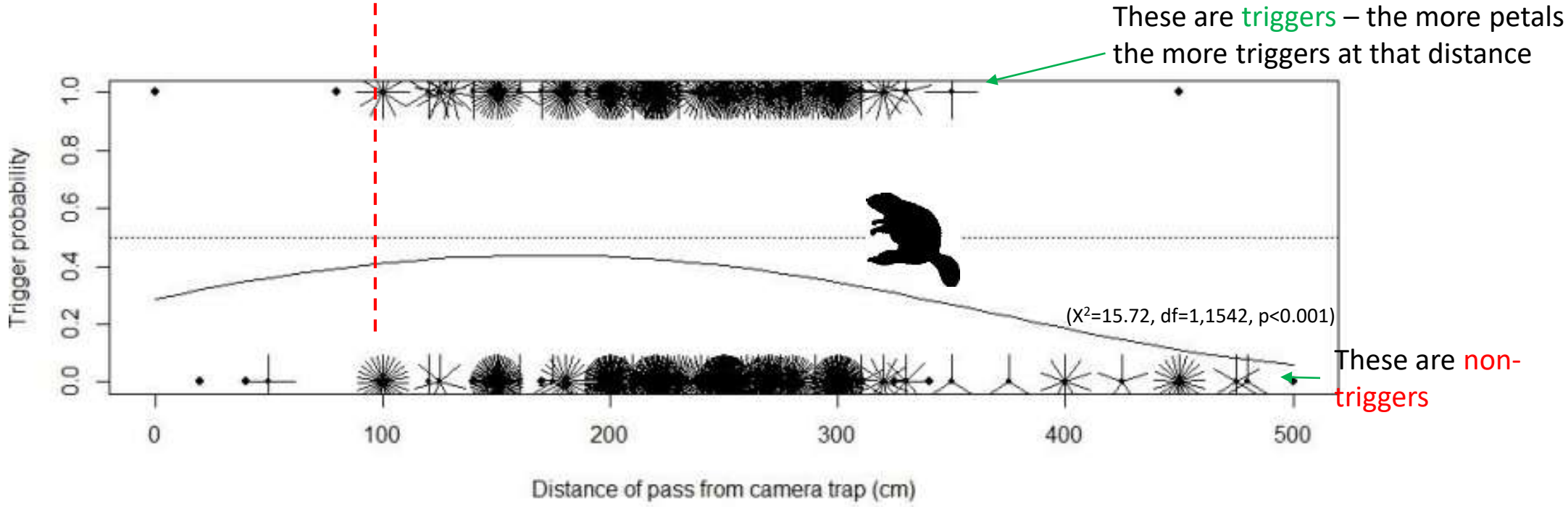
Eurasian otter *Lutra lutra*

European beaver *Castor fiber* (Helen McCallin, with permission)

Versus

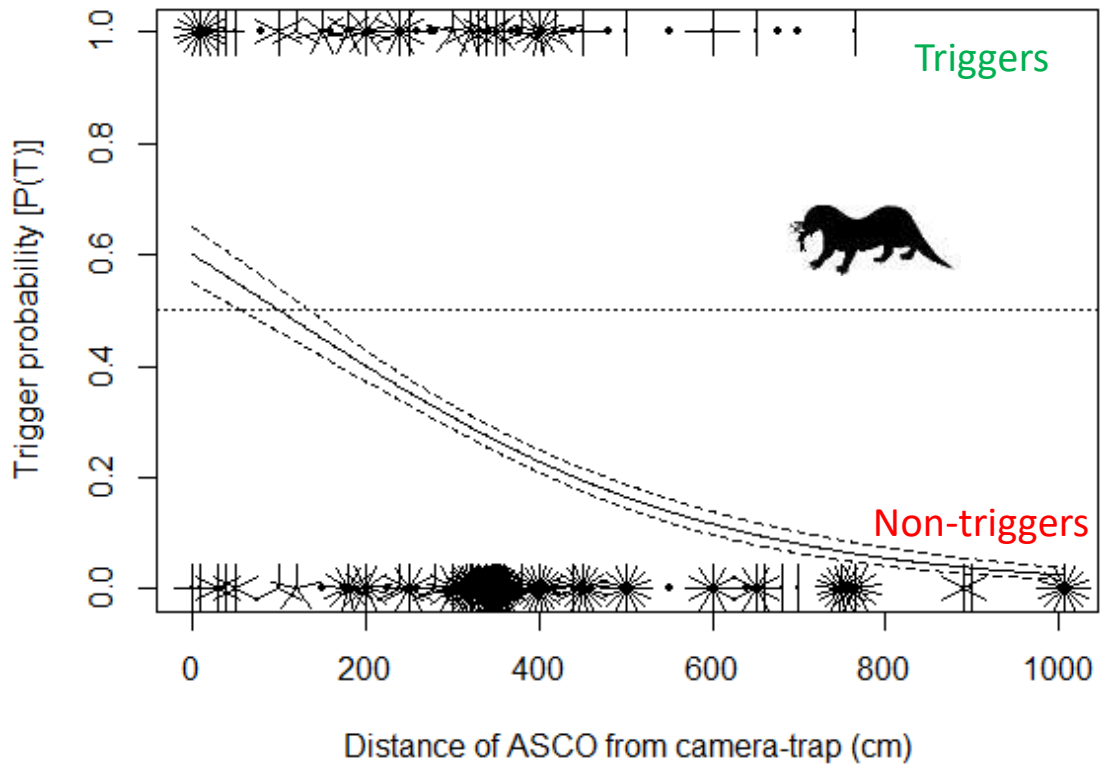
European badger *Meles meles* (Martha de Jong-Lantink, CC BY-NC-ND 2.0)

