Natural Resources Facts
School of Natural Resources, 2021 Coffey Road, Columbus, Ohio 43210 ■ Phone 614-292-2265

Pond Measurements

Eric R. Norland
Assistant Extension Specialist, Natural Resources

Implementing pond management practices necessitates knowing the surface area and volume of the water impoundment. Aquatic herbicide applications, fish stocking rates and fertilization treatments are prescribed on the basis of area and/or volume of the pond.

There are several sources for information about the size and volume of your pond. If a Soil Conservation Service technician or civil engineer designed and supervised the pond construction, that person should be able to provide you with the necessary measurements. Additionally, the local Agricultural Stabilization and Conservation Service office may have an aerial photograph that shows your pond; the surface area can then be calculated from the photo. A surveyor can also be hired to determine the surface area.

Another practical alternative is for you to make your own pond measurements by following the steps listed below. To assure accuracy, take all measurements carefully and carry all calculations to at least four or five decimal places (i.e., 0.11478 acres). When the final calculation has been performed, then round the number to one decimal place.

Surface Area

Shoreline measurements are made with a tape measure or by pacing, and are then used in the appropriate formula below.

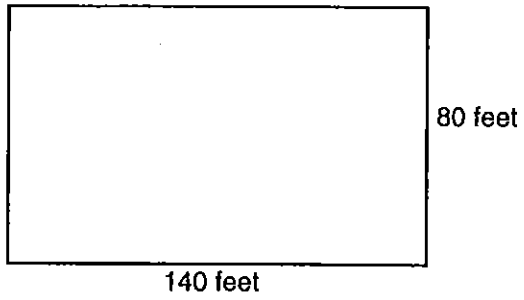
If the pond is **rectangular or square**, use the following formula:

$$\text{Surface area, in acres} = \frac{\text{length, in feet} \times \text{width, in feet}}{\text{43,560 sq ft per acre}}$$

Example: (Figure A)

$$\frac{80 \text{ feet} \times 140 \text{ feet}}{\text{43,560 sq ft per acre}} = .2571 \text{ A, or approximately } \tfrac{1}{4} \text{ acre}$$

Figure A



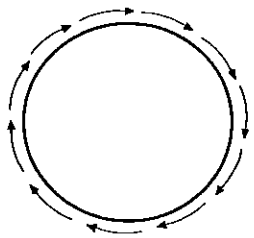
If the pond is **circular or nearly so**, use this formula to determine surface area:

$$\text{Surface area, in acres} = \frac{(\text{total feet of shoreline})^2}{547{,}390}$$

Example: (Figure B)

$$\frac{(520 \text{ feet}) \times (520 \text{ feet})}{547{,}390} = 0.4939 \text{ acre, or approximately } \tfrac{1}{2} \text{ acre}$$

Figure B



THE OHIO STATE UNIVERSITY EXTENSION

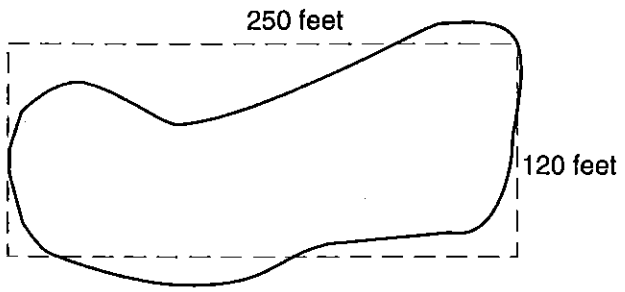
Many ponds are **irregularly-shaped**, which makes the area measurements more difficult. In this case, approximate the pond shape as either a square, rectangle or circle by measuring boundary lines that most nearly represent the actual shoreline.

Example: This pond shape can be approximated as a rectangle (Figure C).

Surface area, in acres $= \frac{\text{length, in feet X width, in feet}}{43{,}560}$

$= \frac{250 \text{ X } 120}{43{,}560} = 0.6887$ acre

Figure C



Volume Measurements

Calculating the total volume of water in the pond is a two-step process:

Step 1: Determine average depth of the pond by taking uniformly-spaced soundings over the entire pond surface. This can be done from a boat, or during the winter when ice covers the entire surface. The measurements can be taken with a long pole, chain or weighted rope marked off in feet. At least 15 measurements should be taken. Add the measurements and divide by the number of measurements taken.

Example: Average depth =

$$\frac{2+3+5+8+9+1+4+6+9+0+1+2+3+3+8}{15}$$

$= \frac{64}{15} = 4.27$ feet

Step 2: Once you have determined average depth and surface area, acre-feet are determined by multiplying the two measurements:

Volume, in acre-feet =
Surface area, in acres X Average depth, in feet

Example: A 1.5-acre pond has an average depth of 4.27 feet.

Acre-feet = 1.5 acres X 4.27 feet = 6.405 acre-feet

Frequency of Measurements

Pond measurements should be re-taken whenever there is an appreciable change in either surface area or average depth. Significant changes in surface area occur when existing ponds are enlarged. However, average depth changes very gradually over a period of years as a result of natural processes. Sediment inflow and the accumulation of decomposing vegetation will cause a pond to gradually become shallower. A pond that may have been 15 feet deep when it was constructed may only be 10 feet deep after several years. Average depth should be re-calculated every five years to account for the gradual filling in of the pond. Soil disturbances in the watershed or excessive accumulation of decomposing vegetation in the pond will require more frequent measurement of the water depth.

Measuring Small Areas Within a Pond

Some pond management activities involve the treatment of only a portion of the water impoundment. In these situations, the same formulas are used but the treatment area dimensions are much smaller.

Example: A pond owner desires to treat a 50' x 100' swimming area for leeches, using a rate of 13.5 pounds (equivalent to 5 parts per million) of copper sulfate per acre-foot (Figure D).

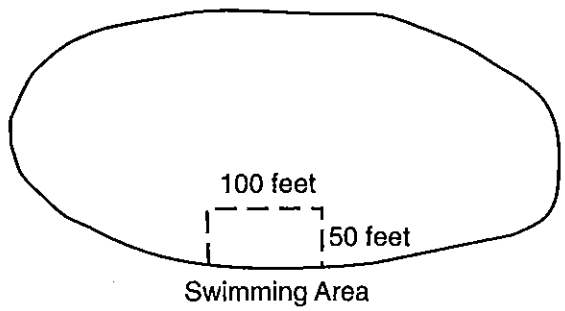
Surface area to be treated $= \frac{50 \text{ X } 100}{43{,}560} = 0.11478$ acres

Average depth of swimming area =
$\frac{1+2+3+5+2+3+4}{7} = 2.8571$ feet

Acre-feet in the swimming area = 0.11478 X 2.8571
= 0.32794 acre-feet

Amount of cooper sulfate to use =
0.32794 acre-feet X 13.5 lbs per acre-foot
= 4.4272 lbs of copper sulfate in swimming area
= 4.4 lbs

Figure D



4/93 — 5M — 105190 REVISED
Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, In cooperation with the U.S. Department of Agriculture, Keith L. Smith, Director, Ohio State University Extension, The Ohio State University.
All educational programs and activities conducted by Ohio State University Extension are available to all potential clientele on a non-discriminatory basis without regard to race, color, creed, religion, sexual orientation, national origin, sex, age, handicap or Vietnam-era veteran status.