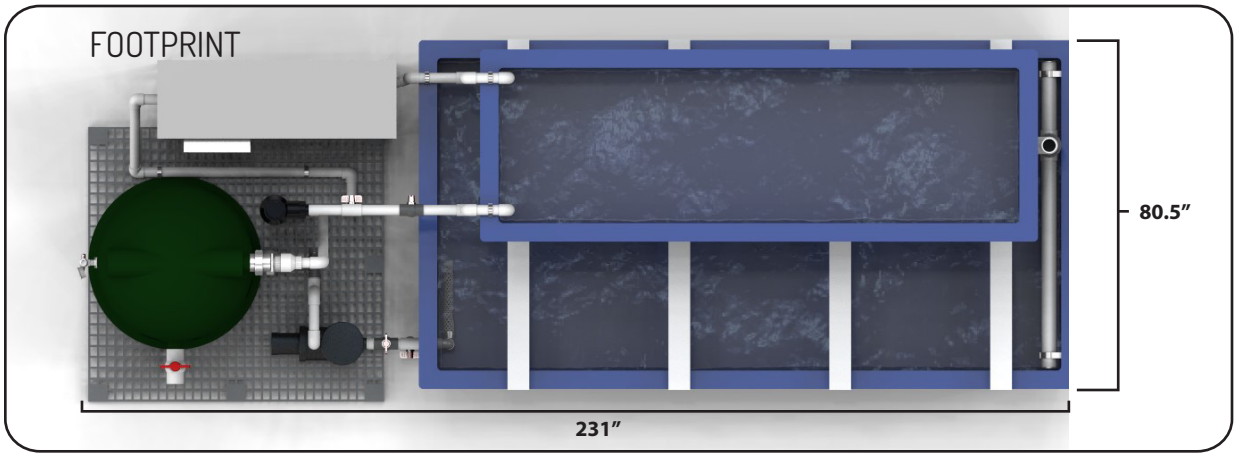
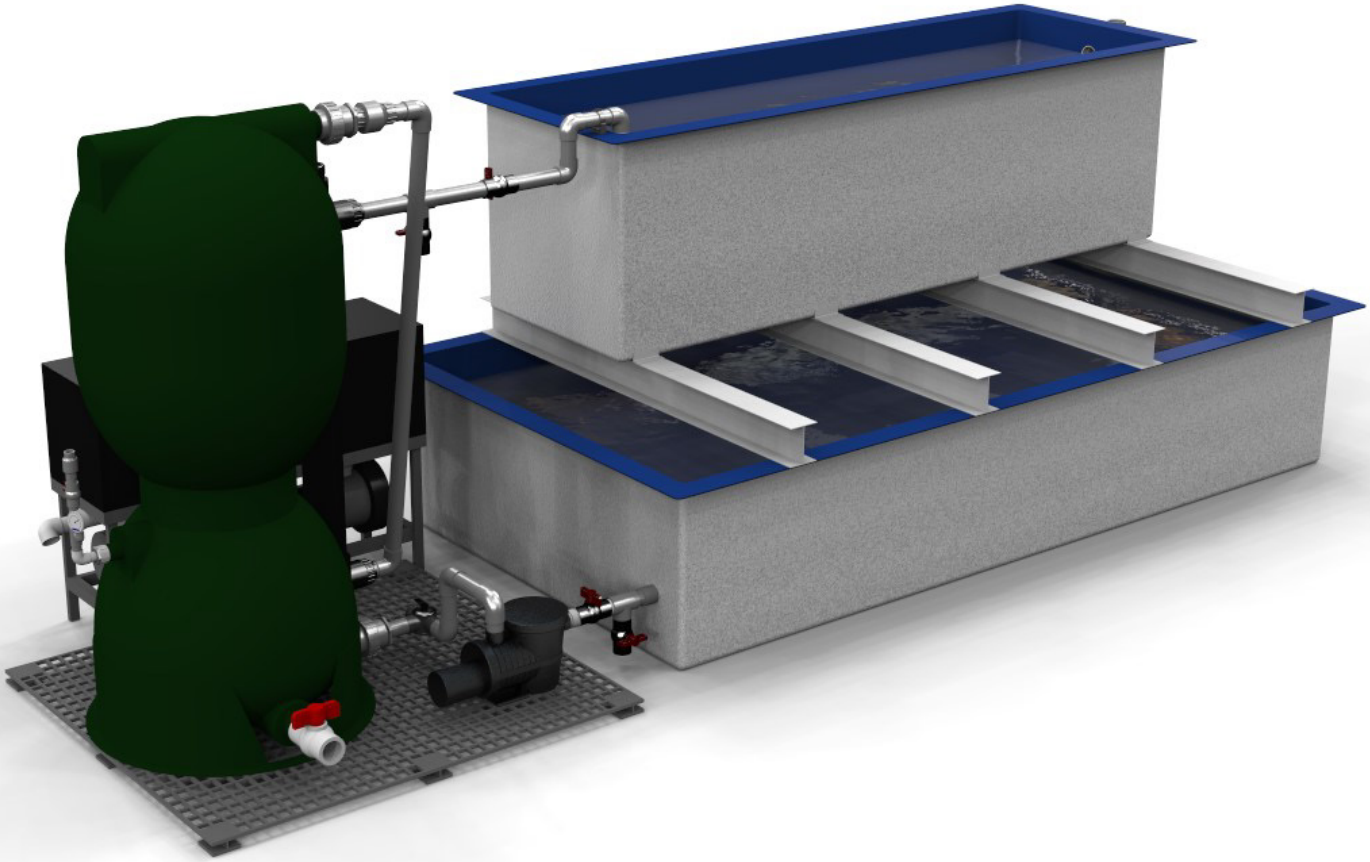