For beavers **distance** influenced trigger probability, with lowest probability furthest from the camera-trap



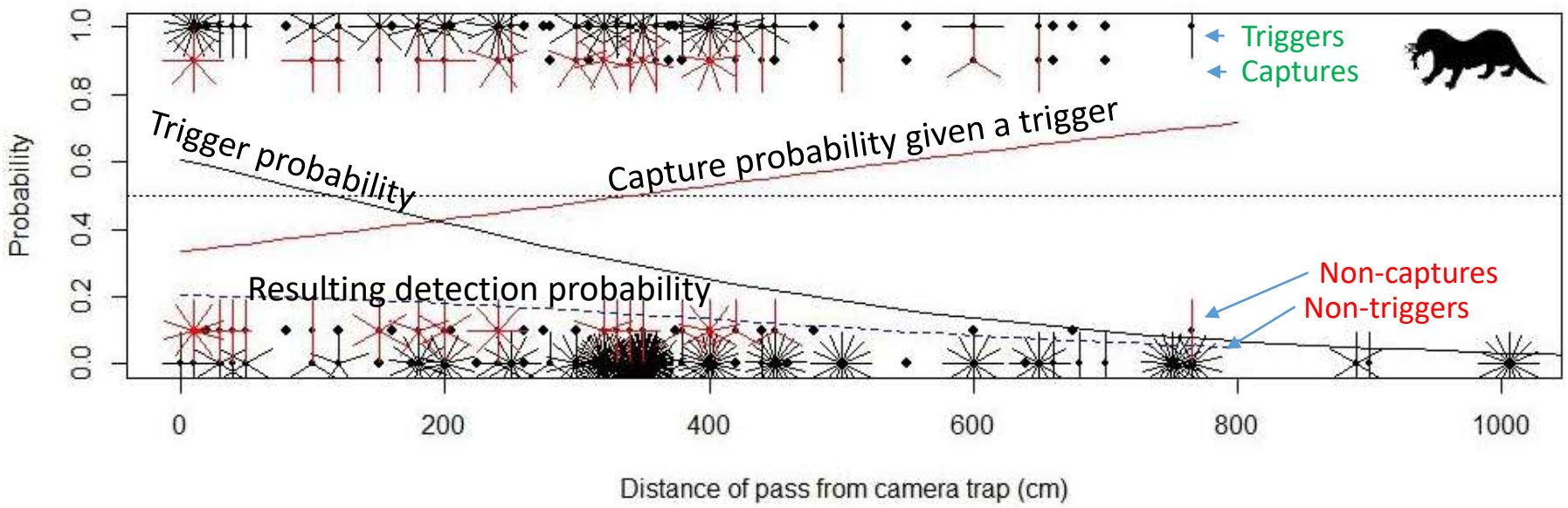
We did not find support for the assumption in previous studies that detection probability must reach 1 at some point in the detection zone. Our maximum for any distance was c. 40% (though note many of our 'passes' were swims)

Asian short-clawed otters (ASCO)



