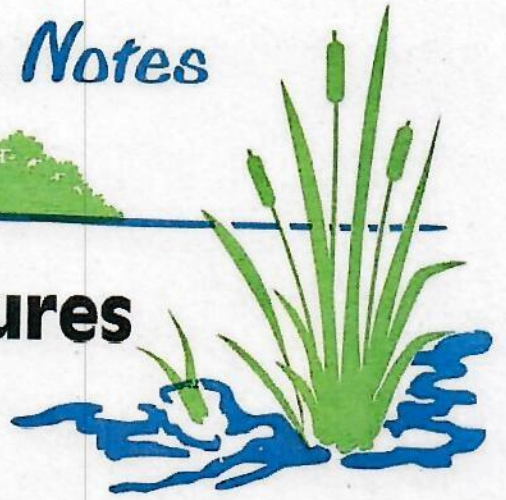




Artificial Structures for Fish Cover



Some lakes, ponds, and reservoirs (especially manmade waterbodies) lack adequate structural features and areas for fish to hide. Tree stumps and logs may have been removed to allow safe navigation by boaters, aquatic herbicides may have reduced or eliminated aquatic plant beds, fluctuating water levels may prevent aquatic vegetation growth, and natural shorelines may have been destroyed and converted to hard edges that provide little or no fish cover or spawning habitat. This issue of *Lake Notes* highlights the importance of structure in lakes, and how you can approximate natural structures by building and installing artificial ones.

The Importance of Structure in Lakes, Ponds, and Reservoirs

Structural features—both biological (e.g., aquatic plant beds, shoreline and backwater marsh areas) and physical (e.g., drop-offs, rock reefs, fallen logs, docks)—are important in helping to maintain diverse, healthy lake ecosystems and in sustaining gamefish and non-gamefish populations. Structure provides places for fish to hide from predators, shade from the hot summer sun, nesting and spawning habitat, and places for food organisms to live and grow.

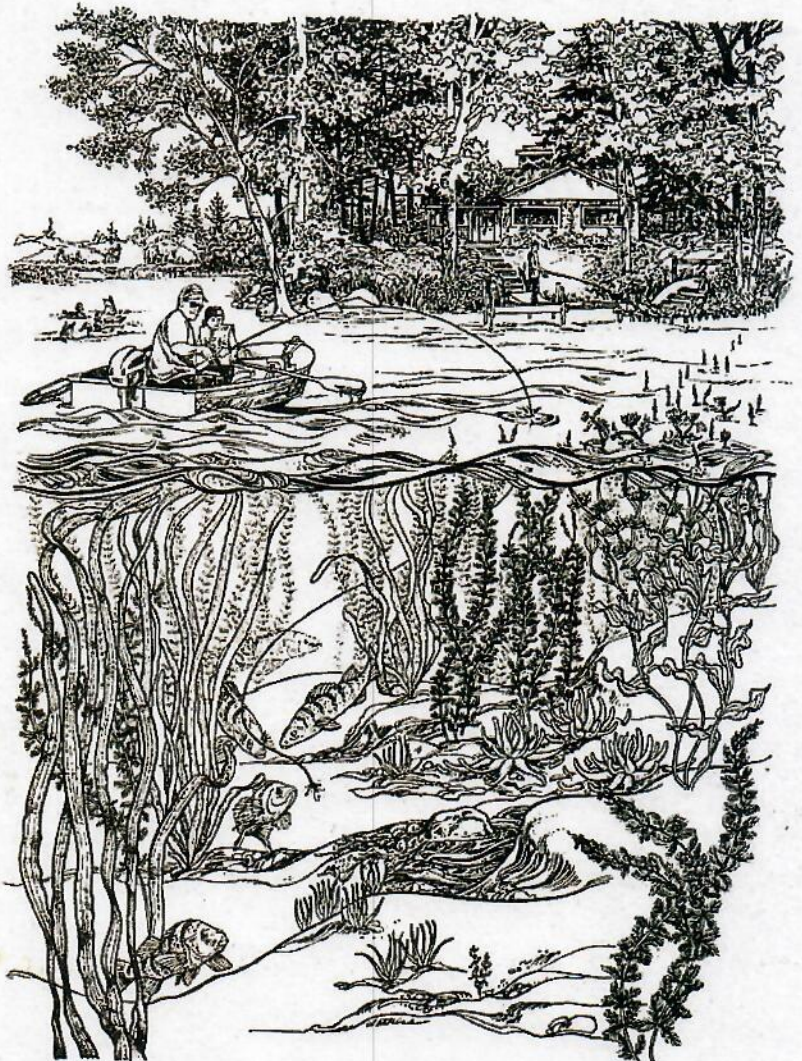
Fish like to hide—especially when bigger fish and other predators are seeking a meal. Without hiding places, populations of young fish and the smaller fish species are at risk of being significantly reduced by predation. Ultimately, this can lead to an imbalanced fish population and reduction in gamefish yields.

