



Using anglers to understand the changes in adult brown trout stock structure within the Tweed

Tweed foundation Trout biologist
Jonny Archer

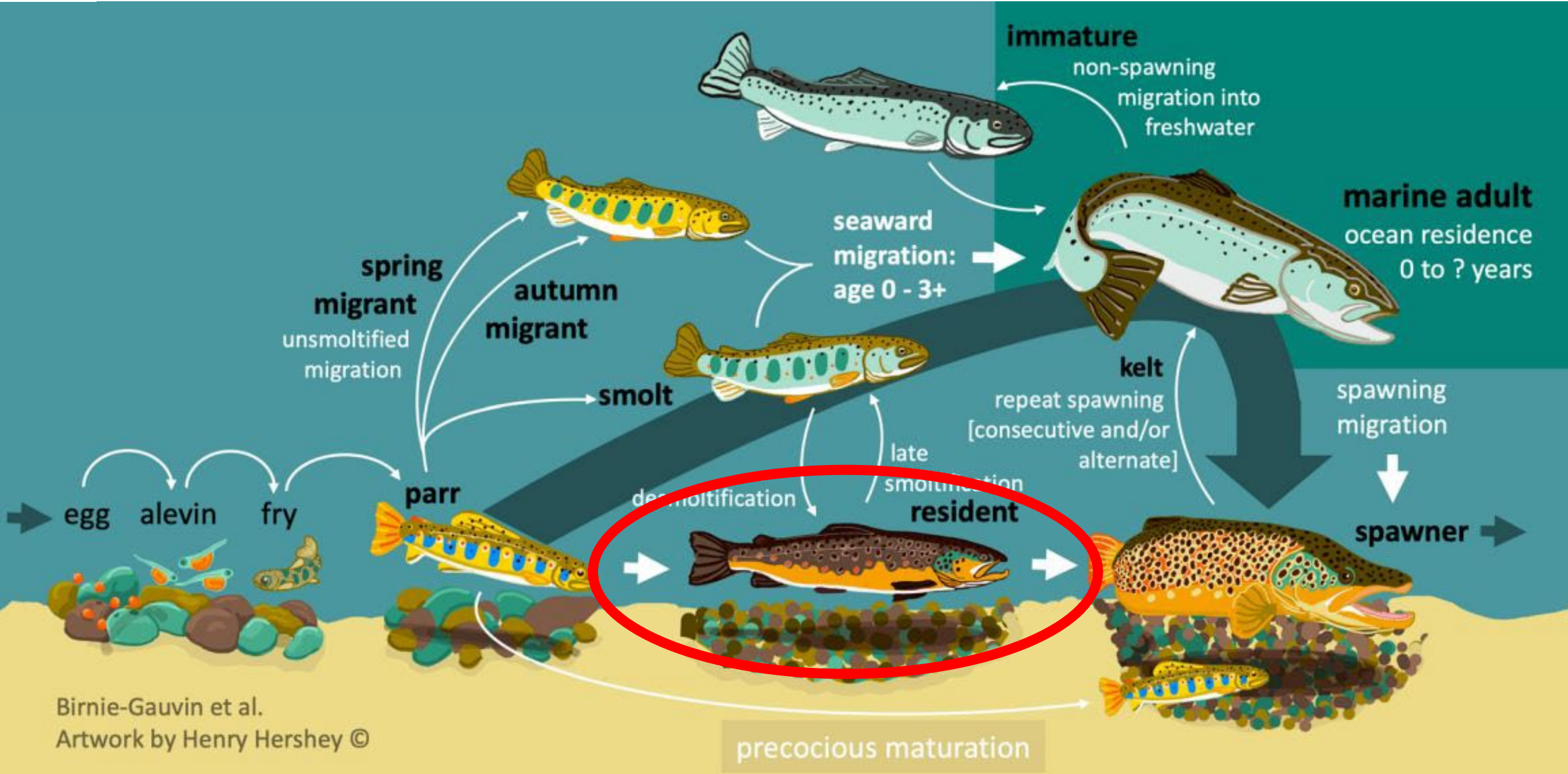
@JarcherP & @RiverTweedNews

This presentation builds on the work of
Dr Ronald Campbell and Kenny Galt



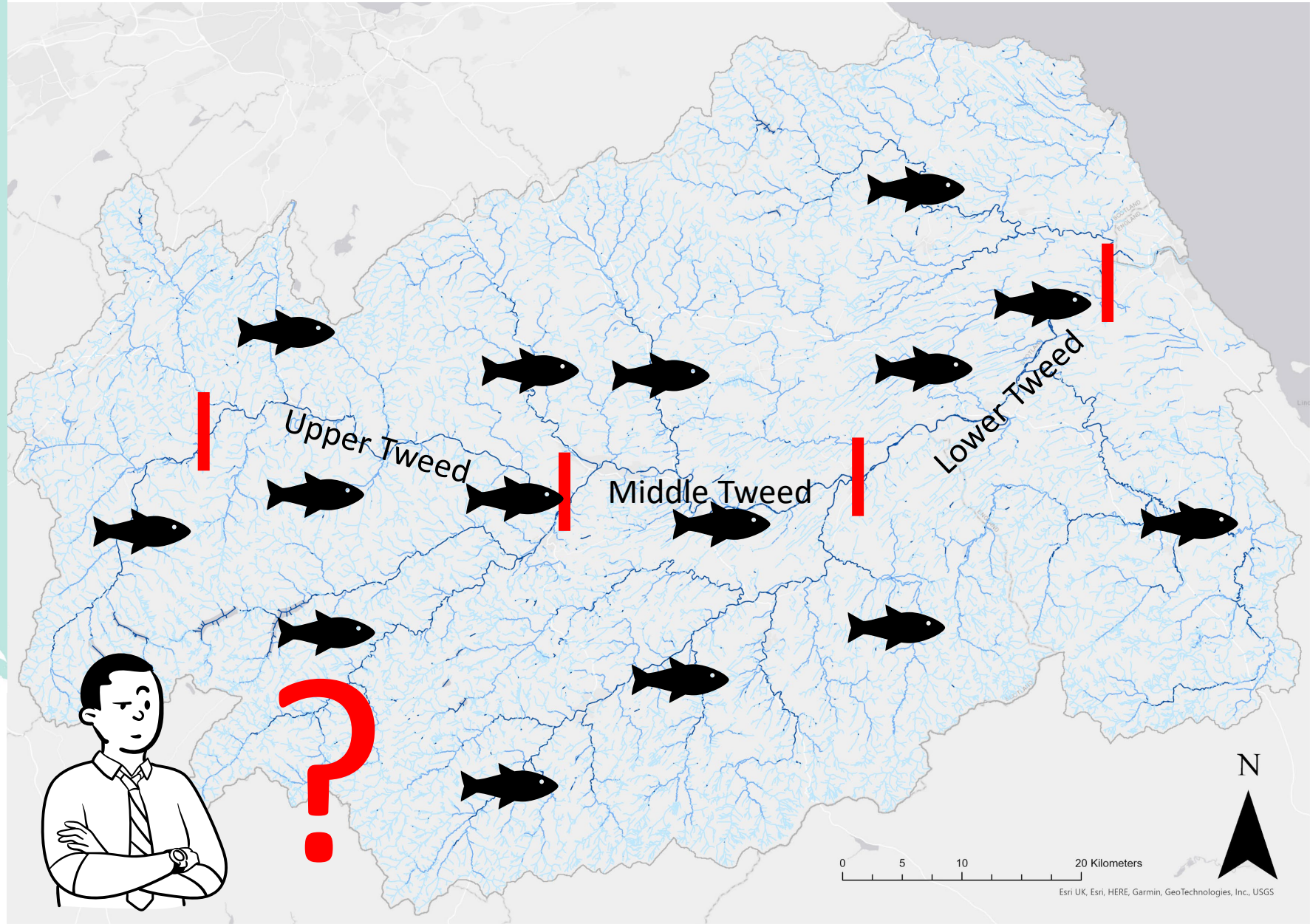
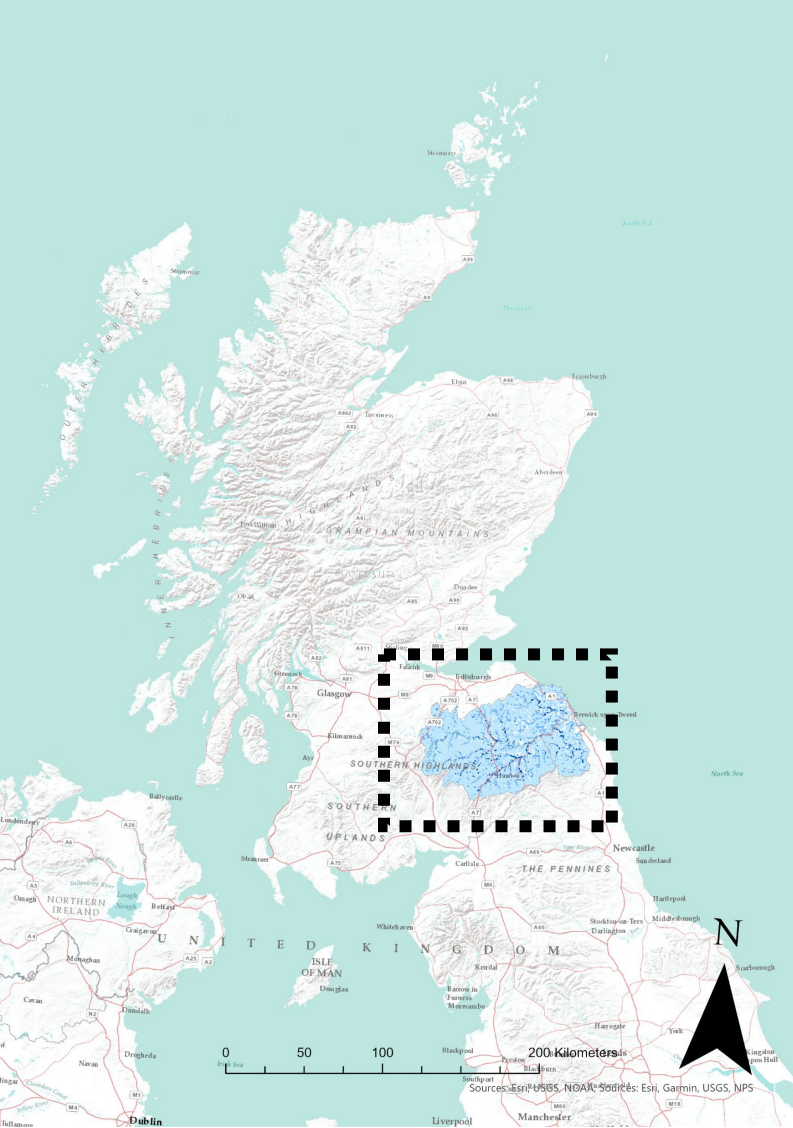


