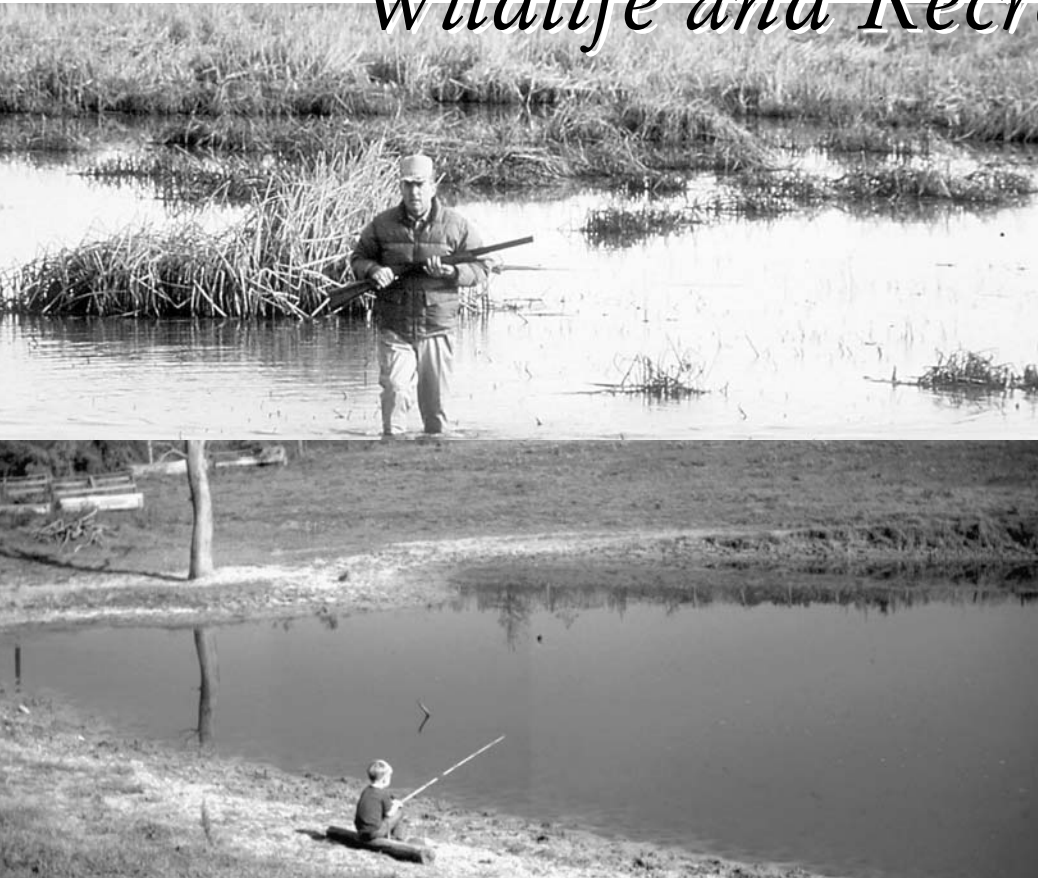


NATURAL RESOURCE ENTERPRISES

Wildlife and Recreation



Hunting Leases: Considerations and Alternatives for Landowners

Interest is growing in the South and throughout the United States for landowners to provide recreational access to their land for sportsmen and others to hunt, fish, and enjoy other types of outdoor recreation. For many farm, ranch, forest, and other landowners, alternative enterprises may provide an opportunity to sustain their natural resource base, maintain their quality of life, and increase annual profits.

Offering access to private land for recreational uses by the public can be a viable alternative enterprise. Natural resource-based alternative enterprises on private land range from producing products such as pine straw for

mulching, to providing access for bird watching, trail riding, and hunting and fishing.

Recreational hunting and fishing leases have become an important source of supplemental income for many landowners in recent years, and the demand for access to private lands for recreational uses continues to grow. When these enterprises are appropriately developed and implemented, they will contribute to local community economies in many ways. However, there are many things to consider before implementing a hunting lease.

Not all private landowners will want to open their lands for such access and use, but for those who feel they would like to explore such

enterprises, some tradeoffs will be necessary. Landowners must consider and manage such enterprises as an integral part of their total operations. They must also keep in mind the long-term sustainability of their natural resource base on which the total operation depends.

The information in this publication helps you as a landowner make informed decisions about one potential alternative natural resource-based enterprise – hunting leases. Much of the information in this publication comes from a number of sources, including scientific papers presented at various conferences, and from personal experience working with private landowners and recreational users over the past 35 years.

This publication does not provide all-inclusive, definitive information on hunting leases for any individual. Natural resource produc-

tivity and sustainability capabilities in different areas are not necessarily the same. Each geographic site capability is different. Each landowner's objectives and management skills are different. Figures in this publication for fees charged per acre and minimum amounts of acreage suggested for specific kinds of hunting operations may not be appropriate for every operation. Some of the figures provided are "rule of thumb" or "ballpark" estimates for consideration based on regional or statewide surveys and informal discussions with enterprise operators. Liability insurance sources provided are simply sources known, and it is very likely there are many other providers. Sample lease agreements and sample hunting club bylaws are simply templates that you, a manager, or a hunting club group may find useful to customize for individual and operation needs.

TYPES OF HUNTING LEASES

A hunting lease is an agreement between you as the landowner (lessor) and hunters (lessees) that grants the hunter access rights for hunting game animals (and other specified activities) on your property for a specified time period. Hunters usually pay you an agreed-upon dollar amount per acre or per hunter. However, in some leases you may agree to a smaller combination of dollars per acre or per hunter with a written agreement that the hunter or hunters perform some service in exchange for the privilege of hunting access. There are numerous kinds of leases and agreements based on the agreed-upon collaboration (usually in writing) between the lessor and lessee. Following are some common types of hunting leases:

■ *Long-Term*

- ✓ Seasonal lease – all species of game legal to hunt
- ✓ Seasonal lease – specified animal or animals
- ✓ Annual or multi-year lease – all species
- ✓ Annual or multi-year lease – specified game animal or animals.

■ *Short-Term*

- ✓ Daily hunting, often by permits
- ✓ Weekly hunts
- ✓ Multi-day (three to five) day hunts
- ✓ Special Season Hunts – such as bow, muzzle-loader, or rifle only.

The most common types of hunting leases are the long-term annual and long-term seasonal. Under this type of leasing system, you generally provide individual hunters or groups of hunters the privilege of access to your land for hunting for a season, a full year, or for several consecutive years.

This type of leasing usually allows the hunter or hunters the privilege of hunting legal game species during specified open seasons, with fees assessed on a cost per-acre or lump sum basis. These leases let you specify which game species can be hunted, and you can reserve hunting rights for yourself, your guests, and immediate family. In fact, depending on the interests of the lessee and your willingness, these leases can be customized to the satisfaction of both you and the lessee, as well as the agreed-upon price paid for the privilege of leasing.

For many landowners, such long-term seasonal or annual leases for a set price per acre or lump sum seem to be the easiest to negotiate and require the least oversight. If you are satisfied with this type of arrangement, the lease fee is satisfactory, and the lessee(s) has demonstrated appropriate and responsible care of the land and resources, you can continue such annual leases on a multi-year arrangement.

Long-term leases have advantages and disadvantages. The advantages are that such leases generally result in better landowner-sportsmen relationships, because you get to know the lessee(s) personally, helping to build trust over time, and the sportsmen get to understand what your objectives are, and they become interested in helping manage the properties to meet these objectives. The longer time that lessee(s) lease a property, the better they come to know it, and the more likely they will become interested in working with you to improve habitat management for wildlife. The more provincial interest they develop in the property, the more they will help to prevent trespass and poaching. If you are satisfied with the long-term arrangement, you can project anticipated income.

The disadvantage is that sometimes such long-term lease arrangements make it difficult to increase lease fees when you need to, and some lessee(s) take such an interest that they begin to think of the property as theirs and forget to honor your rights. However, both sportsmen and landowners are more often willing to make time, labor, and financial investments in leased property when they know they have a secure arrangement for more than one year or season. Such long-term lease arrangements can be for specific game species only or offer hunting for all legal game species to the lessee(s). It can include such other activities as scouting before hunting seasons, camping, and fishing if available.

If you are active in the day-to-day management of the property, you may also choose to lease access rights for hunting one particular species to one hunter or group of hunters and to yet another hunter or group of hunters for hunting another species. An example would be deer hunting to one group and spring turkey hunting to another, or dove hunting to one group and waterfowl hunting to another. Obviously this works best when seasons do not overlap, and it generally requires intensive involvement by you or someone you assign such management responsibilities to. These leases usually return the most annual income but clearly also require the most intensive involvement of you or a

manager. They also require more labor, time, and habitat management investments, such as providing dove fields, food plots, waterfowl blinds, and other requirements.

Short-term leases can be on a daily permit basis, such as for dove hunting; a per weekend basis for deer or waterfowl hunting; a weekly basis during a special season, such as bow hunting or muzzle-loader hunting; or for a one-season, special management type of hunt, such as a late-season doe hunt only. Some of these hunts can be packaged to include guides, lodging if available (on the lease property or at a local motel), and meals. Clearly this type of leasing arrangement requires intensive management and marketing for greatest success, but it can yield a higher rate of return and does not obligate the entire property for an entire hunting season or year. In other words, you can provide access to limited portions of the land for shorter periods of time and can limit the hunting to the species desired.

Hunting leases can be developed by sportsmen contacting you directly about the potential of leasing your land for hunting rights access. Or a broker may make such arrangements. However, more and more landowners interested in leasing their land for hunting access are finding that newspaper and magazine ads or a web site will often locate willing hunters or groups of hunters interested in leasing tracts of land for hunting privileges. There can be some advantage for some owners, particularly non-resident landowners, in having a broker take care of the advertising and locating and dealing with responsible lessee(s) and with neighboring landowners. Another advantage is the broker can help ensure the lessee(s) honor their lease and pay on time. However, such brokers will come at a cost.

Before beginning a hunting lease program, you need to consider a number of things and be prepared to spend some time, labor, and resources to determine the value of your resources, how to manage and sustain them as renewable natural resources, what your long-term objectives are, and if such a leasing program is compatible with your other land management objectives. You also should recognize the advantages and disadvantages of leasing your land for hunting, such as these:

■ *Advantages*

- ✓ Can be a dependable source of additional annual income

- ✓ Can provide in-kind labor assistance from lessee(s)
- ✓ Can help reduce trespass problems
- ✓ Can help you gain better control of who is using the land for what purposes
- ✓ Can complement other land management operations
- ✓ Can improve other recreational opportunities
- ✓ Can benefit local community economy
- ✓ Can help you better manage wildlife habitat and populations

■ *Disadvantages*

- ✓ Increased liability concerns and costs
- ✓ Will require increased landowner or manager involvement of dealing with lessee(s)
- ✓ Could mean some tradeoffs in other operations
- ✓ Could present conflicts with neighbors
- ✓ Likely to require some investment in habitat and access management
- ✓ Will require record keeping, evaluation, and business management

HUNTING LEASE AGREEMENTS

Without question, most hunting leases should be undertaken only with a written agreement. Such an agreement serves as a contract that protects the agreed-upon rights of both you (lessor) and the sportsman (lessee). The significance of a well-considered written lease agreement cannot be over emphasized, since it is the foundation for a successful hunting lease program. Effective hunting lease agreements protect your interests yet allow enough flexibility to permit enjoyment of the access rights provided to the sportsmen or lessee(s). Such leases can be developed from “boiler-plate” examples but can be customized to protect you against later conflicts. A lease must be well thought out before being finalized and agreed to by you and lessee(s). Most of the potential conflicts between you and lessee(s) can be prevented, and a good working relationship can be maintained by having a mutually agreed-upon written lease. Some “boiler-plate” examples of written hunting leases are provided in the back of this publication for examination and modification

to meet individual needs. Your needs and desires are paramount but must be tempered by recognizing the needs and desires of the lessees and what they are willing to pay for.

■ *Considerations when Developing A Lease Agreement*

- ✓ **References** – If you are not familiar with sportsmen or groups who desire to lease your property, you should not hesitate to ask for references. You may get references from other landowners who leased to the lessee(s) previously or from Conservation officers or community leaders who know the person(s).
- ✓ **Proof of liability insurance** – As part of the lease agreement you can require the lessee(s) to pay for liability insurance (with your name listed on the policy) and provide proof of coverage by keeping a copy of the insurance policy with proof of purchase. Requirements for liability insurance can be written into the lease agreement. Be sure such policies cannot be canceled during the lease time. This precaution transfers a large portion of the liability to the lessee(s). Otherwise you are responsible for the costs of appropriate liability insurance coverage to ensure your protection.
- ✓ **Establish and maintain open communication** – An open channel of communication from the beginning prevents potential misunderstanding between you and sportsmen. For hunting clubs or organized groups of lessees, try to arrange a time before the hunting season to meet with the group and get to know them.
- ✓ **Organized groups/hunting clubs** – Hunting clubs should be well organized and governed by self-regulating bylaws and have a contact person designated. A sample of hunting club bylaws is provided in the back of this publication. You should receive a copy of adopted bylaws.
- ✓ **Lease to local sportsmen when possible** – Local sportsmen, if willing to pay, can often help look after property. Having such local participation often avoids the local resentment of the “outsider” image.
- ✓ **Annual meetings** – You should meet with sportsmen groups or hunting clubs who lease your land at least once each year before the hunting season to discuss land use changes,

modifications that may be needed to the lease agreement, or your need for some help improving habitat or hunting opportunities.

- ✓ **Limit hunters and guests** – For the benefits of safety, enjoyment, and protection of the resource, the number of hunters must be restricted. For example, too many hunters using the property at any one time during the season may compromise the safety, enjoyment, and sustainability of the resources. Here are some rules of thumb for consideration with exceptions for different kinds of habitat and hunting: for deer hunting, one hunter per 100 acres; for waterfowl hunting, one hunting party per 100 acres of wetlands or waterfowl habitat; and for turkey, one hunter per 200 acres.
- ✓ **Written rules** – Consider drafting written rules aimed at preventing potential accidents and protecting property, especially if there are known hazards, such as old wells, sinkholes, and other risks to personal safety on the property. Make sure all lessees are aware of these written rules, and have them sign a statement that they have read and understand these rules.
- ✓ **Incorporation** – Hunting clubs representatives (officers) cannot legally represent the entire club when signing a lease agreement unless the club or group is incorporated. If the club or group is not incorporated, each member of the club/group must sign and date the written lease agreement.
- ✓ **Liability risk reduction** – In addition to requiring the club/group to purchase an insurance policy to cover liability, you should practice a risk reduction program that reduces all known hazards on the property. Keep records of such efforts to reduce or eliminate known and potential risks to lessees. You should keep accurate records in case of a libel suit. Identify hazards you cannot reduce or eliminate, and explain them to lessees with a map and written description.

Here are other considerations: If ATVs are to be used on property, require additional rider insurance from lessees. Avoid single-strand cable gates, or have them clearly marked and flagged. If portable tree stands are to be used, make sure lessees' liability insurance covers such use, or require permanent stands to be used. In accord with state law, require sportsmen to pass an approved hunter safety program and

show a certificate of completion. (Anyone born after January 1, 1972 is legally required to complete a hunter education course before purchasing a Mississippi hunting license. Also, anyone 12 years of age but under 16 years of age must have a certificate showing completion of a hunter education course approved by the Department of Wildlife, Fisheries, and Parks before hunting in Mississippi.)

- ✓ **Attorney lease review** – Have an attorney review the written lease before it is agreed to and signed by either party. This helps protect both parties and clarifies that the agreement is legal and binding.
- ✓ **Up-front payment** – The agreed-upon lease payment should be made before the hunting season begins, preferably before the date of the lease period. This ensures that payment is made before the hunt begins, and it allows the owner the potential of investing the funds and earning interest.
- ✓ **Permanent structure policy** – You may or may not want the lessee to put up permanent structures, such as buildings, sheds, or cabins. If you do permit any of these, you should decide what types of structures to allow and what should happen to these structures if and when the lease is terminated.
- ✓ **Vehicle restriction** – You may want to restrict what type of vehicles may be used on identified roads and trails and/or restrict the use of particular types of vehicles to certain roads on the property.
- ✓ **Notification of presence** – You may require hunters to check in and out via a check station or notify you in advance by phone or in writing when hunting or otherwise accessing the property.
- ✓ **Arbitration** – Disputes can arise, regardless of how well the lease agreement is written. Some leases specify using arbiters who were agreed upon in advance by both parties. The arbiter should be a neutral party, such as an attorney, conservation officer, or other mutually agreed-upon individual.
- ✓ **Game law violations** – In case game laws are violated, unintentionally or intentionally, the club/group bylaws need to ensure the violation is reported to both the local conservation officer and to the landowner.

- ✓ **Automatic lease renewal** – If you are pleased with the lessee(s), you may want to provide for an automatic lease renewal agreement consideration. This can be put into effect barring conflicts or need for some change in the agreement, if agreed upon 90 days before the lease terminates. This may be an advantage for both parties if things are going well.

■ *Suggested Items To Include In a Written Hunting Lease*

- ✓ Your name, address, and phone number and the same information for the sportsmen, group, or club (lessees).
- ✓ The purpose of the hunting lease, describing the species of game allowed to be hunted as well as other activities allowed on the property, such as camping, fishing, scouting, permanent structure placement, and disposal.
- ✓ A description of the property with the location of the tract, boundaries, and areas off limits to hunting access. You should also provide a map with the property description. It is wise to conduct a tour of the property or tract to be leased with lessees to point out clearly marked property boundaries as well as any known restricted-use areas or hazards. In the description it is helpful to point out the present condition of the property, such as 20-year-old pine plantation, row crop areas, pasture, restricted areas, and reasons for restrictions.
- ✓ The duration of the lease, describing the beginning and ending dates of the lease, whether seasonal or annual, or longer term.
- ✓ The method of lease payment, stating how much the lessee(s) must pay and a date when payment must be received. Penalties for late payment can be described but must be well in advance of the beginning of the hunting season.
- ✓ Damage provisions and a deposit (if you think this is needed) to cover the costs of damage or loss of your property, livestock, or other resources if not repaired or compensated. Such damage provisions should specify that the lessee(s) are responsible for any damages or losses they or their guests (if allowed) cause to the property or to your assets. You should return damage deposits to the lessee(s) if damage is cor-

rected or does not occur during the effective lease period.

- ✓ A termination of a lease clause with provisions to cancel a lease agreement if either party fails to abide by the terms of the written lease agreement, such as a lessee's violating state or federal game regulations. It must also ensure your or your heirs' rights to cancel a lease if you sell the property or if you die within the effective lease period.
- ✓ A subleasing clause that specifies whether the lessee(s) can sublease or assign leasing rights to a third party. You should avoid the idea of subleasing your property to third party access by the original lessee(s).
- ✓ The lessee's responsibilities should be clearly defined within the agreement to include these items: closing gates and repairing broken fences; obeying all state and federal game regulations; helping put out wildfires; evicting trespassers or at least immediately contacting the owner or local law enforcement personnel; adhering to the management plan regarding game harvest recommendations; keeping good game harvest records; appropriate posting of the property; restrictions on the use of alcohol; and off road vehicles as you determine.
- ✓ Your (lessor) responsibilities should be clearly defined within the lease to include duties (as you agree to provide) such as maintaining roads, planting food plots or preparing fields for dove hunting, and providing facilities for lodging or for cleaning and storing harvested game. Obviously these duties and amenities have a cost, and you will have to consider them in the cost of the lease.
- ✓ Your rights as the landowner must be clearly stated in the lease, such as the right to continue to manage the land to meet your identified objectives, the right to allow family members defined hunting privileges, and the right to request removal of a club or group member who violates property or approved behavior codes.
- ✓ You can add indemnity clauses or "hold harmless" disclaimers to the lease agreement. These may protect you from liability if someone is injured on your land. You can use them as proof that an injured lessee assumed the risks of doing a particular activity like climbing a tree or

crossing a fence. They do not, however, relieve you of liability associated with demonstrated negligence.

- ✓ The number of members allowed in lessee club/group.
- ✓ The number of guests, if allowed, and the number of total lessee(s) and invited guests that may be on the property to hunt at any specific time.

■ *Determining Hunting Lease Price Structure*

If you have no experience leasing land for hunting access, one of the most difficult decisions is determining a fair market price that is competitive yet gives you a reasonable return for the lease and any services or amenities provided. The following are known methods but are by no means the only methods:

- ✓ **Break even plus 10 percent** – The lease price is based on management and costs associated with the lease operation plus 10 percent to cover unforeseen costs and the need for the lease to cover operational costs and land taxes.
- ✓ **Habitat valuation** – The lease price is determined from a subjective rating of the quality and quantity of wildlife habitat available. For example, if the wildlife habitat and populations have been managed to provide high populations of wildlife and better than average hunting opportunities, the value of the lease may be higher, or if the lessee(s) want to limit or keep out other hunters that the property could reasonably sustain, they may have to pay a premium price for that.
- ✓ **Baseline plus value-added** – You charge a base price per acre plus charges on improvements made, amenities, or services provided.
- ✓ **Competitive pricing** – You base the lease price on the going rate of other leases in the area or lease prices charged elsewhere for similar access, services, and amenities provided.
- ✓ **Sealed bid** – This is similar to timber sales in that you develop a description of the hunting lease and what it offers, and you request sealed bids. You can do this via advertising or by contacting individuals or sportsmen groups who may have an interest.

HOW TO FIND A RESPONSIBLE LESSEE

It may be difficult to identify and locate responsible hunters who will take an interest in the land and resources being leased and who will respect the property and abide by terms and conditions in a written lease. It will pay dividends in the long-term, however. Without appropriate screening of lessee(s), you may find yourself with an unmanageable group who have no regard for your rights or maintaining the property and the sustainability of the habitat and wildlife. Many problems could arise, such as trash dumping, wildfires, road and tree damage, illegal hunting, damage to facilities and livestock, and over harvest of the game resource. For the most part, you can avoid these problems by using these practices:

- ✓ leasing to known sportsmen with some local members
- ✓ developing and using a well-constructed written lease that protects your interests and that every member, if the club or group is not incorporated, must sign, or if incorporated, that the representative makes sure every member has read and understands.

Remember that after you locate interested lessee(s) ask them to provide a list of references, and use this list to ensure they have not had problems in the past leasing lands from other landowners and are known to be responsible and ethical sportsmen. If the lessee(s) pass this background check, conduct a personal interview with the lessee(s) or their representative, if the group is incorporated. Develop a list of questions in advance that you want to have answered, and don't be afraid to ask tough questions. Then use all the information to make an informed decision about leasing to the lessee(s) and if you think they are willing to accept and abide by the terms of the written lease agreement.

■ *Trespass*

Mississippi law forbids all persons to enter private lands without permission from the landowner. Hunting, fishing, or trapping on land without permission of the landowner is a misdemeanor punishable by a fine and possible imprisonment. The trespass law is enforceable by conservation officers and county sheriffs.

SUMMARY

Recreational access leases have become an important source of alternative income for many forest and agricultural landowners in the South as well as in other parts of the United States. Most forest industry landowners and managers now consider income from recreational access leases as a vital part of their resource and financial decision-making process.

If you as a private landowner consider such leases as an alternative enterprise to supplement your income, you should understand the advantages and disadvantages of the leases. You also must consider and remember you are not selling wildlife, which is publicly owned. You are selling the opportunity and privileges that go with access to your land for the purposes specified in the written lease agreement. Having some idea of the habitat quality and status of wildlife populations on your land will be important in making decisions. The sustainability of

your renewable resources is the key to long-term income potential as well as sustainability of the operation. Recreational access/hunting leases can become an enjoyable and rewarding experience for you (lessor) and sportsmen (lessees) with advance planning, preparation, management, and communication.

As far as the economic potential of hunting leases, the range of returns varies considerably based on the type of lease. One example would be high quality waterfowl blinds leases that bring the highest annual returns per acre of access, versus leases for small game hunting that may be as low as 50¢ per acre, to high quality big game leases that may go for as much as \$25.00 per acre or more in some areas. A recent study of fee hunting in Mississippi reported that for the 1997-98 season, annual net revenues averaged \$3.91 per acre statewide by landowners leasing their lands for hunting.



SAMPLE HUNTING LEASE AGREEMENT

This hunting lease agreement is for educational purposes only. It is important to check with your attorney before writing and signing a binding legal agreement. You may want this lease to be more detailed or include more requirements, or you may want it to be less detailed. If you want to provide other services or rights, such as guides, cleaning game, or allowing the lessee to improve the habitat, you should include those provisions.

STATE OF:

COUNTY OF:

TRACT:

This Lease Agreement (the "Lease") entered into as of the day of _____, by and between _____ hereinafter referred to as Lessor, and _____ a/an (state whether an individual, a partnership, corporation, or unincorporated association) hereinafter referred to as Lessee.

The Lessor agrees to lease the Hunting Rights, as defined below, on _____ acres more or less, to Lessee for _____ (\$_____/Acre), for a term commencing on _____, (the "Commencement Date") and ending on _____ (the "Expiration Date") on the following described property (the "Land").

See Attached Description

The Hunting Rights shall consist of the exclusive right and privilege of propagating, protecting, hunting, shooting and taking game and waterfowl on the Land together with the right of Lessee to enter upon, across and over the Land for such purposes and none other.

This Hunting Lease Agreement shall be subject to the following terms and conditions:

PAYMENT

1. The Lessee shall pay to the Lessor _____, the amount of one (1) year's Rent in full, on or before _____ by check payable to Lessor.

COMPLIANCE WITH LAW

2. Lessee agrees for itself, its licensees and invitees to comply with all laws and regulations of the United States and of the State and Local Governments wherein the Land lies relating to the game or which are otherwise applicable to Lessee's use of the Land. Any violation of this paragraph shall give Lessor the right to immediately cancel this Lease.

POSTING

3. Lessee shall have the right to post the Land for hunting to prevent trespassing by any parties other than Lessor, its Agents, Contractors, Employees, Licensees, Invitees, or Assigns provided that Lessee has obtained the Lessor's prior written approval of every sign designed to be so used. Every such sign shall bear only the name of the Lessee. Lessor reserves the right to prosecute any trespass regarding said Land but has no obligation to do so.

LESSOR'S USE OF ITS PREMISE

4. Lessor reserves the right in itself, its Agents, Contractors, Employees, Licensees, Assigns, Invitees, or Designees to enter upon any or all of the Land at any time for any purpose of cruising, marking, cutting or removing trees and timber or conducting any other acts relating thereto and no such use by Lessor shall constitute a violation of this Lease. This right reserved by Lessor shall be deemed to include any clearing, site preparation, controlled burning and planting or other forestry work or silvicultural practices reasonably necessary to produce trees and timber on the Land. Lessee shall not interfere with Lessor's rights as set forth herein.

GATES/BARRIERS

5. Lessor grants to Lessee the right to install gates or other barriers (properly marked for safety) subject to the written permission of Lessor and the terms and conditions relating thereto as set forth elsewhere in the Lease, on private roads on the Land, and Lessee agrees to provide Lessor with keys to all locks prior to installation and at all times requested by Lessor during the term of this Lease.

ROAD OR FENCE DAMAGE

6. Lessee agrees to maintain and surrender at the termination of this Lease all private roads on the Lands in at least as good a condition as they were in on the date first above-referenced. Lessee agrees to repair any fences or other structures damaged by itself, its licensees or invitees.

ASSIGNMENT

7. Lessee may not assign this Lease or sublease the hunting rights the subject of this Lease without prior written permission of Lessor. Any assignment or sublease in violation of this provision will void this Lease and subject Lessee to damages.

FIRE PREVENTION

8. Lessee shall not set, cause or allow any fire to be or remain on the Land. Lessee covenants and agrees to use every precaution to protect the timber, trees, land, and forest products on the Land from fire or other damage, and to that end, Lessee will make every effort to put out any fire that may occur on the Land. In the event that any fire shall be started or allowed to escape onto or burn upon the Land by Lessee or anyone who derives his/her/its right to be on the Land from Lessee, Lessor shall have the right immediately to cancel this Lease without notice, and any payments heretofore paid shall be retained by Lessor as a deposit against actual damages, refundable to the extent such damages as finally determined by Lessor are less than said deposit. In addition, Lessor shall be entitled to recover from Lessee any damages which Lessor sustains as the result of such fire. Lessee shall immediately notify the appropriate state agency and Lessor of any fire that Lessee becomes aware of on Lessor's lands or within the vicinity thereof.

INDEMINIFICATION AND INSURANCE

9. Lessee shall indemnify, defend and hold harmless Lessor, its directors, officers, employees and agents from any and all loss, damage, personal injury (including death at any time arising therefrom) and other claims arising directly or indirectly from or out of any occurrence in, or upon, or at the said Lands or any part thereof relating to the use of said Land by Lessee, Lessee's invitees or any other person operating by, for or under Lessee pursuant to this Lease. Lessee further agrees to secure and maintain a \$1,000,000 public liability insurance policy in connection with the use of the Land with Lessor named as

insured and with such insurance companies as shall be agreeable to Lessor. This indemnity shall survive the termination, cancellation or expiration of this Lease.

RULES AND REGULATIONS

10. Lessor's rules and regulations attached hereto as Exhibit "A" are incorporated herein by reference and made an integral part hereof. Lessee agrees that any violation of said rules and regulations is a material breach of this Lease and shall entitle Lessor to cancel this Lease as its option effective upon notice by Lessor to Lessee of such cancellation.

Lessor reserves the right from time to time, to amend, supplement or terminate any such rules and regulations applicable to this Lease. In the event of any such amendment, supplement, or termination, Lessor shall give Lessee reasonable written notice before any such rules and regulations shall become effective.

MATERIAL TO BE SUBMITTED TO LESSOR

11. If this Lease is executed by or on behalf of a hunting club, Lessee shall provide Lessor, prior to the execution hereof, a membership list including all directors, officers, and/or shareholders, their names and addresses and a copy of Lessee's Charter, Partnership Agreement and By-Laws, if any. During the term of this Lease, Lessee shall notify Lessor of any material change in the information previously provided by Lessee to Lessor under this paragraph 11.

LESSEE'S LIABILITY RE: TREES, TIMBER, ETC.

12. Lessee covenants and agrees to assume responsibility and to pay for any trees, timber or other forest products that may be cut, damaged, or removed from the Land by Lessee or in connection with Lessee's use of the Land or any damages caused thereupon.

NO WARRANTY

13. This Lease is made and accepted without any representations or warranties of any kind on the part of the Lessor as to the title to the Land or its suitability for any purposes; and expressly subject to any and all existing easements, mortgages, reservations, liens, rights-of-way, contracts, leases (whether grazing, farming, oil, gas or minerals) or other encumbrances or on the ground affecting Land or to any such property rights that may hereafter be granted from time to time by Lessor.

LESSEE'S RESPONSIBILITY

14. Lessee assumes responsibility for the condition of the Land and Lessor shall not be liable or responsible for any damages or injuries caused by any vices or defects therein to the Lessee or to any occupant or to anyone in or on the Land who derives his or their right to be thereon from the Lessee.

USE OF ROADS

15. Lessee shall have the right to use any connecting road(s) of Lessor solely for ingress, egress, or regress to the Land; such use, however, shall be at Lessee's own risks and Lessor shall not be liable for any latent or patent defects in any such road nor will it be liable for any damages or injuries sustained by Lessee arising out of or resulting from the use of any of said Lessor's roads. Lessee acknowledges its obligation of maintenance and repair for connecting roads in accord with its obligation of maintenance and repair under paragraph 6.

SURRENDER AT END OF TERM

16. Lessee agrees to surrender the Land at the end of the term of this Lease according to the terms hereof. There shall be no renewal of this Lease by implication or by holding over.

MERGER CLAUSE

17. This Lease contains the entire understanding and agreement between the parties, all prior agreements between the parties, whether written or oral, being merged herein and to be of no further force and effect. This Lease may not be changed, amended or modified except by a writing properly executed by both parties hereto.

CANCELLATION

18. Anything in this Lease to the contrary notwithstanding, it is expressly understood and agreed that Lessor and Lessee each reserve the right to cancel this Lease, with or without cause, at any time during the Term hereof after first giving the other party thirty (30) days prior written notice thereof. In the event of cancellation by Lessee, all rentals theretofore paid and unearned shall be retained by the Lessor as compensation for Lessor's overhead expenses in making the Land available for lease, and shall not be refunded to Lessee.

APPLICABLE LAW

19. This Lease shall be construed under the laws of the State first noted above.

IN WITNESS WHEREOF, the parties have hereunto caused this Agreement to be properly executed as of the day and year first above written.

WITNESSES:

SAMPLE HUNTING LEASE AGREEMENT

This hunting lease agreement is for educational purposes only. It is important to check with your attorney before writing and signing a binding legal agreement. You may want more details or fewer details than this lease includes. If you want to provide other services or rights, such as guides, cleaning game, or allowing the lessee to improve the habitat, they should be included.

_____, owner of _____ farm, (legal description of the land), County, (state), herein referred to as "Landowner," for good and sufficient consideration, as hereinafter set forth, leases hunting rights on those portions of the _____ farm, hereinafter described, to _____ and others so executing this agreement and hereinafter referred to as "Lessees," on the following terms and conditions:

1. The tract of land, hereinafter referred to as "lease" upon which hunting rights are granted, is the _____ farm described herein consisting of approximately _____ acres.

(description of land with aerial photograph if available)

Lessees understand the location and boundaries of said tract and agree that no hunting rights are granted hereunder on any tract other than the tract herein designated and that no hunting or discharging of firearms shall be done by Lessees while traveling to or from the lease.

2. This agreement and the rights and duties granted and incurred hereunder shall be for a term commencing with the opening of _____ season in 20____, and the closing of _____ season in 20____, as set for _____ County, (state), under regulations enforced by the (state wildlife agency) unless terminated pursuant to provisions of this agreement hereinafter set forth. Provided that either the Landowner or Lessee may cancel this agreement by giving written notice of its intent to do so thirty (30) days prior to the date that rental for the second or third year of the term here provided is due. In which event, Lessee shall be relieved of the obligation to pay further rental under the terms and shall deliver possession of the premises.
3. The consideration to be paid by Lessee to Landowner at _____ County, (state), is \$_____ in cash, one-half to be paid on or before June 1, 20____, and the balance to be paid on or before October 1, 20____. Failure to pay the second installment shall thereupon terminate and cancel the lease and the amount already paid shall be forfeited as liquidated damage for the breach of the agreement. A \$_____ deposit will be required to insure that lease premises are left in a clean and orderly condition. Farm personnel will inspect the premises within 30 days after the lease expires. If cleanup is necessary, the farm will accomplish such, and the \$_____ deposit will be forfeited by the Lessees. If the premises are determined by farm personnel to be clean and orderly, the \$_____ deposit will be returned to the Lessees within 60 days after expiration of the lease.
4. Lessees shall not assign this lease or sublet the leased premises without the written consent of _____.

5. Lessees shall at all times abide by and obey all state and federal hunting laws and regulations and Lessee shall be responsible for the conduct of Lessee's guests or members in connection with said hunting laws and shall be responsible for any violation of said hunting laws or regulations by said Lessee, its guests, or members. Any violation of the hunting laws or regulations of any governmental authority shall give rise to the right of immediate cancellation of this lease by the Landowner upon written notice to Lessees, and in the event of the cancellation of said lease due to violation of game laws by Lessees, its guests or members, no prorata of the rent previously paid shall be made, same to be forfeited as liquidated damages, and Lessees shall, upon receipt of such notice, immediately vacate and surrender unto the Landowner possession of the leased premises.

