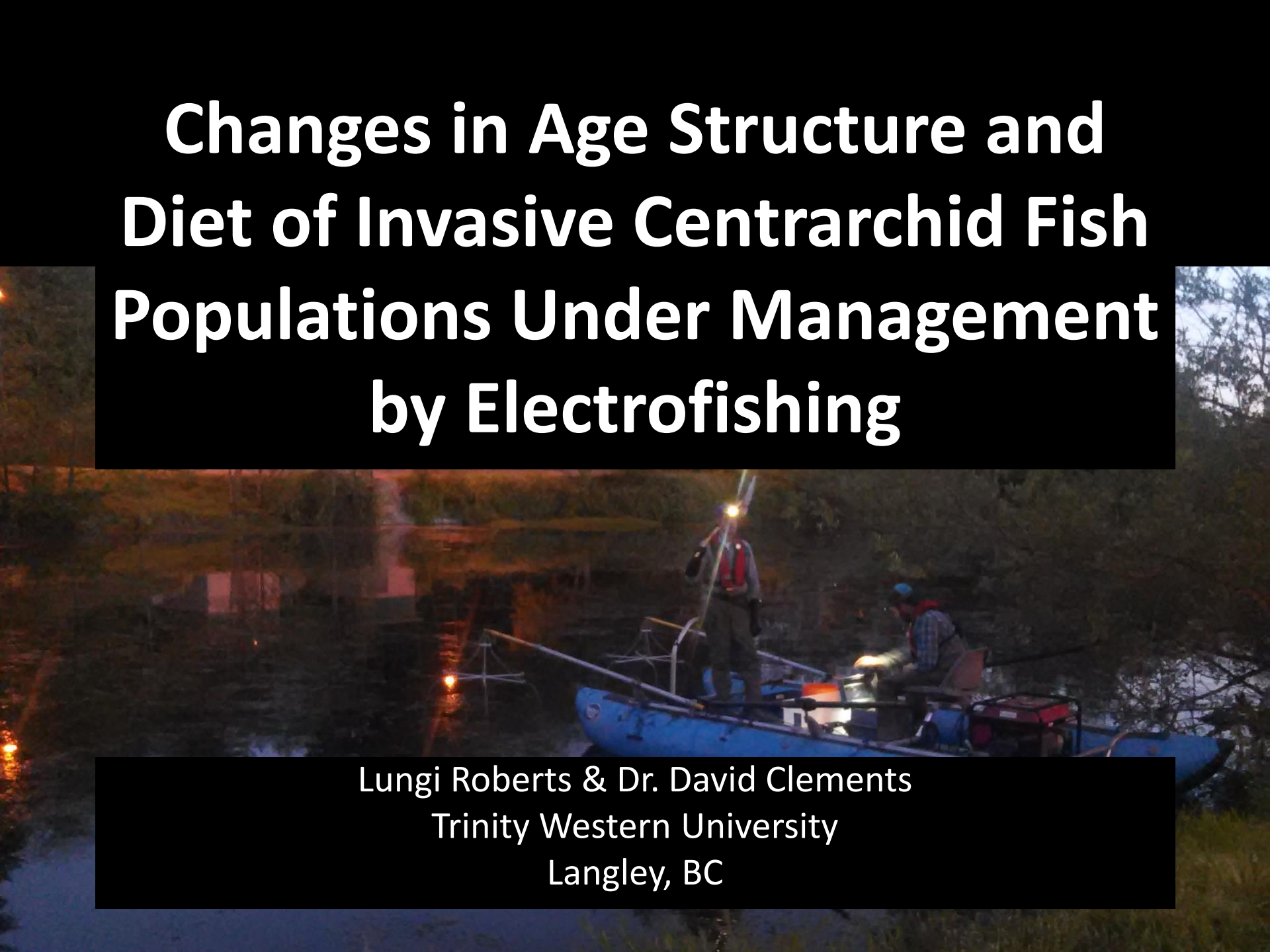


# Changes in Age Structure and Diet of Invasive Centrarchid Fish Populations Under Management by Electrofishing



Lungi Roberts & Dr. David Clements  
