

# Filtration

Keeping your Koi Healthy and Happy with clean water



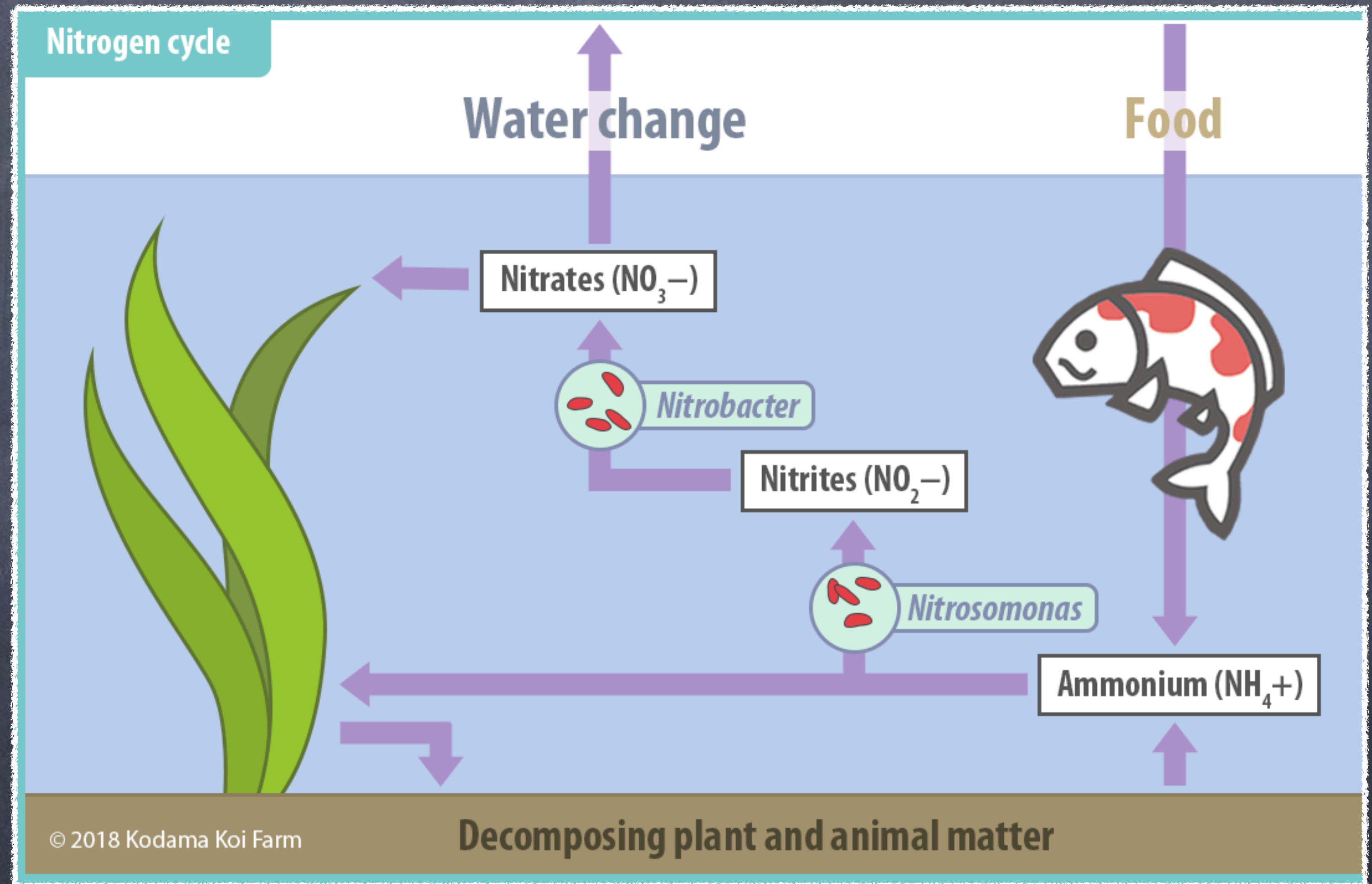
# Key Terms

- Water Flow: How many gallons of water flows through your "system" for a given period of time (gal per hour)
- Turn over: How long it takes to move all of water through your "system"
- Fish Load / Bio-load: (a.k.a. biological load) the amount of waste that exists within your "water column"
- Water column: all the water in your entire pond (includes filters, bogs, waterfalls, etc.) ... every last drop!
- Detritus: Animal waste and dead and decaying plants and animals