My job – Monitor and Research



Birnie-Gauvin et al.
Artwork by Henry Hershey ©

Tweed Catchment





Anglers rod catch data

- Citizen science
 - Mandatory (Salmon and Sea trout 1950s)
 - Voluntary for brown trout
- Foundation on fisheries health
- Angler behavior/perception



A fly fisherman in a river, wearing a waders and a cap, holding a fishing rod. The background is a blurred river scene with greenery.

Nuances of rod catch data

- Anglers
 - Skill
 - Location bias
 - Methods used
 - Not reporting blank days
 - Not reporting/measuring small fish
- Weather condition
- Different permit rules

Paper Book



~850 distributed 2006-2022
2000 distributed 2023

Online form

17:12
◀ Camera

Email for receiving catch reports information
Would you like to hear more from us on catch reports?

Your name (optional)

Permit (Angling Association/Club)*

Permit Type*

Launched in 2022


Logbooks

The perceived decline of trophy trout +25cm (10")

- Poor catch records from angling clubs/competition
 - Counting just the killed ones
- Decline?
 - killing them?
 - Killing brown trout for food since the last ice age
 - Environmental change?
- In 2009 trout clubs introduced
 1. Slot size limits
 2. Full catch and release



Water <i>(e.g. Middle Tweed)</i>	Upper Tweed	
Permit <i>(e.g. Gala A.A.)</i>	Peebleshire PTFA	
Date	05/06/2023	
Time Started <i>(circle)</i>	Morning Afternoon Evening	
Target species <i>(circle all applicable)</i>	Brown trout Grayling	
Time spent fishing <i>(to the nearest ½ hour)</i>	2.5 hours	
Method <i>(circle)</i>	Dry fly Wet fly	
	Nymphs Czech Nymph	
	Other <i>(specify)</i> -	
	Brown trout	Grayling
No. caught below 25cm (10")	1	3
No. caught above 25cm (10")	5	1
No. killed	0	0

Approx. size/weight of biggest 4 Brown trout <i>Please write measurements units (cm/inch/g/lbs/oz)</i> <i>(Place an x next to a size/weight if it's been measured accurately).</i>	(1) 60cm x
	(2) 55cm x
	(3) 30cm
	(4) 20cm
Approx. size/weight of biggest 4 Grayling <i>Please write measurements units (cm/inch/g/lbs/oz)</i> <i>(Place an x next to a size/weight if it's been measured accurately).</i>	(1) 3lbs x
	(2) 1lb x
	(3)
	(4)
Comments	

Catch rate per unit effort (CPUE)

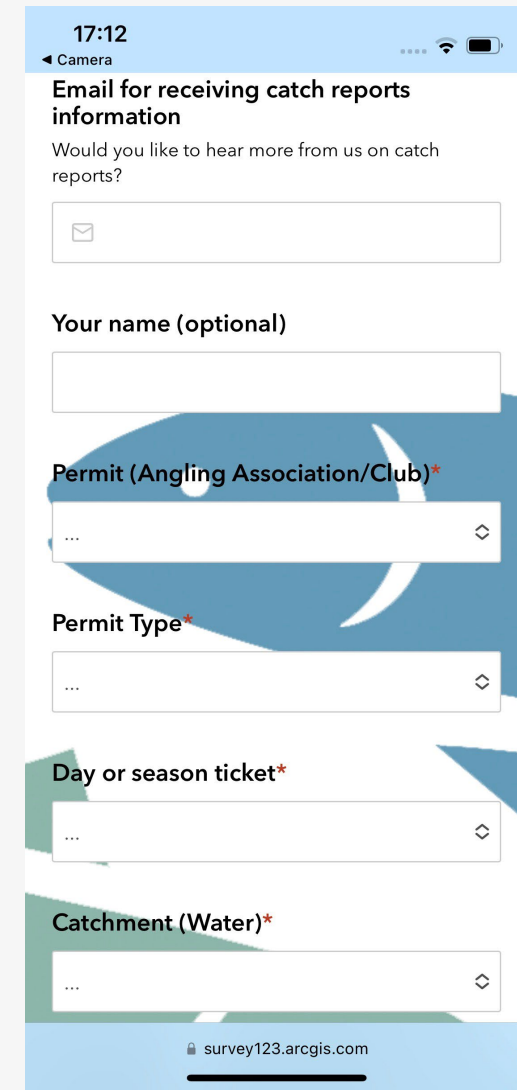
- 2 fish in 1 hour = 2 CPUE (1hr)
- 2 fish for 60 hours = 0.033CPUE (1hr)

**Increase CPUE proxy for
population health
increasing**



The current dataset

- 17 years of data
- 8188 Angling trips in total
 - Per Year 455 +/- 210 sd
- ~30 anglers per year
 - Information lost on angler's names from the past
- Around the catchment but mostly from the main stem of the Tweed
- Size limit 20-25cm (8"-10")
 - Permit based
 - 2023 standardised to 25cm (10") throughout the Tweed



17:12
Camera

Email for receiving catch reports information
Would you like to hear more from us on catch reports?