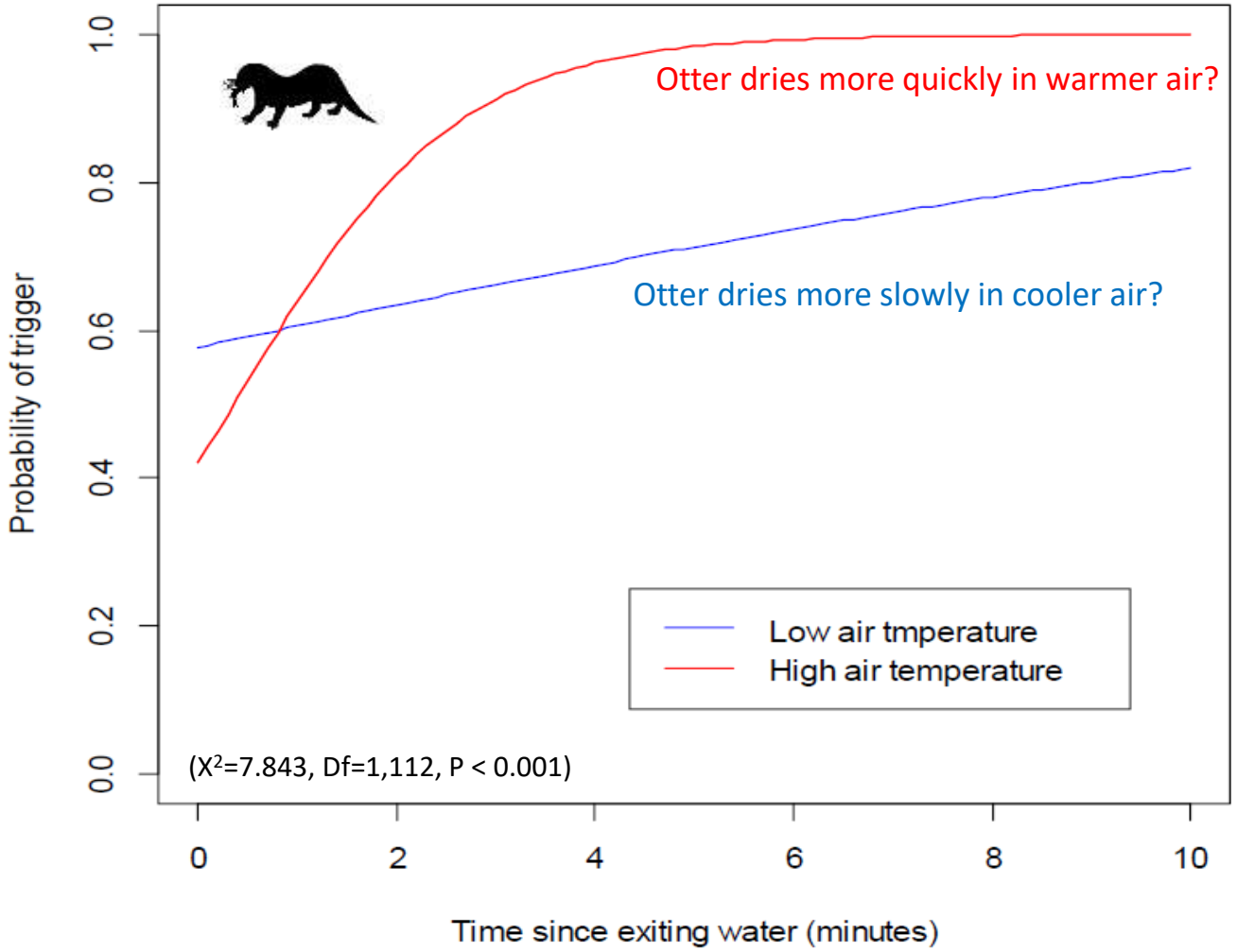
Trigger probability reached higher value for ASCOs, but still did not exceed c. 60% even close to the camera trap

