

Auburn University and USDA/Natural
Resources Conservation Service

Alabama Aquaculture
Best Management Practice (BMP)

Pond Management to Minimize Erosion

BMP No. 4



Definition

Erosion occurs in ponds as a result of wave action, water currents from aerators, inadvertent damage from vehicles or other equipment, and rain impacting on bottoms, dams, and embankments of empty ponds. Soil particles suspended by erosion increase total suspended solid concentrations in pond waters and effluents, and clay particles increase turbidity. Sediment removed from ponds and improperly disposed of can erode and cause contamination of surface water with suspended solids.

Explanation

Wave action causes water to impact on embankments and detach soil particles. Wave erosion is more severe in winter and spring because of greater wind velocity. Grass cover above the normal water level on the wet side of embankments provides protection from wave erosion. Erosion will be most severe when water levels are low and bare soil is exposed directly to waves and rainfall. When ponds are left completely or partially empty, rain falling on exposed bottoms may cause severe erosion, and turbid water containing high concentrations of suspended solids may exit through open drains.

Aerators generate strong water currents that can suspend soil particles from pond bottoms and detach soil particles from dams or embankments. Research has shown that the most severe erosion by aerators results when aerators are positioned to cause strong currents to travel close and parallel to embankments or when aerators are positioned so that strong currents impact directly against embankments.

Sediment accumulates in ponds over time, and ultimately ponds must be drained to remove sediment. If sediment is placed in unvegetated piles, rain falling on spoil piles will cause erosion and the runoff will be turbid with suspended soil particles.

Prevention of erosion

Practices

- *Close drains as soon as the maintenance or other activities for which the pond was drained are completed.*
- *Prevent if possible and repair immediately inadvertent damage caused by vehicles or other equipment.*
- *Stationary mechanical aerators should be installed so that water currents caused by these devices do not cause erosion of pond earthwork.*
- *Tractor-powered emergency aerators should be positioned to avoid erosion.*
- *Sediment should be used where possible to repair pond earthwork. If sediment is removed from ponds, it should be stabilized to prevent erosion.*
- *Earthen berms, riprap, or vegetation can be used to minimize the effects of erosion from waves.*

Implementation notes

Pond water levels should be maintained in winter and spring so that bare soil is not exposed to wave action. Of course, this practice will not be effective unless grass cover is maintained on embankments (See BMP No. 3).

Heavy rainfall can cause severe erosion and suspension of soil particles. Bottoms of empty ponds are susceptible to impact of rainfall and can be a source of highly turbid water. It is very important to close the drains of empty ponds to prevent turbid water from entering streams.

Stationary, electric paddlewheel aerators are used widely for pond aeration, but there still are many trailer-mounted, tractor-powered aerators in use. Both types of aerators can cause erosion.

Aerators usually must be installed near embankments, but water should be at least 3 feet deep directly below the paddlewheel. Aerators should be positioned so that the directed currents must travel for at least 300 feet before they impinge upon a dam or embankment. Aerator placement is illustrated in Figure 1.

Areas in front of aerators should be covered with stone. The location of the area to be protected from erosion will vary with type of aerator. The best way to identify the area is to investigate the erosion pattern in a recently drained pond. Information from old ponds can be used to identify the probable areas of erosion in new ponds.

This practice also can be used with tractor-powered emergency aerators. Because the trailers on which these aerators are mounted are long, they usually slide over the edges of embankments when backed into ponds. Damage to earthwork is common when emergency aerators are positioned in ponds or removed from ponds. Emergency aerators should always be placed in ponds at the same locations and these locations should be reinforced with stone or other material to prevent damage.

When sediment must be removed from ponds, it should be used to repair the insides of embankments if possible. Use of the sediment to repair outsides of embankments also is acceptable, but it should be immediately covered with vegetation.

References

- Boyd, C. E. 1998. Pond water aeration systems. *Aquacultural Engineering* 18: 9-40.
- Boyd, C. E., P. Munsiri, and B. F. Hajek. 1994. Composition of sediment from intensive shrimp ponds in Thailand. *World Aquaculture* 25:53-55.

