Arkansas
AQUAFARMING
Cooperative Extension Program

Vol. 27 No. 1, Spring 2010

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Filamentous Algae (Pond Moss) Control

Nathan Stone, Extension Fisheries Specialist
George Selden, Extension Aquaculture Specialist

The Cooperative Extension Service receives many calls every year regarding problems with excessive growth of filamentous algae in farm ponds. Filamentous algae species (commonly called "pond moss") grow in long filaments and form spongy mats. Typically, the algae grow on the pond bottom in shallow areas, and then floats up to the surface in clumps. The following is a brief overview of some preventative measures and control methods for filamentous algae, but more detailed information can also be found in the fact sheet FSA9094, *Algal Blooms, Scums and Mats in Ponds*, downloadable at http://tinyurl.com/FSA9094.

Prevention - Filamentous algae problems may increase as ponds age and accumulate nutrients, especially ponds that receive organic fertilization (from ducks, application of poultry litter, septic tank field, etc). A key step in prevention is to avoid adding excess nutrients (phosphorus and nitrogen) to the pond. Nutrient inputs can be reduced by establishing a grass buffer zone around the pond.

Control Measures - Unfortunately, there is no 'magic bullet' for algae control, and no single solution works in all situations. The general approach to algae control is to remove as much of the algae as possible through mechanical and/or chemical method(s) and prevent the re-growth of the remaining algae by shading the pond bottom and stocking grass carp.

Mechanical Removal - The algae may be raked out from shallow water but remaining algae may grow and re-infest the pond unless additional control measures are taken.

Herbicides - Herbicide selection depends upon the species of algae to be treated, water temperature, water quality, cost and the herbicide restrictions regarding pond uses or activities (drinking, swimming, eating fish, dairy watering, watering other stock, crop irrigation). To help you select the right herbicide, be sure to consult the 2009 version of the Extension publication MP-44, *Recommended Chemicals for Weed and Brush Control* (accessible at http://tinyurl.com/mp44 herbicide).

Manual removal of algae from ponds is difficult and labor intensive.

For optimal control, aquatic herbicides should be applied when the plant is actively growing, generally at water temperatures above 60-65 degrees F. More than one treatment may be necessary especially if the algae mats are really thick. The herbicide may not penetrate deep enough into thick mats and may kill only the top layer of algae. The label on each herbicide will give specific information on dosages, any surfactants needed, use restrictions and safety measures.

The herbicides that have some degree of effectiveness for controlling filamentous algae are copper products, Diquat, Diquat mixed with a copper product and Hydrothol. However, several species of filamentous algae are especially difficult to treat. For example, black or brown mats of algae identified as

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Lyngbya species, are quite resistant to herbicide treatments. Algae filaments that feel "cottony" or like steel wool (*Cladophora* or *Pithophora* species) are resistant to copper sulfate. However, algae filaments with a slimy texture are typically easier to control with herbicides.

A major concern with aquatic herbicides is the potential for fish kill due to low dissolved oxygen concentrations in the pond resulting from the decomposition of the algae after treatment. To prevent fish mortalities due to the lack of oxygen, aeration should be provided in conjunction with herbicide treatments, no more than one-third to one-half of the pond should be treated at any one time and ponds should not be treated during the hot summer months.

Copper Products - Copper usually gives excellent control of algae, though some filamentous algae, such as *Pithophora*, *Cladophora* and *Lyngbya* are not as effectively killed as other algae species. Copper can be purchased in three forms; copper sulfate crystals, copper solution or as a chelated copper formulation. Copper sulfate crystals can be mixed with water (1 pound crystals: 1½ gallons water) to form a solution for immediate use. Some examples of commercial copper solutions are Copper Z4/4 and K-Tea. Some copper products are also labeled for tank mixing with some diquat products, which can give enhanced control.

A major concern with using copper sulfate is its potential toxicity to fish and its toxicity is dependent on the concentration of free carbonate ions in the water, which can be measured with an alkalinity water test kit. Copper toxicity to fish increases as water alkalinity decreases. Copper is not recommended for ponds with "soft" water, where the alkalinity is below 40 mg/L. Many farm ponds in Arkansas have water with low alkalinity concentrations, often below 20 mg/L. Your county Extension office can help arrange testing to determine the alkalinity of the pond water. Research does not support claims that chelated copper products provide greater safety in low alkalinity waters.

As a rule of thumb, maximum safe treatment rates for copper sulfate where fish are present can be calculated as follows.

