

# Understanding Compensation Dynamics via Removal of an Invasive Species

Dylan M. Glaser, Dr. John R. Post: *University of Calgary*

Dr. Dylan J. Fraser: *Concordia University*





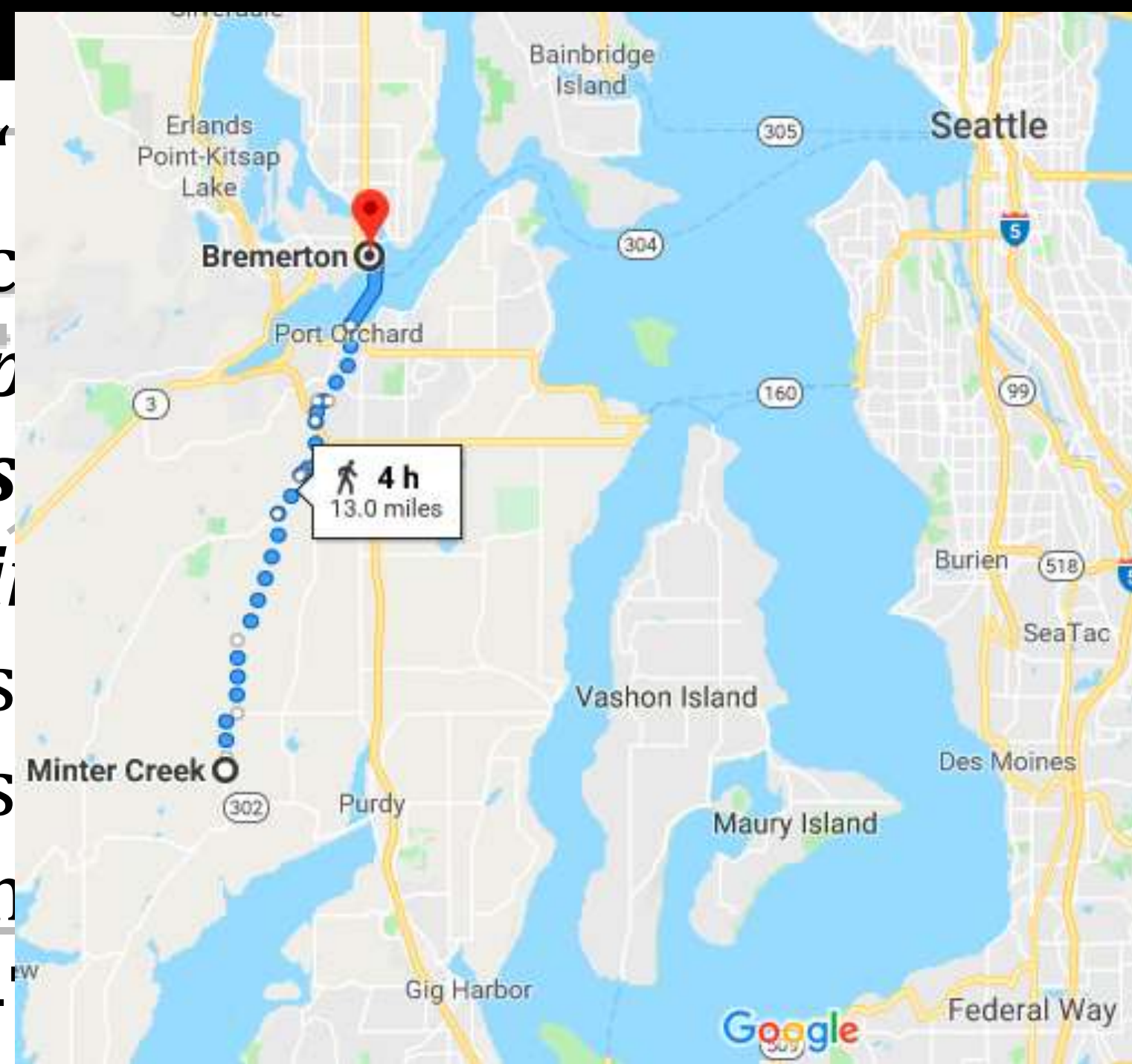
# Compensation?

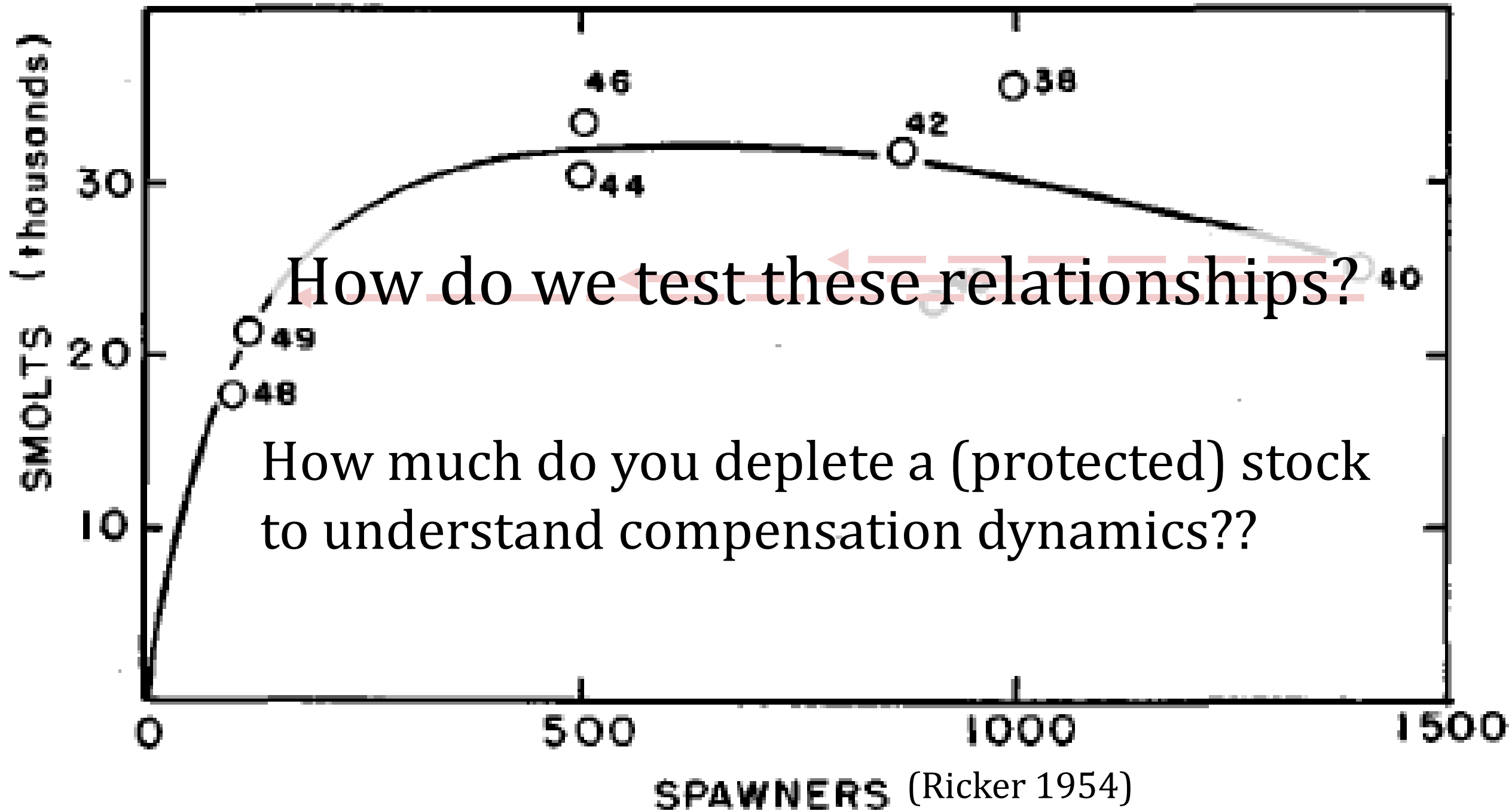
SMOLTS (thousands)



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# Brook Trout (*Salvelinus fontinalis*)



Duane Raver - US



Mount Rainier National Park Archives



Hatchery staff release fish from helicopters and tanker trucks.