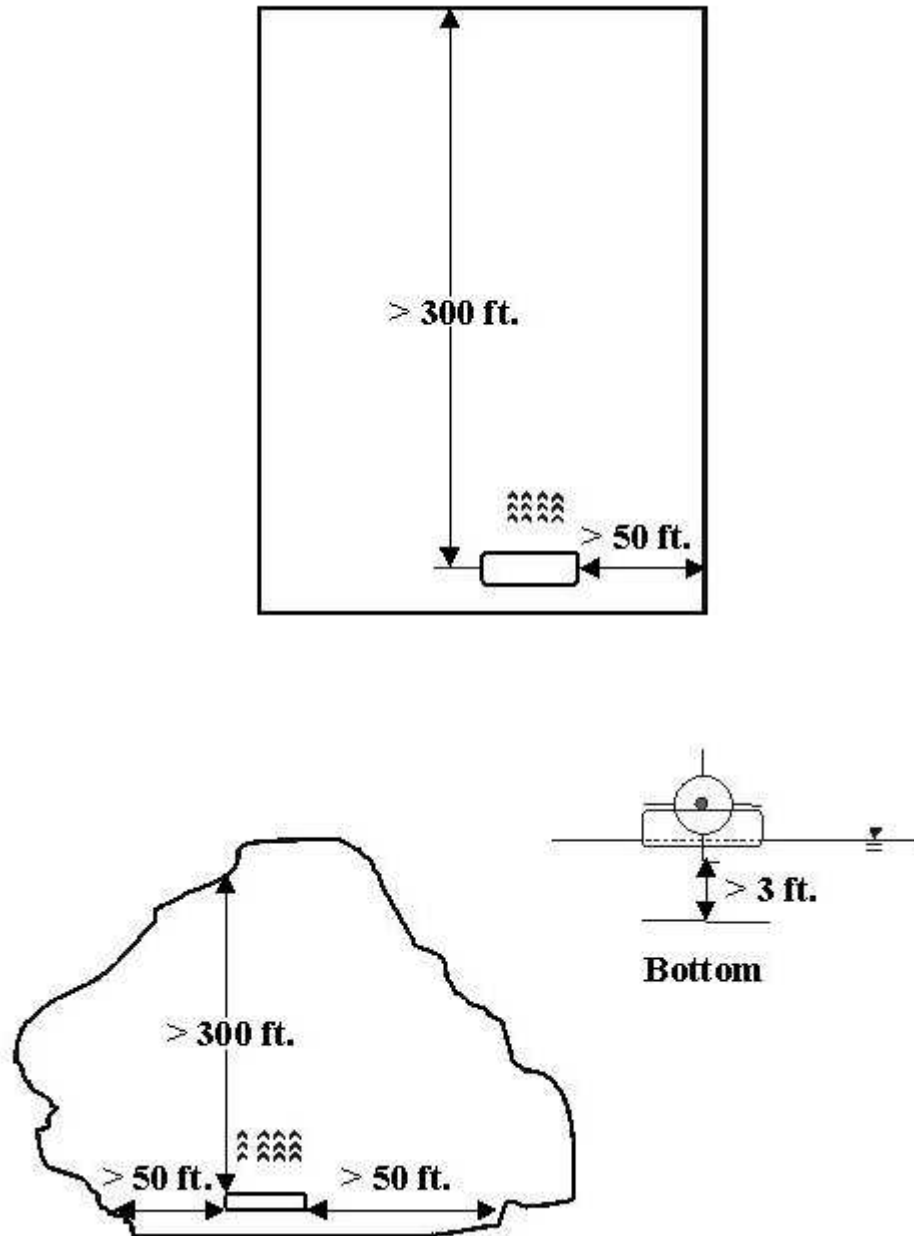


Figure 1. Illustration of aerator placement in a levee pond (upper) and a watershed pond (lower).



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