Your name (optional)

Permit (Angling Association/Club)*
...

Permit Type*
...

Day or season ticket*
...

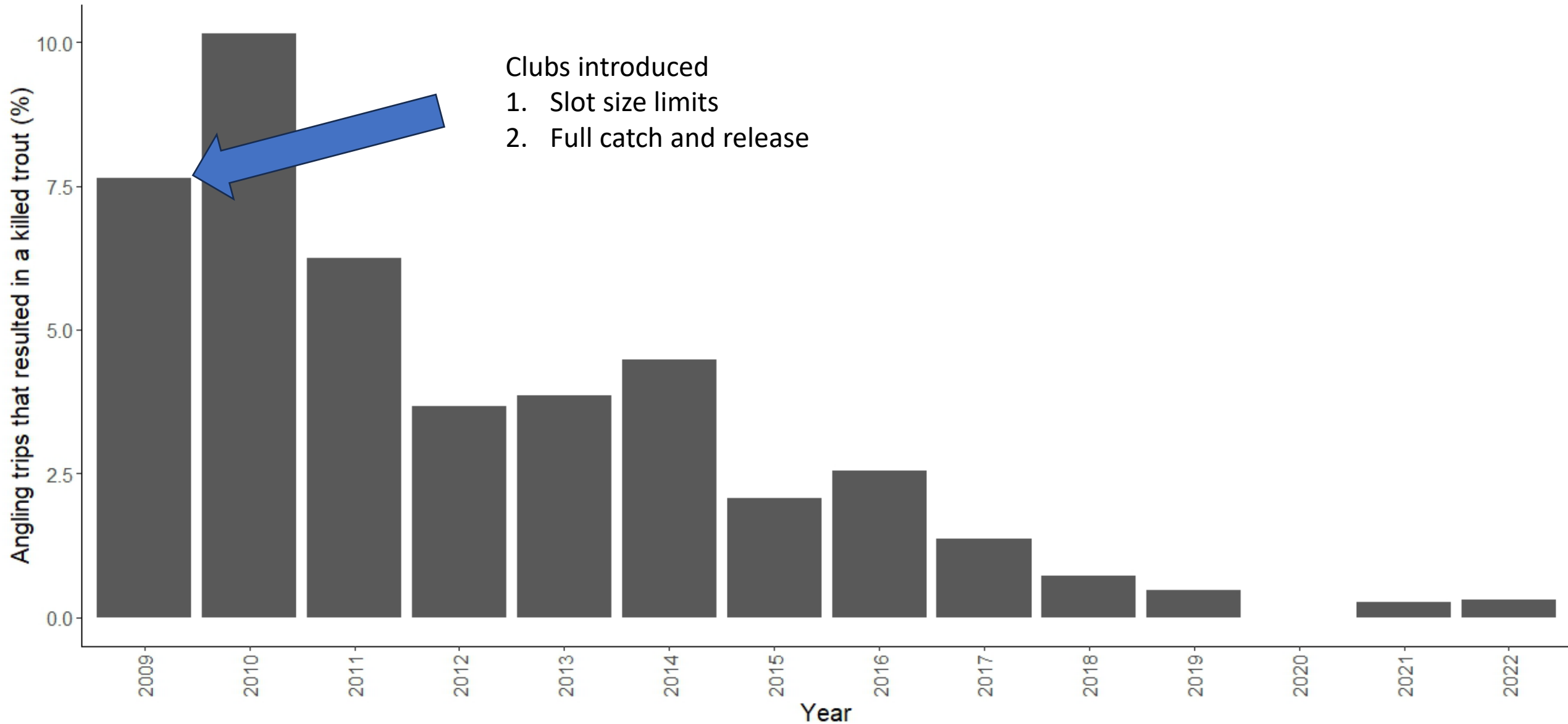
Catchment (Water)*
...

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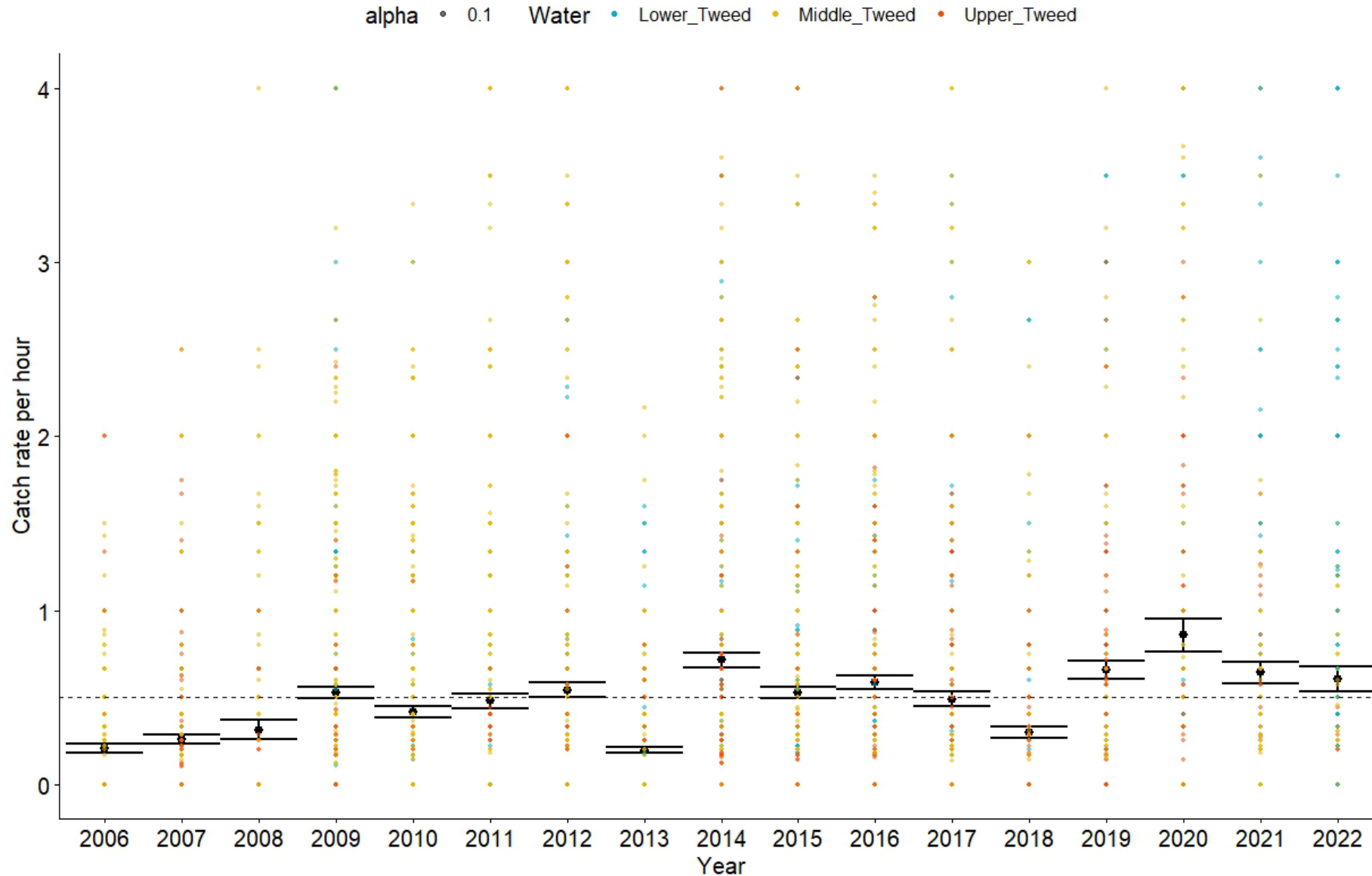


Changes in attitude towards killing trout





Is fishing getting easier for +25cm trout?