- Maximum safe dose of copper sulfate $CuSO_4$ in ppm = Alkalinity/100. For example, if the alkalinity is 120, the maximum safe dose would be 1.2 ppm.
- Dose in pounds of copper sulfate per acre-foot to be treated = Maximum safe dose in ppm (from above) x 2.72. An acre-foot is equivalent to one surface acre of water that is one foot deep (43,560 cubic feet).

Copper is also not recommended for ponds where the alkalinity is above 250 mg/L, because free copper ions would bind quickly with free carbonate ions to form an insoluble precipitate, making it impossible to get an effective dose of copper.

Diquat - Diquat is rated as providing "good" control of some but not all species of filamentous algae. Diquat should not be applied to muddy water as the effectiveness will be reduced. Unlike copper sulfate, diquat can be used in low alkalinity water.

Hydrothol T - The endothall product, Hydrothol 191, is rated as "good" against filamentous algae. However, it is toxic to fish and at rates of active ingredient above 0.3 ppm, should only be applied by a professional applicator.

Sodium Carbonate Peroxyhydrate (SCP) – This product has only recently been approved for use in Arkansas. There are several formulations, such as Green Clean, PAK 27, and Phycomycin. These products produce the active ingredient, hydrogen peroxide, when introduced into water. Hydrogen peroxide is a powerful oxidizer and will rapidly kill algae. Rates vary according to the density of the algal growth and differences in the quantity of active ingredient based on the brand. Be sure to follow the label recommendations. Research indicates that the efficacy of hydrogen peroxide is enhanced by sunlight and warm temperatures. Anecdotal reports suggest that SCP products need to be incorporated into algal mats to be effective. Algal mats in deep water can be difficult to treat effectively, and the product will need to be inserted or injected directly into the algae masses. Treatment with sodium carbonate peroxyhydrate followed the next day by copper sulfate has been recommended for problematic filamentous algae. The hydrogen peroxide increases the permeability of algal cells, increasing the effectiveness of the copper treatment. Because of reduced effectiveness unless injected into the algal mats, it is likely that repeated treatments will be needed.

Shading - There are EPA registered aquatic dyes for use in ponds to color the water and reduce light penetration. These dyes do little to control weeds and algae in shallow water, but help reduce the depth to which sunlight penetrates into the water, shading out filamentous algae on the pond bottom in deeper water. These dyes may last for up to six weeks. They will reduce primary production and subsequently, food production for fish. If the primary use of the pond is for sportfishing and a green bloom is desired, fertilization of the pond will also help shade out the algae on the bottom. Fertilization is effective only after the water is above 65 degrees F, and should be done only after the bulk of the filamentous algae is removed or treated. Otherwise, the added nutrients will simply grow more filamentous algae.

Biological - Grass carp - Filamentous algae is not a favored food of grass carp. In fact, only high numbers of young grass carp (10 to 25 per acre or more) have been shown to provide some control of filamentous algae. While grass carp will eat fila-

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mentous algae if nothing else is available, older fish (larger than 3 lb) at typical stocking rates of 3 to 5 per acre are unlikely to provide control. Addition of small grass carp (but larger that 8-inches in ponds with bass) may help reduce re-infestations if little other underwater vegetation is present.

Tilapia - Field demonstrations in South Carolina and anecdotal reports in Texas showed that tilapia may provide control of filamentous algae. However, tilapia are a tropical fish; they die in cold water and normally would not over-winter outdoors in Arkansas. Thus they would have to be re-stocked each year. The main concern is that tilapia are exotic species and quite aggressive; they out-compete native fish species for nesting space and food. While much less of a concern than other exotic fish species such as snakehead, we do not recommend stocking of tilapia in farm ponds because of concern over possible escapes from these open ponds and the possibility of establishment of localized populations in thermal refuges. The three common tilapia species (blue, Nile and Mozambique) are legal aquaculture species in Arkansas, but the pond owner is responsible for any escapes.

Barley straw - On the internet, there are many references to the use of barley straw for filamentous algae control. Barley straw is not registered with the Environmental Protection Agency as a herbicide and is considered a "home remedy." As such, we do not recommend the use of barley straw and it cannot be used in public waters. Research studies in the U.S. show inconsistent results. It has shown some positive results as an inhibitor of algae growth but it is clear that barley straw is highly unlikely to provide any control of existing mats of filamentous algae.

