problems, the use of Thanite in sources of potable water should not be considered until methods for counteraction or removal of Thanite are developed.

ACKNOWLEDGMENTS

We thank the McLaughlin Gormley King Company of Minneapolis, Minnesota, for supplying the Thanite; ICI America Incorporated, Wilmington, Delaware, for providing the Atlox 1045-A; and Vinard G. Hitt, Fish Management Specialist, Florida Game and Fresh Water Fish Commission, and Jerry E. Moncrief, Biological Aid, U.S. Fish and Wildlife Service, for their assistance in conducting the field work.

REFERENCES

Burress, R. M. 1972. Field trial of Thanite as an aid for live collection of sport fishes at Max McGraw Wildlife Foundation, Dundee, Illinois on October 16-20, 1972. U.S. Fish Wildl. Serv., Southeast. Fish Control Lab., Warm Springs, Georgia, December 1972, typewritten. 27pp.

Cumming, K. B., R. M. Burress, and P. A. Gilderhus. 1975. Controlling grass carp (*Ctenopharyngodon idella* Val.) by chemical and physical means. Prog. Fish-Cult. (In press)

Lewis, W. M. 1968. Isobornyl thiocyanoacetate as a fish drugging agent and selective toxin. Prog. Fish-Cult. 30(1):29-31.

Southeastern Fish Control Laboratory. 1971. Annual report of progress for 1971. U.S. Fish Wildl. Serv., Southeast. Fish Control Lab., Warm Springs, Georgia, December 1971, typewritten. 23pp.

Summerfelt, R. C., and W. M. Lewis. 1967. Repulsion of green sunfish by certain chemicals. J. Water Pollut. Control Fed. 39(12):2030-2038.

THANITE: A FISH MANAGEMENT TOOL IN SOUTHLANDS EXPERIMENT FOREST PONDS

by

James L. Buckner and Carroll J. Perkins[1]
International Paper Company
Southlands Experiment Forest
Bainbridge, Georgia

ABSTRACT

Thanite (82% isobornyl thiocyanoacetate) has been used as a fish management tool on International Paper Company's Southlands Experiment Forest since 1968. Annually, Experiment Forest personnel successfully move 2,000 to 4,000 largemouth bass (*Micropterus salmoides*) with an 0.8 to 1 ppm (active ingredient) mixture of 80% Thanite - 20% Atlox 1045-A. Collection and survival percentages are higher when water temperatures are less than 70° F. Collected fish are placed in cans of untreated water in collection boats and later transferred to an aerated holding tank. Recovery in the tank is usually rapid and survival exceeds 90%.

INTRODUCTION

Thanite (82% isobornyl thiocyanoacetate) is an insecticide manufactured by McLaughlin Gormley King Company of Minneapolis, Minnesota. Thanite is not soluble in water but becomes emulsifiable when used in a mixture of 80% Thanite and 20% Atlox 1045-A, a commercial emulsifier manufactured by ICI America, Inc., Wilmington, Delaware.

Lewis (1968) first reported that Thanite had an anesthetizing effect on fish. Hunn (1972) described the drugging action as cyanide poisoning.

[1]Present address: Mississippi State University, School of Forest Resources, Starkville, Mississippi.

The Silver Lake section of International Paper Company's Southlands Experiment Forest (SEF) contains many small natural ponds which have low productivity and receive relatively heavy fishing pressure for largemouth bass (*Micropterus salmoides*). To sustain this fishing pressure and maintain quality fishing results, methods of moving fish from smaller "rearing" ponds to larger "fishing" ponds were tried including seining, trapping, electro-fishing, and the use of a flyrod. Seining proved impossible due to the extreme number of stumps, logs, and other debris; traps were ineffective for bass; and electro-fishing was unsuccessful because equipment had not yet been developed to work efficiently in waters with extremely low total hardness (range 0-12 ppm). The flyrod proved to be the most successful of the methods tried, but it worked well only in ponds with very high populations of small bass.

In 1968, Mr. Ralph Burress (Chief, Southeastern Fish Control Laboratory, Warm Springs, Ga.) notified us that an insecticide, Thanite, had been successfully used by Lewis to anesthetize fish and suggested that this might have practical application.

