

THE MARY KERNS BIO-FILTER

Mary and Bob Kerns have been raising and breeding koi in both indoor and outdoor ponds for over 25 years. The bio-filter they use produces clear, untainted water even with heavy fish loads. Unique to their design, the filter is submerged within the pond.

Materials Needed

rectangular heavy-duty plastic storage box, large enough to contain the pump and media with room to spare

enough lava rock pieces to fill the container to within a few inches of the top

flexible black hose, extending from the pump to the top of the waterfall

hose adapters, if necessary, to attach hose to the pump

an electric or battery-operated drill

nitrifying bacteria

Making the Bio-filter

1. Rinse the lava rocks well to prevent their dust from coloring the pond water.
2. Mark the container lid with a hole the size needed to bring the outlet hose out of the box. A drill may be used to remove this section. Be sure the hose will fit through.

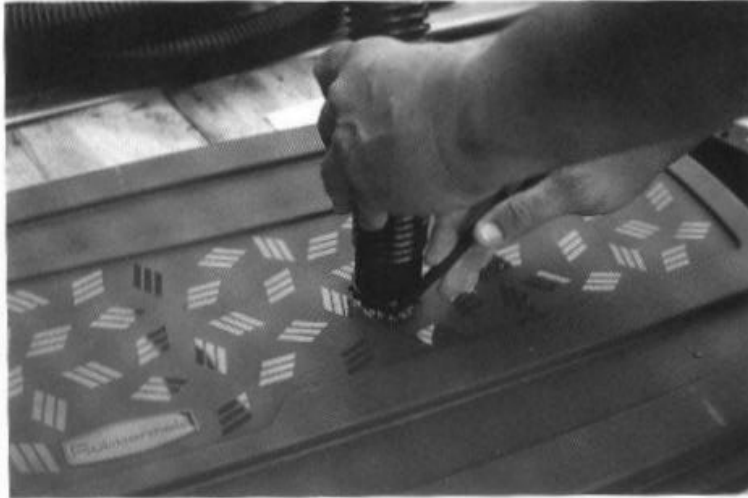
3. Use the largest drill bit to make holes a quarter to half inch (0.6–1.3 cm) apart over the entire lid.

4. Set the pump with its connected hose in the bottom of the container and fill lava rock all around it and up to within a few inches (5 cm) of the top.

5. Thread the outlet hose through the lid and lower the lid so it can be fastened securely once the bacteria have been poured in.

6. Set the filter in the pond in the desired location, pour in bacteria, and fasten the lid.

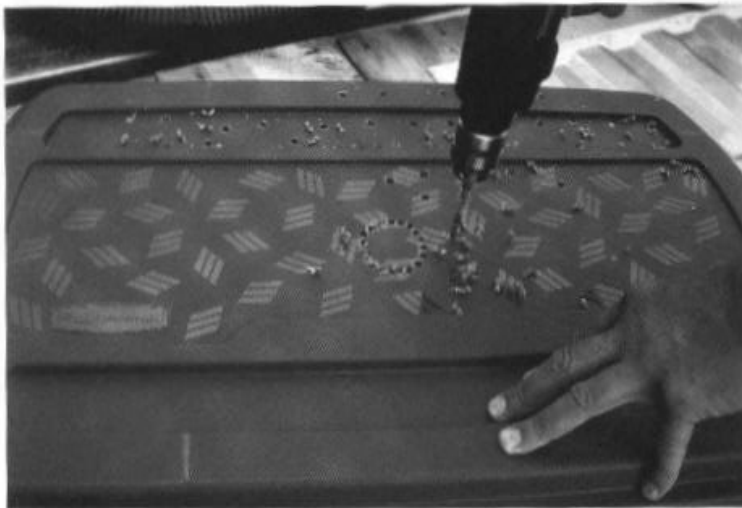
7. Bury the outlet hose up to the point of water re-entry if a waterfall setup is used. If a fountain is set up, the hose should be connected to it.



Mark the top of the plastic storage unit for the pump base and cord to access the filter. Photo by H. Nash.



Thread the lid onto the base that is affixed to the pump inside the container. Photo by H. Nash.



