Experimental Research: Fish species and habitat of Bruce's Creek, Plenty River Catchment

Introduction

I enjoy playing with water, getting wet and watching water flow. For my experiment, I wanted to learn about Bruce's Creek, the creek near my house. My dad suggested to block the creek at my house to make habitat for native fish, but we found out that was illegal, so we had to think of a different idea. We found a report from 1989 online about the fish in the Plenty River, and I decided to do some research to find out if these fish were still in the creek.

In 1989 there were three native fish species present in Bruce's Creek which is part of Birrarung River Catchment; the short finned eel, southern pigmy perch, and Mountain galaxias.

There also was two gold fish – these are introduced, 'pest' species! Amazing!!!!! (3)

This picture shows the instream habitat in Bruce's Creek: wood debris, overhanging vegetation and aquatic vegetation.

Aim

To discover what native fish live in the creek behind my house and if the habitat is suitable.

We will compare our results with a 1989 experiment (3) to see if it has got better or worse.

Hypothesis

That there are no native fish in the creek behind my house because it doesn't flow and the water looks brown and yellow. There are roots and trees blocking it and also grass.

Materials

- Measuring tape
- Advanced Water Quality Sensor
- SPARKvue app in my dad's phone
- Handheld net
- Plastic tub
- Computer and notebook/pen to record my results and write report

Method

Fish survey using net - We used a net to see if any of the three native fish species were present.

Water testing –we tested if the water quality was healthy, and if there was good habitat.

We tested: width, depth, water temperature and water conductivity.

We observed water:

- Turbidity (clarity of the water)
- Substrate (base of the creek)
- Instream cover (fish habitat)

What I did:

1. I measured the width and depth of the creek using a measuring tape.
2. I collected water samples using a handheld, bluetooth, Advanced Water Quality Sensor connected to a phone app called SPARKvue. This was given to me by Mrs Warwick, a science teacher from my school (2).
3. I observed substrate and instream habitat (image 2).
4. I used a handheld net to swirl around edges and middle of the creek to try to catch fish. (image 3)
5. I put the contents of the net in a plastic tub to observe if there were fish.
6. I swirled the net in two separate creek pools across the whole pool. I collected water samples over two separate days. I also collected samples and swirled the net at a nearby section of the same creek.

Safety Requirements: see attached Risk Assessment (Appendix 1)