Trinity Western University  
Langley, BC

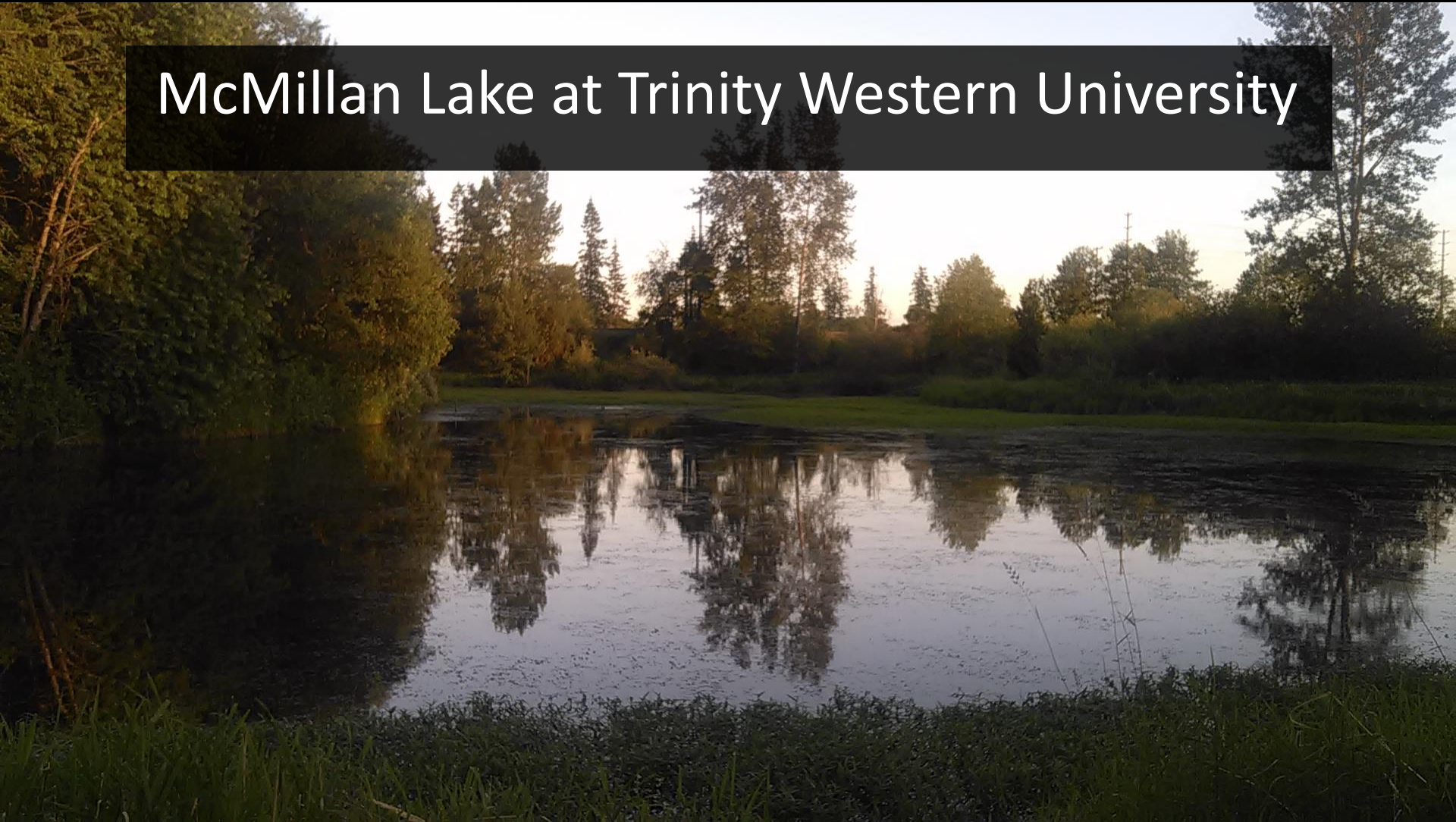
# Overview

- Study Area
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- Results
- Discussion
- Future Research
- Acknowledgements

