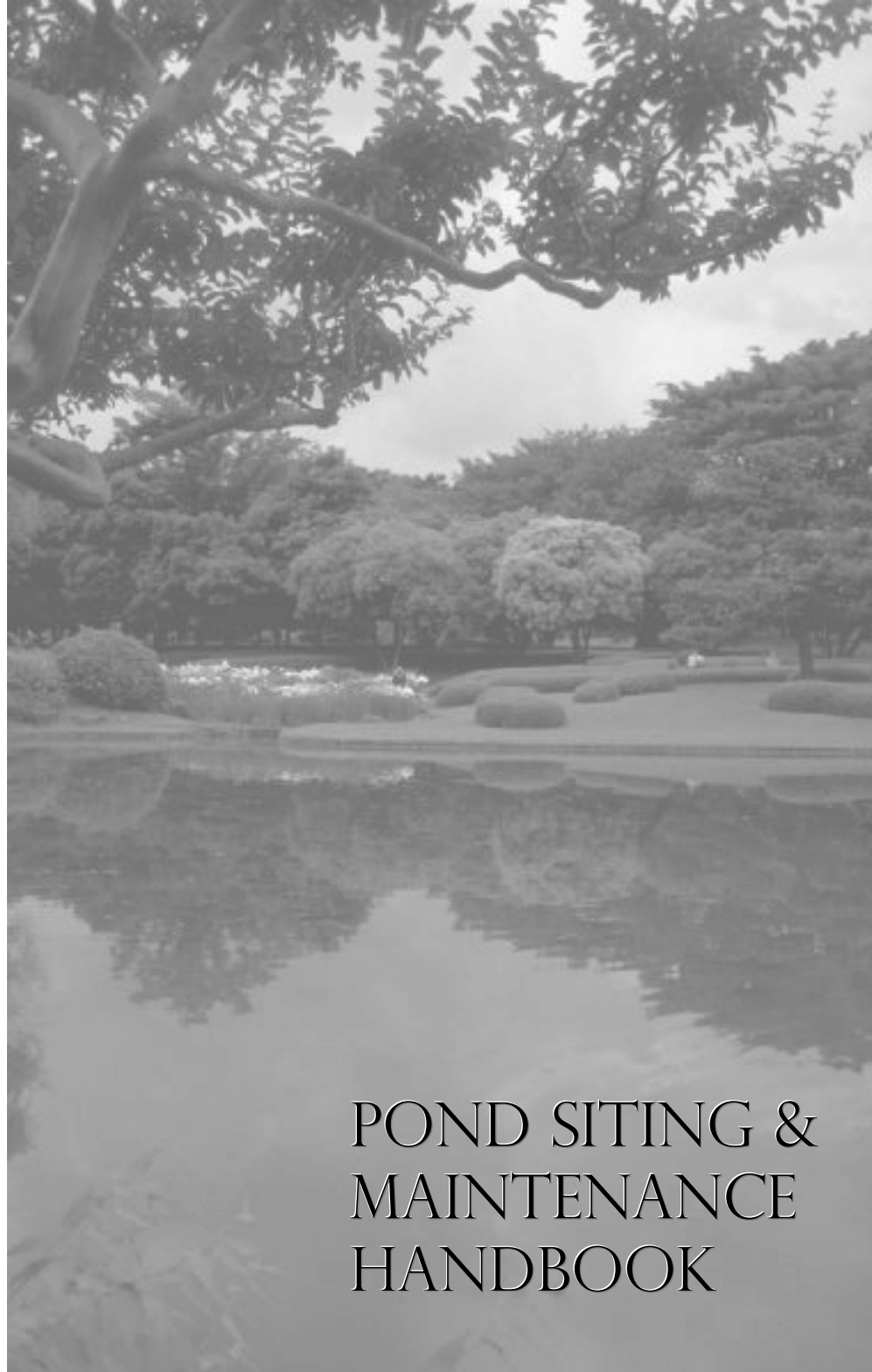


**Ontario County Soil & Water
Conservation District**

Kathy Blachowski, May 2006



**POND SITING &
MAINTENANCE
HANDBOOK**

POND SITING HANDBOOK

Building a pond is a practical way to supply water for recreation, fire protection, fish production, livestock, wildlife, and many other uses. Suitable sites are available in most areas and on a well-suited site, a pond can be built at a reasonable cost.

This booklet discusses various uses for a pond and important information on pond building and maintenance. It may help you to decide whether a pond is an answer to a water supply problem on your land.

POND USES

The main use for a pond generally determines how large of a pond you need, what form it should take, and where the proper site is.

