2nd Australian & New Zealand eDNA conference

QuickConc: A rapid, efficient, and power-free eDNA concentration method for diverse aquatic environments

Ryo Iwamoto[1,2], Tomohiro Kuroita[1,2], Wu Qianqian[3], Toshifumi Minamoto[3]

[1]AdvanSentinel, Inc., [2]SHIONOGI & Co., Ltd., [3]Kobe University

AdvanSentinel

Objectives

Traditional concentration methods

Laboratory Concentration

Glass fiber filters

On site filtration

Sterivex

Challenges in sample concentration

- Limited volume for high turbidity water
- Long processing time
- Insufficient detection sensitivity

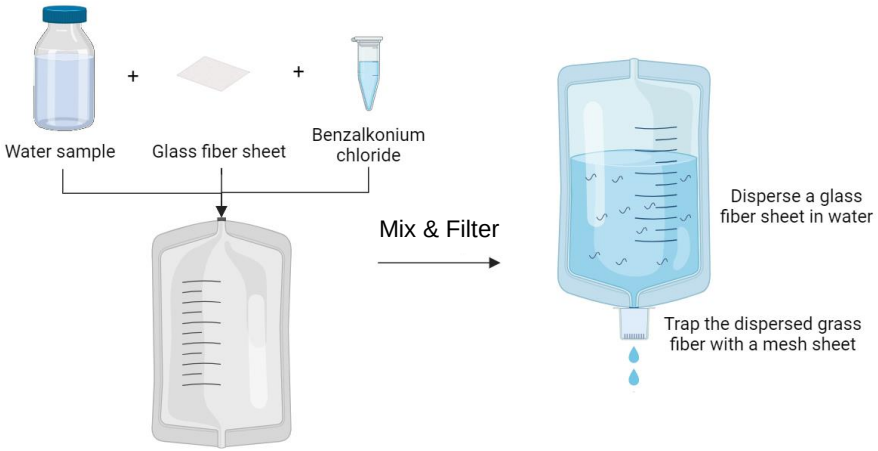
QuickConc™

Overview of QuickConc

- **Challenges of sampling and concentration**
  - > Increase the volume of water that can be concentrated, especially for highly turbid samples

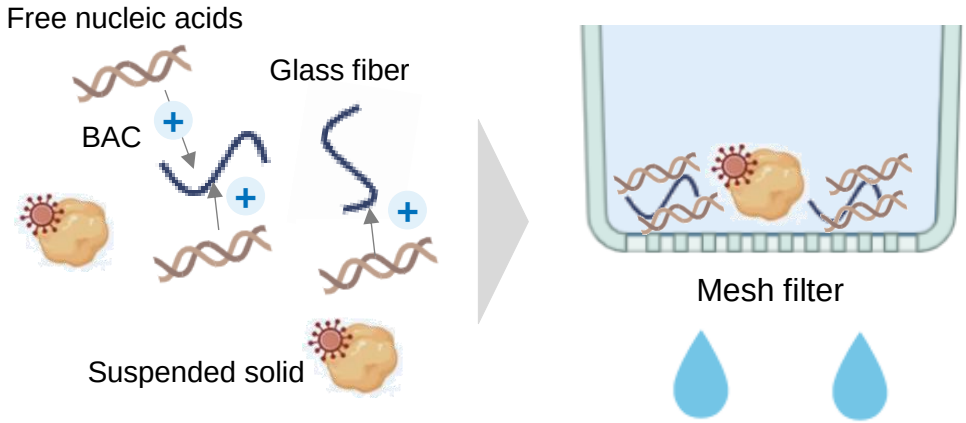
We developed a novel concentration method: QuickConc