Kootenay Trout Hatchery

## Nonchemical Eradication of an Introduced Trout from a Headwater Complex in Banff National Park, Canada

Charlie Pacas

*Parks Canada, Banff National Park*

Mark K. Taylor\*

*Parks Canada, Banff National Park  
Renewable Resources, University of Alberta  
T6G 2H1, Canada*

### LOCAL NEWS

## Hidden Lake fish project underway

BY ROCKY MOUNTAIN OUTLOOK SEP 15, 2011

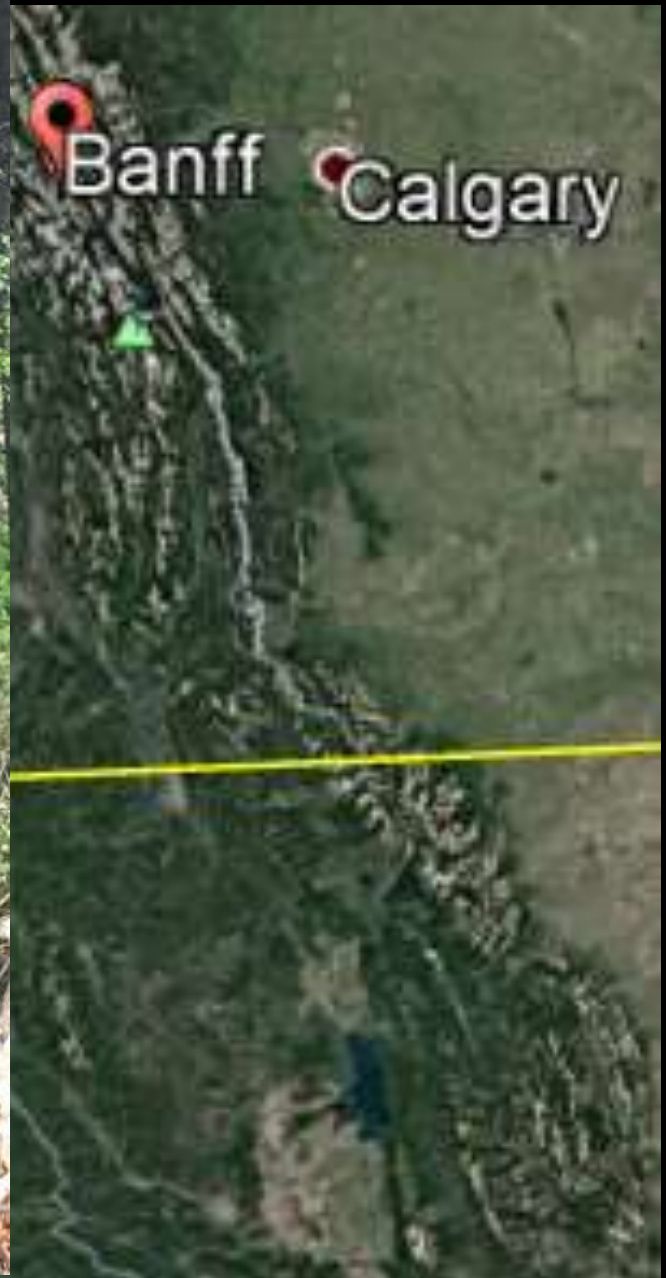
In an effort to return national park waters to their historic ecosystems, Parks Canada has begun removing brook trout from Hidden Lake, north of Lake Louise.