A. Livestock

Water is as important as forage in the production of livestock and the type and location of these watering systems is equally as important. A traditional method of water distribution has been the installation of a pond within the pasture, however a stationary source of water results in the concentrating of the grazing animals in the area closest to the water source. Current recommendations for watering systems include the use of lightweight, portable troughs and a distribution network of pipelines to provide grazing livestock with a source of water that can be moved throughout the pastures of managed grazing land as needed. More details on grazing management and alternative watering systems can be obtained by contacting your local Soil & Water Conservation District.

Daily Consumption of Water by Livestock

Kind of Livestock	Gallons Per Head Per Day
Beef Cattle and Horses	12-15
Dairy Cows (drinking only)	15
Dairy Cows (drinking & barn needs)	35
Hogs	4
Sheep	2

B. Irrigating and Spraying Crops

The amount of water needed for irrigation depends on the area to be irrigated, the water requirements of the crops, and the type of irrigation to be utilized (trickle tubes or aerial dispersion). It also depends on the rainfall during the growing season, the water loss caused by evaporation and percolation, and the efficiency of the irrigation methods used.

The amount of water needed for spraying field and orchard crops to control insects and plant diseases usually is small, but it must be available when needed. Trickle tube irrigation systems provide a far more efficient method of water delivery than aerial systems.

Technicians experienced in irrigation work can estimate how much water you will need. You can obtain assistance locally from technicians with the Soil & Water Conservation District (585-396-1450).

C. Fish Production

A well-managed pond can yield a dependable supply of fish and provide recreational use as well. A fish pond can also be opened to the public for fee fishing to supplement income.

A pond with a surface area as small as one-quarter acre (104 ft. x 104 ft.) can be managed for fish production. Less than two acres is a good family-sized fishpond for management. Information on managing ponds for fish production is also available from the Soil & Water Conservation District.

D. Fire Protection

A pond can provide water for fire-fighting. A pond near your home can be equipped with a pump and sufficient hose length to reach your buildings. Pond water can also be used to fill pump fire trucks if an access road is available. As little as one-tenth of an acre/foot of water (about 32,600 gallons) provides good fire protection. This amount of water would supply 250 gallons per minute for more than two hours. The Finger Lakes RC&D provides materials at a reduced cost and the SWCD can assist with the installation of a fire protection system.

E. Wildlife

Even a small, shallow pond will be very attractive to all sorts of wildlife. A pond will be more heavily used by wildlife whose other vegetative requirements for food, cover, and shelter are met close by.

F. Recreation

A pond can provide many pleasant hours of swimming, skating, and boating for your family. A pond from one-quarter acre to one acre in surface area is suitable for family use. If the pond will be open to the public on a fee basis, it should probably be larger than five acres. If you expect to use the pond for recreation, additional safety measures are needed.

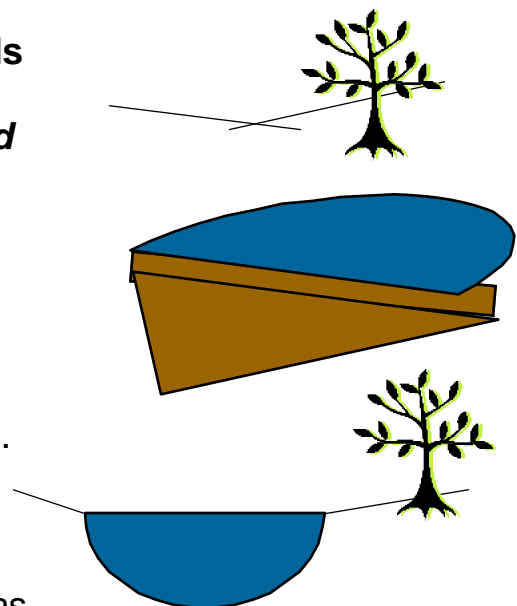
G. Multiple Uses

You will probably have several uses in mind of your pond. For multiple use, you should be sure that the supply and quality of water is adequate and that the uses are compatible. For example, recreational and irrigation use may not be compatible since you will use large amounts of water during the warm weather, making swimming and boating difficult.

Types of Manmade Ponds

Embankment ponds and **excavated ponds** are the two general kinds of manmade ponds. In **embankment ponds**, water is impounded behind an earth dike or dam. Embankment ponds are generally suited to sloping areas, though slopes greater than 10% can be a considerable problem in the creation of this type of pond.

Excavated ponds are made by digging a pit below the surrounding ground level. They can be built in nearly level areas. Excavated ponds are best suited to uses



for which a small pond is adequate.