Workflow of QuickConc



1. Add → 2. Mix → 3. Filtered

Principle of nucleic acids concentration



1. Positive charge of BAC promotes binding of nucleic acids to glass

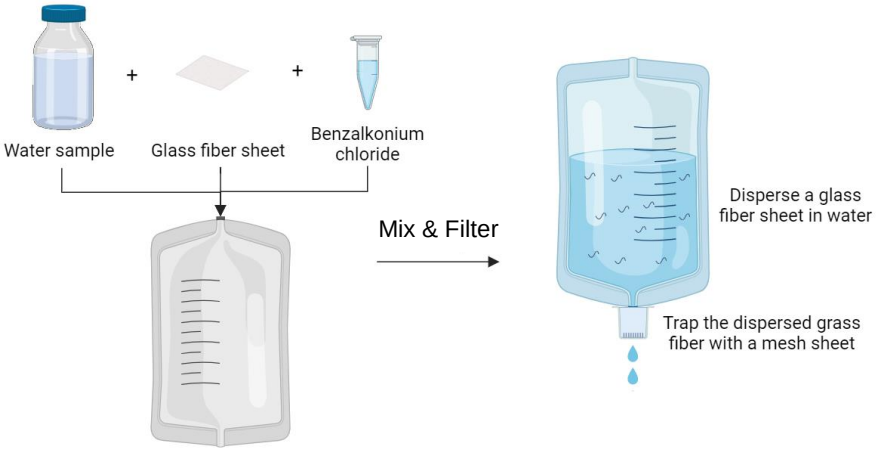
2. Suspended solid and glass fiber are filtered through a mesh filter

Kuroita *et al.*, *under revision*

we can concentrate the nucleic acids by collecting the glass fibers and suspended solid.