Lessees shall, during the period in which it has access to the leased premises, continually protect same against trespassers and squatters, and to the best of Lessee's ability have such persons apprehended and prosecuted.

6. This lease agreement is expressly made subject to the "General Conditions of the Lease," which are attached hereto as Exhibit "A," and made a part hereof for all purposes the same as if copied herein verbatim.
7. If Lessees default in the performance of any of the covenants or conditions hereof, including the "General Conditions of Lease," which are attached hereto as Exhibit "A," then such breach shall cause an immediate termination of this lease and a forfeiture to Landowner of all consideration prepaid. The Lessee shall have no further rights under the term of this lease agreement. In the event a lawsuit arises out of or in connection with this lease agreement and the rights of the parties thereof, the prevailing party may recover not only actual damages and costs but also reasonable attorneys' fees expended in the matter.
8. Landowner shall not be liable for any injuries, deaths, or property damage sustained by (1) any Lessees hereto, (2) any employees of Lessees, (3) any business invitees of Lessees, (4) any guest of Lessees, (5) any person who comes to the leased premises with the express or implied permission of Lessees on the _____ farm with permission of the Lessee hereunder except for such injury, death, or property damage as may be sustained directly as a result of Landowner's sole negligence. Lessee hereunder jointly and severally agrees to indemnify Landowner, his agents or employees against any claim asserted against Landowner or any of Landowner's agents or employees as a result of personal injury, death or property damage arising through: (1) the negligence of a Lessee or any persons on the farm with the permission of a Lessee, or (2) through the concurrent negligence of a Landowner or his agents or employees any one or more of Lessees or any person on the _____ farm with the permission of the Lessee.

All minors permitted by Lessee to hunt, fish, or swim on the leased premises shall be under the direct supervision of one of their parents (or guardian) and when children are present on the leased premises, the parents shall be fully responsible for their acts and safety and agree to hold Landowner harmless therefor, regardless of the nature of the cause of damage, whether property or personal injury, to themselves or others.

9. The leased premises are taken by Lessee in an “as is” condition, and no representation of any kind is made by _____ regarding the suitability of such premises for the purpose for which they have been leased.
10. This lease may not be terminated or repudiated by Lessee except by written notice signed and acknowledged in duplicate before a Notary Public by Lessee, and such termination or repudiation shall not be effective until Lessee has mailed one executed copy thereof to Landowner by registered mail and filed the other executed copy thereof for record in the Office of the County Clerk, _____ County, (state). This lease shall be binding upon the distributees, heirs, next of kin, successors, executors, administrators, and personal representatives of each of the undersigned. In signing the foregoing lease, each of the undersigned hereby acknowledges and represents:

- (a) That he has read the foregoing lease, understands it, and signs it voluntarily; and
- (b) That he is over 21 years of age and of sound mind;

In witness whereof, the parties have set their hands this the _____ day of _____, 20____.

LESSEES:	DATE:	LANDOWNER:	DATE:
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	WITNESS:	DATE:
_____	_____	_____	_____
_____	_____	_____	_____

STATE OF _____

COUNTY OF _____

The foregoing instrument was subscribed, sworn to, and acknowledged before me this _____ day of _____, 20____, by _____ and _____.

My commission expires: _____

Notary Public

**EXHIBIT "A," GENERAL CONDITIONS OF LEASE
(EXAMPLES OF OPTIONAL CLAUSES)**

_____ LANDOWNER, LEASE TO _____ LESSEE

These general conditions of lease are applicable to the lease agreement between _____, hereinafter referred to as LANDOWNER, and _____, LESSEE. Lessee and all persons authorized to Lessee to hunt upon the leased premises shall be hereinafter collectively referred to as "Hunters."

1. It will be the responsibility of the Lessee to furnish each hunter or guest with a copy of these general conditions of lease.
2. Lessees understand and agree that the leased premises are not leased for agricultural or grazing purposes and, consequently, taken subject to the rights thereof.
3. Lessee acknowledges that Landowner owns the property herein leased, primarily for agricultural purposes and the growing of timber. Lessee shall in no manner interfere or obstruct Landowner's farming, forestry, or livestock operations.
4. Landowner reserves the right to deny access to the leased premises to any person or persons for any of the following reasons: drunkenness, carelessness with firearms, trespassing on property of adjoining landowners, acts which could reasonably be expected to strain relationships with adjoining landowners, or any other activities which to the ordinary person would be considered objectionable, offensive, or to cause embarrassment to Landowner or be detrimental to Landowner's interest. Failure of Lessee to expel or deny access to the premises to any person or persons after being notified to do so by Landowner may result in the termination of this lease at discretion of Landowner.
5. No hunter shall be allowed to:
 - (a) Shoot a firearm from a vehicle;
 - (b) Erect a deer stand within 150 yards of the boundary of the herein leased premises;
 - (c) Permanently affix a deer stand in trees;
 - (d) Abuse existing roads by use of vehicles during wet or damp conditions.
 - (e) Fire rifles or other firearms in the direction of any house, barn, other improvements or across any haul road located on the leased premises;
 - (f) Build or allow fires on the leased premises, except in those areas specifically designated by Landowner in writing, and, in event, shall be kept fully liable for such fires; and
 - (g) Leave open a gate found closed or close a gate found open.
6. Hunters shall at all times maintain a high standard of conduct acceptable to _____.

HUNTING CLUB BYLAWS

Hunting Club bylaws should contain provisions that govern the day-to-day operation of the club. The bylaws should be adapted to local conditions that affect the club, its relationship with landowners(s), and the well-being of the land and wildlife resources. You should keep the bylaws as simple, concise, and understandable as possible for the benefit of the members and yourself. Some clubs develop bylaws that are too complex and too extensive for the basic needs and are too difficult to manage or enforce adequately. Bylaws should be written to be basic to the operation of the club or group's interest and to add others as needed based on the club/group's growth, changing needs, changing wildlife regulations, or changes you need. Some examples of items that need to be considered when drafting bylaws are as follows:

- ✓ Guest privileges and/or regulations.
- ✓ Safety for members, for the landowners, and/or property.
- ✓ Land management and stewardship of the property.
- ✓ Appropriate disciplinary procedures for all members and guests, if allowed.
- ✓ Rules of the hunt for all participants.
- ✓ Strict adherence to all state and federal wildlife regulations.
- ✓ Functional/operational committees, such as camp operation and maintenance, stand or blind placement and maintenance, food and cooks for organized hunts, and such.
- ✓ Maintenance of appropriate member and landowner(s) relations.
- ✓ If management for quality deer management is a club/group objective, this needs to be made clear in the bylaws.
- ✓ Any club/group self-imposed management requirements, such as no dogs, use of trailing dogs for retrieving cripples, or for chasing deer. Also consider if other species are allowed to be hunted during regulated seasons, such as turkey, squirrels, raccoons, waterfowl and such, and doves.

Obviously hunting club/group bylaws are essential for many organized hunting operations, and if you have concerns about the legality of the bylaws and their enforcement, you may consult a lawyer. Clearly one of the most important considerations must be that all members and invited guests must understand and agree in writing to the adopted bylaws for them to be useful and effective. The items listed above for consideration are not all you need to consider. The list can be expanded based on the desires and needs of you and the membership.

LIABILITY INSURANCE FOR LANDOWNERS AND HUNTING CLUBS

Insurance is a contract where an insurer (insurance company) undertakes to protect the insured (person purchasing the insurance) against loss, damage, or liability from an unknown or possible event. The insured pays the insurer a premium for this coverage.

Liability insurance covers loss because of negligence. It does not cover loss because of an intentional act. You can greatly reduce negligence on most private lands through risk planning.

Liability insurance companies generally limit the total liability of the insurance company to a certain amount, which may be much less than the insured person may suffer. Therefore, liability insurance may not completely eliminate the loss that occurs, but it does reduce the risk of loss.

If you already have liability insurance on your property, you may be able to work with your insurer to add liability coverage for a hunting lease. Your insurer may require that the hunting club or lessees get liability insurance as part of the written lease agreement. You may want to prepare or have an attorney prepare a hunting club disclaimer that all hunting club members or lessees must sign that points out potential risks on the land. Some of these might be an abandoned well, livestock that may need to be avoided, and such. Disclaimers may not be legal, but they do serve to warn lessees of potential risks and may prevent a liability suit if the lessees ignore the identified risks they signed a waiver for.

Many insurance companies offer liability for hunting clubs or for landowners who lease their land for hunting or other recreational access. **The following list by no means includes all sources of information, but it does provide some sources of information about liability insurance, coverage, costs, and comparisons.** Another source you should not overlook is a rider to existing policies to cover recreational access including hunting.

If someone pays for access to your land to hunt or fish or other recreational use, you owe that person certain duties of care, such as posting warnings as to dangerous conditions on the property, including potentially dangerous animals, abandoned wells, old buildings, and other structures. You may be liable for injuries to a hunter caused by another hunter if not you are not covered by insurance. For example, liability may be based on your negligence if you allow too many hunters in a given area, or if you admit an intoxicated hunter who injures another hunter.

■ *Some Known Sources of Liability Insurance*

Southeastern Wildlife Federation's Hunting Club Liability Insurance Program

Contact – Ms. Carol Cash Turner, Insurance Agent, Southeastern Wildlife Federation, P.O. Box 1109, Montgomery, Alabama 36102. Telephone: (334) 832-9453. Premium rates are based on the number of members in the club and the limit of liability selected. SWF offers liability limits of \$300,000, \$500,000 and \$1,000,000 in either Limited or Broad form. The Limited form excludes occurrences between members and/or guests. The Broad form also has \$25,000 Fire Legal Timber coverage. Both forms include a \$25,000 Accidental Death benefit and a \$1,000 medical Expense benefit for each member. There are no hidden charges, and as many as four landowners may be listed as “Additional Insured” at no extra cost. For any landowners over four, the cost per landowner is \$10 plus tax.

Davis-Garvin-Agency

Contact – Dr. Ed Wilson, Account Executive, P.O. Box 21627, Columbia, South Carolina 29221-9961. Telephone: (800) 845-3163, or (803) 732-0060. This agency provides two types of hunting lease liability packages: (1) for an individual hunting club; or (2) for a landowner with a large acreage or groups of landowners representing large acreages. The premium for hunting clubs is determined by the number of members and

guests, with the minimum premium being \$364 for a \$1 million per occurrence liability limit. The premium for large properties or groups of landowners is determined by the acreage involved, with the minimum acreage being 10,000 acres. The rate for a \$1 million per occurrence liability limit varies from 24¢ per acre plus tax for 10,000 to 49,000 acres to 17¢ per acre plus tax for 50,000 + acres.

Bramlett Agency

1000 Energy Center, Suite 104, P.O. Box 369, Ardmore, Oklahoma 73042, (405) 223-7300. This company sells liability insurance for most types of hunting leases.

ISERA (International Special Event and Recreation Association)

Contact – Jim Quist, Underwriting Specialist, 8722 South Harrison Street, Sandy, Utah 84070. Telephone (toll free): (877) 678-7342 or (801)-304-3735. This company insures primarily shooting preserves and shooting ranges.

Worldwide Outfitters and Guide Association, Outfitters and Guides Underwriters Inc.

Contact – Jim Quist, 8722 South Harrison Street, Sandy, Utah 84070. Telephone (toll free): (877) 678-7342 or (801) 304-3735. This company insures primarily guides and outfitters for a variety of outdoor recreation activities, including hunting and fishing.

Outdoor Underwriters, Inc.

Contact – R. Tim Reed, CLU, Outdoor Recreation Insurance, P.O. Box 431, Wheeling, West Virginia 26003. Telephone: (800) 738-1300. This company is affiliated with the Philadelphia Insurance Companies and insures guides, outfitters, hunting clubs, and landowners with hunting leases for up to \$1,000,000 per occurrence.

These are just some examples. Many other insurers may offer such insurance, including your present property insurer through an additional rider. However, the above contacts provide the opportunity to contact these insurers and compare coverage and costs.

For more information, these publications are available from your county Extension office:

P2308 – Natural Resource Enterprises – Wildlife and Recreation, A Checklist of Considerations

P2310 – Natural Resource Enterprises – Wildlife and Recreation, Hunting Leases

SRAC #479a – Fee Fishing: An Introduction

SRAC #480 – Fee Fishing Ponds: Management of Food Fish and Water Quality

SRAC #481 – Development and Management of Fishing Leases

SRAC #482 – Fee Fishing: Location, Site Development, and Other Considerations

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By **James E. Miller**, Outreach/Research Scientist, Extension Wildlife and Fisheries

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NATURAL RESOURCE ENTERPRISES

License Granting Access to Hunt on Private Land

This agreement granting access to hunt on private land is for reference purposes only. You should check with a licensed attorney before writing or signing a binding legal agreement. You may want the agreement to be more or less detailed or you may want to provide other responsibilities, services or rights, such as guides, cleaning game, etc.

This license granting access to hunt upon private land (“Agreement”) is made this _____ day of _____, _____, by and between _____ (“Landowner”), whose address is _____ and the following individuals, hereafter referred to as Licensee(s), who each warrant that they are at least eighteen (18) years of age:

Name	Address
_____	_____
_____	_____
_____	_____

I. Description of Land and Consideration Paid for Hunting Premises

- Licensee agrees to pay Landowner the sum of \$_____ for the right to hunt _____, for a period of _____ year(s) beginning on _____, _____ and ending on _____, _____, the following described property:

All that parcel of land in _____ County, Indiana, containing _____ acres, more or less, and being more particularly described in Appendix A, which is attached to and made part of this Lease, and hereafter referred to as “Hunting Premises.” (Attach picture, map, plat, legal description, etc. as Appendix).

- Licensee agrees to pay the sum due, one-half to be paid on or before _____, 20____, and the balance to be paid by _____, 20____.
- Licensee agrees to provide the Landowner with a security deposit of \$_____ (the “Deposit”) on the commencement of the Agreement term. The Deposit is refundable upon termination of this Agreement if the provisions of the Agreement have been adhered to and no damages have been placed upon the Landowner or the Hunting Premises as result of the granting of privileges by Landowner contained herein or the actions of the Licensee. Landowner has 30 days to inspect the Hunting Premises upon termination of the Agreement. Any costs to repair the Hunting Premises will be deducted from the Deposit. Any Deposit which is due to the Licensee will be paid within 60 days after the expiration of the Agreement.

4. Landowner may cancel this Agreement by giving written notice of intent to do so 30 days prior to the date upon which cancellation is effective. In the event that a termination takes place, Landowner shall refund to Licensee all payments received under the terms of this Agreement.

II. Licensee's Obligations

1. Licensee agrees to abide by and obey all local, state, and federal hunting ordinances, laws, and regulations at all times. Any violation of the hunting laws or regulations of any government authority shall give rise to the right of immediate cancellation of this Agreement by the Landowner upon written notice to Licensee. In the event of the cancellation of said Agreement due to violation of game laws by Licensee, no fee previously paid shall be refunded. Such fees will be forfeited as liquidated damages, and Licensee shall, upon receipt of such notice, immediately vacate the Hunting Premises.
2. Licensee agrees to exercise the highest degree of care in the conduct of activities permitted under this Agreement, which includes refraining from using alcohol or drugs or being under the influence of the same while on the Hunting Premises.
3. Licensee is authorized to undertake wildlife habitat improvement, such as plantings or tree cuttings or removal, at the expense of Licensee. Plans for any improvements must be submitted as part of a wildlife habitat improvement plan and approved in writing by Landowner prior to being made. Clearing of underbrush must be done in a manner so as not to damage any trees or crops that have been planted. Any improvements made become the property of Landowner at the expiration of this Agreement.
4. No structures of any kind may be erected on the Hunting Premises, including but not limited to tree stands, blinds, nor any objects driven into trees, unless Licensee receives the prior written approval of the Landowner.
5. Licensee agrees to pay Landowner the fair market value for any trees which are cut down or severely damaged by actions of Licensee unless this provision is waived by Landowner when approving the wildlife habitat improvement plan.
6. Licensee may allow no more than one of his own minor children to accompany him on the Hunting Premises. Licensee may not allow minors of whom Licensee is not the parent or guardian to accompany him on the Hunting Premises. The child must be at least 10 years of age, must have all licenses and permits required by law, and must have completed a course in hunting safety approved by the State of Indiana. The Licensee agrees to take full responsibility for the child, to keep the child within sight and reach, and to directly supervise the child at all times.
7. Licensee shall, during the period of which he has access to the Hunting Premises, continually protect the same against trespassers and, to the best of Licensee's ability, have such persons apprehended and prosecuted.
8. Licensee agrees to maintain proper safety procedures regarding firearms, including but not limited to ensuring that all firearms are unloaded while in a vehicle and in vicinity of all buildings.

9. Licensee agrees to maintain a no-hunting or shooting zone within 100 yards of any occupied building and around all other designated areas, and to never shoot in the direction of any individual, livestock, or building.
10. Licensee agrees to maintain proper vigilance aimed at preventing fires or damage by other means to the Hunting Premises and to immediately report any wildfires that may occur on the Hunting Premises to the Landowner and proper authorities.
11. Licensee agrees to ensure that vehicles are driven only on established roads, except that ATVs may be driven off of established roadways so long as the property is not damaged and the ATV is used in conjunction with the hunting activities authorized in this Agreement.
12. Licensee agrees to leave all gates as originally found.
13. Licensee agrees to remove all personal property or structures placed or constructed by Licensee upon the Hunting Premises at termination of this Agreement unless the Landowner has provided prior written consent to leave any or all such property.
14. Licensee agrees to repair any damage caused to the Hunting Premises and to return the Hunting Premises and property to the Landowner in the same condition that existed upon commencement of the Agreement with the exception of improvements approved by Landowner.
15. Licensee agrees to in no way interfere with any farming activities or to cause damage to cropland, crops, or livestock.
16. Licensee agrees to not enter upon any neighboring land or hunt on any real estate not described herein.
17. Licensee agrees to provide notice to Landowner before entering the Hunting Premises outside of the hunting season for which the Licensee has permission to hunt. This includes but is not limited to entering the property to scout, perform wildlife habitat improvement, or set up tree stands or blinds.
18. Licensee agrees to keep the Hunting Premises free of litter at all times.
19. Licensee agrees to acquire liability insurance in the amount of \$1 million per occurrence in the event of any accidents, damages, injuries, or deaths which arise out of the use of Hunting Premises and to include Landowner as an additional insured party. Insurance may not be canceled without prior notice to Landowner. Licensee must provide Landowner with a copy of the insurance prior to gaining access to the Hunting Premises so that Landowner may verify coverage.

III. Landowner Obligations and Rights

1. Landowner agrees to provide the Licensee with hunting rights on the Hunting Premises during the term of this Agreement, subject to the conditions and restrictions provided herein.
2. Landowner agrees to not lease to or give any other individual(s) permission to access, occupy, or use for recreational purposes, including hunting, the Hunting Premises during the term of this Agreement. However, Landowner reserves the right for himself and his family to continue to use the Hunting Premises for recreational purposes, including hunting.

3. Landowner agrees to notify Licensee of his presence on the Hunting Premises when Landowner intends to engage in hunting activities.
4. Landowner reserves and at all times shall have the full, free, and absolute right and authority, by himself or his agents, servants, and employees, and others from time to time authorized by Landowner, to go on, upon, and over the Hunting Premises for any purpose, including but not limited to farming activities, silviculture, or maintenance activities of the Hunting Premises.
5. Landowner retains all rights necessary to lease all crop and pasture land to another individual to be used for agricultural production.

IV. Breach

1. If Licensee defaults in the performance of any of the covenants or conditions hereof, such breach may result in immediate termination of this Agreement, at the discretion of Landowner, and a forfeiture to Landowner of all consideration prepaid. The Licensee shall have no further rights under the term of this Agreement. In the event a lawsuit arises out of or in connection with this Agreement and the rights of the parties thereof, a prevailing Landowner may recover all reasonable attorney fees from Licensee.
2. Either party's failure to complain of any act or omission on the part of the other party, no matter how long same may continue, shall not be deemed a waiver by such party of any of its rights hereunder. No disclaimer by either party at any time, express or implied, of any breach of any provision of this Agreement shall be deemed a waiver of any other provisions of this Agreement or a consent to any subsequent breach of the same or any other provision.

V. Indemnification

The Licensee agrees to indemnify, defend, and hold harmless the landowner, his heirs, agents, employees, and assigns from and against all claims and damages, including court costs and attorney's fees, resulting from any accident or incident arising out of or in any way resulting from the use of the leased premises or the Licensee's active or passive negligent conduct thereon. These include, among other things, injury or death to the Licensee and damage or destruction of the Licensee's personal property, claims made by third parties the Licensee allows to access the property in violation of this Agreement, claims made by any minor child resulting from the Licensee's use of the Hunting Premises, and claims of attractive nuisance resulting from any structure erected by the Licensee.

VI. Miscellaneous Provisions

1. The term "Licensee" shall be interpreted to include all licensees party to this Agreement, and "Landowner" shall include all landowners party to this Agreement.
2. In the event that any action is filed in relation to this Agreement, the unsuccessful party in the action shall pay to the successful party, in addition to

all other sums that either party may be called on to pay, a reasonable sum for the successful party's attorneys' fees.

3. Any modification of this Agreement or additional obligation assumed by either party in connection with this Agreement shall be binding only if evidenced in a writing signed by each party or an authorized representative of each party.
4. The titles to the paragraphs of this Agreement are solely for the convenience of the parties and shall not be used to explain, modify, simplify, or aid in the interpretation of the provisions of this Agreement.
5. This Agreement shall constitute the entire Agreement between the parties and any prior understanding or representation of any kind preceding the date of this Agreement shall not be binding upon either party except to the extent incorporated in this Agreement.
6. All modifications to this Agreement must be made in writing, and signed by all parties in order to be effective.
7. Any notice provided for or concerning breach or termination of this Agreement shall be in writing and be deemed sufficiently given when sent by certified mail or registered mail to the respective address of each party.
8. The rights of each party under this Agreement are personal to that party and may not be assigned or transferred to any other person, firm, corporation, or other entity without the prior, express, and written consent of the other party.
9. If any provision of this Agreement shall be held to be invalid or unenforceable by a court of competent jurisdiction, the remainder of the Agreement shall not be affected thereby, and each remaining provision shall be valid and enforceable to the fullest extent permitted by law.
10. This Agreement shall be construed and enforced in accordance with, and governed by, the laws of the state of Indiana (without giving effect to the principles of conflicts and laws thereof). The parties hereto irrevocably agree and consent to the non-exclusive jurisdiction of the courts of the State of Indiana and the federal courts of the United States, sitting in Indiana for the adjudication of any matters arising under or in connection with this Agreement.

VII. Acknowledgement of Risk and Waiver of Liability

WARNING

Under Indiana law, an agritourism provider is not liable for an injury to, or the death of, a participant in agritourism activities at this location if the death or injury results from the inherent risks of agritourism activity.

Inherent risks of agritourism activities include risks of injury inherent to land, equipment, and animals as well as the potential for you to act in a negligent manner that may contribute to your injury or death, or for other participants to act in a manner that may cause you injury or cause your death.

You are assuming the risk of participating in this agritourism activity.

[“Agritourism provider” refers to Landowner and “You” refers to Licensee]

1. Licensee acknowledges that hunting is inherently dangerous and that he is aware of the risk and dangers involved in the hunting activities, which include, but are not limited to, injuries resulting from the use of firearms, accidents or illnesses occurring in remote places without medical facilities, and dangers resulting from natural and man-made conditions in the hunting area. It is mutually agreed that Landowner cannot list and/or physically show Licensee each and every potential hazard on the Hunting Premises and despite this, Licensee enters onto said premises at his own risk.
2. **Licensee further agrees that he, his heirs, successors, and assigns will not make any claim or institute any suit or action at law or in equity against the landowner named above or his heirs, agents, representatives, employees, successors, or assigns in connection with the presence of the Licensee and any accompanying minor child on the Hunting Premises pursuant to this Agreement. Licensee intends this release to be effective, regardless of whether the claim of liability is asserted in negligence, strict liability in tort, or any other theory of recovery.**

Licensees:

Date: _____

Landowner:

Date: _____

Landowner Considerations for Hunting Leases

Leasing one's land to sportsmen and hunters can be a steady additional source of income for farmers and other landowners. In addition to more income, leasing one's land can lead to a reduction in trespass problems, land management improvements through in-kind assistance, and a greater benefit to the local community's economy. While the benefits of leasing land for recreational use are numerous, it is important that a landowner institutes certain protections against liability and increased land management costs through a written lease agreement. This checklist provides information on some common areas of concern that should be addressed in a comprehensive recreational use lease agreement. *This checklist is not a substitute for legal advice. Please consult an attorney before writing or signing a lease agreement.*

I. Area of land to be leased

- Have you conducted a wildlife inventory?
 - o The inventory will indicate the types and quality of animals on your property, which will control what hunting opportunities you can offer.
 - o The inventory will also assist you in determining the lease price, based on the demand for the game present on your land and the number of each kind of game present on your land.
- Have you inspected your property and neutralized potential risks or developed means to warn lessees of them?
 - o Risks could include:
 - Pesticide reentry restrictions
 - Abandoned wells
 - Open mine shafts
 - Sinkholes
 - Dead or fallen trees
 - Dilapidated buildings
 - Accumulated toxic and hazardous wastes
 - Known areas with concentrations of poisonous snakes or aggressive livestock
 - o If risks can't be neutralized, your lease agreement should contain a list of existing hazards in order to fully inform lessees. This list may limit liability for injuries sustained on your land due to any hazardous conditions because the lessee was fully informed of their existence and location.
 - o Pursuant to the new Indiana Agritourism Limited Liability statute (Ind. Code 34-31-9, effective July 1, 2011), proper signage should be posted and/or a warning should be included in the written agreement. For more information see section V, Liability and Indemnification.
- What portion of the property will you make available for lease?
 - o You need to determine whether you will lease an entire parcel or portions of it. You might lease timber or grassland and not crop land. Or, you may choose to include crop land in the lease.

- If you lease less than the entire parcel to a party, will you allow other people to use the property? While you can lease various parts of the property to different people, it may lead to conflicts in use or risks of injury.

II. Lease Price

- What is an appropriate lease price?
 - Options:

<u>Method</u>	<u>Lease Description</u>
What neighbors or others are charging in the immediate area	Lease price is based upon the going rate in the area
Break-even plus 10 percent	Lease price is based upon management and other costs plus 10 percent
Habitat valuation	Lease price is based upon a subjective rating of the quality and quantity of wildlife habitat
Baseline plus value-added	Base price per acre is charged. Additional fees are assessed on each improvement, amenity, or service provided
Sealed bid approach	Similar to timber sales. A description of the hunting lease is made and a request for offers is solicited.

Source: (Yarrow, G. “Developing a Hunting Lease: Considerations, Options Realities”, Clemson University. Presented during the Maryland Cooperative Extension Conference “Natural Resources Income Opportunity for Private Lands”).

- Your lease price should be determined based upon an income schedule that works with your business plan and personal needs as well as what the local market can bear.
- A landowner may choose to allow someone to hunt for free. It is also possible that someone could hunt in exchange for game, services rendered for wildlife management, or in-kind contributions for wildlife management. If these provisions are met, landowners are not liable for injuries suffered by the user of the property unless there was an attractive nuisance or the owner of the property caused the injury.

III. Length of Lease

- Have you determined the duration for your lease?
 - Multiple-year
 - Advantages to multiple-year leases include the consistency of the income for the landowner. They may also require less oversight over lessees when lessees become familiar with the characteristics of the land and the schedules of the people who manage the land, leading to the development of a strong relationship between landowner and sportsman.
 - Disadvantages to multiple-year leases include that it can be difficult for a landowner to increase rent unless the contract specifies how increases will be handled. Parties have to wait a prolonged period of time to get out of

- the agreement when/if they want to and some lessees can begin to treat land like they own it.
 - Multiple year leases may need to be recorded.
 - Year-long
 - They provide access to the property for one year.
 - Advantages include that the lease can be renegotiated each year and the landowner and lessee are not tied to an agreement that may turn out to be unsatisfactory.
 - Limited Duration (Day or Seasonal)
 - These leases provide a more limited access to the property, such as for the length of hunting season for each type of game.
 - These leases won't obligate the entire property for a whole hunting season or year.
 - They can require a large amount of management and marketing in order to gain a return on investment. However, that return can be very high, depending on the turnover of lessees.

IV. Method of Negotiation

- Have you interviewed potential lessees?
 - It is important to trust the lessee and to determine if your land management objectives are compatible with lessee's objectives.
 - Face-to-face interaction assists both parties in expediting the lease process and quickly coming to an agreement on essential terms.
 - Negotiations can take place by other means, such as through email. Make sure you are comfortable with this form of negotiation before venturing into it.
 - Ask for references if you feel they are necessary.

V. Provisions to Include in Written Agreement

- Name and address of landowner(s) and hunter(s)
 - If an incorporated hunting club is leasing, the registered agent for the hunting club can represent the entire organization. If not, all members of the hunting club must sign the lease and provide their contact information.
- Purpose of hunting lease
 - Explain what game is permitted to be hunted
- Description of the "Leased Area"
 - Including the tract, boundaries and an attached map of the property. Description should include the property's present condition.
- Duration of lease, including beginning and ending dates.
- Method of lease payment, date of lease payment, and a penalty provision for late payment.
- Termination provisions
 - The actions that will result in termination of the lease, such as if the condition of property is materially changed during the duration of the

- lease, state game laws are violated, the lease terms are materially breached, etc.
 - Whether the lease will continue if the land is transferred by the landowner.
- Lessee's responsibilities
 - Obeying all game laws
 - Following game harvest recommendations
 - Reporting game harvest records
 - Making wildlife habitat improvements
 - Not injuring trees (unless permitted expressly by landowner)
 - This should include provisions about the use of tree stands
 - Forbidding/allowing the use of blinds
 - Closing gates
 - Mending broken fences
 - Removing structures, unless allowed to remain by the landowner
 - Landowners should be aware that structures, such as tree stands, could potentially subject them to liability by trespassing children as an attractive nuisance.
 - Refraining from hunting near buildings and livestock
 - Keeping vehicles on a designated path
 - Not using alcohol or drugs
 - Not littering
 - Not trespassing on neighbor's property
 - Procuring an insurance policy
- Landowner Rights
 - Right to continue land management
 - Hunting by family and friends
- Inspection provision
 - Lessee should have an opportunity to inspect the Leased Area, and accept the land in an "as is" condition.
- Damages provision
 - This requires lessee(s) to cover the costs of destruction of the property, livestock, and other landowner assets caused by lessee(s)' presence on the property if not properly repaired or compensated.
 - A landowner could require a damage deposit which will be returned to hunter(s) if damage is corrected or does not occur.
- Assignability
 - By allowing the lease to be assigned through a sublease or other transfer, a landowner may lose control because the landowner no longer controls who is using his/her land. However, if one chooses to allow this, provisions should be created to indicate the type of transfer that is acceptable.
 - This includes notice of transfer, duration of sublease, etc.
- Liability and Indemnification
 - Landowners that did not have liability protection under the Indiana Recreational Use Statute (IRUS) because they received a monetary

consideration for land access now have limited liability protection under the new Agritourism Limited Liability statute (Ind. Code 34-31-9) provided the landowners comply with the statute's requirements. If compliant, the landowner would have protection from liability for the injury or death of a participant resulting from the inherent risks of agritourism activities.

- To be compliant with the new statute, a lease should include in clearly readable print the statute's required warning language. The landowner has the option to include the warning in either a written agreement or on at least one clearly visible sign at the main entrance for the activity which states the required warning language in black letters at least one-inch in height.

- The required warning language is:

WARNING

Under Indiana law, an agritourism provider is not liable for an injury to, or the death of, a participant in agritourism activities at this location if the death or injury results from the inherent risks of agritourism activity.

Inherent risks of agritourism activities include risks of injury inherent to land, equipment, and animals as well as the potential for you to act in a negligent manner that may contribute to your injury or death, or for other participants to act in a manner that may cause you injury or cause your death.

You are assuming the risk of participating in this agritourism activity.

- A lease should include an Acknowledgement of Risk provision
 - It indicates that the hunter is engaging in hunting of his/her own free will and is aware of and accepts the inherent dangers in doing so.
- A landowner should require a hunter to waive the right to sue the landowner
 - It is not possible to waive the rights of a minor child, so some may wish to prohibit minors from accessing of the property.
 - Even if a landowner prohibits children from coming onto the property, they might still be there in violation of the agreement.
- A landowner can require a hunting club or individual sportsman to obtain a liability insurance policy.
 - If so, the lease should set out the terms and minimum amounts of coverage acceptable to the land owner.

- The lease should require an indemnification provision, which provides that the hunter will reimburse the landowner for any damages assessed to the landowner.
 - However, this will only be effective if the hunter has sufficient assets to cover any damages. If electing to waive the insurance requirement, a landowner must make sure that a hunter could cover all possible damages.

VI. General Contract Provisions to always include

- Merger clause
 - States that the provisions described in the agreement are the full and final agreement between the two parties and any other written or oral agreements between them are now void and have no effect. Everything pertaining to the lease agreement should be contained within the written agreement.
- Choice of Law and Choice of Venue clauses
 - If you are considering a lease with a lessee from outside Indiana, the lease should include both a choice of law clause and a choice of venue clause.
 - A choice of law clause might specify that any litigation that arises under the contract must apply the laws of the state in which the developer is located. While the dispute might be heard in an Indiana court, the court would be required to apply the laws of the developer's home state.
 - If the lease contains a choice of venue clause, the case would be heard by a court in the developer's home state. It is usually in the landowner's best interest to have all legal disputes resolved under Indiana law by an Indiana court.
- Effective Date
 - Date that the agreement between the landowner and lessee is effective and the date that the sportsmen have all of the privileges that are expressed in the agreement.
- Notice provisions
 - Notice shall be in writing and deemed "given" when sent by certified mail or registered mail to the respective addresses of the parties.
- Severability Provision
 - If any one part of the Agreement is found to be unenforceable by a court in competent jurisdiction, the remainder of the Agreement shall not be affected by this decision.
- Modification Provision
 - All modifications to this agreement must be made in writing, and signed by both parties in order to be effective.

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Fee-Fishing An Introduction

Charles E. Cichra, Michael P. Masser and Ronnie J. Gilbert*

Fishing is the number one recreational pastime in the United States. The U.S. Department of the Interior estimated that 35.6 million anglers spent \$24 billion in 1991. The increasing demand on already over-utilized public fishing waters provides an opportunity for the development and expansion of commercial fishing facilities. "Fee-fishing," the practice in which anglers pay for the right to fish or for any fish that are caught, can bridge the supply shortfall for quality fishing opportunities, especially near urban areas. Fee-fishing can provide profits for the owner, social and recreational benefits for the community, and a market for locally produced fish.

Many privately owned ponds are seldom fished and often underharvested. These can be turned into alternative sources of revenue for the pond owners. In addition, many sites exist for new ponds that can be specifically designed, constructed and managed for fee fishing.

Fee-fishing is appealing to a variety of individuals, including ex-

perienced anglers who seek particular species, anglers who like to fish but are limited by time or resources, families with small children, the physically challenged and the elderly. Fee-fishing can be attractive to tourists or individuals that fish only occasionally, since most states do not require anglers to have a license to fish in fee-fishing ponds.



Figure 1. Fishing rights on larger ponds with quality fishing can be leased on a long-term basis.