ACKNOWLEDGEMENTS

The authors express their appreciation to Mr. Ralph Burress for his interest and encouragement and Mr. Herb Wyatt for his assistance in the initial stages of this project.

METHODS

Following the manufacturer's recommendation to emulsify Thanite, we mixed a stock solution of 70% Thanite, 20% kerosene, and 10% Atlox 1045-A, and began using the chemical in the summer of 1968. Our trial had a two-fold purpose: first, to test the feasibility of using the chemical and, if successful, to develop a procedure for operational use.

On August 24, 1968, we treated our first two ponds, one with 0.41 surface acres (1.81 acre ft.) and another with 0.16 surface acres (0.40 acre ft.). Treatments were 1 ppm and 0.7 ppm (active ingredient), respectively.

Fish reaction was almost immediate in both ponds. Species collected were largemouth bass, bluegill (*Lepomis macrochirus*), and redear sunfish (*Lepomis microlophus*). Surface temperatures were 86° and 98°(F), respectively, and survival was poor, yet good enough to encourage further work in cooler water.

We resumed work with Thanite in October, 1968, and continued through March, 1969. Concentrations of 0.4 to 4.0 ppm were tried in 18 small ponds, and we successfully moved more than 2,000 largemouth bass which ranged in size from fingerlings to 7 pounds. Survival ranged from 60% to 100%, with an approximate average of 70%. We also collected bluegill, redear sunfish, spotted bass (*Micropterus punctulatus*), eastern lake chubsucker (*Erimyzon sucetta*), chain pickrel (*Esox niger*), crappie (*Pomoxis* spp.), warmouth (*Lepomis gulosus*), gizzard shad (*Dorosoma cepedianum*), threadfin shad (*Dorosoma petenense*), and striped bass (*Morone saxatilis*).

In 1970, two major changes were made in the collection procedure; first, we built a 250 gallon tank equipped with two 12-volt agitators to hold the fish as they were removed from the collection boats, and secondly, the Thanite mixture was changed. Mr. Ralph Burress (personal communication) had achieved better results in laboratory bioassays with an 80% Thanite - 20% Atlox 1045-A mixture than the 70% Thanite 20% kerosene - 10% Atlox 1045-A. With cool water (less than 70° F) and the aerated holding tank, survival increased to greater than 90%. We have not observed an increase in efficiency of fish collection after deleting the kerosene from the Thanite mixture, but neither have we observed a decrease under field conditions.

Application Procedure

a. Water Temperature

We use Thanite only after the water temperature falls below 70° F and have experienced poor results each time a thermocline has been encountered.

b. Pond Survey

The pond to be treated is measured and a topographic map is drawn. Patches of aquatic vegetation are carefully noted because drugged fish tend to hide in them and a substantial amount of this vegetation can severely lessen the success of the collection effort.

c. Thanite Concentration

A 1.0 ppm concentration (active ingredient) of 80% Thanite - 20% Atlox 1045-A has proven to be most desirable in Southlands waters. Although concentrations as low as 0.4 ppm have given acceptable results, time of collection is shorter with 1 ppm and the fish do not tend to hide as much as with the lower concentrations.

d. Treatment Application

The Thanite-Atlox mixture is poured into a 30-gallon drum mounted in a boat and the drum is then filled with water. A hose is attached to a spigot in the drum and is connected to the lower unit of the outboard motor just in front of the propeller. The prop wash of the outboard assists in distributing the diluted material into the pond water.

The deeper areas of the pond are treated either by "washing" with the outboard motor while the bow of the boat is lodged against a tree stump, or by pumping the diluted mixture down into them. Because fish avoid contact with Thanite, deep holes are usually treated first in order to force the fish into more shallow areas.

e. Fish Collection

Each boat used to collect fish is equipped with a large can - usually a 32-gallon garbage can with a plastic bag liner - filled with untreated pond water. Fish are picked up with a long-handled dip net, taken out of the net *by hand*, and placed into the can of water in the boat. If they are put into the holding can with the net, droplets of treated water from the mesh of the net fall into the untreated water of the can and may create a potentially lethal solution.

Fish reaction time varies with Thanite, as it does with many other chemicals, depending on the overall volume of water and the length of time required to get the material into solution.