Introduction of QuickConc

Workflow of QuickConc



1. Add → 2. Mix → 3. Filtered

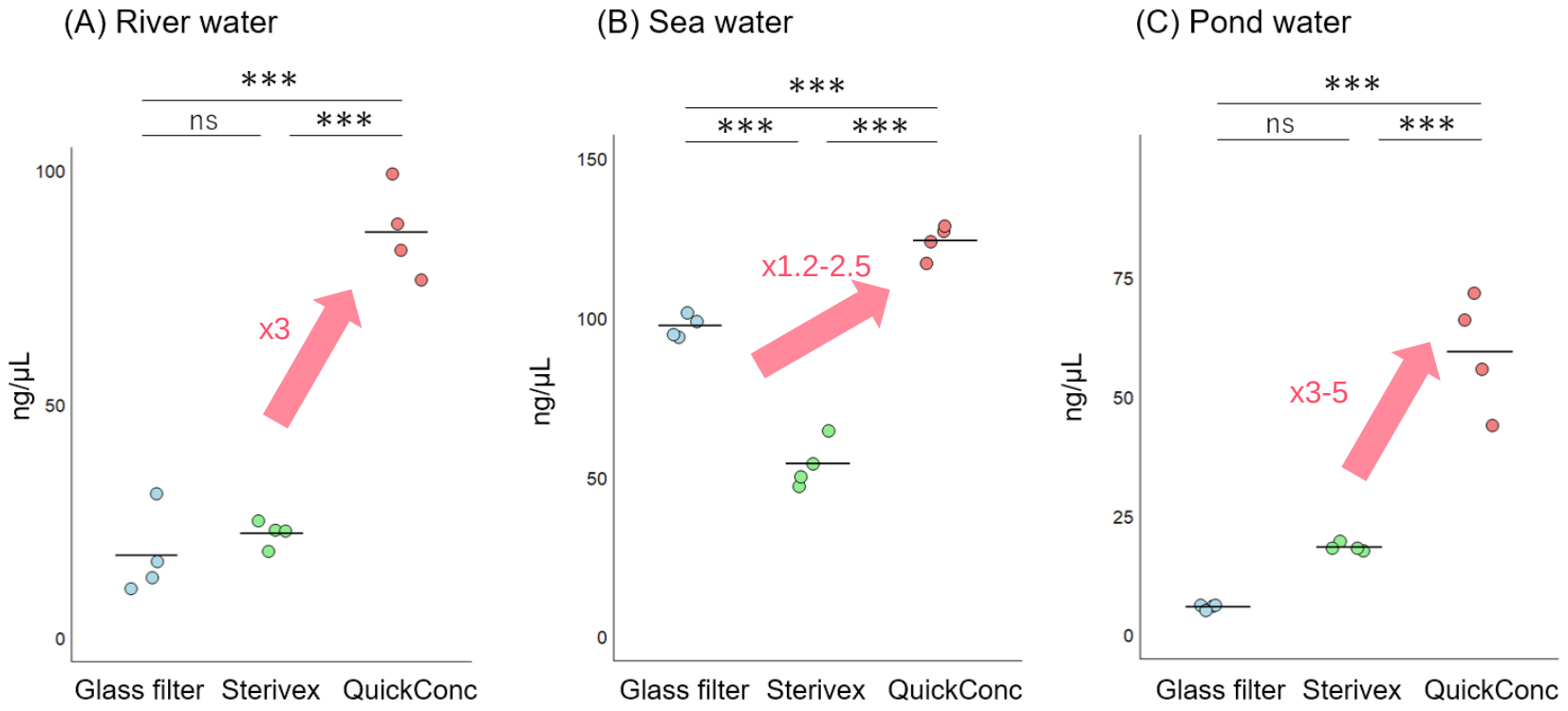
QuickConc™

QuickConc is an efficient and user-friendly method for on-site nucleic acid concentration

Kuroita *et al.*, *under revision*

Total eDNA among QuickConc, glass fiber filter, and Sterivex

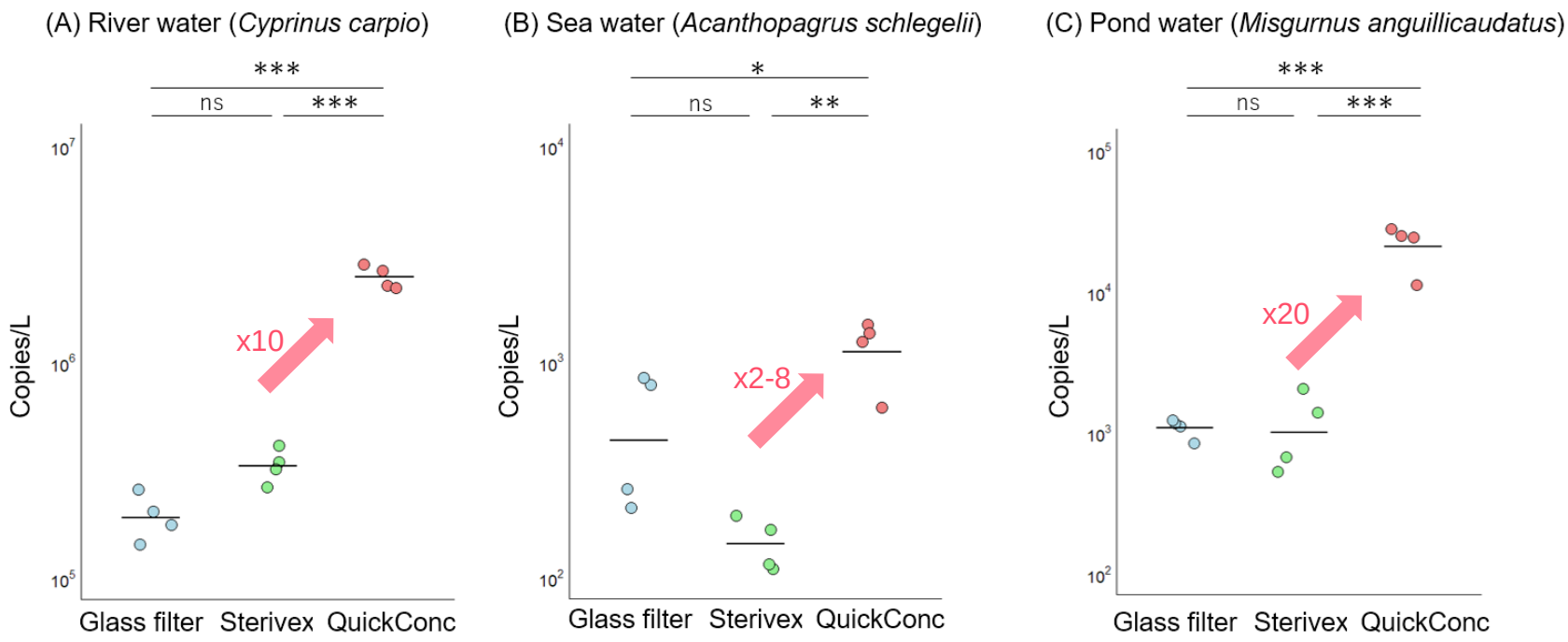
- Samples: River (400 mL), Sea(1,000 mL), Pond (70 mL)
- Extraction: Blood & Tissue kit
- DNA concentration measurement: Nanodrop