### ENVIRONMENT

## Parks Canada uses chemical to remove non-native fish species

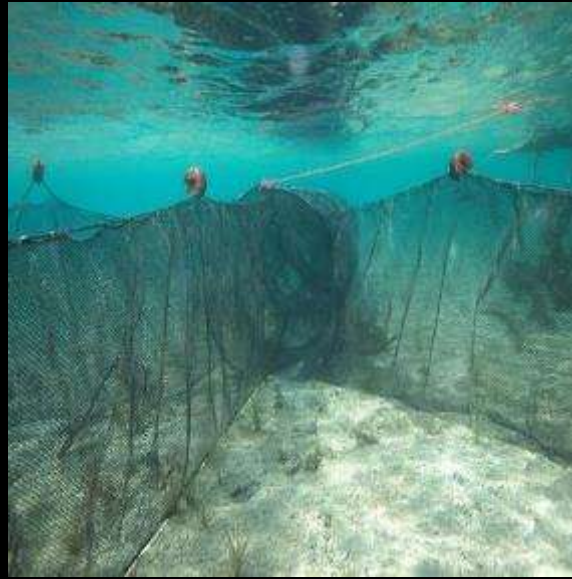
BY PAUL CLARKE AUG 23, 2018







# Methods



**Mark –recapture** to determine population size. PIT tags applied for population estimates and individual metrics



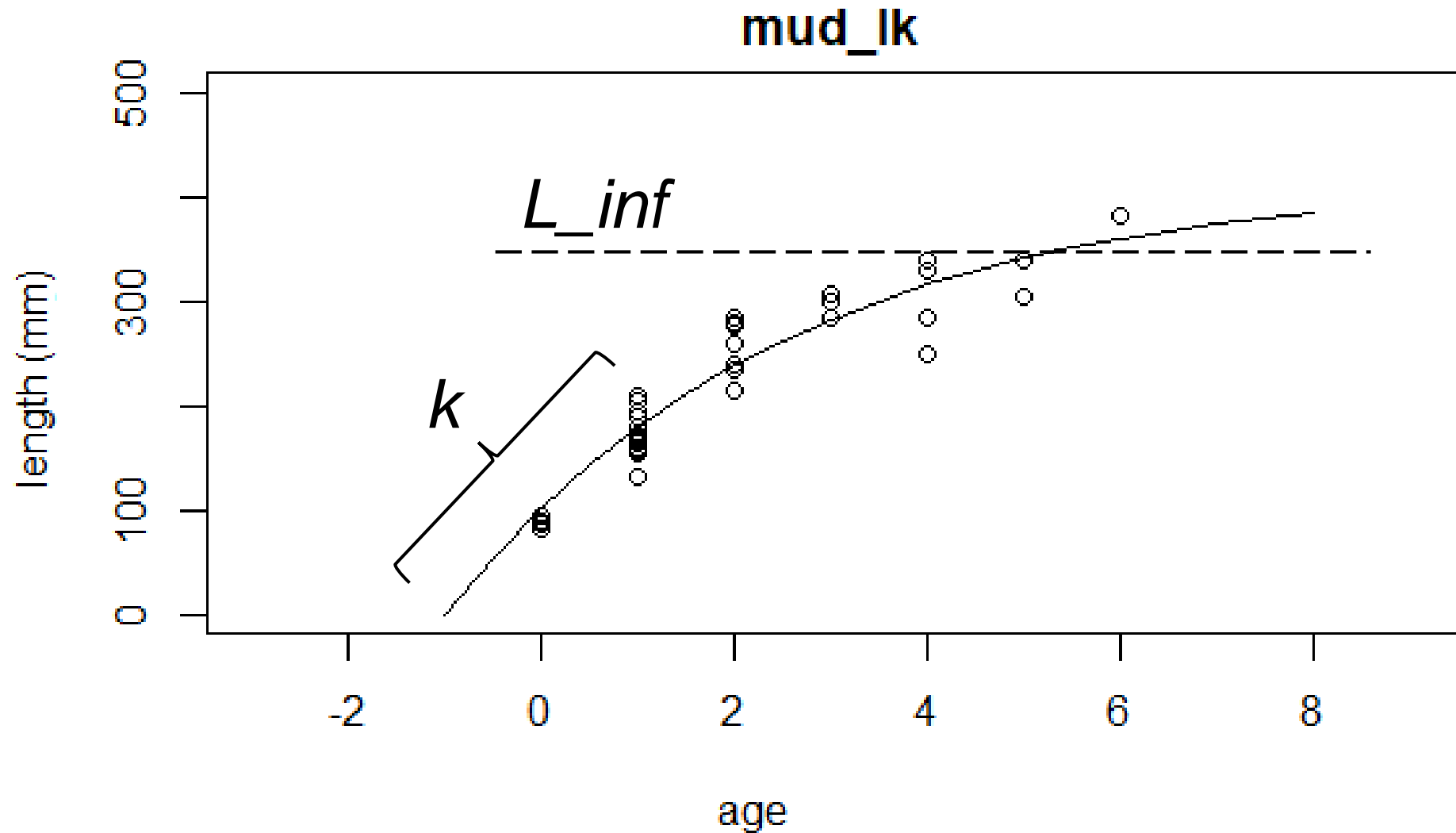
**Stock Assessment**  
mixed mesh gillnets to collect biological data (otoliths, DNA, morphology, etc.). Remove ~ 4-10%.