Types of fee-fishing operations

There are three basic types of fee-fishing operations: (1) long-term leases; (2) day leases or "ticket" lakes and (3) "fish-out" ponds, "pound" lakes or "pay-by-the-pound" lakes. Long-term leasing involves the leasing of exclusive fishing rights on a long-term basis similar to hunting leases to an individual or group (Figure 1). Fishing success relies on natural production of the leased water body. Day leasing involves collecting a daily use fee from anglers, allowing access to a given water body. Both natural production and occasionally stocked fish support the angler's harvest. Fish-out ponds are stocked with high densities of catchable-size fish. The angler is then charged for each fish caught or limited as to the number that can be taken. More information can be found in SRAC Publication Numbers 480 (*Fee-fishing Ponds: Management of Food Fish and Water Quality*), 481 (*Development and Management of Fishing Leases*) and 482 (*Fee-Fishing: Location, Site Development and Other Considerations*).

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Long-term leasing

Long-term leasing usually involves quality fishing for large-mouth bass or panfish, such as bluegill, redear sunfish and crappie. Location and aesthetics are often the most important selling points. Many people fish to relax and escape the hustle and bustle of daily life. They want a quality fishing experience and are willing to pay for it. Unlike hunting leases, which generally require a large tract of land to support adequate game, fishing leases can be small. With proper management, each acre of water can support 300 to 400 pounds of harvestable-size sportfish, providing many hours of productive fishing.

Major steps involved in leasing the fishing rights to a pond include: (1) locating suitable lessee, (2) establishing terms of the lease and (3) executing the written lease.

Interested parties can be located through word of mouth, newspapers or magazine advertisements. The amount of effort and money expended in locating possible lessees should depend on the quality of the fishing and the location and visual attractiveness of the site. These factors will determine the value of the lease. A trophy bass fishery, located at an attractive site and close to a large metropolitan area, will bring top dollar.

The lease should spell out exactly the rights and responsibilities of each party including:

- 1) who will have access/fishing rights to the pond;
- 2) how long the lease will be in effect;
- 3) the price;
- 4) under what conditions the lease can be broken;
- 5) any fishing limits or regulations that are to be followed;
- 6) other privileges such as camping or swimming;

- 7) what management practices will be followed such as aquatic weed control, water level drawdown and stocking;
- 8) who will pay for each management option;
- 9) how much liability insurance will be required and who will pay for it; and
- 10) what privileges will be retained by the owner.

A written lease should be prepared with the advice of an attorney, certified public accountant, fisheries biologist and/or other professionals.

Major costs to the pond owner are locating a lessee and drawing up the lease. Any work requested by the lessee should be paid by the lessee. Annual returns can vary from less than \$100 to almost \$100,000. Lease prices vary primarily due to the size of the water body and quality of fishing, but also because of site location and configuration, and demand.

A long-term lease can be advantageous to the landowner. The owner only deals with a few individuals on an occasional basis, minimizing labor. In addition, the landowner will have someone on the property, which should decrease problems with trespass-

ing, theft, vandalism and fire. This option is particularly appealing for absentee landowners. One limitation to long-term leasing is that not all ponds are large enough, or have suitable fisheries, locations or aesthetics.

Day leasing

An aesthetically pleasing pond or one that offers good fishing tends to attract local anglers. Many anglers ask for the right to fish, while others trespass. Such an "attractive nuisance," often considered a liability, can be turned into a source of income. Instead of allowing free fishing, the owner can charge a nominal daily fee for fishing rights, hence the term "day leasing." Ponds of at least 1 acre, but often 5 to 10 acres, are most commonly day leased (Figure 2).

Most of these ponds are located close to a public road. Appropriate signs allow easy recognition by individuals travelling in the area. Angler harvest relies primarily on the natural production of the pond, including largemouth bass, bluegill, redear sunfish and crappie. However, channel catfish may be supplementally stocked to attract more anglers by increasing harvest.



Figure 2. Natural fish production provides most of the angler harvest at day leases.

There are many methods to monitor angler access. First, pond location should be close to the manager's residence to ensure that all anglers pay. The simplest way to collect fees is to have anglers place them into a specially constructed deposit box as they enter the property. This reduces the time expended in collecting fees and works well with small numbers of trustworthy local anglers. Another way to regulate access is to lock the entrance to the pond and require anglers to check in before gaining access. This may be inconvenient if it disrupts work or family life. Posting limited hours and even seasons of the year when the pond is open to fishing will relieve some of this inconvenience. A final method of keeping track of those who have paid is to allow open access to the pond. The manager then visits the pond on an occasional basis to collect the entrance fee. A dated receipt, ticket or permit is then given to those who pay. Later, the manager visits the pond and makes sure that each angler has a current ticket, collecting entrance fees from those that don't possess a current ticket. These operations are often referred to as "ticket lakes."

Operating costs for day-lease ponds are intermediate to those of long-term leases and fish-out ponds. Major costs are collecting the daily use fee and removing garbage. An aesthetically appealing pond helps attract anglers. Advertising can be as simple as by word of mouth. However, this method will generally restrict use to local anglers, and will likely result in only a modest income. Larger numbers of anglers can be drawn to such a pond by posting attractive signs along the roadside and by advertising in local newspapers.

Cost of fish is usually minimal if the natural production and harvest of fish is in balance. Supplemental stocking can increase catch rates and angler interest in returning, with cost varying with the quantity and cost of stocked fish. Returns from stocking can far out-

weigh costs. Additional costs, associated with proper pond management, include aquatic weed control, mowing of pond banks, fertilization, liming and supplemental feeding.

Daily fees generally range from \$2 to \$7 per day for adults for bass/panfish ponds, but can go as high as \$100 per day for ponds with quality bass fishing. There is frequently a limit on the number of fish that can be kept. Children are often admitted free or at half price. Senior citizens are sometimes given discounted fees.

One advantage of day leasing over long-term leasing is the lack of a long-term commitment, allowing the owner to be more flexible in the use of the pond. The day lease relies on natural fish production and requires minimal input of time and money; a distinct advantage over a fish-out operation. A day lease operator could also simply charge for access with no management. A disadvantage of day leasing is that it requires more of the pond owner's time than is required in long-term leasing. Time must be spent collecting litter and fees.

Fish-out ponds

Fish-out ponds, also known as "pound lakes" or "pay-by-the-pound ponds" involve the highest level of management, the highest costs, and potentially the highest returns. Fish-out ponds are marketing as opposed to production operations. Fish-out ponds are especially appealing to families with children (Figure 3) and novice anglers, because of the increased probability of catching fish. They can be excellent places to learn to fish and also to purchase guaranteed fresh fish.

Catchable-size fish are stocked at densities well above natural production limits. Currently, the most commonly used species in southeastern fish-out ponds are channel catfish and rainbow trout. Other species are difficult to consistently obtain in abundance or to haul, hold or stock. A minimal entrance fee is usually charged. An additional charge is then paid for any fish that are caught, based on their number, weight or length. Another method is to charge a fee for entry with a catch limit on numbers or weight of fish.

Fish-out operations should have a minimum of two ponds, allowing anglers to select where they fish. Having more than one pond



Figure 3. Children like to fish at fish-out ponds because of the high likelihood of catching fish.

allows fishing to continue should problems occur in a pond. Ponds of a variety of shapes and sizes will give anglers the feeling of a natural setting. Half-acre ponds will accommodate a fairly large number of anglers who will be able to “reach” most of the fish, but not so large that the ponds can’t be easily seined.

One problem with catfish is that all of them are not caught before fishing success drops off.

Typically, catch rates may be as high as 8 to 10 fish per angler hour for the first two weeks after stocking, dropping to 1 to 2 fish per angler hour after the first few weeks. These “hook-shy” fish can be seined from the ponds, placed into live tanks and sold live or sold as processed fish to individuals who don’t fish or to those who don’t catch enough fish to meet their needs.

Late spring through early fall (April through November) is the primary sales period for catfish. Sales as high as 4,000 pounds per week have been recorded during the spring at individual fish-out operations. Both anglers and fish slow down in the summer. Sales usually increase in the fall as temperatures cool. Fish-out operations are generally open on weekends. Some are open seven days a week. Daylight hours are most common; however, many remain open after dark, especially on weekends.

Shade, a picnic area, food and beverages, bait, tackle, rental equipment, ice and a fish cleaning service can be incorporated into the business. The best means of advertising are word of mouth and roadside signs. Prizes can be given to anglers who catch extremely large fish or tagged fish.

Costs for such an enterprise are highly variable. Major expenses will be for fish and for labor. Help must be on site during all hours of operation to rent equip-

ment, sell concessions, weigh fish and collect fees, keep the facilities litter free, and minimize poaching. Other costs include construction of office, concession and toilet facilities, fencing or natural barriers to keep trespassers out; fish feed; and monitoring and maintaining proper water quality.

Returns from a fish-out operation are limited primarily by the number of pounds of fish, concessions and services that can be sold.

Entry fees of \$1 or more per person are common. Fish prices vary from \$1 to over \$2 per pound live weight for catfish and over \$3 per pound for rainbow trout. Many operators indicate that they make more money from selling drinks, food, bait and tackle than from the fish sold.

A distinct advantage of fish-out operations is the possibility of using small ponds. Ponds can be located within city limits and at major highway intersections. Also, fishing success does not rely on natural production, but upon artificially maintained populations. The major disadvantage is that fish-out operators must make a tremendous commitment to public relations, marketing and

promoting, and must be sensitive to public needs and behavior. Such operations need to be near population centers and highly visible. A lot of time is required on the part of the manager, who must deal with “people problems” (Figure 4).

Considering fee-fishing as a business

Fee-fishing allows pond owners to supply fishing opportunities to anglers while simultaneously using under-utilized resources as a source of income. Fee-fishing is both a form of entertainment and a source of fresh fish for the user.

Market

Fee-fishing operations are good markets for fish producers. Production acreage in many states is small and geographically dispersed. Producers can sell their fish live to local fee-fishing operations. Thus, there is no need to build a processing facility, and many state health regulations can be avoided by selling live fish. Producers can often get a higher price per pound from fee-fishing operators than from processors.



Figure 4. Day lease and fish-out pond operators must be willing to deal with people.

Licenses and permits

As with most aquaculture facilities, permits must be obtained for surface and ground water (wells) rights, surface water storage (pond and ditch construction), construction of buildings and to meet any additional county or municipal regulations. In addition, permits may be required to sell live fish, bait and concessions, and for construction of buildings. Employees involved in selling food and cleaning fish should obtain state health certificates.

Many states have special permits for the operation of fee-fishing facilities such as ticket lakes or fish-out ponds. These allow anglers to fish at the facility without having to purchase state fishing licenses.

Liability

Customers are subject to injury, therefore liability insurance is highly recommended. Liability insurance is available from most specialty insurance agents. Costs vary, but are usually based on gross annual revenues. In addition, product liability insurance covers you if someone gets sick on the fish that they take home and cook. In the case of a long-term

lease, the cost of liability insurance is less and is usually paid by the lessee (Figure 5).

All reasonable steps should be taken to avoid negligence. Alcohol should be prohibited. Aeration equipment should be placed so that it can operate effectively, yet provide little inconvenience and potential danger. First aid and life saving equipment should be readily available. Swimming should not be allowed. Safe access for handicapped anglers should be provided.

People management

Successful day leases and fish-out operations require as much people management as they do fish management. They require a commitment to public relations, marketing and promotion, and sensitivity to public desires and behavior. The attention span of many anglers is short. Many people fee fish because they are almost certain to catch fish. If they do not catch fish within 5 or 10 minutes, they begin to complain. Some operations charge low prices for their fish, provide little service and have few expenses. Customers bring their own equipment and take care of themselves. Many successful

operations often charge more per pound, but provide everything including tackle rental, employees to explain rules, instruction for new anglers, conversation while they fish, and employees to remove fish from their hooks and to clean and pack their catch on ice.

Operators must be able to get along with people, because that's half the business. If you don't like people, you have a losing battle on your hands, no matter how well you manage your fish. You must be polite and courteous, even under the most difficult situations. The biggest problem that some anglers will have is knowing when to stop catching fish, catching more than they have money to pay for, and discovering this upon trying to leave your facility.

Conclusion

Fee-fishing facilities are rapidly increasing in number, but vary substantially in their success due to differences in location, facilities, services and management. Medium to large ponds with controlled access are best suited for long-term leasing, while small to medium ponds can be day-leased or used as fish-out ponds. If individuals do not want to take the time to deal with people, yet want to use their ponds as a source of revenue, then they would be best advised to lease on a long-term basis.

Sources of information

For additional information on fee fishing and pond management, contact your local county Extension agent, state fisheries specialist, local USDA Soil Conservation Service office or the nearest office of your state Fish and Game Commission. Phone numbers for these agencies are listed in the government section of your phone book.



Figure 5. Liability insurance must be provided at all fee-fishing operations in the event that someone is injured.

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Fee Fishing

Location, Site Development and Other Considerations

Charles E. Cichra, Michael P. Masser and Ronnie J. Gilbert*

Important ingredients for a successful fee-fishing operation are: having a good location, knowing your clientele, providing good facilities and services, and operating like any profitable business.

The site must be carefully chosen, developed and promoted to attract a large group of anglers, and once there, for them to have a successful and enjoyable fishing experience. The staff must work with the customers to provide consistently good catches in a pleasant atmosphere. This fact sheet provides information which can be used as the basis for locating, developing and operating such a facility.

Additional information can be found in SRAC Publication



Numbers 480, *Fee-fishing Ponds: Management of Food Fish and Water Quality* and 483, *Fish-out Ponds: Economics*.

Location

Most successful fee-fishing operations are located within 30 to 50 miles of population centers with 50,000 or more people. Proximity to popular fishing areas or other types of public attractions increases an operation's chance for success. Locating in a high-traffic area (major highway or intersection) increases the number of people who pass by and have a chance to see the operation.

Do not locate near an existing fee-fishing operation unless you are confident that there are enough customers to support more than one facility. The majority of anglers at urban fee-fishing establishments drive 15 miles or less, while anglers at rural fee-fishing operations commonly drive more than 15 miles.

Ponds should also be located in a "natural" setting screened from urban distractions, and have easy access and plenty of parking. Trees effectively screen roads, parking areas and buildings from the fishing area. Other considerations in selecting a site include having soils suitable for constructing ponds and having an adequate supply of high quality water. For more information, refer to SRAC Publication Numbers 100, 101 and 102 on site selection and construction of levee and watershed ponds.

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Clientele

Fee fishing appeals to experienced anglers who simply like to fish but are limited by time or resources (e.g., owning a boat), families with small children, the physically handicapped, single parent families and the elderly. Fee fishing is attractive to tourists or individuals who only occasionally fish because in most states no license is required to fish in a fee-fishing pond.

Fee fishing provides the excitement and challenge of fishing with improved chances of catching fish. Fish-out ponds are especially appealing to families with children because of the ease of catching fish. They are an excellent place to take someone who is learning to fish.

Many patrons will have little fishing experience. Nationwide, most patrons are family groups (parents with children), groups of family members and friends, or individual men. Many customers will be retired or disabled. Repeat customers will represent a large proportion of the clientele.

The four leading reasons why people go fee fishing are:

- good fishing;
- as a family activity;
- abundance of amenities available; and
- it is a fun and safe activity.

Advertising

Fee fishing must be planned as a business. Advertising can greatly enhance the probability of success. Many forms of advertising are used by fee-fishing operators, including word-of-mouth, roadside signs, newspaper advertisements, television and radio commercials, local shopper and visitor guides, bumper stickers, fliers, direct mail, and hats and clothing with imprinted advertising.

The most effective means of advertising are word-of-mouth and signs. Most customers come based on word-of-mouth, so be sure that customers are satisfied.

For every group of anglers which has a good fishing experience, as many as 8 to 10 additional groups will show up at an operation. It is a definite advantage for an operation to have been around for a while so that customers get to know the facility and its operators. Having a good relationship between the management and customers is important to ensure that people will refer others to the operation. Professionally-painted attractive signs, large enough to be easily seen and well located, are usually worth the expense. During the start-up period of a new operation, other forms of advertising can also be effective. Advertisements should include directions; facilities, services and activities available; schedule of operation; and fees.

Permits

Permits must be obtained for surface and ground water (wells) rights, surface water storage (pond and ditch construction), construction of buildings and for meeting any additional county or municipal regulations. Permits may also be required to sell live fish, bait and concessions, and for construction and operation of restroom and fish cleaning facilities. Employees involved in selling food and cleaning fish should obtain state health certificates.

Many states also have special permits for the operation of fee-fishing facilities. These permits allow customers to fish without having to purchase state fishing licenses.

Developing a successful fee-fishing operation

A fee-fishing operator should always keep in mind that, primarily, he/she is providing recreation, not just selling fish. To successfully provide quality recreation, the operator must pay close attention to facility design and security, pond construction, fishing success, concessions, daily operation, promotion, safety and aesthetics. A fee-fishing operation is a people-oriented business that requires

a person with the personality, motivation and resources to deal with the public. It is not that much different from operating a restaurant; people come for enjoyment and expect service.

Facility design and security

Security and control of access must be kept in mind when designing a fee-fishing operation. Good security will increase customer safety and decrease vandalism, unwanted entrance during off hours and theft. In most cases, complete fencing of the pond area with only one entrance is recommended. Paths, fences, gates and landscaping should lead the customers from the parking area to the entrance, usually the concessions area, where entry and exit to the ponds can be supervised. This design ensures that entrance fees are collected. Entrance fees help to reduce loitering by individuals who do not intend to fish. As anglers leave the facility, fees can be collected for all fish that were caught, and coolers, pails and other storage containers can be inspected to reduce theft.

Concessions and restrooms should be located in the entrance and exit area. Sales of concessions can be increased by funneling traffic past concession areas. Restrooms should be located in sight of the cashier to allow for good supervision. Restrooms and other out-of-the-way places are a temptation for some customers to dispose of fish that they have caught and do not want to purchase.

Security lighting of more remote parts of the ponds will help keep out unwanted night-time intruders and provide a safer and more convenient fishing environment for late-night anglers. Lighting also allows extended hours of operation.

Since a fee-fishing business is often operated close to the owner's home so that the pond and concession areas can be closely watched, it is important to

make private areas off limits to customers. Areas open to fishing and associated activities should be clearly identified to protect the privacy of family members and neighbors.

Paths leading to the ponds will minimize the effects of heavy foot traffic. Special considerations must be taken in design and construction for physically-handicapped anglers. Often, inexpensive minor design modifications will greatly improve access for this group of anglers. **Keep safety in mind!**

Pond size and construction

Every imaginable shape, size and construction technique have been used for fee-fishing ponds. The following are some important considerations that a prospective or expanding fee-fishing operator should consider when building or renovating ponds. Pond size and construction are important to the overall success of a fee-fishing operation.

Ponds should be constructed with:

- a good clay base and dam core
- smooth, even bottoms with no stumps or obstructions
- properly constructed drains
- proper bank, side and bottom slopes
- accessible banks
- levees that are wide enough to allow vehicular traffic for stocking, harvest by seining and routine maintenance
- emergency spillways

Ponds without a proper clay base or dam core will leak making it difficult to manage or maintain water levels. Ponds should be constructed with a drainage system through the dam and smooth bottoms sloping toward the drain without obstructions, so they can easily be seined and drained (see SRAC Publication Number 480 (*Fee-fishing Ponds: Management of Food Fish and Water Quality*).

Rectangularly-shaped ponds allow a larger shoreline-to-water ratio than square ponds, thus providing more shoreline for fishing a given size pond. Irregularly-shaped ponds give people the feeling that they are fishing under a more or less natural setting; however, margins should not be so irregular that the pond cannot be effectively seined. Optimum pond depth is between 3 to 5 feet, except where icing is a problem. Those ponds should be 5 to 8 feet in depth. Fish do well at this depth and seining is simplified. Avoid pond areas with depths of less than 2 feet to reduce aquatic weed problems.

Pond banks need to be grassed or sodded and should be wide, relatively flat, but gently sloping toward the pond. This allows for easy access, room to accommodate the movement and comfort of customers, and quick drainage of water after rains. Ideally, ponds should be constructed with minimum slope of the banks down to the water so patrons can fish at the water's edge and land fish without problems. Finally, if the pond receives run-off during rainfall, it should have an emergency spillway. It may be necessary to build an escapement barrier across the emergency spillway to keep large fish from leaving the pond during heavy rains. For

assistance in pond construction contact your local USDA Soil Conservation Service Office.

Pond size is also important. Small ponds are better from a management and fishing success standpoint than large ponds. Ponds of one quarter to one acre in size can be readily managed. Ponds of this size can be quickly stocked to optimum levels, seined or treated for disease or to improve water quality, and can be intensively fished from the banks. Ponds larger than two acres generally do not allow complete fishing access unless they have been specifically designed with earthen jetties, piers or a highly convoluted shoreline (see "Utilizing existing ponds" section which follows).

Intensively managed fee-fishing operations should have multiple ponds. This enables the manager to better control fishing success and to isolate and treat diseases or other problems. If several ponds are available, the manager can move patrons to ponds where fish are actively biting, assuring successful and satisfied customers. Fish can be moved from one pond to another to increase densities and catchability. Also, fish of unknown condition (i.e., purchased off-farm) can be isolated in a separate pond away from other fish so there is no chance of disease transmission. If a single pond



Concessions can increase profit potential.

in a multiple pond fee-fishing enterprise develops a problem (e.g., disease), the manager can get the problem under control in that pond without having to close the entire operation.

Water source

All ponds must have a water source. Sources could include rainfall, a reservoir, stream or well. Rainfall can be undependable; therefore, these ponds should have an alternative water source. Many fee-fishing operations have a reservoir that traps rainfall which is used to fill and maintain the fish-out ponds. The reservoir may also be fished. Ponds can be filled with water from a nearby stream, but first check on state laws that regulate use of public water. Surface water sources may introduce wild fish, parasites and diseases. The best water source is a well which produces good quality water. Wells should be sized to the pond acreage. For filling ponds, a well of at least 40 gallons per minute per acre of pond is needed. A well that produces 20 gallons per minute per acre of pond is sufficient to maintain water levels. Finally, always have well water checked for its quality before relying on it as a water source.

Concessions

Concessions can be the most profitable segment of a fee-fishing enterprise. Concessions should be within easy access of the ponds, attractively maintained, and can include some or all of the following:

- bait
- fishing tackle
- food, snacks and drinks
- ice
- newspapers
- cookbooks, fish batter and seasonings
- hats and clothing
- first aid supplies

- rental equipment (rods, reels, chairs, umbrellas, etc.)
- live and dressed fish (fresh/frozen)
- fish cleaning services

Concessions should be viewed as not only a chance to make money, but also an opportunity to provide the customer with essential services. Many patrons will arrive having forgotten critical supplies; without a concession that carries these items, patrons will be forced to return home or leave to purchase the items elsewhere. A selection of bait (worms, crickets and stink-bait) and fishing tackle (hooks, line, sinkers, corks and lures) is most essential.

Many concessions also rent fishing equipment, chairs and giant umbrellas. Cane poles or spin casting gear are most commonly used. Deposits help discourage rental equipment vandalism and theft. Food is also common, ranging from drinks and snacks to complete meals. Sundries such as sunscreen, bandaids, aspirin and antiseptics should also be sold. Often, operations sell imprinted caps, sunglasses and T-shirts. These become walking advertisements for the establishment. A holding tank can provide live fish for individuals who do not fish, but want fresh fish for home consumption, and for anglers who want more fish than they were able to catch.

Adequate restroom facilities are necessary to insure the success of an operation. They must be kept clean. Consult with your County Health Department about appropriate regulations.

Finally, fish cleaning services are popular. Many anglers like to catch fish, but do not like to clean them and will pay for this service. Fee-fishing operations commonly charge \$0.25 to \$0.75 per pound to clean fish for the customer. Before starting a fish cleaning service, check with your County Health Department about sanitation standards for fish processing and

waste disposal. Dressed fish, fresh and/or frozen, are also commonly sold. Selling dressed fish means anyone can take fish home for dinner. Consider accepting food stamps.

Non-anglers can be provided with alternative activities and conveniences such as game rooms, playgrounds, picnic areas and camping facilities. Seriously consider the possible financial return on such investments and potential increased liability and maintenance cost before providing these facilities.

Times of operation

For most of the southern United States, the primary fishing season runs from the middle of March through early November, with Memorial Day to Labor Day being the peak period. People have the urge to fish and fish are generally most willing to bite during this period. Sales as high as 4,000 pounds per week, most of which are sold on weekends, have been recorded at some operations. Both anglers and fish slow down in the heat of the summer. Southern states have an advantage over northern states in that catfish will often bite during the winter, especially if it is mild. Northern operations, however, can provide anglers with good fishing through much of the fall, winter and spring by stocking species such as rainbow trout which prefer cold water. Ice coverage can stop pond fishing, but aerators can keep ponds open and fishable.

Fish-out operations are generally open on weekends. Thursday through Sunday are peak days. Some operations are open seven days a week, 24 hours a day. Daylight hours are most common, with many operations remaining open after dark especially on weekends. A good plan is to start out slowly, being open only on weekends, and then to expand operating hours as business increases.



Regulations should be in obvious places.

Signs

Signs should clearly direct customers to parking areas and from parking areas to the entrance of the pond area. At the entrance, signs should provide all information needed by potential customers including prices, fishing regulations, times of operation and activity rules. Prices for fish, fishing and fish cleaning, along with other services should be clearly displayed to avoid confusion and later misunderstandings. All rules should be posted. Swimming and the use of alcohol should be prohibited for liability reasons. All fish caught should be kept to prevent loss of fish due to

- indicating any fishing gear restrictions
- prohibiting snagging, minnow traps and live bait
- asking customers to report anyone breaking these rules

These rules, along with information on how to fish and business name, location and times of operation, can be included in a pamphlet that is given to all customers. Anglers can refer to this while fishing, and take it home as a form of advertising to later encourage them and others to return.

delayed hooking and handling mortality.

Other items that can or should be on the signs include:

- prohibiting the use of abusive language
- indicating which ponds are open for fishing

Promotion

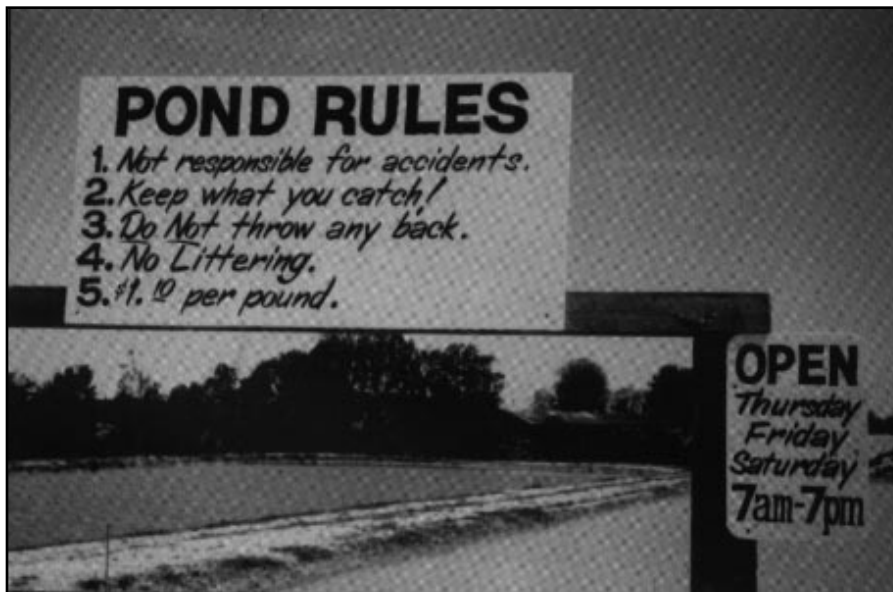
Night fishing and group rates, including free entrance fees, should be offered to the elderly, handicapped and youth groups such as those sponsored by churches, schools and scout organizations. You may want to award prizes for the largest fish, most fish or for catching a specially-marked fish when groups are fishing.

Some operations further promote their business with regular customers by tagging a few "trophy" fish and offering prizes to any angler that catches one. Posting instant photographs of customers with their catch, especially large fish or large numbers of fish, will bring people back to show their friends the photograph, and it will encourage other anglers to return. Your imagination is the limit when promoting your business.

Safety and liability

Liability insurance is highly recommended because customers can be injured while on the property. Product liability insurance covers you if an individual gets sick eating fish that they take home. Insurance coverage is often required by the landowner, if different from the operator, and by your banker. Generally, the more people that you deal with, the higher your insurance rates. All reasonable steps should be taken to avoid negligence. Alcohol should not be allowed on the premises because of the many problems and questions of liability that it can cause.

Equipment must be placed so that it can operate effectively, yet provide little inconvenience and potential danger to customers. Electrical aerators also pose the problem of combining the hazards of electricity with that of water. First aid and life saving equipment should be readily available. All areas should be kept mowed to reduce habitat for snakes and other pests. Fire ant and wasp control programs should be maintained to reduce injuries due to



Limited entry times and well-publicized liability statements are good practices.

insect bites and make fishing more comfortable.

Aesthetics and comfort

The area in and around the ponds should be aesthetically pleasing. The grounds should be well kept: grass mowed, banks maintained and litter removed. Covered trash containers should be readily available and frequently emptied. Provide benches and picnic tables in shaded areas for customers by planting fast-growing trees or constructing small shade pavilions or awnings. Good seating and shade will improve customer comfort and increase the length of their stay. Fee fishing is a people-oriented business; provide patrons with good fishing in a pleasing setting and they will be return customers.

Utilizing existing ponds

Many existing ponds, while not ideal for fee fishing, can be successfully used. In fact, many fee-fishing operations in the Southeast use old hill ponds.

The problems with using existing hill ponds are generally associat-

ed with design. These ponds usually will not have proper access around the entire pond, many will be too large (usually greater than 2 acres) to be fished effectively, and most cannot be easily drained or seined. Ponds that cannot be completely fished, and those that cannot be drained or seined, accumulate large numbers of "hook-shy" or non-catchable fish (see SRAC Publication Number 480, *Fee-fishing Ponds: Management of Food Fish and Water Quality*). Thirty to fifty percent of the catfish in a pond can be "hook-shy." This accumulation of fish reduces fishing success and limits the number of additional fish that can be stocked into the pond. As fishing success drops, so will customer satisfaction.

Although access and fishing success can be a problem, larger hill ponds can be attractive because of their aesthetic beauty and the perception of a larger, less crowded environment. Overwhelming fishing success may not be the most important aspect of a customer's fishing trip. Some customers come to enjoy the experience of fishing and the beauty of uncrowded natural surroundings.

Many times large hill ponds are managed as "ticket lakes" rather than as "fish-out lakes." Fewer fish are stocked and most profit is derived from concessions. The entrance fee goes to purchase fish for restocking. Large hill ponds managed as ticket lakes can be profitable, particularly as supplemental income.

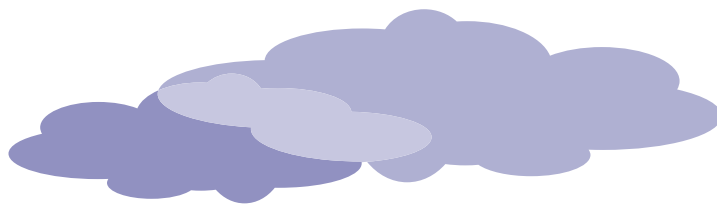
Remember, fee fishing is a recreation business. Success will be based on repeat customers and good word-of-mouth advertising. A repeat customer is one who caught fish and "had a good time." An attractive, well-managed pond with consistently good fishing and friendly service will keep customers coming back!

Additional sources of information

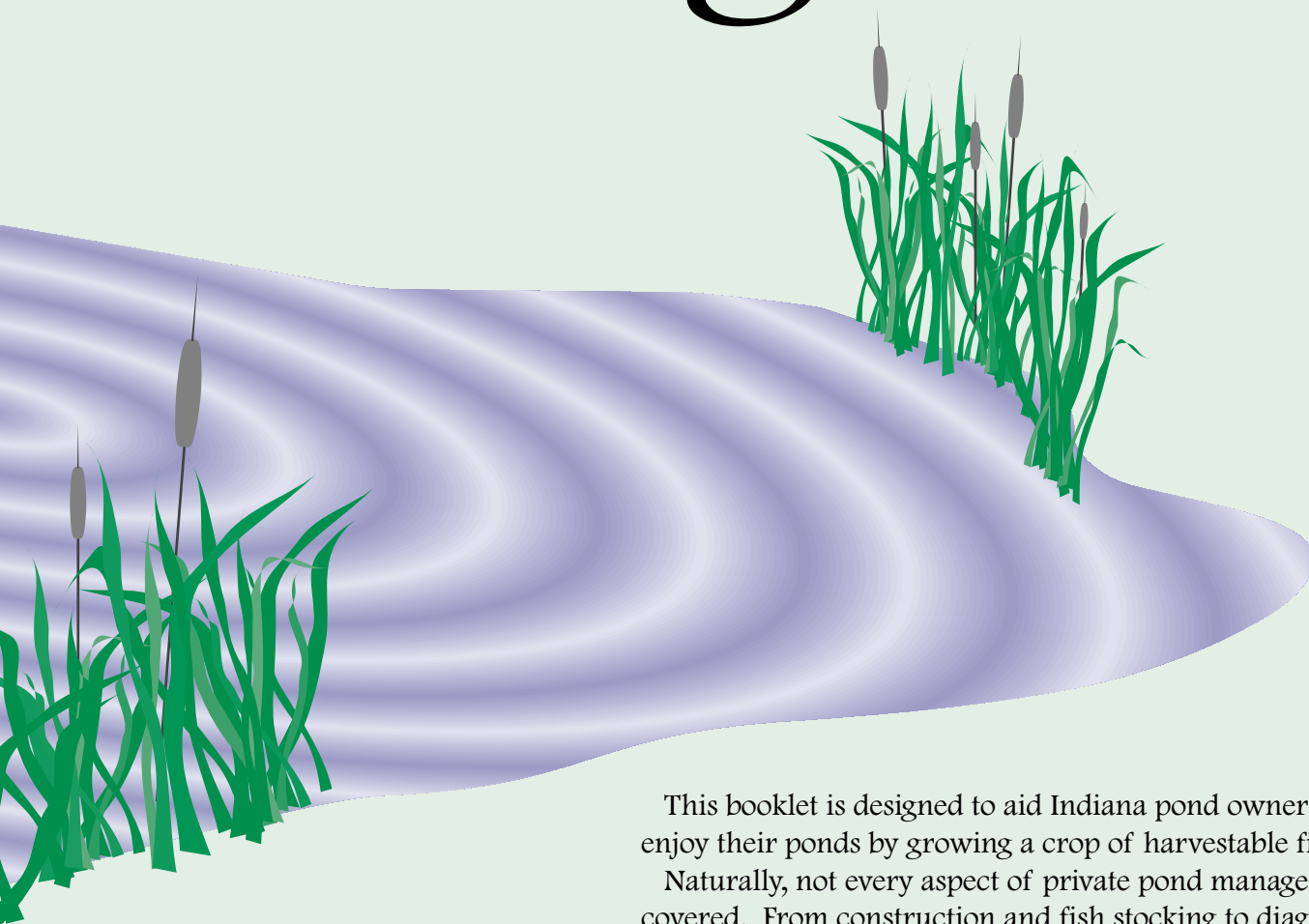
Contact your county Extension office or State Fisheries Extension Specialist for more information on fee fishing in your state. Many states have Extension publications which deal specifically with the topic of fee fishing or with related topics such as pond construction, fish production, management of water quality and fish health.