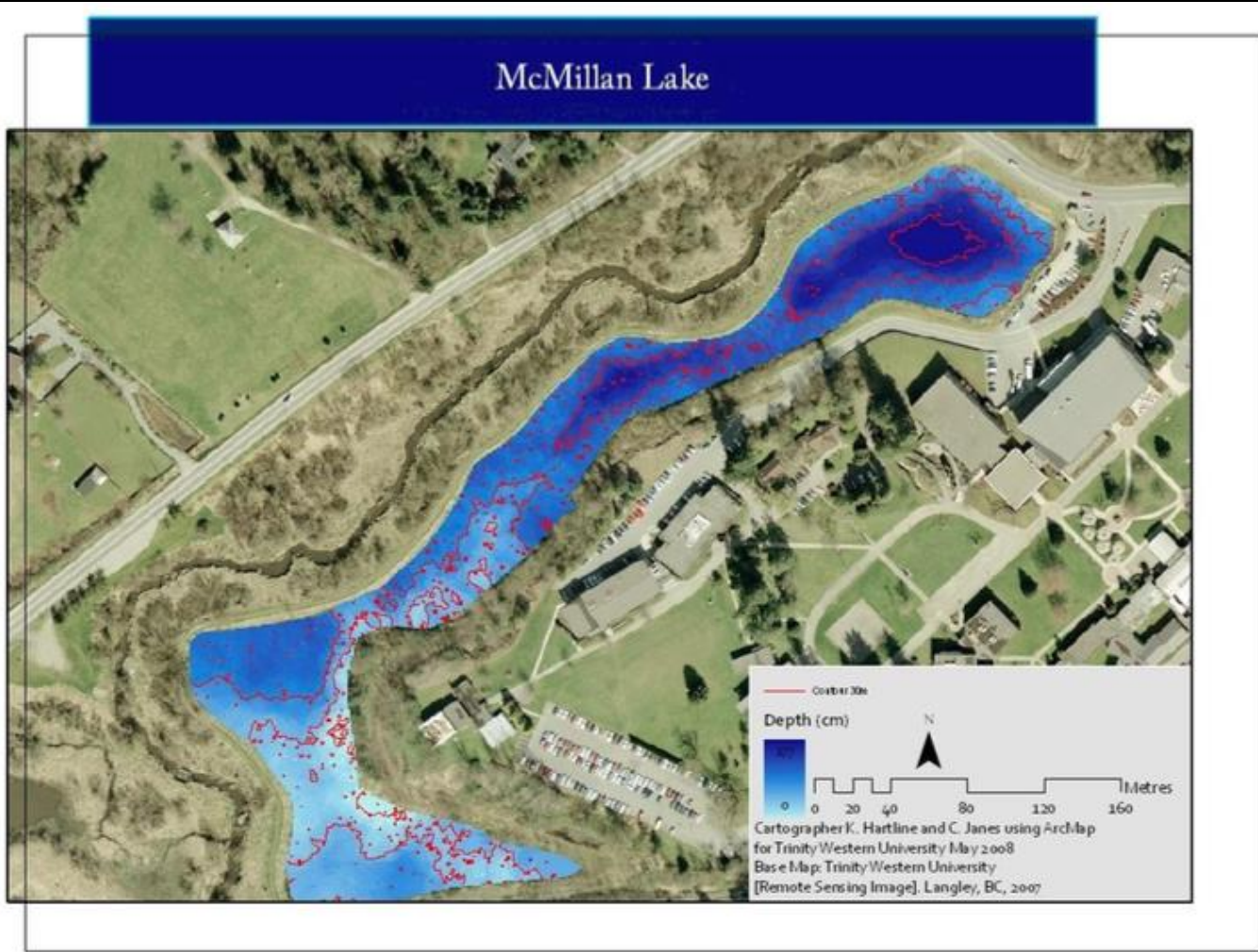


# Study Area

McMillan Lake at Trinity Western University



# McMillan Lake



# Introduction



- Recognition that certain invasive species pose a threat to salmonids in McMillan Lake
- Consequential obligation from the BC Ministry of Environment to commence research to manage invasive species and protect native populations

# Introduction (cont.)

The primary predators to the salmonids present in McMillan Lake at Trinity Western University are the Largemouth Bass (*Micropterus salmoides*) and the Pumpkinseed Sunfish (*Lepomis gibbosus*).



# Introduction (cont.)

Summer 2008 – invasive fish discovered

2008-2012 – period of research

2012 – BC Ministry of Environment obligation to eradicate nonnative fish species

Summer 2013 – electrofishing project

Summer 2014 – electrofishing project

Summer 2015 – electrofishing project

Summer 2016 – non-electrofishing project

Summer 2017 – electrofishing project

# Research Questions

- Over past four years, has significant variation occurred in age structure of invasive fish populations observed in McMillan Lake?
- Is there evidence of substantial change in feeding behavior of invasive fish populations?
- As possible result of reduced populations, has early maturation been observed in these invasive species?



# Methods

- Fish collection
- General information
- Gonad mass
- Stomach content
- Approximate age