Large trout > 20-25cm (8-10")
Kruskal-Wallis rank sum test

data: CPUE1hr by Year
Kruskal-Wallis chi-squared = 163.92,
df = 13, p-value < 2.2e-16

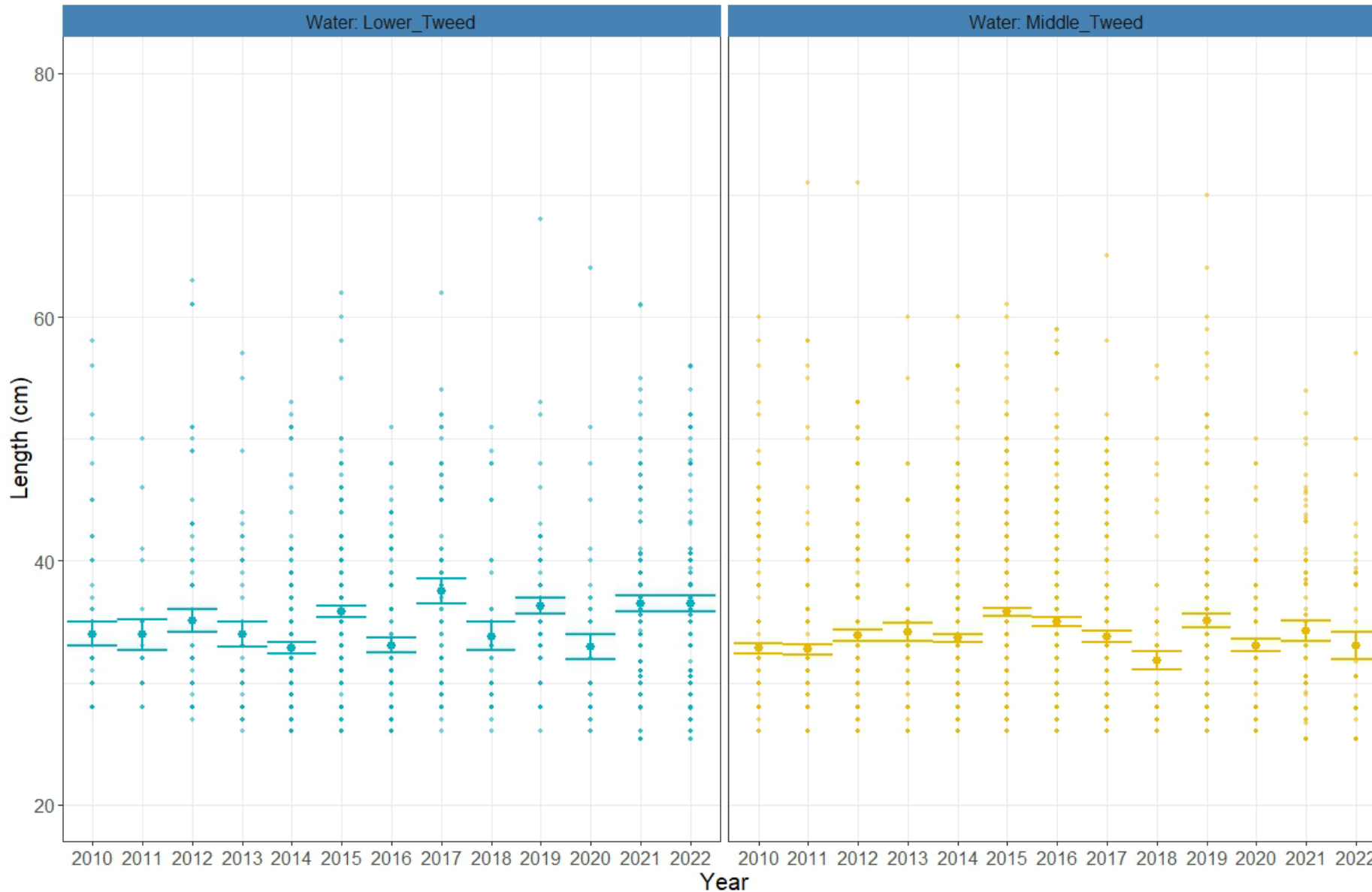
*****Further analysis
needed*****

**Love to chat to someone
about zero inflated models**

**Reduced killing or
environmental limitations
changing?**



Are Middle and Lower Trout getting bigger?



Middle Tweed

Kruskal-Wallis rank sum test

data: Length by Year
Kruskal-Wallis chi-squared =
84.101, df = 12, p-value =
6.773e-13