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Indiana



Fish Pond Management



This booklet is designed to aid Indiana pond owners who wish to enjoy their ponds by growing a crop of harvestable fish.

Naturally, not every aspect of private pond management can be covered. From construction and fish stocking to diagnosing your pond's problems to techniques of management, we have attempted to present basic information you need for developing and maintaining a good fish pond. Some aspects require detailed or additional information, and you may wish to contact a district fisheries biologist or go to your local library for more information.

Private pond management is far from being an absolute science. However, by basing an active management program on proven principles and guidelines, you can expect to make the most of the fishing potential your pond offers.

Presented by



Indiana Department of
Natural Resources



INDIANA DIVISION OF
FISH & WILDLIFE

317-232-4080

INTRODUCTION

Private ponds, also called farm ponds, represent tremendous fishing potential in Indiana. There are over 40,000 ponds in the state. Average pond size is about one acre. Many new ponds continue to be constructed each year. While most ponds are found in southern Indiana, they are widely distributed throughout the Hoosier state.

Besides fishing, ponds provide many important and practical benefits: erosion control, fire control, livestock watering, irrigation, swimming, picnicking and wildlife enhancement. This booklet has been prepared for pond owners who wish to make the most of their pond's **fishing** potential.

Unfortunately, many Indiana ponds do not provide the kind of fishing they're capable of producing. Good fishing doesn't just happen. It's the result of proper fish management. By managing your pond wisely, you can look forward to many enjoyable hours of good fishing.

YOUR POND

- *Good fish management begins with an understanding of your pond's physical, chemical and biological features.*

Good fish management begins with an understanding of your pond's physical, chemical, and biological features. These three features determine the quality of fishing your pond can produce and the kinds of problems you may encounter.

Physical Features

If you are planning to construct a pond, contact the local Natural Resources Conservation Service (U.S. Department of Agriculture) office at the county seat. The NRCS can provide the technical engineering advice you need to properly design and construct a pond. But remember, there may be some legal aspects of pond construction that you should consider. Contact your county surveyor, planning commission, or the Indiana Department of Natural Resources prior to pond construction to obtain any necessary permits. The NRCS office can also help in making sure your pond meets the legal qualifications. Since you are interested in managing the pond for fishing, several factors should be considered when planning a new pond.

Fish ponds should be at least one surface acre in size. Ponds smaller than one acre seldom support a satisfactory fish population over many years. They usually require much more intensive fish management and may not justify the costs.

Fishing ponds should have a drain line so the pond can be completely drained. The additional construction cost will result in dollars saved over the years. A pond that can be drained is more easily and economically managed for good fishing. Water-level drawdowns can be effective in controlling overabundant small fish. Because few ponds provide high quality fishing indefinitely, it may become necessary to eliminate a poor fish population.

Some pond owners believe that a deep pond provides better habitat (living space) for fish. This is seldom true. Most deep ponds in Indiana don't contain enough oxygen for fish in water greater than 15 feet deep during the summer. Only during the spring and fall months, when the water temperatures are changing, does the pond water circulate enough to supply oxygen to the deeper holes. Under ice and snow cover in winter, oxygen concentrations in the deep water drop again.

Certain ponds, especially gravel pits, may contain sufficient oxygen at depths where water temperatures are cool (less than 70°F). These ponds can be managed for trout fishing. Most ponds, however will support only "warm water" fish like bass, bluegill and channel catfish.

To ensure good water quality in your pond, do not allow livestock to wade in it. They trample the banks and muddy the water. If you need to water livestock at the pond, fence in a small area along the bank. Don't allow runoff from a barnyard or feedlot into the pond. Runoff from these sources adds excessive nutrients to the water and can produce obnoxious weed problems and cause fish kills. Avoid letting agricultural fertilizers and pesticides into the pond. Avoid plowing near the pond and reduce areas where soil erosion carries silt into the pond.

Once you have a pond, it is important to know the exact acreage, maximum depth, average depth, and water volume. This information becomes useful in calculating the amount of herbicide needed for weed control and the number of fish needed for stocking.

- *Once you have a pond, it is important to know the exact acreage, maximum depth, average depth and water volume.*

Chemical Features

The amount of oxygen dissolved in your pond's water is the most important chemical feature. Without oxygen, fish simply suffocate. If oxygen levels drop low, fish become stressed. Stress can then trigger secondary problems, such as poor growth, poor reproduction and diseases. So it is vitally important to maintain adequate amounts of oxygen in the water.

The amount of oxygen needed depends on the kinds of fish in the pond. Bass, bluegill and channel catfish require more than five parts per million (ppm) of oxygen. When oxygen is less than five ppm, fish may show signs of stress. Fish kills can occur when oxygen is less than three ppm. Oxygen levels below one ppm are catastrophic.

Some fish species survive low oxygen concentrations better than others. Unfortunately, these are usually undesirable species, such as common carp and bullheads. If your pond undergoes periods of low oxygen concentrations (hot cloudy days in August or during mid-winter snow storms), game fish will likely die and be replaced by undesirable fish.

To measure the amount of oxygen in your pond, a small chemical kit (sold by Hach Chemical Company) can be purchased. It is a relatively simple test using pre-measured chemical powders.

Another chemical feature of your pond is pH or acidity. Indiana ponds usually have a pH of 7.5 to 9.0. Fish do well within this pH range. Recent evidence indicates that normal rainfall is becoming increasingly acidic from industrial pollutants in many areas east of Indiana. At present, Indiana's soils are able to buffer acid rain before it enters lakes and ponds. However, there may be periods immediately after the spring thaw that your pond can receive an increase in acidic runoff, but it is unlikely fish will be affected.

Biological Features

A pond is like the land around it. There is a limit to what it can produce. While a certain field can produce 100 bushels of corn per acre or a pasture can support two cows per acre, a pond also has a limit to the pounds of fish it can support. Just like the land, the upper limit or "carrying capacity" of a pond is influenced by fertility (nutrients available), climate and the type of crop being grown.

In a detailed study of 14 Indiana ponds, the total weight of fish ranged from 109 to 703 pounds per acre. The average pond supported 320 pounds of fish per acre. This "standing crop" consisted of 224 pounds of bluegill, 36 pounds of largemouth bass, and 60 pounds of miscellaneous fish per acre.

A standing crop of 320 pounds might consist of 320 one-pound fish, or any combination totalling 320 pounds. The important fact is that each pond has a limit

to the pounds of fish that it can sustain. The pond owner who understands the concept of carrying capacity will be better able to manage and use the fish crop that the pond produces.

Stocking Your Pond

After you have a properly constructed pond and a basic understanding of its features, it is time to stock your pond. You must consider what kinds of fish you want, how many and what size of fish you need to stock, when and how to stock, and potential stocking problems. Proper stocking can make a world of difference in fishing quality in years to come.

WHAT FISH TO STOCK

- *The stocking strategy you choose should be geared to the kind of fishing you want.*

The stocking strategy you choose should be geared to the kind of fishing you want. If your chief interest is to raise an annual food crop, then channel catfish or common carp would be best. If you simply want something in the pond to catch, just about any stocking combination will do. For both sport and table fare, the largemouth bass-bluegill-channel catfish combination is hard to beat.

Other combinations involving smallmouth bass, walleye and northern pike can be used if the pond owner is willing to pay for periodic and expensive restocking. A few deep, well-oxygenated ponds may be able to support trout. However, this is a “put-grow-and-take” proposition as with walleye or northern pike. There are many other species of fish that will live and grow in Indiana fish ponds. However, many of them require specialized management that most pond owners can’t afford.

The use of hybrid sunfish in combination with largemouth bass is a popular technique. Hybrids are fast-growing and do not overpopulate as bluegill often do. In fact, so few hybrids reproduce, regular restocking is required. One important drawback to hybrids is that they will crossbreed with other sunfish (bluegill, redear, green sunfish). When this occurs, hybrid identity and vigor are soon lost. Where other sunfish are present or there is a good chance they may enter a pond, a hybrid stocking program will have little success.

The best all-around stocking combination for Indiana ponds has proven to be largemouth bass, bluegill and channel catfish. All three provide excellent sport in addition to fine eating. Occasionally, redear are substituted for bluegill because they seldom overpopulate. However, redear are caught less frequently and may disappear altogether from small ponds.

How Many Fish to Stock and What Size

- *The initial stocking ratio widely successful in Indiana consists of five bluegill fingerlings to one largemouth bass fingerling, not to exceed 1000 bluegill and 200 bass per acre.*

Considerable effort has been made over the years to determine the best stocking rates for new fish ponds. Stocking too many fish leads to poor fish growth and is a waste of money. Stocking too few fish promotes fast growth initially, but increases the risk of initial overharvest, especially bass. Both problems can lead to an unbalanced fish population and corrective fish management may be needed.

The initial stocking ratio widely successful in Indiana consists of five bluegill fingerlings to one largemouth bass fingerling, not to exceed 1,000 bluegill and 200 bass per acre. For a low fertility pond, it is advisable to maintain the 5:1 ratio but reduce the number stocked to 500 bluegill and 100 bass per acre. The desirable stocking size for bluegill is one to two inches and three to four inches for bass. Four to six inch channel catfish should be stocked at a rate of 100 fish per acre. If redear are desired, replace one-fourth of the bluegill fingerlings with one to two inch redear fingerlings. If hybrid sunfish are desired instead of bluegill or redear, a 10:1

ratio of sunfish to bass would probably be more suitable. In this case, the maximum stocking rates would be 1,000 sunfish and 100 bass per acre.

For ponds larger than five acres, you may stock as if the pond was only five acres in size: 5,000 bluegill, 1,000 bass, and 500 catfish. If costs are not prohibitive, stocking more fish will provide better fishing sooner. Once again, be sure to maintain the 5:1 ratio and do not exceed 1,000 bluegill and 200 bass per acre. For ponds smaller than a half acre, hybrid sunfish or channel catfish only may be stocked at a rate of 500-1,000 fish per acre. Stocking size in this instance is not as important as when the fish are stocked in combination with largemouth bass.

Simply stocking a few adult fish to populate a new pond is risky and not advised. First-year production of young fish from these adults is unpredictable. For example, bluegill may spawn more successfully than bass and the pond will immediately be "out of balance." Fishing quality will become poor in a hurry and will probably stay that way.

How and When to Stock Your Pond

After you have decided what to stock, the next step is to locate a good source. While catching adult fish from a nearby pond or creek and stocking them in your pond may be inexpensive and convenient, it can lead to several problems. Fish identification can be difficult, particularly of small sunfish. Stocking green sunfish that you thought were bluegill, or bullheads that were supposed to be channel catfish, will certainly make for unpleasant surprises later on. Other problems include difficulty in catching the proper number and size of fish, as well as increasing the chances of introducing unhealthy fish that may be diseased or injured. To invest a lot of money into the proper construction of your fish pond and follow it with poor stocking practices won't give you the return on your dollars that you expect.

Fish for private ponds are no longer available from federal hatcheries or from Indiana state fish hatcheries. All fish raised at these facilities are used for stocking public waters that have guaranteed public access to all Hoosier fishermen. The best source of fish for private ponds is a reputable commercial fish hatchery. Several hatcheries are located in Indiana as well as in surrounding states. A list of commercial fish hatcheries is available from the Division of Fish and Wildlife.

Getting your fish from the hatchery to the pond in good shape is extremely important. Avoid rough handling and large temperature changes. If water in the hauling container differs by more than 10°F from the pond water, the fish should be carefully acclimated. Place the hauling container (plastic bag) into the pond water or gradually exchange the water in the container with pond water until the temperatures are similar.

Stocking should not be delayed once a new pond has filled. As soon as the pond has adequate water in it, contamination by unwanted fish is possible before a good fish population develops. Some pond owners believe unwanted fish eggs are carried into their pond attached to birds' feet or within a bird's digestive system. This is simply not true. However, many good fish ponds have been ruined through indiscriminate stockings by others or by emptying unused bait minnows into the pond.

The time of year a pond is stocked is not important. However, most commercial fish hatcheries are geared to growing fish during summer for stocking during autumn. If you plan to stock fish in your pond during the fall and the pond is not completely filled, you should consider water depth. Unless the pond has at least five feet of water, you may risk fish loss during winter.

- *To invest a lot of money into proper construction of your fish pond and follow it with poor stocking practices won't give you the return on your dollars that you expect.*

- *By placing milk cans, sections of large diameter, field tile or culvert in the pond at depths of three to four feet, catfish can be induced to spawn.*

Other Stocking Needs

Properly managed, the initial stocking of bass and bluegill is the only stocking you should ever have to make. However, regular restockings of channel catfish are usually necessary. This species requires a darkened enclosure such as a hollow log or undercut bank in which to spawn. Since this type of habitat is lacking in most ponds, channel catfish seldom reproduce. By placing milk cans, sections of large diameter field tile or culvert in the pond at depths of three to four feet, catfish can be induced to spawn. However, small catfish are a preferred food item for bass so even this will not guarantee more catfish. In most cases, it is necessary to add catfish from time to time. These should be at least six and preferably eight inches or longer so they're not simply a free meal for your bass. Depending on how fast you remove the initial stocking, a second stocking of catfish should not be needed for two or three years.

PROBLEM FISH

Pond owners should be aware of potential problem fish species. These fish, once established in a pond, can harm good fishing and cause the pond to fall far short of its fishing potential. Fish that are considered problem species are bullhead, common carp, buffalo, sucker, crappie, perch and miscellaneous sunfish species.

Bullheads

Bullheads, often called "mudcats" or "yellow-bellies," are not desirable in ponds because they often overpopulate and roil the bottom, making the water muddy. Overabundant bullhead populations produce few bullheads of desirable size. In addition, their presence often limits the success of channel catfish.

Carp, Buffalo and Suckers

Introduction of these three fish species into fish ponds is a serious mistake, unless you are only interested in growing fish to eat. They compete directly for food with small bass and bluegill, destroy bass and bluegill habitat, and can only be removed by totally draining or chemically treating the pond. Because of their bottom feeding habits, common carp make the water extremely muddy. Common carp reproduce quite successfully in ponds.

Crappies

Although both black and white crappies do well in large lakes, they usually do not do well in small ponds. Once crappies become established, they prey on small bass, compete for food with adult bass and bluegill, and tend to overpopulate. This produces a pond full of small, slow-growing crappies.

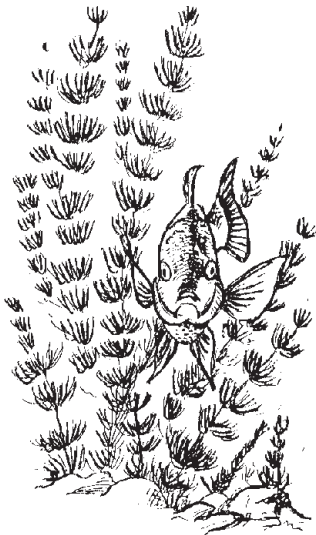
Perch

Yellow perch are much like crappies in ponds. They are prolific, compete with other game fish, prey upon small bass and bluegill, and usually don't grow well. Perch are much more suited to large lakes and should not be stocked in ponds.

Miscellaneous Sunfish

Many pond owners have difficulty identifying the seven sunfish species commonly found in Indiana. These include bluegill, redear, longear, warmouth, pumpkinseed, green and orange spotted sunfish. Only bluegill and redear are suited for Indiana ponds. When stocked into fish ponds, the other sunfish usually produce an undesirable fish population. Green sunfish and warmouth are aggressive feeders and compete with bass and bluegill for food. If they get big enough, they even eat small bass.

The pumpkinseed, longear and orange spotted sunfish do not grow big enough to interest fishermen and they overpopulate easily.



FISH BIOLOGY

Bluegill

Bluegills are generally dark olive-green along the back and lighter along the side. They have five to nine dark vertical bars on each side, blue cheeks, and a dark spot at the rear of the dorsal fin. Bluegills do not have a margin on the opercular, “ear”-lobe.

Bluegill feed primarily on insects, both aquatic and terrestrial. However, they will often eat snails, small crayfish, zooplankton (microscopic animals), and other fish and fish eggs. Because of their varied diet, bluegills can be caught on many different kinds of baits, including insect larvae (bee moths, spikes, mousies), crickets, grasshoppers, and worms. Bluegills avidly hit on artificial flies that resemble aquatic insects.

The amount of food each bluegill eats determines how fast it grows. If food is abundant and bluegill numbers are low, they grow rapidly. If food is scarce and numbers are excessive, they grow poorly, or even not at all. Slow growing bluegill populations are the most serious problem in Indiana fish ponds. The simplest pond management techniques focus on maintaining good bluegill growth.

Bluegills grow more rapidly in southern Indiana ponds than northern Indiana ponds. This is a result of regional differences in the length of the growing season (climate). They usually reach six inches by age four and their typical life span is six years.

- *Because of their varied diet, bluegill can be caught on many different kinds of baits, including insect larvae (bee moths, spikes, mousies), crickets, grasshoppers, and worms.*

AVERAGE GROWTH RATE OF BLUEGILL IN INDIANA

(age in years)	1	2	3	4	5	6
Southern Indiana						
Length (inches)	1.7	4.2	5.5	6.3	7.1	8.0
Weight (pounds)		0.05	0.12	0.18	0.25	0.36
Northern Indiana						
Length (inches)	1.2	2.7	4.5	5.9	6.9	7.4
Weight (pounds)		0.01	0.06	0.15	0.23	0.29

Some bluegills begin spawning in their first year. However, most don't spawn until they are two years old. The older they get, the more eggs they produce. A four year old female produces about 20,000 eggs. Bluegills lay their eggs in shallow depressions, called “beds,” fanned in sandy areas. Bluegills will spawn over most types of bottom and often throughout the summer. Eggs hatch in three to four days.

The tremendous reproductive ability of bluegills can cause problems for the fish pond owner. Bluegills often produce more young than the pond can support. When this happens, bluegill growth is very poor and few fish reach sizes desired by the pond owner. Corrective management is then warranted.

Bluegills not only provide good fishing and eating, they are a major food item for largemouth bass. In a well-managed pond, bass abundance should remain high enough to control bluegill overabundance.

Largemouth Bass

Largemouth bass are the major predators in Indiana fish ponds. Largemouth bass are dark olive-green on the back with green sides shading to a white belly. A dark horizontal band extends on each side from the eye to the tail. The most distinguishing characteristic is its large mouth with the upper jaw extending past the rear margin of the eye.

Largemouth bass usually eat smaller fish, primarily bluegills. But often, when crayfish, tadpoles and other minnows are abundant, bass may switch to these food items. On occasion, bass are cannibalistic. Because they are predators, bass bite well on artificial lures that resemble small fish and crayfish.

Like bluegill, food availability determines how well they grow. If forage items are plentiful and accessible, bass grow rapidly. However, many Indiana ponds contain too much cover (aquatic plants usually) that prohibits bass from catching ample food. When this happens, bass growth may decline and prey species become too abundant. Corrective fish management is then needed to increase the efficiency of bass predation.

Bass grow about three inches each year for the first four years in northern Indiana ponds and about four inches each year in southern Indiana ponds. They usually live to be six years old with some reaching 10 years and measuring over 20 inches long.

Some largemouth bass spawn at age two, but most begin spawning at age three. Three and four year old bass usually produce the most viable eggs, averaging about 10,000 eggs per female. After age six, the number of eggs declines.

AVERAGE GROWTH RATE OF LARGEMOUTH BASS IN INDIANA

(age in years)	1	2	3	4	5	6
Southern Indiana						
Length (inches)	4.4	8.3	11.4	14.0	16.0	18.0
Weight (pounds)	0.04	0.26	0.67	1.26	1.90	2.72
Northern Indiana						
Length (inches)	3.1	6.4	9.4	12.0	14.0	16.0
Weight (pounds)	0.01	0.12	0.37	1.18	1.26	1.90

Bass spawn once a year when the water temperature reaches 62°F. Bass also build nests, but slightly deeper than bluegill beds. They prefer to spawn in more protected areas than bluegills, usually around aquatic plants. After the eggs hatch, the male keeps young bass schooled for about a week to 10 days.

Bass reproduction in Indiana ponds is influenced by environmental conditions much more than bluegill reproduction. Increases in turbidity (muddiness) and rapid changes in water temperature reduce spawning success. Since bass produce fewer eggs and are more susceptible to environmental changes, bass reproduction fluctuates dramatically from year to year. Weak year-classes can trigger population explosions among other fish, especially bluegills. As bluegill numbers expand, they eat bass eggs and fry, further limiting bass recruitment. The pond manager is once again required to initiate corrective management to restore balance in the fish population. While bass are popular to catch, a pond owner must work to keep ample numbers of bass in the pond to control bluegill. In many cases, a bass in the pond is worth two on a stringer.

Channel Catfish

“Mr. Whiskers,” traditionally found in slow-moving rivers, is equally at home in Indiana fish ponds. Channel catfish are characterized by the lack of scales, their deeply forked tail, and 24-29 rays in their anal fin. They can easily be distinguished from bullheads (see section on Problem Fish) since bullheads have blunt tails.

Channel catfish grow well in Indiana fish ponds, usually 3-4 inches per year. They may reach over 20 pounds and are excellent tasting. Unfortunately, reproduc-

tion and survival of young channel catfish are severely limited in many Hoosier ponds. Young catfish make easy prey for other fish. You should not expect channel catfish to maintain good fishing without restocking.

Channel catfish are “omnivores.” That is, they eat about anything they find. They usually feed on insects, crayfish, and fish, including dead fish. They feed primarily near the bottom and can be caught using worms or “stink baits” (chicken liver). Although channel catfish eat small bluegills, don’t expect them to control bluegill overpopulation.

The channel catfish begins its life in a nest constructed by the male in a secluded, dark, quiet retreat. This may be under a bank or mass of vegetation, or in old tires, tiles or large cans sunk in the water. Spawning occurs in June and July in Indiana when water temperature exceeds 75°F. The female catfish produces up to 4,000 eggs per pound of weight.

During their early development, the fry stay packed in a tight ball. This strong schooling instinct is their downfall. Often, the entire school can be consumed by a single bass as the harried fry regroup after each attack. If you want to keep a large channel catfish population, periodic restocking will probably be necessary.

- *Channel catfish grow well in Indiana fish ponds, usually 3-4 inches per year.*

MANAGING YOUR POND

Successful pond management requires more than just stocking fish. It is also important to maintain the proper environmental conditions, to monitor fish harvest and growth, check for successful fish reproduction, and to keep out unwanted fish. This is the science of fish management, the solid basis for ensuring good fishing.

How to Test Your Pond

The best way to tell how well your fish are doing is to **go fishing**. By catching fish, you can check on how well your fish are growing, how well your fish are reproducing, or whether unwanted fish are now in the pond.

You should fish your pond frequently, not only to learn how well your pond is producing, but also to harvest the crop of older, larger fish before they succumb to natural mortality. Most Indiana ponds are capable of producing many big bluegill. These fish should be harvested to reduce competition for food among the remaining fish. Bluegill fishing can begin within one year following stocking.

Keep a record of the fish you harvest from your pond. This will aid you in determining whether additional management is needed. Record the kind and size of fish you catch. Then, periodically review your catch records. Ask yourself these questions:

1. Is the average size of bluegill declining?
2. Is the largest size of bluegill you catch getting smaller?
3. Do you catch fewer big fish per hour or more little fish per hour?
4. Are bass more difficult to catch?
5. Are crappie, common carp or other non-stocked fish showing up in the catch?

Answers to these questions can form a “common sense” approach to fish management in your pond.

You may also wish to purchase a minnow seine, about 12 feet long and four feet deep. By dragging the seine along some shallow, shoreline areas, you can

sample your fish population. Seining is especially effective in catching small bass and will aid you in determining how successfully the bass are reproducing.

Another effective method of catching fish is using wire-mesh cylindrical traps. A wire funnel should be attached to one end of the trap while the other end is closed. These traps work best at catching bluegill and redear. By placing one or two traps at various locations and depths throughout your pond for 24 to 48 hours, you can usually catch enough fish to judge their size range.

Once you have examined your fishing records and the seine or trap catches, you can judge how “balanced” the fish community is and whether any problems exist.

Diagnosing Your Pond’s Problems

There are three basic reasons why your pond may not produce the quality of fishing you want: your pond may contain the wrong kind of fish, the wrong size of fish, or the wrong number of fish.

- *There are three basic reasons why your pond may not produce the quality of fishing you want: your pond may contain the wrong kinds of fish, the wrong size of fish, or the wrong number of fish.*

Remember, many kinds of fish found in Indiana lakes and streams are not suited for ponds. Corrective fish management to eliminate undesirable fish usually focuses on completely draining the pond or chemically eradicating all fish in ponds that cannot be drained.

Most pond owners who are not satisfied with the size of bluegill usually complain of catching only “little ones,” mainly in the three to five inch range, and seldom any bluegill larger than six to seven inches. By far, this is the most common problem in Indiana ponds. It usually means too much of the pond’s standing crop (fish population) is tied up in overcrowded, slow-growing bluegill. Corrective management of this problem centers on removing many of the small bluegill by seining, trapping or fishing and reducing bass harvest to allow the predator (bass) population to increase.

Occasionally, fish pond owners complain about catching only small bass and that no “hawg-bass” are present in their pond. These problems result either from overharvest of bass before they grow to large size or from inadequate forage to sustain good bass growth. If your bass grow at normal rates, merely reducing the number you harvest should allow the remaining bass to grow big. If the bass are growing slowly, simply harvesting more small bass should thin their numbers so those left in the pond grow faster.

Aligned closely with the problem of having the wrong size of fish in your pond is the problem of having the wrong number of fish. Too many fish usually means not enough food is available for each fish to grow at a normal rate. Consequently, only small fish are present. And of course, too many little fish means not enough big fish. The same corrective fish management techniques that address the problem of having the wrong size fish will also correct the problem of having too many fish.

Throughout this discussion of testing and diagnosing your pond’s fish problems, one common symptom related to each problem is fish growth. How rapidly fish grow is the best indicator of how well-balanced your fish population is. If your fish grow rapidly, chances are that they are not too numerous and overcrowded. Therefore, if you know the age and growth rate of fish in your pond, you will be more able to diagnose and correct problems.

Managing the Harvest

Biologists and pond fishermen commonly talk about “pond balance” or “population balance.” They are simply talking about the relationship between the abundance of predators (largemouth bass) and the abundance of prey (bluegill). When bluegill overpopulate and become slow-growing, the pond is said to be “out of balance.” In a “balanced pond,” bass remain abundant enough to prevent overpopulation of bluegill.

A balanced pond fishery can be established with the initial stocking. **Maintaining** that balance requires the pond owner to **manage** the harvest. This is usually the most difficult part of pond management. After the cost and effort of pond construction and fish stocking, the owner is understandably anxious to begin reaping the initial fishing benefits. Too often this leads to bass overharvest within the first two years.

When too many bass are removed, bluegill are free to overpopulate. The excessive number of small bluegill that survive in the absence of adequate bass predation quickly outstrip their own food supply. The result is a horde of small, very slow growing bluegill and not much else. This is an extremely common occurrence in ponds. To correct this situation, it is usually necessary to renovate the pond completely and start over with a balanced re-stocking. However, this can all be prevented by conservatively managing the bass harvest.

Channel catfish and bluegill can be harvested as soon as they reach a desirable size. However, **no bass** should be removed during the first two years after stocking. This doesn't mean you shouldn't catch bass. With gentle handling, you can enjoy many hours of catching and releasing these fish with virtually no harm to them. Bass will normally spawn for the first time during their second spring in a new pond. If bass harvest has been prohibited up to this point, the pond should still contain 60 to 80 percent of the bass originally stocked. A new and sizable generation of bass will be produced to maintain the fishery balance as well as to provide enjoyable bass fishing. The bass originally stocked have to provide most of the bass fishing for the first five years. It takes two seasons to grow them to maturity and it will be three more years before their first progeny reach sizes of 10 to 12 inches. If bass harvest is prohibited during the first two years and carefully managed thereafter, your pond can provide many years of quality fishing.

Although there are no hard and fast rules for managing bass harvest, the key is to practice a conservative harvest. One way is with a minimum size limit of 14 inches. Another helpful guideline is to remove no more than 20 to 25 bass per surface acre each year (after the first two years). This approach emphasizes the quality rather than the quantity of pond fishing. The dividends are large, spunky bluegill, plenty of bass fishing action including some "lunkers," and an occasional bass for the frying pan. But perhaps the greatest dividend of all is to see your management efforts translated into good fishing year after year.

When catching and releasing largemouth bass, there are a few simple rules to follow that improve the chances of the bass surviving. These are:

1. Don't overplay the bass. Retrieve and release it quickly.
2. Don't put it on a stringer and then decide to let it go.
3. Carefully remove hooks so excessive bleeding doesn't start.
4. If the hook cannot be removed, cut the hook or line and release the fish.
5. Keep the bass out of sunlight and in the water.

Correcting Muddy Ponds

A muddy pond does not provide good habitat for fish. Muddy water can adversely affect fish reproduction. Mud also prevents sunlight from penetrating the water and reduces microscopic plant (phytoplankton) growth. Phytoplankton release oxygen into the water during photosynthesis for fish to breathe. Phytoplankton also serve as the first link in the pond's food chain. If your pond is muddy much of the time, look for the cause of the problem and try to correct it. Some common causes of muddy ponds include: 1) soil erosion due to poor land management practices in the watershed, 2) an abundance of bottom feeding fish such as common carp or bullheads, 3) wave action along an unprotected shore, 4) livestock trampling the pond banks, and 5) suspended clay particles. Maintain a buffer strip of terrestrial vegetation around the pond to hold the soil and reduce silt and nutrient inputs.

- *If bass harvest is prohibited during the first two years and carefully managed thereafter, your pond can provide many years of quality fishing.*

To reduce bank erosion caused by wave action, you may wish to place large rocks or gravel along the shore. Allowing some aquatic vegetation, such as cattails and lilies, to grow in areas where wave action is greatest can also reduce bank erosion.

If muddy water is caused by common carp or bullheads, complete pond draining or chemical eradication may be warranted. Livestock should be kept out of ponds.

Muddy water caused by suspended clay particles can sometimes be corrected by spreading broken bales of high quality hay around the shoreline. As the hay decays, a weak acid is formed which causes clay particles to settle. Approximately two bales of hay per surface acre should clear the water.

Fertilizing Your Pond

Pond fertilization is based on the notion that the addition of nutrients to the water will increase the production of plankton (microscopic plants and animals). This increase in the amount of fish food then results in increased fish production (pounds of fish per acre).

While fertilization may increase fish production and help control aquatic vegetation due to water clouding caused by dense plankton blooms, the disadvantages of fertilization usually outweigh the advantages.

Fertilization can promote aquatic vegetation growth rather than plankton. Increases in aquatic vegetation can increase chances of summer and winter fish kills as the vegetation decays. Plankton blooms can also occur, damaging the appearance of your pond by making it a soupy, green color. Once fertilization is started, it must become a permanent part of your management program or your pond's carrying capacity is reduced, often resulting in over-crowded, slow-growing fish. Because of these many disadvantages of fertilization, it is not recommended that you initiate a fertilization program.

- *Fish kills in general can be best prevented by properly controlling nutrient inputs and overabundant aquatic vegetation.*

Preventing Fish Kills

The most common cause of fish kills in Indiana ponds is suffocation. Suffocation occurs when aquatic plants do not produce enough oxygen for fish to breathe. This may occur during heavy snow and ice cover in winter, during rapid plant die-offs after a cold rain or several days of cloud cover, or following aquatic plant die-offs from herbicide applications. Once fish suffocation starts, it is too late to stop it.

Fish kills in general can be best prevented by properly controlling nutrient inputs and overabundant aquatic vegetation.

Winter kills can be prevented by removing snow from the pond. Three inches of ice covered by five inches of snow will shut out 99% of the incoming sunlight. To prevent or reduce the severity of winter kills, remove snow from at least 50% of the pond surface. Drilling holes in the ice will not help.

Additional action that can be taken to prevent winterkills includes artificially aerating and circulating the water either by motor-driven air compressors or wind driven baffles. When using an air compressor system, do not allow the air stone (diffuser) to lie on the bottom. This will usually stir up organic materials and result in more oxygen consumption as the materials decay. Suspend the diffuser at least two feet off the bottom.

Summer-kills can be prevented by making sure no fertilizer, herbicides, insecticides or organic run-off (silage, manure) enter the pond. Chemically treat aquatic vegetation early in the growing season according to the label and avoid treatments in late July and August. Avoid treating large amounts of aquatic vegetation throughout the pond by treating one area at a time.

Aquatic Weed Control

Aquatic plants are essential members of the pond community. They are beneficial to fish and wildlife. Rooted plants provide living areas for fish and fish food organisms such as aquatic insects. Certain plants offer shade to fish from bright sunlight and provide natural fish attractors to larger fish. Some kinds of aquatic vegetation provide food and cover for waterfowl and various mammals. Most types of aquatic vegetation never cause problems in ponds. Control is not recommended if the vegetation covers less than 20-25% of your pond's surface area. This level of aquatic vegetation is generally accepted as optimal for sport fish populations and the ecology of the pond.

When aquatic vegetation becomes overabundant (covering more than 20-25% of the pond), it can cause problems. Excessive amounts of aquatic vegetation detracts from the pond's appearance and makes swimming, boating and fishing difficult. Aquatic vegetation also uses nutrients that could go into producing fish food organisms. Excessive aquatic vegetation offers unneeded protection to small fish from predators and often results in panfish overpopulation. On cloudy, hot summer days or under ice cover, excessive vegetation can lead to fish kills by using up the available oxygen.

There are several ways to control aquatic vegetation in ponds. Hand pulling, cutting or raking aquatic vegetation may be the simplest and least expensive. Placing permeable filter fabric on the bottom can control vegetation in specific areas of the pond. Some Indiana pond owners control vegetation with registered and approved aquatic herbicides. Another alternative may be biological control (see section on Grass Carp).

The first step in chemically controlling aquatic vegetation is to correctly identify the problem plants. There are four basic types of vegetation found in ponds: emergent plants, submergent plants, floating plants and algae. Your choice of herbicide will depend on the types of problem plants you want to control.

Filamentous algae is perhaps the most common vegetation problem in Indiana ponds. It is a stringy, hair-like plant (sometimes mistakenly called "moss") that can completely cover a pond's surface. Algae can be difficult to control and may require several treatments.

If you are unable to correctly identify your problem plants, enclose a damp sample within a plastic bag and mail them to your District Fisheries Biologist (see map and list to locate your fisheries biologist).

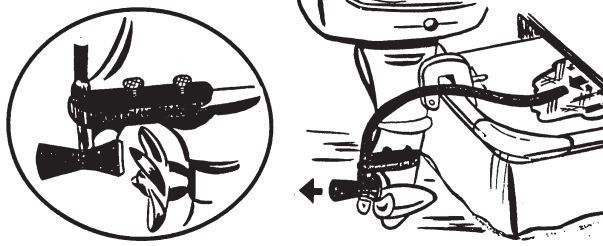
After your problem vegetation has been identified, the next step is to determine the acreage and water volume of the area to be treated. To prevent killing too much vegetation, you may wish to treat the pond in sections. In this case you will need to calculate the area and the volume of only the section you want to treat. (see section on Partial Pond treatment, Figure 2)

Now you are ready to select an appropriate aquatic herbicide that's registered and approved by the EPA and the Indiana State Chemist's Office. Carefully read the entire label to ensure the herbicide will do the job in the manner you expect. Especially note the precautionary statements and directions before using the product. Be sure to wear any safety equipment such as gloves or eye protectors as stated on the product label.