# What gets removed by filters...

- Detritus
- Ammonia
- Nitrates
- Nitrites
- Phosphates
- Nitrogenous Waste
- Debris/pollutants





# Types of Filtration

- Mechanical
  - Removes waste from the water
  - Involves separating the detritus from the water column
- Biological
  - Converts waste into "nutrients" within the water column
  - Leverages living organisms to break down waste



# Mechanical Filters

Skimmers

Socks

Screens

Sieve tanks

Settling tanks

Traps







# Biological Filters

Bacteria  
Media

Plants / Animals

Oxygen

Protein Skimmers

UV (kinda)



# "Did you Know..."

The water temperature for optimum growth of Nitrifying bacteria is approximately  $75 - 85^{\circ}\text{F}$ .

Growth rate is cut to 50% at approximately  $65^{\circ}\text{F}$ , and cut by 75% at approximately  $50^{\circ}\text{F}$ .

Growth is zero at approximately  $40^{\circ}\text{F}$  or below.

Nitrifying bacteria will die if frozen, or if water temperature reaches  $120^{\circ}\text{F}$ .



# How do I know my filter is working?

- Water testing
  - Ammonia  $\rightarrow$  (0.0 - 0.25)
  - Nitrates/Nitrites  $\rightarrow$  (<0.5)
- Clarity
- Health of the Koi
  - flashing
  - jumping





How can I improve my  
filter?



"Clean your filter!"

-Mom



# Try and Don't Try

## • Try

- Frequent Cleaning / water changes
- Increasing media surface
- Increasing Oxygen
- Increase Beneficial Bacteria
- Automation
- Different Food
- Plants
- Move pump to end of filtration

## • Don't Try

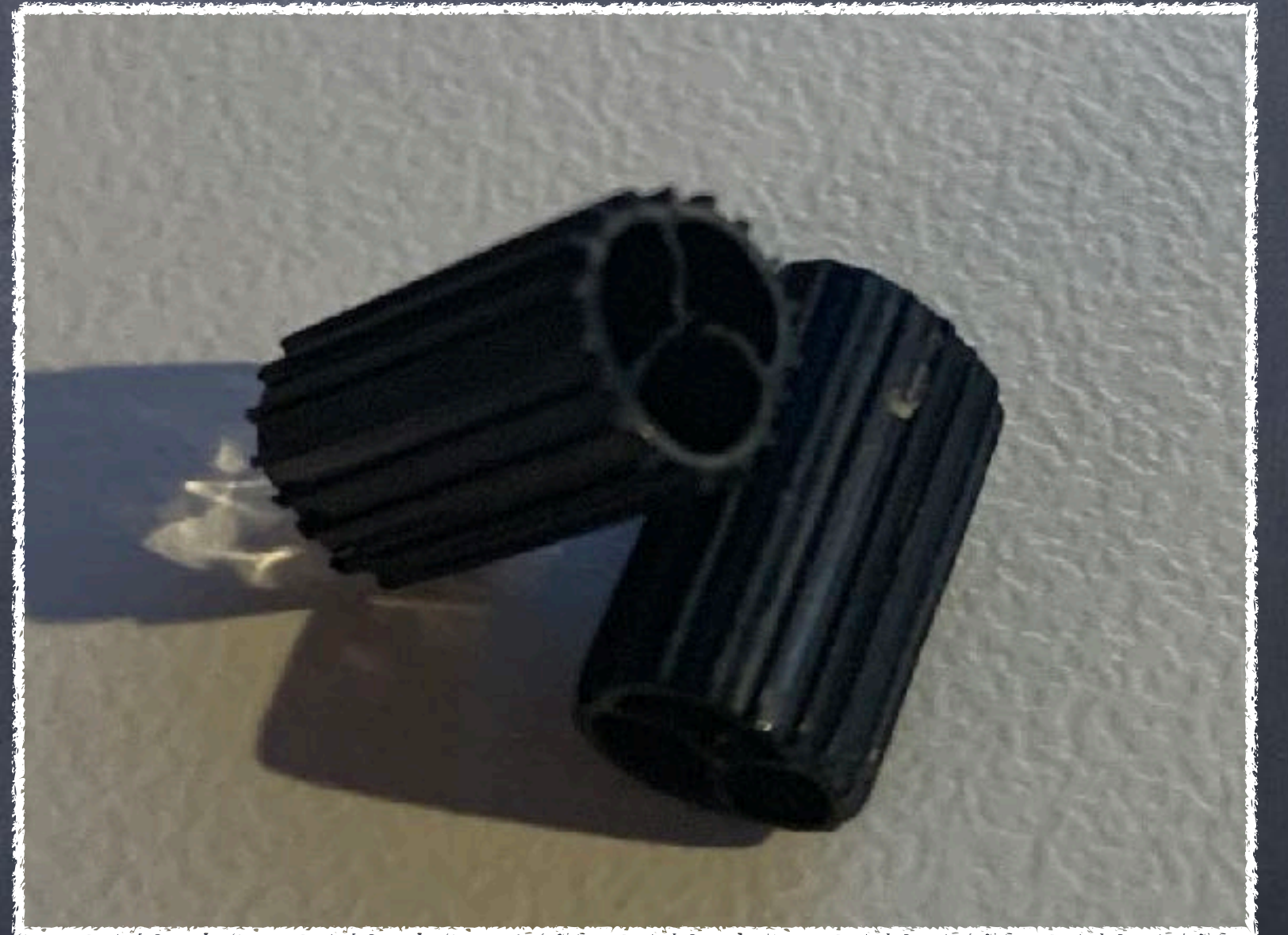
- Incorrect screens
- Leaving screens/media dirty (nitrate factory)
- Adding more media
- Add Salt to media
- Ignore the pH
- Using aggregate as Bio-Filter
- Adding unnecessary filters