Drill holes in the top of the container so water can enter the unit. Photo by H. Nash.



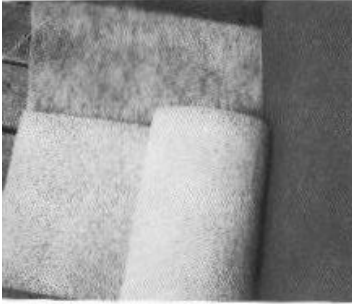
Fill around and over the pump with washed lava rock. Photo by H. Nash.



Replace the lid and submerge filter box in pond. Photo by H. Nash.

RUNNING AND MAINTAINING

The pump should be run around the clock in order to assure the nitrifying bacteria the oxygen they need to live. No maintenance is required during the season. When the temperatures stabilize below 50°F (10°C) in the autumn or winter, remove the pump from the pond. Set up the pump for winter operation, if desired, and store the cleaned filter until spring.



Filter media, commonly called foam, is available in different densities and thicknesses. Photo by Oliver Jackson.

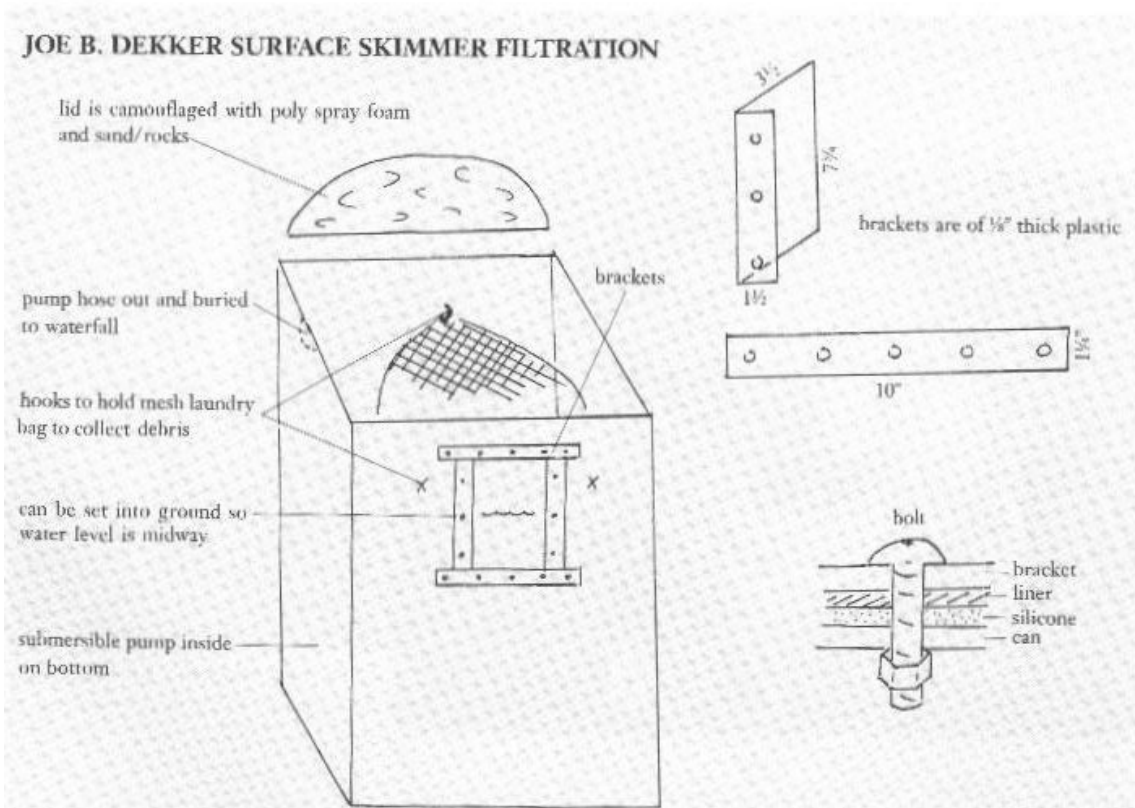
The system consists of a 30-gallon plastic trash can installed immediately adjacent to the pond with the opening of the unit sealed to the pond liner. A submerged pump in the bottom of the can pulls in the surface water and returns it to the pond through a flexible hose routed to a waterfall on another side of the pond. A nylon laundry bag hung on hooks inside the can collects the debris. The can lid is camou-

flaged with spray polyfoam and rocks and sand or by a flat stone. A natural or bio-filter can be included and set up at the waterfall.