STANDARD OPERATING PROCEDURES FOR

SEAFOOD HOLDING SYSTEM 1500



BEAD FILTER SOLUTIONS™

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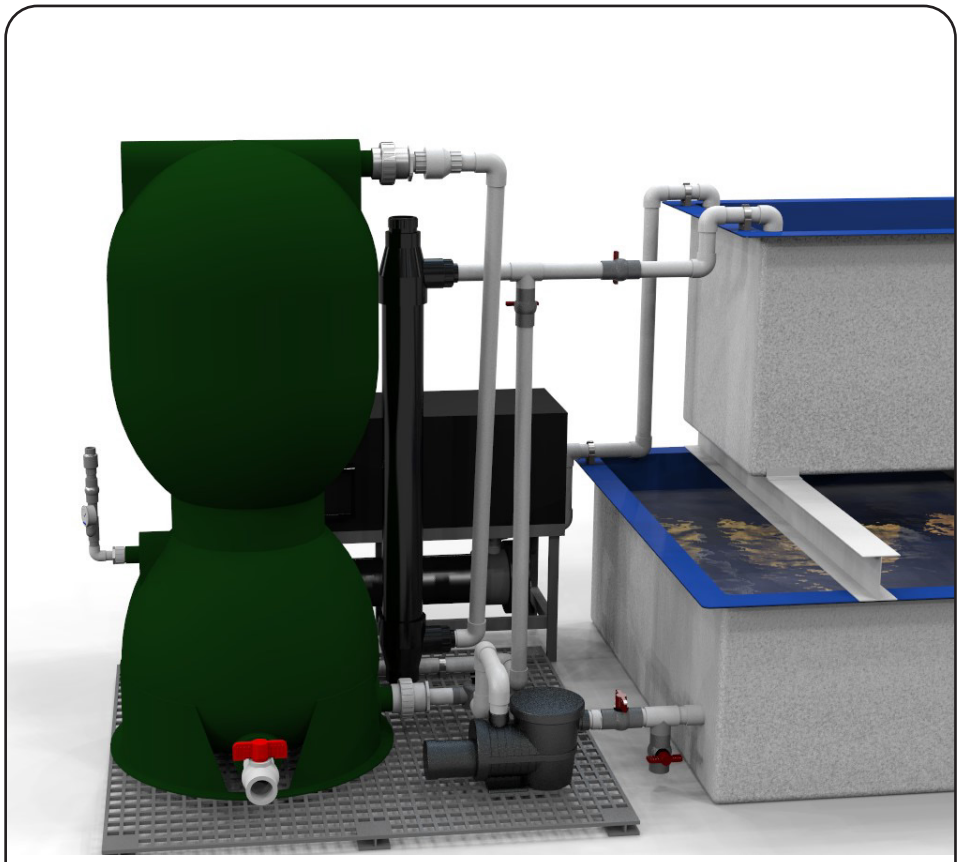


