

Make Your Own Plankton Sieves: A Tool for Studying Plankton.

This guide provides step-by-step instructions on making a series of sieves or strainers that can be used to separate marine plankton into different size class. Each sieve is constructed using a fine netting material with a particular mesh size. When a plankton sample is poured through a series of sieves, organisms in the sample can be separated based on their overall length or size. This technique is called size fractionation and it provides a starting point for a variety of further studies and activities for students of all grade levels.

Why size fractionate?

When a plankton sample is separated by size, the specific size categories can provide useful information about the organisms and can be a good starting point for further studies. Size categories can help narrow down species identification or they can be used to investigate the different trophic levels (i.e., producers, herbivores and carnivores) of the marine food web. Plankton samples obtained from offshore tows will collect a diversity of species including a variety of phytoplankton as well as zooplankton. Phytoplankton are typically microscopic in size and are the primary producers in the marine ecosystem. Zooplankton are often macroscopic in size and are considered consumers since they feed on phytoplankton or other types of zooplankton.

Materials Needed:

- 2" PVC pipes (each sieve is 4" in length) *
- 2" PVC couplings (1 coupling per sieve)
- Nitex mesh cloth of various sizes
(can be order from www.wildco.com, www.sterlingnets.com, or www.sefar.com)
- Small tube of silicone
- Scissors
- Marker
- Hacksaw or pipe cutters

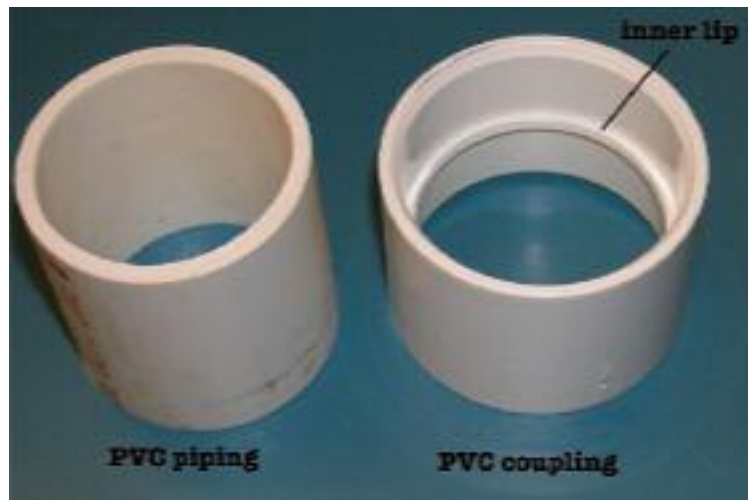


* Alternative materials:

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- You can make plankton sieves out of plastic beakers or even plastic cups instead of PVC piping.
- You can also hot glue the Nitex mesh cloth to the PVC pipe edge instead of using silicone. However, hot glue tends to break down and degrades more quickly than silicone.
- Although PVC piping is more challenging to cut, the snug fit of the inside pipe against the inner lip of the coupling creates a more effective and durable straining device.



Instructions:

1. Cut the PVC piping into pieces that are approximately 4 inches in length. Make sure that the cut edges are smooth and as straight as possible. If using plastic beakers or cups, cut off the bottom making sure that the cut edges are as straight as possible.
2. Trace a circle onto the mesh netting using one of the 4" PVC pipes as a template. When you cut out the mesh circle, leave a margin about one finger thick around the outside edge of the circle.



3. Dab a small amount of silicone on the cut end of the 4" PVC pipe. Place the mesh circle on top of the silicon and pull the netting tight over the end of the pipe.



4. Press firmly around the edges until the silicone squeezes through the holes of the mesh. Smooth the silicone with your finger and then allow it to dry for about 30 minutes.



5. Insert the 4" PVC pipe into the PVC coupling making sure that the mesh covered end is orientated down. Force the 2 pieces together until the bottom of the 4" PVC pipe fits snugly against the inner lip of the coupling. To make sure that the PVC pipes are securely connected, place both hands on the upper pipe and lean down hard with your body. Or carefully bang the sieve on a hard surface a few times.