**Harvest** with selective gillnets to deplete the largest individuals (50% of pop.).

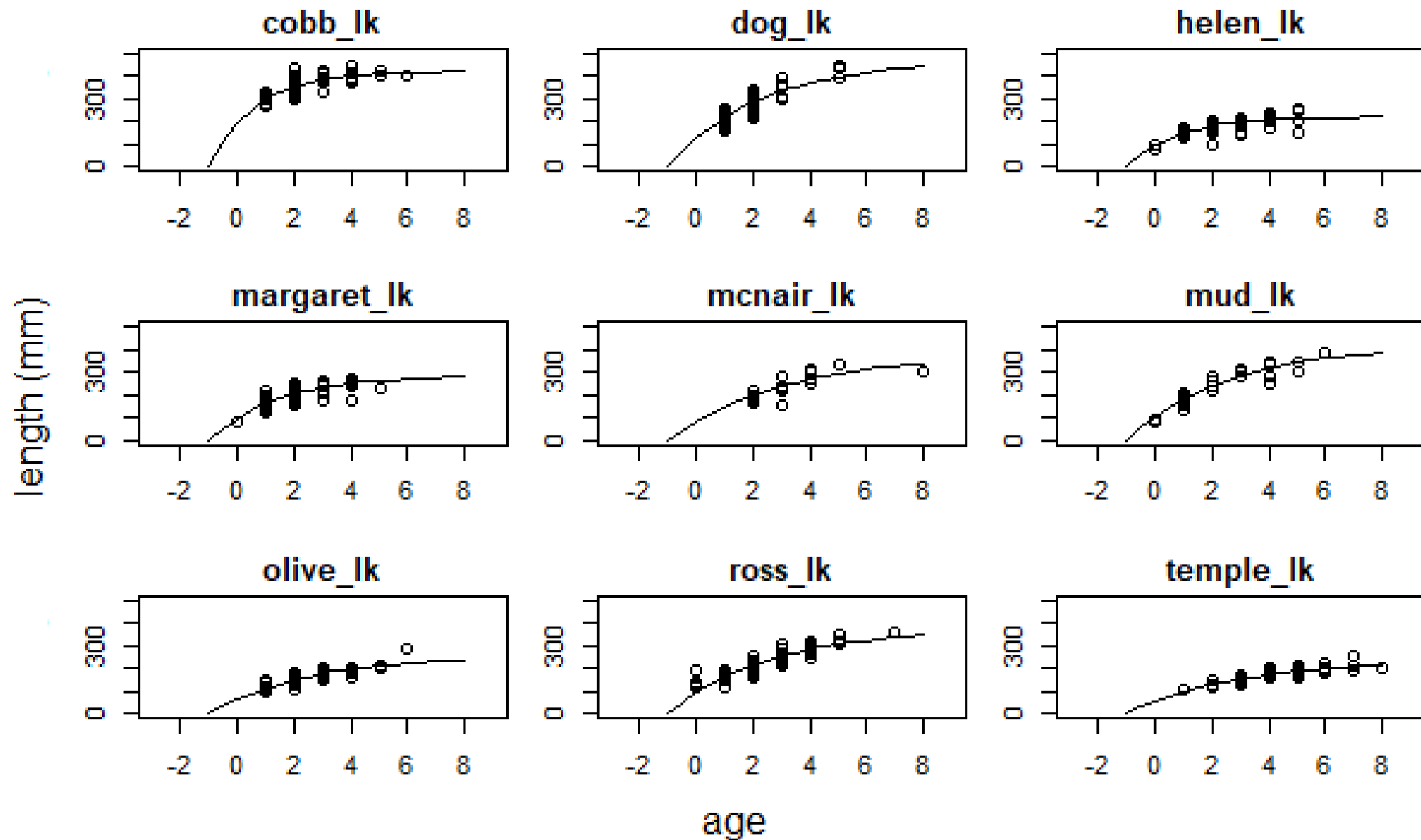
# Growth

## Von bertalanfy growth curves





## Von bertalanfy growth curves





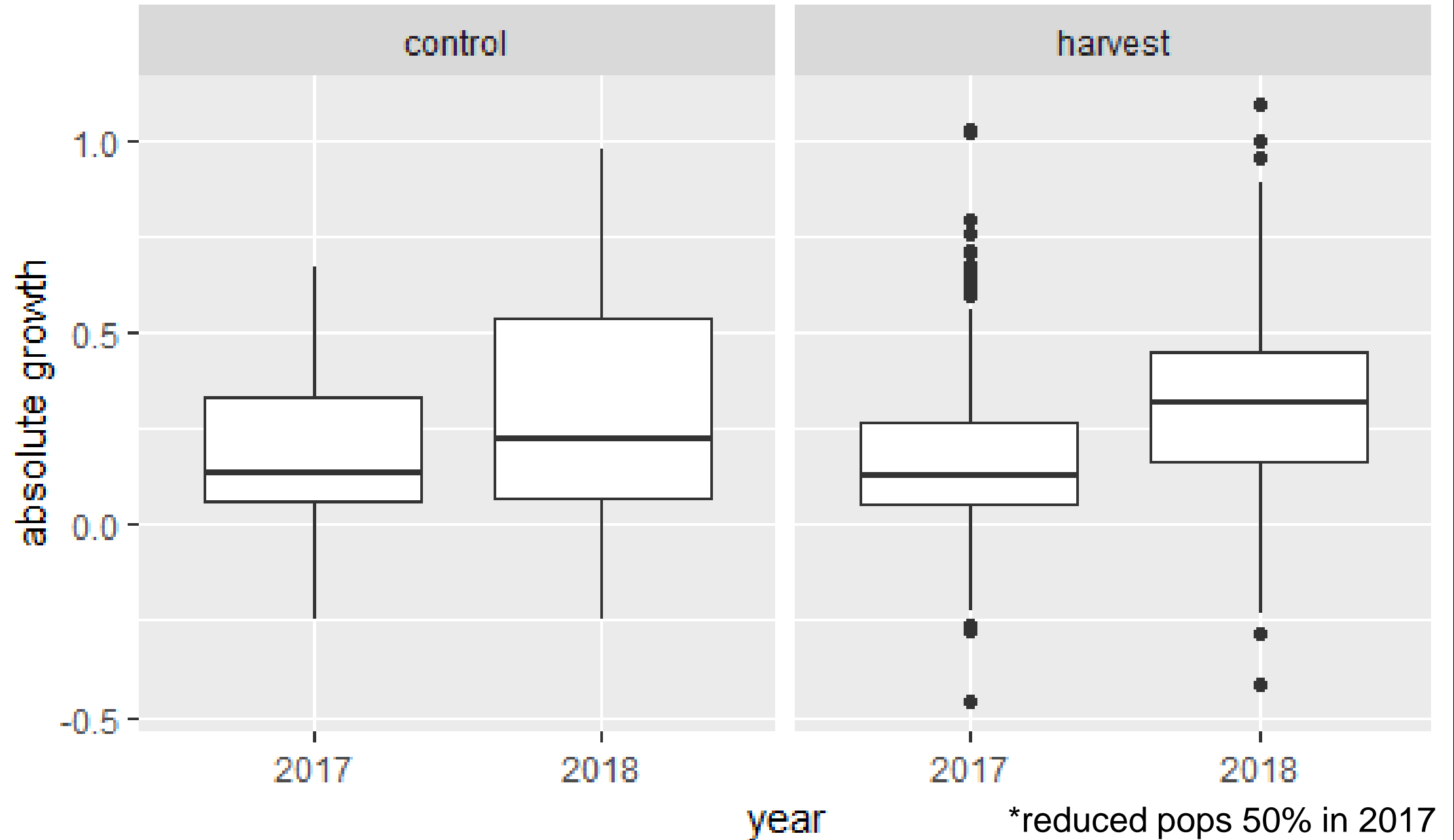
# Absolute growth

$$\frac{\textit{growth}}{\textit{time}}$$

You better be 10 days minimum

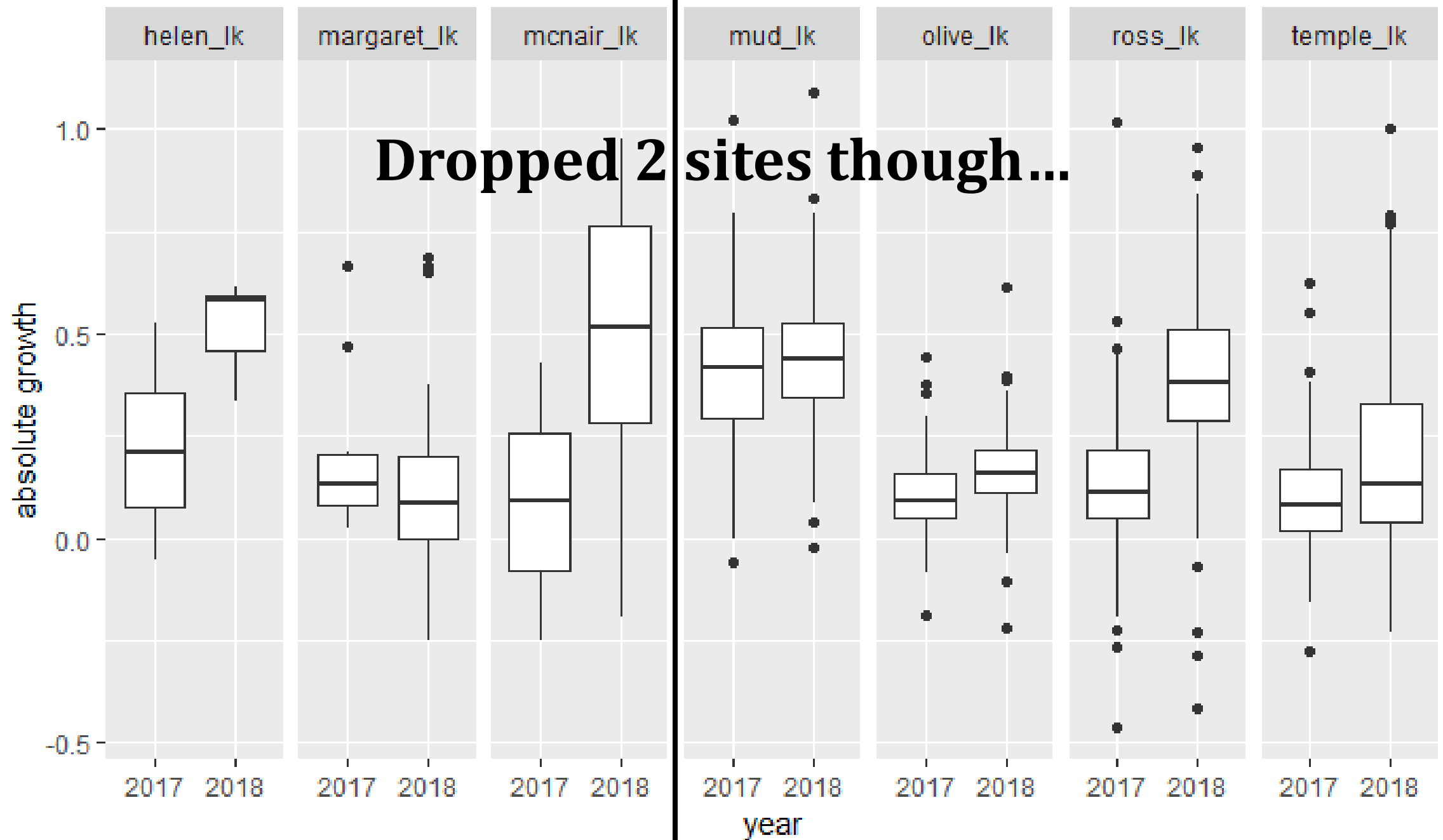


# growth between treatments





## growth between years



# need for BACI analyses...

e.g. growth  $\sim$  size at tagging+ time:treatment + (1|site)

- GDD5
- effective density ( $\Sigma L^2$ )
- prey density
- etc ...