SHS 1500

AST™
BEAD FILTER SOLUTIONS

1. System Description:

The Seafood Holding System (SHS-1500) is a system designed to hold up to 1500lbs of live seafood for wholesale distribution. The filtration system helps to improve water quality thus lowering stress factors known to contribute to increased mortality rates. In many cases, the reduction in mortality can result in a positive ROI in less than 1 year; the system pays for itself and continues to perform flawlessly for years. The system is designed to easily recycle water, reducing chiller demand resulting in low energy costs. Low water loss during filter backwash events promotes water recycling, reducing cost associated with make-up water. The filtration process provides mechanical, biological, and disinfection which reduces system footprint and improves water quality.

Initial Start Up: Upon initial start-up, be sure that threaded and glued connections are secure and valves are in the appropriate (normal operation) position. Each tank should be filled with water (marine salt mix or raw saltwater) to between 30-32" water level. If making your own saltwater, be sure to add enough salt to produce water at 30ppt (parts per thousand). The salinity can be increased if necessary. Once the tanks are full, you are ready to start the water pump. The water will be drawn from the tank and will fill the bead filter, UV sterilizer, and water chiller. Once the water returns to the tanks, you may adjust flow control ball valves. Water should be flowing at approximately 100-150 gallons per minute (40gpm through chiller) and remaining flow returns directly to tank. Ensure that water is flowing through the bead filtration system AND the chiller, if applicable. Next plug in the UV sterilizer. Ensure that a blue light is visible on top of UV sterilizer. Mark the date and time for records. Next plug in the chiller. Adjust temperature control to desired temperature (40F). Mark the date and time for records. The system will begin to cool down to desired temperature over 24 hours. Refer to the filter manual for bio-filter acclimation. Bio-filter should be acclimated before fully stocking the system.