6. For sieves made from PVC piping, examine the mesh to make sure that its connection with the inner lip of the outer couplings is complete and secure.

**Your fractionate sieve
is now ready to use!**



7. If you make several sieves with various mesh sizes, you can stack them one on top of the other to select for specific size categories. The number of categories and their respective sizes will depend upon the number of sieves used as well as the specific mesh sizes of each sieve.
8. Stack the sieves making sure that the smallest mesh size is on the bottom and the largest mesh size is at the top. Place the stack of sieves in a plastic pan or tray to catch the filtrate. Slowly pour the sample through the top sieve.



Congratulations! You have now separated your plankton sample into size classes based on your selection of plankton sieves.

9. Organisms of specific sizes or lengths are now caught on the inside of each sieve. To get them off the mesh, you will need to backwash each sieve into a separate container.

First separate the different sieves in the stack. Then for each sieve, turn the sieve upside down over a clean container and squirt the water on the mesh netting. This will wash the plankton off the mesh netting and into the container below.



10. What you might find in various plankton size classes:

1 mm and above: jelly plankton and fish larvae

200 microns –1 mm: large zooplankton

64-200 microns: small zooplankton

20-64 microns: phytoplankton

less than 64 microns: smaller phytoplankton, microbes, viruses

Conducting a Plankton Tow:

Marine plankton can be collected from both inshore and offshore waters using inexpensive nets constructed from everyday items or more expensive models sold commercially. A plankton sample collected off a pier in a harbor setting can be just as productive as one collected from a vessel miles from shore. Homemade nets are easy to make from every day materials like nylon stockings and metal coat hangers. Commercial nets have a longer lifespan and are designed to collect plankton of a specific size range depending upon the size of the mesh used. Commercial nets come in a variety of sizes and price ranges and can be purchased from science supply companies and oceanographic supply businesses. With plankton net in hand, you can collect both microscopic and macroscopic organisms that form the base of the marine food chain.

The species of plankton that you collect from your plankton tow will depend upon the mesh size of your net and the depth of the water column that is sampled. Once the tow is complete, make sure to rinse the sides of the net with salt water. This will wash any plankton stuck in the mesh down into the collection chamber at the bottom of the net. You now have a concentrate of plankton that can be used in numerous activities and observations. Before removing a portion of your plankton sample for further study, you may want to record the initial volume of your plankton concentrate. This volume is needed in order to determine the number of planktonic organisms per volume of seawater.

Further Resources:

A Guide to Marine Coastal Plankton and Marine Invertebrate Larvae by Deboyd L. Smith, Kevin B. Johnson. Kendall Hunt Publishing Company. June 1996.

Common Marine Plankton Poster by Dr. Juanita Urban-Rich.
<http://www.cosee-ne.net/resources/resourcesforeducators.php>

Coastal Marine Zooplankton. A Practical Manual for Students. Second Edition. Christopher D. Todd, M.S. Laverack and Geoff Boxshall.

Methods in Marine Zooplankton Ecology by Makoto Omori and Tsutomu Ikeda. New York: Willey 1984.

Zooplankton of the Atlantic and Gulf Coasts: A Guide to Their Identification and Ecology. William S. Johnson, Dennis M. Allen and Marni Fylling.

Zooplankton Methodology Manual edited by Roger P. Harris, Peter H. Wiebe, Jurgen Lenz, Hein-Rune Skjoldal and Mark Huntley.

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Kelly Rakow has been very involved with Project PSOS since the beginning, working on developing a plankton station. She is pursuing her PhD in the lab of Dr. Larry Madin through the MIT/WHOI Joint Program in Oceanography. Her research interest is the ecology of gelatinous zooplankton. Kelly enjoys passing on scientific inquiry skills and enthusiasm to the next generation of scientists through education and outreach activities.

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