# Methods (cont.)



# Methods (cont.)



female eggs

male testes

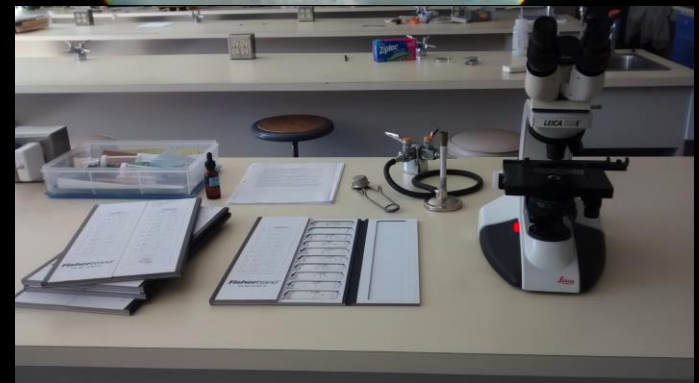
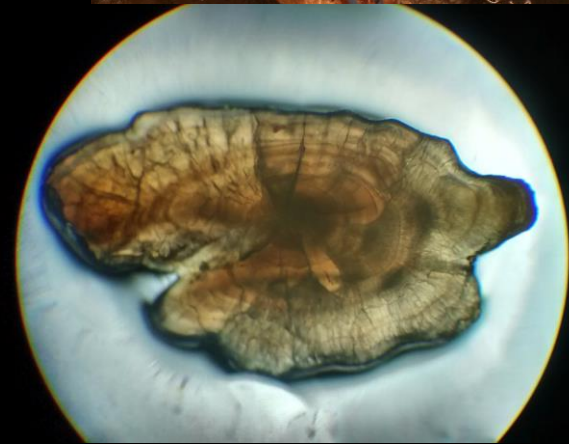
Both the male and female gonads of Largemouth Bass removed for gender and weight analysis.

Stomach of a Largemouth Bass dissected for the purpose of stomach content analysis.



# Methods (cont.)

- Otoliths in Largemouth Bass and Pumpkinseed Sunfish removed for age analysis.
- Procedures attempted for otolith analysis:
  - Sanding
  - Burn method
  - Oil immersion
  - Peer-review



# Methods (cont.)



Rings observed on a Pumpkinseed Sunfish otolith, using darkfield



Rings observed on a Pumpkinseed Sunfish otolith, using lightfield

# Results

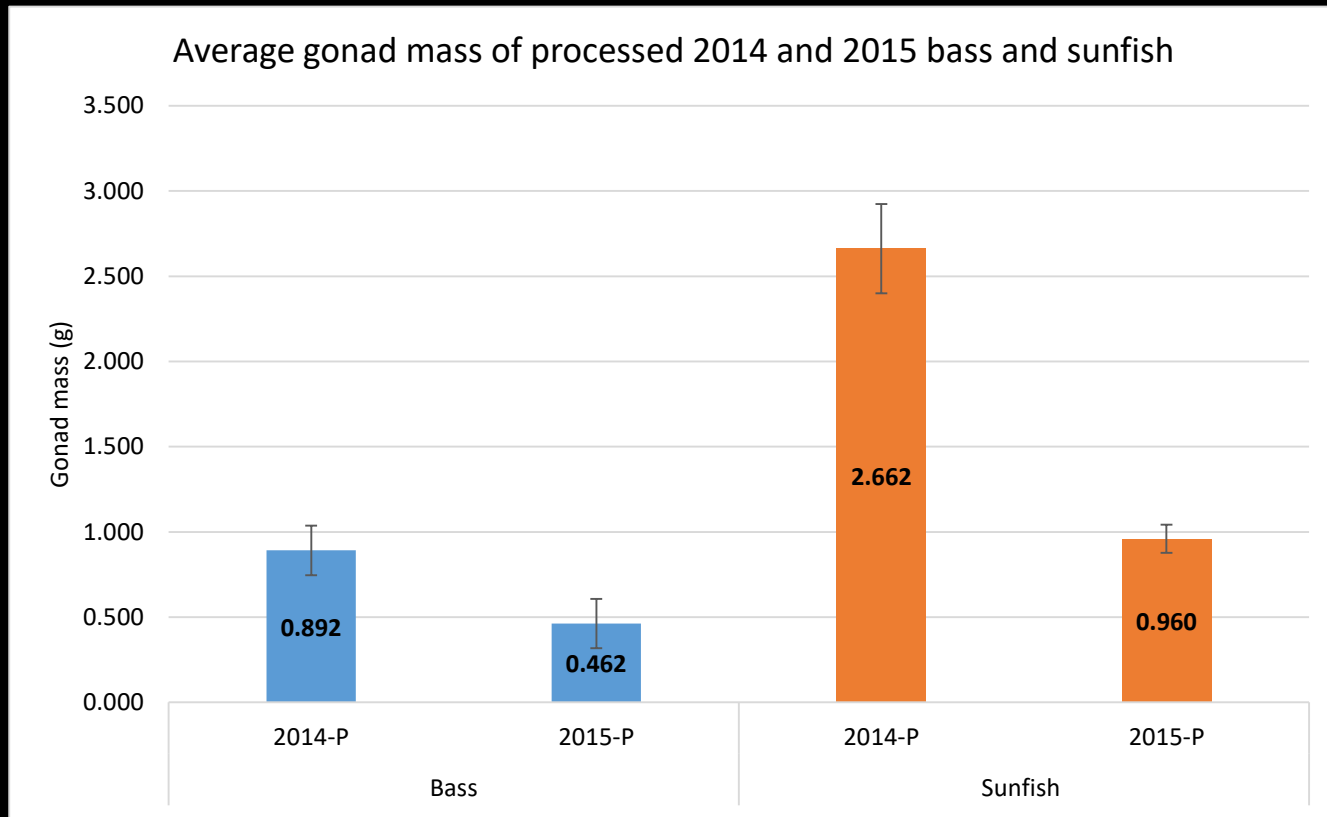
2013 – the first electrofishing project at McMillan Lake was performed. The resulting haul was 579 fish.