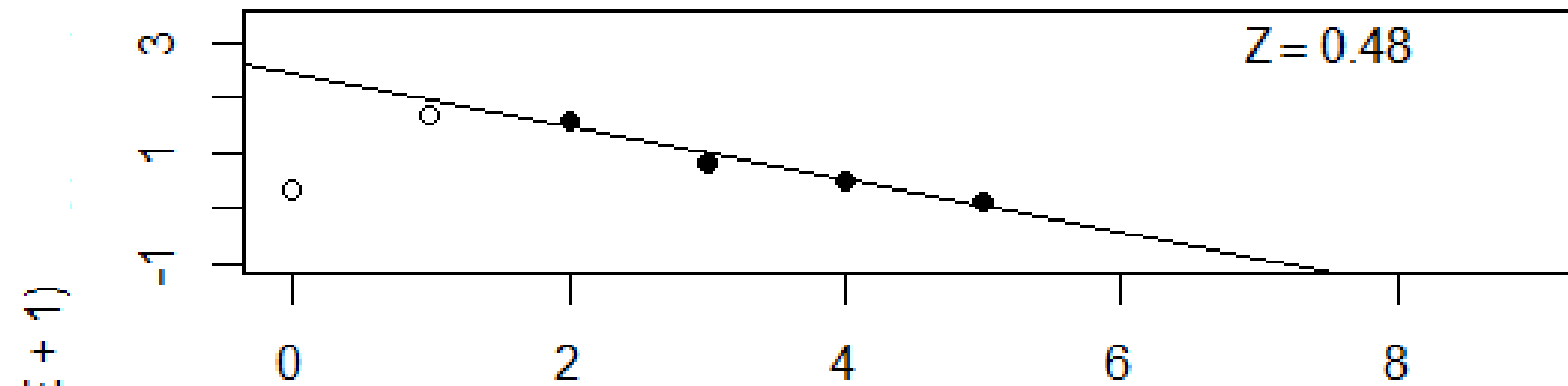




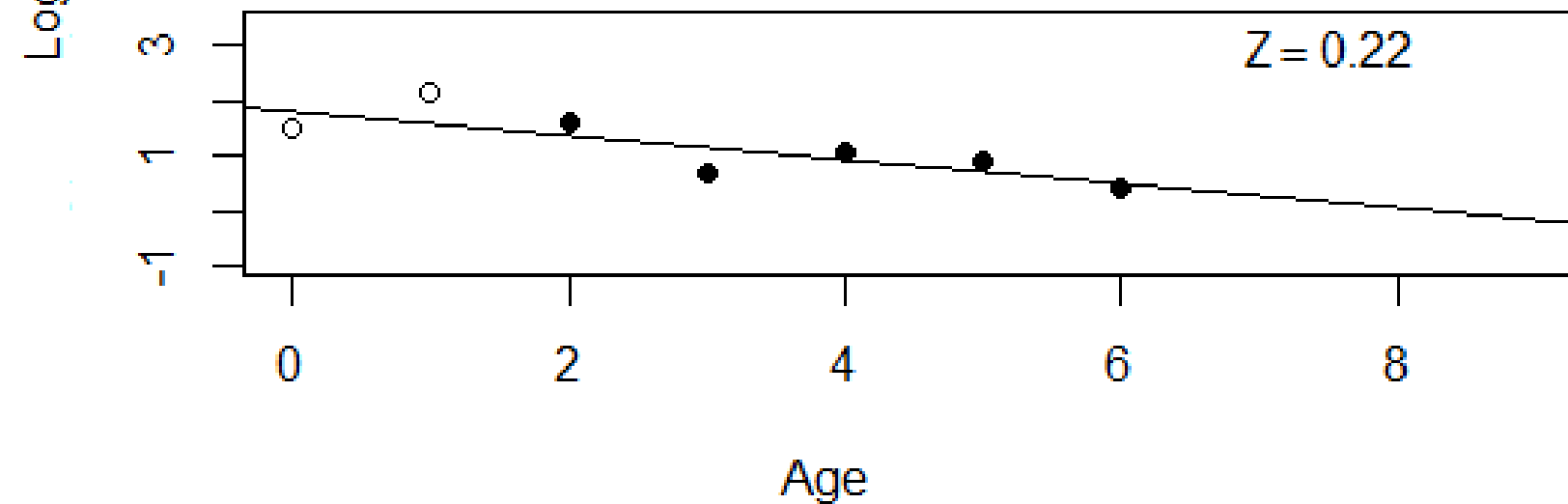
# Survival

Catch Curves for ages  $\geq 2$

**margaret\_lk**



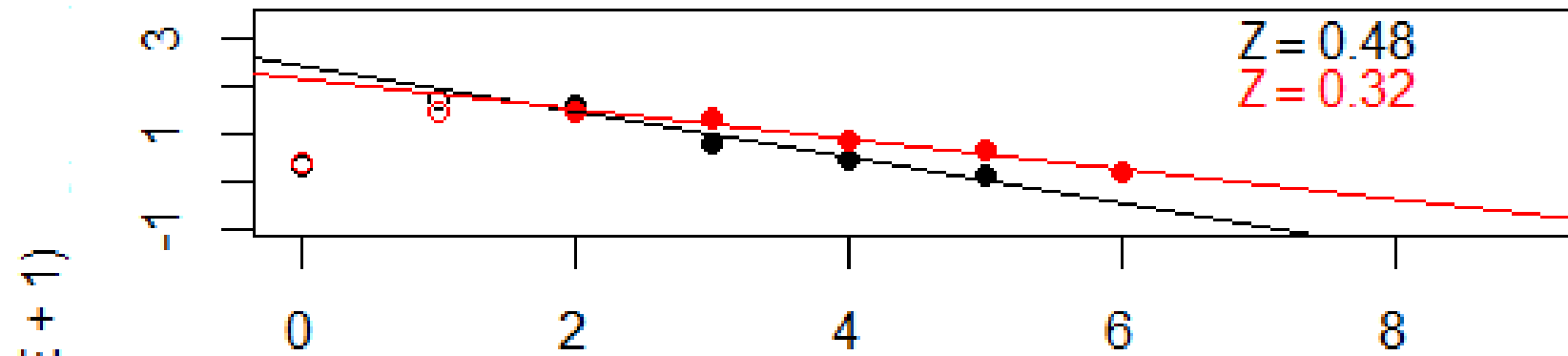
**mud\_lk**



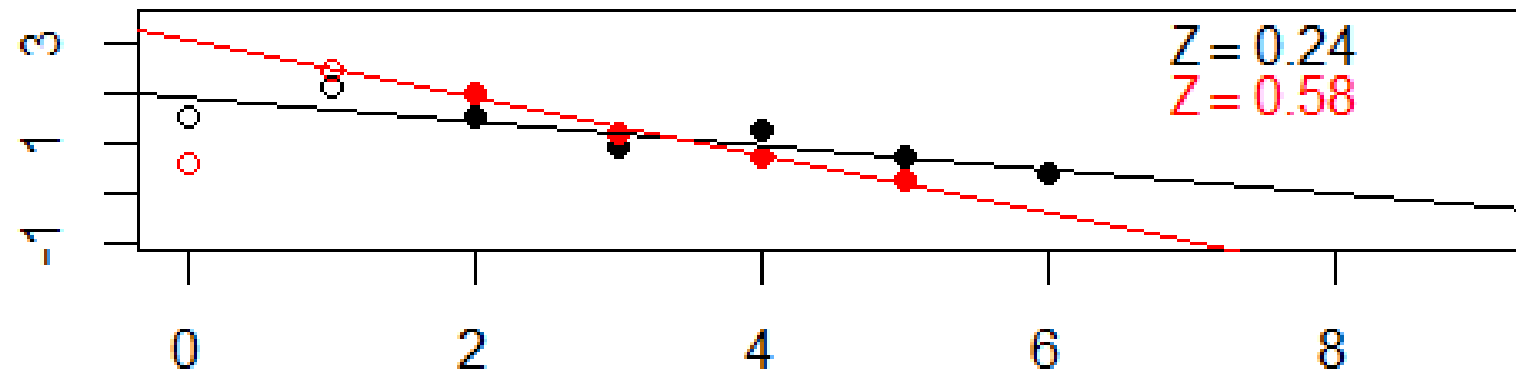


Catch Curves for ages  $\geq 2$

**margaret\_lk**

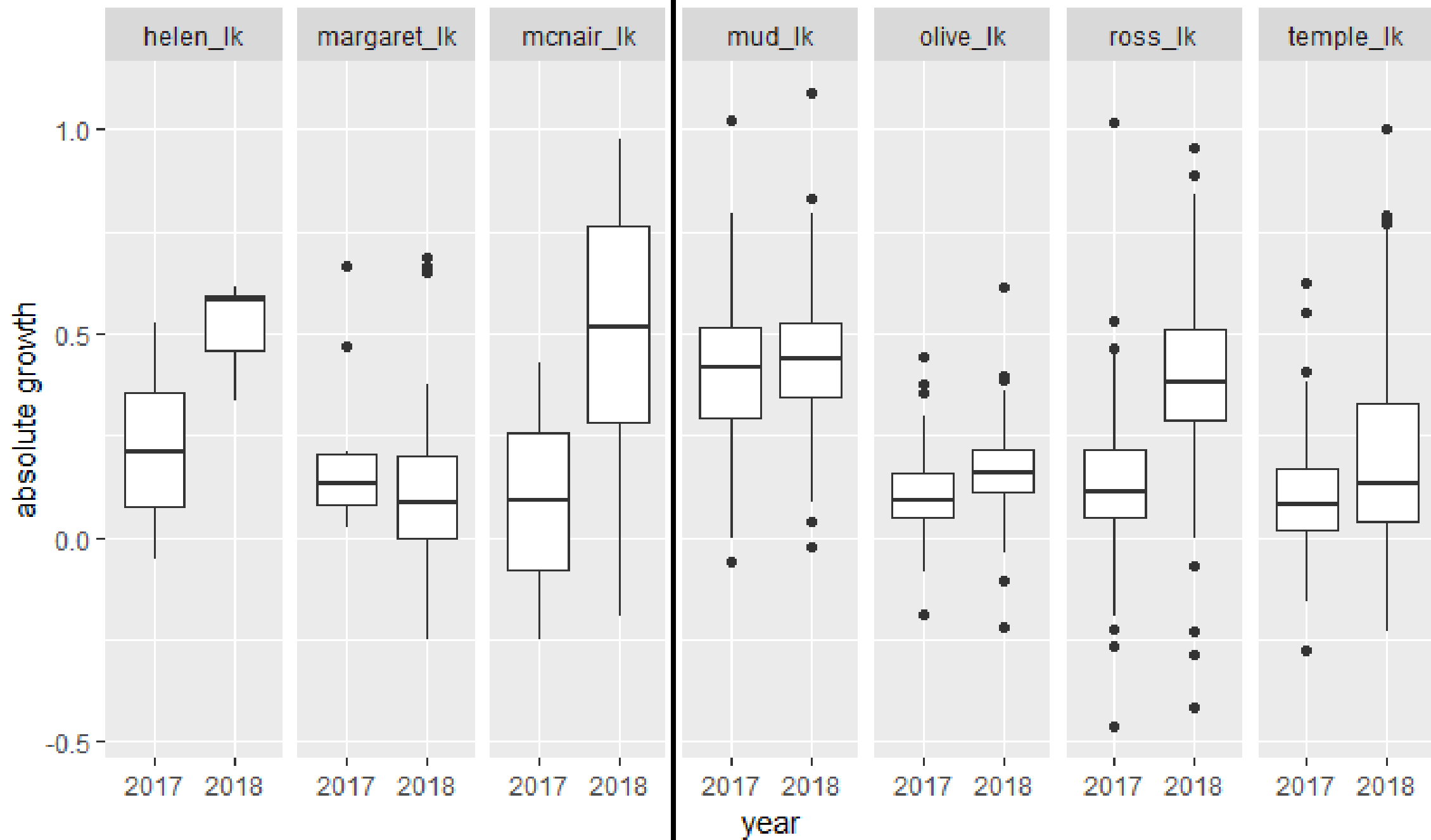


**mud\_lk**



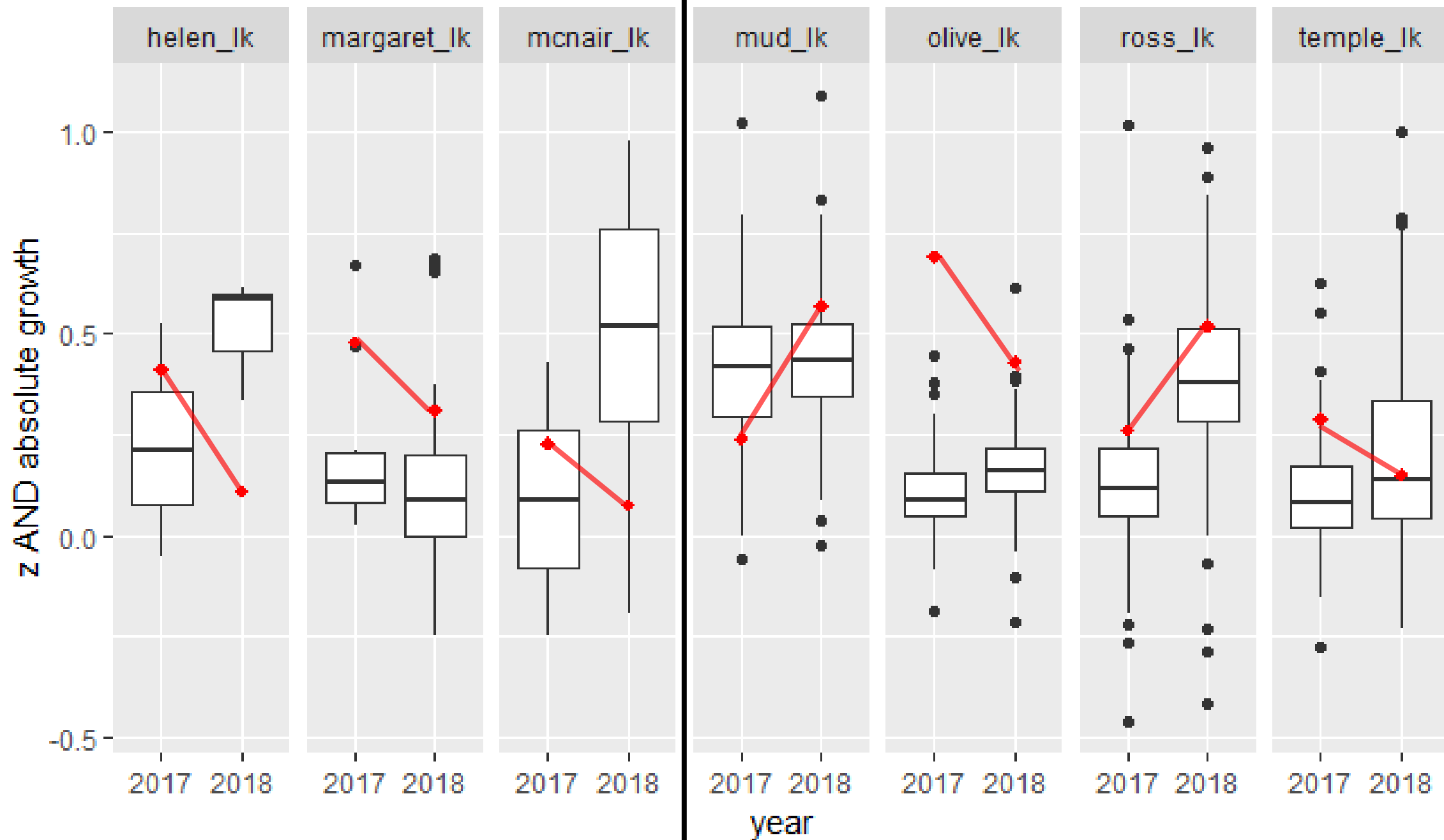
**2017 2018**

growth between years





