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Farm Pond Ecosystems

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Introduction

Farm ponds have traditionally been used as an economical and efficient way to retain water for livestock watering and irrigation. More recently, farm ponds are being recognized for a variety of other functions in agricultural landscapes. Farm ponds can provide food, cover, and nesting habitat for a variety of wildlife species including amphibians, reptiles, fish, birds, and mammals. Successful farm pond management can increase watershed health, reduce erosion and sedimentation, conserve wildlife habitat, increase property values, supply recreational opportunities, and serve as a source of water for agricultural lands. Farm ponds also increase the aesthetic quality of a landscape that may, in turn, increase associated property values.

This leaflet is designed to serve as an introduction to farm pond ecology and management. Farm pond ecology is reviewed and followed by an outline of habitat needs for various pond species. It discusses farm pond management and provides a list of landowner assistance programs. For information on pond planning, design, and construction, readers should consult the Natural Resources Conservation Service's (NRCS) Agricultural Handbook Number 590: Ponds – Planning, Design, Construction, available at *ftp://ftp.wcc.nrcs.usda.gov/downloads/hydrology_hydraulics/misc/ponds.pdf* or Conservation Practice Standard Number 378: Pond, available at *ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/378.pdf*. To obtain hard copies of these publications, contact your local NRCS office.

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Farm pond in Jasper County, Iowa

Farm pond ecology

Ponds consist of complex systems that support various forms of life. The basis of aquatic life in a farm pond is phytoplankton. These are small, usually single-celled, photosynthetic organisms, also known as algae. Other small organisms that live in ponds are called zooplankton, which are members of the animal kingdom that are suspended in the water column. Common examples of zooplankton are rotifers, cladoceras (water fleas), and copepods. Zooplankton, insects, crustaceans, and tadpoles that live in the pond consume phytoplankton. Larger invertebrates, including gastropods (snails), bivalves (fingernail clams), oligochaetes (worms), annelids (leeches), decapods (crayfish), and insects consume these smaller animals, creating the complex food webs that occur in the farm pond ecosystem. The typical farm pond ecosystem can support an extensive array of plants, insects, amphibians, reptiles, fish, and birds.

A food chain describes the relationships between producers, organisms that produce energy from inorganic sources, and consumers, organisms that obtain energy from feeding on organic matter. The producers in farm ponds are phytoplankton and plants which, in turn, provide food for consumers, which include zooplankton, insects, amphibians, reptiles, birds, and mammals.

Invertebrates

In addition to forming the base of the food chain, aquatic invertebrates can be valuable in determining the health of the pond ecosystem. Each species of invertebrate has specific habitat requirements and will respond differently to changes in the biological, chemical, and physical makeup of the pond. Farm ponds contain many species of invertebrates that help

maintain the complex farm pond food chain by functioning as both predators and prey.

Aquatic insects are small invertebrates that depend upon aquatic systems for all or part of their lifecycles, either for living beneath the water's surface or skimming along the top of the water. Aquatic insects live among aquatic plants, in pond substrate, and along shorelines. Some insects feed on organic materials produced by aquatic plants, while others feed on other insects. Insects help to form the basis of the pond food chain because they serve as an important source of food for fish, amphibians, reptiles, and birds and because they help to facilitate processes that are important in the breakdown and cycling of nutrients within the farm pond.

