Auburn University and USDA-Natural Resources Conservation Service

Alabama Aquaculture
Best Management Practice (BMP)

Managing Crawfish Ponds

BMP No. 21

Definition

Several farms in Alabama produce red swamp crayfish (Procambarus clarkii), and white river crayfish (P. zonangulus) are also usually present as "volunteer" residents of culture ponds. These animals commonly are known as crawfish instead of crayfish in Alabama and other southern states.

Crawfish typically are reared in shallow ponds of 18 to 24 inches in depth and from one to several acres in area. Ponds should be constructed in level or gently sloping terrain. Crawfish dig burrows in the soil during the summer where they find moisture and survive until they re-emerge in the fall. The soil in crawfish ponds must be clayey enough to prevent burrows from collapsing.

New ponds are filled with water and stocked in April or May with crawfish usually obtained from another commercial pond. Ponds are drained in May or June and the crawfish burrow into the soil. Pond bottoms are planted with rice or sorghum sudan (Figure 1). Agricultural limestone is applied if soils are acidic, and inorganic, N-P-K fertilizers are used to promote forage production. Ponds are flooded in the fall, and adult crawfish and their young leave the burrows to forage on decaying vegetation in the pond. Mechanical aeration or water exchange (pond waters recycled, land applied, or discharged to surface stream) must be implemented to prevent low dissolved oxygen concentration as a result of decaying vegetation. Any discharges to State waters must be strictly managed to ensure that the pond water does not cause or contribute to a violation of the State Water Quality Standard for instream dissolved oxygen of 5.0 mg/l. Baffle levees may be constructed in ponds to improve water circulation and prevent zones of low dissolved oxygen concentration and impaired soil quality (Figure 2). Crawfish are harvested by trapping during late fall, winter, and spring. At the end of harvesting, ponds are drained, and the production procedure is repeated as illustrated in Table 1.

Table 1. Crawfish culture cycle.

Time	Activity
April-May	Stock adult crawfish (new ponds only)
May-June	Drain pond over a 2- to 4-week period
June-August	Plant crawfish forage or manage natural vegetation
October	Re-flood pond
November-May or June	Harvest crawfish
May or June	Drain pond and repeat cycle (without restocking crawfish)

In some locations, ponds cannot be drained and planted with vegetation. Natural aquatic macrophytes can be encouraged to grow in shallow, crawfish ponds but this vegetation is a poor substitute for planted forage and crawfish production will be low.

Explanation

As a result of fertilizer application to stimulate forage production and because of decay of forage after flooding, effluents from crawfish ponds may have higher concentrations of nitrogen, phosphorus, and organic matter and lower concentrations of dissolved oxygen than streams into which they discharge. Nevertheless, compared to other kinds of aquaculture, fertilizer inputs

are low and high-protein content feeds are not used. Moreover, the organic matter in crawfish pond effluents does not degrade as rapidly as that in fish and shrimp pond effluents. Therefore, if crawfish farm operators apply fertilizers conservatively and manage ponds to prevent low dissolved oxygen concentrations, effluents should be of relatively good quality. Moreover, ponds typically are drained in late spring when stream flow is moderate to high and capable of diluting modest inputs of nutrients and organic matter.

Operating crawfish ponds

Practices

All operations should install applicable practices from Aquaculture Best Management Practice (BMP) Nos. 1-15. In addition, the following practices should be used:

- *Management plans should be prepared by and practices implemented with the assistance of a professional engineer (PE) licensed in the State of Alabama or other qualified credentialed professional (QCP). Periodic inspections of the operation also should be conducted by a PE or QCP.*
- *Ponds should be aerated with electric paddle wheel aerators at least during the period when decay of vegetation is high and dissolved oxygen concentration may be low.*
- *To reduce the volume of effluents, water exchange should only be used when necessary.*
- *Fertilizer for vegetation should be applied in reasonable amounts and mixed into the soil.*
- *Dead crawfish should be disposed in a responsible manner according to NRCS technical standards and guidelines.*

Crawfish farms that qualify as concentrated aquatic animal production (CAAP) facilities must comply with EPA effluent limitation guidelines, applicable NRCS technical standards, and if required, ADEM NPDES permitting requirements.