2. System Components

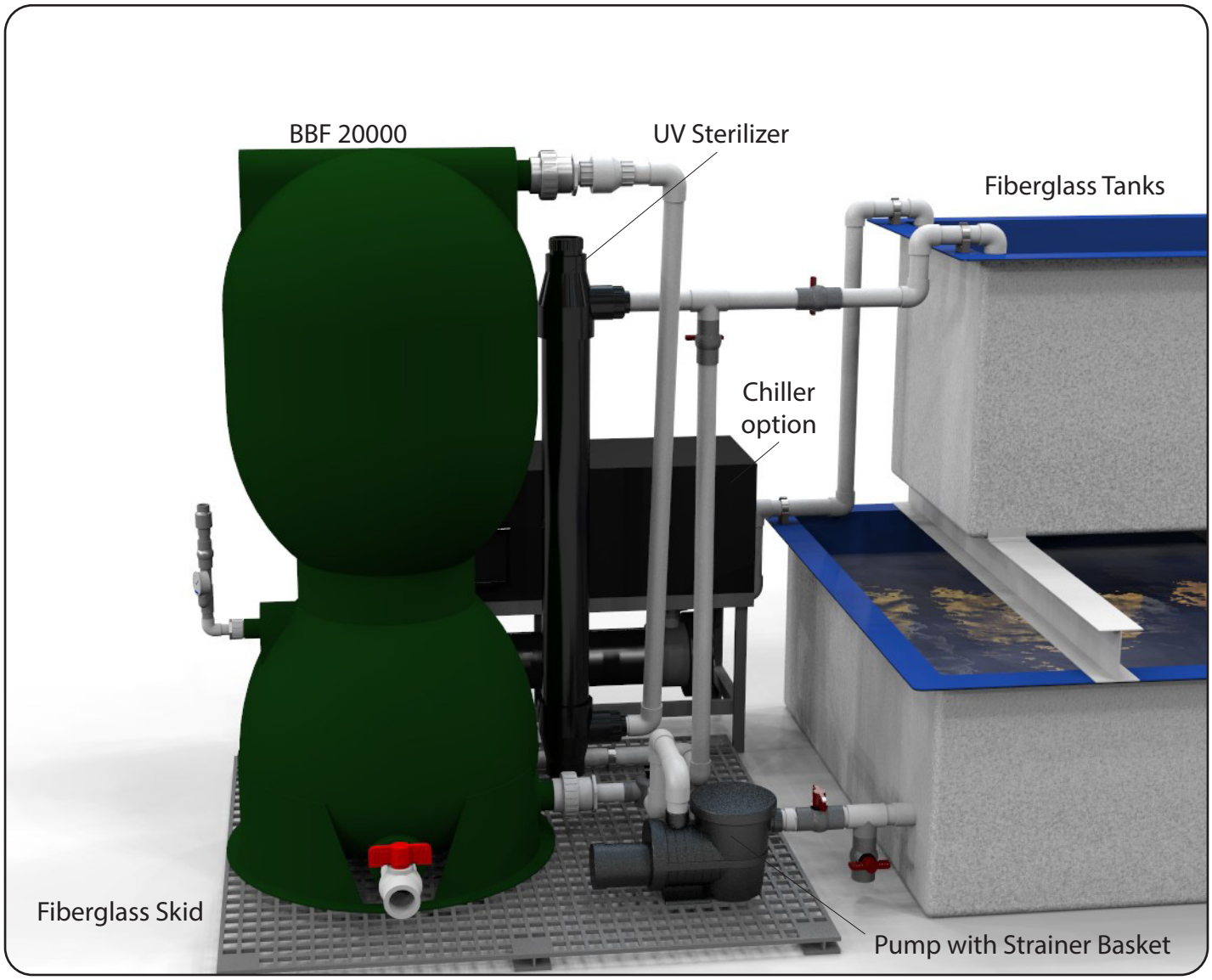
Bead Filter: The Bead Filter (BBF-XF20000) provides mechanical and biological filtration. The filter removes suspended solids and biologically treats the water rendering the water free of solid waste and biologically clean for extended re-use. The filter should be backwashed regularly to remove solid waste from the bead media. Backwash interval is based on loading but will typically be required 2 times/week in live seafood holding systems at max stocking density. Each backwash event will waste 150gallons of water or <1% of system volume. The filter should not be operated above 20PSI. Refer to the owner's manual for detailed information.

UV Sterilizer: The UV Sterilizer (AST-150UV) provides sterilization and disinfection to the system water. Sterilization is important for holding aquatic animals in a confined system. Disease can easily be introduced to a closed (recirculating system) during normal operation whether from the introduction of new animals, unsanitary conditions, or unintended human interaction with the system. Refer to the owner's manual for detailed information.

Chiller: The Multi Temp Chiller (MT-1) is an air cooled chiller designed to chill water in a recirculating loop. The chiller is a main component in the system and is responsible for keeping the animals at the desired temperature for holding. Water must always be running through the chiller to ensure that the system water maintains the appropriate temperature. Refer to the owner's manual for detailed information.

BBF XF 20000
SHS 1500

System Component Diagram



System Components continued

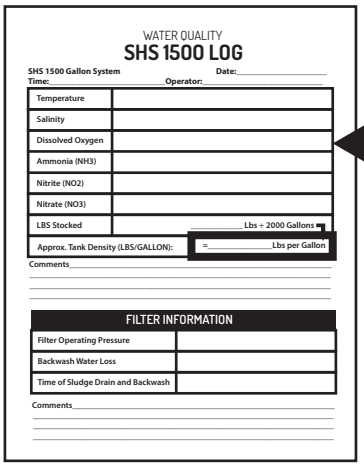
Tanks: The two tier holding tanks are insulated, have a combined total volume of 2,000 gallons and are designed to hold live animals in 100lb crates. The tanks are supported by 6" Fiberglass "I" Beams and bolted into place to ensure no movement. Tank water level should be maintained at 30"-32" in both top tier and bottom tier tanks.

Water Pump: The water pump (A2 ¾ HF SW) provides all water flow through the system. The water pump contains corrosion resistant, saltwater, mechanical seals. The water pump also contains a prefilter basket that is designed to remove large debris that could affect the ability to pump water.