2014 – the electrofishing methods used were far more efficient and successful. The resulting haul was 4,520 fish.

2015 – the third electrofishing project resulted in a haul of 1,992 fish.

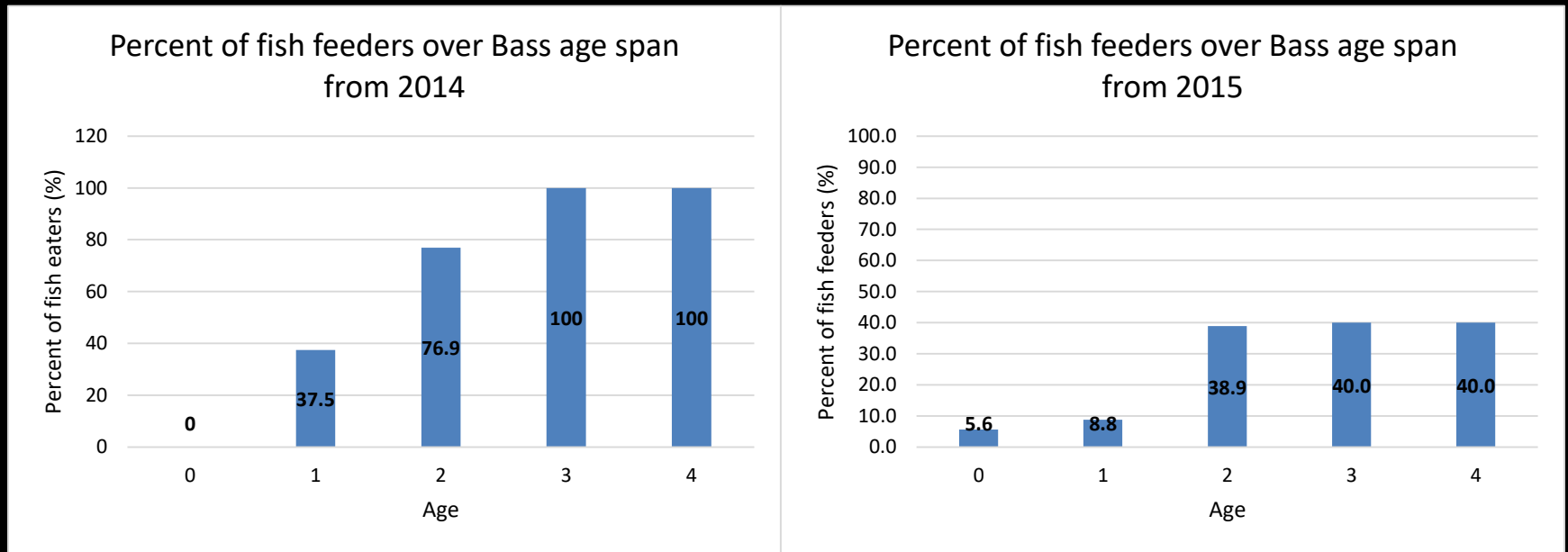
2016 – non-electrofishing methods (angling, trapping, seining) were employed. The resulting haul was 121 fish.

# Results (cont.)



Comparison of average gonad masses between processed Largemouth Bass and Pumpkinseed Sunfish from 2014 and 2015.

