



# Fasting increase foraging costs in Steller sea lions

Caroline Svärd

International Master Programme Applied Biology 2008  
Final Thesis



## Acknowledgement

Special thanks to my supervisors Dr Andreas Fahlman, Dr Jordi Altimiras and Dr Andrew Trites. Great thanks to researchers and trainers at the UBC Open Water Research Station.

Support was provided by NOAA and the North Pacific Marine Science Foundation to the North Pacific Universities Marine Mammal Research Consortium.

Travel grant was provided from SEB.



**contact info:** carsv260@student.liu.se  
**homepage:** [https://cms.ifm.liu.se/edu/biology/master\\_projects/2008/presentation-of-master-th/web-pages/svard-caroline/](https://cms.ifm.liu.se/edu/biology/master_projects/2008/presentation-of-master-th/web-pages/svard-caroline/)



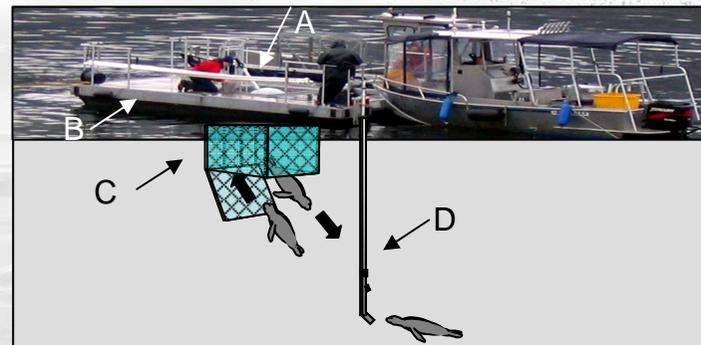
## The UBC Open Water Research Station

The study was conducted at the Open Water Research Station, Vancouver, Canada. The lab hosts 3 female Steller Sea lions, trained to dive feely in the open water, up to 50 m depth.

The sea lions are trained to enter a floating respiratory dome (A) designed to measure the oxygen consumption/metabolic rate. The dome is placed in a hole on an experimental barge (B), under which a closable cage (C) extend down into the water.

By command the sea lion dive down to a submerged feeding tube (D) thru which fish is delivered, resembling an artificial prey patch.

When resurfacing into the dome the oxygen the consumption during the dive can be measured.



## The decline of Steller sea lions

The population of Steller sea lion has declined with over 80 % the last 30 years. This is thought to be due to food shortage and under nutrition, as a result of over fishing and/or a large ocean climate regime shift.

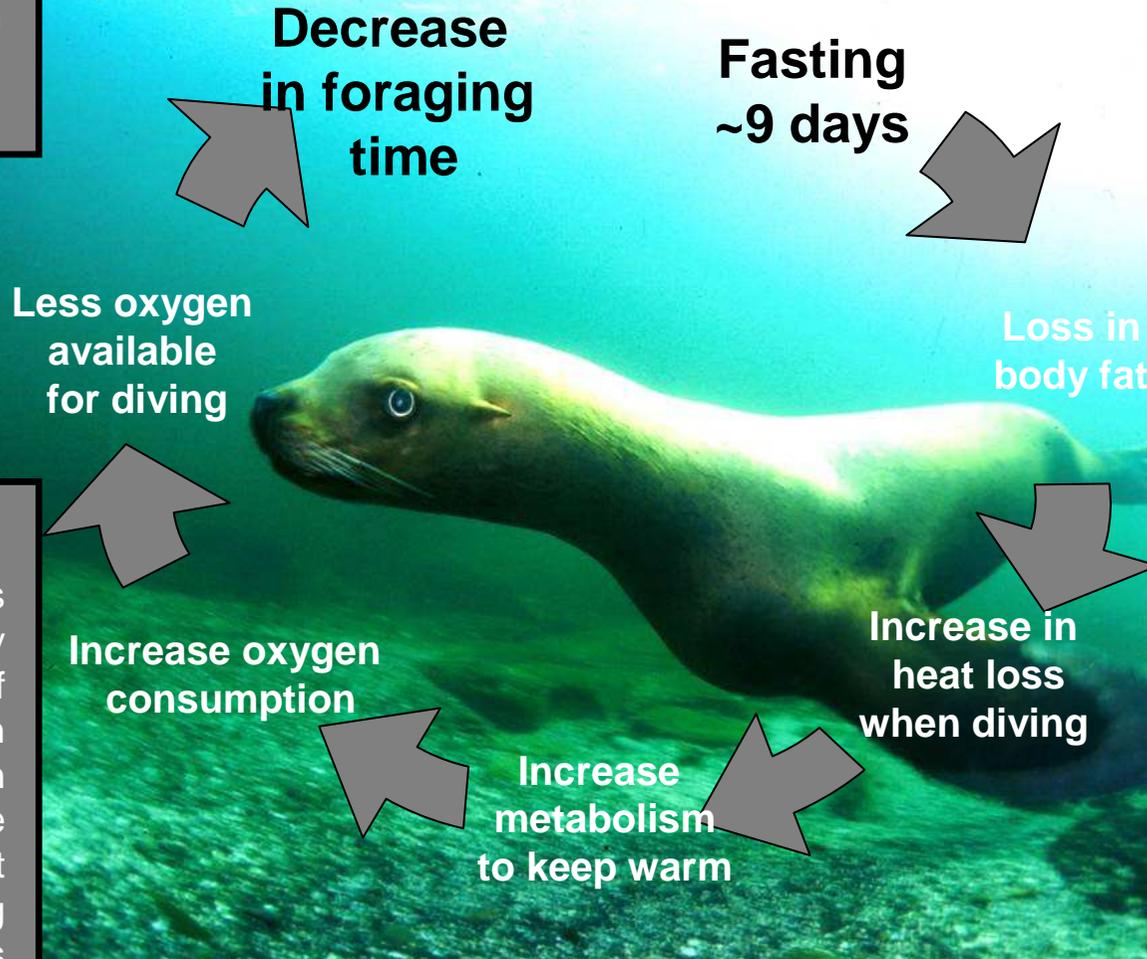


## Fasting

In the summer during the pup rearing period female Steller sea lions fast for ~10 days to nurse their pups. Involuntary periods of fasting could also occur at any time of the year due to changes in prey availability.

## Objectives

Assess how periods of fasting affect Steller sea lions' foraging ability, and if the response vary with season. This to determine if there are certain times of the year when Steller sea lions are particularly vulnerable to alteration in prey availability.



## The Experiment

3 captive Steller sea lions were fasted for 9-10 day periods. They lost 9.5 % of their body weight after fast in the summer and 10.6 % in the winter. To determine how periods of fasting affect foraging ability their diving and resting metabolic rates were measured, and the amount of oxygen available for diving estimated.

## Conclusions

Steller sea lions have an elevated metabolic rate when diving after fast, especially in the winter. This is possibly due to an increase in convective heat loss after loss in insulative fat. The decrease in oxygen available for diving resulted in a 18 % decrease in foraging time in the winter and 5 % in the summer.