Aquatic Herbicides for Arkansas Ponds

George Selden, Extension Aquaculture Specialist

With over 300,000 ponds and lakes in Arkansas, there is an abundance of potential habitat for aquatic weeds. All too frequently, an aquatic weed can become a problem and the pond owner may have no real choice but to use herbicides to control them. Herbicides that have been legal to use in non-food fish ponds for several years in Arkansas include: copper sulfate in various forms, endothal (aquathol and hydrothol), various forms of 2,4-D, diquat dibromide, glyphosate, fluridone (Sonar and others), imazapy (Habitat and others) and triclopyr (Renovate).

In 2009, several new aquatic herbicides received registration from the state Plant Board, making their use legal in Arkansas. They are imazamox (Clearcast), penoxsulam (Galleon), carfentrazone (Stingray) and sodium carbonate pentahydrate (Greenclean, PAK 27, Phycomycin).

Penoxsulam and imazamox are systemic heribicides, which target a specific plant enzyme, acetolactate sythase (ALS). As such, they are sometimes called ALS herbicides. This enzyme plays a key role in the production of amino acids needed for protein synthesis. Both of these herbicides can be fairly selective in which plants they kill, and as systemic herbicides can take weeks to kill the target weed. They are similar to fluridone in the length of time required to achieve control. Penoxsulam can be effective against submersed and floating weeds, while imazamox can be effective against floating, submersed and emergent plants.

Carfentrazone is a contact herbicide that inhibits the activity of specific plant enzymes, leading to plant death. It can be effective against many floating weeds, and submersed and emersed broadleaf weeds. Like many heribicides, use of a surfactant (or sinker with submersed weeds) will enhance effectiveness. This can be tank mixed with 2,4-D for a better weed kill.

Sodium carbonate pentahydrate (SCP) is a compound that converts into hydrogen peroxide when it comes in contact with water. As hydrogen peroxide, it can be an effective algaecide against planktonic and filamentous algae. Hydrogen peroxide rapidly breaks down into water and oxygen. It has no effect on higher plants and is very safe for use with fish. Due to this, it is a possible remedy for problem algae in low alkalinity water where copper sulfate is not a viable option. One reported problem with SCP is the difficulty of getting the herbicide pellets within filamentous algae mats, leading to reduced effectiveness.

None of these herbicides are currently legal for use in commercial food fish ponds. After correctly identifing the nuisance plant, consult the MP44 for a list of weed response ratings to help select the most effective herbicide. Follow all label recommendations.

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www.uaex.edu/aqfi/newsletters/

Drug Use in Aquaculture

Anita M. Kelly, Extension Fish Health Specialist

The use of drugs, pesticides and herbicides in fish culture venues are necessary to survive. A compound is considered an animal drug and is under the jurisdiction of the Center for Veterinary Medicine (CVM) if it is intended for use in the diagnosis, cure, mitigation, treatment or prevention of disease in animals and is intended to affect the structure or any function of the body of animals. The amount of data needed for approval is predicated on whether a fish is considered to be a food fish or non-food fish. A fish is considered to be a food fish species if there is a possibility it will be consumed for food by humans. CVM defines an aquaculture species as a non-food species if it is reasonably likely that no significant percentage of the species population will be consumed directly or indirectly by humans for food, or the fish species is not known to be consumed by an identifiable human population. By CVM's definition, baitfish and ornamental fish are non-food fish species.

When a drug is approved by CVM, the conditions of the approval are listed on its label. These conditions include: the species for which the drug is approved; the approved dosage; the approved route of administration; the approved frequency of use; mandatory withdrawal times; and the approved indications for use. Only a licensed veterinarian may legally prescribe or use an approved drug under conditions that are not listed on the label. CVM has a list of drugs that are approved for use in aquaculture. These drugs must be obtained from the sponsor of the approved drug. Using the same active ingredient or drug formulation from a non-approved source is illegal and can result in fines and or jail time. Currently, the approved drugs and their sources are:

Florfenicol (Aquaflor®) - supplied by Intervet/Schering-Plough Animal Health, Summit, NJ for control of mortality in 1) channel catfish due to enteric septicemia of catfish associated with *Edwardsiella ictaluri*, 12-day withdrawal time, 2) freshwater-reared salmonids due to coldwater disease associated with *Flavobacterium psychrophilum*, 15-day withdrawal time, 3) all freshwater-reared salmonids due to furunculosis associated with *Aeromonas salmonicida*, 15-day withdrawal time, and 4) catfish due to columnaris disease associated with *Flavobacterium columnare* (12-day withdrawal time; Conditional Approval). Aquaflor is a Type A Medicated Article by Veterinary Feed Directive.

Human Chorionic Gonadotropin (Chorulon®) - supplied by Intervet, Inc., Millsboro, DE, may be used as an aid in improving spawning function in male and female brood finfish; inherent withdrawal time.