QuickConc collected significantly larger amount of eDNA

Species-specific qPCR results among QuickConc, glass fiber filter, and Sterivex

- Samples: River (400 mL), Sea(1,000 mL), Pond (70 mL)
- Extraction: Blood & Tissue kit
- qPCR: Environmental Master mix

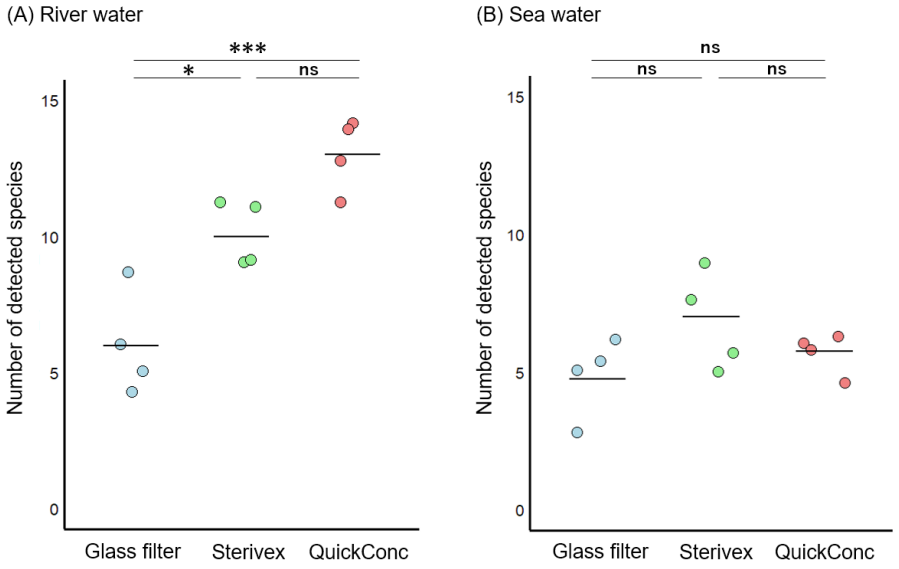


QuickConc exhibited significantly higher sensitivity in all the conditions

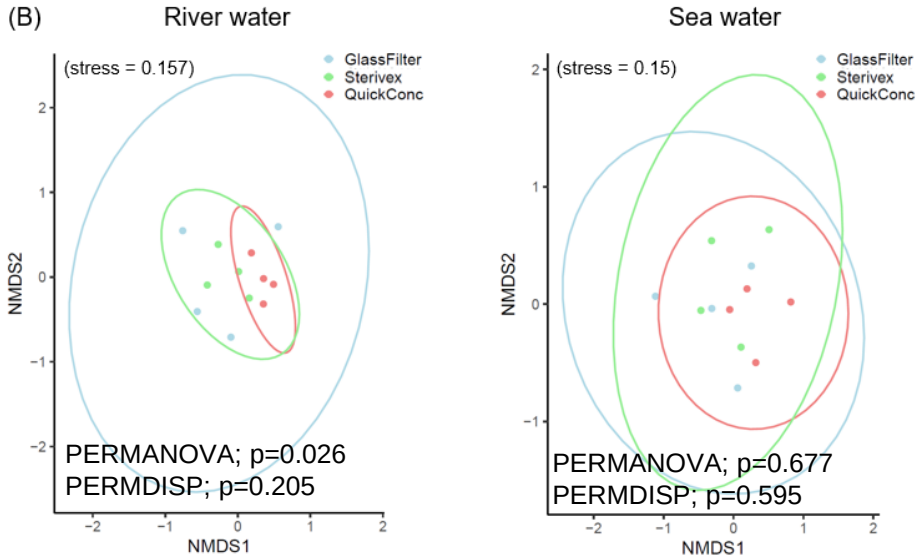
Metabarcoding analysis

- Comparison of the number of detected fish species using MiFish
- NMDS analysis of MiFish data