# Design impacts on filtration

- Sump vs Bottom drains
- Gravity-fed vs Pump-fed
- Pipe Size
- Water Flow
- Water turn-over
- Surrounding Environment



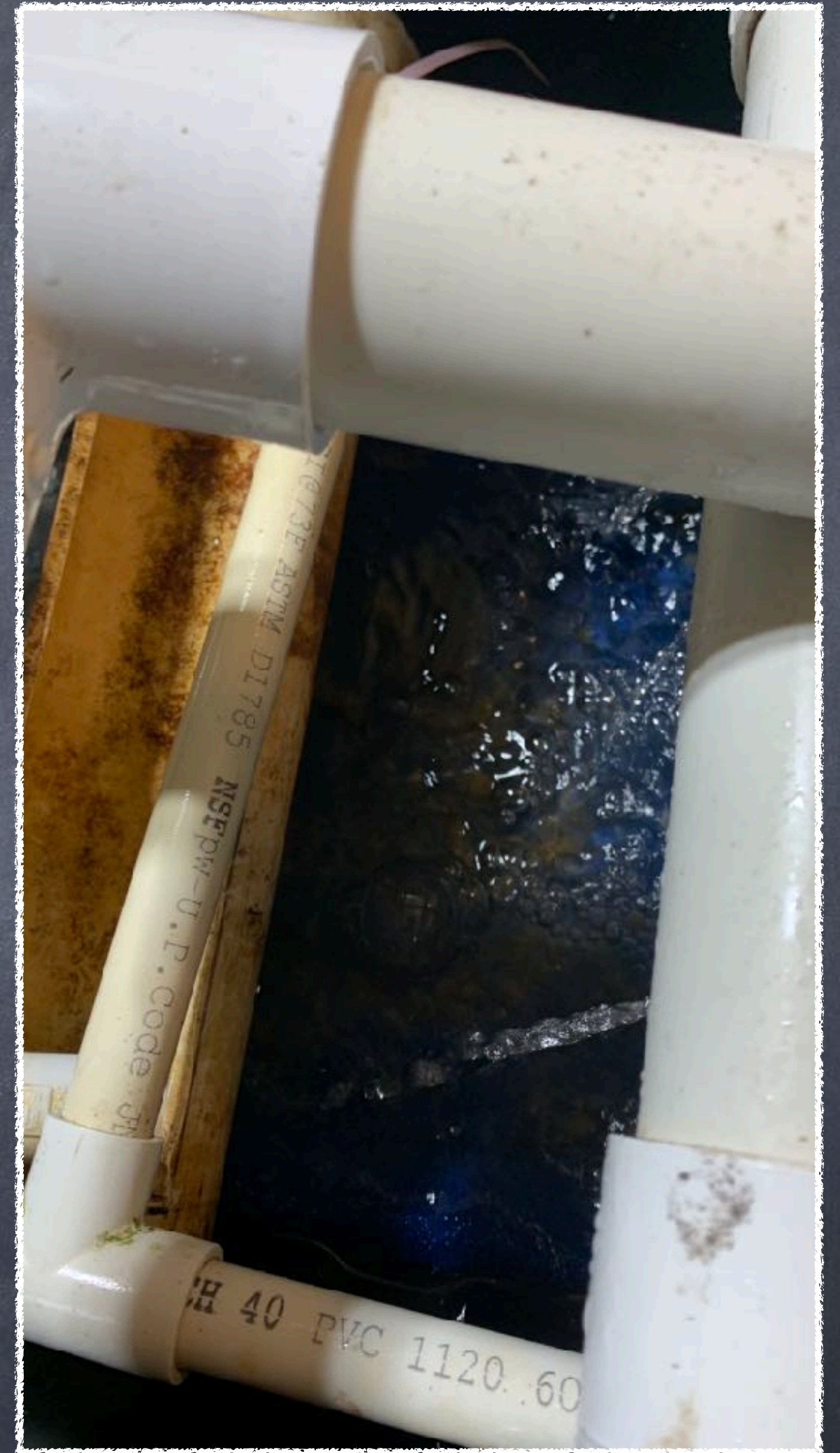
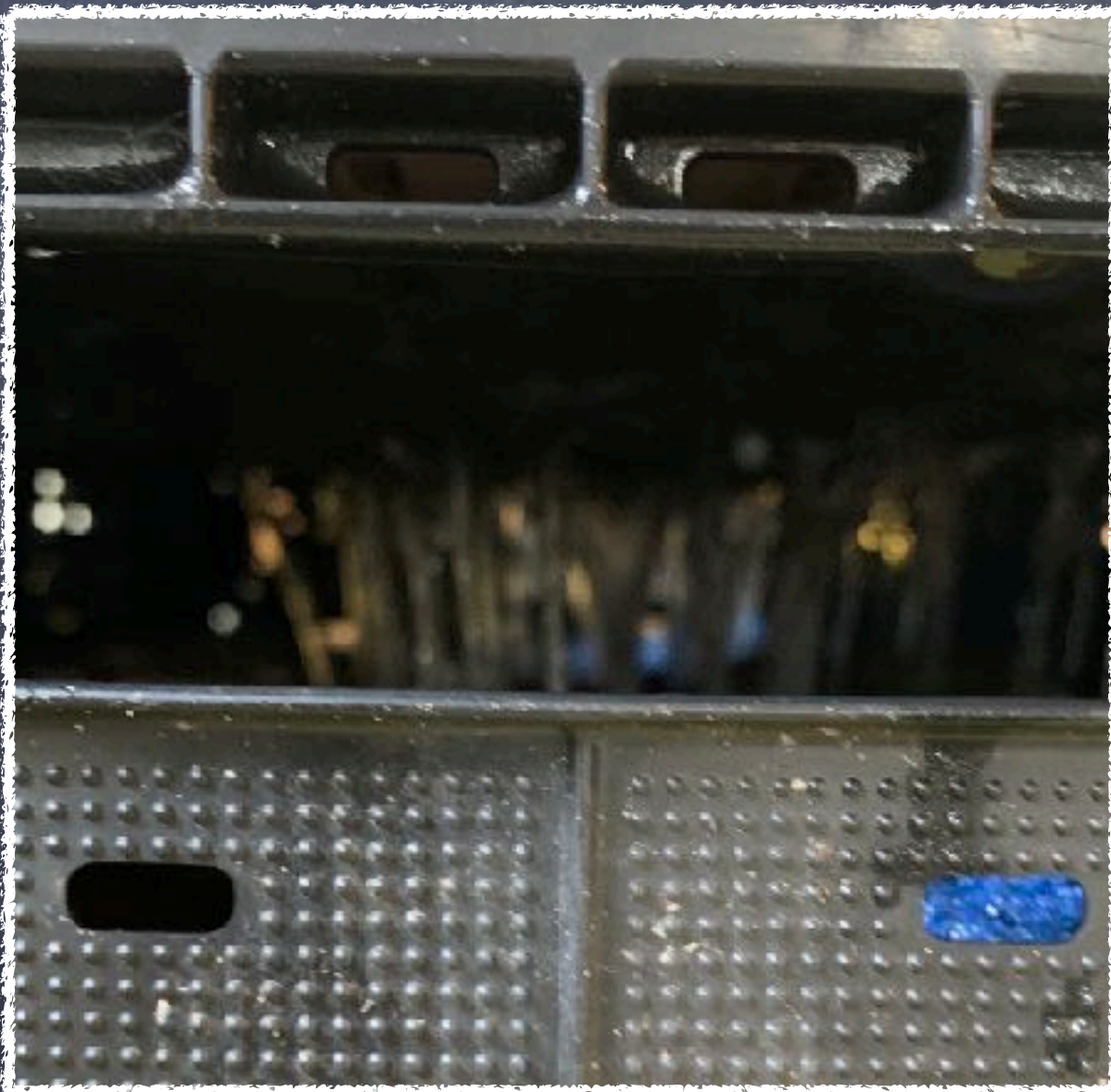