# growth AND survival at sites



## Olive Lake

180mm



- 1200 fish/ha
- Wide outlet, spring influence, doesn't *fully* freeze -> strong recruitment?
- Absence of large (e.g. 200mm) fish  
-> low cannibalism?

both 5 years old!

- 60 fish/ha.
- Isolated “pot hole” lake -> poor spawning habitat?
- Can't detect small fish -> high cannibalism?
- late tagging morts?

## Cobb Lake

430mm



# Thanks

## Post Lab (U. Calgary)

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Dr. Ariane Cantin  
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Dr. Fiona Johnston  
Dr. Kyle Wilson  
Dr. Jon Mee

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Bradley Stitt  
Megan Goudie

## Fraser Lab (Concordia U.)

Dr. Dylan Fraser  
Brent Brookes  
Thaïs Bernos

## Derry Lab (UQAM)

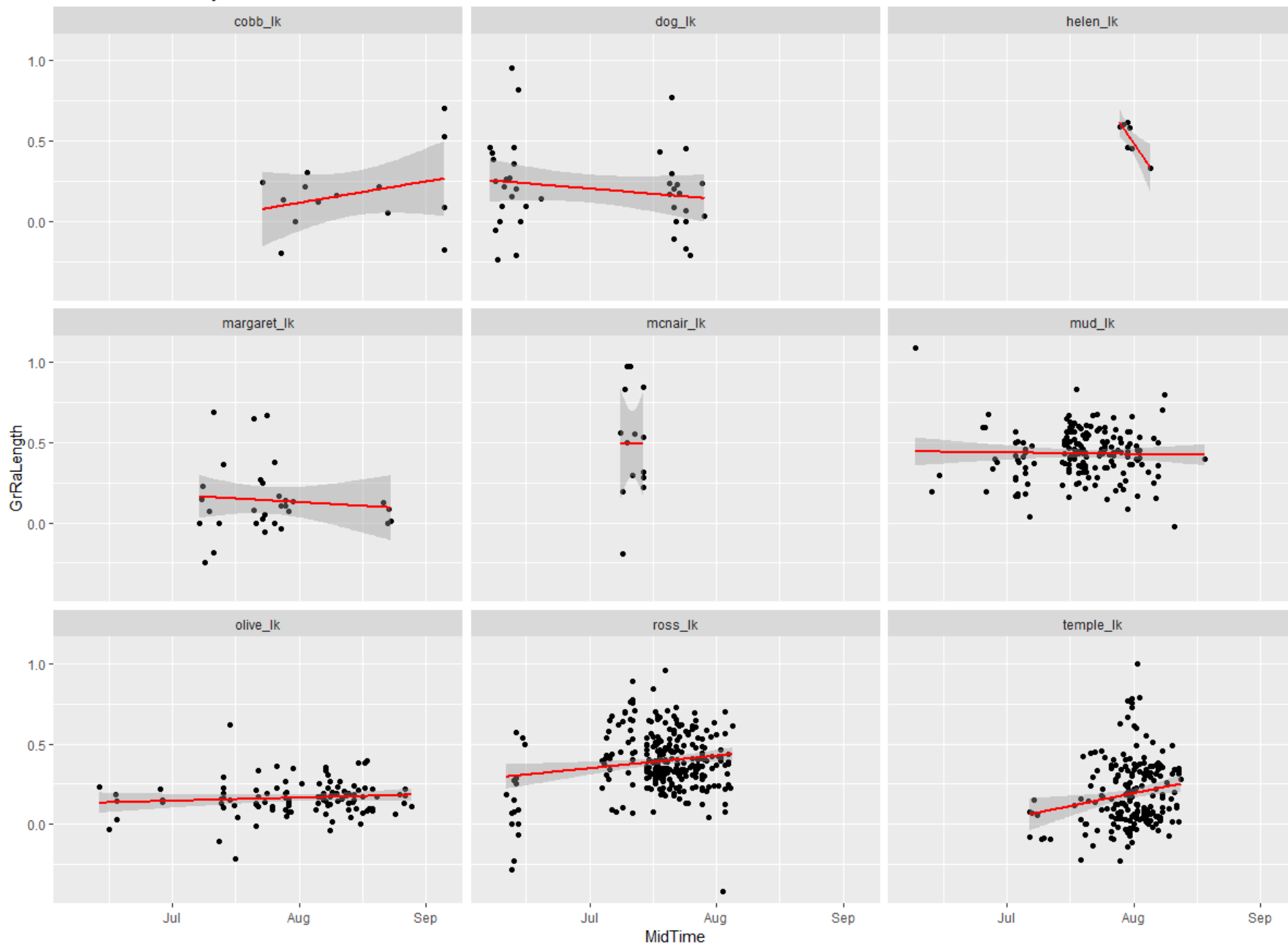
Dr. Alison Derry  
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Dr. Matthew Yates