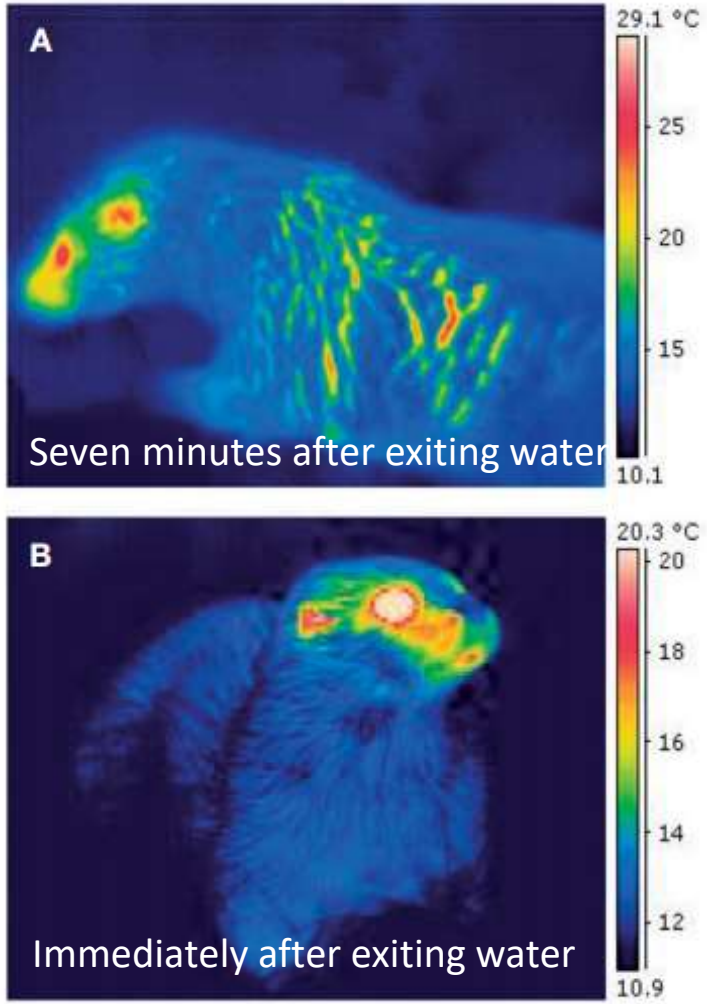
What happens when we consider CAPTURE as well as TRIGGER?



When multiplied together (= detection probability), this led to a slight negative relationship with distance but at a low level. Effectively, differing trends in trigger and capture probability "balanced" each other out, although the negative effect of trigger probability was slightly stronger for this species and context… in other contexts a different balance may exist

In summer, we found that the influence of time since exiting water was stronger when air was warm than when air was cool for ASCO





Kuhn & Meyer (2009) Aquatic Biology 6:143-152 goo.gl/iTxYYF

Air temperature may impact on how quickly water evaporates from otters' coats

Eurasian otter – variables that affect **TRIGGER** success

From model selection (glmer) using AIC, trigger success was affected by

1. Water temperature and distance
2. Air temperature and distance
3. From holt/not from holt (as a proxy for dry vs wet) and distance
4. Distance

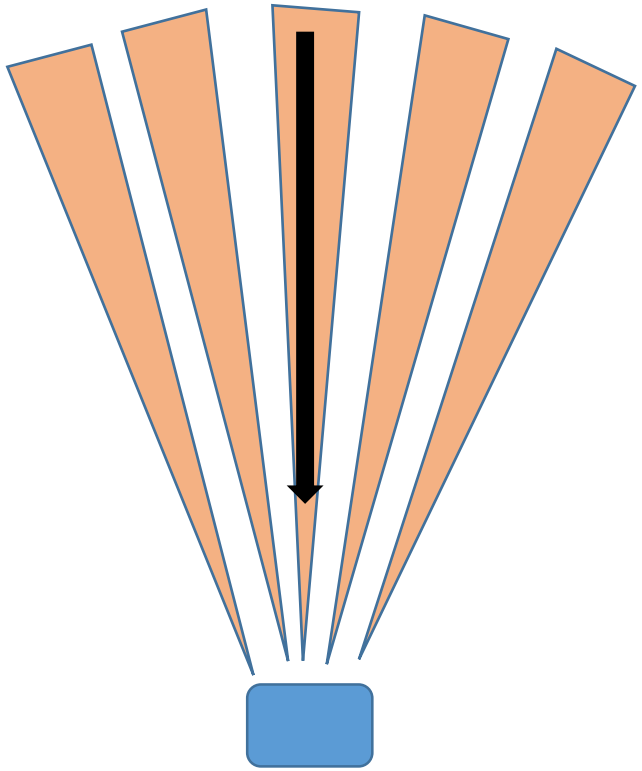
Eurasian otter – variables that affect **CAPTURE** success