Numbers of detected fish species



NMDS analysis



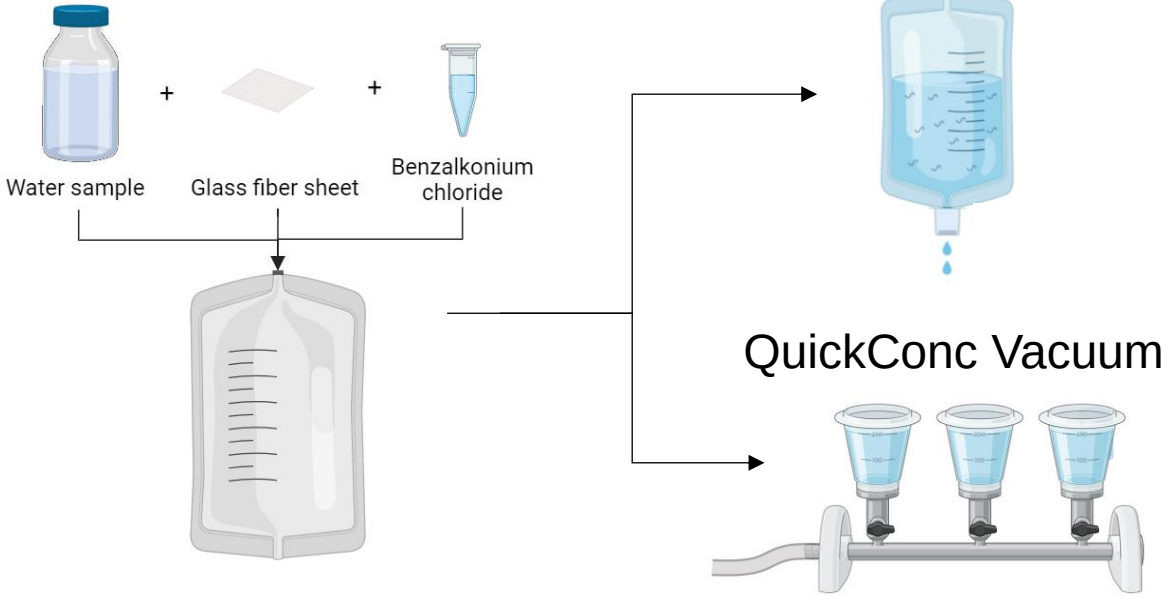
River	QuickConc showed a significant difference in the numbers of detected fish species and in the NMDS analysis
Sea	No significant difference was observed.

QuickConc Vacuum

Need for improvements to QuickConc

- Integration with a pump
- Increased processed water volume

We developed a pump applicable version; QuickConc Vacuum



Use cases

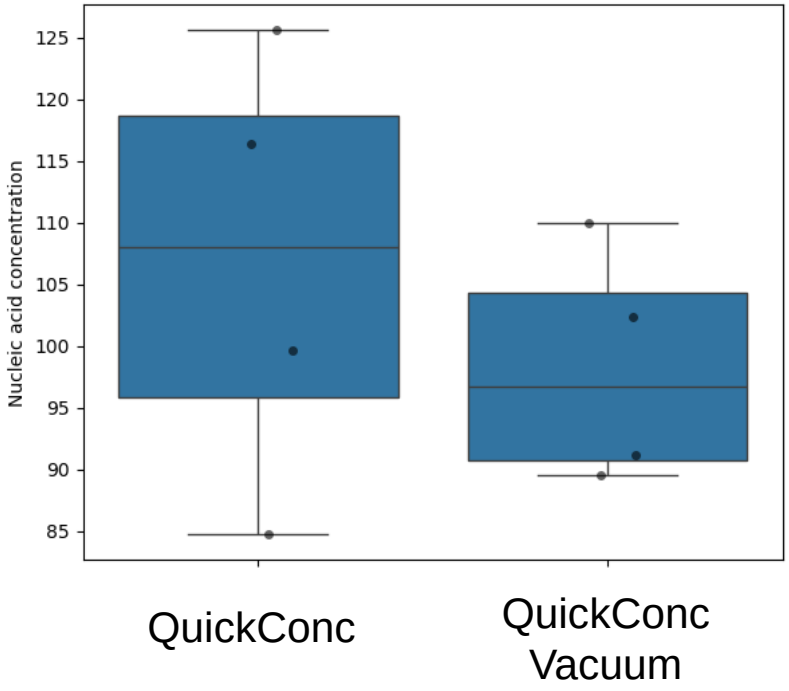
- On-site filtration
- Ability to process highly turbid water