Some local governments require a permit before constructing any ponds. New York State does not regulate smaller ponds, but larger ponds may require a permit and an engineered design. Before you start constructing your pond, contact your local Code Enforcement Officer and the Soil & Water Conservation District or regional DEC Office of Regulatory Affairs for permitting requirements. And as with any excavation project, contact Dig Safely New York for utility clearance.



Pond Depth

Pond depths are influenced by natural topography, side slopes, and intended uses. Some recommended ***depths for quarter acre ponds*** are:

1. Swimming Pond: 6 to 8 ft. minimum in center
2. Trout Pond: 8 ft. minimum over 1/3 of bottom surface area
3. Warm Water Fish Pond: 6 ft. minimum over 1/3 of surface area
4. Wildlife Marsh or Pond: 5 ft. deep with 1/3 of the pond at the depth of 1 ft.
5. Fire Pond: 6 ft. deep, and an additional 2 ft. deeper at hydrant inlet

Some Important Points to Remember:

Before you build your pond...

- * Find out what community or state laws pertain to constructing a pond.
- * Locate your pond so that it will not receive runoff from barnyards or other contamination sources. Ponds must be located at least 200 feet away from a septic system leach field.



- * Decide on your uses for the pond so that you or your engineer can plan beaches, guards over conduits, and other safety measures as needed. Visit the following website for more information on requirements: <http://assembly.state.ny.us>
- * Have your pond designed and built by a reputable contractor who will follow design specifications.
- * Visit your Soil & Water Conservation District office to obtain the topographic and soil maps for your proposed pond.
- * Dig test pits to the intended depth of the pond to verify soil conditions at the site.

Selecting a Site

There are several points to keep in mind when selecting a pond site. The size of the watershed, the land area that drains into the pond, is important. If the watershed is too large, you may have difficulty in preventing erosion at the pond site. If the watershed is too small, runoff may be inadequate to fill the pond. On balance, people more often choose to locate in watersheds that are too large.

In Ontario County, with clay soils and adequate rainfall, a minimum of 10 acres of watershed land is necessary for every acre of water surface. In other words, as little as 2.5 acres of watershed land may be adequate to sustain a typical quarter-acre pond, especially if the soil has a high clay content. On more porous, sandy soils, larger watersheds may be needed to compensate for losses and sustain a stable water level.

The extent of active erosion in the pond's watershed will dictate the water quality in your pond. If significant erosion is taking place, your pond will fill up with sediment in a relatively short time. Erosion should not be a problem if the watershed has good vegetative cover and appropriate conservation practices are installed. Delay the pond construction while these conservation practices are installed or for installing an upstream sediment trap. Remember, the more a pond's watershed is in your possession and management, the more control you will have over the quality of water in your pond.

Some nutrients travel with sediments while others are dissolved in water. Dissolved nutrients and other pollutants emanating from barnyards, septic systems, landfills, and similar areas that are not properly managed are difficult to eliminate. It is better to site your pond away from such nutrient sources or at the very least to obtain an appropriate vegetative buffer between the nutrient source and the pond.

The uses you wish to make of your pond will have a bearing on its location. A livestock pond should serve a large grazing area while necessitating a minimum travel distance for the animals. Animals should NOT have direct access to a pond but should be watered from troughs or through gates and ramps that limit their access to the pond itself. Several methods exist for pumping water from the source to the trough, including solar and wind powered pumps.

If fire protection is the main use, the key to proper siting is providing easy access to the hydrant. Remember that the conditions of access will change with the seasons.

A secluded site is best for the pond used to attract wildlife. An attractive and accessible site is desirable if you plan to use the pond for recreation. For embankment ponds, the best site may be one where the largest volume of water can be stored with the least amount of fill needed to construct the dike.

Except for wildlife marshes, avoid sites in which the pond will have large expanses of shallow water. Evaporation losses and the growth of aquatic vegetation will be excessive at such sites.

During Construction...

- * Strip and stockpile topsoil.
- * Remove all trees, stumps, and brush within the swimming area.
- * Remove all wire, rubbish, machinery, and fences that might hinder safe recreational use.
- * Eliminate sudden drop offs and deep holes in the swimming area.
- * Include a gently sloping beach area for safe access to the water.

- * Dig a core trench four feet deep under any dike or dam over four feet in height from the original ground.
- * Install a spillway and cut into the native, undisturbed soil, to release water from the pond at an elevation of at least one foot below the lowest point in the dike.