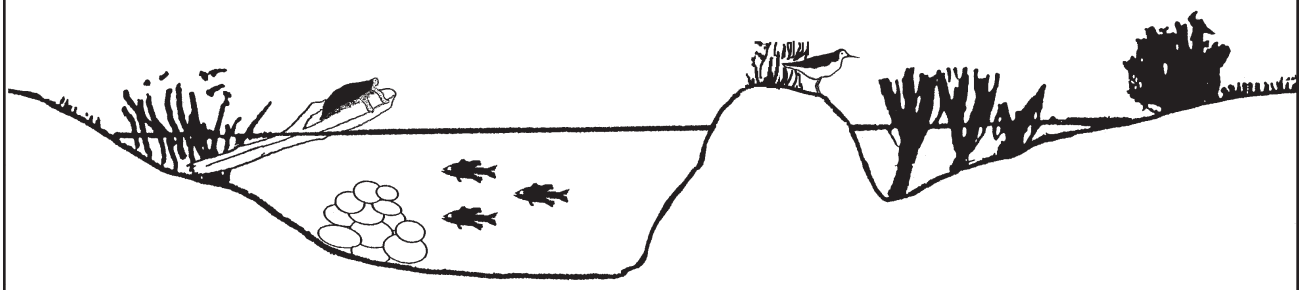
Farm pond habitat

Amphibians

Amphibians such as toads, frogs, and salamanders are unique animals that, during various phases of their lifecycles, use lungs, gills, and skin to breathe. Many amphibians require aquatic habitats for at least part of their lifecycle. Amphibians deposit their eggs in water or in moist upland areas. Upon hatching, amphibians enter the larval stage of their lifecycle, which is contingent upon suitable aquatic habitat. Following this aquatic stage, juveniles metamorphose into adults and may move onto the land. Amphibians vary in where they spend the non-breeding season. Some species remain in or close to water, whereas, others move into nearby forested habitats. Due to wetland habitat losses and the degradation of suitable habitats, many species of amphibian are on the decline. In areas where natural wetlands have been reduced or eliminated, farm ponds can play an important role in providing suitable habitat to amphibians. Amphibians can be encouraged to live in and around farm ponds by ensuring their habitat requirements are met.

Amphibians consume a variety of foods including insects, algae, snails, earthworms, and crayfish. Ponds with a diversity of habitats—muddy bottoms, shallow water areas, deepwater areas, and stands of submerged and emergent vegetation—are ideal for amphibians. Amphibians depend heavily upon organic leaf litter for foraging and downed logs and rocks for structural protection from predators. Amphibians will readily use old boards and rock piles positioned around the pond for cover, provided livestock do not frequently disturb the area. Structures, such as rock

Farm Pond Habitats



1. Aquatic plants help maintain water quality, temperature, and oxygen levels; reduce bank erosion; and provide food, spawning grounds, and escape cover for wildlife.
2. Logs can provide basking and sunning opportunities for amphibians and turtles; egg-laying sites for fish, frogs, and salamanders; shelter for fish; and perches for birds.
3. Deeper pond areas provide habitat for fish. For fish to reproduce, it is important to incorporate fish spawning areas, such as rock piles, into the farm pond.
4. Islands in the farm pond can provide resting and escape cover, nesting habitat, and feeding areas for waterfowl and shorebirds. (Please note that islands are not recommended in certain regions. For more information, landowners should check with their local NRCS office.)
5. Amphibians prefer shallow, fishless waters for breeding and rearing.
6. Wide- (at least 50 feet) vegetated buffer areas provide essential nesting, winter, and escape cover for wildlife. They also increase the aesthetic qualities of the pond property and increase the amount of water infiltration of the soil.

piles and fallen logs placed within the pond, can provide basking and sunning sites for amphibians and turtles, shelter for fish, egg-laying sites for fish, frogs, and salamanders, and perches for birds. (See box below for tips on how to create basking logs.) When amphibians leave the breeding pond, they need safe places to hide, feed, and travel. The location of protective cover must be within and adjacent to the pond to be attractive to amphibians.

Tips for constructing a basking log

1. Use logs that have been cut and stored for 6 months to 1 year. Freshly cut logs quickly become water logged and sink.
2. Logs should be 5 to 8 feet long, and an average of 6 to10 inches in diameter.
3. Logs should be placed at least 5 feet from shore to restrict access by predators.
4. Anchor the logs in place with a cable or branches stuck in mud to prevent the log from moving.
5. If animals are observed crowding, add additional logs.

Fishless pools are ideal for amphibians because fish are efficient predators of amphibians. To benefit amphibians, minimize the chances of fish establishing themselves in a fishless pond by avoiding high-water connections with other water bodies that support fish. Ponds should have wide buffer strips to improve water quality and provide post-breeding habitat. Access by domestic livestock should be managed to reduce their impact, as intensive wading can disturb vegetation and increase turbidity and nitrogen levels. Amphibians need shallow water 1 to 3 feet in depth for breeding and to support aquatic vegetation. Ponds too small or too shallow to support fish year round are ideal for many amphibians. However, larger ponds will support amphibians if shallow, vegetated areas are available. Amphibians are often susceptible to chemical changes in aquatic habitats; therefore, pesticide, herbicide, and fertilizer applications should be carefully managed.

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Amphibians such as the tiger salamander can meet their habitat requirements in and around farm ponds.