Implementation notes

Implementation of applicable practices from BMP Nos. 1-15 will assure efficient and safe farm operations, reduce erosion of farm infrastructure, and improve the capacity of ponds to assimilate wastes. Of course, in crawfish culture, it may not be possible to cease water exchange completely as recommended in BMP No. 2. Nevertheless, it should be possible to greatly reduce water exchange by installing mechanical aeration and using water exchange only when dissolved oxygen concentration is low or other water quality variables, e.g., ammonia, hydrogen sulfite, nitrite or pH, are outside desirable ranges.

A general recommendation for fertilizing planted vegetation in crawfish ponds is to apply 60 to 80 lbs/acre of nitrogen and 30 lbs/acre of both potassium and phosphorus (P_2O_5). More accurate fertilization rates should be obtained by sending soil samples to the Auburn University Soil Testing Laboratory for determination of fertilizer requirements. Soil samples should be collected from the upper 6-inch layer and samples from 10 or 12 places in the pond combined and thoroughly mixed to provide a composite sample for analysis. The same sample can be used to determine if the pond bottom should be treated with agricultural limestone. Excessive fertilization should be avoided and the fertilizer should be mixed into the soil by tilling. Nitrate is a particularly good nitrogen source for pond bottoms, because the nitrate not taken up by plants will be denitrified and lost from the system after flooding. In clayey soils, most phosphorus will be fixed in insoluble iron, aluminum, or calcium phosphates, and little phosphorus will enter the water from the soil after flooding.

BMP No. 13 should be consulted concerning the management of large mortalities of crawfish that might occur as a result of disease or water quality impairment. Chloride concentration and saline water management is considered in BMP No. 16.

References

ADEM Administrative Code Chapter 335-6-6 (NPDES Rules)

Benoit, D. A. 1988. Ambient water quality criteria for chloride – 1988. United States Environmental Protection Agency, EPA 440/5-88-001, Washington, D.C.

Boyd, C. E., J. F. Queiroz, G. N. Whitis, R. Hulcher, P. Oakes, J. Carlisle, D. Odom, Jr., M. M. Nelson, and W. G. Hemstreet. 2003. Best management practices for channel catfish farming in Alabama. Special Report 1, Alabama Catfish Producers, Montgomery, Alabama.

Masser, M., G. Whitis, and J. Crews. Undated. Production of crawfish in Alabama. Alabama Cooperative Extension System, Circular ANR-891, Auburn University, Alabama.

McClain, W. R., J. L. Avery, and R. P. Romaire. 1998. Crawfish production, production systems and forages. Southern Regional Aquaculture Center, Publication No. 241, Stoneville, Mississippi.

Figure 1. A crawfish pond.

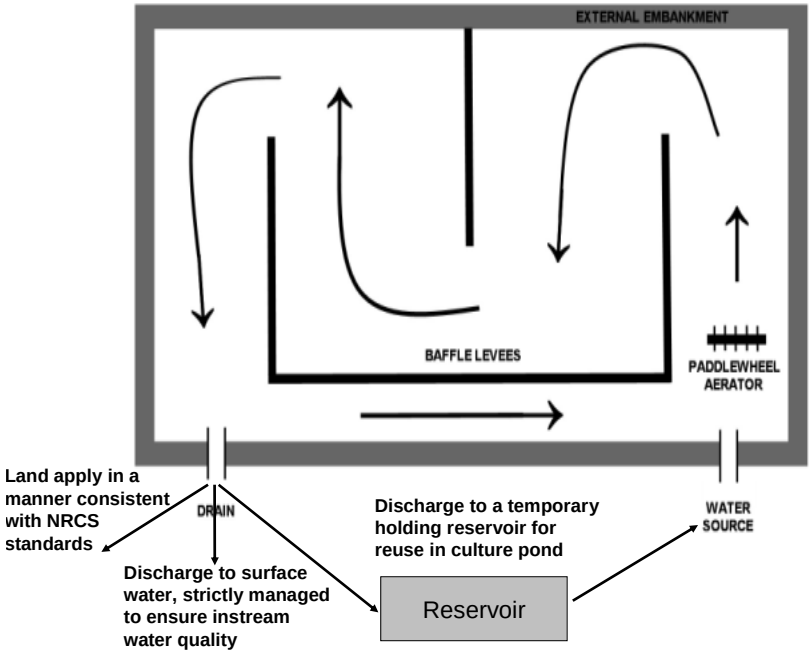

Figure 2. Conceptual drawing of crawfish pond with baffle levees and paddle wheel aeration to improve water circulation.

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