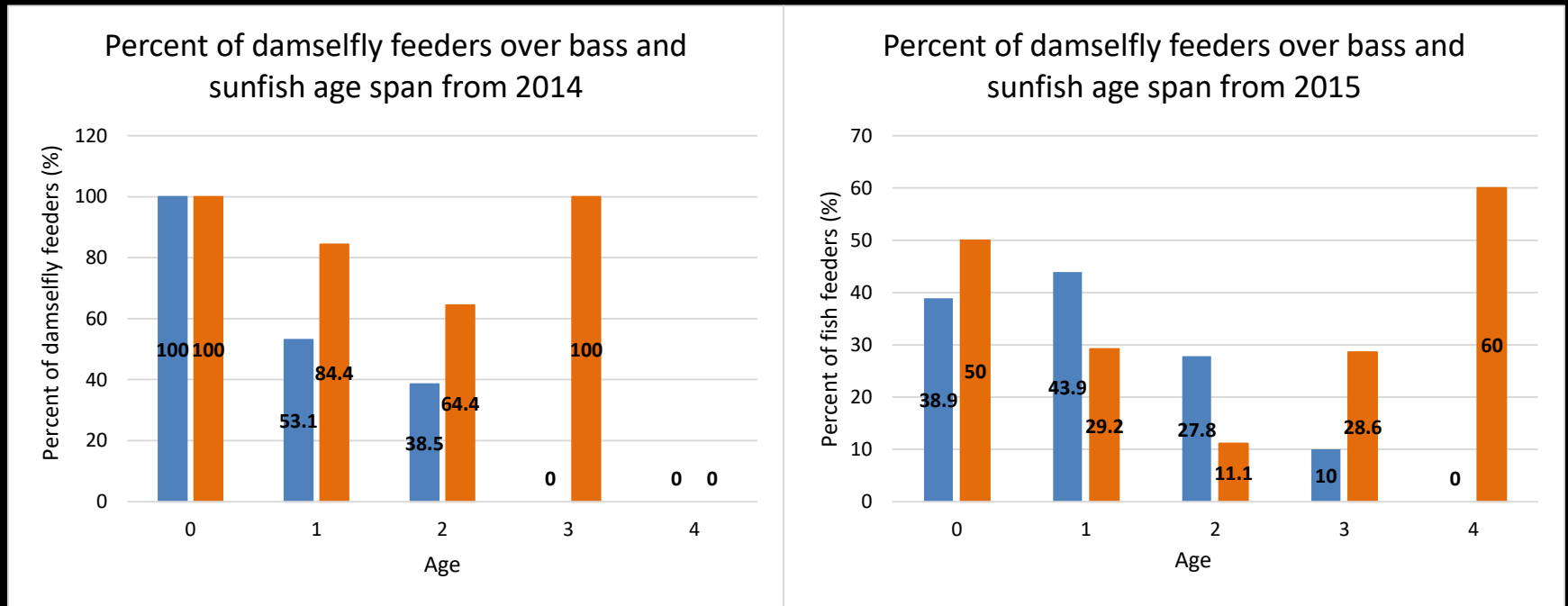
# Results (cont.)



Age distribution of the percentage of Largemouth Bass in which stomach contents contained fish.