3. Water Quality

Recommendations: Water quality is the most important factor affecting mortality in recirculating systems. Failure to regularly monitor and maintain good water quality can result in catastrophic losses. Wholesale seafood holding systems require specific water quality parameters to be strictly adhered. The water quality parameters and recommendations for Maine Lobster are listed below in order of importance.

- **Temperature: 38-42F**
- **Salinity: 30-35ppt**
- **Dissolved Oxygen >5mg/L**
- **Ammonia <3mg/L**
- **Nitrite <1.5mg/L**
- **pH 7.5- 8.5**



WATER QUALITY
SHS 1500 LOG

SHS 1500 Gallon System Date:_____
Time:_____ Operator:_____

Temperature	
Salinity	
Dissolved Oxygen	
Ammonia (NH3)	
Nitrite (NO2)	
Nitrate (NO3)	
LBS Stocked	_____ Lbs ÷ 2000 Gallons =
Approx. Tank Density (LBS/GALLON):	=_____Lbs per Gallon

Comments_____

FILTER INFORMATION	
Filter Operating Pressure	
Backwash Water Loss	
Time of Sludge Drain and Backwash	

Comments_____

PLEASE USE THE PREPARED WATER QUALITY LOG AND KEEP FOR INTERNAL RECORDS

***It should be noted that Nitrate (NO3) will accumulate in the system with NO negative effects on the animals.**

Water Quality Testing: Water quality should be regularly tested and maintained to ensure low mortality. It is advisable to purchase a reliable, hand-held temperature, salinity, and dissolved oxygen probe. It is also advisable to use low cost test strips for determining ammonia and nitrite concentrations.

If ammonia or nitrite is above recommended levels, a 10-20% water exchange is advisable. Be sure to appropriately condition the make-up water to ensure that the system is not shocked (temperature, chlorine, fresh water, etc.)

*It should be noted that shock loading (loading from 0% stocked to 100% stocked) is extremely stressful on the animals and can result in high mortality events. **It is advisable to keep approximately 25% max stocking within the system at all times (~375lbs).** This will ensure that the biofilter is adequately fed allowing for a shock load with minimal negative consequences. **Conversely, if the system is stocked at 0% max, the stocking should be staggered and slowly stocked to max over 2-3 days.**

Water Quality Testing

Water quality should be taken frequently when first starting a system, and after large stocking changes. When possible, stocking should be gradual. If that is not possible, it is imperative to test the water frequently (daily or every other day) and take the proper corrective actions as needed (Water exchanges for high ammonia or nitrite). ***Water should be tested at least once a week*** when the system is cycled and operating properly. Water parameters will shift over time; ***regular monitoring prevents losses.***

4. Maintenance

Proper maintenance is key to the success of any recirculating system. Below is a list of recommended system maintenance.

Bead Filter: The bead filter should NEVER exceed 20 PSI. The filter should be backwashed approximately **2 times/week** and the sludge should be wasted. An increase of approximately 3-4 PSI above normal operating pressure indicates a loaded bead bed and a need for backwash. Failure to regularly backwash the bead filter will significantly reduce the operational efficiency and lifetime of the filter.

UV Sterilizer: The UV Sterilizer should be run all the time. The UV bulb has a lifespan of approximately **6-9 months**. When replacing the bulb, it is advisable to carefully clean the quartz sleeve inside of the UV Sterilizer. The quartz sleeve is extremely fragile and scratches easily.

Chiller: The heat exchanger should be cleaned approximately every **12 months** or as needed to allow proper performance. On some models this process may be done without removal of the heat exchanger shell. (i.e., water flushing system)

Tanks: The water tanks should be mechanically cleaned (scrubbed) approximately every **3 months**. Bleach should ONLY be used when NO ANIMALS are in the system. Any soap and bleach residue should be 100% removed before stocking animals. Use of bleach or soap as a cleaning agent poses a health threat to aquatic animals and should be avoided.

Water Pump: The water pump is designed to run constantly. The water pump should only be shut off during the bead filter backwash. The water pumps should NEVER be run dry. The strainer basket should be cleaned regularly **(1 time/week)** during bead filter backwash.