Fish response to the treatment varies from the violent nervous reactions experienced with rotenone to slow, straight-line swimming. If the fish are not picked up in the open water of the pond, many end up against the bank and can be recovered there.

Although much recovery may take place in the can, the fish are soon removed from it - with a net used only for that purpose - and put into a holding tank equipped with agitators. Recovery here is usually quite rapid.

Collection of centrarchids can last over a 4 to 6 hour period. Fish remaining in the treated water for extended periods are slower to recover and have a lower survival percentage.

Unless there is an influx of fresh water into the pond, e.g., a stream, run-off from a rain, etc., most fish remaining in the pond are usually dead the following morning. Rotenone treatments while the fish are still weak from Thanite have given excellent eradication.

f. Species Susceptibility

The number of species in our ponds is limited but differential species susceptibility is obvious. We regularly collect centrarchids at 1 ppm and when encountered also take members of Clupeidae (shads), Percidae (darters), Catostomidae (chub suckers), and Esocidae (pickerel). We have collected golden shiners (*Notemigonus crysoleucas*) and mosquitofish (*Gambusia* spp.) at that rate, but it is rare and then only after long exposure. We rarely encounter carp (*Cyprinus carpio*) and have never collected one at the 1 ppm concentration. On one occasion we collected 16 striped bass which reacted very quickly to the 1 ppm application. At 4 ppm we have collected some ictalurids.

In November, 1973, we successfully captured 10 of 11 white amur *(Ctenopharyngodon idella)* weighing 6 to 9 pounds in a two-acre pond. Collection time ranged from 4 hrs. 35 min. to 7 hrs. As the first amur was netted, the 3rd ppm was being added.

SUMMARY

Thanite has been used on Southlands Experiment Forest as a fish management tool since 1968. Annually, SEF personnel have successfully moved 2,000 to 4,000 largemouth bass using an 0.8 to 1 ppm (active ingredient) of an 80% Thanite - 20% Atlox 1045-A mixture. Results are best in colder water temperatures with initial reaction time in very small ponds as low as 20 minutes. Collection of centrarchids can last over a 4 to 6 hour period. Recovery in an aerated holding tank is rapid and survival exceeds 90%. The length of time to recover depends on the amount of exposure and depth of sedation.

Collected fish, primarily largemouth bass, are used to stock new ponds, to replace fish removed by heavy fishing pressure, to crop overpopulated sunfish, and as breeders.

LITERATURE CITED

Hunn, J. B. 1972. The effects of exposure to thanite on the blood chemistry of carp. Prog. Fish-Cult. 34(2):81-84.

Lewis, W. M. 1968. Isobornyl thiocyanoacetate as a fish drugging agent and selective toxicant. Prog. Fish-Cult. 30(1):29-31.

AQUATIC MACROINVERTEBRATE RESPONSES TO AN EXTREME DRAWDOWN[1]

by

William Wegener, Vincent Williams and Thomas D. McCall
Fisheries Division
Florida Game and Fresh Water Fish Commission
207 Carroll Street
Kissimmee, Florida

ABSTRACT

An extreme drawdown conducted on Lake Tohopekaliga, Florida, improved littoral substrate, stimulated development of aquatic macrophytes and increased invertebrate standing crop. Benthic macroinvertebrates increased from 98 to 244 organisms per square foot in limnetic areas after reflooding; littoral benthos rose from 154 to 250 organisms per square foot. Phytomacrofauna increased from a predrawdown high of 304, to 1364 organisms per sample unit after reflooding, Standing crops decreased to predrawdown estimates within two years following peak production periods. These decreases were attributed mainly to predator cropping. Fish food organisms were favored by the drawdown, and their incidence in largemouth bass stomachs increased. As a final expression of increased production, sportfish populations which utilized these organisms nearly doubled.

INTRODUCTION

Aquatic substrate and vegetation communities can be manipulated to increase abundance and production of macroinvertebrates. In turn, this increase is passed through various trophic levels, terminating (for fishery management purposes) in higher standing crops of sportfish. Studies on Lake Tohopekaliga have shown that the simplest most economical method for accomplishing this is through extreme water fluctuation during the plant growing season.

[1]This is a contribution from Dingell-Johnson Project F-29-R, Florida.