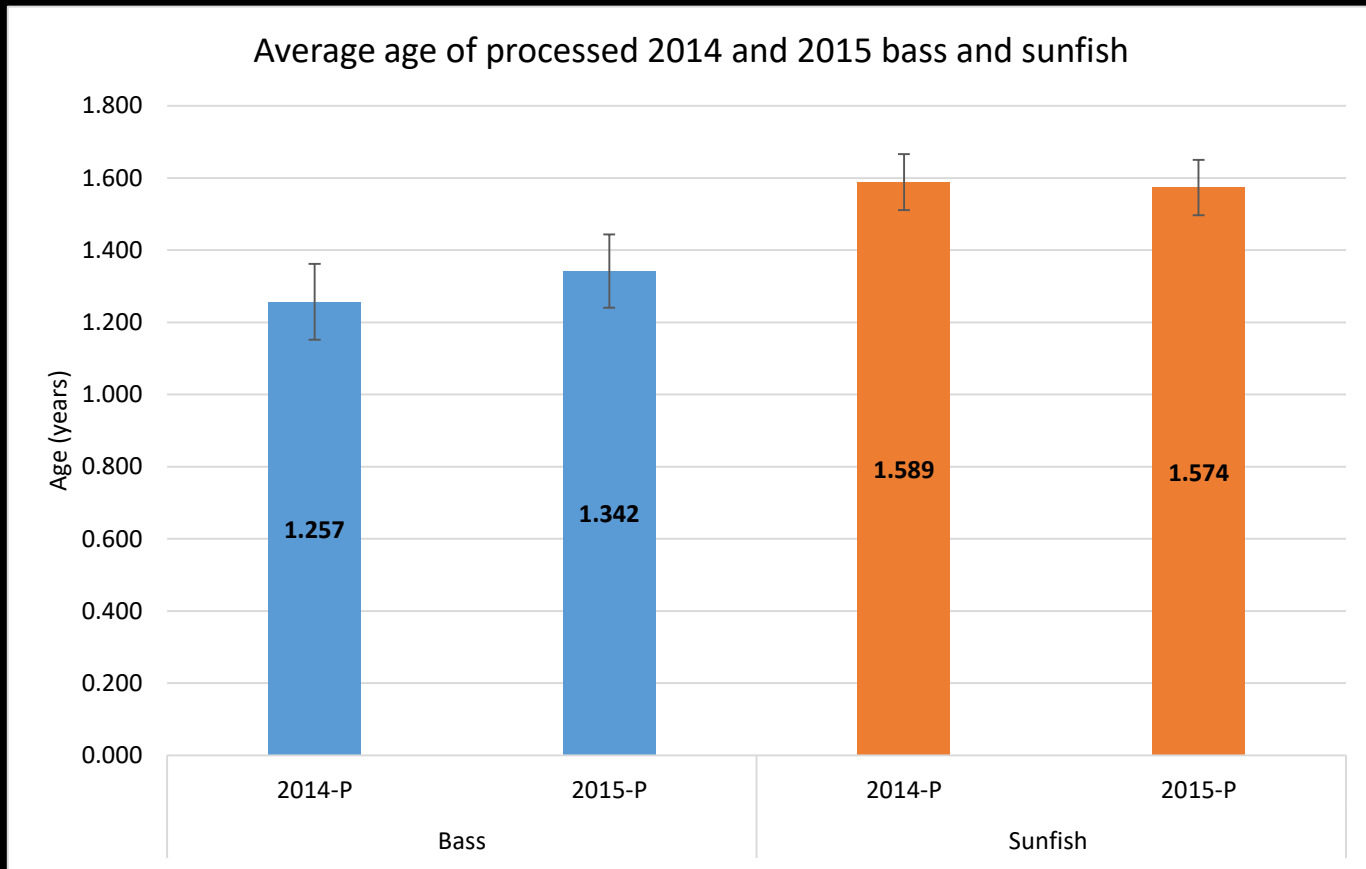


# Results (cont.)



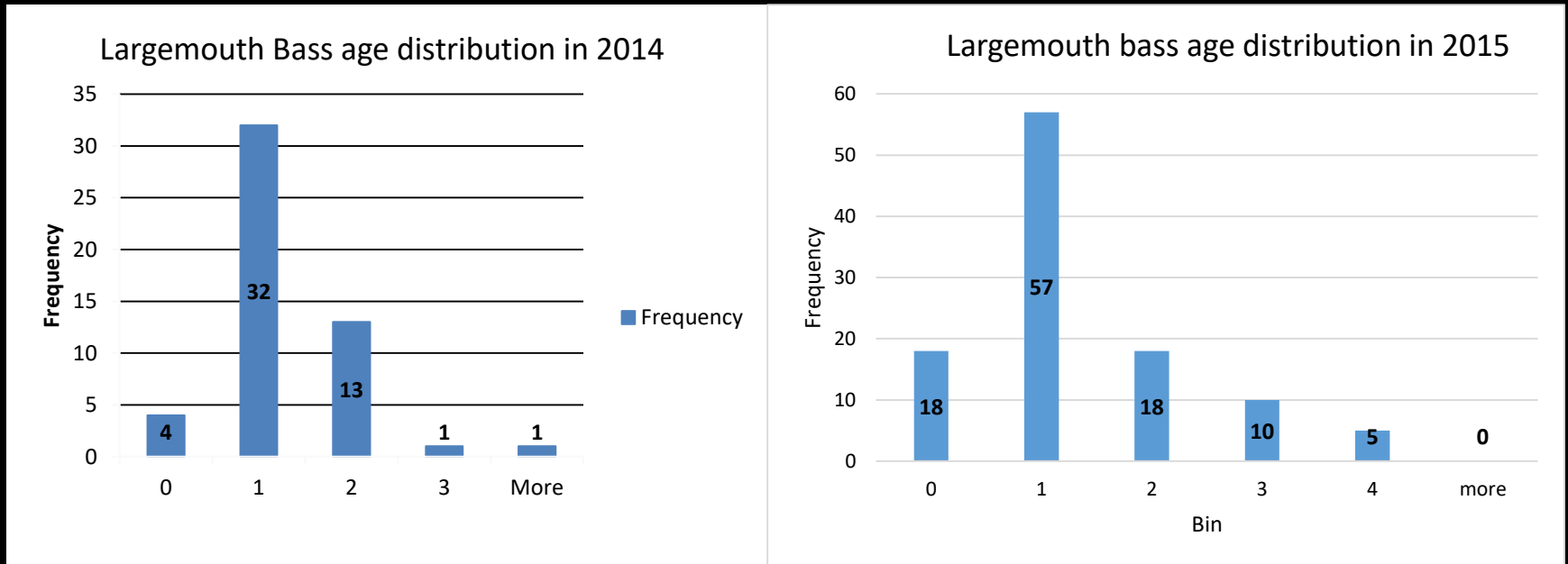
Age distribution of the percentages of Largemouth Bass (blue) and Pumpkinseed Sunfish( orange) that contained damselflies in their stomachs.