Reptiles

Many species of reptiles need aquatic habitats to meet the requirements of their lifecycles. Reptiles, namely turtles and snakes, do not need water to breed, but often depend on aquatic environments for food and cover. Both natural and constructed ponds can provide suitable habitat as long as there are enough resources available. Most individual reptiles have a small home range, but require suitable aquatic and terrestrial habitats within that range.

Many turtles and snakes require a readily available supply of underwater plants, fish, insects, and tadpoles upon which to feed, and substantial terrestrial and aquatic cover. Many turtles are scavengers, relying upon dead or decaying material for food; although, they will also eat aquatic weeds, crayfish, amphibians, and insects. Turtles not only feed in the pond, but spend much of their time basking on logs or hiding in pond vegetation and mud. Water snakes are common residents of farm ponds, as are species that are primarily terrestrial (they make their homes in adjacent uplands, but visit ponds to feed). Some snakes feed on pond animals such as leeches, fish, tadpoles, and crayfish. Wide, vegetated buffer areas around the pond connected to nearby natural areas provide cover for reptiles and encourage them to frequent the farm pond.

Most egg-laying reptiles require nesting habitat. Providing piles of compost or woodchips around the pond can provide nesting habitat for snakes and lizards. Turtles will nest in surrounding treeless meadow areas, especially those that are sunny and have clay or silt loams in which nests can be easily excavated when moist.

To provide upland cover for reptiles, ground nesting birds, songbirds, and mammals, landowners or managers should leave downed trees, shrubs, rocks, and natural vegetation around the pond. A well-groomed pond does not support as many species as a messy one. When upland areas lack a variety of loafing and escape cover, brush piles can be constructed. Construct brush piles in close proximity to farm

ponds or field edges to ensure that aquatic and terrestrial species will not have to travel far from other areas of cover. The foundation and bottom layers of brush piles should be constructed of large woody material, preferably consisting of rot-resistant hardwoods, although dried conifers may be satisfactory, and smaller twigs and branches piled on top. Brush piles should be constructed to be 4 to 8 feet in height, 10 to 20 feet in diameter, and placed 100 to 150 feet apart. Brush piles that are too small will not provide adequate cover for many wildlife species. When brush pile construction is complete, each should be loose enough for small animals to navigate through, but dense enough to provide sufficient cover.

Fish

Stocking farm ponds with fish can provide many recreational opportunities. Typically, farm ponds are stocked with fish such as bluegill, large mouth bass, and/or channel catfish. These species have proven to be most popular in farm pond fish stocking endeavors because they fare well in the farm pond ecosystem and they provide for an enjoyable fishing experience. Bluegills, or occasionally threadfin shad, are typically stocked as a food source for predatory fish, such as largemouth bass. Landowners should be sure to stock farm ponds with fish species that are native to the region. Native fish have evolved over thousands of years to be successful in a particular region, and are ideally suited to the habitat in those areas. Landowners should consult officials from state fish and wildlife agencies, NRCS, or county extension offices when determining which species are native to the area, and at what rate they should be stocked to ensure proper ecological balance.

Farm ponds managed for fish production should be approximately 6 to 10 feet deep, depending on the desired species to be stocked, and at least a half acre in size. A minimum depth of 8 feet should comprise at least 1,000 square feet of the pond to be suitable for fish stocking.

It is important to incorporate fish spawning areas, or shoals, when designing a farm pond for fish production. Spawning shoals are structures such as underwater sand bars or rock piles that provide shallow areas for breeding fish. Shallow water shoals can be created by adding multiple rows of large-sized rocks to the bottom of certain portions of the pond. Nylon mats can also be used as artificial spawning sites for stocked species such as largemouth bass. Placing a number of boulders, approximately 2 to 3 feet in diameter, along the bottom of the pond may also augment fish habitat. These boulders will provide resting cover to fish populations.

Recommendations for managing farm ponds for amphibians and reptiles[1]

1. Avoid clearing or replacing natural native vegetation around the pond. A minimum of 50 feet is recommended, but more would be better.
2. Provide buffers of unmanaged terrestrial habitat around ponds and in upland areas. This should be 500 feet or wider, if possible.
3. Do not introduce non-native plants or animals, as they may harm or replace native species.
4. Leave logs, snags, and other woody debris on site and replace if removed.
5. Develop vegetated corridors between habitat fragments to provide habitat complexes rather than habitat islands.
6. Minimize mowing shorelines and drainage ditches late winter through mid-fall.
7. Avoid overgrazing and keep livestock out of the pond and surrounding vegetative buffer.
8. Whenever possible, avoid intensive techniques that unnecessarily reduce potential refuges for amphibians and reptiles.
9. Limit pesticide and fertilizer use. Follow pesticide/fertilizer directions carefully.