The method(s) of herbicide application is dictated by the formulation and the product label. Liquids are usually sprayed from shore or a boat.

Some liquids can also be injected from a boat mounted tank into the prop wash of an outboard motor with a simple device called a boat bailer (Figure 1). If the vegetation is very thick, spraying may be easier than bailing. Granular herbicides can be broadcast by hand or hand held spreaders. Powders might be dissolved in water and sprayed or poured along the shoreline as a paste or slurry.

Figure 1. Boatbailer



Licensed and certified commercial aquatic pesticide applicators are available to treat pond vegetation for a fee. A list of licensed commercial applicators is available from your District Fisheries Biologist.

Do not apply aquatic herbicides to your pond on rainy or cloudy days or if the weather forecast calls for a period of rainy or cloudy days or else you may cause a fish kill.

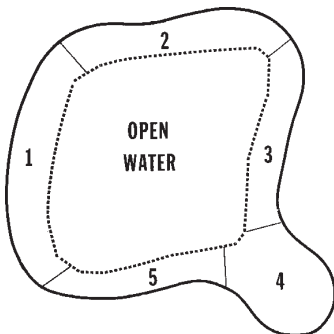
Important points to remember when treating aquatic vegetation are:

1. Identify the problem plant and select the appropriate herbicide.
2. Use only registered, approved herbicides.
3. Carefully read and follow all herbicide label directions.
4. Distribute the herbicide evenly, covering all areas in the treatment zone.
5. Do not over treat or apply the herbicide to an area larger than needed.
6. Treat submergent vegetation and algae early in the growing season.
7. Properly dispose of empty containers and unused herbicide.

Example: Plants are growing from the shoreline to a depth of 10 feet around the entire pond. An easy way to calculate the area (acres) and/or volume (acre feet) to be treated is to divide the pond into five treatment zones (Figure 2).

Treatment Zone	Length (feet)	Width (feet)	Area (acres)	Average Depth (ft.)	Volume (ac. ft.)
1	210	60	0.29	4	1.16
2	150	60	0.21	4	0.83
3	90	60	0.12	4	0.49
4	100	75	0.17	3	0.52
5	85	60	0.12	4	0.47

Figure 2. Partial Pond Treatment



Before you apply the chemical to a treatment zone, you need to know the area (acres). To determine the area, measure the length and width in feet. Multiply the length by the width and divide by 43,560 (the number of square feet in one acre)

Here is the formula:

$$\frac{\text{LENGTH (FEET)} \times \text{WIDTH (FEET)}}{43,560 \text{ SQUARE FEET/ACRE}} = \text{AREA IN ACRES.}$$

You may also need to know the **volume (acre feet)** of the treatment zone. To calculate the volume in the treatment zone, determine the average depth in feet and multiply the average depth times the acres (Figure 3). Here is the formula:

$$\text{Acres of treatment zone} \times \text{Average depth (feet) of treatment zone} = \text{Volume in acre feet.}$$

Determining where Grass Carp Stocking Permits are Not Required

The Department of Natural Resources allows triploid grass carp stocking, without a stocking permit, only in private ponds and lakes. A stocking permit is not required if a pond or lake meets the following criteria:

- 1) The land surrounding the lake is wholly in private ownership. No portion of the land is owned by a public entity, including a public access site, city park or public road crossing.
- 2) A state fishing license is not required to fish the lake and state fishing regulations do not apply to fish caught from the lake.
- 3) The Department of Natural Resources has never stocked fish into the lake.

If your pond or lake does not meet these criteria or you are in doubt request a stocking permit application from the Fisheries Section, Division of Fish and Wildlife, 402 W. Washington Street, Room W273, Indianapolis, IN 46204. Send the completed stocking permit application along with a \$3 processing fee back to the same address. State fisheries personnel will determine if a permit is needed and if so, under what conditions grass carp may or may not be stocked.

The Division of Fish and Wildlife will not issue permits for stocking triploid grass carp into any natural body of water including glacial lakes, slough potholes, bottomland lakes, streams, rivers, water areas known to harbor rare, threatened or endangered animals, or plants on the official national or state listing, any state nature preserve, or any wetland.

Obtaining Triploid Grass Carp for Stocking

Triploid grass carp may only be purchased from holders of an Indiana aquaculture permit. A list of permit holders is available from the Division of Fish and Wildlife and district fisheries offices. Pond owners are not allowed to pick up grass carp and stock their own ponds. The aquaculture permit holder must deliver and stock the fish, and present the purchaser with a bill of sale and copy of triploid certification. It is the responsibility of the purchaser to retain these documents for at least two years.

Triploid Grass Carp Stocking Guidelines

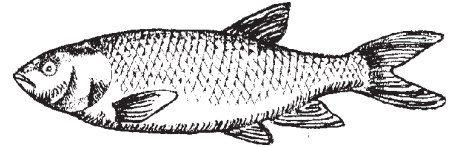
Grass carp are not a cure-all for aquatic vegetation control. Excess vegetation is a result of nutrient buildup in ponds, and the source of these nutrients will have to be controlled for best long-term results. As grass carp consume aquatic vegetation, the water is likely to become more turbid and less desirable plants or algae may become dominant in the pond. Grass carp may also seriously affect sport fish populations if they are overstocked. Vegetation control with grass carp is extremely variable and desired results are difficult to obtain and **are not guaranteed**.

Based on research done by Indiana, the following general guidelines offer the best chance for successful use of grass carp in most Indiana ponds and lakes.

1. It sometimes takes years to see changes in aquatic vegetation abundance following grass carp stockings. Monitoring of changes in aquatic vegetation following stocking should be done each year.
2. If less than 20 percent of your pond is covered by aquatic vegetation, stocking grass carp is not recommended. Use chemical or mechanical spot treatments as necessary. This level of aquatic vegetation is generally accepted as optimal for sport fish populations and the ecology of the pond.

- *As grass carp consume aquatic vegetation, the water is likely to become more turbid and less desirable plants or algae may become dominant in the pond.*

3. All grass carp stocking recommendations are based on an accurate determination of the acres of aquatic vegetation covering the pond's surface plus the areas covered by submerged vegetation as far as you can see into the water. The best way to do this is to physically measure and calculate the square feet of vegetation covering your pond. Divide the number of square feet by 43,560 to determine acres of aquatic vegetation. An alternative method is to determine the entire surface area of the pond in acres, then estimate the percent of aquatic plant coverage from a vantage point where you can see the entire pond. Take the surface area of your pond times the percent of plant coverage to determine acres of aquatic vegetation.
4. Stocking rates are based on the use of 8-12 inch long triploid grass carp. When using fish less than eight inches long, increase the stocking rate by 40 percent, except in ponds that do not contain largemouth bass. In these ponds, stock at standard rates. For fish larger than 12 inches, decrease the stocking rate by 30 percent.
5. If your objective is to totally eliminate aquatic vegetation, stock 30 grass carp per acre of vegetation. If significant vegetation reduction has not occurred by the end of the third summer, stock an additional 15 fish per acre of vegetation. Mechanical and chemical methods can be used for initial control, however, be careful not to kill the grass carp. Keep in mind that total elimination of aquatic vegetation will seriously affect sport fish populations and normal pond ecology.
6. The recommended objective is to maintain some vegetation in your pond. Reducing the grass carp stocking rate to 15 per acre of vegetation generally offers the best chance of meeting this objective. If no improvement in vegetation coverage has occurred after four summers, stock an additional 7 grass carp per acre of vegetation. These stocking rates were developed in the absence of any supplemental chemical or mechanical vegetation control measures. Any interim measures taken should be very selective and cover only small areas, otherwise elimination of all vegetation may occur. Results of using this approach for vegetation control will be highly variable. No two ponds will react the same way. You will have to refine your vegetation management strategies over the years on an individual basis



Numbers of 8-12 inch triploid grass carp needed for various acres of aquatic vegetation at the two standard stocking rates.

Stocking Rate	<u>Acres of Aquatic Vegetation</u>						
	1/4	1/2	1	2	3	4	5
15/Acre	4	8	15	30	45	60	75
30/Acre	8	15	30	60	90	120	150

7. Grass carp will not control cattails, spatterdock (yellow water lily) or filamentous algae (pond moss) without first eliminating most other plants in the pond. If these plants are your problem and elimination of all plants is acceptable, use the method described in number 5, otherwise, spot treatments by chemical or mechanical methods are recommended.
8. Stocking grass carp in a lake that normally has high discharges is not recommended. In this situation, grass carp will leave the lake. Fish barriers should not be used unless the dam and spillway have been designed to account for the reduced spillway efficiency and blockage that will occur during high flows. A professional engineer should be consulted to evaluate barrier impact on dam safety if a fish barrier is considered.

Correcting Poor Fishing

If your pond contains the wrong kind of fish (carp, bullheads, unwanted sunfish) or is dominated by over-crowded, slow-growing bluegills, you should consider having the fish eradicated. Total fish eradication is a severe measure but often it is the only way to improve fishing.

Fish can be eradicated by completely draining the pond or by applying a chemical fish toxicant. Draining, of course, is the least expensive if your pond was properly constructed so that it can be drained. The pond should be drained during fall and refilled with spring run-off.

If you cannot completely drain the pond, then a fish toxicant may be used. Because this fish toxicant is classified as a restricted use pesticide by the U.S. EPA, only pesticide applicators certified and licensed with the Office of Indiana State Chemist in pest control may use this product. According to the Office of Indiana State Chemist, a person holding a private applicator's permit may purchase and apply this restricted use pesticide, but only to their privately owned pond. A person may not use this product in a pond which empties into a public waterway without holding a commercial pesticide applicator license in Category 5 (Aquatic Pest Control). Should there be a question regarding whether or not your pond empties into a public waterway, you may contact a District Fisheries Biologist to discuss your situation. You may also contact the Office of Indiana State Chemist at (317) 494-1594 or a District Fisheries Biologist to secure the names of licensed aquatic pest control businesses.

Installing Fish Attractors

If your pond contains very little fish cover, you may wish to add cover by providing artificial fish attractors. Not only do fish attractors provide cover, they also provide a substrate for aquatic insects, and they concentrate fish for better fishing.

Brush piles are the most common type of fish attractor. Any type of woody brush, such as branches or discarded Christmas trees, can be anchored together in a pile. Hardwoods resist decay longer than softwoods and are recommended. Another type of fish attractor is the stake-bed, constructed from discarded lumber slats or old boards.

Fish attractors can be constructed on the ice during winter and allowed to sink. The attractors should be heavily weighted to prevent floating. Cable or nylon rope works best to secure the materials.

- *If the pond owner wishes to supplementally feed fish, it should only be done to provide a small boost to fish growth in an already-balanced pond.*

Feeding Your Fish

“Should I feed my fish?” is a question often asked by pond owners. In most cases, the answer is “no” if you're managing your pond for bluegill and bass. While feeding fish may be entertaining, it is not recommended for most pond owners.

The natural fertility of ponds is usually sufficient for providing enough food organisms for normal fish growth. Supplemental feeding costs money and takes time. Fish must first learn to eat commercial pellets and for optimum learning, feed should be offered daily in the same places. Feeding “just when you feel like it” is a waste of time and money. Many fish never learn to take artificial feed and feed that isn't consumed falls to the bottom to decompose.

If the pond owner wishes to supplementally feed fish, it should only be done to provide a small boost to fish growth in an already-balanced pond. Trying to make “slab” bluegills out of thousands of five-inchers by artificial feeding does not always work.

A bluegill needs to eat 2 percent of its body weight per day for maintenance of good health and growth. And remember, the average standing crop of bluegills in Indiana ponds is 224 pounds per acre. This means that pond owners would have to add about five pounds of feed per acre per day to get improvements in growth.

One situation where supplemental fish feeding is recommended is for small ponds used to produce harvestable-size channel catfish.

SPECIAL PONDS

Not all Indiana ponds are suited for growing just bass, bluegill, and catfish. Certain ponds, such as those smaller than 1/2 acre, deep gravel pits, or those larger than 5 acres can be managed in special ways to provide different types of fishing. Still others can be used for growing fish for food only or for growing bait minnows or frogs. However, since this booklet is intended for the pond owner whose main interest is sport fishing, we will discuss only management of special ponds for fishing. Pond owners who would like more information on raising fish for food, either for themselves or commercially, should contact:

Aquaculture Extension Specialist
Department of Animal Science
Purdue University
West Lafayette, IN 49707
(765) 494-6264

Catfish Ponds

Small, shallow ponds can be used to provide fishing for channel catfish. Each year, a pond owner may wish to buy small channel catfish fingerlings for stocking. They should be stocked at densities up to 1,000 three-inch fingerlings per acre. Catfish will grow rapidly (and can be artificially fed for even faster growth) and will provide fishing as well as “good eating.” Stocking larger fingerlings at lower numbers will provide fishing sooner and larger fish by the end of the summer. Aeration may be required to overwinter fish in small, shallow ponds.

Trout Ponds

Deeper, well-oxygenated ponds can be used to provide trout fishing. However, several environmental requirements must be met before trout should be stocked. There must be water cool enough (less than 70°F) that contains ample amounts of dissolved oxygen (greater than five parts per million) throughout the year. Just because you think you have a cool, underground spring that flows in your pond, don't be misled into thinking it will support trout. Underground springs do not contain oxygen. Temperature and dissolved oxygen should be measured at two foot intervals from top to bottom in late August or early September to determine a pond's suitability to support trout.

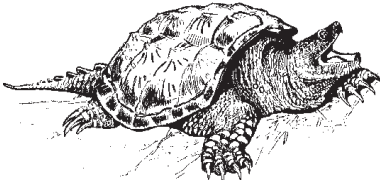
Trout stocked in small lakes with the proper conditions grow rapidly and bite readily on artificial lures or live bait. Since they will not reproduce, restocking is necessary. Even if your pond does not maintain ideal trout conditions throughout the year, you may wish to consider stocking trout in the fall when water temperature drops below 70°F. Trout bite so well that nearly all may be caught before the following spring when the water temperature rises again. Ponds containing rainbow trout should not be treated with copper sulfate because it is very toxic to them.

OTHER POND PROBLEMS

Indiana pond owners are likely to encounter several other problems that will require attention such as: turtles, muskrats, fish parasites and disease organisms.

Turtles

Turtles are one of the first inhabitants to appear in new ponds. Quite often, their first sighting is viewed with alarm by the pond owner who sees turtles as a threat to good fishing. However, most turtles are vegetarians and pose no threats to fish. In fact, turtles are beneficial in ponds as scavengers.



Occasionally the common snapping turtle can become a nuisance. The “snapper” feeds on fish and can eat small ducklings. It has extremely strong jaw and neck muscles and an ability to quickly lash out at its prey.

Snapping turtles can be caught in traps. Wire funnel traps, set partially in the water at the pond’s edge and baited with fresh meat, are effective if the pond owner does not want to harm the turtle. Coil-spring traps are effective when mounted to a wooden board and floated upside-down. Position the trap over two feet of water and anchor them to the bank. As with the other method, bait should consist of fresh meat.

Turtles can also be caught on baited hooks or caught by hand during early ice-cover. Turtles can often be spotted in shallow water before snow covers the ice. By simply chopping a hole through the ice, you can reach down and grab them by the tail. Because of the cold temperature, they are very lethargic. Be sure the ice is safe and be sure you grab them by the tail.

Muskrats

Muskrats build dens in burrows along steep banks of a pond. Entrances are usually 6-18 inches below the water line with burrows penetrating into the bank up to 10 feet. Where muskrats become abundant, they can cause damage to the pond’s banks and dam.

Properly constructed ponds usually discourage muskrats from digging into the banks. The dam should have a minimum slope of 3:1 on the water side, be above the water level by three feet, and be at least 20 feet wide at the water level.

There are several ways to control muskrats. The first is simply eliminating starchy water plants, such as cattails, bulrushes and arrowhead. These are favorite foods of muskrats. Muskrats can also be trapped or repelled by chemicals.



Trapping is the most effective and economical way to control muskrats. If possible, trapping should be done during the legal trapping season. Selling muskrat pelts can earn the pond owner extra income and quickly pay for the traps.

If you have a muskrat problem and need to take the animal(s) out of season, Indiana Fish and Wildlife Administrative Rules allow the resident landowner or tenant to take a muskrat at any time, without a permit, if the animal is damaging property when discovered. A landowner or tenant must report the taking to the Division Director or to a Conservation Officer within seventy-two (72) hours of the taking.

To chemically repel muskrats, place calcium carbide, moth balls, or naphthalene flakes in each hole and seal it with dirt or sod. These chemicals temporarily prevent muskrats from digging into the dam. Muskrats move from pond to pond in the spring and fall. Preventive treatment with chemicals should be made in early April and in August.

FISH PARASITES AND DISEASES

Fish, like any animal, are exposed and susceptible to a wide range of diseases and parasites. In fact, it is unusual to find a fish completely free of disease organisms. It is normal to see a few dead fish from time to time. These fish usually die as the result of natural causes. Severe losses of fish due to disease organisms are rare in a natural environment. Most severe losses occur when fish are stressed due to unfavorable conditions, such as poor water quality.

Disease problems are most noticeable in the spring when fish are in a weakened state after winter and during the stressful spawning period. Also, as the water warms in spring, living conditions are better for growth of disease organisms.

There are no practical, and few safe methods, for treating disease problems in ponds. Disease outbreaks in ponds simply must run their course. Prevention or repression of disease is best accomplished by stocking only healthy fish from reputable sources and by maintaining a favorable pond environment.

With the exception of the broad fish tapeworm, fish parasites are not harmful to humans. Proper cooking destroys parasites, including tapeworms. Some of the more common parasites and diseases are described below.

- *Disease problems are most noticeable in the spring when fish are in a weakened state, after winter and during the stressful spawning period.*

Black-spot disease

These parasitic flatworms appear as tiny black spots on the skin, fins and flesh of fish. No method of control is available for the elimination of this problem. This organism does little harm to the fish. The main problem associated with black-spot is the unsightly appearance it may cause. Skinning infected fish will remove most black spots.

The life cycle of the parasite is quite complex. A fish-eating bird (typically a great blue heron or kingfisher) eats an infected fish. The black spot or worms are released and grow to sexual maturity in the bird's intestine. The adult worms pass eggs with the bird's droppings. When the eggs reach water, they hatch into free-swimming organisms which then penetrate snails for further development. Finally, after leaving the snails they burrow into the skin of fish and form a cyst. The fish surrounds the cyst with black pigment that gives the disease its name. If an infected fish is consumed by a bird, the cycle repeats itself.

Yellow grub

The yellow grub (or white grub) is also a larval flatworm with a life cycle similar to parasites causing black-spot disease. The parasite appears as yellow or white spots in the flesh, often 1/4 inch long. While unsightly, it is harmless to man and in many cases can be removed during the cleaning process.

Fungus

The most common fungus is saprolegnia and appears as gray-white threads resembling cotton balls growing on fish or fish eggs. Fungus usually occurs as a secondary infection caused by handling, parasites or bacterial attack. There is no practical way to control fungus in pond situations. Fungus rarely causes a fish to die, but can often be found on weakened or stressed fish before they die.

Ichthyophthirius “Ich”

Ich is a large, ciliated, single celled animal (protozoan) that can be positively identified under a microscope by its horseshoe shaped nucleus (center). It is common on warm-water fish, and occasionally found on cold-water fish.

In the early stages of Ich, infected fish usually rub against the pond bottom in an effort to rid themselves of the parasite. This protozoan can be very harmful to fish. Losses due to “Ich” often occur.

The elimination of “Ich” in a pond situation is virtually impossible. Problems resulting from the parasite can be minimized by maintaining good water quality in the pond and by making sure only healthy fish are stocked

Lymphocystis

Lymphocystis is a viral disease that causes a yellow or white wart like growth on the fish’s body. Lymphocystis subsides naturally only to return, much like a cold-sore in humans. Generally, little harm is done to the fish but the infection is unsightly.

- *Bacterial diseases are common in all fish and occur most when environmental conditions, such as water quality, are not favorable.*

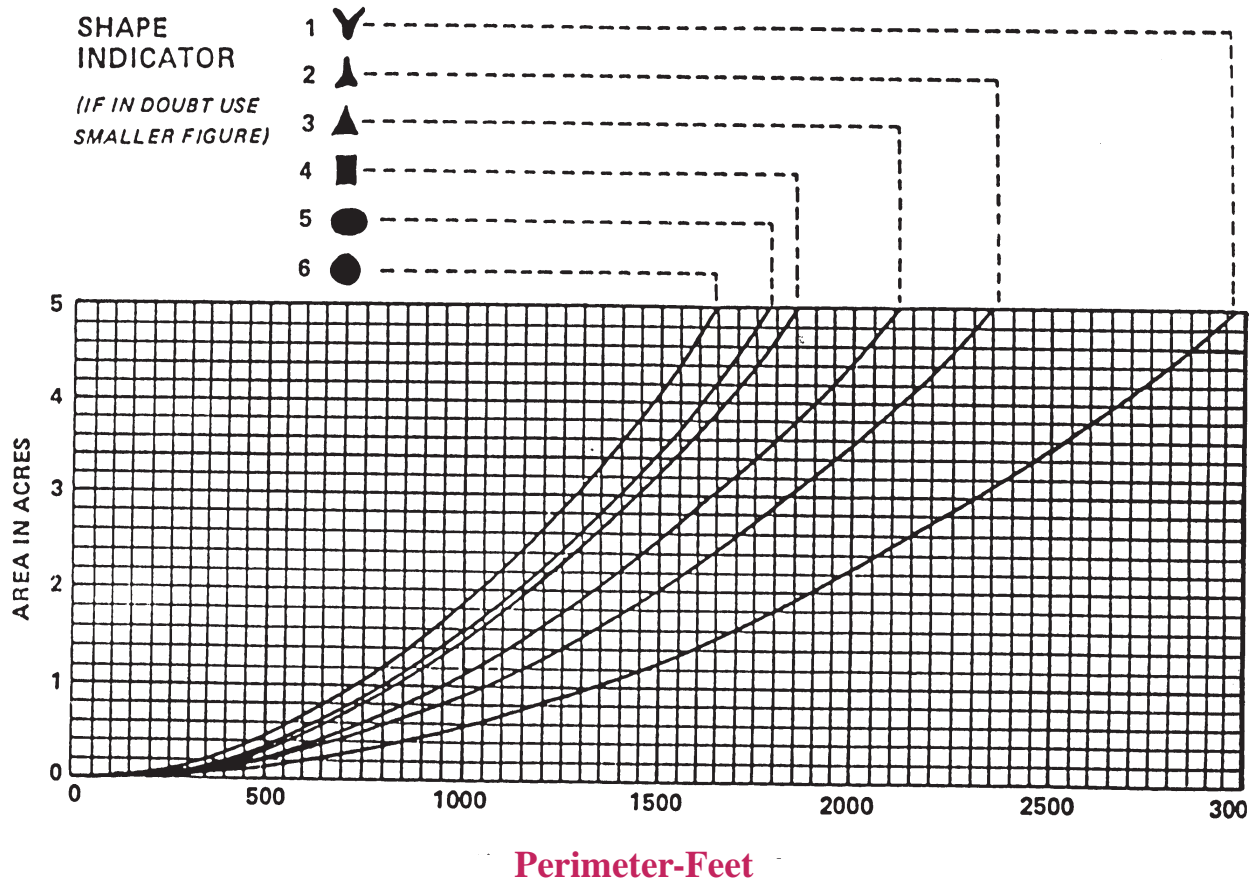
Bacterial Diseases

Bacterial diseases are common in all fish and occur most often when environmental conditions, such as water quality, are not favorable. Inadequate oxygen levels in the pond can stress fish and make them susceptible to bacteria infections. These infections are often associated with spring die-offs in fish ponds. As the water warms during the spring, fish weakened by the winter months are often invaded by harmful bacterial that can cause death. This weakened condition can also be enhanced by frenzied spawning activity that further stresses the fish.

Bacterial losses are one of the most commonly noted causes of fish loss during May and June. No control is available for the treatment of bacterial problems in ponds. Fortunately, bacterial problems rarely reach epidemic proportions in ponds.

Area In Acres

WIDTH Feet	LENGTH — Feet																		
	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
100	.230	.344	.459	.574	.689	.803	.918	1.03	1.15	1.26	1.38	1.49	1.61	1.72	1.84	1.95	2.07	2.18	2.30
150	.344	.517	.689	.861	1.03	1.21	1.38	1.43	1.72	1.89	2.07	2.24	2.41	2.58	2.75	2.93	3.10	3.27	3.44
200	.459	.689	.918	1.15	1.38	1.61	1.84	2.07	2.30	2.53	2.75	2.98	3.21	3.44	3.67	3.90	4.13	4.36	4.59
250	.574	.861	1.15	1.43	1.72	2.01	2.30	2.58	2.87	3.16	3.44	3.73	4.02	4.30	4.59	4.88	5.17	5.45	5.74
300	.689	1.03	1.38	1.72	2.07	2.41	2.75	3.10	3.44	3.79	4.13	4.48	4.82	5.17	5.51	5.85	6.20	6.54	6.89
350	.803	1.21	1.61	2.01	2.41	2.81	3.21	3.62	4.02	4.49	4.82	5.22	5.62	6.03	6.43	6.83	7.23	7.63	8.03
400	.918	1.38	1.84	2.30	2.75	3.21	3.67	4.13	4.59	5.05	5.51	5.97	6.43	6.89	7.35	7.81	8.26	8.72	9.18
450	1.03	1.43	2.07	2.58	3.10	3.62	4.13	4.65	5.17	5.68	6.20	6.71	7.12	7.75	8.26	8.78	9.30	9.81	10.3
500	1.15	1.72	2.30	2.87	3.44	4.02	4.59	5.17	5.74	6.31	6.89	7.46	8.03	8.61	9.18	9.76	10.3	10.9	11.5
550	1.26	1.89	2.53	3.16	3.79	4.42	5.05	5.68	6.31	6.94	7.58	8.21	8.84	9.47	10.1	10.7	11.4	12.0	12.6
600	1.38	2.07	2.75	3.44	4.13	4.82	5.51	6.20	6.89	7.58	8.26	8.95	9.64	10.3	11.0	11.7	12.4	13.1	13.8
650	1.49	2.24	2.98	3.73	4.48	5.22	5.97	6.71	7.46	8.21	8.95	9.70	10.4	11.2	11.9	12.7	13.4	14.2	14.9
700	1.61	2.41	3.21	4.02	4.82	5.62	6.43	7.12	8.03	8.84	9.64	10.4	11.2	12.0	12.9	13.7	14.5	15.3	16.1
750	1.72	2.58	3.44	4.30	5.17	6.03	6.89	7.75	8.61	9.47	10.3	11.2	12.0	12.9	13.8	14.6	15.5	16.4	17.2
800	1.84	2.75	3.67	4.59	5.51	6.43	7.35	8.26	9.18	10.1	11.0	11.9	12.9	13.8	14.7	15.6	16.5	17.4	18.4
850	1.95	2.93	3.90	4.88	5.85	6.83	7.81	8.78	9.76	10.7	11.7	12.7	13.7	14.6	15.6	16.5	17.6	18.5	19.5
900	2.07	3.10	4.13	5.17	6.20	7.23	8.26	9.30	10.3	11.4	12.4	13.4	14.5	15.5	16.5	17.6	18.6	19.6	20.7
950	2.18	3.27	4.36	5.45	6.54	7.63	8.72	9.81	10.9	12.0	13.1	14.2	15.3	16.4	17.4	18.5	19.6	20.7	21.8
1000	2.30	3.44	4.59	5.74	6.89	8.03	9.18	10.3	11.5	12.6	13.8	14.9	16.1	17.2	18.4	19.5	20.7	21.8	23.0



*This estimator was obtained from the Missouri Department of Conservation.

Table of Equivalents

1 acre foot	= 1 acre of surface area covered by 1 foot of water = 43,560 cubic feet = 2,700,000 pounds of water (approximately) = 326,000 gallons of water
1 cubic foot	= 7.5 gallons = 62.4 pounds of water = 28,355 grams of water
1 gallon	= 8.34 pounds of water = 3,800 cubic centimeters = 3,800 grams of water = 231 cubic inches
1 quart	= 946 cubic centimeters = 946 grams of water
1 pound	= 453.6 grams = 16 ounces
1 ounce	= 28.35 grams
1 ppm requires:	2.7 pounds per acre foot 0.0038 grams per gallon 0.0283 grams per cubic foot 0.0000623 pounds per cubic foot 1,233 grams per acre foot 0.0586 grains per gallon 8.34 pounds per million gallons of water 1 milligram per liter

Units	Gallons	Quart	Pint	Pound	Ounces	Fluid Ounces
1 gal	1.0	4.0	8.0	8.345	133.52	128
1 qt.	0.25	1.0	2.0	2.085	33.36	32.0
1 pt.	0.125	0.5	1.0	1.043	16.69	16.0
1 lb.	0.12	0.48	0.96	1.0	16.0	15.35
1 oz.	0.0075	0.03	0.06	0.0625	1.0	0.96
1 fl. oz.	0.0078	0.031	0.062	0.065	1.04	1.0
1 cu. in.	0.0043	0.017	0.035	0.036	0.576	0.554
1 cu. ft.	7.481	29.922	59.844	62.426	998.816	957.51
1 cc	-	0.001	0.002	-	-	0.034
1 liter	0.264	1.057	2.1134	2.205	35.28	33.81
1 gram	-	-	0.002	0.0022	0.0353	0.034

forestry & natural resources

WILDLIFE AND FISHERIES

Fish Kills in Indiana – Their Causes and Prevention

by Herbert C. Krauch, Extension Specialist in Wildlife

For anyone who has a stocked pond - and there are thousands in Indiana - fish kills can be quite a problem. The condition called "fish kill" occurs when a number of fish in a given body of water die from a specific cause. Among these causes are chemical pollution, water quality (pH, hardness, oxygen supply, etc.), old age, physical disturbance, oxygen depletion, parasites, blue-green algae, and/or disease.

Often, fish kills can be anticipated and measures taken to prevent them.

The most common cause of fish kills in Indiana ponds is oxygen depletion. Oxygen depletion results when conditions create a greater demand for oxygen than the aquatic environment can produce. Oxygen depletion can occur in both winter and summer.

Winter kill

The conditions which produce oxygen depletion in winter are quite different from those which result in summer kills. The results of a winter kill are seldom noticed until spring when the ice melts. Then the dead fish, often the larger ones, are seen washing up along the edge. Because they require more oxygen, the large fish suffocate and die first.

During winter, most ponds are covered by ice. The oxygen supply under the ice depends on the passage of light through the ice and the resulting production of oxygen by the tiny algae in the water. If the ice is snow-covered, sunlight cannot penetrate and the plants cannot produce oxygen. Just an inch of snow can shut out as much as 90 per cent of the light; and five inches will shut out about 99 per cent.

The existing oxygen is then gradually used up by the respiration of the fish and by natural decay processes. If the snow remains on the ice long enough, the fish will suffocate.

Generally, not all the fish are killed. Some are more resistant to low oxygen levels than others. In addition, poor conditions may not exist uniformly throughout the pond. So, the result may be that the larger fish, such

as bass, die, leaving the smaller, immature fish in the pond. This creates conditions further unbalancing the pond population very quickly.

Preventing winter kill

Pond design is important to preventing winter kill. In Indiana, ponds should be at least eight feet deep over a least 25 per cent of the pond area. Greater depths are even better.

If, however, an eight foot depth isn't possible, a six foot depth over at least half the pond is an alternative. Deepening the pond and/or removing build-ups of dead and decaying organic matter from the pond will help preserve the oxygen.

Removing snow cover from at least 59 per cent of the pond surface may help. But, unless the ice is thick enough to hold a person or small tractor, this can be very dangerous. Be sure the ice is sufficiently thick! Chopping holes in the ice won't help.

Summer kill

The most common cause of summer fish die-offs is the same as winter kill - oxygen depletion. But the causes of depletion may be more complex than with winter kills. Summer depletion can result from oxygen removal by excessive quantities of plants, animals or decaying organic matter.

This can be caused by overstocking, overfeeding, over fertilization, pollution from barns, feedlots, improper septic drainage, or chemical treatment of aquatic weeds during the critical months — June through September.

Another common cause of summer fish kills occurs when a dense growth of submerged aquatic plants or algae in a pond dies suddenly from natural causes or from herbicides.

The decay process from the dead plants may use up the oxygen in the water. This type of summer fish kill almost always happens about sunrise, when the dissolved oxygen is at its low point for the day.

Another condition leading to summer fish kill, and related to the plant die-off, is high water temperatures. During July, and especially in August, water temperatures in ponds may reach 85-95°F. Water can hold much less oxygen when its temperature is above 80°F.

When overcast skies persist for several days, while temperatures are high and winds are calm, a fish kill may occur. Plants cannot produce sufficient oxygen at reduced light levels and calm weather reduces the exposure of water to oxygen in the air. Therefore, the dissolved oxygen may disappear entirely.

Signs of oxygen depletion

1. Large numbers of fish are seen at the water surface gulping air at night or early in the morning. When disturbed they dive, but quickly return to the surface.
2. If oxygen depletion is not severe, fish are at the surface in the early morning but go to deeper water as oxygen builds up during the day. This may continue or several days. If the owner is observant it will give him time to take corrective action.
3. Although feeding is not recommended in Indiana, if fish are being fed they will suddenly stop eating.

Prevention

Conditions leading to fish kills from aquatic plant die-offs and temperatures can be alleviated by controlling rooted aquatic vegetation and algae. When plants are dense, chemically treat only a portion of the pond at one time and allow that part of the vegetation to decay before further treatment.

In new pond construction, a bottom-water overflow outlet will reduce the chances of a die-off. Briefly, this type of outlet releases water from the pond bottom. Contact the local Soil Conservation Service office for details on this construction.

Emergency treatment is suggested if signs of oxygen depletion are observed. Steps should be taken immediately to prevent losses.

Physical treatments

1. Flush the pond with fresh aerated water from a well or adjacent pond.
2. Spray water from a 2 to 3 foot depth into the air with a pump.
3. In small ponds, add oxygen by stirring the surface water vigorously with an anchored outboard motor.

Chemical treatment

There is a chemical treatment to alleviate oxygen depletion temporarily, but this should not be attempted without obtaining advice from a fisheries biologist.

Emergency treatments will help alleviate oxygen depletion. However, the key to preventing oxygen depletion is first, proper pond construction, and second, proper pond management. After the emergency has passed, find and eliminate the cause of oxygen shortage.

Other factors causing fish kills

Fish kills can also be caused by organic pollution, chemical run-off, and disease. Organic pollution from barnyards, feedlots, and faulty septic system drainage consumes oxygen as it decays and quickly depletes oxygen content in the pond. Fish kills from these sources of pollution often occur after a rain has washed quantities of these materials into the pond.

Steps should be taken to prevent all organic waste from entering ponds. Preventive measures include properly installed tiling, grading, and /or diversion ditches.

Pesticides used on farm crops or in home yards and gardens may wash into a pond during heavy rains and cause a fish kill. Fish may die from the direct effect of the chemical.

Caution should always be exercised in the selection of pesticides and in the time of application.

In the spring or summer a few fish may be found dead along the shoreline. Such mortality is often the result of natural causes. The natural resistance of fish to disease is lower in the early spring than at any time of the year. Larger fish seem to be more susceptible, but, it may also be a simple case of old age. Heavy parasite infestation may also be a cause of death.

There are other less common causes of fish kills, but those dealt with here will account for the great majority.