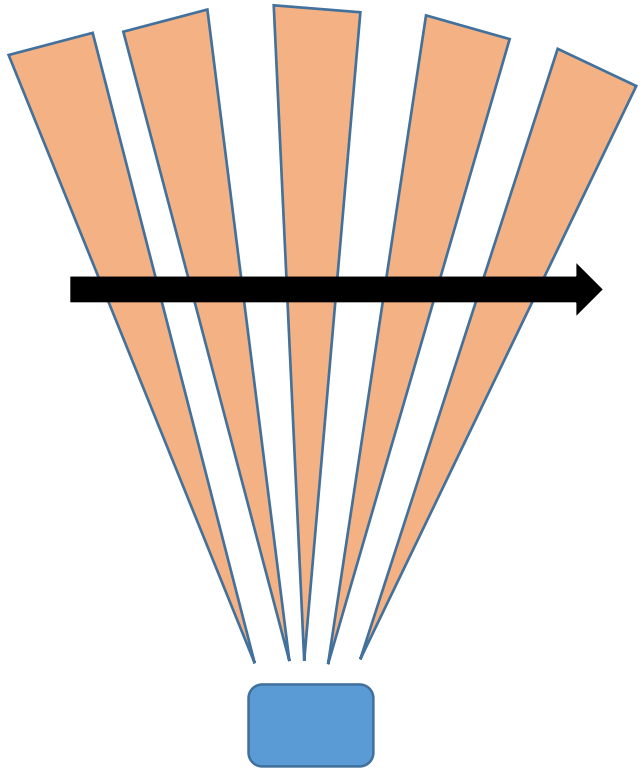
From model selection (glmer) using AIC, capture success was affected by