Lower Tweed

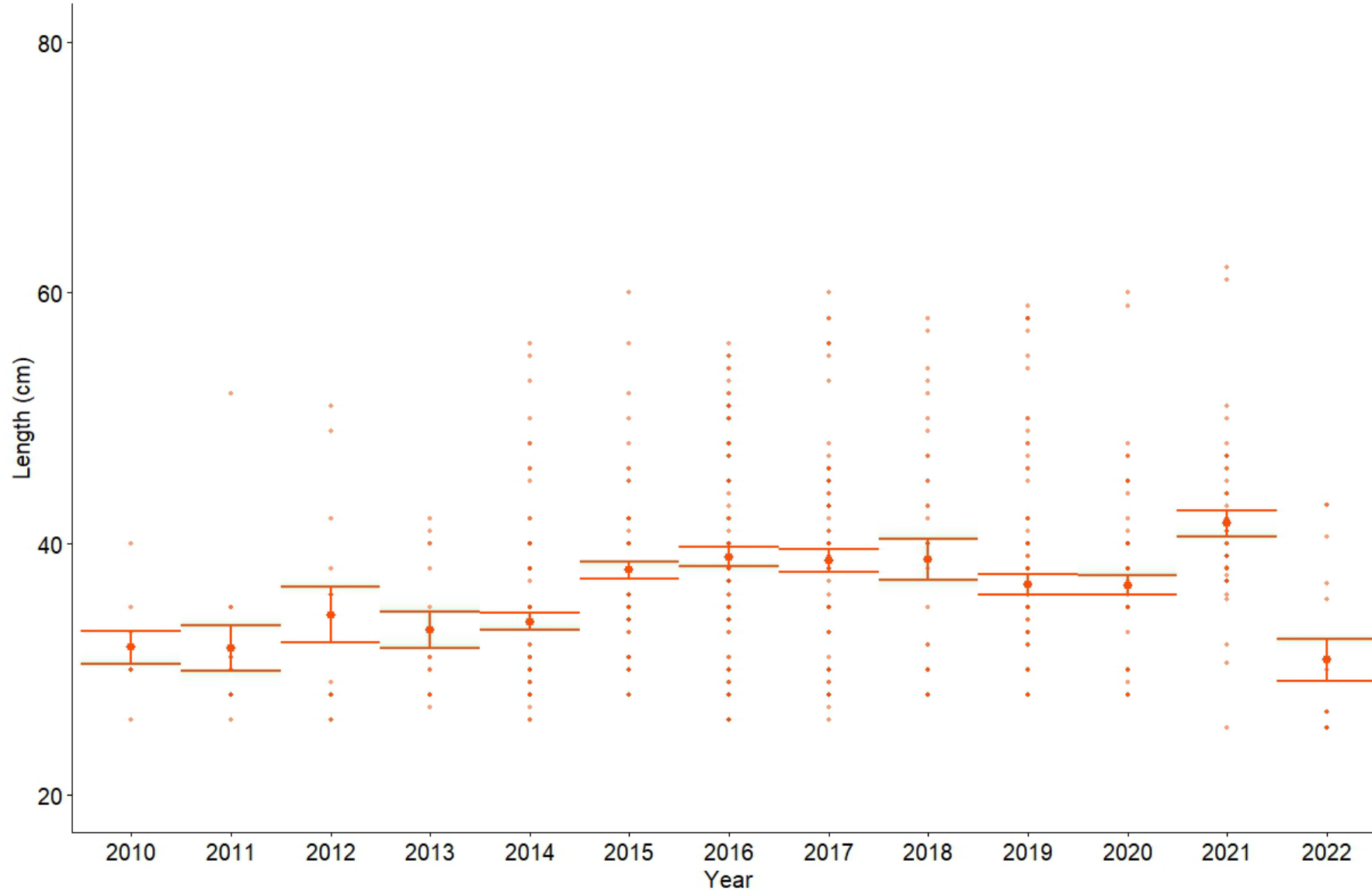
Kruskal-Wallis rank sum test

data: Length by Year
Kruskal-Wallis chi-squared =
76.763, df = 12, p-value =
1.703e-11

*****Further analysis needed*****



Upper Tweed trout getting bigger?



Upper Tweed

Kruskal-Wallis rank sum test

data: Length by Year

Kruskal-Wallis chi-squared =
86.145, df = 12, p-value =
2.741e-13

*****Further analysis needed*****

**Reduced killing or
environmental limitations
changing?**

Increased recaptures?



Preliminary evidence



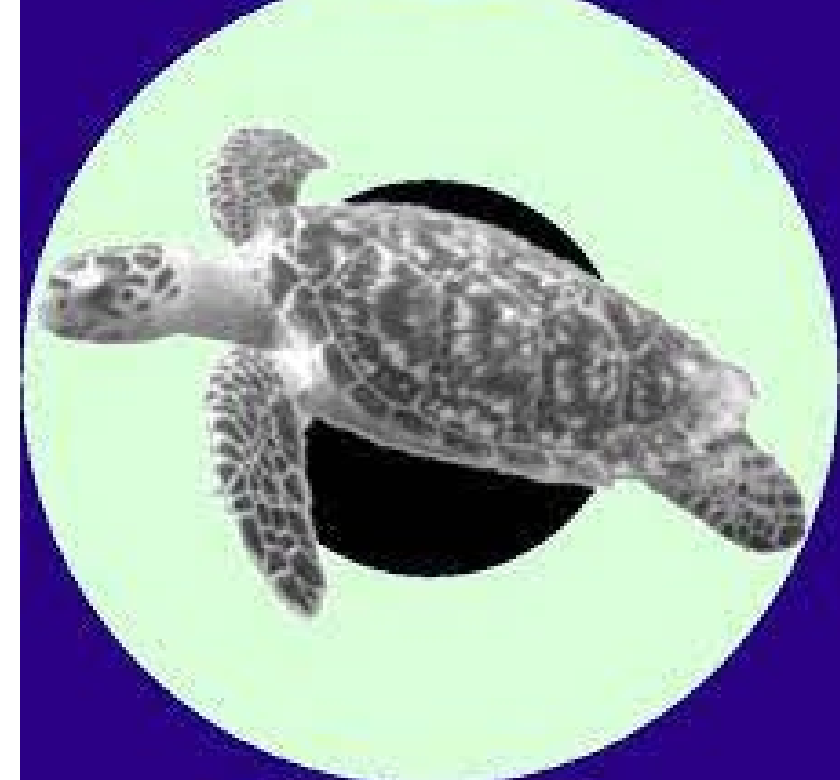
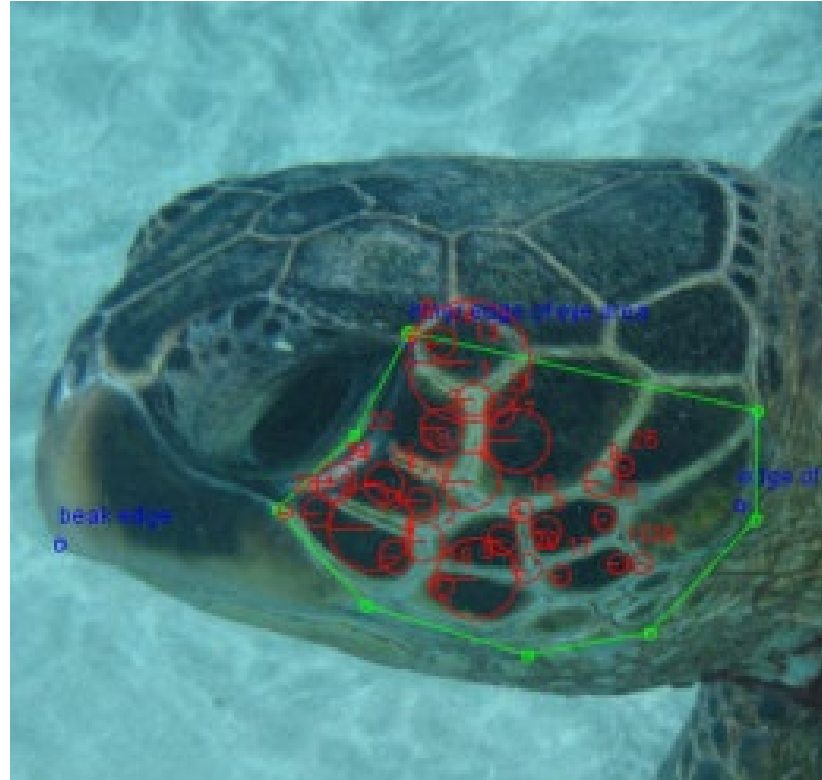
A leopard never
changes its spots!





