

Auburn University and USDA/Natural
Resources Conservation Service

Alabama Aquaculture
Best Management Practice (BMP)

Fish Mortality Management

BMP No. 13



Definition

Mortality of fish in production ponds can occur soon after stocking as a result of handling stress or at anytime during culture as a result of disease or in-pond water quality deterioration. The amount of mortality is variable among ponds ranging from a few to large numbers of fish, but high mortality is the exception. Dead fish may sink and not be seen, but they usually float to the surface and accumulate around the edges of ponds. There are three main environmental concerns with dead fish: (1) carcasses and associated bacteria may be released from ponds if outflow of water occurs; (2) decomposition of dead fish following sudden, massive mortality could impair in-pond water quality and cause effluent water quality to decline; and (3) where ponds are near dwellings, bad odors from large fish kills could be a problem. Fortunately, most mortality occurs during hot summer weather when ponds seldom overflow, and most catfish farms are in rural areas where dwellings or gathering places seldom are located near ponds. Nevertheless, ponds should be operated in a manner to prevent dead fish from entering natural waters, causing objectionable odors, or causing in-pond water quality to deteriorate.

Explanation

Fingerlings usually are stressed to some degree by handling and during transportation from hatcheries to ponds. As a result, some fingerlings usually die soon after stocking. Because of their small size and numbers,

mortality of fingerlings soon after stocking does not present an environmental problem.

Investigations by the Alabama Fish Farming Center suggest that annual mortality of catfish in ponds is about 10 to 20%. Fish may die at anytime in the culture period, but small fish are more vulnerable to cannibalism, bird predation, in-pond water quality imbalance, and disease than larger fish. Thus, the majority of the mortality occurs in small fish. Significant numbers of large carcasses can be expected after episodes of dissolved oxygen depletion or other severe in-pond water quality problems. However, such catastrophic events are rare in commercial catfish ponds because producers use mechanical aeration and monitor in-pond water quality (Boyd and Tucker 1998).

In winter and early spring, it is not uncommon to observe a few to several hundred dead fish floating along the edges of some ponds. During the rest of the year, the number of dead, floating fish normally will be diminished. Dead fish decompose quickly and disappear within a few days in warm months, but in cold weather, carcasses may persist much longer. This partly explains why more carcasses are found around pond edges in winter. Winterkill also is a common phenomenon in catfish ponds (Tucker and Robinson 1980). Several species of wildlife feed on fish carcasses. The most common are vultures, wood storks, cormorants, herons, opossums, raccoons, turtles, and alligators. Large numbers of scavengers come to ponds after fish kills, and they can quickly consume many carcasses.

It would be extremely difficult to remove fish carcasses from ponds on a regular basis, and it is not necessary to do so. Ponds have an ability to “digest” organic residues, so fish carcasses usually do not significantly impact pond water quality. Moreover, routine mortality does not cause an odor problem, and massive mortalities with odor problems seldom will occur near residences. The main problem is that carcasses can be lost from ponds in overflow. Most fish kills occur in the hot, drier part of the year when ponds normally do not overflow. Water often flows from ponds in response to winter and early spring rains, so riser pipes in ponds should be equipped with trash racks to prevent floating dead fish from entering discharge pipes. It also is in the farmer’s interest to contain carcasses from massive mortality in the pond where the event occurred. Most ponds in Alabama are built in series with water flowing from the uppermost pond through one or more other ponds and exiting from the lowest pond. Carcasses in one pond can enter the next pond below and harm pond water quality or even spread disease.

Fish disease usually causes a prolonged, gradual mortality and does not result in large numbers of floating carcasses. However, massive mortality of fish may occur following dissolved oxygen depletion, toxic algal blooms, or other in-pond water quality problems. Many hundreds or even thousands of floating carcasses may accumulate at pond edges following massive mortality. When this occurs, ponds should be prevented from discharging. The majority of the mass die-off of fish should be removed promptly and transported to a permitted landfill, incinerated, composted, rendered, or ground up and applied to the land as fertilizer. Of course, when ponds are near residential areas, dead fish should promptly be removed or managed to prevent odor.

Some farmers apply calcium oxide (burnt lime) or calcium hypochlorite to carcasses that may accumulate after a fish kill with the intention of accelerating decomposition. This practice should not be used because it will actually retard the rate of decomposition of carcasses by killing bacteria.