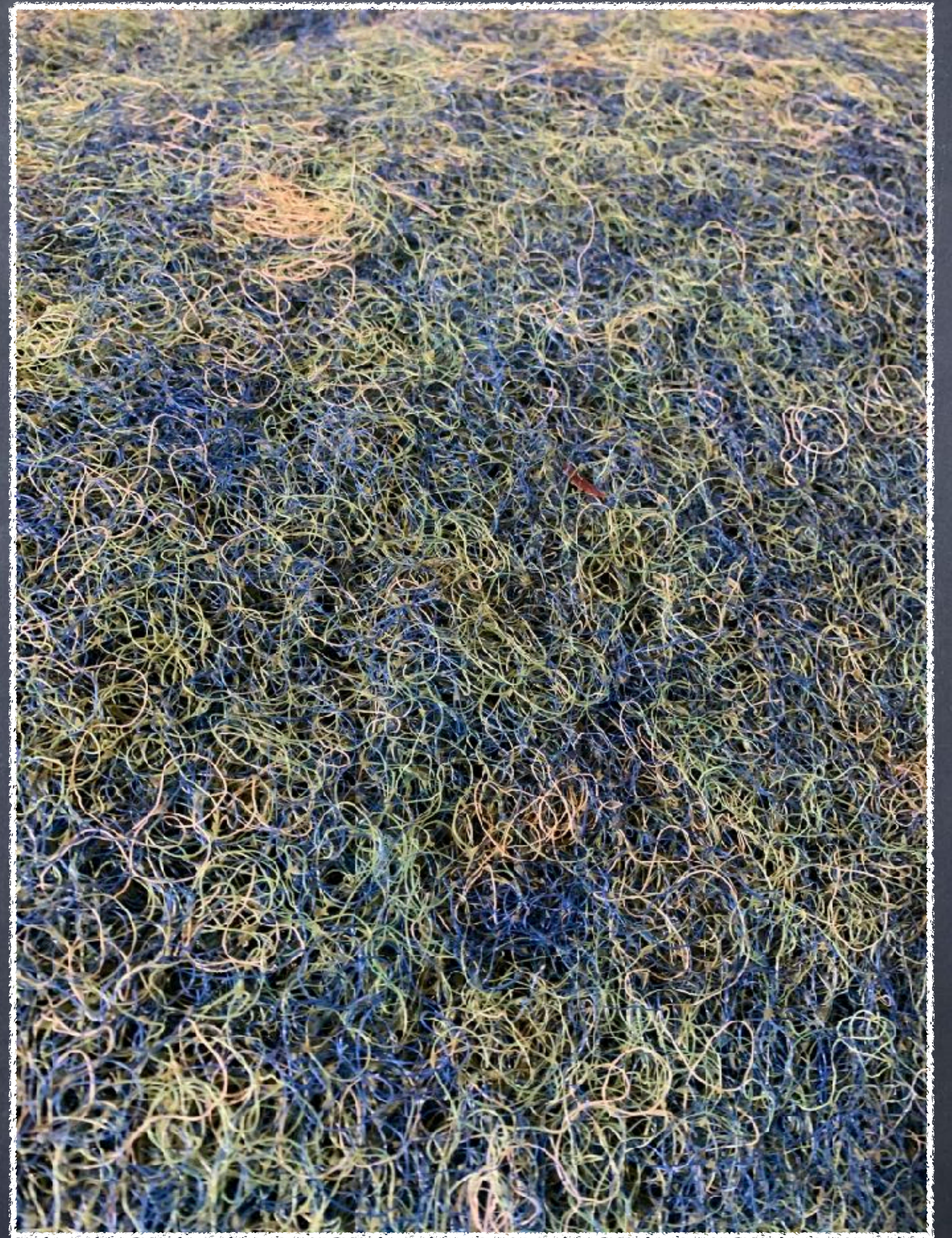
# Common Questions:

- How much filtration do I need?
- Should I add or upgrade or both my filtration?
- Should I "make my own" OR buy?















# What to consider when getting a filter

- Size
- Easy maintenance
- Optimal water flow
- Current / Future fish load
- Seasonal Changes
- Downsides
- Filter Failure
- Automation
- Add-ons