Clearing and Vegetation

1. It is necessary to remove all or most of the trees and shrubs on or near the pond site, dam, and spillway sites and areas in which fill will be placed.
2. Any large or unique trees which are to be retained should be clearly marked. It is the landowner's responsibility to monitor the contractor so that trees are protected. Trees, shrubs, low branches, and root systems (generally the size of the tree's drop line) should be marked with flagging and fencing.
3. Trees cannot survive when soils is placed around their bases and roots. Even half a foot of fill can be fatal. Compaction of soil can also kill trees. If fill must be placed, build stone wells around trees prior to pond construction.

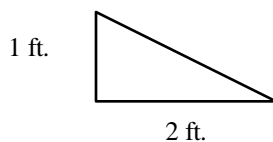
Pond Construction Sequence

1. Clear site. Strip and stockpile topsoil (6 to 12 ft.) before grading the site.
2. Divert surface water away from the site with diversion ditches if necessary.
3. Construct the pond to specifications. Avoid excessively stony or frozen materials for the dike. Build the dike in 6 to 10 inch courses, with compaction.

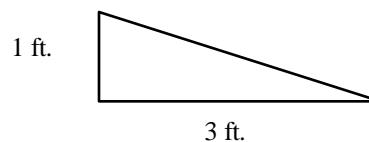
4. Re-seed all disturbed areas, especially the back-slope, slopes of the dike, and bottom of the earthen spillway. The Soil and Water Conservation District will supply you with seeding recommendations.

Side Slopes

Pond side slopes should not be steeper than 2 feet horizontal to 1 foot vertical. Steeper slopes are unstable and will erode. Side slopes of 3:1 are generally recommended for recreation and maintenance areas where fishing, boating, and mowing will occur.



2:1 Side Slopes



3:1 Side Slopes

How Much Does a Pond Cost?

A wide variation in site characteristics, soils, and design details makes for a wide range of pond prices. A reputable and experienced contractor should be able to make a cost estimate based on the number of cubic yards of material to be moved. The Soil and Water Conservation District maintains a list of local, insured excavation contractors. Contact our office at (585) 396-1450 to request a copy of our current contractor's list.

Maintaining a Pond

Timely maintenance of your pond is just as important as good design and construction and can prevent costly repairs.

* Inspect your pond carefully after heavy rains and repair any damage immediately.

preventing erosion and establishing a new seeding under these conditions.

- * The grass on a dam or spillway needs to be mowed several times per year, and a light application of fertilizer may be used to help to establish sod.
- * Watch the pond side of the dike. If it is being damaged by wave action, protect it with riprap or a log boom.
- * Watch the spillway. All trash and debris should be cleared away from spillway pipes, which should be protected with trash racks/ metal grates. An earthen spillway should be watched for excessive erosion, to make certain that the sod cover is not being undermined by flow. A grass sod is a superior form of protection than any form of rock riprap in the spillway.
- * Watch the dam. Burrowing animals such as woodchucks and muskrats can severely damage dikes and dams.
- * If there is a fence around your pond, keep it in good repair. The fence prevents livestock from trampling the shore and polluting the water.
- * Leeches have been known to inhabit Ontario County ponds. A four foot draw-down of water level at first freeze in the fall will help to control their numbers.
- * Several kinds of materials are used to control unwanted aquatic weed growth in ponds. Label instructions should be followed closely. All herbicidal treatments require a permit from the NYS DEC. Copper sulfate is a toxin which has long been used in water supplies for the control of algae. In higher concentrations, it can kill fish and wildlife. A variety of herbicides have been formulated for use on aquatic weeds, however these may prevent other water uses for extended periods of time and can kill fish and wildlife if not properly used. Some pond owners treat their ponds with non-toxic colorants which block light penetration and therefore control aquatic growth. None of these practices, however, remove the source of excessive plant growth in the pond. If a pond has aged, filled with sediment, become overgrown with plants, and contains a good store of nutrients, the only long-term solution is thorough clean-out of the pond area with heavy equipment.

Aquatic Vegetation

Identifying various types of aquatic vegetation in a pond or lake is vital to prescribing proper treatment procedures (if any). A loss of one type of plant species from control practices may lead to the introduction or spread of more troublesome species. Understanding the nature and growth patterns of certain plants will render plant management practices more effective, if needed. Aquatic plants fall under two basic classifications: algae and vascular plants.



Algae are the most common and widely distributed of all aquatic plants. Nearly all water contains many species of the three basic types of algae: plankton, filamentous, and macroscopic.