[1]Adapted from Kingsbury and Gibson, 2002.

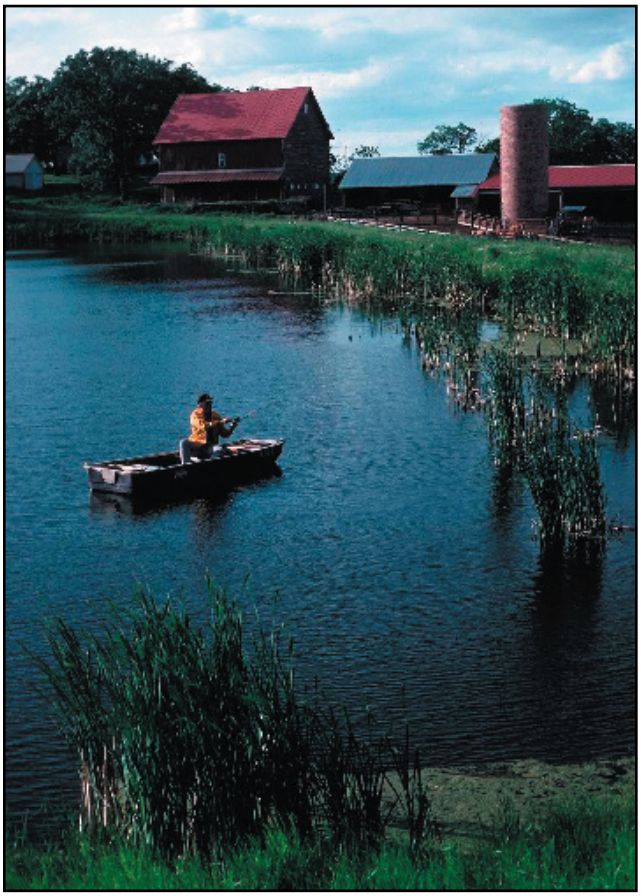
When ponds are stocked with fish, it is important to consider the effect of fish on amphibians and other aquatic life. Shallow-water areas should be provided for nursery areas for young fish and amphibians where access by larger predatory fish is minimal. Another alternative is to install a small, shallow pond for amphibians near the larger, deeper pond for fish.

Birds

Shorebirds can utilize farm ponds where shallow water is provided. They feed on invertebrates, such as bloodworms, that can be found in mud or in very shallow waters. Shorebirds use the muddy shorelines of farm ponds as resting and feeding areas during migration. In some agricultural areas, farm ponds may provide the majority of available foods for shorebirds during migration.

Waterfowl also use farm ponds for breeding, feeding, brood-rearing, or resting during migration periods. Diving ducks, such as canvasbacks and redheads, can be attracted to farm ponds where no more than 50 percent of their surface area is covered with emergent vegetation. Waterfowl require emergent vegetation, as well as healthy upland vegetation, for nesting cover. It is important to avoid the addition of chemical pesticides and herbicides, especially in areas where they may contaminate the water supply, because these chemicals may render the farm pond unsuitable for desired waterfowl species.

To provide maximum habitat benefits to common dabbling ducks such as mallards, blue-winged teal, and pintails, 20 percent of the wetland should be 3 to 4 feet deep, 30 percent of the wetland 1.5 to 3 feet deep, and the remaining area less than 1.5 feet deep. Creating a pond with shallow areas will also provide suitable habitat for shorebirds and wading birds that may use the farm pond. The pond shape should be irregular, with side slopes varying from a ratio of 8:1 to 16:1, to be most suitable for various types of waterfowl.



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Farm ponds can provide recreational opportunities, such as fishing.