# Results (cont.)



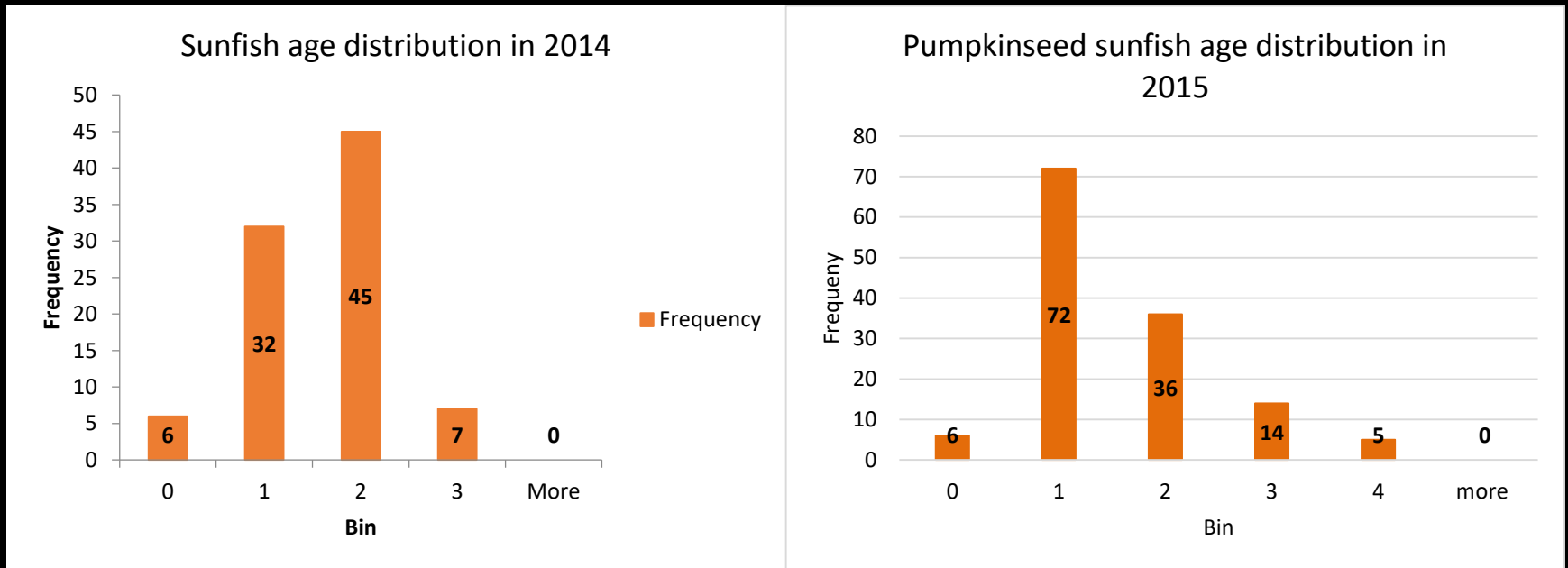
Comparison of average ages between Largemouth Bass and Pumpkinseed Sunfish collected in 2014 and 2015.

# Results (cont.)



Frequency among age groups in Largemouth Bass populations of 2014 and 2015.

# Results (cont.)



Frequency among age groups in the Pumpkinseed Sunfish populations of 2014 and 2015.

# Discussion

- Decline in Pumpkinseed Sunfish populations has possibly driven Largemouth Bass populations to adapt their diet.
- Trends of decreasing populations with increasing age in both species reveal a possible increase in their mortality rates.
- Speculation of decreased size due to dietary changes observed in stomach content relative to size of same-aged Pumpkinseed Sunfish.
- Decline in piscivory observed in stomach content of Largemouth Bass between 2014 and 2015.

# Future Research

- Although an extensive data collection has been compiled, further analysis is needed for conclusive research.
- In summer 2016, genetic samples were collected for the Department of Fisheries and Oceans (DFO). The DFO has been conducting genetic analysis on invasive fish throughout BC.
- Contract approved for the anticipated continuation of electrofishing project this summer (2017).
- Although the invasive species have not been eliminated, through further analysis we hope to understand the effectiveness of electrofishing in our lake and make recommendation for other similar invaded bodies of water for applications of management measures.

# TWU Electrofishing Research Group



# Acknowledgements

Supervisor: Christopher Hall

Coworkers: Andrew Tung, Chloe Reves, Evie Morin, Katelyn Cannon and Andrea Falk

TWU Biology department

Lab materials, solutions, and SOPs: Darcy Kehler, Sarah Fandrich, and Kim Redshaw

Funding: NSERC USRA (Tung), Pacific Salmon Foundation (2014), Dr. and Mrs. Kong, and the Provost Research Grant



# Questions?