Vascular plants are divided into three categories based on growth characteristics:

- * Submergents (growing in deeper water, attached to bottom)
- * Floaters (relatively shallow water)
- * Emergents or Marsh Plants (shallow water along shorelines)

The most conspicuous and troublesome aquatic plants belong to the vascular or flowering plant types. These plants vary in size and shape and have characteristics similar to other land plants. Most are green, photosynthesize, and are grazed upon by various species of aquatic animals. Most die back like perennial plants and become dormant in the fall. In the spring, they re-sprout and resume growth.

Please contact our office at (585) 396-1450 to schedule a site visit with a District employee. We will evaluate the status of your pond and provide suggestions for treatments as needed, as well as assistance with permit application when necessary for the recommended practices.

Environmental Factors

Rooted aquatic plants should be seen as a natural part of your pond. They are necessary to oxygenate the water and provide cover for young fish. Ponds age naturally, and one symptom of the process is excessive growth of aquatic plants. Aquatic plants, like other living things, require certain environmental conditions for survival and growth. Many factors affect the distribution and rate of aquatic growth. Once identified, these factors can be manipulated to create the conditions for a healthy pond and to avoid practices that would throw the pond conditions out of balance.

Six basic environmental factors affect the growth of aquatic vegetation:

- * light penetration (and water clarity)
- * depth of water
- * water temperature
- * current or wave action
- * sediment and substrate type
- * the water chemistry (including nutrient levels)

The Treatment of Cloudy Ponds

In some ponds, water does not clear up after construction, heavy rains or wind, or from swimmers stirring up the clay on the bottom. The cloudy condition is caused by fine clay particles that remain in suspension in the water and do not precipitate to the bottom. Ground agricultural limestone applied evenly over the surface at the rate of 1000 pounds per surface acre should flocculate (cause to aggregate) the clay particles and therefore allow them to settle out more readily. Do not use hydrated or quick lime as these will kill fish.

Stocking and Feeding Fish

Selection of fish for your pond requires that you know what its Water temperature is, especially in the warmer summer months. Purchase a submersible thermometer and check the temperatures in the deep water in mid-August. If areas test below 62 degrees, trout will

survive, but they will not reproduce unless other conditions such as flow, temperature, and bottom material can be met. The best time to stock trout is in the fall after September 30th or in the spring no later than May 1st. Bass are stocked in the summer between May 1st and September 30th. Forage fish, such as golden shiners or fathead minnows, may be stocked in April or May, the same year as the bass are stocked. The Soil & Water Conservation District holds an annual fish stocking sale, please contact our office for more information on species available and annual sale dates.

You may wish to feed trout prepared fish food on a regular schedule from spring until September 1st. Feed as per directions and do not feed more than can be consumed in two to three minutes.

Local Hatcheries:

List of New York State DEC Fish Hatcheries				
Hatchery/ Address/ Telephone	Location	Visiting Hours	Major Species	Spawning Season
Adirondack: HCR1, Box 1 Saranac Lake, NY 12983 (518) 891-3358	Off Rte. 30, one mile south of Lake Clear	9am-4pm April 1 - Dec 30	Landlocked salmon	Nov 1- Nov 15
Bath: 7169 Fish Hatchery Rd., Bath, NY 14810 (607) 776-7087	Off Rte. 54, one mile north of Bath	8am-3:45 pm daily	Brown, rainbow, and lake trout	None
Caledonia: 16 North Street Caledonia, NY 14423 (585) 538-6300	Rte. 36, between Mumford and Caledonia	8am-4pm every day, year round	Brown trout	None
Catskill: RR 1, Box 312 Livingston Manor, NY 12758 (914) 439-4328	Hatchery Road in DeBruce	8:30 am- 4pm Monday-Fri.; 8:30 - noon, Sat-Sun	Brown trout	Sept
Chateaugay: RR1, Box 755 Chateaugay, NY 12920 (518) 497-6151	Off Rte 11 .75 mile east of Chateaugay	8 am-3 pm every day year round	Brook, brown, rainbow, lake trout	None

List of New York State DEC Fish Hatcheries (Contd.)