Landowners may construct islands within the pond to make it more attractive to certain species of birds. Waterfowl and shorebirds use islands as resting and escape cover, nesting habitat, and for feeding. The water surrounding the island protects nests from raccoons and other terrestrial predators. Turtles may also use the islands to bask in the sun, while fish utilize the shaded areas islands provide for spawning grounds and as protected areas for vulnerable juveniles. Floating islands made of wood or other buoyant material can be constructed where earthen island construction is not feasible. Waterfowl and shorebirds that regularly use islands as nest sites are able to move considerable distances from areas that provide food and cover sources to nest sites, and are able to concentrate nest sites to small, isolated habitats. Typical island nesting birds include mallards, gadwalls, Canada geese, and shovelers.

Landowners may want to deter certain bird species, particularly Canada geese, from congregating around their farm ponds. Constructed islands will often be used as nesting sites by Canada geese. Excessive numbers of Canada geese can cause damage to agricultural crops and residential lawns, plants, and gardens by trampling, foraging, and/or depositing fecal matter. To deter Canada geese, landowners can plant a diverse vegetated buffer and eliminate mowing around the pond, which restricts access to the pond and eliminates supplemental food sources for the geese.

Mammals

Mammals will use farm pond water and vegetation resources; although, they are typically not as dependent upon them as the animals previously discussed. Mammals that frequent farm ponds may include deer, raccoons, squirrels, mice, and voles. Due to the relatively small size of constructed farm ponds, conditions may not support sustained populations of furbearers such as muskrats, beavers, or otters.

Farm pond management

Properly managed farm ponds can help to increase species richness and diversity in agricultural landscapes. Management practices for farm ponds can focus on the whole pond ecosystem or certain groups of organisms. In some cases, practices designed to benefit one aspect of the pond may be detrimental to others. For example, a pond planned solely for fish stocking will require a deeper shoreline habitat, which is unsuitable for most amphibians. However, some fish and amphibians can coexist if the habitat is complex, containing both deep-water areas, and shallow, vege-

tated areas. For this reason pond owners need to determine specific goals for the pond before the management plan is put into practice. Consult table 1 to identify the needs of the wildlife group you wish to use your pond, and then manage the pond accordingly.

Planting vegetation

A diversity of water-tolerant vegetation within the pond and upland plants near the pond will offer a variety of food and cover to wildlife. A vegetated buffer around the pond and upland areas will filter and store runoff, reduce floods, and provide necessary organic matter to the pond. Planting and maintaining aquatic plants suited for the pond site will help maintain water quality and temperature, pond depth, and oxygen levels; reduce bank erosion; and provide food, spawning grounds, and escape cover for wildlife. Reducing erosion is particularly important because nutrients removed by soil erosion may accumulate in the water, where problems such as algal blooms and eutrophication may occur. See the section on Controlling algae for ways to reduce these problems. Landowners should use native plants, whenever feasible, to vegetate the pond itself and surrounding buffer areas. Native plants are plants that have evolved over thousands of years to be successful in a particular region, and are thus ideal when creating habitat for native species. Once established, native plants do not generally require fertilizers, pesticides, or irrigation.

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Logs, islands, or other structures placed in ponds can increase habitat value for wildlife.

The most important aspect to consider when planning pond area plantings is the hydrology of the land, including how often each area will be inundated with water and the degree of soil saturation. Aquatic plants can thrive in submerged areas, depending on water depth, soil conditions, and the length of time their roots are flooded. Hydrophytic plants include free-floating vegetation, submerged vegetation, and emergent vegetation. Pond ecosystems will also support species that are less water-tolerant along shorelines and in upland regions. The diversity of the farm pond's vegetation community is maximized when 50 to 80 percent of the pond is covered by emergent and submerged vegetation and more than 90 percent of the shoreline is vegetated. An overabundance of aquatic vegetation may become a nuisance, creating difficulties in fishing, swimming, and/or irrigation. See the section on Controlling Invasive Species for tips on how to remove excessive aquatic vegetation. Many aquatic and hydrophytic plants will become established in newly created ponds through natural regeneration without planting. To help ensure the successful establishment of submerged and emergent plants, landowners may use live plugs or tubers of native species. These types of vegetation should be planted at recommended depths in the pond and along shorelines.

Buffer zones of trees, shrubs, grasses, and forbs around the pond help maintain the pond's water depth and quality. Buffer areas provide essential nesting, winter, and escape cover for wildlife. Vegetated buffer zones should be at least 50 feet wide, and the wider the better for wildlife habitat. In general, buffer zones 400 to 1,000 feet wide are most likely to support various reptile and amphibian populations. Buffers also increase the amount of water infiltration of the soil and prevent up to 70 percent of sediments from entering a waterway. Buffers will also increase the aesthetic qualities of the pond property.