- Parallel filtration
- Ability to process large water volumes

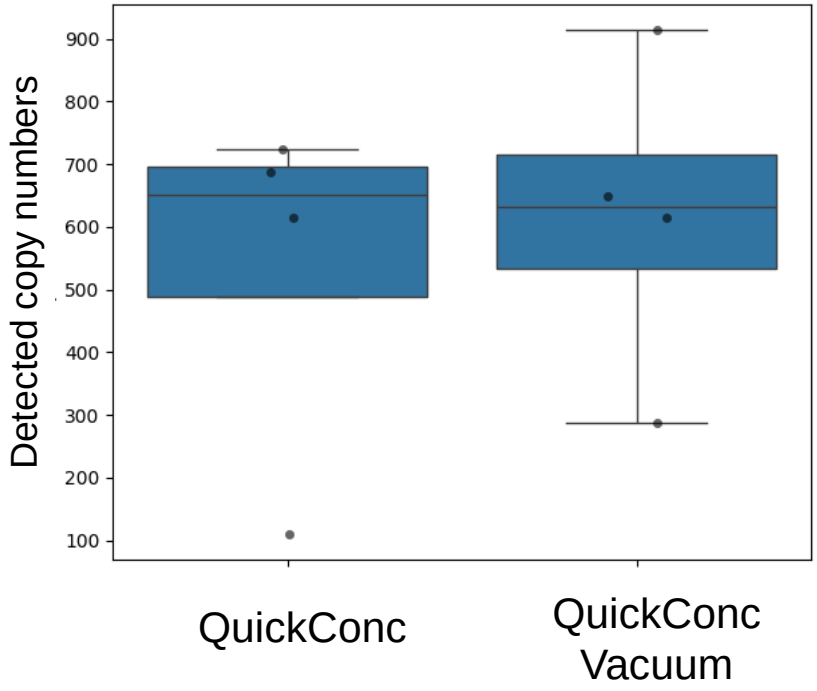
Species-specific qPCR results between QuickConc and QuickConc Vacuum

- Samples: Sea (1L)
- Extraction: Blood & Tissue kit
- DNA concentration measurement: Nanodrop
- qPCR: Environmental Master mix