Hatchery/ Address/ Telephone	Location	Visiting Hours	Major Species	Spawning Season
Chautauqua: 952 Pendergast Blvd. Mayville, NY 14757 (716) 789-2705	Off Rte. 394 in Mayville	9am - 4pm Mon-Fri.; Me- morial Day- Labor Day	Muskellunge, wall- eye	Mid-April
Oneida: Box 303 Constantia, NY 13044 (315) 623-7311	Off Rte. 49 in Con- stantia	8am-4pm; every day April 1-Oct 1	Walleye, lake stur- geon	Late Mar- early Apr
Randolph: 1095 1 Hatchery Rd., Randolph, NY 14772 (716) 358-4755	Off Rte. 394 two miles east of Randolph	9am-3:30pm every day year round	Brook, brown and rainbow trout	Sept., Dec.
Rome: 8306 Fish Hatchery Rd. Rome, NY 13440 (315) 337-1390	Off Rte. 46 two miles north of Rome	9am-3:30 pm every day year round	Brook and brown trout, kokanee salmon	None
Salmon River: 2133 County Route 22 Altmar, NY 13302 (315) 298-5051	Off Rte. 13 in Altmar	9am-4pm every day Mar 15-Nov 30	Brown trout, steel- head and chinook, coho and land- locked salmon	Late March and early April and Sept-Oct
South Otselic: Box 170 South Otselic, NY 13155 (315) 653-7727	Rte. 26 in South Otselic	8am-3pm Mon- Fri.; year round	Walleye, brook trout, tiger muskel- lunge	None
Van Hornes- ville: Van Hor- nesville, NY 13475 (315) 858-0857	Van Hornesville, NY	9am-3pm Mon- Fri.; year round	Rainbow trout	None

Safety Measures

It is very likely that your pond will be used for swimming and skating regardless of the intended use. Be sure to remove all trees, stumps, brush, fences, and rubbish from the swimming area. Children are naturally attracted to water, pond owners should protect themselves by fencing, posting warning signs, and providing rescue equipment near their ponds.

Notes of Caution

Every component of pond design has a reason and the design should be followed without deviation. Some of the components have an important bearing on the success and safety of the pond.

All ponds will have some seepage, even though it may not be evident. Not even the most experienced contractor or authority can guarantee that a pond will hold water, but professional services, such as those supplied by the Soil and Water Conservation District, are intended to maximize your chances of success.



Permits and Licenses

Depending on uses and management practices, the pond owner may need to obtain permits from the New York State Department of Environmental Conservation (NYSDEC), 6274 East Avon-Lima Road, Avon, New York, 14414. The Avon office telephone number is (585) 226-2466. Additional state requirement information can be obtained at the New York State Assembly website: <http://assembly.state.ny.us>

A permit or license is required to:

1. Stock Fish
2. Seine
3. Trap bluegills, muskrats, or turtles
4. Drain fish ponds
5. Use fish-killing materials/chemicals
6. Use aquatic herbicides (Only certified applicators will be granted permits by the NYSDEC to apply chemicals to water.)
7. Construct a dam or water-impounding structure unless it:
 - (a) has a watershed of less than one square mile (640 acres); or
 - (b) is less than ten feet in height above the normal ground; or
 - (c) impounds less than one million gallons of water
8. Construct a farm pond on farm land unless it:
 - (a) is not in a natural stream or watercourse and has an earthen embankment which does not exceed fifteen feet from the top height of its embankment to the lowest point of excavation; or
 - (b) does not impound more than one and one-half million gallons and has a drainage area of two hundred acres or less; or
 - (c) has less than ten acres of surface water when full and does not use water diverted from an artificial obstruction in or across a natural stream or watercourse.

Additional permits, either from the NYSDEC or other agencies, may be required even if your proposed project is exempt from the provisions outlined above. You should check with the Region 8 DEC office and with your local government offices to determine the regulatory status of your project BEFORE you begin construction.

Additional Permit Information

The following information was taken directly from the NYSDEC website regarding their permitting practices for pond construction & maintenance.

A Dam Safety Permit for construction of an impoundment structure unless the structure satisfies one of the following permit exemption criteria:

- a. maximum height is 6 feet or less;
- b. maximum impounding capacity is one million gallons or less;
- c. maximum height is between 6 feet and 15 feet and the maximum impounding capacity is less than three million gallons.

Maximum height is measured from the down stream (outside) toe of the dam at its lowest point to the highest point at the top of the structure.

Maximum impounding capacity is the volume of water impounded when the water level is at the top of the structure.

A Stream Protection Permit for the disturbance to the bed or banks of a protected stream. Protected streams are determined by their assigned water classification.

A Freshwater Wetland Permit for undertaking excavation or placing fill in or within 100 feet of a freshwater wetland regulated by the NYSDEC. Regulated wetlands are identified on official NYSDEC Freshwater Wetland Maps

A Mined Land Reclamation Permit for excavating and moving off-site one thousand tons or more of soil and minerals.

