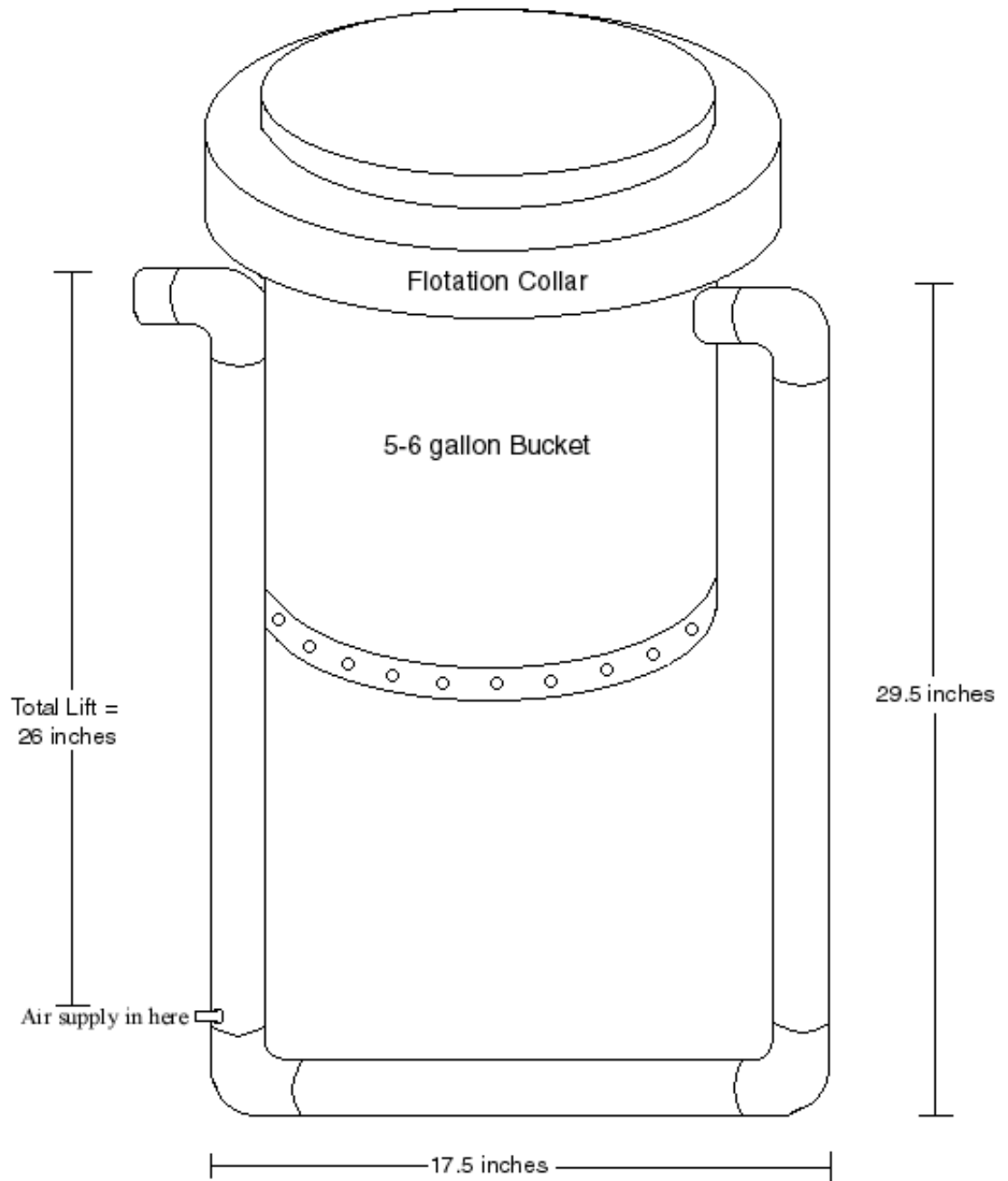


Student Sheet #2



Upweller Nursery Assembly

In this exploration you will construct your own airlift upweller shellfish nursery using common construction tools and materials. Upweller nurseries usually produce good shellfish growth rates while keeping the investment of effort and money to a minimum. You can raise a high volume of shellfish within a relatively small space and the routine maintenance of the system is relatively easy. You can refer to Student Sheets #1 and 2 to help you when you are constructing your system.

