CORNELL Cooperative Extension

Commercial Farm Pond Management Series

Calculating Water Volume in Ponds

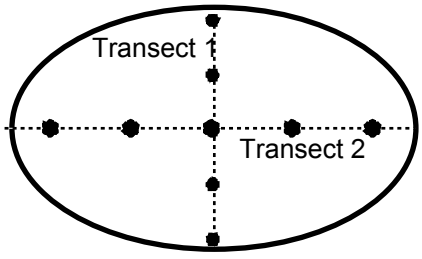
It is often important to know the volume of a farm pond. If you are using a pond as a water source for irrigation or watering, the pond volume limits the amount of water available over a short period of time. By calculating the pond volume after drawing down the water level, followed by making a new pond volume estimate several days later, you can also determine the pond recharge rate; that is, the rate at which groundwater or surface water replenishes the pond water supply.

Pond volume can also be important for non-farm uses. For example, it is helpful for local fire officials to know the volume of ponds used as water sources for fire suppression. It is also important to know the pond volume when applying chemical treatments to control aquatic vegetation or algae, since treatment amounts are often established according to pond volume.

In general, calculating the volume of a pond requires taking into account the overall shape, as well as requires measuring both pond surface area and depth. In this fact sheet, we provide several approaches for taking these measures and calculating the volume of farm ponds with different shapes.

Depth

Calculating pond volume always requires some measure of water depth. Water depth can be easily measured from a boat along two perpendicular transects. One simple approach is to use a weighted



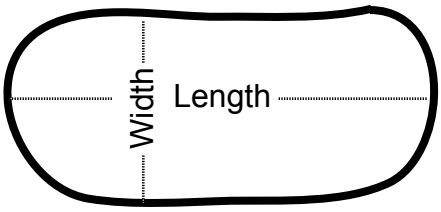
line to measure depth at five evenly-spaced locations along each transect (a greater number of measurements should be taken from ponds larger than two acres in surface area). To calculate average depth, the depth measurements should be added together then divided by the total number of measurements. It is also effective to measure pond depth during the winter by drilling holes in the ice along transects at regular intervals, then lowering a weighted line through the holes.

For those seeking a more sophisticated approach to measuring pond depth, hand-held sonar devices are now sold commercially that can measure depths up to 200 ft. The one commercial model with which we are familiar -- Polarvision by StrikeMaster – is about the size of a large flashlight and can be used to measure water depth from a boat or from the surface of an ice-covered lake. This device is available from several specialty angling suppliers.

Volume

The following calculations will give you a reasonable estimate of the number of gallons in your pond, depending on the general shape of your pond.

If you have a rectangular pond (see figure), the following calculation should be used:



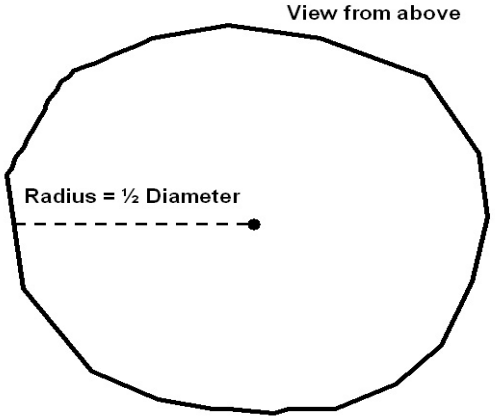
Length **x** Width **x** Average Depth (see above) = ____ cubic feet

To convert from cubic feet to gallons, multiply by 7.5:
(Cubic feet **x** 7.5 = ___ gallons)

If you have a circular pond (see figure) with steep sides that drop off quickly, the following calculation should be used:

3.14 **x** pond radius squared **x** average depth = ___ cubic feet

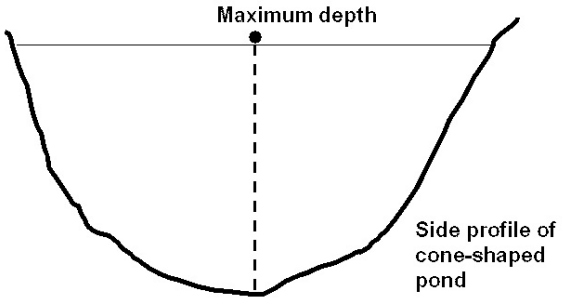
To convert from cubic feet to gallons, multiply by 7.5:
(Cubic feet **x** 7.5 = ___ gallons)



If your pond basin has a conical depth profile (see below) and is circular in shape, you can also calculate the pond volume by using a formula for the volume of a cone:

1.047 **x** surface radius squared **x** maximum depth = ___ cubic feet

To convert from cubic feet to gallons multiply by 7.5



Prepared by Cliff Kraft, Assistant Professor, Department of Natural Resources, Cornell University, December 2002. Production of this fact sheet was funded by a Cornell Small Farms Program Grant.

If you are interested in additional information about commercial farm pond management, please refer to the other fact sheets in this series:

Farm Pond Safety and Responsibility
Meeting Small Farm Needs with a Pond
Farm Pond Maintenance Routines
Farm Ponds and Fire Suppression

You can access these and other pond management topics on-line at http://pond.dnr.cornell.edu