Restoring the balance after a fish kill

Generally, to correct the population imbalance resulting from a fish die-off, regardless of cause, it is best to renovate the pond. That is, kill the remaining fish, either with a chemical or by draining, and restock.

If there is a question concerning the severity of the kill, contact the district fish management biologist, Indiana Department of Natural Resources, for advice on checking the pond's fish population.

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Fish and Wildlife Resources in Indiana

FNR-IDNR-101-W



Fishing in Indiana Motivations of Indiana Anglers 2005 Survey

Shorna Broussard, Alicia Haley, Matt Burlingame, and Stu Shipman

Introduction

Indiana anglers have many different motivations for fishing. Some fish to get away from their regular routine; others fish for sustenance. There are also specific characteristics of fishing locations that are desirable to anglers. Knowing the motivations of anglers will help fisheries managers create programs and manage sites in such a way that will encourage greater fishing participation among the angler population. Human dimensions research also provides insights on why some anglers drop out of fishing and what will motivate lapsed anglers to resume fishing.

Demographics of Indiana Anglers

A 2005 Indiana Licensed Angler Survey conducted by the Division of Fish and Wildlife (DFW) and Purdue University¹ was sent to 7,000 licensed anglers holding either a resident, 1-day, or combined hunting/fishing license. Twenty-seven percent or 1,887 anglers responded to the survey. Of these responding anglers, 93% were Caucasian and 2% were African American. Hispanic, Asian, and Native American anglers each represented approximately 1% of anglers in Indiana. There were also 2% of the respondents who stated that their race was other. As for gender, 81% of Indiana anglers were male, and 19% were female. The average



Ed Braun

age of Indiana licensed anglers is 48 years with a range of 18 years to 80. The mean education level of anglers in Indiana is between trade or technical school and having completed some college education. The average household income of anglers ranged from \$50,000 to \$59,000. Of anglers that are married, approximately 54% have spouses who also fish. For anglers who have children under the age of 17 living at home, at least 85% of those children also fish.

Motivations

To determine the overall importance of certain fishing motivations to Indiana anglers, a scale of 18 questions capturing varying fishing motivations was used on the Indiana angler survey. These 18 motive

statements were then factored into the following six dimensions: 1) fishing to improve skills and trophies; 2) fishing for the thrill of the catch; 3) fishing for rest and relaxation; 4) fishing to experience nature; 5) fishing for the social time with friends and family; and 6) fishing for sustenance.

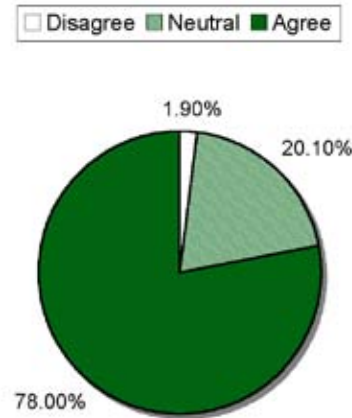
The rest and relaxation motivation had the highest mean agreement with 78% of anglers fishing for rest and relaxation. This motivation included the statements for relaxation, to get away from the regular routine, and to get away from the demands of other people. Sixty-nine percent of anglers also fish to experience nature. The fishing to experience nature motivation included the questions to be outdoors, to be close to the water, and to experience unpolluted natural surroundings.

The fishing for the thrill of the catch factor was just behind the experiencing nature factor when it came to agreement among anglers, with a 67% of anglers fishing for the thrill of the catch. The thrill of the catch motivation included the questions: for the experience of the catch, to experience adventure and excitement, for the fun of catching fish, and for the challenge or sport. Additionally, 43% of anglers fish for social time with friends and family. This motivation included the questions to be with friends and for family recreation.

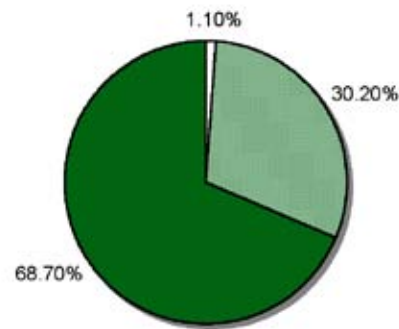
Two motivation factors were not particularly salient with Indiana anglers. Twenty-two percent of Indiana anglers fish for sustenance. This motivation included the questions to obtain fish for eating, and to catch a limit comprised the fishing for sustenance factor. Lastly, less than 1% of anglers agreed that fishing to improve skills and win trophies was a major motivating factor for their angling. The fishing to improve skills and win trophies motivation included the questions to obtain trophy fish, to test equipment, to win a trophy or prize, to develop skills, and for challenge or sport.

Anglers were given the opportunity to provide open-ended comments at the end of the survey. Of the anglers who commented about fisheries management, approximately 16% discussed fishing motivations. Four broad motivations that anglers identified were: fishing as a family activity, fishing bringing back childhood memories, fishing as a great past time they wanted to keep up with, and that being out on the water brought a sense of enjoyment and contentment.

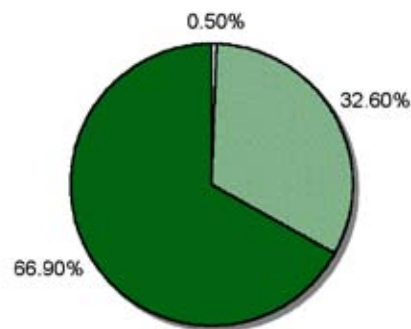
Fish for Rest and Relaxation



Fish to Experience Nature



Fish for the Thrill of the Catch



Fishing Preferences

To determine overall attitudes towards what characteristics anglers are looking for when choosing a fishing location, a scale of 14 questions capturing the range of fishing site preferences was used on the Indiana angler survey. These items factored into 3 dimensions as follows: 1) facilities are important to fishing experience; 2) proximity is important to fishing experience; and 3) being undiscovered and fee free is important to fishing experience. The facilities dimension included site characteristics such as fishing where restrooms, campsites, boat launches, picnic tables, boat rentals, trash disposals, bait and tackle shops, where piers or jetties are available, and fishing where you do not have to walk more than 15 minutes to get to your location. The proximity dimension includes site characteristics such as being close to home or work. Lastly, the undiscovered and fee free dimension covered characteristics that include fishing in new waters, fishing in an area that doesn't have a users fee, and fishing in natural settings with few man made structures.

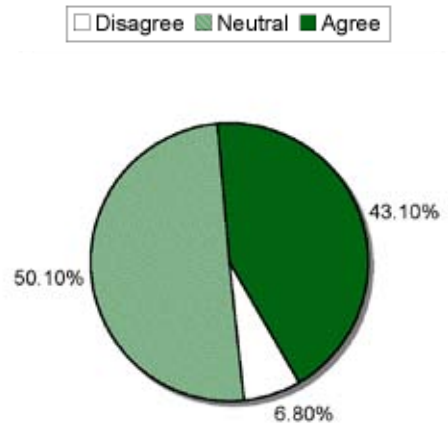
The most salient fishing preference for this sample was being undiscovered and fee free with almost 70% of the anglers who responded to the survey being in agreement with this dimension of fishing location. Alternatively, about 19 % of anglers were in agreement with characteristics that made up the proximity dimension, suggesting that many Indiana anglers are willing to travel a distance to fish. Likewise for facilities, anglers had neutral attitudes toward many of the amenities that could be provided on location.

On the open-ended comments section of the survey, about 11% of anglers who made comments related to fisheries management commented on their fishing preferences. Anglers noted particular lakes, reservoirs, rivers, streams, and ponds where they prefer to fish including: Patoka Lake, many strip pits, and Lake Michigan. Additional comments were related to where anglers would like to see new fishing spots, including more lake fishing in southern Indiana.

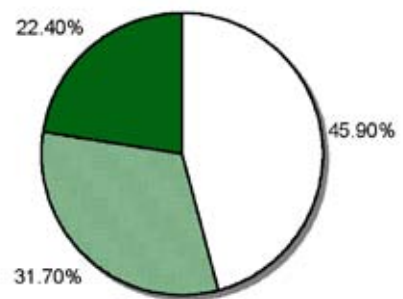
Lapsed Anglers

Of the respondents who answered the angler survey, 11% had not gone fishing in Indiana in the past year. When asked why, the primary reasons stated were lack of time due to both work and family obligations. License fees being too high and not having a place to fish that was close to home were other factors that ranked high amongst lapsed anglers. Few respondents indicated that having no one to fish with, not having

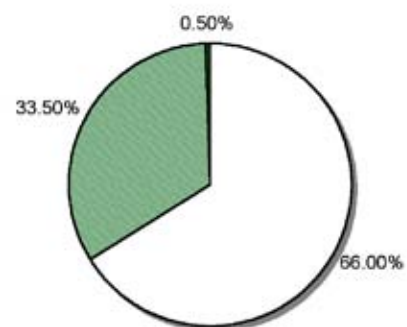
Fish for the Social Time With Friends and Family



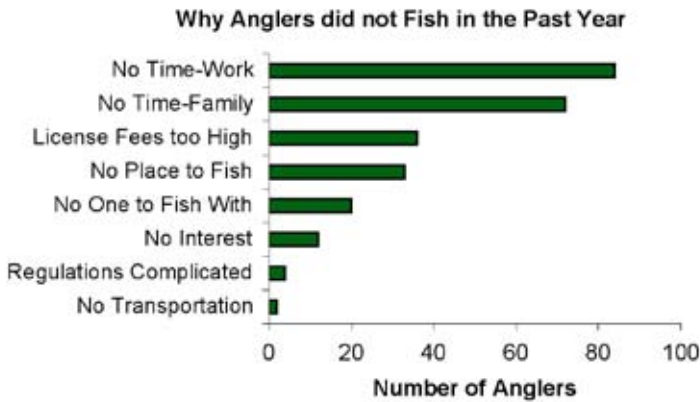
Fish for Sustenance



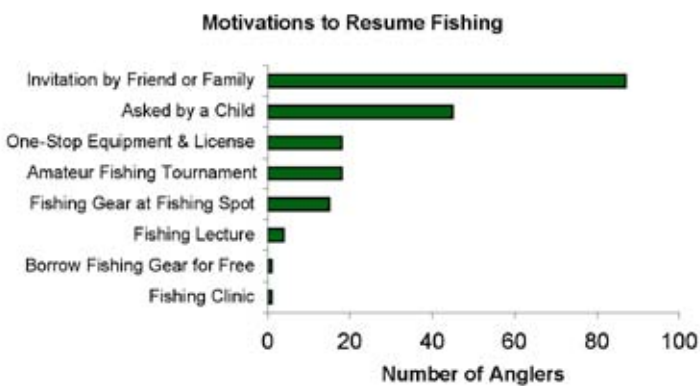
Fish to Improve Skills and Win Trophies



an interest, the regulations being too complicated, and no transportation to get to the fishing location were important reasons why they did not fish in the past year.

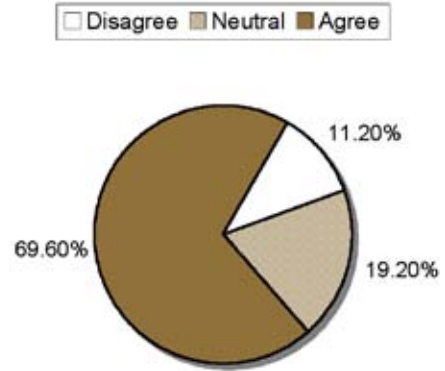


Lapsed anglers were also asked what would motivate them to resume fishing. The majority stated that an invitation from a friend or family member would be a motivating factor. Being asked by a child was also a main motivating factor to resume fishing. Other factors that would motivate anglers to resume fishing, but were not ranked as highly include: one-stop equipment and license purchasing, amateur fishing tournaments and having fishing gear provided at fishing locations. Having fishing lectures, borrowing fishing gear for free, and fishing clinics were ranked the lowest by anglers.

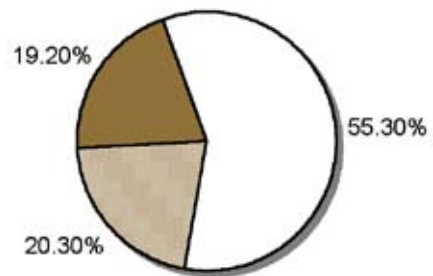


On the open-ended comment section, approximately 10% of the anglers who commented on the human dimensions of fisheries management, spoke about why they stopped fishing, and what would motivate them to fish again. In addition to the reasons

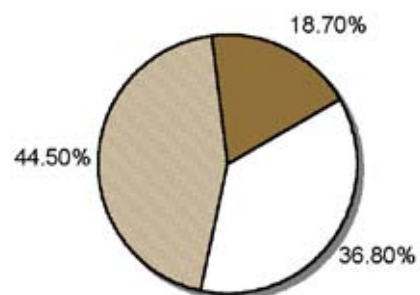
Undiscovered and Fee Free Sites Influence Where you Fish



Proximity Influences Where you Fish



Facilities Influence Where you Fish



on the survey, open-ended comments provided additional reasons why Indiana anglers had stopped fishing. Concerns that were mentioned include: wanting to be able to catch a reasonable amount of fish, and being able to eat the fish they catch without fear of contamination, the closure of facilities and the DFW not keeping up with other fishing locations, and lacking information about where to go fishing and how to get started. Also, there were anglers who had mentioned that they now fish out of state because it is cheaper and better fishing can be found (i.e., more to catch, less people, and they can eat what they catch). Motivations that would encourage these lapsed anglers to resume fishing included having better access to fishing locations, not paying access fees, eating the fish caught, and having knowledge of where to fish.

With our data, we wanted to investigate if there was a difference in the strength of attitudes between active and lapsed anglers. In all cases, active anglers held significantly stronger attitudes toward “fishing to improve skills and win trophies,” “fishing for thrill of the catch,” and “fishing to experience nature” dimensions of fishing motivations compared to lapsed anglers. There was no difference in “the fishing for rest and relaxation,” “fishing for the social time with

family and friends,” and “fish for sustenance” angling motivations between lapsed and active anglers. Active anglers also held significantly stronger attitudes toward the “undiscovered and fee-free sites influence where you fish” when compared to lapsed anglers. There were no differences between active and lapsed anglers in preferences for “facilities influence where you fish” or “proximity influences where you fish”.

Conclusions

Looking at what motivates anglers to fish gives fisheries managers an idea of what key areas they should focus on when creating programs to entice people to fish. Also, by knowing what Indiana anglers want in terms of amenities at a fishing location, fisheries managers can try to create fishing locations with different types of anglers in mind. According to results from the Indiana angler survey, managers should emphasize the “rest and relaxation” and the “experiencing nature” aspects of fishing. Also, many Indiana anglers are interested in the “thrill of the catch”, so any work that fisheries managers can do that creates a sense of adventure and challenge would garner a good response from anglers.

Indiana anglers also are searching for waters that are new to them and free from man-made structures. Combining some of these aspects and fishing locations that do not require a user fee would attract many anglers to these fishing holes.

Lapsed anglers could be targeted for a marketing campaign. Lack of interest, transportation, and unawareness of regulations were not major issues for Indiana anglers that had a lapse in their license. Therefore, appealing to the primary factors that did matter such as involving a family member, friend, or a child in their fishing experience would be enough to potentially get them back “on the hook.” Also, providing programs that accommodate the average work schedule would be well received by this group. Secondary factors in letting their licenses lapse were not having places to fish, not having anyone to fish with, and license fees that were too high. Secondary factors to motivate these lapsed anglers back to fishing were one stop equipment and license, tournaments, and providing gear. Lapsed anglers were also more likely to have children at home than were active anglers. Messages related to the family-centered, social, and relaxation aspects of fishing would be well received.



Tim Pickering

Open-ended comments provided additional insights into motivations that were important to anglers. One of the most salient motivations stated in the open-ended comments was going fishing because it was something they used to do as a child. Many commented on how they like to take their children and grandchildren fishing because their parents and grandparents took them. The open-ended comments suggest that it is important to involve children in fishing if fisheries managers want to create lifelong anglers. By understanding the needs and motivations of Indiana anglers, fisheries managers should be able to craft programs and enhance habitat in ways that will lead to more satisfied anglers.

For more information about fishing in Indiana visit: www.in.gov/dnr/fishwild/ or contact the following authors.

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Fish and Wildlife Resources in Indiana

FNR-IDNR-102-W



Fishing in Indiana Information Use, Preferences, and Specialization of Indiana Anglers 2005 Survey

Shorna Broussard, Alicia Haley, Matt Burlingame, and Stu Shipman

Introduction

Anglers have many preferences regarding the best places to fish and what fish they feel are the best to catch. Many of these differences stem from the skill level and specialization of the angler and how they use information to make fishing decisions.

Demographics of Indiana Anglers

A 2005 Indiana Licensed Angler Survey conducted by the Division of Fish and Wildlife (DFW) and Purdue University¹ was sent to 7,000 licensed anglers holding either a resident, 1-day, or combined hunting/fishing license. Twenty-seven percent or 1,887 anglers responded to the survey. Of these responding anglers, 93% were Caucasian and 2% were African American. Hispanic, Asian, and Native American anglers each represented approximately 1% of anglers in Indiana. There were also 2% of the respondents who stated that their race was other. As for gender, 81% of Indiana anglers were male, and 19% were female. The average age of Indiana licensed anglers is 48 years with a range of 18 years to 80. The mean education level of anglers in Indiana is between trade or technical school and having completed some college education. The average household income of anglers ranged from \$50,000 to \$59,000. Of anglers that are married, approximately 54% have spouses who also fish. For anglers who



Gary Hudson

have children under the age of 17 living at home, at least 85% of those children also fish.

Angler Use of DFW Information

DFW has many outlets to dispense information about fishing in Indiana, which include Division of Fish and Wildlife fishing reports, open houses, fish consumption advisories and a DFW Website. Information on the quality of fishing in an area can be found in the fish consumption advisories prepared by the DFW. Fishing consumption advisories can also be found at the Indiana State Department of Health Website and the Purdue University Website.

Seventy-nine percent of the anglers who responded to the survey were aware of fish consumption advisories in Indiana. Of these anglers, 45% indicated that this information impacted where they fish.

Thirty-seven percent of anglers stated that they were aware of fishing reports developed by the DFW, and 12% indicated that these reports helped them to determine where to fish. These fishing reports include where anglers can fish in the state and what fish can be found at fishing locations. Thirteen percent of anglers were aware of the open-houses held by the DFW to receive input on proposed administrative rule changes for fisheries regulations. However, less than 1% of anglers actually attended one of these open houses.

Approximately half of respondents to the survey said they were aware of the DFW Website. Of these respondents, 61% had visited the Website. The majority of the anglers who use the Website (89%) felt that the information provided on the Website was very or somewhat useful for making decisions on where to fish and for what type of fish.

Anglers were also given the opportunity to provide open-ended comments at the end of the survey. Of the anglers who commented on human dimensions of fisheries management, 5% discussed their use of fishing related materials and their educational needs. Comments anglers made regarding the use of information and need for education included wanting maps of fishing locations, seeing pictures of fish so they can identify what they catch, and receiving updates regarding the stocking of fish. They would like this information to be posted on the Division of Fish and Wildlife Website. Other anglers commented on how they would like the DFW to reach out to children in order to bring new anglers into the sport.

Skill and Specialization

Many of the anglers' preferences come from different experiences and specializations. Specialized anglers may target a particular species or may be seeking a challenge, while an average skilled angler may be content just putting the pole in the water and catching something every once in a while.

When comparing their fishing skill level to other anglers, about half of the respondents felt that they were average anglers, while 39% rated their angling ability as above average. Three percent of anglers consider themselves to be experts when it comes to fishing, and 6% rated themselves as beginners. About half of the anglers in Indiana have been fishing

between 30 and 50 years. There were 92 anglers who have been fishing for less than 10 years, and 24 anglers had more than 60 years of fishing experience.

Eight percent of the anglers participated in a fishing tournament in Indiana in 2004, and 12% purchased an Indiana trout/salmon stamp during 2004. In addition, 5% of respondents belonged to a fishing club in Indiana.

We wanted to investigate whether skill level varied by fishing club membership, tournament participation, and rating of fishing quality in Indiana. Analysis was conducted to compare the mean skill level of anglers and whether or not the angler participated in a tournament during the past year. There was a significant difference in skill level between those who participated in fishing tournaments and those who did not fish in tournaments.

The average skill level of those who participated in tournaments was significantly higher than the average skill level of those who did not participate in tournaments. Additionally, more analysis was conducted to compare the mean skill level and whether or not the angler belonged to a fishing club. There was a significant difference in skill level between those who belonged to a fishing club and those who did not belong to a fishing club. The average skill level of those who belonged to a fishing club was significantly higher than the average skill level of those who did not belong to a fishing club.

Fishing Preferences of Anglers

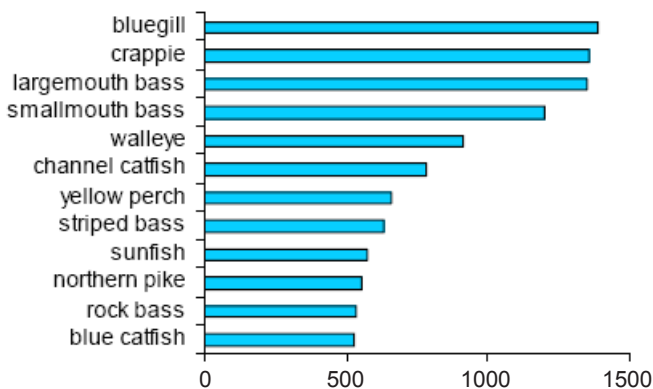
To better understand what anglers in Indiana seek while fishing, survey questions asked what Indiana anglers prefer to fish for and where and how they fish. Anglers were first asked to rate fishing quality in Indiana. The majority of Indiana anglers considered fishing in Indiana to be either good (41%) or fair (47%).

Four percent of anglers rated the quality of fishing as excellent, and 8% think the quality of fishing in Indiana is poor. Approximately half of anglers (46%) feel that fishing quality in Indiana is staying the same, while 35% find the quality of fishing to be declining. The additional 19% of anglers find the quality of fishing in Indiana to be improving. A little over half of anglers (51%) also feel that the overall performance of the Division of Fish and Wildlife is good. Six percent of anglers feel that the overall performance of the DFW is excellent, 35% think their performance is fair, and 8% feel their performance is poor.

We also wanted to investigate if there was a significant difference between the skill level of an angler and how they rated the fishing quality in Indiana. Analysis found that there was not a significant difference between skill level rating and rating of fishing quality in Indiana. Anglers of all skill levels rated the fishing quality near 2.5 on a 4-point scale ranging from poor (1) to excellent (4).

The most popular way to fish among Indiana anglers is by boat or from the bank. They are less likely to fish by wading, from a pier, or through the ice. For bodies of water, Indiana anglers prefer to fish in private ponds, small rivers and streams, and small reservoirs. They also fish in large reservoirs, natural lakes of Northern Indiana, strip pits and quarries, large rivers, and Lake Michigan and its tributaries. However, these bodies of water were not ranked as highly among anglers.

To determine which fish species Indiana anglers like to fish for, they were given a list of 26 species and were asked which species they would prefer to catch. The most preferred species were bluegill, crappie, largemouth bass, smallmouth bass, walleye, channel catfish, yellow perch, striped bass, sunfish, northern pike, rock bass, and blue catfish. They were also asked of the 26 species presented, which they actually fish for most often. The top three species that respondents actually fish for are bluegill, largemouth bass, and crappie.



Most fish species reproduce adequately enough to provide good fishing without stocking. However, some species that will not successfully reproduce must be stocked by the DFW. Stocked species give Hoosier anglers a wider range of fishing opportunities

in Indiana. The three most prominent responses for stocked fish preferences were walleye, striped bass, and channel catfish. Species that received lower rankings by Indiana anglers include: inland rainbow trout, muskellunge, brown trout, sauger, steelhead, chinook salmon, and coho salmon.

Conclusions

Where and how anglers choose to fish can be influenced by the experience and specialization of the angler, and how they access information about fisheries resources in Indiana. If given a choice, many Indiana anglers would prefer to be out on their boats, on the banks, or on private ponds fishing for bluegill, crappie, or bass. They would also like to see walleye, striped bass, and channel catfish continue to be stocked in waters around Indiana.

The best way reach the majority of anglers in Indiana is by keeping the DFW Website up to date with events and information. Anglers will use the Website; they need the Website to gather information they may not otherwise be able to find. The open houses and fishing reports were useful to a small percentage of anglers, but the majority did not take advantage of these resources. Also, many anglers use the fish consumption advisories to help them determine their next fishing location. Increased publicity of Indiana fish consumption advisories by the DFW will help to make consumption of recreationally caught fish a safe activity. Overall, Indiana anglers feel that the Division of Fish and Wildlife has been meeting their needs and that the quality of fishing in Indiana is fair to good. On the whole, quality fishing combined with a little challenge and desirable locations, can lead to many satisfied anglers.

For more information about fishing in Indiana visit the following Web site: www.in.gov/dnr/fishwild/

For more information regarding fish consumption advisories in Indiana, visit the following Indiana State Department of Health's Website:

http://www.in.gov/isdh/dataandstats/fish/fish_adv_index.htm

or the Fish for Your Health Website:
<http://fn.cfs.purdue.edu/anglingindiana/>



Ed Braun

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Fish and Wildlife Resources in Indiana

FNR-IDNR-103-W



Fishing in Indiana Attitudes of Indiana Anglers Toward Policies and Regulations 2005 Survey

Shorna Broussard, Alicia Haley, Matt Burlingame, and Stu Shipman

Introduction

As the human population in Indiana continues to grow and change, so does the population that constitutes Indiana anglers; but in the future, we'll see a change in the demographics of Indiana anglers. Each angler will enter the sport of fishing with different expectations and preferences as to what they want out of a fishing experience. Due to the various needs and wants of Indiana anglers, fisheries biologists must be able to manage people, as well as manage fish and aquatic habitats. Research in the area of human dimensions has been conducted to gather this information. Effective policies and regulations can be created when fisheries managers combine human dimensions research with the scientific knowledge that is guided by the fisheries biologists.

Demographics of Indiana Anglers

A 2005 Indiana Licensed Angler Survey conducted by the Division of Fish and Wildlife (DFW) and Purdue University¹ was sent to 7,000 licensed anglers holding either a resident, one-day, or combined hunting/fishing licenses. Twenty-seven percent or 1,887 anglers responded to the survey. Of these responding anglers, 93% were Caucasian and 2% were African American. Hispanic, Asian, and Native American anglers each represented approximately 1% of anglers in Indiana.



Brian Schoenung

There were also 2% of the respondents who stated that their race was other. As for gender, 81% of Indiana anglers were male, and 19% were female. The average age of Indiana licensed anglers is 48 years with a range of 18 years to 80 years. The mean education level of anglers in Indiana is between trade or technical school and having completed some college education. The average household income of anglers ranged from \$50,000 to \$59,000. Of the anglers who are married, approximately 54% have spouses who also fish. For anglers who have children under the age of 17 living at home, at least 85% of those children also fish.

Purdue Extension

Knowledge to Go

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Angler Attitudes Toward Policies

The survey administered to licensed Indiana anglers asked questions regarding angler’s attitudes toward certain policies and statements related to policies. A scale of 15 questions capturing the full range of attitudes toward policies was used. These items factored into six different dimensions: 1) population protection should be present; 2) DFW management improves fishing success; 3) piers and speedboats create negative impacts to fishing experience; 4) aquatic vegetation control is needed; 5) government involvement is important to improve fishing; and 6) tournament fishing is a positive aspect of fishing.

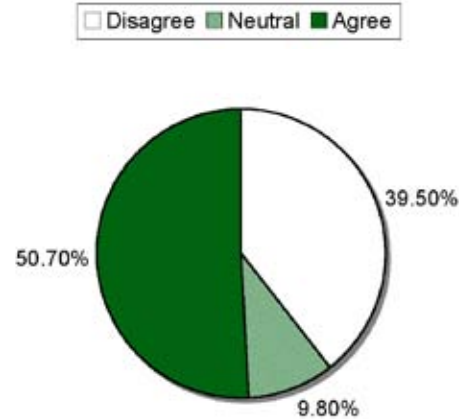
Over half of Indiana anglers agreed that population protection regulations should be in place. These regulations include more restrictive bass size and creel limits to the improve quality of bass fishing and catch and release programs for predators like bass, walleye, and muskellunge. Approximately half of Indiana anglers also agree that DFW management improves fishing success. Resources that could help improve fishing success include having a Website that posts tournament schedules and stocking more fish in order to improve fishing quality. Seventeen percent of Indiana anglers were in agreement that the operation of speedboats detracts from a quality fishing experience, and that piers from private property take up too much public fishing water.

On the open-ended comment section of the survey, 10% of the anglers who commented on fisheries management identified the negative impacts of boats and jet-skis. Issues that were mentioned by anglers were the need for size and number limits on boats that can be launched due to overcrowding of lakes and reservoirs, the need for posted speed signs, and stricter enforcement of speed and wake zones. Others commented on how speed boats and jet skis were disruptive to fishing and family fishing experiences.

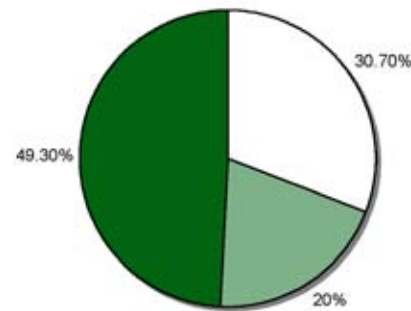
Indiana anglers also had a neutral opinion on whether aquatic vegetation control is needed. Thirteen percent of anglers agreed with statements about aquatic vegetation that included the following: more emphasis is needed on aquatic vegetation control; aquatic vegetation is a nuisance, aquatic vegetation can improve fishing and fish populations, and aquatic invasive species are limiting fishing experiences.

Most anglers were neutral as to government involvement, with 9% of anglers being in agreement with this government involvement. Statements in

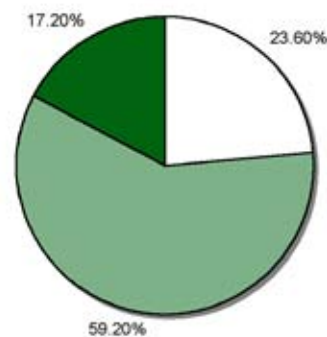
Population Protection Regulations Should be Present



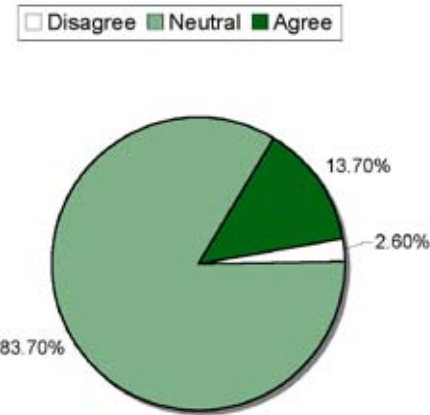
DFW Management Improves Fishing Odds



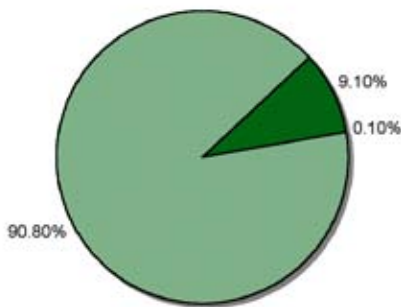
Piers and Speedboats Create Negative Impacts to Fishing Experience



Aquatic Vegetation Control is Needed

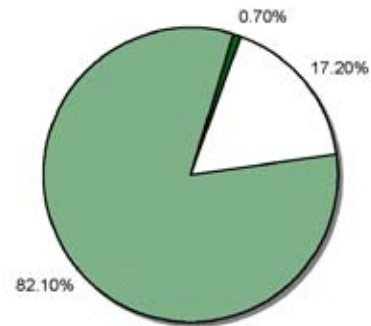


Government Involvement is Important to Improve Fishing



this dimension include: over harvesting limits fishing quality, availability of free public access to fishing areas, and stricter water quality regulations leading to improved fishing. The tournament fishing dimension was the least salient among anglers, with less than 1% of anglers being in agreement with these items (i.e., fishing tournaments should be exempt from some size and creel limits, and tournament fishing has no effect on the future of sport fishing).

Tournament Fishing is a Positive Aspect of Fishing

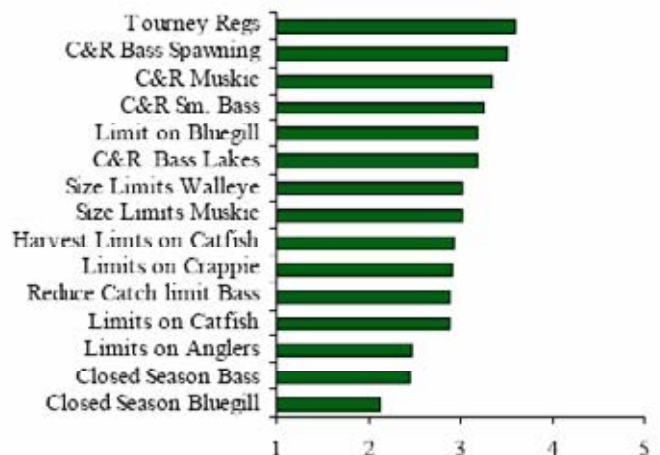


At the end of the survey, a section for open-ended comments was provided. This provided additional insights into angler attitudes toward policies. These open-ended comments were coded; 5% were related to fishing tournaments. While several anglers stated that they enjoyed fishing tournaments, most of the comments regarding tournaments were critical. Issues related to tournaments that were brought up were: too many tournament anglers, aggressive fishing by these anglers, and the belief that certain fish populations are harmed by tournaments.

Angler Attitudes Toward Specific Regulations

Indiana anglers were asked to rate their agreement (1=strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree) with 15 statements regarding specific fisheries policies and regulations.

Attitudes towards Regulations



The statement that had the highest agreement was placing tighter regulations on fishing tournaments. Even though this statement had the highest mean agreement, the average mean was just over 3.0, which suggests that the anglers are undecided on this topic.

Catch and release for bass during the spawning season and starting a catch and release programs for both muskellunge and smallmouth bass had slightly lower mean agreements. Imposing a harvest limit on bluegill, having catch and release only for bass on designated lakes, imposing size limits on walleye and muskey, having harvest limits on catfish, size limits on crappie, reducing catch limits on bass, imposing size limits on catfish, limiting the number of anglers on certain lakes, and having a closed season for bass, had even lower agreements by anglers. Having a closed season for bluegill was the least salient regulation among anglers. The majority of the means for this question were close to undecided (3), suggesting that most anglers do not have strong opinions toward many of the regulations.

Attitudes toward policies and regulations represented 22% of open-ended comments received regarding human dimensions of fisheries management. Most, but not all, anglers favored catch and release and creel and slot limits. Some anglers also noted that they thought closed seasons had a positive impact on fishing quality.

Conclusions

By examining angler preferences for policies and regulations, fisheries managers can better manage for these preferences. Hoosiers are concerned about population protection and support DFW policies that improve fishing success.

According to results from the Indiana angler survey, anglers would be most supportive of policies that help to protect bass and other predatory populations and that help improve fishing success for anglers as long

as these policies are also biologically viable. Anglers would also like to see stricter regulations for fishing tournaments, and a strong policy on catch-and release fishing. By combining the recommendations and needs of anglers with sound scientific knowledge, fisheries managers can craft policies that will lead to more satisfied anglers.

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Why Should I Care About Invasive Plants?