- Safety glasses must be worn when constructing the upweller system.
- Care should be exercised when using power tools to cut plastic pipe and bucket.
- PVC cement must be handled carefully as it contains potentially hazardous chemicals.
- All electrical outlets used near water must be equipped with ground fault interrupters.

Materials

Each student group will need:

- five- to six-gallon plastic straight-sided bucket
- four 90° elbows – 2-inch diameter Schedule 40 PVC with slip joints
- one male adapter – 2-inch diameter Schedule 40 PVC with slip joints
- approximately 55 inches of 2-inch diameter Schedule 40 PVC pipe
- one plastic pipe hanger for 2-inch diameter Schedule 40 PVC pipe
- PVC cement
- approximately 15-inch by 15-inch square of fiberglass window screen
- tube of aquarium-grade silicone sealer
- one hose clamp – large enough to clamp around the bucket
- approximately 20-inch by 20-inch square of rigid foam insulation – two inches thick
- eight small (#12) nylon machine screws with nuts
- one small (1/4-inch) nylon machine screw with nut
- 2.25-inch hole saw
- band or table saw
- hand drill with bits to make holes for the two sizes of nylon bolts
- small air pump capable of providing XXcfm at 30-inch depth
- airline tubing sufficient to reach from the air pump to the upweller silo
- one airstone capable of fitting into 2-inch diameter PVC pipe

1. Using the power saw, remove the bottom of the bucket by cutting around the outside of the bucket at the bottom.
2. Cut a second time around the bottom to remove a 1-inch cylindrical band of plastic.
3. Cut a hole with the 2.25-inch hole saw approximately 1/3 of the way down from the top of the bucket.
4. Drill a hole for the 1/4-inch nylon machine screw directly opposite from the 2.25-inch hole and approximately 2 inches up from the bottom.
5. Lay a bead of silicone cement around the outside of the bucket at the bottom in a 1-inch band.
6. Stretch the window screen over the bottom of the bucket and clamp it over the sides of the bucket with the hose clamp, making sure that the clamp is higher than 1 inch from the bottom of the bucket. Pull the screen tight under the clamp.

Student Sheet #3

7. Place the 1-inch plastic band over the window screen on top of the silicone cement. You can split the ring if you need to get it on or you can heat the band to approximately 350°F to stretch it over.
8. With the band in place, drill holes through the band, window screen, and bucket wall and screw the band down with the nylon machine screws to hold the window screen in place.
9. Allow the assembly to dry overnight.
10. The following day, remove the hose clamp and cut away the excess window screen above the band.
11. Attach the plastic pipe hanger to the bucket using the 1/4-inch machine screw through the hole you drilled.
12. Cut the PVC pipe into two pieces 22 inches long and a single piece approximately 10.25 inches long (this may vary depending on the diameter of your bucket).
13. Assemble the PVC pipe with elbows as indicated in Student Sheet #2, Figure 2.
14. Cut a circle out of the center of the rigid 2-inch foam such that the bucket will fit into it.
15. Attach the foam to the bucket either by hanging the rim of the bucket onto the foam (being careful to cut the correct diameter in the foam) or by using nylon ties to hold the foam in place.
16. Attach the pipe assembly to the bucket by inserting the PVC male adapter from the inside out through the 2.25-inch hole in the bucket and cement the male insert into the inward facing elbow.
17. Snap the opposite side of the pipe assembly into the plastic pipe hanger.
18. Place the upweller into the water, insert the airstone (attached to the pump with the airline) into the discharge side of the airlift, being careful not to extend the airstone beyond the bottom elbow.
19. When you turn on the air, you have a functioning upweller silo. Allow the system to run for 24-48 hours to leach out any solvents associated with the plastic assembly.
20. Add shellfish seed, making sure the seed is of sufficient size to be retained on the silo screen. Test it first with a sieve constructed of window screen.