

# INFERENCE

What can you find out about a population by looking at a sample?

# Getting started

- You need a population to sample
- There should be a reason to sample

The koala learning activity was developed by Anthony Harradine (2008)

# Are the koalas healthy?



*Southern koala*

*Northern koala*

**Southern Koalas** MALE Length: 75-82cm (Average: 78.2cm) □ Weight: 9.5 - 14.9kg (Average: 12kg).

FEMALE Length: 68-73cm (Average: 71.6cm) Weight: 7-11kg (Average: 8.5kg)

**Northern koalas** □ MALE: Length: 67.4 - 73.6cm (Average: 70.5cm) Weight: 4.2 - 9.1kg (Average: 6.5kg).

FEMALE: Length: 64.8 - 72.3cm (Average: 68.7cm) Weight: 4.1 - 7.3kg (Average: 5.1kg)

## *Just how plump are the koalas?*

### *The Reality.*

In a koala population there are about 1000 female koalas. The population has been suffering hard times of late (drought and shortage of food).

A Parks and Wildlife Officer is given the task of developing a good description for how the weight of the female koalas presently varies.

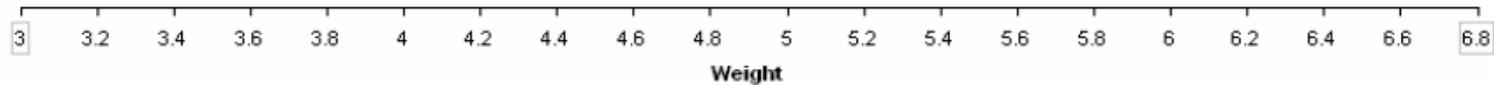


*Southern koala*

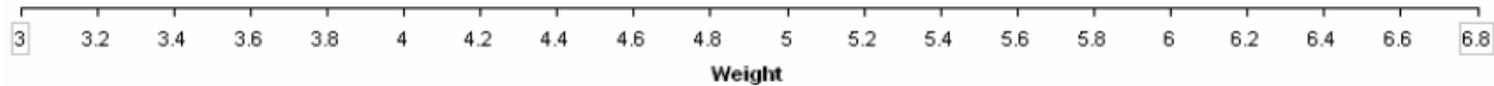
*Northern koala*

# Take a sample and make a dotplot

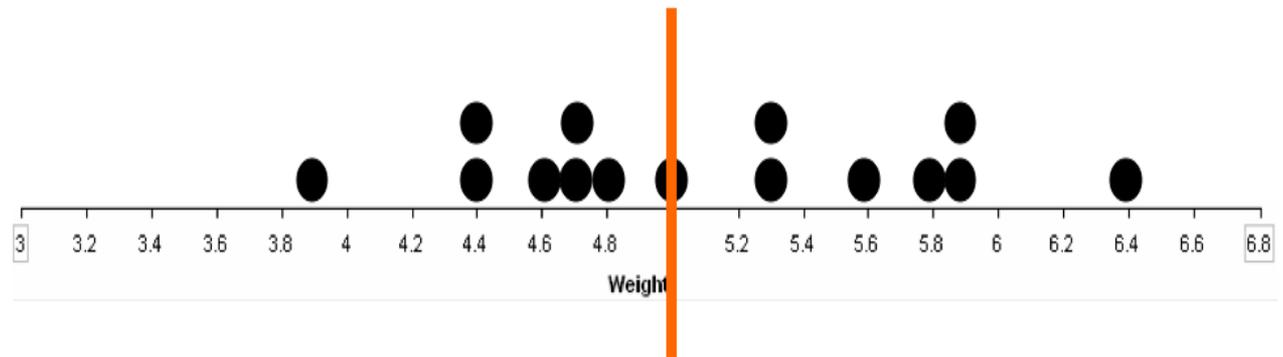