CONSTRUCTION

Materials Needed

one 30-gallon (120 l), heavy-duty, plastic trash can



one piece of $\frac{1}{8}$ " (0.3 cm) thick plastic at least 10×9 " (25×23 cm), which will be cut into pieces, one measuring $10 \times 1\frac{1}{2}$ " (25×4 cm) and two measuring $7 \times 1\frac{1}{2}$ " (18×4 cm)

eleven $\frac{1}{2}$ – $1\frac{1}{4}$ " (0.04–3 cm) bolts with nuts

five screw-in hooks

one tube of RTV single-component silicone

one nylon-mesh laundry bag

$1\frac{1}{4}$ " (3 cm) flexible black hosing to reach from pump to waterfall

submersible water garden pump of at least 750 GPH

hose adapter, if required, to affix hose to pump

Optional: filter foam to fit inside dimension of trash can

spray polyfoam for camouflaging lid

Preliminaries

1. Excavate a hole adjacent to the pond edge to accommodate a 30-gallon (100 l), heavy-duty, plastic trash can so the water level of the pond will be at the midpoint of the centered 7×8 " (18 – 20 cm) cut-out $1\frac{1}{2}$ " (4 cm) from the top of the can.

2. Layer the bottom of the excavation with 2–4 inches (5–10 cm) of well-tamped crushed stone.

3. Provide a shallow trench from the can to the waterfall for routing the flexible return hose.

Preparing the Can

1. Mark and cut out an 8×7 " (20×18 cm) rectangle $1\frac{1}{2}$ " (4 cm) down from the top and centered on the front of the can.

2. Cut a slot from the side of the top for the pump hose and electrical cord to exit the can when the lid is replaced.

3. Cut three brackets from $\frac{1}{8}$ " (0.3 cm) thick plastic:

Cut one at $10 \times 1\frac{1}{4}$ " (25.5×3 cm) (for the horizontal bottom edge of hole)

Cut two at $7 \times 1\frac{1}{4}$ " (18×3 cm) (for the left and right vertical edges)

4. Match up brackets to the opening edges of the can and drill holes for bolts.

5. Set the can into the prepared excavation.

6. Apply $\frac{1}{4}$ " (0.6 cm) thick by $\frac{1}{2}$ " (1.3 cm) wide RTV single-component silicone compound around the face of the cut-out of the can. Press liner to the face of the can and hold it firmly to the silicone by bolting on the three brackets.

7. Use the cut-out of the can as a guide to cut the liner across the top and down the sides for a matching hole. Fold the liner flap to the inside of the can.

8. Attach two screw-in hooks approximately 8" (20 cm) down from the top of the can on each

side of the cut-out and two screw-in hooks 1" (2.5 cm) down from the top on each side of the cut-out so the pond liner flap is enclosed within the bag. Attach another hook 1" (2.5 cm) down from the top to the center of the opposite side of the can. (The skimmer bag will hang on these five hooks.)

9. Connect the flexible hosing to the pump and place the pump in the bottom of the can. Route the hose and the pump's electrical cord from the can.

