

# RO – GIVE IT A GO!

BIG Result little investment

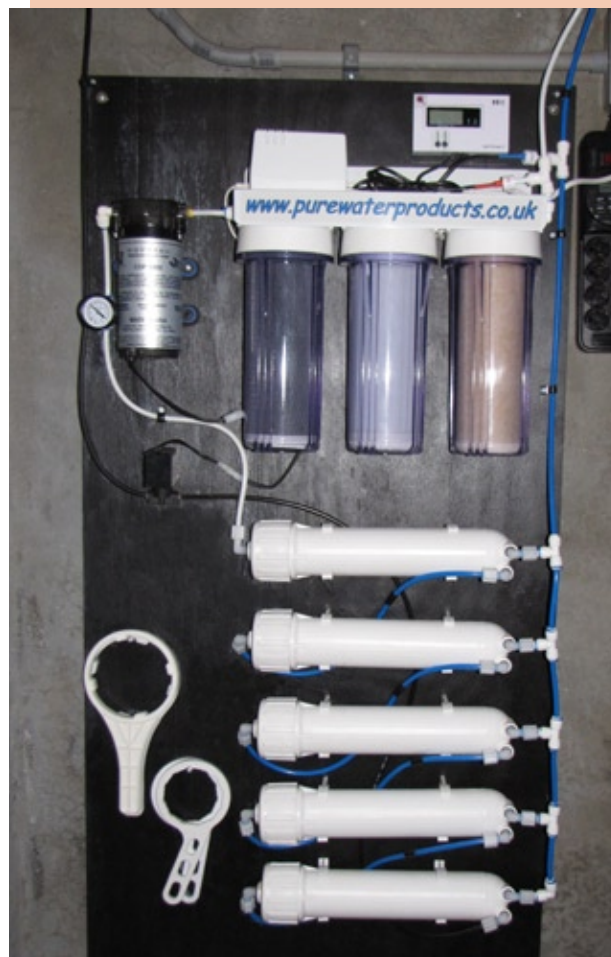
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**IN FEBRUARY 2008 KOI NATIONS** published an article called the Mud Pond Alternative by my buddy Mike Snaden. The premise of the article in a nutshell is you can get the same or even better results than the breeders in Japan by monitoring your Total Dissolved Solids (TDS) levels. The article discussed using Reverse Osmosis (RO) to help you achieve this. Then all hell broke loose with some people running out and buying units right

away and others with confused looks on their faces.

One of the biggest issues for hobbyists - both the "for it" and "against it" sides - was the amount of waste that traditional RO units produce. I personally liked the idea but hated the thought of the waste. My pond is just under 20,000US/16,653UK gallons and is set up with a semi-flow through, flow-through, top-off, or whatever you want to call it. On average I overflow 400US gallons a day. In order for me to be able to continue that with a readily available RO unit I would actually use anywhere from 600-1,000US gallons a day based on the flow rates the manufacturers' advertise.

Besides my main concern of RO, which is the waste water, there are two other very big concerns. The first is the cost of getting one of the best units - meaning one that will produce 75 good gallons to 25 wasted gallons or better. The ones I found that would actually produce and live a long life were in the \$5,000 range. You can get into a cheaper model for around \$1,200 but those will most likely only produce a 50/50 rate at best. Regardless of which one you go for, we need to look at the monthly operating cost of the unit - this was my second concern. Now there are some variables here, for instance the size of the pump on the unit and your local electricity charges. The units mentioned above would come with at least a ½hp but most likely a ¾hp pump. When I ran the numbers for myself it would cost me \$70 a month (I pay \$0.09/KWH) to run the RO unit. Now \$70 wouldn't kill me but when I added that to the extra water usage it started to add up quickly. After looking into it, I decided I would only go ahead if I couldn't find a reasonable alternative. So I set out to find a better way...



Here is the system I got from Pure Water Products. Minus the pump at top Left and the dual TDS meter top Right.

What we are looking at starting from the top Right of the picture. The white tube is the pre-filtered source water. That goes into the three smaller pre-filters (from R-L) sediment, granulated carbon, carbon block. It then exits to the pump. even when the pump is off the water will flow freely through it. Then we have the pressure gauge that leads into the first membrane. From there the pure water goes to the right in the blue tube and the waste from that membrane exits in a blue tube at the bottom with a black band on it.

This repeats through all the membranes and the blue tubing to the right carries the pure water to the pond while the last membrane's waste line is black and obviously that goes to the sump. The little black box below the pump serves two purposes. One it is a flow restricter and two it also has the built in timer to flush the membranes every hour for 18 seconds.

## Deionization

First I looked at Deionization but that was a short lived dream. They have resins that will do all the things we as hobbyist want but unless you are willing and have the space to put a small chemical plant in your yard it just isn't practical. With the amount of water we as hobbyists use we would have to recharge the resins as much as every other day. Now, you can get longer runs out of it if you have larger containers to hold more of it, but it just didn't seem practical to me. I would think that DI will be there one day it's just today isn't that day.

## Softeners

With DI not really being an option, RO started looking like the only choice. After feeling like I wasn't making any headway I decided to just try a pre-filter and a whole-house water softener. My thoughts were: if I was going to buy 600-1,000US gallons a day with RO maybe the Koi would be better off getting all the softened water instead of just 300-500US gallons a day of RO water because the other half went in to the sewer.

I looked at the box stores for a water softener but none of them really had the

quality that I wanted. I figured if I was going to be the guinea pig for all of you, I'd better give it a fair shake. So I ended up calling Culligan (I'm not endorsing them just telling you what I used) to come out so I could show them exactly what I wanted. After all the funny looks and stares (non-Koi people really don't get it) we agreed on the products they would bring me. The first line of defense was a whole-house pre-filter that has a layer of carbon to pull out the chlorine and chloramines and another custom-made layer that pulls out heavy metals.