Fish also like to keep cool. That's why you'll often see fish seeking refuge from the hot summer sun under docks, amongst rock outcroppings, and within lily beds.

And of course fish need to eat and reproduce. Algae and other organisms (including bacteria, zooplankton, and aquatic insects), which are important fish foods, use physical and biological structure as growth substrates or

habitat areas. Depending on the fish species, physical and biological features also are used for nesting and spawning.

From an angler's perspective, structure attracts fish—both the smaller fish seeking cover and the larger predatory fish (including most gamefish species) searching for prey. This spells good fishing for anglers who know where structural features are located.



General Information on Artificial Structures

In lakes, ponds, and reservoirs lacking adequate natural structure, the addition of artificial structures can be an effective way to concentrate fish and increase fishing success and angler satisfaction.

Almost any physical structure, from a dead tree stump to a shipwreck, can serve as an underwater habitat feature or artificial reef. In fact, many lakes already have a number of physical structures including docks and piers, fallen trees and logs, piles of brush or other natural debris, and rocks.

However, it is clear that some structures, such as fallen trees, are more appropriate to add to a lake than others, such as tires or old cars. Appropriate types of structures include those that are mostly or completely constructed of natural materials. These include logs and trees—but should not include treated wood products like telephone poles, railroad ties, or any lumber treated with a preservative. (See another *Lake Notes*, "Pressure Treated Wood," for more information on that topic.)

Three general design characteristics should be incorporated into any artificial fish structure:

1. Structures should be complex. That is, they should contain a high number of surfaces, holes, and hiding places to maximize areas available for hiding and food growth.
2. Structures should be heavy enough, or anchored to the lake bottom, to withstand waves and shifting currents.
3. Structures should be constructed of non-toxic materials that will not significantly deteriorate in a short time.

Whatever structures you choose to use as habitat features, be sure to secure the structures to the lakebed. Floating debris can pose serious danger to boaters and swimmers. Hardwood branches (oak, maple, cherry, and hickory for example) are superior to softwoods (such as pine and fir) because they last longer without decomposing. Concrete blocks are superior to cinder blocks as anchors because cinder blocks are not heavy enough to anchor effectively.

Types of Artificial Structures for Fish Cover¹

Depending on lake characteristics, the target fish species, and available materials, different types of physical structures may be appropriate.

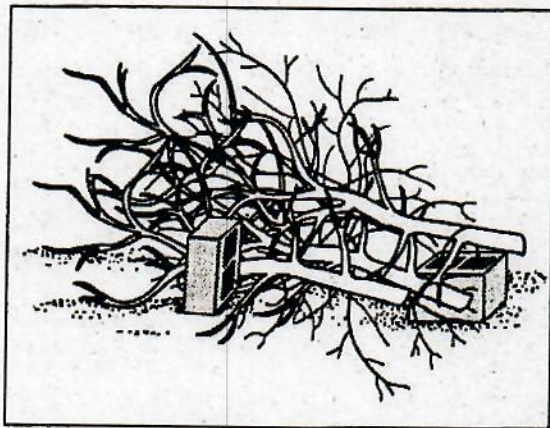
Fallen Trees and Stumps

Perhaps the most natural of the physical structures, fallen trees and tree stumps can be dragged into the water and anchored to the lake bed. Bass are especially attracted to

these structures. Shoreline trees that fall into the water can simply be left in place, the above-water parts of their trunk and limbs providing additional benefit as resting places for turtles and birds.

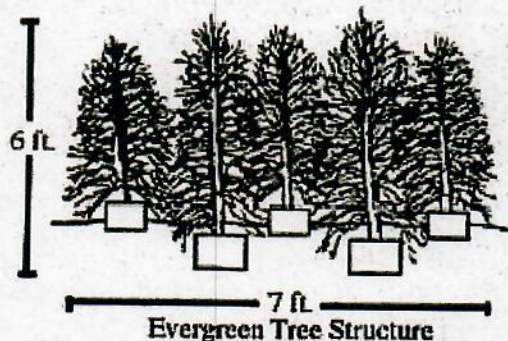
Brush Piles

Brush piles can be bundled together and tied to rocks or concrete blocks to weigh the pile down on the lake bottom. Baling wire or a wood frame can be used to keep brush together. Brush piles degrade more quickly than some other types of structures, resulting in nutrients being released to the water. Depending on the nutrient level already present in the lake, this may or may not be desirable. Piles with larger and freshly cut branches will degrade more slowly than those of smaller and more aged wood. Fish species that are attracted to brush piles include largemouth bass, bluegill, and other panfish (fish small enough to be fried whole in a pan.) Brush cuttings in shallow water also serve as egg attachment sites for minnows.