10. Optional foam may be cut to fit over the pump for additional small-particle filtration.

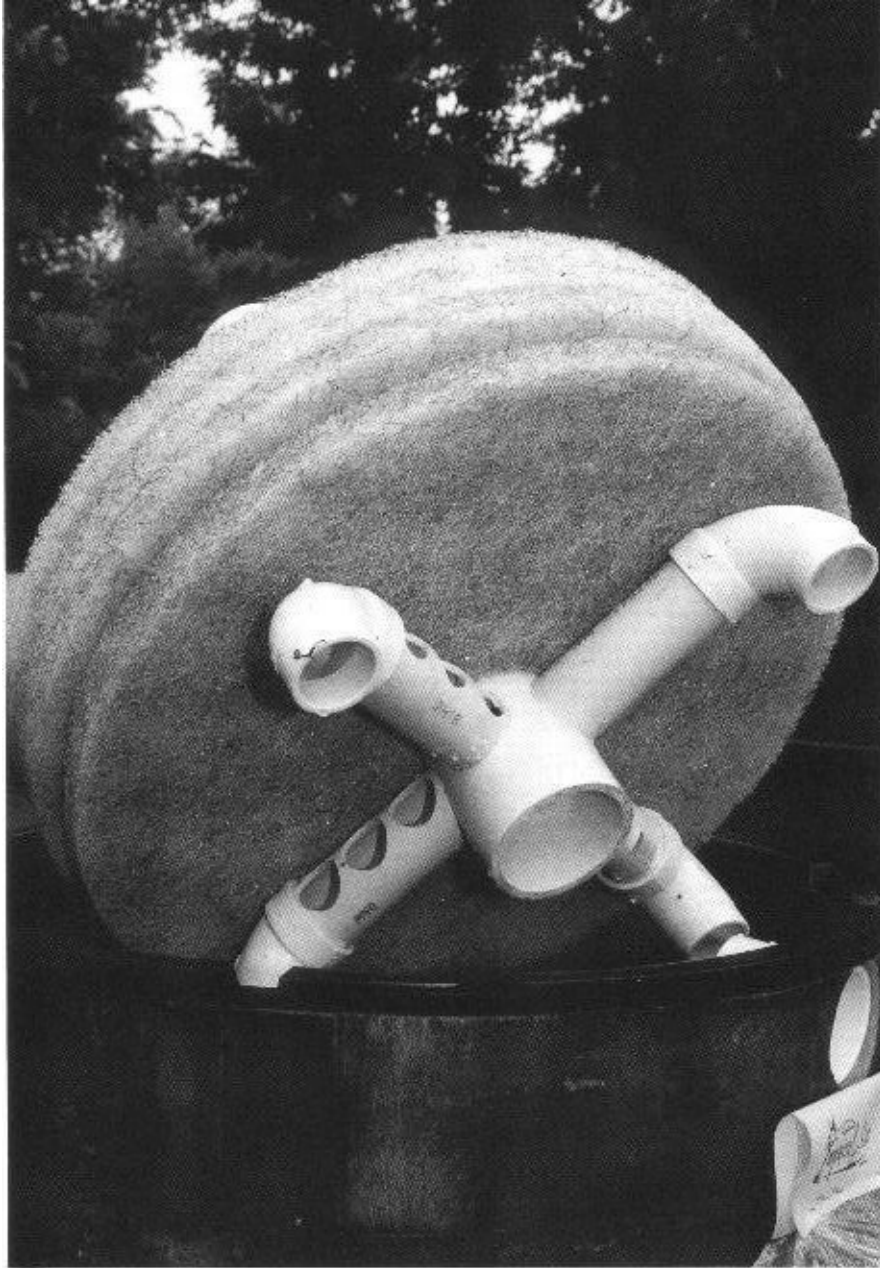
11. Attach the edge of a nylon laundry bag onto the hooks inside the can while keeping slack at a minimum.

12. Poly foam may be sprayed onto the can lid. While it is wet, sand and small gravel may be tossed onto it for camouflage. Flat paving stones can also be used to hide the lid.

Using the System

1. During operation, the water level should be maintained at one-half to two-thirds of the way up the opening of the cut-out.

2. Clean out the nylon bag as needed. Likewise, hose clean any foam media as needed.



George Rosicky's Leisure Bio Filter design features centrifugal pipes below the filter mats. Photo by H. Nash.

Because lava rock and other filter media may clog with particulate matter, West Coast hobbyist Ron Williams has devised a way of keeping it clear. He uses a 1/2" (1.3 cm) PVC pipe run to the bottom of his rock filter, where the pipe is hooked into a horizontal ring full of 1/4" (0.3 cm) holes. When his filter shows signs of slowing, he turns off his pump, plugs up the outflow pipe from the filter, and attaches a wet-dry vacuum to an adapter on the top inflow pipe. The air blown into the pipe bubbles up through the rock media and dislodges debris that floats to the top, where it is skimmed off.