Angler trophy photos

I3S Software



The process

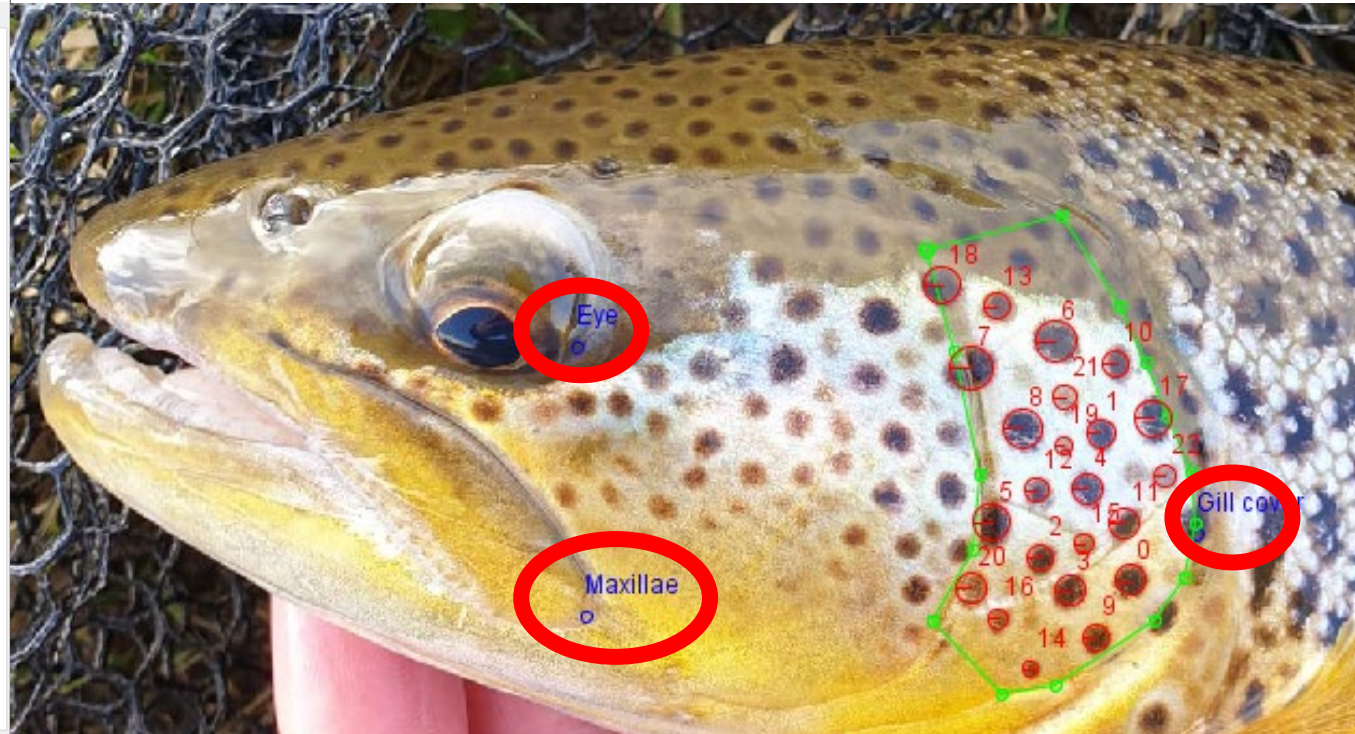
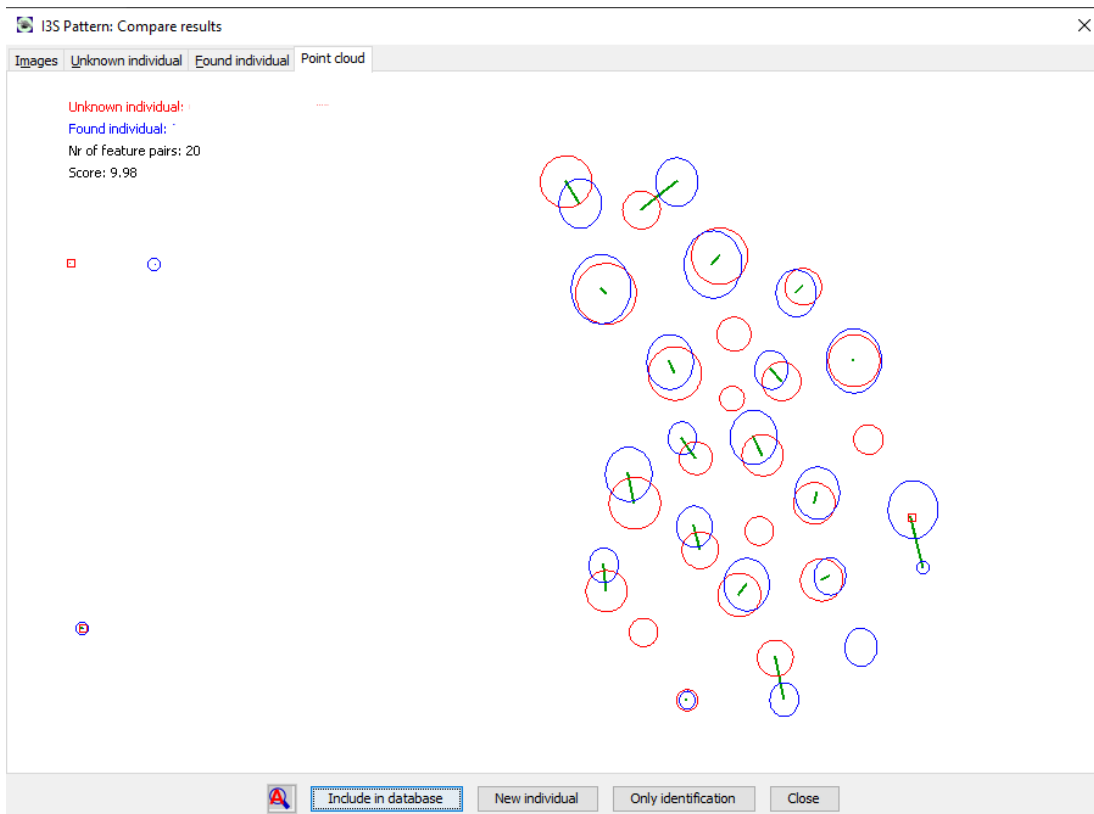
- Picture
 - Whole head
 - Left gill plate
 - In focus
- Over 30cm size

- Fork length
- Date of capture
- Location caught

2594 pictures

2014-2023

Pictures throughout the catchment



The upper Tweed prelim results



1. 540 Unique trout identified
2. 121 being recaptured at least once
3. 22% recapture rate (1 in 5)