Sample 1



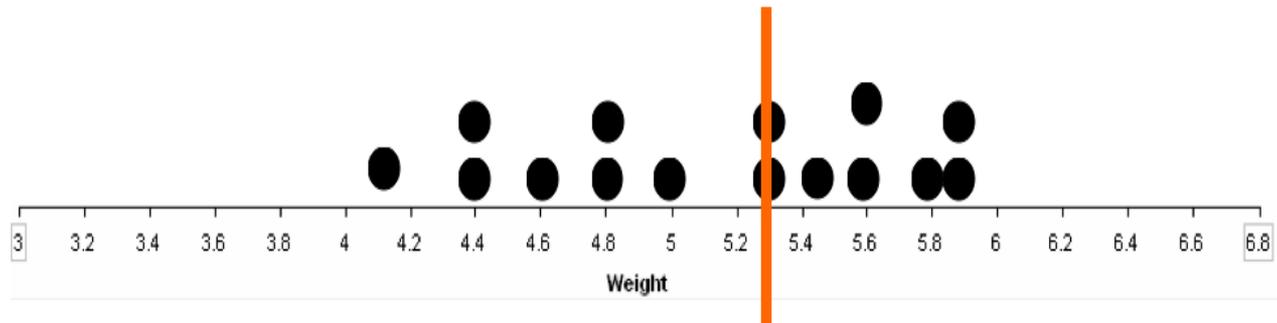
Sample 2



## Sample 1

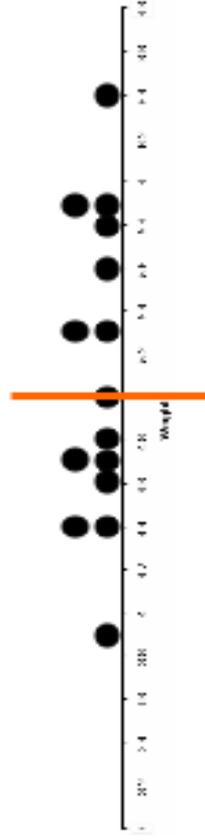


## Sample 2

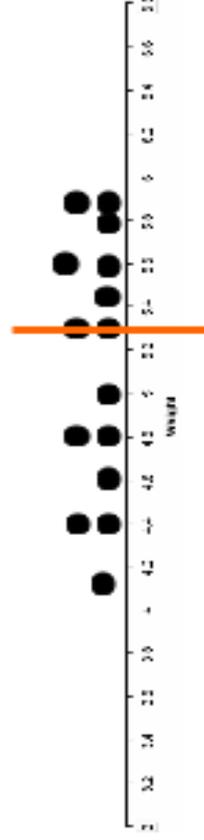


# What do you notice?

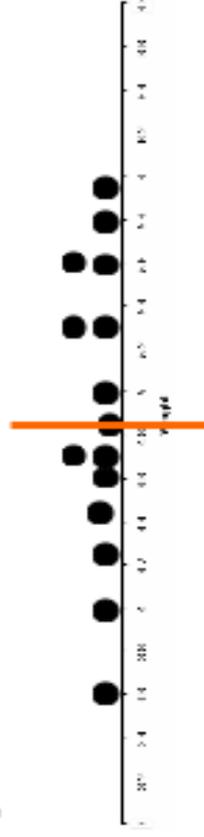
Sample 1



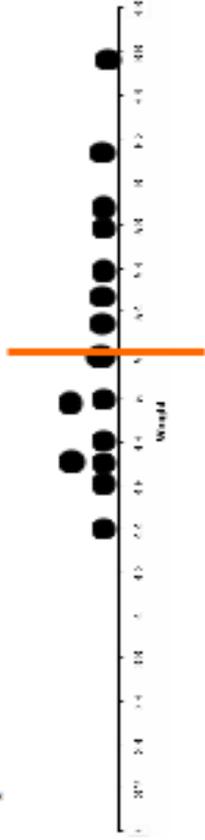
Sample 2



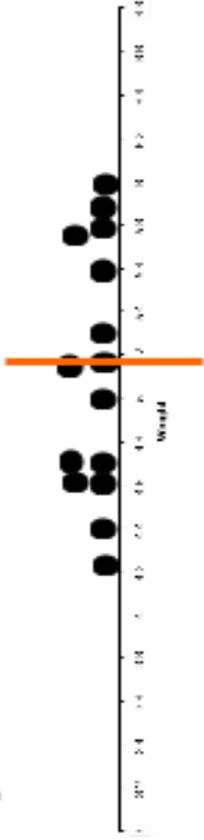
Sample 3



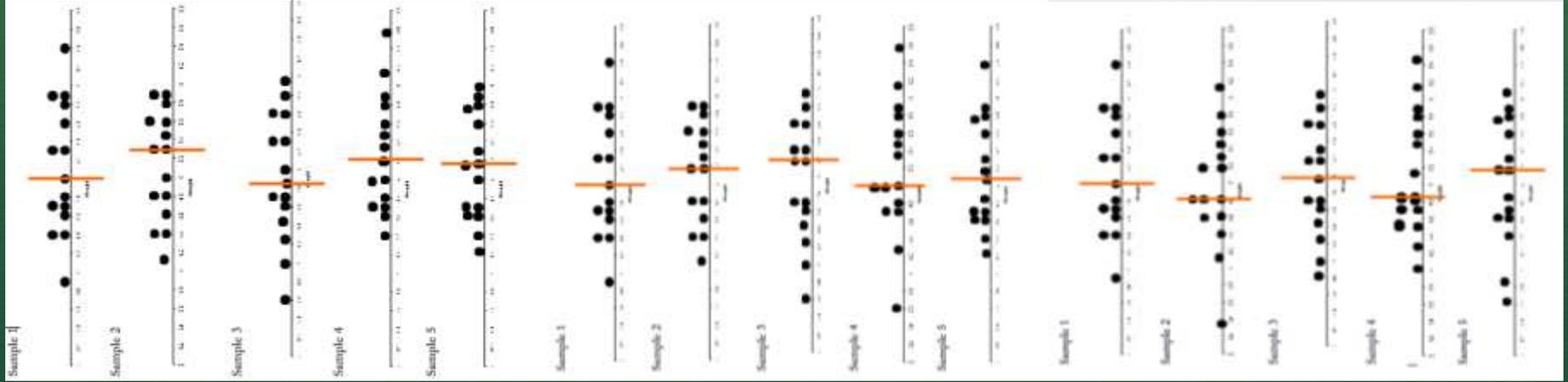
Sample 4



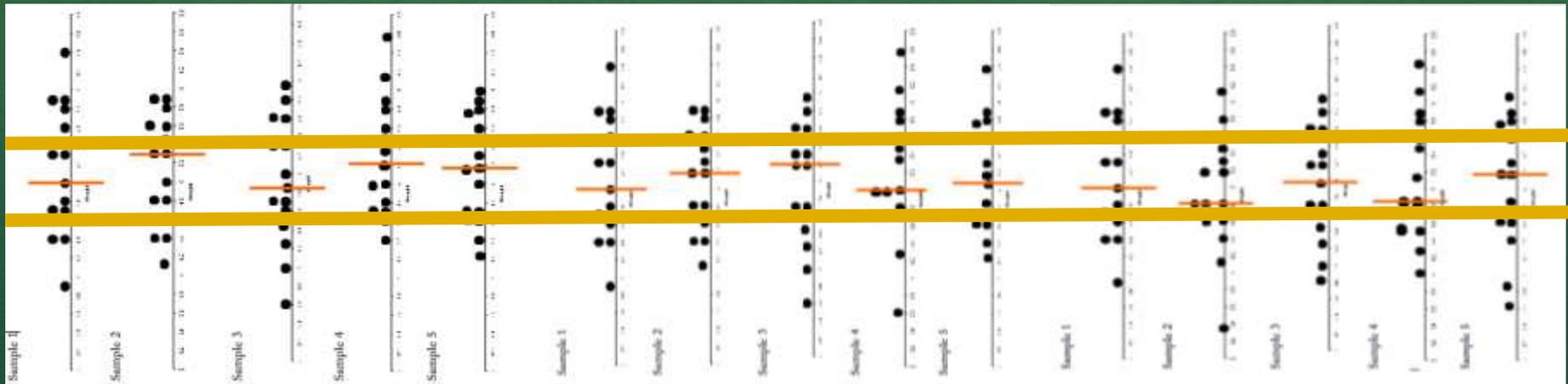
Sample 5



# What do you notice?

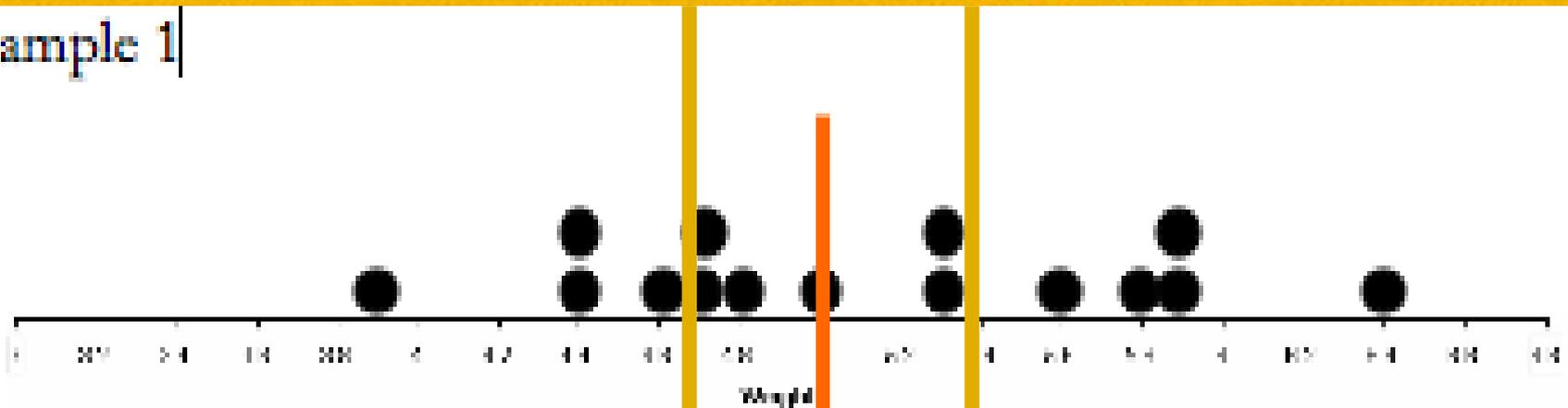


The median of the population is likely to be within the range of sample medians.