Controlling invasive species

Invasive species are those that spread easily and, within a short time, out-compete other vegetation. Invasive species, particularly non-native invasives, reduce biodiversity and lessen the suitability of the site for many native wildlife species. There are many different techniques employed to eradicate invasive species, including biological, mechanical, and chemical controls; although, combinations of these are usually most effective. For example, the hand pulling or mowing of individual weeds followed by a selective herbi-

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A variety of vegetation in and around ponds can improve wildlife habitat and watershed health.

cide treatment of remaining weed residues can be a very effective eradication technique.

Biological controls involve the use of natural controls, such as beneficial insects, to minimize the growth and reproduction of invasive plants. For this type of control to be effective, landowners must identify the natural predators of the target species. For example, the aggressive invader purple loosestrife can be managed by introducing the European native beetle *Galerucella calmariensis*. For additional information concerning biological control methods of pest species, refer to the Fish and Wildlife Habitat Management Leaflet Number 24: Integrated Pest Management and Wildlife.

Mechanical techniques to control invasive plant species include hand pulling, cutting or mowing, tilling, mulching, solarization, flooding, and prescribed burning. Hand pulling can be advantageous because the technique impacts only the affected areas and can be quite cost-effective for small areas. Cutting and mowing can be effective controls for some species; however, there are varieties of weeds that sprout aggressively when cut. When considering cutting or mowing, it is important to know how the target species will react. Tilling is most effective against annuals and shallow-rooted perennials; whereas, species with deep root systems will often resprout after tilling practices. Mulching may prove effective in the control of invasive species, but it can negatively impact the growth of desirable natives. Solarization involves covering affected soils with plastic to trap solar radiation, resulting in increased soil temperatures that can kill unwanted seeds, plants, or insects. The drawback of solarization is that raising soil temperatures may change the biological, physical, and chemical properties of the soil, impacting the growth of native plants. Flooding shallow pond areas and/or increasing or decreasing water levels can be effective in controlling aquatic invasives. Prescribed burning can effectively control invasive vegetation, such as cattails or common reed. Prescribed burning is a complex, technical management practice that should not be attempted before consulting proper experts.

Chemical controls, such as the use of pesticides, can be effective eradicating invasive species. However, when used irresponsibly or inappropriately, pesticides, including herbicides, can contaminate surface and groundwater, resulting in negative impacts on aquatic and terrestrial ecosystems. Herbicide application techniques for aquatic areas are different then those used on upland sites. Herbicides must be licensed for use in or near bodies of water, wetlands, and other aquatic systems to be acceptable. When trying to determine what herbicide will be most effective, consider the growth habits of the target species, any long-term effects on water and soil quality, effects on wildlife species, the method of application, and the safety of individuals who frequent the site. Pesticide use should be avoided near the farm pond ecosystem

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Purple loosestrife (in background), an invasive species, can be controlled by introducing its natural predator, a beetle native to Europe.

and its drainage area whenever possible. When pesticide use is required for upland treatment, apply only at the lowest effective rate.

Controlling algae

A limited amount of pond algae can be beneficial to provide protection from UV rays and supply food for fish, amphibians, reptiles, and birds. However, upland management practices, such as the repeated use of fertilizers, may result in excessive algal blooms. Algae thrive on components of commonly used fertilizers and agricultural products that may be included in surface runoff. These blooms may lead to water quality problems, especially in ponds where water levels are maintained by surface runoff.

Excessive algal populations may choke out aquatic vegetation, reducing the diversity of the pond ecosystem. Excessive algae populations may be a problem if the color of the water appears to be more green than normal, if water has an overly musky odor, or water feels somewhat gritty. Algal blooms can be controlled manually by raking water to gather excess algae. Chemicals such as herbicides may also be applied to control algal blooms. Alternatively, corn meal contains a natural algae herbicide and when sprinkled over the pond does not add to nutrient overloading. This provides an immediate, though temporary, solution to algae blooms. The most effective control of aquatic vegetation is to monitor and reduce the level of nutrients entering the pond, thereby, preventing excessive algal and aquatic weed growth.