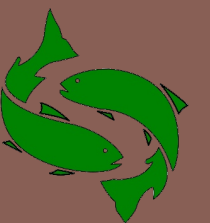
The same trout
Caught 3 years apart





The most recaptured trout on record

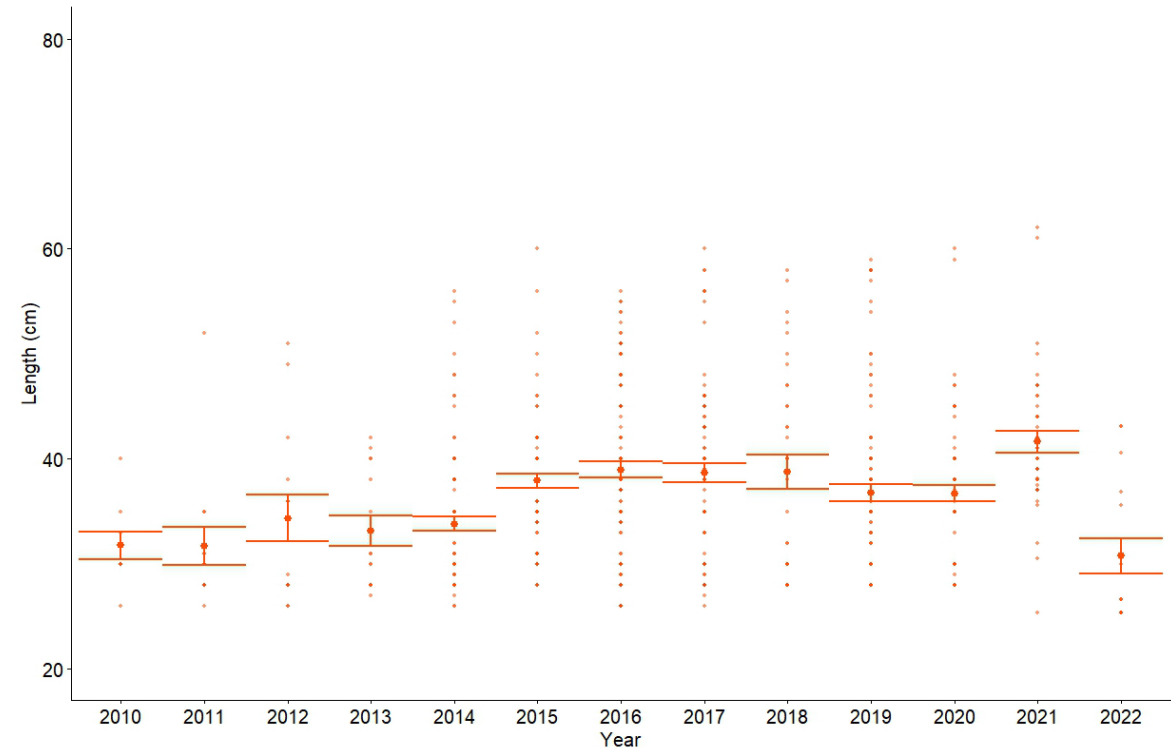
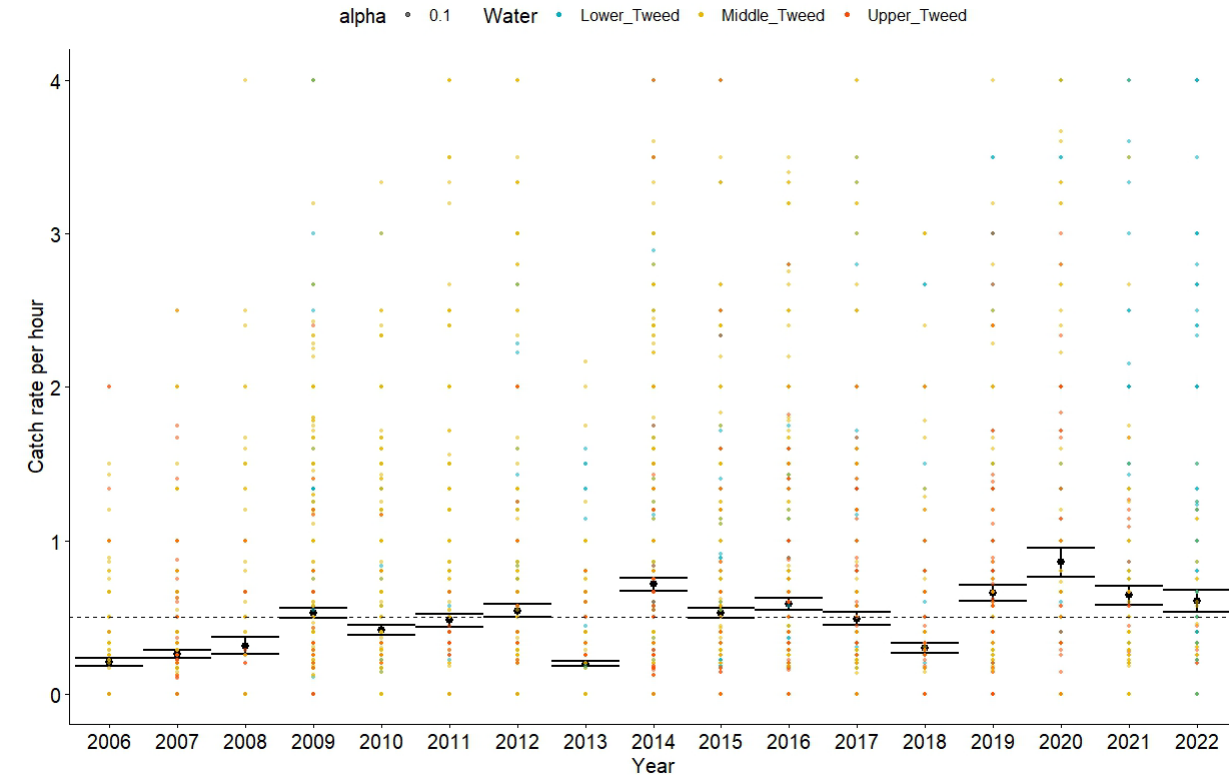
- | | | | |
|----|------------|------|---------------------|
| 1. | 02/06/2020 | 33cm | Angler 1 |
| 2. | 06.06.2020 | 33cm | Angler 1 |
| 3. | 09.01.2021 | 42cm | Angler 2 (By Catch) |
| 4. | 22.04.2021 | 40cm | Angler 1 |
| 5. | 25.05.2021 | 40cm | Angler 3 |
| 6. | 02/04/2022 | 46cm | Angler 4 |





Artificial inflation by catch and release?

“New hypothesis: The population of trophy trout has exhibited constancy, while the accessibility of angling for them has increased.”



Combine
citizen science
methods

ID

~~Mark and recapture studies~~

Population estimates



10:12 4G

Picture for Trout 1 (Spot Pattern Recognition)
Send us a picture of the left gill plate of any 5 trout caught greater than 10" and we can let you know if, when and where the fish was caught before. Please provide email below so we can let you now what we find.

1 Drop image here or select image (maximum number of files allowed: 2)

Picture for Trout 2
1 Drop image here or select image (maximum number of files allowed: 2)

Picture for Trout 3
1 Drop image here or select image (maximum number of files allowed: 2)

Picture for Trout 4
1 Drop image here or select image (maximum number of files allowed: 2)

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Thanks for listening!

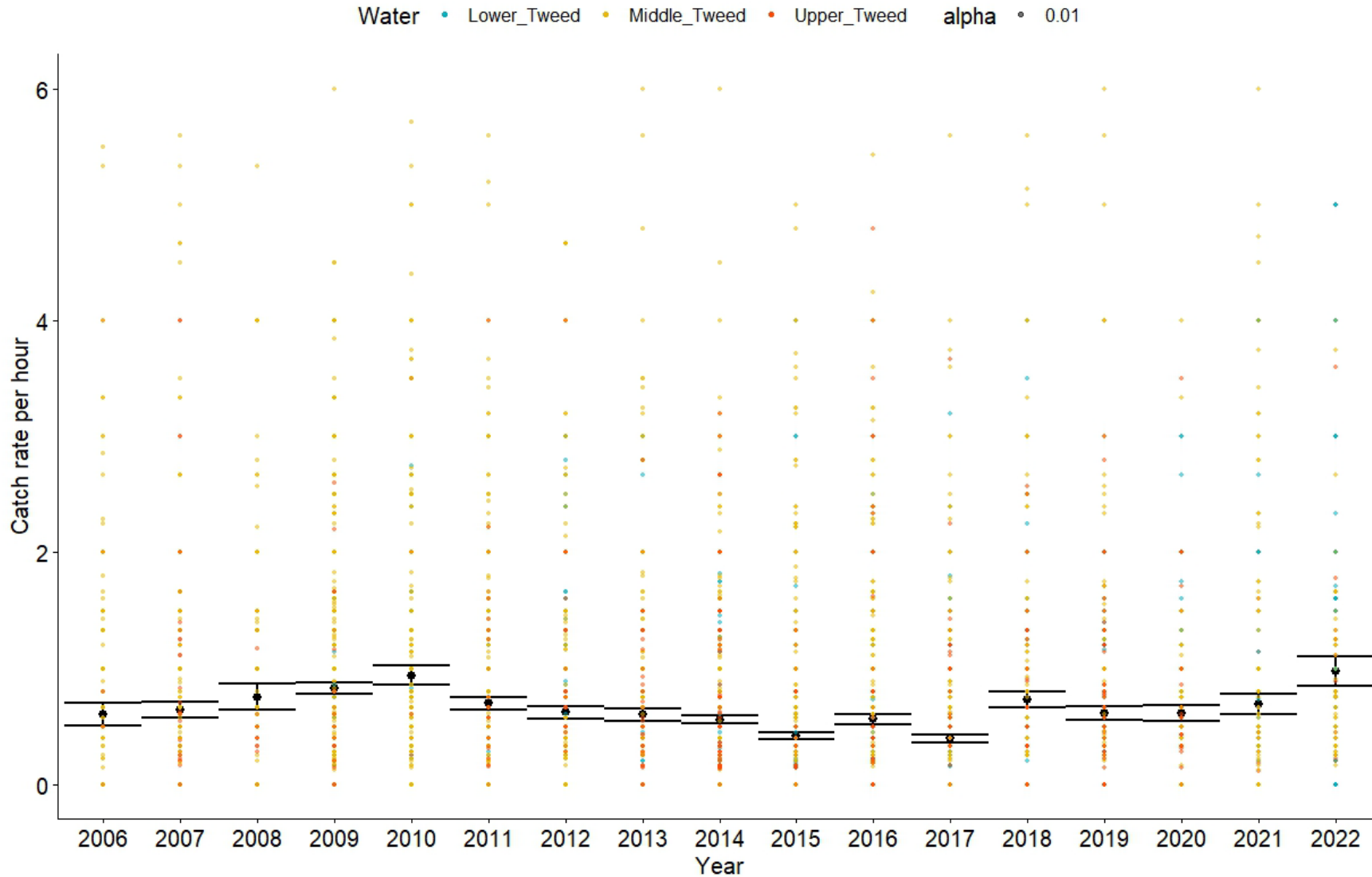
- Trout anglers are no longer killing trout to the same extent
- Big trophy trout seem to be back and bigger
 - Further analysis needed
 - Need to combined logbooks and angler photos
 - Reduced killing or environmental change?
- Fishing is stable if not getting better
 - Reduced killing or environmental change?