Evergreen Trees

Submerged evergreen trees secured in concrete blocks may be the cheapest and most available material for creating artificial structure, especially since evergreen trees are readily available after Christmas. There is also some evidence that evergreen trees are highly effective for attracting large numbers of fish. Like brush piles, evergreen trees degrade more quickly than other structure types and thereby release nutrients into the water—which may be a concern.



Oak Pallets

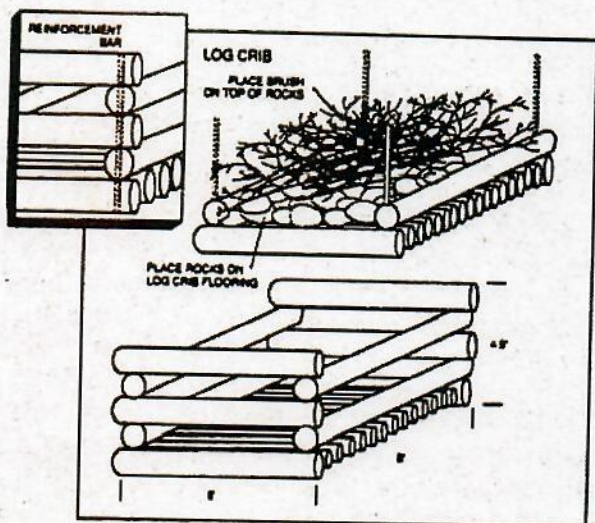
Three oak shipping pallets can be bound together in a triangular shape using bolts and weighted with concrete blocks. Brush and branches are placed in the openings of the pallets and secured there with cable or by really packing them in tight.

Rock/Rubble Piles

Piles of rocks, concrete blocks, and broken concrete of various sizes approximate underwater features found in natural lakes. They tend to attract a variety of species including catfish, walleye, bass, and panfish.

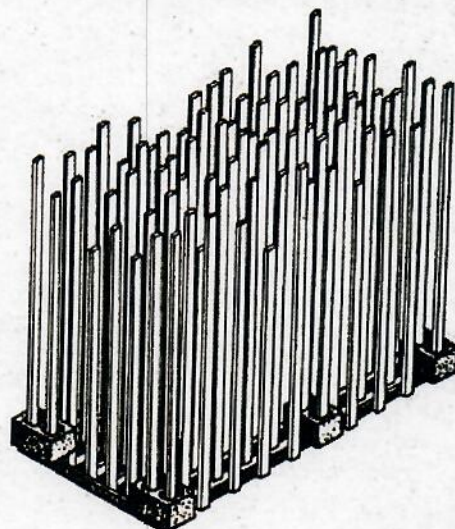
Log Cribs

Cribs consist of wooden frames of heavy logs usually filled with brush and large rocks. Log cribs typically attract walleye, bass, catfish, and panfish.



Stake Beds

Stake beds, usually constructed of green lumber, are made using two-by-fours to create a bottom support to which numerous sawmill stakes are nailed (stake density does not need to be as high as shown in the accompanying diagram). Concrete blocks are used to weight the structure. Stake beds attract crappie, largemouth bass, and panfish.

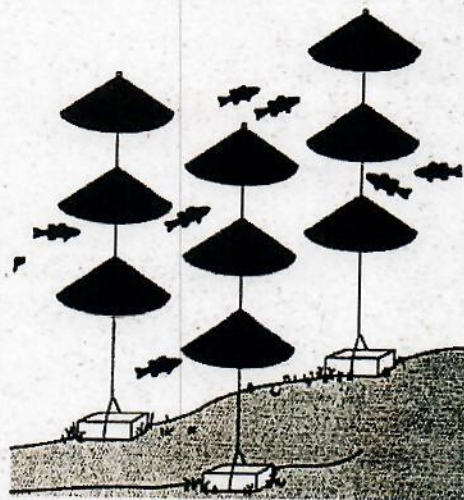
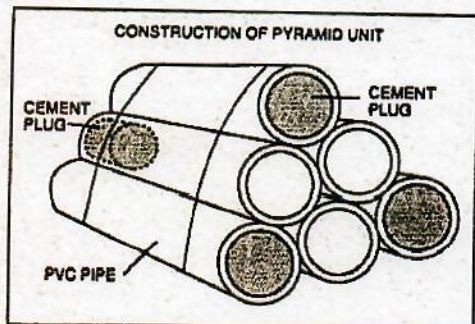


Plastic

Buoyant, black polyethylene plastic strips cut 1-2 inches wide and 4-12 feet long can be used to resemble aquatic plants. Clumps of 25-30 strips are held together with a base weight and strung together to mimic an aquatic plant bed. Other plastic structures include mid-water attractors: buoyant objects of variable design that are suspended a number of feet below the water surface and anchored in place. Shapes such as tents, inverted cones (shown in the diagram below), and platforms are effective.