Other approvals may be required depending on specific Circumstances. To determine if a proposed pond site contains a protected resource or construction involves activities that will require a permit from the NYSDEC, please contact the DEC Region 8 Regional Permit Administrator at the Avon office—(585) 226-5380.

Volume and Weight Relationships of Water

1 gallon weighs 8.345 pounds
1 cubic foot contains 7.48 gallons
1 acre-foot contains 325,829 gallons
1 acre contains 43,560 square feet

To determine acre-feet, multiply the average length times the average width times the average depth and divide by 43,560.

To determine total gallons, multiply the average length times the average width times the average depth, divide by 43,560, then multiply that result by 325,829.

Evaporation Losses from Ponds

Though there is considerable variation, mean evaporative losses in Ontario County from April through September have been computed as 0.445 cm. per day, or about an inch per week. Without recharge from surface runoff or groundwater, this would lead to over two feet of water level variation in a season.

Managing the Overflow

Building a pond increases your liability for managing the flow of water after the pond is in place. Your action in impounding a large amount of water in an area where water was not previously located, increases your responsibility to assure that the overflow is properly managed so as not to cause damage to your property, adjacent properties, and the environment.

A pond should not be built until you have a plan for properly managing the overflow. There are several common ways of managing overflow. A pipe can be installed during the construction of the pond. If a pipe passes through the dike, it should be properly protected against vibrations and seepage by installation of collars. In some cases, a pipe

may be installed as a segmented drop-structure that will allow total or partial drainage of the pond.

If the pond is small and/or has a small watershed (of less than 10 acres), an earthen spillway may be all that is needed to control the pond water level and manage the overflow. An earthen spillway is a wide, almost-flat, overflow channels constructed in undisturbed soil (even soil compacted into the dike will not be as stable). A typical earthen spillway measures eight to twelve feet wide, perfectly flat over the section to prevent the runoff from building up, and fifteen to twenty-five feet long. Ideally, it returns the overflow to a stable natural channel. Sod makes the best protective covering for the spillway.

Ponds with large surface and drainage areas should have both a drop-structure pipe and an emergency earthen spillway for the best protection of the dike.

There are distinctive problems associated with each type of overflow control. Pipes rust, collapse, and become plugged. Earthen spillways erode, rut, and clog. So proper planning and construction of these structures is essential

Design Considerations

Anyone planning on constructing a pond on their property should carefully consider the increased liability associate with overflow. You can protect yourself by clearing your pond plan with a certified engineer, who can advise you on runoff quantities and overflow capacities.

Design capacities must be calculated based on storm precipitation rates that only occur every ten to twenty-five years. A good illustration of the need for this storage is the streambed that stands dry in August but is transformed into a raging, threatening stream in March. No one wants to pay the extra cost for an excessive design, but that cost may pale in comparison to the property damage caused by an improperly sited or under-sized outlet structure.

Soil Maps & Geographic Information Systems (GIS) Access

Soil data for the proposed pond location is necessary to determine the suitability of site soils or the need for clay to be brought in from off-site. Historical aerial photographs and soil surveys can be obtained at the District office. More recent aerial photographs and soil surveys as well as topography, wetland locations, and various other data can also be obtained at our office through our GIS database. There is a small fee for both of these services. Office hours are Monday through Friday 7:30 AM to 4:00 PM.

Local Pond Contractors

Please contact the District office for an up-to-date list of local pond Contractors.

Eutrophication

Ponds undergo a natural aging process and with the addition of nutrients and sediment over the years, maintenance becomes a high priority for keeping your pond in the desired condition. The following pages will discuss pond maintenance as well as options for treatment once a pond has aged to the point of excessive nutrients levels and/or plant growth.

POND MAINTENANCE & TREATMENT

Aquatic plants are an important to a pond's ecosystem by contributing oxygen, providing cover, nesting habitat, nursery habitat, and food for aquatic animals, and in some cases, protecting the shorelines against erosion. However, excessive vegetation growth can affect both the aesthetic and ecological condition of the pond. The Decomposition of organic matter within the pond and nutrient runoff from adjacent land creates an excess of nutrients allowing for excessive plant growth.

The best methods for preventing excessive plant growth include re-directing nutrient runoff, ensuring proper septic system maintenance, and limiting the buildup of organic matter in the pond. A two to three foot wide buffer of native trees, shrubs, and grasses along your pond will help to filter nutrients from the runoff entering the pond.

You can schedule a pond visit with a Soil & Water Conservation District staff member to properly identify aquatic plants. Several publications are available through the District regarding pond maintenance and treatment, including “W2O” (Weeds Watch Out! Stop Invasive Aquatic Plants) identification guide.