Fish Carcasses

Practices

- *For routine mortality, the producer should implement measures to assure that fish carcasses do not exit ponds in overflow.*
- *Following massive mortality, overflow or other discharge from ponds should be prevented. A minimum period of 1 month should be allowed for decomposition of carcasses by processes in the pond. (Note: Do not restrict overflow for watershed/runoff type ponds.)*
- *In cases where overflow cannot be prevented for a minimum period of 1 month following massive mortality, fish carcasses must be removed from ponds for sanitary disposal.*
- *In cases where massive mortality may cause offensive odors to neighbors, fish carcasses should be removed from ponds as soon as possible for sanitary disposal.*

Implementation notes

Water should discharge from the surface of ponds because in-pond water quality is better in surface water than in deeper water. Dead fish tend to float, and they may enter overflow pipes. A screen can be put around entrances to overflow pipes of levee ponds to prevent fish from entering. The trash rack (Figure 1) on the riser of watershed (embankment) ponds will prevent the dead floating fish from exiting the pipe system. Fortunately, dead fish usually drift into corners of ponds or along shorelines and only would move to the drain during periods of heavy rain where there is considerable inflow and outflow.

References

- Boyd, C. E. and C. S. Tucker. 1998. Pond water quality management. Kluwer Academic Publishers, Boston, Massachusetts, USA.
- Tucker, C. S. and E. H. Robinson. 1990. Channel catfish farming handbook. Van Nostrand Reinhold, New York, New York, USA.

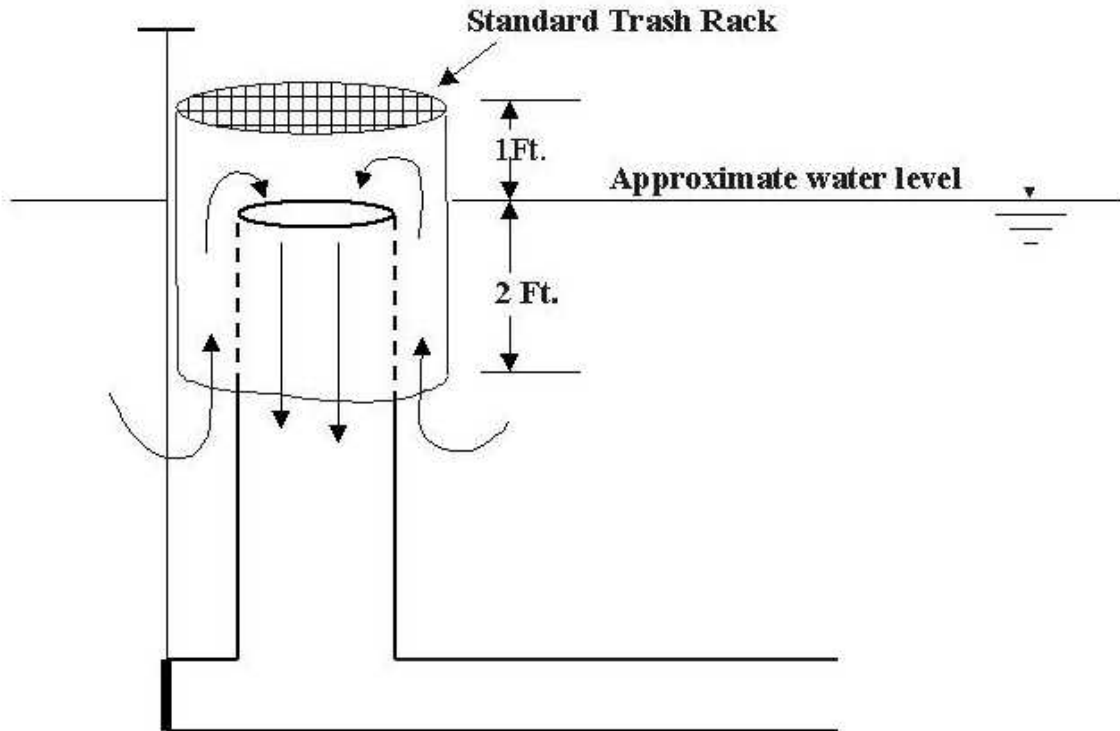


Figure 1. Standard trash rack over an upright pipe.



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