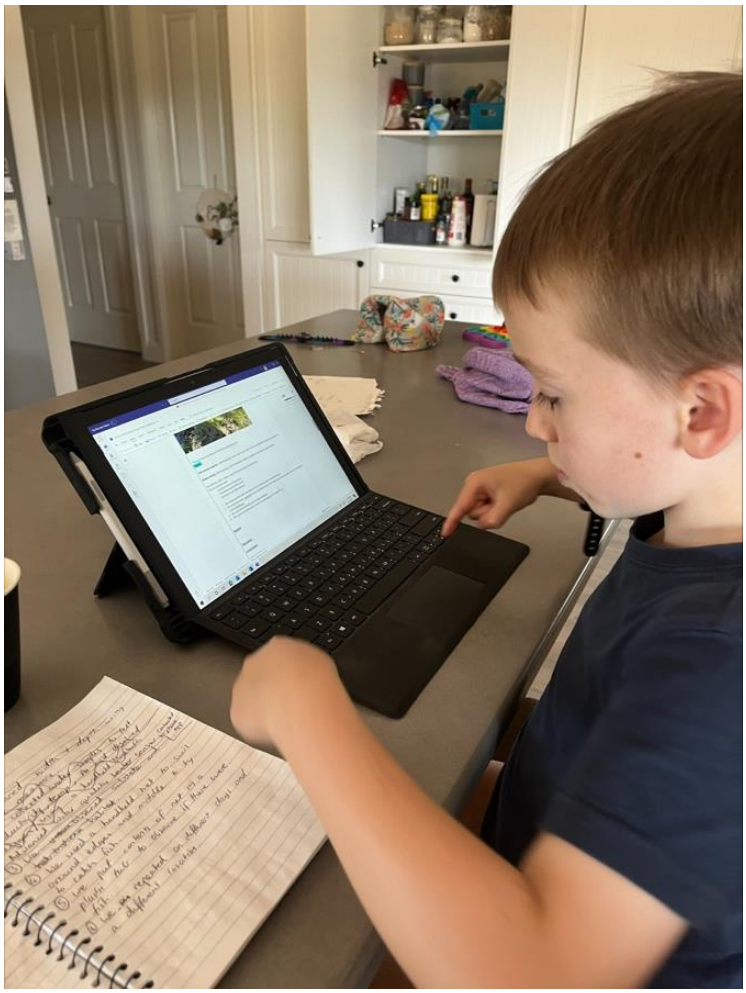


Image 1. Recording method

Image 2. Recording data from measurements

Image 3. Trying to catch fish with handheld net

Results

Measurement	Jan 1989	09/03/24 Location 1	16/03/24 Location 1	16/03/24 Location 2
Width	3.0-5.0	0.00-4.1m	0.00-4.1m	0.00-5.0m
Depth	0.4-1.2	0.00-0.55m	0.00-0.55m	0.00-1.0m
Temperature	19.5	17.8-18.9	17.0	22.2
Conductivity	330	630	690	883
Turbidity	Turbid	9 NTU - clear	9 NTU - clear	clear
pH	-	6.4-6.7	-	-
Dissolved Oxygen	-	1.82-2.86	2.08	4.8
Substrate	Clay, cobbles	Stone, clay	Stone, clay	Stone, clay
Instream Cover	Wood Debris, Aquatic vegetation	Aquatic vegetation, undercut bank, wood debris,	Aquatic vegetation, undercut bank, wood debris,	Aquatic vegetation. Rocks, overhanging trees
Fish Species caught	Short finned eel, Southern Pygmy Perch, Mountain Galaxia Mosquito Fish	1 Mosquito Fish observed	No captures	No captures
Flow	Slow flowing	No flow – series of intermittent pools	No flow – series of intermittent pools	No flow – series of intermittent pools

Mountain galaxais. **Found:0** Mountain galaxais needs temp up to 32°C. (Way hotter than everyone else!!!???)

Short finned eel. **found:0** Short finned eel needs a temperature at 20°C – 28°C.

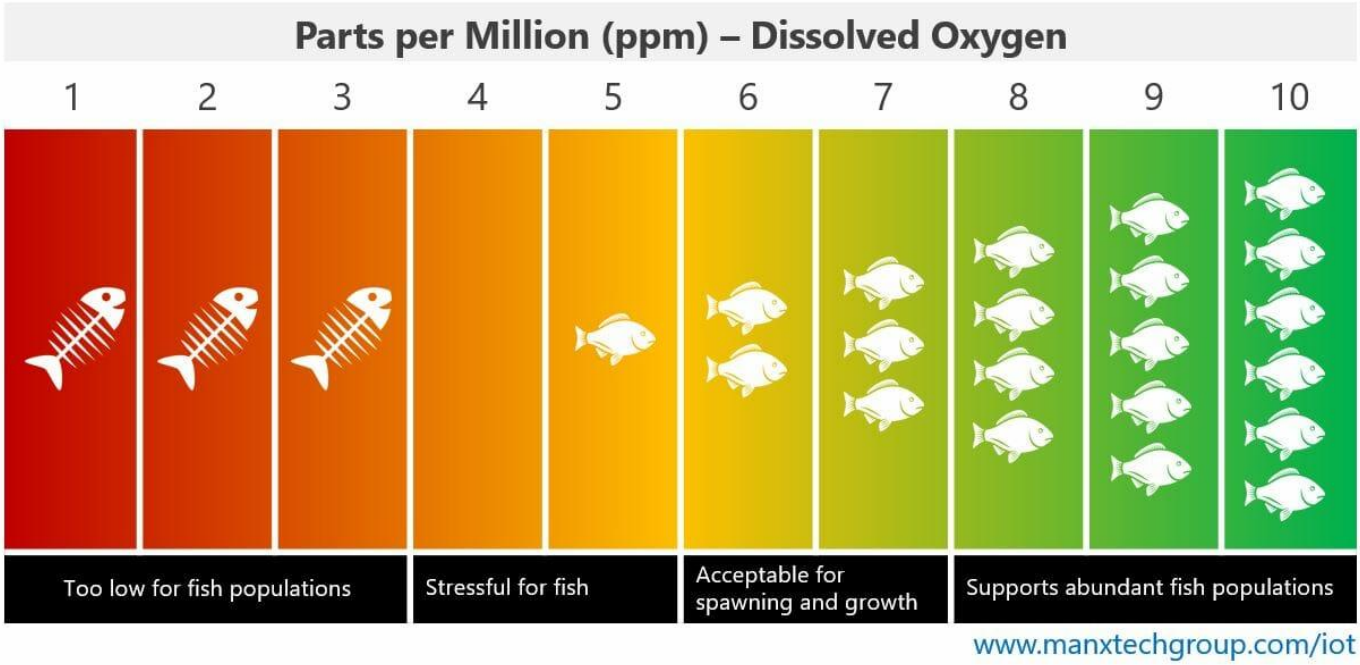
Southern pigmy perch. **found:0** Southern pigmy perch needs a temp at 5°C - 20°C or 8°C – 22°C.