Pipes

Submerged pipes that are plugged at one end with cement and bundled into a pyramid shape can be used to create small, cavity-like structures underwater. Some fish, such as catfish and bullhead, feel safe in dark, enclosed places and use them for spawning and nesting. Clay pipes, drainage tiles, and PVC and polyethylene pipes are all sufficiently stable to withstand degradation for many years.



¹Adapted from *Fish and Fisheries Management in Lakes and Reservoirs: Technical Supplement to the Lake and Reservoir Restoration Guidance Manual* (EPA-841-R-93-002), U.S. Environmental Protection Agency, Washington, D.C. May 1993.

Locating and Installing Artificial Structures

Follow these suggestions when locating artificial structures in lakes, ponds, and reservoirs:

1. Locate structures away from other underwater habitat features, especially those that are already beneficial to fish so as not to interfere with them.
2. Locate structures where they are not a danger to swimmers, boaters, or skiers; that is, away from swimming areas and boating lanes, and deep enough to allow safe boat passage (at least 4 feet below the water surface.) It also may be wise to mark the location of artificial structures with a buoy or other highly visible object.
3. Place structures where they will attract the target fish species and, if recreational fishing is a goal, where anglers can access or cast fishing lures to the area.
4. Be sure to locate structures on stable lakebed material such as clay, sand, or stone. Structures may sink into mud and other soft substrates and eventually disappear.
5. Generally, several smaller groupings of structures placed at a range of water depths and locations are better than only one, large grouping.

In shallow lakes and ponds, structures usually can be safely placed in water 6 to 10 feet deep. Remember that areas of open water are also important to healthy fish populations. Too many fish structures, especially in small ponds and lakes, work against the purpose of the structures—to build fish populations. Because artificial structures increase angler efficiency and can aggravate problems with over-fishing, they should not be installed in heavily fished lakes.

In larger and deeper lakes and reservoirs, structures can be placed deeper, from 10 to about 20 feet deep. Water deeper than that usually has low or no oxygen in the

summer months. Structures placed in water lacking oxygen will not attract fish. Structures that are placed in shallower water (such as 6 feet) will be less used by fish in summer months because they will seek the cooler temperatures found in deeper water.

In a pond, just a few small groups of structures are usually adequate (e.g., three groupings of three evergreen trees). In larger lakes and reservoirs, research has found that long lines of physical structures may be more effective as habitat than individual, randomly placed, or scattered structures. However, work within the allowable parameters of your particular lake.

Artificial structure placement is most conveniently done in the winter when the lake, pond, or reservoir is safely ice-covered. The often bulky structures then can be slid across or assembled upon the ice at locations where the structures will sink after the spring thaw. Otherwise, the structures will have to be deployed from a boat.

Permits

If you are interested in placing an artificial fish structure in "public waters," a permit is required from the Illinois Department of Natural Resources—Office of Water Resources (phone: 847/608-3100 in Cook, DuPage, Kane, Lake, McHenry, and Will Counties; 217/498-8313 in all other Illinois counties). Public waters are defined in Illinois' Administrative Code as "all lakes, rivers, streams, and waterways which are or were navigable and are open or dedicated to public use...." Lakes in Illinois that are specified in the Code are Lake Michigan, Lake Calumet, Wolf Lake (Cook Co.), all backwater lakes of the Mississippi and Illinois Rivers, the Fox Chain-O-Lakes (Lake and McHenry Co.), Griswold Lake (McHenry Co.), Spring Lake (Tazewell Co.), Horseshoe Lake (Alexander Co.), and other navigable waters "dedicated to public use." (You can read the administrative code on-line at www.dnr.state.il.us/owr/resman/3704RULE.htm)

For all other waters, contact the lake owner and/or manager for any necessary permits or permissions.



Lake Notes . . .

is a series of publications produced by the Illinois Environmental Protection Agency about issues confronting Illinois' lake resources. The objective of these publications is to provide lake and watershed residents with a greater understanding of environmental cause-and-effect relationships, and actions we all can take to protect our lakes.

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