The following statement is from the New York State Department of Environmental Conservation (NYSDEC) regarding the use of pesticides to control plant growth in ponds.

“Pesticide Use

Pesticides may be applied to ponds to control weed growth, algae blooms or to remove undesirable fish. Chemical treatment must be performed by a registered pesticide applicator. A NYSDEC pesticide permit is required for pesticide applications in aquatic environs. A wetlands permit is also required for the use of pesticides, if the pond is contained within a regulated wetland.

Cause of Fishkill	Symptoms	Problems	Recommended Solution (s)
Summer-kill	Low oxygen levels in pond water during periods of hot, cloudy, still days and nights. Fish found dead and/or gasping for air at the surface.	Water temperatures reach high (>85 degrees F) in shallow ponds; very warm water does not hold as much oxygen. Shallow, weedy ponds are especially vulnerable.	Deepen pond by draining and dredging and/or install pond aeration system.
Inversions	Low oxygen levels in pond water. Dead or gasping fish found after extreme weather including heavy downpours and high winds.	Large sudden inflows of cool rainwater and strong winds cause bottom water (low in oxygen) to mix with surface water, resulting in low oxygen levels.	Deepen pond and/or install pond aeration system.
Phytoplankton Die-off	Low oxygen levels in pond water. Fish found dead and/or gasping for air. Pond water turns a greenish tint prior to or during a fish kill. Phytoplankton may look like green paint floating on water surface.	Nutrient enriched ponds produce dense phytoplankton (algae) blooms which can suddenly die-off and decompose causing an oxygen shortage.	Reduce Nutrient inputs by diverting overland runoff that is rich in nutrients (i.e. from field crops, septic system leach fields). Plant native vegetation along the shore of the pond to act as a buffer and filter excess nutrients.

Cause of Fishkill	Symptoms	Problems	Recommended Solution (s)
Dead Vegetation	Low oxygen levels in pond water. Fish found dead and/or gasping for air within a few days after a large aquatic herbicide application. (Also see the closely related “organic pollution cause”).	Mass die-off of aquatic vegetation from natural causes or herbicide use Large amounts of rotting vegetation will use up the oxygen supply in the pond.	Pond banks should have 3:1 slope to reduce excess vegetation growth. Treat no more than 25% of the pond with herbicide at one time.
Winter-kill	Fish die from low oxygen levels. Dead fish seen floating along shoreline soon after ice melts. Population of fish greatly reduced from previous fishing season.	Snow covered ice stays on pond for an extended period of time keeping sunlight from reaching aquatic plants to produce oxygen.	Clear snow if a depth of more than 2-inches is covering over 70% of the pond surface for an extended period of time and/or install a pond aeration system to prevent complete ice cover.
Organic Pollution	Fish die from low oxygen levels. Look for large sources of organic matter within the pond, especially settled on the bottom of the pond. (This cause is a very common due to the natural aging process of the pond if not maintained properly.)	Excess animal wastes, leaves, decaying vegetation, and other organic matter consume oxygen as it decays. Large amounts of decomposing matter deplete the pond’s oxygen supply.	Prevent excessive organic matter from entering or building up in the pond. Cut trees back away from pond. Divert animal waste runoff around the pond. Use aeration to speed up the decay process and reduce build-up. Periodic dredging of the pond can limit organic build-up.

Cause of Fishkill	Symptoms	Problems	Recommended Solution (s)
Natural Causes	A few fish found dead along the shoreline in early spring.	<p>After a long, stressful winter, a fish's natural resistance to disease is lowest in the early spring. Spawning stress may also cause a few fish to die. Larger and older fish seem to be more susceptible to death by these causes than smaller fish.</p>	None; it is part of the natural cycle of a pond habitat.

The information contained in this booklet has been obtained from many sources including the NYSDEC, Cornell Cooperative Extension, and various Soil & Water Conservation District manuals and websites. Please contact our office at (585) 396-1450 to obtain additional information or to schedule a pond visit with one of our staff members.

Additional Information—Website Links

Ontario County Soil & Water Conservation District
www.ocswcd.com

New York State Department of Environmental Conservation
www.dec.state.ny.us

New York State Assembly
<http://assembly.state.ny.us>

Cornell Cooperative Extension
www.cce.cornell.edu

U.S. Army Corps of Engineers—Buffalo, NY, Office
www.lrb.usace.army.mil

W2O: Weeds Watch Out! - Aquatic Invasive Plants Guide
<http://co.caygua.ny.us/wqma/weedswatchout/documents/guide.pdf>