**HOW INVASIVE PLANTS IMPACT
HUNTING, FISHING, BOATING,
GARDENING, HIKING, BIKING,
HORSEBACK RIDING, AND
OTHER RECREATIONAL ACTIVITIES
IN THE MIDWEST**



Midwest Invasive Plant Network

Invasive plants are spreading on almost all private and public lands in the Midwest.

so WHY SHOULD YOU

- Invasive plants, if left unchecked, will limit many uses on lands now and for future generations.
- Invasive plants can harm the natural heritage of our wetlands, prairies, forests, lakes, and rivers.
- Invasive plants can decrease your ability to enjoy hunting, fishing, mushroom collecting, bird watching, and other recreational pursuits.
- The longer we wait, the more expensive it will be to control invasive plants.

You can be a part of the solution by being aware of invasive plants and taking action to prevent their spread.



To learn more, please read on!

Jody Shimp, Illinois DNR

Kudzu taking over a forest in Illinois

Cover photo by Christopher Jordan

First of all, what is an invasive plant?

An **invasive plant** is defined as a plant that is not native and has negative effects on our economy, environment, or human health. Not all plants introduced from other places are harmful. The term “invasive” is reserved for the most aggressive plant species that grow and reproduce rapidly, causing major changes to the areas where they become established.



Lee Casebere, Indiana DNR

Purple loosestrife invading a stream bank

What is the Midwest Invasive Plant Network?

The **Midwest Invasive Plant Network (MIPN)** was formed to help reduce the impact of invasive plant species in the Midwest. This network is composed of people from federal, state, and local governments, universities, industry, non-profit organizations, and the general public, who are concerned about invasive plants. Together we are working to address the threats of invasive plants through prevention, early detection and rapid response, control and management, research, and education.

Invasive plants are a major threat on a national scale. Across the U.S., invasive plants are estimated to occur on 7 million acres of our national park lands, and at least 1.5 million acres are severely infested. In addition to federal lands, state and private lands are also plagued with invasive plants and may have even higher infestation rates. This problem is an expensive one. The economic cost of invasive plants is estimated at more than \$34 billion per year, and the costs continue to grow. Now is the time to act to reduce the threat of invasive plants in our region.

If I am a logger or forester, why should I care?

Invasive plants can greatly impact the health and regeneration of forest lands. For example, garlic mustard can rapidly spread into the understory of hardwood stands, and has been documented to suppress other understory plants, which may reduce tree seedling establishment. Japanese barberry, an invasive shrub, not only crowds out other plants, but also alters soil conditions to its benefit. Deer avoid eating this spiny shrub, which means they browse more on native trees, slowing the growth of seedlings or even killing them.

Dense thickets of Japanese barberry or other invasive shrubs like Asian bush honeysuckle displace native plants and wildlife dependent on those plants and also create tangles that make it difficult to walk through the forest.

The Nature Conservancy

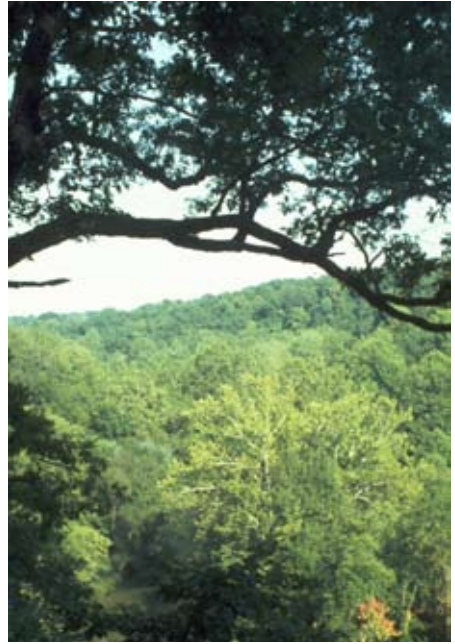


In addition to herbs and shrubs, trees can also be invasive. Tree-of-heaven is an invasive Asian tree species that can grow 3 feet per year and reaches up to 60 feet tall, quickly overtopping and shading out our native trees in forest openings. Tree-of-heaven can also cause intestinal and heart problems in people exposed to its sap.

Most invasive plants depend on some kind of disturbance to get established in the forest. Forest management activities, such as timber har-

vesting, create opportunities for invasives to get established and spread. Invasive plants present in small numbers prior to forest management activity may explode in growth following management activity.

Since loggers and foresters rely on the long-term supply of forest resources, it is in their best interest to ensure the healthy regeneration of forest stands to native tree species.



The Nature Conservancy

What can you do to minimize the introduction and spread of invasive plants?

- Learn to identify invasive plant species and watch for them. The sooner invasive plants are detected, the easier and cheaper it is to control them. Management costs escalate when invasive populations are allowed to spread.
- Initiate control of invasive species before harvest activities take place. Invasive plant populations quickly explode after disturbance to the forest canopy and soils; decreasing their cover before harvest is a good way to avoid this dramatic increase.
- Require the cleaning of timber harvesting equipment before it comes onto a new job site to prevent the movement of seeds of invasive species caught on tire treads and undercarriages.

If I am a hiker, cyclist, or horseback rider . . .

Invasive plants can affect your ability to enjoy natural areas, parks, and campgrounds. Hikers, cyclists, and horseback riders all enjoy well-maintained trails, and invasive plants can grow over trails to the point that the path cannot be followed or can be difficult to navigate through. Dried and dying knapweed plants catch in bicycle chains, slowing the rider and stirring up dust as they are dragged.



The Nature Conservancy

Ron Leonetti



Native prairie plants

Natural scenic beauty sought by recreationalists is degraded by invasive plants, which often form single-species stands, displacing attractive native flowers. The annual trek to see spring wildflowers or hunt for mushrooms may be disappointing when none can be found in a sea of garlic mustard.

Favorite camping spots taken over by spiny or dense shrubs can make it hard to find a good spot for a tent. Treating these infestations can eat up a natural area's budget, leaving little funding for trail maintenance and other improvements.

Some invasive plants can have nasty effects on your health. Wild parsnip or giant hogweed sap on skin exposed to sunlight can result in burns, blistering, and skin discoloration. The sap from leafy spurge

Why should I care?

causes eye irritation. Spines on invasive thistles can become lodged in skin and cause irritation.

Many invasive plant seeds, such as those of burdock with its spiny seed balls, hitchhike on fur, increasing the effort needed to groom the horse or family dog after a hike. Some invasive plants, such as leafy spurge, are toxic to horses and mules.

Recreationalists can be vectors for invasive plant spread. Here are some things you can do to reduce the spread of invasive plants:

- Learn to recognize invasive plant infestations and avoid passing through them.
- Report any infestations to the local land manager.
- Check for seeds or plant parts and clean equipment, boots, animals, and gear between trips, or preferably when leaving an infested area.
- Dispose of seeds in a plastic bag in a trash can.
- Always use weed-free hay and feed for your animals.



Barry Rice, The Nature Conservancy

Leafy spurge



The Nature Conservancy

Boot brush station at entrance to nature preserve

If I am a boater or angler, why should I care?

From the Great Lakes to the Mississippi River, the lakes and rivers of the Midwest provide stunning scenery and vital habitat for a wide variety of aquatic species. The spread of invasive plants threatens both the beauty of these areas and their ability to sustain fish and wildlife populations.

One common underwater invader is Eurasian watermilfoil, an aggressive plant that reduces native plant diversity and degrades fish habitat. Studies have shown that Eurasian watermilfoil supports fewer aquatic invertebrates, a vital source of food for fish, than native plants do. It also reduces oxygen levels in the water, leading to fish stress and fish kills, and clogs water intakes on motors causing engines to overheat.

Michigan Sea Grant: www.miseagrant.umich.edu



Photo courtesy Ottawa National Forest

Examples of the havoc that Eurasian watermilfoil can wreak on water recreation

One of the most widespread invasive plants in wetlands, lakeshores, and riverbanks is purple loosestrife, an extremely aggressive plant that replaces diverse native plant communities with just a single species, greatly reducing the quality of wildlife habitat.

Invasive plants can also increase the risk of flooding and soil erosion leading to cloudy water, lower water quality, and silted spawning beds. Thick stands of invasive plants such as curlyleaf pondweed, Eurasian watermilfoil, and other submerged and floating aquatic plants can impede navigation for anglers and boaters. In addition to invasive aquatic plants, boaters and anglers need to be aware of invasive aquatic animals such as zebra mussels, spiny waterfleas, round gobies, and Asian carp that also impact lakes and rivers of the Midwest.

Barry Rice, The Nature Conservancy



Zebra mussels

Boaters and anglers have the opportunity to help prevent the spread of aquatic invasive plants by following a few simple steps.

- Remove visible plants, animals, and mud from your boat before leaving a waterbody.
- Drain all water from your boat, motor, bilge, live well, and bait containers before leaving a water access.
- Clean and dry boats and equipment before entering another waterbody.
- Dispose of unwanted bait in the trash, and never release plants and animals into a waterbody unless they came from that waterbody.

If I am a hunter, why should I care?

Midwestern natural areas support a great diversity of wildlife that hunters rely on and enjoy. However, invasive plants are in the process of degrading and even destroying many of these habitats.

For example, invasive plants such as Russian olive have taken over roadsides and natural areas in many parts of the Midwest, creating undesirable habitat for birds and mammals. Native vegetation supports a much greater variety of birds than areas infested with the invasive Russian olive.



Wild turkeys

The Nature Conservancy



Russian olive

The Nature Conservancy

Invasion of common reed in wetland areas and along lake shores has a negative effect on water birds, including ducks and geese. Diverse native vegetation in wetlands and on lake shores generally results in higher waterfowl populations.

Invasive plants reduce the number and variety of forest wildlife, primarily by reducing the availability of food and suitable cover. For instance, invasive species like Asian bush honeysuckle can

The Nature Conservancy



Common reed

shade out oak tree seedlings and saplings and, over time, reduce the oak component of a forest. Fewer acorn-producing trees mean lower food availability and reduced habitat quality for wildlife such as white-tailed deer, squirrel, grouse, and turkey.



Gigi LaBudde, Bison Belly Futures

Hunter in a patch of multiflora rose

Invasive species can also turn an enjoyable stroll through the fields, woods, or wetlands while hunting into a painful trip through a tangled thorny mess in areas invaded with multiflora rose, an invasive plant with thorns that easily rip through clothes and skin. Other invasive plant species can also form dense tangles that are difficult to push through, even if they are not armed with thorns.

Invasive plants threaten our native ecosystems by altering the natural communities that wild animals depend upon to produce food and cover. If invasive plants win, the native plants and wildlife lose, and so do the people who enjoy them.

Here's what you can do to help:

- Clean your boots and gear after a hunting trip to make sure you aren't carrying invasive plant seeds to new locations.
- Don't plant invasive plants for wildlife. Native species provide much better food and cover for native wildlife.
- Learn to identify the invasive plants in your area and report any new sightings to local land managers.

If I am a gardener, why should I care?

Invasive plant species not only threaten our natural areas, they may invade your garden! Landscaping shrubs like Asian bush honeysuckle seed so freely into maintained landscapes that it is a continual challenge to rip them out before they take over and displace other species you lovingly planted in your garden.

These aggressive species will also move from your land onto your neighbor's land, decreasing both their enjoyment of their land and their enjoyment of having you as a neighbor.

Just because a plant is not spreading in your own garden, that doesn't mean that the seeds from your plants aren't spreading elsewhere. Purple loosestrife seeds, for instance, may wash from your yard into storm sewers and nearby waterways and germinate in moist areas like creek banks and lake shores.

Here are some things you can do to help.

- Avoid using invasive species in your garden. Until you are able to get rid of invasive plants that may already be planted in your yard, be responsible and remember to remove and destroy seed heads of invasive plants. Also, don't share invasives with other gardeners.
- If you are worried that your garden will lose its luster after removing invasives, it is easy to find non-invasive or native alternatives for invasive landscape plants. Before choosing a native plant alternative, first think about the characteristics of the invasive plant you are replacing. For example, if you like the showy fruits of Asian bitter-sweet, try replacing it with American bittersweet. If you like Japanese honeysuckle for its vining habit, consider replacing it with a summer late-blooming vine like leatherflower vine. If you like purple loosestrife for its vibrant magenta flowers, try planting purple coneflower or one of the many native species of blazing stars instead.



Ellen Jacquart, The Nature Conservancy

Invasive plants to watch for:

John M. Randall, TNC



Asian bush honeysuckles (Amur honeysuckle, *Lonicera maackii*; Morrow's honeysuckle, *Lonicera morrowii*; Tatarian honeysuckle, *Lonicera tatarica*; and Bell's honeysuckle, *Lonicera x bella*)

There are three species of bush honeysuckles and one hybrid from Asia that are aggressive

invaders in the Midwest. All four species are multi-stemmed shrubs reaching 2-6 meters in height. They have opposite, entire leaves, paired, showy flowers, and red or yellow fleshy berries. These species have been widely planted throughout the Midwest for landscaping and wildlife habitat and are highly invasive in forests. Bush honeysuckles prevent regeneration of forest trees and herbs and also provide poor habitat for nesting birds. Bush honeysuckles are difficult to control once they have reached high densities, so it is important to control new infestations as quickly as possible.

Buckthorns (common buckthorn, *Rhamnus cathartica*; glossy buckthorn, *Frangula alnus*)

Both species of buckthorn are deciduous shrubs that can reach up to 8 meters in height. They have elliptical leaves and produce abundant small, fleshy fruits that are black when ripe. Buckthorns were introduced to North America for use in hedgerows and for wildlife habitat. Glossy

John M. Randall, TNC



buckthorn primarily invades wetlands and wet prairies but is also found in some forested areas. Common buckthorn is an invader of forested areas. Buckthorn fruits are consumed by a variety of birds and mammals, which aid in their dispersal. These shrubs form dense thickets that prevent woody

seedling regeneration and may inhibit herbaceous understory growth in some areas. Common buckthorn has also been identified as an overwintering host for soybean aphids, a pest of soybean crops.

Invasive plants to watch for:

Garlic mustard (*Alliaria petiolata*)

Garlic mustard, an invader of forests across the eastern U.S., is a biennial herb that was introduced from Europe in the 1860's. During its first year of growth, the plant forms a low-growing cluster of distinctive kidney-shaped leaves. It grows up to 40 inches tall in its second year, and can be recognized by its 4-petaled, white flowers and triangular stem leaves with toothed edges.

Ellen Jacquart, TNC



Garlic mustard plants produce copious seeds, with as many as 3,000 seeds per plant. These seeds can survive for up to 10 years in the soil, creating a lasting problem at invaded sites. Garlic mustard alters the chemistry of the soils where it grows by adding chemicals to the soil that prevent the growth of other plant species. In invaded areas, garlic mustard forms a single-species carpet on the forest floor.

Purple loosestrife (*Lythrum salicaria*)

Purple loosestrife is easily recognized by its purple to magenta flowers composed of 5 to 6 petals, and its square stems. This species was introduced as an ornamental from Europe, where it is a minor component of wetland vegetation. Here in North America, purple loosestrife has escaped cultivation and is abundant in wetlands and other wet areas

(streambanks, lakeshores, and ditches) in almost every state in the U.S. Purple loosestrife forms dense single-species stands that cause a decline in plant diversity and affect wildlife by reducing food and habitat for waterfowl and spawning grounds for fish. A single plant can produce 2.5 million seeds annually, and these seeds can be transported great distances by humans, animals, water, and wind. Fireweed is a common native plant that is often mistaken for purple loosestrife, but can be distinguished by having flowers with four petals and round stems.

Mike Norris, TNC



Invasive plants to watch for:

Asian bittersweet (*Celastrus orbiculata*)

This woody vine was introduced from Asia for ornamental purposes. It is easily recognizable by its showy red fruits surrounded by papery yellow seed coats and is often used for wreaths and other decorations. Asian bittersweet closely resembles the native American bittersweet but can be distinguished by the position of its flowers and fruit; American bittersweet bears flowers and fruit only at the ends of vines, whereas the Asian species produces fruit all along the vine. Asian bittersweet grows quickly, and vines can reach up to 4 inches in diameter and nearly 60 feet in length. Trees and shrubs can be damaged

or killed by the vine, which constricts sap flow, weakens limbs and trunks making them more susceptible to wind and ice damage, and shades out leaves growing underneath it. Asian bittersweet is also able to hybridize with American bittersweet, altering the genetic make-up of the species and further reducing rare native populations.



Eileen Jacquart, TNC

Multiflora rose (*Rosa multiflora*)

Multiflora rose was intentionally introduced to North America as an ornamental because of its abundant, fragrant flowers, and has also been used for living fences and erosion control. This thorny shrub has become a menace in pastures, along roadsides, and in forested areas. It creates impenetrable thickets, reducing growth of other plant species in



Katherine Howe, MIPN

natural areas. Multiflora rose is tolerant of a wide range of habitat conditions and grows aggressively once established. Multiflora rose can be distinguished from native roses by the presence of fringed stipules (small, green, leaf-like structures at the base of each leaf); stipules on native roses are not fringed.

Invasive plants to watch for:

Common Reed (*Phragmites australis*)

Common reed, often referred to by its Latin name as *Phragmites*, is a very tall grass, often reaching up to 3 or 4 meters in height. Grass blades are 1-5 cm in width and seed heads are large, showy, and feathery in appearance. This plant spreads clonally and is an aggressive invader of wetlands. A stand of common reed can extend its boundaries by as much as 50 feet within one season. Common reed invasion can have major impacts on wetlands by reducing the quality of the habitat for invertebrates that fish and migratory waterfowl rely on for food. Although common reed is actually native to the Midwest, the aggressive, invasive varieties are non-native in origin and can be distinguished from the native strains by a variety of characteristics, including darker leaves, much more rigid stems, and dense seedheads.

© Tom Ransburg



Japanese knotweed (*Polygonum cuspidatum*)



Britt Slattery, USFWS, www.forestimages.org

Japanese knotweed is a large herbaceous perennial that forms dense thickets, especially in riparian areas, and can reach up to 10 feet in height. Distinguishing characteristics of this plant include stems with swollen joints that are covered by a membranous sheath, sprays of small greenish-white flowers, and small, winged fruits. Japanese knotweed is remarkably resilient, tolerating floods, drought, shade, high temperatures, and high salinity. Floods can further the spread of this species by carrying plant fragments downstream, which can root and sprout, forming new infestations.

Invasive plants to watch for:

Canada thistle (*Cirsium arvense*)

Canada thistle is an aggressive invader in prairies, savannas, and dunes, as well as a pest in pastures and agricultural fields. This species, which was introduced accidentally as a contaminant in crop seed, invades natural areas both by vegetative reproduction through rhizomes and by seed, which can be carried very long distances by wind and water. Canada thistle competes with other plants for water and nutrients, causing reductions in plant diversity and crop yields. It is avoided by cattle and eaten infrequently by deer. Before initiating control efforts for Canada thistle, it is important to make sure you can recognize the differences between this species and native thistles, which are much less aggressive and are often rare.



© Tom Ransburg

Spotted knapweed (*Centaurea biebersteinii*)

Spotted knapweed is a biennial or short-lived perennial with pinkish-purple, thistle-like flowers and stem leaves that are covered with downy grayish hairs. It is believed to have been introduced from Europe in the 1890's as a contaminant in alfalfa or hay. Since its introduction to North America, this species has become one of the most problematic and widespread invasive plants in the western U.S. and is now spreading throughout the Midwest. Knapweed thrives in disturbed areas and spreads quickly once established. Cattle will not eat spotted knapweed because it has a bitter taste. Knapweed is especially troublesome because of its ability to release toxic chemicals from its roots; these chemicals reduce growth and germination of neighboring plants.



John M. Randall, TNC

Invasive plants to watch for:

Crown vetch (*Coronilla varia*)

Crown vetch is a low-growing, herbaceous perennial vine with clusters of small, pea-like white to purple flowers. It has been widely planted along roads and waterways for erosion control but spreads easily into adjacent fields, prairies, and forest edges. This species has a rapid growth rate and is difficult to control, making it a great concern to landowners and land managers. Infestations of crown vetch reduce the abundance of native plants and the wildlife species that depend on them. Crown vetch also alters soil chemistry by adding nitrogen to the soil, which has the potential to affect invaded areas even after the species is removed.

Lee Casebere, Indiana DNR



Eurasian watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil was introduced to the United States in the 1940's and has since spread to almost every state. This submersed aquatic plant can be identified by its feather-like leaves arranged in whorls of four around a long stem. Stems produce several branches which form a dense, floating mat on the water surface. Eurasian watermilfoil reproduces vegetatively; a single stem fragment can take root and form a new colony, growing on almost any substrate. Dense mats of Eurasian watermilfoil reduce plant diversity and the quality of fish spawning habitat as well as interfering with swimming, boating, and other recreational activities.

Ian Shackelford, Ottawa National Forest



Invasive plants to watch for:

Cutleaf teasel (*Dipsacus laciniatus*)

This species may have been introduced from Europe as early as the 1700's, yet its abundance in the Midwest has increased rapidly in the past 20-30 years. Its range is believed to have expanded along highway corridors, with seeds spread by mowing equipment. Cutleaf teasel is also commonly used in flower arrangements. When these arrangements are discarded or left behind in cemeteries, they can cause new infestations. Once established, cutleaf teasel can expand rapidly into prairies, excluding native vegetation. Teasel has a unique inflorescence that makes it readily identifiable when flowers or seed heads are present.



Lee Casebere, Indiana DNR

Japanese stiltgrass (*Microstegium vimineum*)

Japanese stiltgrass is an annual grass that thrives in forested areas with moist soils and along streambanks and ditches. It often makes its way into forests along trails or old logging roads and from there can rapidly spread into the forest understory, completely wiping out all other plants within just a few years. Stiltgrass has broad leaf blades that can be identified by the presence of a pale, silvery stripe of hairs along the middle of the leaf on the upper leaf surface. Japanese stiltgrass is abundant in the southern part of the Midwest region and is rapidly moving northward.



Jody Shimp, Illinois DNR

Myths and Facts about Invasive Plants

MYTH #1: Invasive plants aren't really a concern in the Midwest. They're more of a problem in places like California and Florida.

FACT: While invasive plants may have received more attention and publicity in other parts of the country, invasive plants are just as big a problem here as they are in other regions. It is estimated that 18% of the plants in national parks in the Midwest are non-native species, many of which are highly invasive. The percentage of invasive plants is even higher in areas with greater disturbance from human activity, such as roadsides or pastures.

MYTH #2: Species move around and expand their ranges naturally. When people introduce a new species, it's no different than the natural process of species movement.

FACT: People are moving far more species at a much faster rate than any natural colonization or range expansion. By bombarding our ecosystems with many new, aggressive species over a short time span, we are exposing them to conditions that would never occur without human intervention.

MYTH #3: All non-native species are bad.

FACT: Many non-native species do not cause problems in the areas where they are introduced and can be important for agriculture, horticulture, medicine, or other uses. The species of concern are those that become invasive, taking over native ecosystems and crowding out native species. It is often difficult to know in advance if a new species that is introduced will become invasive, so great caution should be used when importing or planting new species.



Ellen Jacquart, TNC

Reed canary grass invading a wetland

Myths and Facts about Invasive Plants

MYTH #4: I live in an urban area, so it doesn't matter if I plant invasive species. They won't be able to spread to natural areas from my yard.

FACT: Even if you don't live near a natural area, your yard could be a source of invasive plants. Seeds of invasive plants can be carried in many ways—by birds eating fruits and depositing the seeds elsewhere, by water carrying seeds from your yard into sewers that lead to rivers or streams, or by car tires or shoe treads when you travel to parks, nature preserves, or recreational areas. The best way to prevent the spread of invasive plants is to not plant them in the first place.

MYTH #5: Cutting, hand-pulling, or mowing are the best ways to control invasive plants.

FACT: This is true in some instances. Small infestations of some species, such as garlic mustard, can be removed by hand-pulling. However, hand-pulling for large infestations leaves large patches of disturbed soil, and often seeds from the seed bank will germinate and re-colonize areas where garlic mustard has been removed. Properly-timed cutting or mowing can also control some species, however, perennials such as Canada thistle should not be cut or pulled. Removing only part of the plant will only stimulate growth and produce more plants. Combining cutting with herbicides can be an effective method of treatment for many species.

Ottawa National Forest



Hand-pulling invasive plants



Sody Shimp, Illinois DNR

Using herbicide to control invasive plants

Myths and Facts about Invasive Plants

MYTH #6: Biological control methods such as insects are the answer to invasive plant problems.

FACT: There is no one miracle fix for controlling invasive plants. Relying on a single control method is unlikely to be successful. The best approach is an integrated management plan tailored to specific sites and species that includes a combination of methods appropriate to the situation, such as chemical control (herbicides), biological control (insects or pathogens), mechanical control (pulling or cutting), and prescribed burning.



Scott Namestnik, JF New

Galerucella beetle used for biocontrol of purple loosestrife

MYTH #7: Biological control is a bad idea, because it involves the release of non-native insects or pathogens that could damage native plants in addition to the targeted invasive plants.

FACT: In years past, some biological control efforts were poorly planned, and as a result, there were some unintended negative consequences of releasing non-native organisms to control invasive plants. These days, however, biological control agents are highly regulated and extensively tested prior to their release in the U.S. Scientists conduct careful experiments in quarantine facilities to determine whether potential biological control agents have the ability to feed or develop on plants native to the U.S. If the potential biological control agent does not feed on native plants and shows itself to be specific to the target invasive plant species, it can then be approved for release. Biological control agents should always be carefully monitored after their release to watch for any unanticipated effects on native ecosystems.

How you can help . . .

- Learn how to identify the invasive plants that are in your area.
- Make sure that seeds are not stuck to your clothes or gear. You don't want to introduce or spread these plants to other areas!
- Do not camp or travel through areas infested with invasive plants, if they can be avoided.
- Clean mud or dirt off your vehicle, pets, and even your hiking boots before going onto public lands.
- Wash your boat before going to a new lake, river, or stream.
- Drive on established roads and ride or hike on designated trails.
- Don't plant invasive species on your land. Find native or non-invasive alternative species to plant instead. Ask your local nursery to stock native plant species.
- Volunteer to help inventory or control invasive plants. Early detection and eradication of small infestations and prevention of new infestations are the most cost-effective ways to manage invasive plants. We need your help locating and eradicating the invasive plant species that have been described on the previous pages. Be on the lookout and help wipe out invasive plants.
- Pass it on! Tell your friends and family about this problem.
- Visit the Midwest Invasive Plant Network's website for more information on invasive plants in our region.

mipn.org

Purple loosestrife plants



Superior National Forest

Additional Resources in Your Area

Illinois

Illinois Department of Natural Resources, (217) 785-8688

<http://dnr.state.il.us/lands/education/ExoticSpecies/exoticspintro.htm>

Chicago Wilderness (847) 242-6424, www.chicagowilderness.org/

Indiana

Indiana Dept. of Natural Resources, Division of Entomology & Plant Pathology, Exotic & Invasive Pest Species Program, (317) 232-4120
www.in.gov/dnr/invasivespecies/

Iowa

Iowa Department of Natural Resources

- Aquatic Nuisance Species Program Coordinator, (515) 432-2823

www.iowadnr.com/fish/news/exotics/exotics.html

- Invasive Species & Forest Health Coordinator, (512) 233-1161

www.iowadnr.com/forestry/

Michigan

Michigan Dept. of Agriculture, (517) 241-2977, www.michigan.gov/mda/

Michigan Invasive Plant Council, <http://forestry.msu.edu/mipc/>

Minnesota

Minnesota Dept. of Agriculture, www.mda.state.mn.us/pestsweeds.htm

Minnesota Department of Natural Resources, (651) 259-5131

www.dnr.state.mn.us/invasives/index.html

Missouri

Missouri Dept. of Conservation, (573) 751-4115, www.mdc.mo.gov/nathis/exotic/

Ohio

Ohio Department of Natural Resources

- Wildlife Mgmt. and Research Group, Division of Wildlife, 1-800-WILDLIFE

- Division of Nature Preserves www.dnr.state.oh.us/dnap/invasive/

Ohio Invasive Plants Council, www.mipn.org/ohio

Wisconsin

Plant Conservation Program Manager, Bur. of Endangered Resources, Wisconsin Dept. of Natural Resources, (608) 267-5066, www.dnr.state.wi.us/invasives/

Invasive Plants Association of Wisconsin, www.ipaw.org







The mission of the Midwest Invasive Plant Network is to reduce the impact of invasive plants in the Midwest. To learn more about our work, please visit our website (www.mipn.org) or contact us at info@mipn.org.

Invasive Plants in Indiana



Their threat and what you can do

What Can We Do?

-  Avoid using non-native invasive plants in your garden; ask your nursery for native, non-invasive alternatives. More information is available in the INPAWS brochure "Landscaping with Plants Native to Indiana" and in the book *Go Native* by Carolyn Harstad (Indiana University Press, 1999).
-  Scout your property for invasive species, and remove invasives before they become a problem. For more information on how to control them see The Nature Conservancy's web site listed below.
-  Alert people in your neighborhood and place of work about the problem with invasives and what species to watch for.
-  Volunteer to help at local parks and natural areas to remove invasives.

For more information on native & invasive plants, please contact:

- **Indiana Native Plant and Wildflower Society**
www.inpaws.org
- **The Nature Conservancy**
1505 N. Delaware St, Ste 200
Indianapolis, IN 46202
317-951-8818
tncweeds.ucdavis.edu/
- **IDNR Division of Nature Preserves**
402 W. Washington St. Rm W267
Indianapolis, IN 46204
317-232-4052
www.in.gov/dnr/naturepr/index.html
- **Plant Conservation Alliance**
www.nps.gov/plants/
- **Natural Resource Conservation Service**
plant-materials.nrcs.usda.gov

Other Invasives in Indiana
Although many are still commonly available in nurseries, the following additional invasive plants are currently threatening natural areas in Indiana. Avoid planting these and learn to recognize and eliminate them before they spread.

Indiana Distribution: A=All, N=North, C=Central, S=South
Habitat Invaded: O=Openland, F=Forest, W=Wetland

		Indiana Distribution	Habitat Invaded
FLOWERS			
Canada thistle	<i>Cirsium arvense</i>	A	O
Dame's rocket	<i>Hesperis matronalis</i>	A	F,O
Sanicle	<i>Lespedeza cuneata</i>	A	O
Sweet clover	<i>Melilotus alba, M. officinalis</i>	A	O
Star of Bethlehem	<i>Ornithogalum umbellatum</i>	S,C	F
Japanese knotweed	<i>Polygonum cuspidatum</i>	S	F
GRASSES			
Smooth brome	<i>Bromus inermis</i>	A	F,O
Tall fescue	<i>Festuca elatior</i>	A	O
Japanese stilt grass	<i>Microstegium vimineum</i>	S,C	F
Maiden grass	<i>Miscanthus sinensis</i>	S	O
VINES AND GROUNDCOVERS			
Purple winter creeper	<i>Euonymus fortunei</i>	A	F
Creeping Charlie	<i>Glechoma hederacea</i>	A	F,O
Japanese hops	<i>Humulus japonicus</i>	S	F
Creeping Jenny	<i>Lysimachia nummularia</i>	A	F,W
Kudzu	<i>Pueraria lobata</i>	S	F,O
Periwinkle	<i>Vinca minor</i>	A	F
SHRUBS			
Black alder	<i>Alnus glutinosa</i>	A	F
Winged burning bush	<i>Euonymus alatus</i>	A	F
Bicolor lespedeza	<i>Lespedeza bicolor</i>	A	F,O
Common privet	<i>Ligustrum vulgare</i>	A	F
Multiflora rose	<i>Rosa multiflora</i>	A	O
Highbush cranberry	<i>Viburnum opulus v. opulus</i>	N	F,W
TREES			
Norway maple	<i>Acer platanoides</i>	N,C	F
Tree-of-heaven	<i>Ailanthus altissima</i>	S	F
White mulberry	<i>Morus alba</i>	N	O
Black locust	<i>Robinia pseudoacacia</i>	N,C	O
Siberian elm	<i>Ulmus pumila</i>	A	F

INDIANA NATIVE PLANT and Wildflower Society







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What are Invasive Plants?

"Invasive plant" is another name for a plant which grows quickly and aggressively, displacing other plants as it spreads. Usually, invasive plants are not native to North America. Of the roughly 2,300 plant species growing outside of cultivation in Indiana, 25% are non-native. Most non-native plants cause little trouble. However, a few aggressive species are responsible for degrading and destroying thousands of acres of our natural plant communities in Indiana and are costing us hundreds of thousands of dollars each year in control measures. Some of these invasive plants are still being sold by nurseries and planted by well-meaning Hoosiers, not realizing the problems they can cause. The good news is that there are many non-invasive alternatives that can be planted instead. Read on and find out more about the problems and the solutions.

Why Do We Care?

-  Invasive plants hurt wildlife by eliminating the plants our native animals need for food and cover.
-  Invasive plants destroy habitat for rare wildflowers and animals; they threaten two-thirds of all endangered species.
-  Invasive plants cost money. Agencies around Indiana spend hundreds of thousands of dollars each year to eradicate these species and protect our natural areas. Each year the cost grows.
-  Agricultural losses and control costs due to invasive plants are estimated at \$15 billion per year in the U.S.

The following are ten of the most damaging of the many invasive plants in Indiana.

Bush Honeysuckles

Lonicera maackii, *L. tatarica*, *L. morrowii*

Anur, Tartarian, Morrow honeysuckle

Description: These upright shrubs with arching branches are 6-15 feet tall. Each of these species has dark green egg-shaped leaves. They stand out in the understory of forests as the first shrubs to leaf out in the spring and the last to lose leaves in the fall. The paired, tubular flowers are white on Anur and Morrow honeysuckle and pink on Tartarian honeysuckle. Berries range from red to orange and are dispersed by birds.

Problem: Bush honeysuckles grow so densely they shade out everything on the forest floor, often leaving nothing but bare dirt. This means a great reduction in the food and cover available for birds and other animals. Some species release chemicals into the soil to inhibit other plant growth, effectively poisoning the soil. Bush honeysuckles are found throughout the state, but are particularly invasive in central and northern Indiana.

Alternatives: Dogwoods (*Cornus racemosa*, *C. amomum*, and *C. sericea*), chokeberry (*Aronia melanocarpa*), winterberry (*Ilex verticillata*), and northern arrowwood (*Viburnum dentatum*).

Purple Loosestrife

Lythrum salicaria



Mike Norris

Description: This plant grows 3-7 feet tall and puts up several spikes of purple flowers in June-July. The leaves are opposite and the stems are square. Purple loosestrife spreads aggressively by seed and by rhizome. Even "sterile" cultivars can still produce viable seed. **Note - it is illegal to buy, sell, or plant purple loosestrife in Indiana.**

Problem: Purple loosestrife invades wetlands in northern Indiana, forming pure stands that choke out native vegetation. This eliminates food and cover for many wildlife species, which are dependent on a diverse mixture of native species to survive.

Alternatives: Dense blazing-star (*Liatris spicata*), wild bergamot (*Monarda fistulosa*), cardinal flower (*Lobelia cardinalis*), and sweet joe-pye-weed (*Eupatorium purpureum*).



Mike Norris

Japanese honeysuckle

Lonicera japonica

Description: Japanese honeysuckle is a woody semi-evergreen vine with opposite, oval leaves. The white, fragrant flowers grow in pairs and turn yellow with age. The fruits are black berries, also in pairs.

Problem: This vine climbs over vegetation in southern Indiana, forming dense patches that can overtop young forests.