1. An interaction between orientation and speed
2. Orientation and distance

The importance of orientation

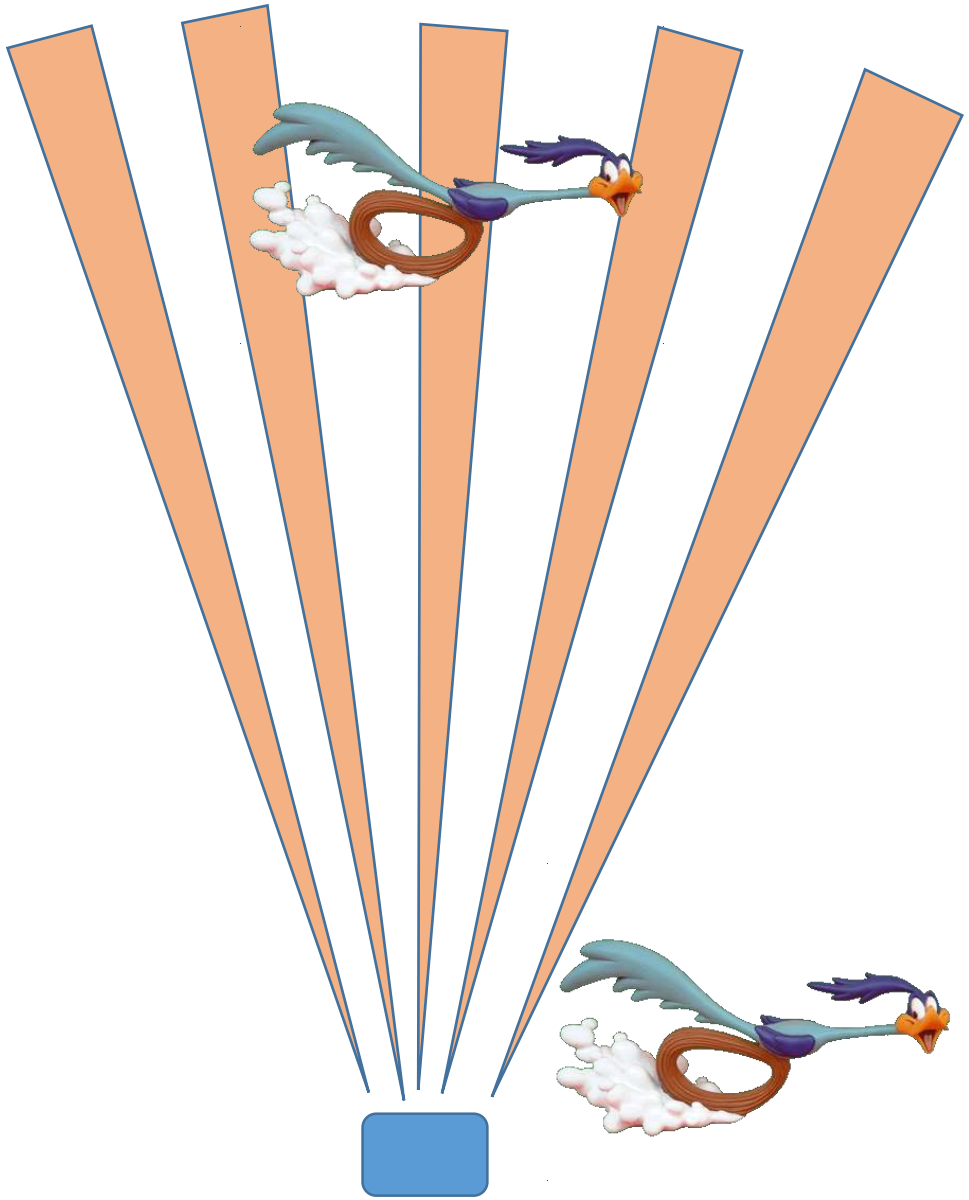
The importance of orientation





A lateral pass will provide multiple trigger stimuli

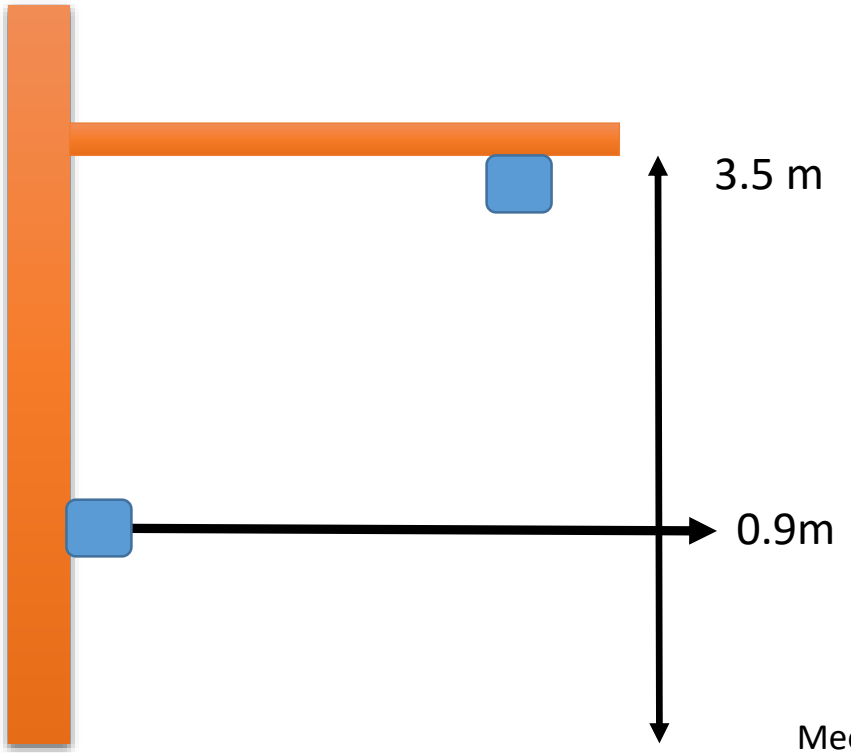
The importance of speed



Decrease in capture with decrease in distance

The importance of height –"the higher you go, the less you will know" (Meek et al. 2016)

Cameras were places at 3.5 m (to reduce theft), while other cameras were set at 0.9m, some were orientated horizontally, and some vertically (looking straight down)



Conclusion: lower cams performed much better, also horizontal performed better than vertical

Meek, P.D., Ballard, G.A. & Falzon, G. (2016). The higher you go the less you will know: placing camera traps high to avoid theft will affect detection. *Remote Sens. Ecol. Conserv.* **2**, 204–211.

Survey methods- time to move on!

Key messages

CTs are fantastic tools and offer a method for greater understanding than field evidence on its own

CTs are not without bias

The nearest tree or fencepost simply wont do! CT positions have to be optimised.

There is need of practical guidance to support the use of CTs