Discussion

What happened and what did you learn?

We found out that there are no native fish behind my house in the creek. All the measurements (temperature, turbidity, conductivity, pH) we collected were healthy except one - DISSOLVED OXYGEN!!!!!!!!!!!!!!!!!!!!!!!!

The water was not flowing – when the water flows it allows the air to mix with the water. This is why the dissolved oxygen was low. In 1989 the creek was flowing when fish were caught.



This infographic shows what is too low to 'amazing' levels of dissolved oxygen for fish.

Did the results reflect your hypothesis? Do you think you know why?

YES, it did reflect my hypothesis. When I first observed the water it was low, I couldn't see anything swimming around and there was no flow.

Maybe there is a dam blocking it upstream, or not enough rain because of climate change, or farmers could be taking water from upstream.

Did you find unexpected results? Can you explain this?

Yes, we found out that there NO fish at Bruces Creek and a bit more up. There weren't any fish in the Bruces Creek behind my house. I wasn't expecting there the results to be as healthy as they were (except for dissolved oxygen).

What problems did you encounter?

- I dropped the water quality sensor in the water. It didn't work for a period of time then it went back to normal but the pH didn't. The readings it was giving were crazy and could not be accurate.
- Access – long grass, thorny bushes, barb wires, paddocks. This made it difficult to carry all the equipment.
- 1989 records don't include dissolved oxygen – This was the most important factor and we couldn't match the results in the experiment. However, in 1989 the water was flowing which indicates that there would have been higher dissolved oxygen in 1989.

How could you improve on your experiment or data collection?
1. If I did it again I would have held the water sensor tight so it wouldn't fall in and it would be alright.
2. Access: It would have been easier if there wasn't any long grass, thorny bushes, barb wires, paddocks. I could have asked my Pa to mow the grass or borrowed a ladder to cross the fence.
3. If the 1989 experiment showed the dissolved oxygen we could have matched our experiment results to see if it was better than today's result.

Conclusions

The most interesting thing was that there was only 1 fish – an introduced Mosquito Fish. Originally my plan was to dam the creek with old bricks to see if this would provide habitat for a fish population. The only problem was that this would have been illegal. If I was allowed to, I would create a little waterfall for the water to 'crash' over and oxygenate the water.

I do not believe that the native fish population in Bruce's Creek will improve in the future because climate change might affect rainfall leading to even less flow.

Acknowledgments and References

1. My Dad – James Kearney - he suggested my experiment and helped collect data, he helped me with typing my project and carried some stuff to the creek.

2. Lucille Warwick – Head of Science – Plenty Valley Christian College – she gave us a backpack with some instruments to measure water quality to test with.

3. McKenzie, O'Connor - *The fish fauna and habitats of the Plenty River*. June 1989. Department of Conservation, Forests and Lands, Victoria

Appendix 1: Risk Assessment

Risk Assessment Form:

Name of Entry: Water quality/fish survey in local creek
Student Name: Ethan Kearney Signature: 
Date: 19/05/24

Your assessment should include sample handling, storage, disposal, spill procedures and use of machinery...

Use as many pages as necessary, a blank table provided on the next page.

Type of Risk	Hazard	Level of Risk	Precaution taken to control risk	Source of information
□ Chemical or microorganism □ Procedure or equipment	Slip, fall or scratch when accessing the watercourse	Low	- Supervised by parent at all times. - Identify safest route to water - Wear suitable clothing - Take phone in case of injury or emergency	
□ Chemical or microorganism □ Procedure or equipment	Dangerous animal eg snake	Medium	- Supervised by parent at all times - Identify and avoid potential hiding places - Set up collection/recording station in open area on a picnic blanket - Parent collect samples from risky areas	
□ Chemical or microorganism □ Procedure or equipment	Water – drowning	Low	- Supervised by parent at all times - Test water depth before entering water. - Wherever possible collect samples from dry/solid ground - Parent collect samples when entering water required	