Alternatives: Virginiancreeper (*Parthenocissusquinquefolia*), virgin's bower (*Clematis virginiana*), American bittersweet (*Celastrus scandens*).



Tom Ransburg



Ellen Jacquart



Tom Ransburg

Tom Ransburg



Ellen Jaquart

Reed Canary Grass

Phalaris arundinacea

Description: This grass grows to 2-5 feet tall. The hairless stems have rough leaf blades 3-10 inches long. The flowers occur in dense clusters and are green to purple, changing to beige and becoming more open as they mature. The plant spreads aggressively through a thick system of underground stems.

Problem: Widely planted for forage and erosion control, this grass has taken over large areas of both open and forested wetlands throughout Indiana. It forms monocultures by out-competing all the native wetland plant species. There may be native strains in the state; however, there is no reliable way to tell the native from the non-native strains.

Alternatives: Switch grass (*Panicum virgatum*), Canada bluejoint (*Calamagrostis canadensis*), prairie cord grass (*Spartina pectinata*), Indian grass (*Sorghastrum nutans*), and big bluestem (*Andropogon gerardii*).

Ellen Jaquart

Autumn Olive

Elaeagnus umbellata

Description: Autumn olive is a fast-growing shrub or small tree reaching up to 20 feet tall. Its leaves are small and oval, dark green on the upper surface and silvery below. This shrub has light yellow, aromatic flowers and produces large quantities of small, round red fruits that are readily eaten and spread by birds.

Problem: Often planted for wildlife food and cover in the past, autumn olive can quickly take over open areas, eliminating all other species. Such monocultures actually reduce the variety and amount of wildlife food available. It is now found throughout Indiana.

Alternatives: Black haw (*Viburnum prunifolium*), dogwoods (*Cornus racemosa*, *C. amomum*, and *C. sericea*), and serviceberry (*Amelanchier arborea*).



Ellen Jaquart



Tom Ransburg

Crown Vetch

Coronilla varia

Description: This perennial legume has creeping stems which form dense mounds of vegetation. Each of the compound leaves bears fifteen to twenty-five leaflets. Pea-like pink and white flowers are produced in early summer and develop into narrow, leathery seed pods.

Problem: Introduced to the United States for use in erosion control, crown vetch is very widely planted along roadsides in Indiana. Since it has a tap root rather than fibrous roots, it actually provides little erosion control. It spreads rapidly through seed and by underground stems, invading many of our open natural areas like prairies and savannas.

Alternatives: Roundheaded bushclover (*Lespedeza capitata*), purple vetch (*Vicia americana*), goat's-rue (*Tephrosia virginiana*). For erosion control, use a mix of native grasses with these species.



Lee Caspere

Common Reed or Phragmites

Phragmites australis

Description: Common reed is a grass that reaches up to 15 feet in height. The leaves are smooth, stiff and wide with coarse hollow stems. The big, plume-like flower head is grayish-purple when in fruit. Common reed spreads mostly vegetatively forming huge colonies by sprouting new shoots through underground stems.

Problem:

Common reed grows in open wetland habitats and ditches primarily in northern Indiana. It can create pure, impenetrable stands, excluding all other wetland plants. Some populations are not invasive and may be native; however, there is no reliable method to tell the two apart.

Alternatives: Switch grass (*Panicum virgatum*), Canada bluejoint (*Calamagrostis canadensis*), prairie cord grass (*Spartina pectinata*), Indian grass (*Sorghastrum nutans*), and big bluestem (*Andropogon gerardii*).



Tom Ransburg

Garlic mustard

Alliaria petiolata

Description: Garlic mustard is a biennial herb. It begins as a rosette of kidney-shaped garlic-smelling leaves in the first year. The second-year plants grow a stem up to 4 feet tall with triangular sharp-toothed leaves and small white four-petaled flowers in clusters at the top of the stem. The plants die after setting seed. Garlic mustard can produce several thousand seeds from one plant, and the seeds can remain viable for seven years or more.

Problem: Garlic mustard can grow in dense stands covering many acres of forest understorey. Now found throughout Indiana, it is a particular threat to spring wildflowers, overtopping and shading them out. Compared to the diversity of plants it eliminates, it provides little food for wildlife.

Alternatives: Celandine poppy (*Stylophorum diphyllum*), blue phlox (*Phlox divaricata*), and Jacob's ladder (*Polemonium reptans*).



John Randall

Oriental Bittersweet

Celastrus orbiculatus

Description: Oriental bittersweet is a rapidly spreading deciduous, twining vine with alternate round, glossy leaves. Small greenish flowers occur in clusters in the leaf axils. The leathery capsule surrounding the seed turns a bright orange in the fall.

Problem: This vine occurs throughout Indiana and can overrun natural vegetation, forming nearly pure stands in forests. It can strangle shrubs and small trees, and weaken mature trees by girdling the trunk and weighing the crown. There is some evidence that it can hybridize with American bittersweet, thus threatening the genetic integrity of the native species.

Alternatives: American bittersweet (*Celastrus scandens*), virgin's power (*Clematis virginiana*), and Virginia creeper (*Parthenocissus quinquefolia*).



Lee Casebere

Buckthorns

Rhamnus cathartica, *R. frangula*

Description: Buckthorns are tall shrubs or small trees that grow up to 20 feet tall. Glossy buckthorn has shiny leaves with smooth edges. It has solitary red to purple berry-like fruits. Common buckthorn has black fruits and dull green smooth leaves. Glossy buckthorn tends to occur more often in wetlands and common buckthorn in uplands.

Problem: Both buckthorns occur in a wide variety of habitats in northern Indiana and spread quickly through natural areas by seed. They take over the understorey and eliminate the diversity of native plants important to wildlife.

Alternatives: Lance-leaved buckthorn (*Rhamnus lanceolata*), Carolina buckthorn (*Rhamnus caroliniana*), serviceberry (*Amelanchier arborea*), and dogwoods (*Cornus racemosa*, *C. amomum*, and *C. sericea*).



Mike Norris

Liability Insurance for Landowners and Hunting Clubs (revised 6/8/04)

LIABILITY INSURANCE FOR LANDOWNERS AND HUNTING CLUBS PERCEPTIONS AND REALITY

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LIABILITY INSURANCE:

Insurance is a contract where an insurer (insurance company) undertakes to indemnify the insured (person purchasing the insurance) against loss, damage, or liability arising from an unknown or contingent event. The insured pays the insurer a premium for this coverage. Liability insurance covers loss due to negligence, but not loss due to a willful act, of the insured. Negligence is one of the conditions that through risk planning can be greatly reduced on most private lands. Liability insurance companies generally limit the total liability of the insurance company to a specified sum, which may be much less than the liability incurred by the insured. Therefore, liability insurance may not completely eliminate the loss which the insured incurs, but it does reduce the risk of loss. Many landowners who already have liability insurance on their property can work with their insurer to add a rider as a supplement to their existing policy to cover liability for a hunting lease. Others may require that the hunting club or lessee's obtain liability insurance as a part of the written lease agreement. Many landowners will also prepare or have an attorney prepare for them a hunting club disclaimer that all hunting club members or lessee's must sign that points out potential risks that are found on the land, such as an abandoned well, or livestock that may need to be avoided, etc. Disclaimers may not be legal, but they do serve to warn lessee's of potential risks and may prevent a liability suit if the lessee's ignored the identified risks that they signed a waiver for.

There are a number of insurance companies that offer liability for hunting clubs or for landowners who lease their land for hunting or other recreational access. The following list is by no means exhaustive, however, it does provide some sources of information about liability insurance, coverage, costs, and comparisons. Another source that should not be overlooked is a rider to existing policies to cover recreational access including hunting. A landowner owes anyone paying for access to their lands for hunting or fishing or other recreational use certain duties of care, such as posting warnings as to dangerous conditions on the property, including potentially dangerous animals, abandoned wells, old buildings and other structures. He may be liable for injuries to a hunter caused by another hunter if not covered by insurance. Liability may be based on landowner negligence in allowing too many hunters in a given area, or by admitting an intoxicated hunter who subsequently injures another hunter as some examples.

Agricultural ECONOMICS

Legal Affairs

Indiana Farm Fence Laws

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Introduction

Many questions and problems arise on Hoosier farms concerning the duties and rights associated with partition (line) fences. Fence law provisions are in the Indiana law (IC 32-26-9). This publication discusses a few key points concerning line fences and related legal issues, including liability for escaped animals, and closes with a discussion of adverse possession. Landowners should, however, consult the township trustee and may need a lawyer's assistance when they have problems concerning line fences, damages caused by animals, or location of property lines.

Line Fence Law

Indiana law makes it a duty for landowners outside corporate town or city limits to separate "agricultural land" from that of their adjoining neighbor by a partition fence (IC 32-26-9-2)—but only if one or both of the adjoining parcels is "agricultural land." The law, as amended in 2003, says, "'agricultural land' means land that is:

- (1) Zoned or otherwise designated as agricultural land;
- (2) Used for growing crops or raising livestock; or
- (3) Reserved for conservation."

Further, the law states that it "shall be liberally construed in favor of the objects and purposes for

which it is enacted and shall apply to all agricultural land, whether enclosed or unenclosed, cultivated or uncultivated, wild or wood lot" (IC 32-26-9-5).

The law states that unless there is a recorded agreement to the contrary, a landowner shall build the right one-half of the line fence determined by standing on his or her own property and facing the adjoining neighbor's property. If a landowner has constructed and maintained one-half of a given partition fence other than his right one-half for five or more years, then the right one-half rule may be ignored. A partition



fence is to be placed on the line dividing the properties (IC 32-26-9-2-(a)(3)).

Generally, the law supports special agreements, even when oral, between adjoining landowners for fence maintenance. However, for agreements to be binding (covenants running with the land) on subsequent landowners, they should be in writing and recorded. Covenants in deeds concerning the maintenance of fences have been held by Indiana courts to be binding on future as well as current landowners.

Landowners may agree not to have or maintain a partition fence. This situation may endure indefinitely or until the neighboring landowner asks for a fence. The duty to build or repair arises with a request.

If an adjoining landowner refuses to construct or maintain his or her share of a line fence, the other landowner can seek the assistance of the trustee of the township in which the line fence is located. But first the landowner seeking assistance must build or repair his or her share and provide a notice to build or repair to the neighbor. If, after 20 days, the neighbor has not built the fence, then the township trustee may be contacted for assistance. The trustee has a reasonable time to determine the probable cost of the project and to notify the nonperforming landowner. If the notified landowner does not perform the work in 20 days, the trustee is required to have the work performed. The law provides for costs to be collected, along with property taxes of the non-performing landowner, after a certified statement is presented to the county auditor.

While many farmers build alternative fences, the law is “all fences of every structure must be sufficiently tight and strong to hold hogs, sheep, cattle, mules, and horses” (IC 32-26-9-3 (f)). Minimum required height is stated as 4 feet for wire, pickets, or boards; 4 1/2 feet for rail fence; and 5 feet for worm rails.

Where a ditch or creek crosses the division line, the fence across it may entail unusual expense such as a floodgate. If the property owners cannot agree on sharing expenses for this special construction or maintenance, the trustee is required

to appoint three disinterested parties to resolve the matter by apportioning expenses. This is the case even though the situation exists on the half of the boundary belonging to one landowner. If a ditch or creek is on the dividing line, such that a fence cannot be maintained on the line, then each landowner is required to construct and maintain a separate “line” fence.

If a landowner wishes to remove a segment of a line fence, his neighbor is entitled to six-months’ notice to protect a growing crop (IC 32-26-2-18). While the neighbor may not object to the fence being removed, he or she is entitled to its protection for an unharvested crop, even though six months may have elapsed after notice (IC 32-26-2-20).

Hedge or live fences along highways (outside cities and towns) that could block the view of traffic at intersections and curves are required to be trimmed at least once annually to no more than 5 feet in height. If a landowner or tenant ignores this rule after notice from a township trustee or highway superintendent or Indiana Department of Transportation, one of these authorities with jurisdiction is required to do the trimming. The nonperforming landowner is billed for the costs along with property taxes. (IC 32-26-9-4(c)).

Fencing the Railroad Rights-of-Way

Indiana law requires all railroads to construct and maintain fences along rights-of-way sufficient to prevent livestock from getting onto the tracks. Railroads are required to fence the entire distance between their right-of-way and the abutting farmer’s land that is entitled to a fence. A railroad need not fence through “unimproved and unenclosed lands” such as wooded land. But, if the landowner has enclosed the other three sides of the area bounded by a rail right-of-way, then the railroad, upon request, is compelled to provide a fence along the tracks in order to complete the enclosure.



When a railroad fails to build or maintain a fence desired by an adjacent landowner, the landowner may build or repair the fence and follow procedures in the law to obtain reimbursement of costs, including attorney fees.

If right-of-way fences are not constructed or maintained properly, then the railroad is liable to the landowner for all damages that may result, including, but not limited to, livestock killed or injured on the railroad track. If the railroad raises an “entry where no fence required” defense, courts have required railroads to prove that an injured animal entered the right-of-way at a point where no fence was required.

Fencing Highway Rights-of-Way, Public Parks, and Forests

Interstate highways and other specified roadways are limited access, which normally implies fencing of all rights-of-way. Limited access right-of-way fences will be constructed by the state at federal and state expense and maintained by them even though the farmer may benefit. However, such fences are in place to restrict access for safety and for protection of the right-of-way. The fact that farmers may prefer no fences at all in order to avoid equipment damage may be irrelevant. Variances may be granted to avoid having a fence fronting a business or other property in the case of non-interstate, limited access roads. Safety along and integrity of a right-of-way must be maintained in order to allow a variance to continue.

When roads and highways are not limited access, the fencing of the rights-of-way is all at the expense of the abutting property owner. In specific cases, a fence may be built by the state as part of the compensation for right-of-way acquisition. But in these cases, the fence becomes the property and responsibility of the abutting owner.

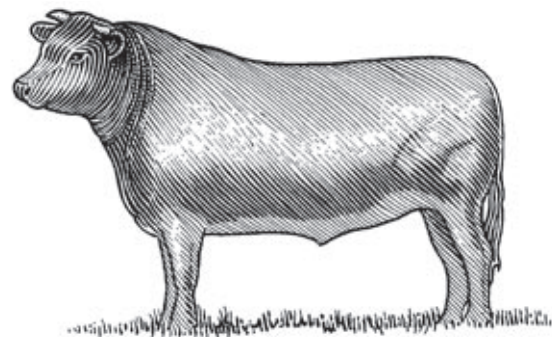
Indiana state park policy is to share costs with neighboring landowners when a fence is needed for livestock. Signs rather than fences are used to mark boundaries, unless signs are inadequate for the situation.

National parks and forests normally do not fence their boundaries and do not come under the state law on fencing. They may fence at the government’s expense when it is needed to protect a specific development or area. While they will share expenses for a survey, they will not share expenses with a farmer who needs a fence for livestock. In fact, a federal court case in West Virginia required the landowner to enclose his property to avoid violating federal regulations against his livestock being on the public property. This case and prior cases have held that the federal government was not bound by the state law covering cost sharing. There is no law requiring the U.S. to fence its park and forest properties.

Liability for Animals

Under common law (before or without statutes), landowners had no duty to fence their land unless they maintained animals on the premises. A keeper of animals was under a duty to keep them enclosed. If the animals escaped from their owner’s property, the owner was liable for damages caused by the animals. In 1887, Indiana placed this rule into a statute. It is the law today that:

If any domestic animal breaks into an enclosure or wanders upon the lands of another, the person injured thereby, shall recover the amount of damages done: ... it shall not be necessary to allege or prove the existence of a lawful fence in order to recover for damages done. (IC 32-26-2-2(b))



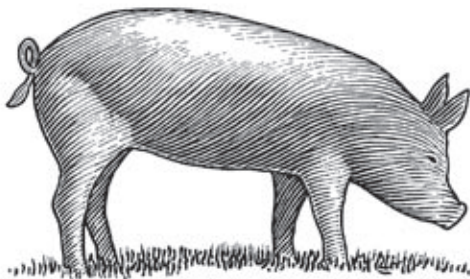
Indiana law provides for an election by each township of a “fencing-out” or “fencing-in” law. “Fencing-out” is the open-range option, whereby the landowner must build fences on his own if he

desires to keep animals off his land. Under a fencing-out option, the injured party would have to prove that livestock broke through his lawful fence before damages could be recovered.

Although the above option exists, all of Indiana is under modified fencing-in law, with adjoining landowners sharing in the construction and maintenance of line fences—where at least one of landowners has “agricultural land.” Indiana’s line fence law is an exception to the basic rule of fencing-in. Unless neither of the adjoining landowners has “agricultural land,” **a landowner is compelled to help build and maintain a share of a lawful line fences, even if it is only to keep his neighbor’s livestock from trespassing.** The requirement to share in the construction and maintenance of a line fence has an element of the fencing-out rule.

But the livestock owner (landowner or tenant) has a duty to keep animals off the roadways with appropriate “exterior” farmstead fences. Animals might escape from a farmstead, travel down a roadway, and enter a neighbor’s field where there is no gate or exterior fence. The farmer without livestock has no duty to build an exterior fence. Because the basic law requires fencing-in one’s own livestock, the farmer may be strictly liable for the trespasses of his animals.

According to past litigation, if animals go through a line fence and damage a neighbor’s property, whether or not the animal keeper is liable for damages should depend upon who was responsible for the portion of line fence that permitted passage. It is possible that the neighbor with damages was at fault in not maintaining his or her portion of the line fence. It seems



reasonable that this should be the rule, in order to place a penalty upon the landowner who did not maintain his or her share of the fence. Adjoining landowners must have adequate notice, as explained above, to repair a fence before livestock are turned against an inadequate fence. **Patience, neighborliness, good judgment, and legal counsel may be necessary to avoid liability, even when landowners think they are within their rights.**

It may be difficult or impossible to determine which part of the fence the animal escaped through. In that case, the animal keeper (or his or her insurer) likely will be held responsible for damages. Because of the cost of investigations and disputes, reasonable damages may be paid by an insurance company without substantial inquiry into the facts to determine fault.

Indiana law permits a property owner to “take-up” animals that are trespassing and hold them until proper compensation is offered for damages and the cost of keeping the animal(s). The statute requires the township trustee to appoint two disinterested parties, if requested, to determine the damages. If the owner of the animal(s) offers an amount to settle and subsequent court proceedings award no more than the settlement offered, the party claiming damages is assessed the court costs.

Landlords and farm operators need adequate liability insurance, because trespassing animals can lead to tenant and landowner liability. However, an owner of an escaped animal may not be liable for damages to motor vehicles or for injury to motorists. Court cases in Indiana and in other states indicate that if the animal owner shows that: (1) he or she was not aware that the animal(s) had escaped and (2) the fences were in good repair, the animal owner or landlord may not be liable.

Adverse Possession

By mistake, line fences may be a distance from the true boundary line. Indiana case law has held just as the statute states, that a line fence is to be placed on the boundary (survey) line (IC 32-26-9-

2(a)(3)). A fence may have been erected under an erroneous assumption about the location of a boundary line and have stood for many years without a question. Landowners should be aware that an adjoining neighbor may acquire a strip or segment of their land when after several years it is found that the fence has a landowner's land on the neighbor's side.

Adverse possession theory and a "quiet title" lawsuit are legal measures that can be used to resolve such disputes. If the use of someone else's land is what the court may view as open, continuous, distinctive and exclusive, adverse, and notorious for at least 10 years, title may be established by adverse possession.¹ And a landowner may assert a claim under adverse possession by adding periods of time during which a disputed strip was adversely occupied by prior owners by the tacking time periods. Once these elements are established to the satisfaction of a judge or jury, fee simple title to the disputed tract is conferred to the claimant (neighbor) by operation of the law thus extinguishing title in the original (record) owner.

An adverse possessor may prevail without knowledge of the mistake until adjoining neighbors raise the issue. The adverse possessor merely needs to use the land as if it were his or hers. If the possessor knows there is a disagreement, he may win out by simply using the property for at least 10 years. Note that adversity cannot be established when there is consensual use—e.g., under a lease or an easement.

If the adjoining landowner accepts the erroneous boundary, whether knowing or not knowing it is wrong, the law, after 10 years, may give the property to the adverse possessor. However, if a landowner believes another possesses his or her land, he or she may bring a lawsuit to quiet title.

Either adjoining landowner can bring a quiet title lawsuit to let a court decide who is entitled to the disputed land. The landowner who claims the loss of land must not let the 10-year statutory

period elapse, or else the possessor's rights may be irrefutable. Once a court renders a judgment, this determines who has marketable title in the disputed strip or portion of land. A lawsuit and judgment may be necessary to clear the record, even if it appears that all the requirements of adverse possession have been satisfied.

A 1982 Indiana Appellate Court case established that ownership to a strip of land could shift to a neighbor where there was an agreement by the abutting neighbors to treat a fence as a legal boundary line. Further, ownership can shift to the possessor of the strip of land even though the property was not held for the statutory period (10 years) required under the theory of adverse possession. This was held to be binding on subsequent owners as long as no fraud could be shown to be present.

Conclusion

It is important that all parties know their rights and duties under the law. It is generally costly in terms of both dollars and human relationships to exercise the full recourse offered by the courts and the law. Because most people value good relationships with their neighbors, often a compromise may be best.

Acknowledgments

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¹ An Indiana law, IC 32-21-7-1, requires an adverse possessor to show that he or she paid the property taxes. However, Indiana case law may make an exception for strips along a fence line. To research the case law, see *Fraley v. Minger*, 786 N.E. 2d 288, (Ind. Ct. App., 2003).

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An Agricultural Law Research Note

Recreational Use of Private Lands: Associated Legal Issues and Concerns

by

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Recreational Use of Private Lands: Associated Legal Issues and Concerns

Roger A. McEowen*

Recreational activities on private lands have increased in recent years due to the inability of public lands to meet demand. The prospect of monetary gain and the liability protection provided by state law for recreational activities on private land provide other incentives for the increased use of farm and ranch land for recreational activities. The key questions for those wishing to operate fee-based recreational activities on rural land are potential liability exposure to participants, the extent to which state law provides liability protection, and whether additional steps are necessary to insulate against liability claims.

Review of Premises Liability Law

Adult and child trespassers. The traditional approach varied the duties owed to the entrant based upon the benefit the entrant bestowed upon the owner or possessor, with the adult trespasser owed the lowest duty. An owner or possessor of land only has a duty to refrain from willfully or wantonly injuring an adult trespasser. Child trespassers are treated differently.¹ Under the “attractive nuisance doctrine,” if a landowner has a reasonable expectation that children will be attracted to the premises by a dangerous artificial condition on the land, trespassing children can be treated legally as an invitee.² Potentially, this doctrine has a wide reach with respect to agriculture. Many farm assets such as livestock, machinery and equipment can attract curious children to the premises. For farm ponds, most courts that have considered the question have indicated that bodies of water are not attractive nuisances and that child trespassers will be treated the same as adult trespassers in terms of

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¹ Children, by their nature, lack mature judgment and generally cannot appreciate dangers that are inherent on the land on which they are trespassing. Children that can appreciate the danger of a particular situation are not covered by the doctrine. Hence there is no age cut-off for application of the rule.

² As to invitees, the landowner must make and keep the premises safe and must warn of existing dangers. *See, e.g.,* McGaughey v. Haines, 189 Kan. 453, 370 P.2d 120 (1962) (plaintiff, a four-year-old boy, fell from tractor on neighbor’s land and attached disk ran over plaintiff causing serious and permanent injuries; defendant not liable because defendant had no knowledge of children playing on land on previous occasions); Griffin v. Woodard, 486 S.E.2d 240 (N.C. Ct. App. 1997) (doctrine inapplicable where child trespasser realizes risk involved and facts demonstrate that child can otherwise be held to adult standard).

the duty that the owner or occupier of the real estate owes to them.³ For farm ponds located in remote areas, most courts hold that it would be an unfair burden on property owners and occupiers to have to shoulder liability for injury to child trespassers. However, items associated with farm ponds (such as a pier, dock or tree tire swing) can be attractive nuisances.

A limitation to the attractive nuisance doctrine is that it does not apply if the child is trespassing on land before noticing the object on the land that ultimately results in harm to the child. This is known as the “allurement limitation,” and stems from a Kansas case ruled on by the United States Supreme Court in 1922. Under the facts of the case, the doctrine was held not to apply to children ages eight and eleven that died after jumping into an exposed cellar hole containing sulphuric acid. The Court noted that the children were trespassing at the time the “pool” was discovered.⁴

Other entrants. A licensee is anyone on the premises with permission or acquiescence, but who does not bestow a benefit on the landowner or occupier. Examples include the hunter with permission who does not pay a fee. While the landowner or occupier is not obligated to make the premises safe, due care must be exercised to avoid injury to the licensee. In addition, a licensee is entitled to a warning of hidden dangers and hazards known to the landowner or occupier that the licensee cannot reasonably be expected to discover.

A social guest is a person on the premises who does not confer an economic benefit, but does confer a social benefit on the landowner or occupier. A social guest might be able to recover from a fall on a highly waxed floor, a faulty step or a poorly lighted stairway, for example. If it can be established that the premises were carelessly maintained, a social guest is likely to recover.

An invitee is a person on the premises for business purposes or for mutual advantage rather than solely for the benefit of the person entering the property. Examples include business guests such as cattle buyers, milk truck drivers, veterinarians and employees. Door-to-door salesmen can be classified as invitees once they have been greeted and invited inside. To invitees, the landowner or occupier owes a duty to make and keep the premises safe and to warn of existing dangers.⁵

Modern approach to premises liability. In recent years, court opinions in various states have moved away from basing an owner or occupier’s liability to entrants on the status of the entrant. The

³ The attractive nuisance doctrine only applies to artificial conditions on the land. The doctrine does not apply to natural bodies of water. However, the “natural bodies of water” exception does not apply when the child is an “invitee.” *See, e.g., Degas v. Majestic Mobile Manor, Inc.*, 129 Wash. 2d 43, 914 P.2d 728 (1996).

⁴ *United Zinc & Chemical Co. v. Britt*, 258 U.S. 268 (1922). The doctrine has also been held inapplicable on the same theory to a nine-year old child who fell through a hole in the second floor of a barn after removing floorboards. The barn was not an artificial condition and the child was trespassing at the time the barn was discovered. *Cruce v. Kennington*, 220 Ga. App. 49, 467 S.E.2d 227 (1996).

⁵ This requires the landowner or occupier to search out dangers and maintain a level of surveillance for risks that can befall a person who is on the premises as a business guest or invitee. *See, e.g., Curvin v. Pinyan*, 717 So. 2d 435 (Ala. 1998) (invitee employed to catch chickens in defendant’s chicken house injured by fall of “over-winch” fan; defendant not liable for invitee’s injuries because defendant kept premises in reasonably safe condition and gave warning of dangerous conditions). employees have successfully sued employers for the employer’s failure to provide a safe working area and to warn of existing dangers. *See, e.g., Baumler v. Hemesath*, 534 N.W.2d 650 (Iowa 1995).

modern approach tends to replace the traditional entrant classification scheme with the ordinary negligence principles of foreseeable risk and reasonable care.⁶

Recreational Use Statutes

In 1965, model legislation was promulgated by the Council of State Governments that was designed to provide a measure of liability protection to rural landowners who made their land available to the general public for recreational purposes without charge. Most states have enacted some version of the model legislation. For example, the Kansas version is contained in Kan. Stat. Ann. §§58-3201-3207 (2002) and covers a wide array of recreational activities that might occur on agricultural land. Rural landowners covered by the statute owe no duty to entrants to keep the premises safe or to give any warning of a dangerous condition.⁷ To obtain the protection of the statute, however, a rural landowner must not charge the entrant a fee.⁸

Fee-Based Activities

Comprehensive liability insurance. Owners and occupiers of rural land in Kansas that operate fee-based recreational activities on their land are not covered by the recreational use statute. Thus, other means of protecting against potential liability claims must be utilized. Many farmers and ranchers have a general comprehensive liability policy covering bodily injury and property damage arising out of farming activities and activities that are incidental to farming. However, most standard policies do not provide liability protection for claims arising out of business pursuits other than farming. Thus, fee-based recreational activities are likely not covered.⁹ Likewise, recreational

⁶ In some states, the owner or occupier owes a duty or “reasonable care under all of the circumstances” to all entrants other than trespassers. In these states, the cases are decided on a case-by-case basis with several factors considered such as the foreseeability of harm to the entrant, the magnitude of the risk of injury, the individual and social benefit of maintaining the condition, and the burden to the landowner or occupier in providing adequate protection. *See*, *Webb v. City of Sitka*, 561 P.2d 731 (Alaska 1977); *Rowland v. Christian*, 69 Cal. 2d 108, 433 P.2d 561, 70 Cal. Rptr. 97 (1968); *Mile High Fence v. Zadovich*, 489 P.2d 308 (Colo. 1971); *Pickard v. City & County*, 452 P.2d 445 (Haw. 1968); *Keller v. Molls*, 472 N.E.2d 161 (Ill. App. 1984); *Rosenau v. City of Estherville*, 199 N.W.2d 125 (Iowa 1972); *Cates v. Beauregard Elec. Coop., Inc.*, 328 So. 2d 367 (La. 1976); *Limberhand v. Big Ditch Co.*, 706 P.2d 491 (Mont. 1985); *Ovellette v. Blanchard*, 364 A.2d 631 (N.H. 1976); *Basso v. Miller*, 352 N.E.2d 868 (N.Y. 1976); *Moody v. Mann’s Auto Repair*, 871 P.2d 935 (Nev. 1994); *Mariorenzi v. Joseph DiPonte, Inc.*, 333 A.2d 127 (R.I. 1975). Several other states, however, retain the common law duty with respect to trespassers and all other unlawful entrants, but utilize a standard of reasonable care for all lawful entrants. *See*, *Jones v. Hansen*, 867 P.2d 303 (Kan. 1994); *Poulin v. Colby College*, 402 A.2d 846 (Me. 1979); *Mounsey v. Ellard*, 297 N.E.2d 43 (Mass. 1973); *Peterson v. Balach*, 199 N.W.2d 639 (Minn. 1972); *Heins v. Webster County*, 552 N.W.2d 51 (Neb. 1996); *Ford v. Bd. of County Commissioners*, 879 P.2d 766 (N.M. 1994); *Nelson v. Freeland*, 507 S.E.2d 882 (N.C. 1998); *O’Leary v. Coenen*, 251 N.W.2d 746 (N.D. 1977); *Hudson v. Gaitan*, 675 S.W.2d 699 (Tenn. 1984); *Antoniewicz v. Reszczyński*, 236 N.W.2d 1 (Wis. 1975); *Clarke v. Beckwith*, 858 P.2d 293 (Wyo. 1993).

⁷ Kan. Stat. Ann. §58-3203 (2002).

⁸ Kan. Stat. Ann. §58-3204 (2002).

⁹ *See, e.g.*, *Heggen v. Mountain West Farm Bureau Mutual Insurance Co.*, 715 P.2d 1060 (Mont. 1968)(no coverage under comprehensive farm policy for injury to participant in steer roping contest; profit motive present even though all entry fees paid out in prize money; contests regular and continuous).

activities are probably not incidental to farming activities.¹⁰ Consequently, endorsements to an existing policy may be necessary to ensure coverage, or it may be necessary to buy a standard commercial general liability policy and then modify it with an endorsement. In any event, it may be wise to require recreational users to carry their own liability insurance in addition to whatever coverage the owner or occupier may have.

Liability release forms. Another means of protection against liability is to have recreational entrants sign liability release forms. To be an effective liability shield, the release must be drafted carefully. The courts generally construe release language against the drafter and severely limit the landowner's ability to contract away liability for the landowner's negligence.¹¹ Thus, while the law generally disfavors release agreements, courts will uphold them if they contain clear and unambiguous language, are not inordinately long and complex, and are the result of roughly equal bargaining power between the contracting parties.¹² However, release agreements signed by minors are generally not enforceable, and courts tend not to uphold release agreements signed by a parent for a minor child.¹³ This could be an especially important point with respect to hunting and fishing activities that can be engaged in by underage youth.

Other issues. Persons conducting fee-based recreational activities must also take care to ensure compliance with the Americans With Disabilities Act,¹⁴ Title II of the Civil Rights Act of

¹⁰ See, e.g., *Windt v. Fidelity & Casualty Co. of New York*, 507 P.2d 1383 (Cal. Supp. Ct. 1973)(insured operated stable for fee and several horses escaped causing traffic accident and killing driver; stable not within reasonable interpretation of "farming," but associated grazing activity covered under policy. Repairing fences and keeping gates closed incidental to normal farming activities; because accident related to unclosed gate, policy covered landowner's liability for driver's death).

¹¹ See, e.g., *Steele v. Mt. Hood Meadows Oregon, Ltd.*, 159 Ore. App. 272 (1999)(release provided no defense against plaintiff's negligence claim; release failed to specifically refer to negligence and was partially ambiguous); *Bothell v. Two Point Acres, Inc.*, 965 P.2d 47 (Ariz. 1998)(release strictly construed against drafter and failed to bar liability as a matter of law); *but see*, *Street v. Darwin Ranch, Inc.*, 75 F. Supp.2d 1296 (D. Wyo. 1999)(release used in context of participation in trail ride upheld; release fairly entered into and evidenced parties' intent to release defendant from negligence in clear and unambiguous language).

¹² See, e.g., *B&B Livery, Inc. v. Riehl*, 960 P.2d 134 (Colo. 1998)(rider injured by fall from horse provided by livery; release agreement precluded rider's claims).

¹³ See, e.g., *Cooper v. Aspen Skiing Co.*, 48 P.3d 1229 (Colo. 2002)(public policy of state gave minors significant protection that prevented parent or guardian from releasing minor's own prospective claim for negligence; opinion did not address effect of parental releases when minor child participating in activities whose inherent danger could not be eliminated by reasonable care).

¹⁴ 42 U.S.C. §§12101-12213 (2003). The Act defines "public accommodation" broadly. See 42 U.S.C. §12182(a) (2003). Compliance with the Act can only be avoided if certain strict requirements are satisfied. See 42 U.S.C. §12182(b)(3).

1964,¹⁵ and the Safe Drinking Water Act.¹⁶ They must also ensure that the activities of guests do not constitute a nuisance to neighboring landowners¹⁷ and that guests do not trespass on others' lands.

Summary

Certain common sense steps should be taken to minimize the liability risks associated with fee-based recreational activities. Those include conducting routine safety audits, plugging abandoned wells, fencing off dangerous areas, separating recreational users from livestock, establishing and posting guidelines and having emergency supplies and equipment available. With proper structuring and planning, fee-based recreational activities can provide additional income for the farm and ranch family.

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¹⁵ 42 U.S.C. §§2000a-a-6 (2003). The Act prohibits discrimination based on race, color, religion or national origin in many places of exhibition or entertainment. *See, e.g., United States v. Jackson Lake, Inc.*, 312 F. Supp. 1376 (S.D. Ala. 1970)(family-owned recreational complex with swimming and picnic held to be “place of entertainment” subject to Title II’s non-discrimination provisions).

¹⁶ 42 U.S.C. §§300f-300j-26. The Act could apply, for example, to a bed and breakfast, hunting or fishing lodge, dude ranch, or almost any recreational business that furnishes water to at least 25 persons. *See* 42 U.S.C. §300f(4).

¹⁷ *See, e.g., Gray v. Barnhart*, 144 Pa. Commw. 474, 601 A.2d 924 (1992)(jury question presented as to whether shooting range constituted nuisance).