## Alberta Environment and Parks

Dr. Mike Sullivan  
Laura MacPherson

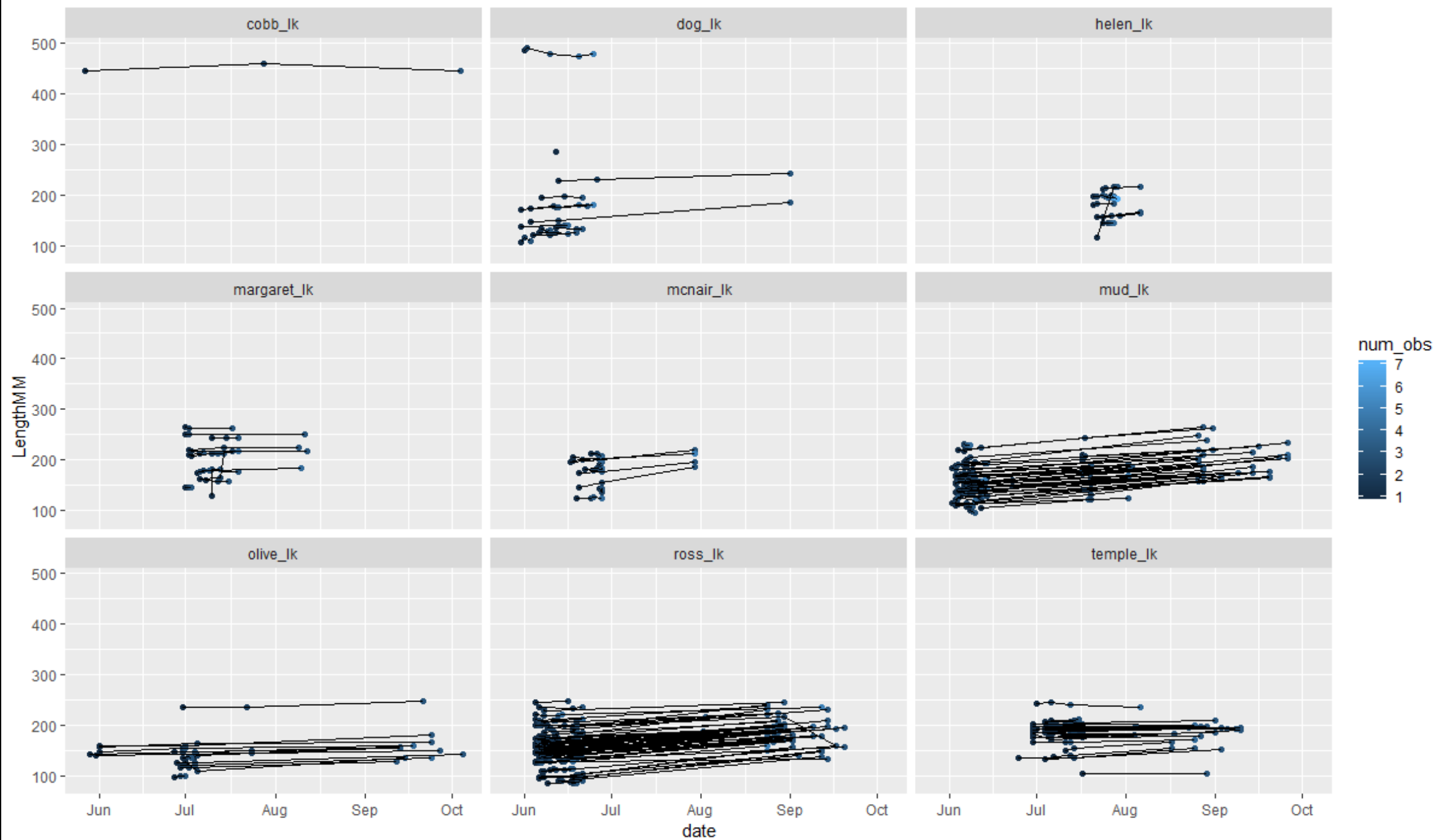


2018, all sz. 10 days

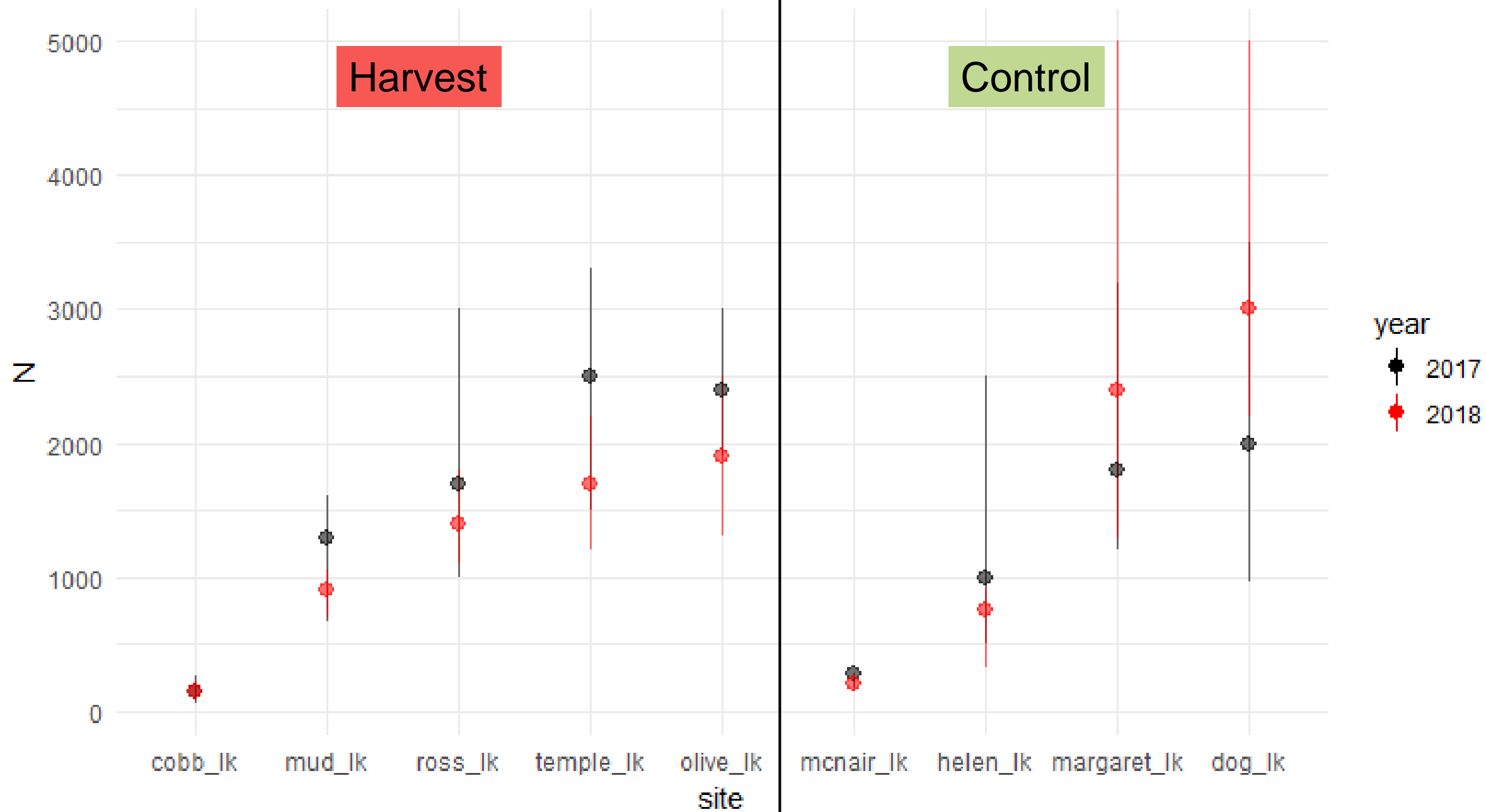


Some trends...  
Die with large sample  
size though

2018



## Population Estimates





## Length at Age