After running through the pre-filter the water is fed into the whole house-sized water softener. From that point I plumbed the line to dump directly into the outlet of a Nexus 300.

## Observation

It's been about a year now and what I have found is that soft water has some skin benefits but not much else. Dick Benbow asks me about it from time to time and my answer is always the same. Not much change! There is the obvious benefit in that the Kohaku don't get shimmies but I will tell you this and I don't care who tells you

different... I bought two Kohaku sisters from Yamamatsu. Same bloodline same spawn, one just seemed to be more prone to getting shimmies than her sister. So Kohaku A slowed down on her shimmy production while her sister never got any. Just keep in mind that shimmies are more a product of genetics than water. The soft water does seem to slow them down, so I can't say that it doesn't do anything, but apart from that and the skin appearance there are no real OMG! side effects visible to me. No extraordinary growth or appetites.

## Seeing is believing

Over the past year or so Mike and I have talked extensively about the whole RO ordeal. I resigned myself to the fact that I would have to get an RO unit, so I spent several weeks looking for the right one and discussing it with Mike. I had a trip to the UK coming up to see him and he told me he was building a new custom one for himself. So I put off buying one till I saw that. Hey, I'm a guy - I like to tinker, so if he's making something I like, I'll just mimic it.

When I got to Mike's place he was still installing the unit so it wasn't up and

## Helpful tips

As far as the softener goes, I just rented them. You can buy them but my opinion is this: the rental company is responsible for the units so if they break, they have to fix them at their expense (I've already used this) and two, there is always something new and better coming out so when I see that I can have them bring me the latest and greatest.

The whole-house sized pre-filters can be built to order. So if you know you have a particular mineral you want gone they can make sure they put the right resin in it for you.

In the test results please take note that the inlet water's temperature has a lot to do with the amount of pure to waste water ratio.





This dual TDS meter reads the inlet and outlet water in ppm. Here you see at the time this picture was taken I had 298 ppm source water. But earlier that morning I had 320 ppm.



After the RO we are getting 7 ppm. Some may ask why not 0 ppm. You could get that with a few tweaks and adding a small amount of DI to the unit. But it is not needed.



### Results

Please note that I am pre-treating and softening the water before it ever gets to the RO units pre-filters. I know that if I didn't do that I would most likely not get these numbers. The inline pressure after all the pre-filtration is a steady 65-70psi without the pump and 90-100psi with the pump. The inlet TDS fluctuates based on what the city provides me, however it hovers around 290-325 ppm while the outlet water (pure water) reads 7-10 ppm.

### Oct 8th

W/O Pump  
80F/27C source water  
380 gallons pure  
132.5 gallons waste  
512.5 gallons total  
26% waste

W/ Pump  
80F/27C source water  
540 gallons pure  
146 gallons waste  
686 gallons total  
21.25% waste

### Oct 19th

W/O Pump  
84F/29C source water  
393 gallons pure  
124 gallons waste  
517 gallons total  
24% waste

### Nov 7th

W/O Pump  
79F/26C source water  
361 gallons pure  
135 gallons waste  
497 gallons total  
27.25% waste



ABOVE: The blue tube is our pure RO water coming into the Nexus the 3/4in PVC is for the pre-filtered source water since it will have to be mixed with the RO water to maintain stable water parameters.

running but he said he wanted to show me some ponds that I didn't get to see last time I was there. Now, in all fairness I will say it before anyone else can: Mike sells Bakki showers so all the ponds I saw had them. There, now that's in the open.

The ponds were all different in various ways - yes, they all had Bakki showers on them but they also had other variations of filtration on them. The one common denominator they all had, with the exception of one, was RO. The one that didn't have RO running just happened to have the correct or close enough TDS and pH levels right out of the tap (lucky dude indeed).

There are some really nice jumbo-sized Koi in all these ponds. But there is this one particular pond that erased any and all doubt that I may have had about RO. This pond also has jumbo-sized Koi but some of the Koi were pond grade at best. Nowhere near the same quality as their pond mates but they are just as large. We are talking monsters here and even though the quality is not there, they are no less impressive than their pond mates. Their sheer overwhelming mass forces you to respect them. To top it all off, the food that was being fed left a lot to be desired.

This pond is living proof to me that TDS and pH are the most important aspects of Koi husbandry if you are trying to achieve maximum potential. By the way, the stocking levels I would say average around 300US/250UK gallons per fish.

### What's next?

On the way home I got kind of upset that I didn't have these results so Mike and I start talking about how I could get this German company to send me the RO unit I wanted. Then

Mike remembered hearing about a guy who is getting good results from a very small RO unit.

So we got home and looked the guy up on the internet to see what he has and what he was working on at the moment. After looking at his site [www.purewaterproducts.co.uk](http://www.purewaterproducts.co.uk) for a bit I decided to give the owner Alan a call.

We talked for the next couple of weeks, trying different things. Alan had already tested most of the stuff I had thrown at him but I liked being the Devil's advocate. I would ask him if X would work and he would either say "yes", "no" or "let's test it and see".

After a week or two of testing out some new membranes Alan and I agreed on what he would send me to meet my needs. The unit has been running for a little over a month at the time I am writing this article, but I see no reason or signs to indicate that it will not perform for a long time.

### Setup

Here is a breakdown of all the parts you may need or want should you decide to go this route. And just to be clear I am not saying this is the "only" way to raise large Koi. I have Koi over 30in. However, in my opinion if you want to get every last bit of size out of your Koi, this is the way to do it.

Everything you see in the photos I got from Pure Water

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