Difference between Water Exchanges and Top-offs

A ***water exchange*** is described as a removal of water from the system (via backwash, draining, etc.) that constitutes a need to add new salt water. It is extremely important that water exchanges are performed carefully, and that new water is conditioned (temperature, salinity, etc.). In a water exchange, saltwater is removed and saltwater is replaced.

Water ***"Top off"*** is performed when the water level is low due to evaporation. Salt is left behind when saltwater evaporates, so only freshwater needs to be added to correct the salinity concentration. It is OK to add unconditioned water (fresh water) as long as the volume does not exceed 100 gallons on the SHS 1500. Larger amount of water require the use of water conditioners to remove chlorine or chloramine. In a water top off, freshwater has evaporated and the salt was left behind; only freshwater needs to be added.

It is imperative that water salinity is checked prior to and after any new water addition whether a water exchange or water top off. Swings in salinity can result in animal deaths.

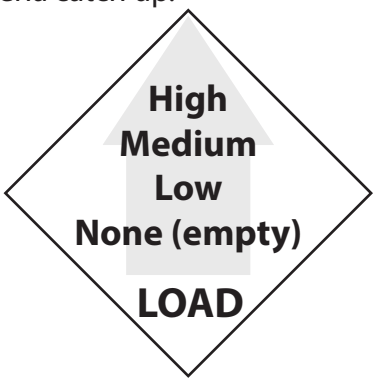
5. Nitrification Cycle

The filter captures waste mechanically, straining out the physical debris and waste within the system. Bubble Bead filters also breakdown the waste using naturally occurring biological bacteria. When a system first starts, these bacteria colonies need time to colonize and grow.

These bacteria colonies are fed by the metabolic processes and waste of the animals within the system. If there are no animals; no food (ammonia, nitrite) exists and these colonies die off. A new system has to develop these colonies. If new animals are stocked when there is not enough bacteria in the filter processing the waste, they are stressed by their waste (that has not been broken down into nitrates).

To prevent stress and animal loss, ideally the system should move a step (in loading) at a time. For example, an empty system (load of none) should be stocked at a low level to allow the bacteria time to grow (approx. 3 weeks when starting a brand new system). Once the bacteria has an established colony, it can grow to accomodate stocking over a few days (bacteria reproduces exponentially and can grow very quickly to accomodate for higher loading). If going between multiple stages (low to high, "shock loading"), increase your water quality testing to prevent mortalities while the bacteria catch up.

It is advisable to keep approximately 25% max stocking within the system at all times (~375lbs). This will ensure that the biofilter is adequately fed allowing for a shock load with minimal negative consequences. **Conversely, if the system is stocked at 0% max, the stocking should be staggered and slowly stocked to max over 2-3 days.**



Waste Breakdown

Ammonia (NH_3)	This is the chemical composition of the metabolic waste produced by the animals within the system. This is toxic to them and needs to change into something else in order to not kill them. If the bacteria do not break it down, ammonia can poison and kill the animals within the system.
↓	
Nitrite (NO_2)	Bacteria living in the filter eat ammonia and turn the waste into nitrite. Nitrite is also toxic to the seafood, impairing their blood's ability to carry oxygen. High levels of ammonia or nitrite can be managed with a water exchange.
↓	
Nitrate (NO_3)	Nitrite is broken down by another type of bacteria (one type breaks ammonia to nitrite, the second processes nitrite into nitrates) into nitrates. Nitrates are relatively non-toxic to the animals within the system. Nitrates are okay and will naturally rise in the system

WATER QUALITY

SHS 1500 LOG

SHS 1500 Gallon System **Date:**_____

Time:_____**Operator:**_____

Temperature	
Salinity	
Dissolved Oxygen	
Ammonia (NH_3)	
Nitrite (NO_2)	
Nitrate (NO_3)	
Lbs. Stocked	_____ Lbs ÷ 2000 Gallons
Approx. Tank Density (LBS/GALLON):	=_____Lbs per Gallon

Comments_____

_____

_____

_____

FILTER INFORMATION

Filter Operating Pressure	
Backwash Water Loss	
Time of Sludge Drain and Backwash	

Comments_____

_____

_____

_____