eDNA concentration



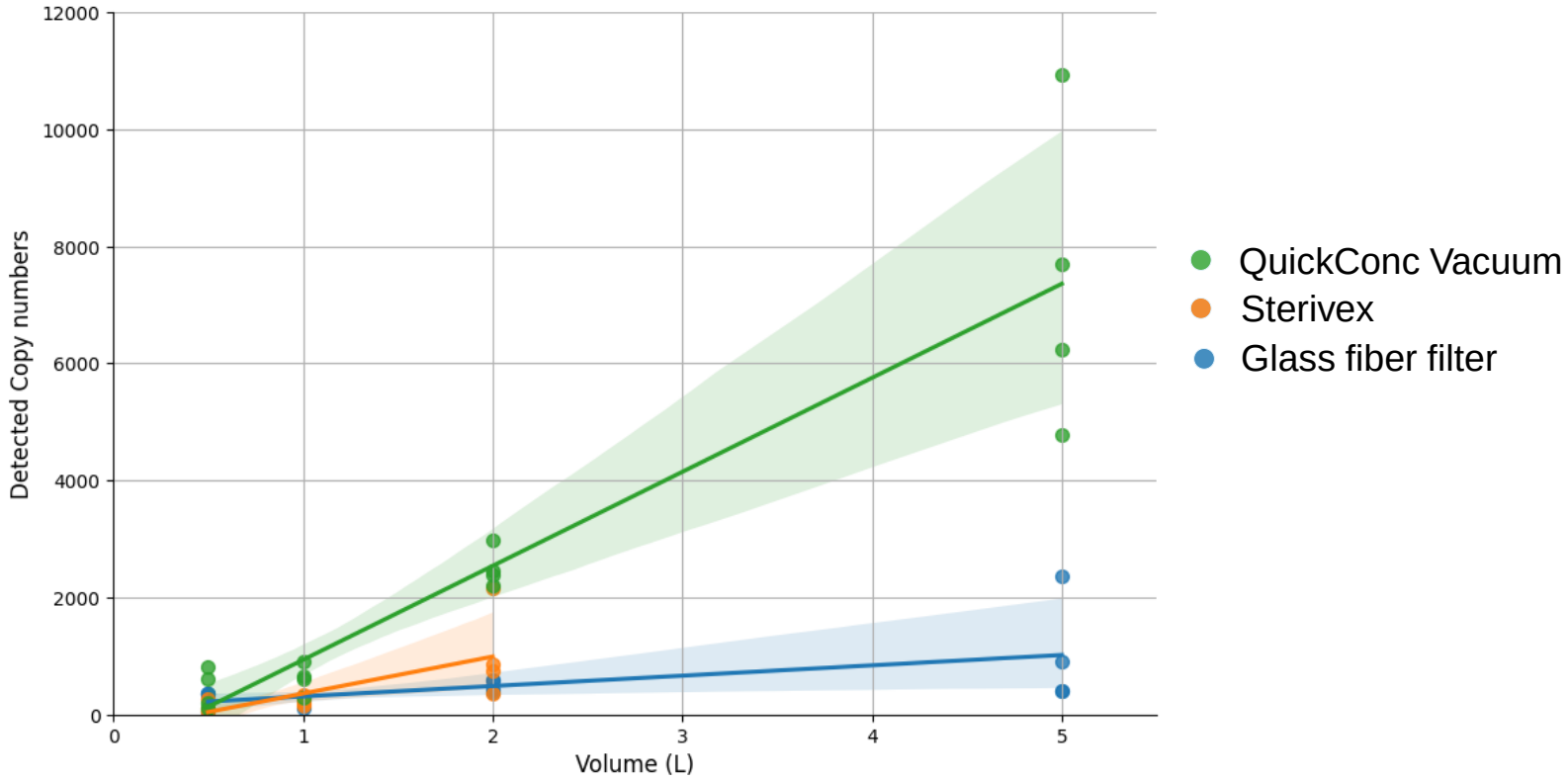
Cyprinus carpio



Comparable performances between QuickConc and QuickConc Vacuum

Species-specific qPCR results among QuickConc Vacuum, glass fiber filter, and Sterivex

- Samples: Sea (0.5 - 5L)
- Extraction: Blood & Tissue kit
- Purification: PowerClean Pro kit
- qPCR: Environmental Master mix (Target: *Acanthopagrus schlegelii*)



QuickConc Vacuum showed the highest sensitivity while maintaining linearity

Summary

- We have developed a new concentration method QuickConc™
- **Results**
  - > QuickConc had significantly higher eDNA yields in sea, river and pond water, compared to Sterivex and glass fiber filters
  - > Metabarcording results show that higher number of species was detected in river water using the QuickConc method, while no significant difference was observed in seawater.
  - > QuickConc Vacuum can handle a large amount of water while maintaining linearity
- **Future studies**
  - > Conduct large scale analysis using various environment samples
- **For more information**
  - > Contact: ryo.Iwamoto@advansentinel.co.jp
  - > Visit our booth to get a **FREE trial kit (First come, first served)**