Spare slides



Is fishing getting easier for small trout?



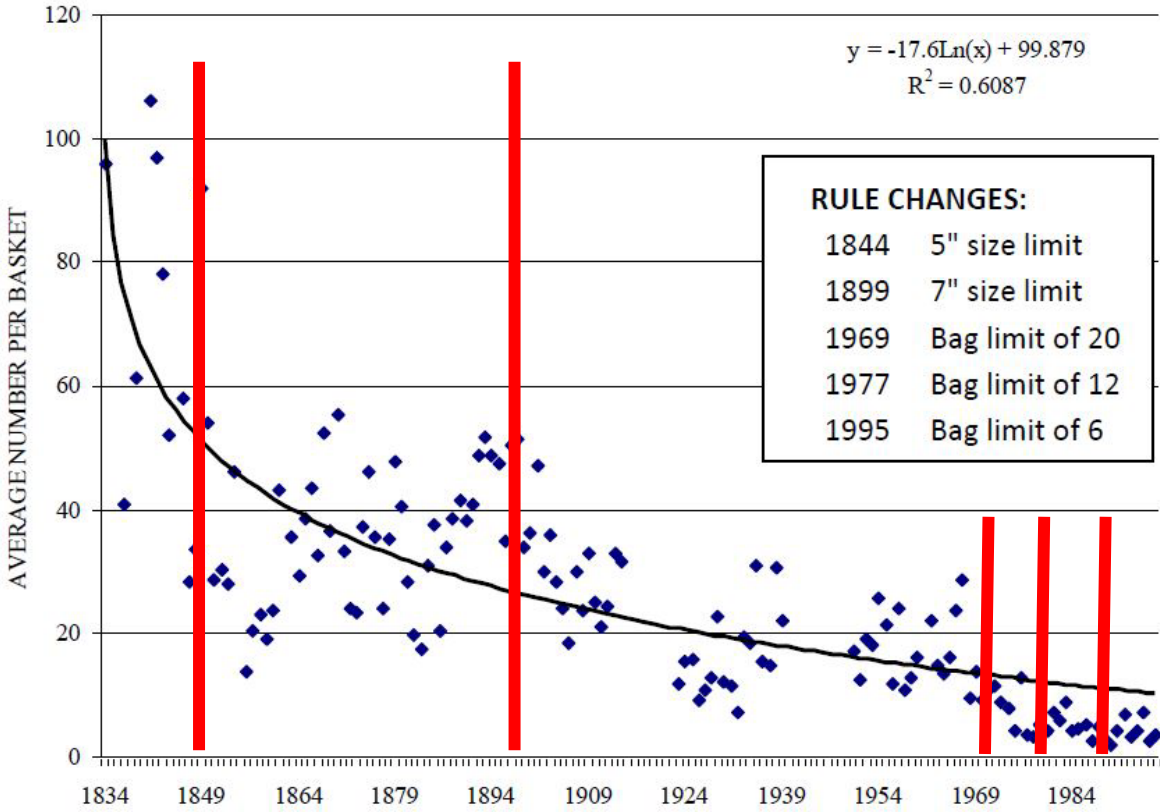
Kruskal-Wallis rank sum test

data: CPUE1hr by Year

Kruskal-Wallis chi-squared = 139.11, df = 13,

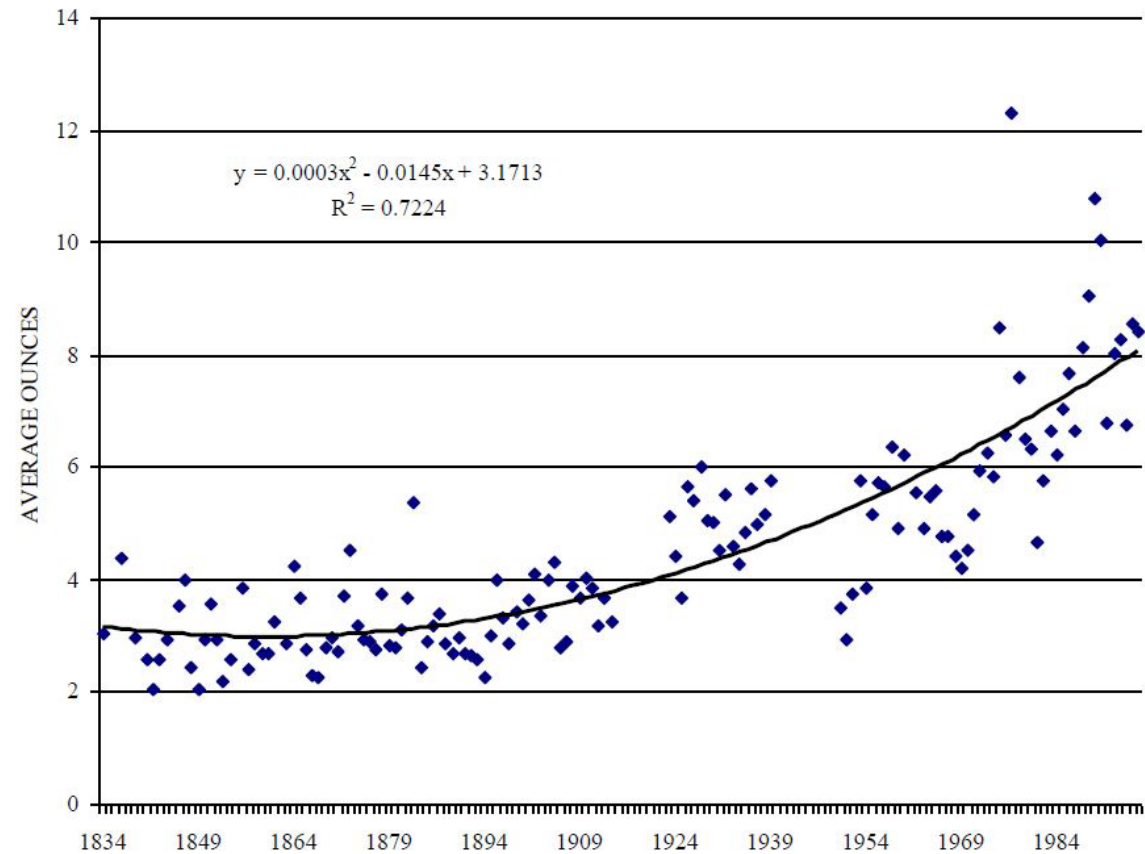
p-value < 2.2e-16

*****Further analysis needed*****



Graph 4.3.1: Average numbers in weighed-in baskets caught during the Ellem Fishing Club's annual medal competition 1834-1997

Ellem Tweed fishing competition 1834-1997



Graph 4.3.2: Average weight of trout in weighed-in baskets caught during the Ellem Fishing Club's annual medal competition 1834-1997

Graphs by Dr Ronald Campbell