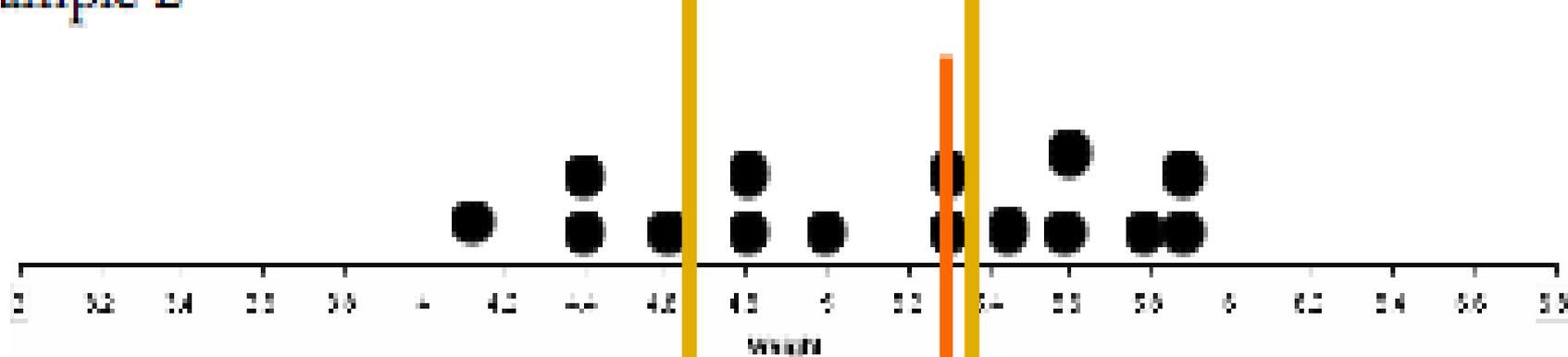


The median weight of the female koalas is likely to be between 4.7kg and 5.4kg.

Sample 1



Sample 2



# Are the koalas healthy?



*Southern koala*

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# Making an inference

The actual population median is 5.1kg.

Usually we only see one sample.

We make an **inference** that the population median is the same as the sample median (even though we know that it is probably not exactly the same).

This is called a **point estimate**.

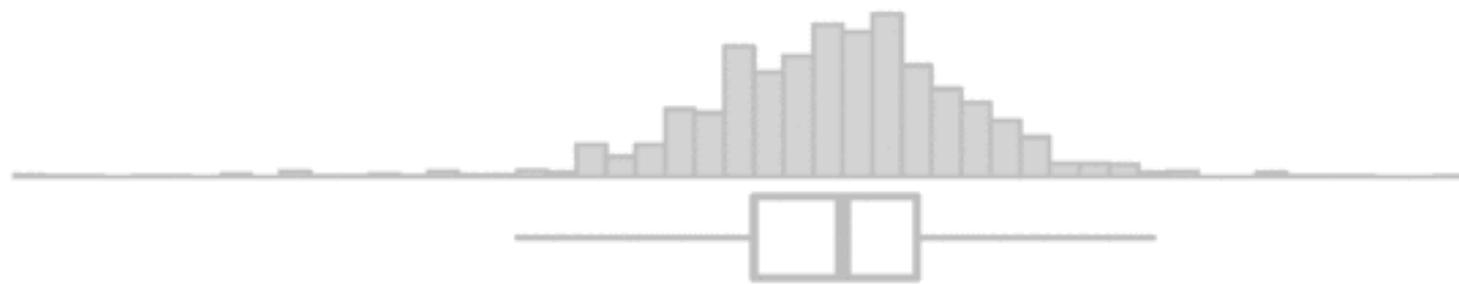
# Making an interval estimate

At NZC level 7, the idea of the interval is developed further.

Taking samples of different sizes and collecting the medians, you can demonstrate that there is less variation in the medians of large samples than the medians of small samples.

# Heights of girls aged 12

Population distribution: The unseen world



**Samples of size 30**



100

120

140

160

180

200

Height (cm)