Controlling livestock access

If the pond serves as a water source for livestock, managers need to consider how this affects pond ecology and wildlife habitat. If livestock are granted direct access to a pond, they may be the source of severe water quality degradation, which will negatively impact the entire farm pond ecosystem. Some problems caused by excessive livestock use of farm ponds include accelerated bank erosion, water sedimentation and nutrient enrichment resulting in increased turbidity of water, rapid growth of algae and other undesirable species, and increases in water borne disease and foot rot in livestock. Fencing around the farm pond, limiting livestock access, can reduce these problems.

To combat problems associated with livestock grazing in farm ponds, landowners are encouraged to implement an alternative livestock watering system. Many alternative systems are designed for accessing water in a way that is beneficial to both livestock and the environment. These systems include access ramps, gravity flow, utility power, solar or wind power, and nose pumps.

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Fences can be used to reduce livestock access to ponds, protecting pond ecology.

Landowner assistance programs

Various public and private organizations are available to provide technical and financial assistance to landowners interested in constructing a farm pond. Table 2 lists specific programs that can provide landowners assistance in implementing a variety of wildlife and natural resource conservation activities.

Conclusion

Although farm ponds are typically constructed to supply agricultural lands with water for irrigation, livestock watering, or fire control, they can also enhance the aesthetic qualities of a landscape, provide recreational opportunities, and supply habitat for wildlife. Farm ponds help to increase the overall health of the watershed, and can contribute to soil and water conservation. If a farm pond is managed properly, it can provide valuable fish and wildlife habitat, while fulfilling other farm needs for many years.

Table 1 Pond characteristics for healthy populations of certain groups of organisms

Group	Subgroup	Pond physical characterisitics	Pond biological characteristics
Amphibians	Frogs and Salamanders	Temporary or permanent water Muddy bottom Shallow and deep water areas Clear water High oxygen content Low nitrogen content	Abundant aquatic floating, emergent, and submerged vegetation Absence of fish Good supply of aquatic invertebrates Trees and grasses around pond area Quality upland vegetation ranging from grasses and forbs to woodlands
Fish	Fish that eat plant material and invertebrates	Permanent water Clear water High oxygen content Constant range in temperature Spawning substrate	Aquatic floating, emergent, and submerged vegetation
	Fish that eat other fish	Permanent water Clear water High oxygen content Constant range in temperature Spawning substrate	Good supply of small fish Good supply of tadpoles
Birds	Shorebirds, Waterfowl, Wading birds, and Songbirds	Permanent or temporary water Clear water Mudflats	Floating, emergent and, submerged vegetation Quality upland vegetation ranging from grasses and forbs to woodlands Good supply of fish and aquatic insects
Reptiles	Snakes	Suitable habitat for burrows Presence of compost or woodchip piles for nesting Suitable cover, such as rock piles Ponds located far from trafficked roads	Good supply of small mammals, amphibians, and lizards
	Turtles	Muddy bottom Presence of rock piles, stumps, and floating or suspended logs for basking Presence of sunny clearings or embankments for nesting	Submergent aquatic vegetation Good supply of fish and insects

Table 2 Assistance Programs that may help with farm pond establishment and management

Program	Land eligibility	Type of assistance	Contact
Agricultural Management Assistance (AMA)	Applicants must own or control the land and agree to conservation practices.	5- to 10-year contract for federal cost-share of 75% of eligible practices.	NRCS or FSA state or local office
Conservation Security Program (CSP)	Tribal and private working lands, including cropland, grassland, prairie land, improved pasture, range land, and forested land.	Financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes.	NRCS state or local office
Conservation Technical Assistance (CTA)	Landowners and land-users interested in receiving assistance with resource management.	Technical assistance in the planning and implementing of conservation systems.	NRCS state or local office
Environmental Quality Incentives Program (EQIP)	Cropland, range or grazing lands and other agricultural lands in need of treatment.	Up to 75% cost-share for conservation practices in accordance with 1- to 10-year contracts. Incentive payments for some practices.	NRCS state or local office
Watershed Protection, Watershed Surveys, and Flood Prevention	Private lands.	Technical and financial assistance to survey land and develop plans for natural resource and erosion management on a watershed basis.	NRCS state or local office
Waterways for Wildlife	Private lands.	Technical and program development assistance resulting in wildlife habitat that meets watershed level goals.	Wildlife Habitat Council
Wildlife Habitat Incentives Program (WHIP)	High-priority fish and wildlife habitats.	Up to 75% cost-share for conservation practices under 5- to 10- year contract.	NRCS state or local office

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