Formalin solution - supplied by Argent Laboratories, Redmond, WA **(Paracide-S®)**, may only be used in trout, salmon, largemouth bass and bluegill to control 1) protozoa-*Ichthyophthirius* sp, *Chilodonella* spp., *Costia* spp., *Scyphidia* spp., *Epistylis* spp., and *Trichodina* spp., and 2) monogenetic trematodes-*Cleidodiscus* spp., *Gyrodactylus* spp., and *Dactylogyrus* spp. and control on salmon, trout and esocid eggs of fungi of the family Saprolegniaceae; zero withdrawal time.

Formalin solution - supplied by Western Chemical, Inc., Ferndale, WA (**Parasite-S®**), Natchez Animal Supply, Inc., Natchez, MS (**Formalin-F®**), and B.L. Mitchell, Inc. Leland, MS (**Formacide-B®**) may be used to control: a) external protozoa (*Chilodonella* spp., *Costia* spp., *Epistylis* spp., *Ichthyophthirius* spp. *Scyphidia* spp. and *Trichodina* spp.) on all finfish, b) monogenetic trematode parasites (*Cleidodiscus* spp., *Dactylogyrus* spp., and *Gyrodactylus* spp.) on all finfish, c) fungi of the family Saprolegniaceae on all finfish eggs, and d) protozoan parasites (*Bodo* spp., *Epistylis* spp., and *Zoothamnium* spp.) on penaeid shrimp; zero withdrawal time.

Hydrogen peroxide (35% PEROX-AID®) - supplied by Eka Chemicals, Inc., Marietta, Georgia for control of mortality in a) freshwater-reared finfish eggs due to saprolegniasis, b) freshwater-reared salmonids due to bacterial gill disease associated with *Flavobacterium branchiophilum*, and c) freshwater-reared coolwater finfish and channel catfish due to external columnaris disease associated with *Flavobacterium columnare* (*Flexibacter columnaris*); zero withdrawal time.

Tricaine methanesulfonate (MS-222) - supplied by Argent Laboratories, Redmond, WA (**Finquel®**), and Western Chemical, Inc., Ferndale, WA (**Tricaine-S®**), may only be used in the families *Ictaluridae* (catfish), *Salmonidae* (salmon and trout), *Esocidae* (pike) and *Percidae* (perch) when the fish is intended to be used for food. It may not be used within 21 days of harvesting fish that could be used for food. In non-food fish and in other cold-blooded animals, the drug should be limited to hatchery or laboratory use.

Oxytetracycline dihydrate (Terramycin® 200 in Fish) - supplied by Phibro Animal Health, Ridgefield Park, NJ for control 1) in catfish of bacterial hemorrhagic septicemia caused by *Aeromonas liquifaciens* and pseudomonas disease, 2) in salmonids of ulcer disease caused by *Hemophilus piscium*, furunculosis caused by *Aeromonas salmonicida*, bacterial hemorrhagic septicemia caused by *Aeromonas liquifaciens* and pseudomonas disease; For control of mortality in a) all freshwater-reared salmonids due to coldwater disease associated *Flavobacterium psychrophilum* and b) *Oncorhynchus mykiss* due to columnaris disease associated with *Flavobacterium columnare*. To remove limitation on treating salmonids in water temperatures below 9°C.; Type A medicated article; 21-day withdrawal time Marking in Pacific salmon of skeletal tissue; Type A medicated article; 7-day withdrawal time.

Oxytetracycline hydrochloride - supplied by Pharmaq AS, formerly I.D. Russell Company, Oslo, Norway (OxyMarine®); IVX Animal Health, Inc., formerly Phoenix Scientific, Inc., St. Joseph, MO; (**Oxytetracycline HCL Soluble Powder-343®**); Pfizer Animal Health, Kalamazoo, MI (**Terramycin 343®**); and Cross Vetpharm Group Ltd., Dublin, Ireland (**TETROXY AQUATIC®**) for skeletal marking in finfish fry and fingerlings; inherent withdrawal time.

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Sulfamerazine (Sulfamerazine in Fish Grade®) - supplied by Pharmaq AS (formerly American Cyanamid Company), Oslo, Norway; for control in rainbow trout, brook trout and brown trout of furunculosis *Aeromonas salmonicida*; Type A medicated article; 21-day withdrawal time. Note: this product is currently not marketed.
Sulfadimethoxine/ormetoprim (Romet® 30, Romet® TC) - supplied by Pharmaq AS (formerly Hoffmann-La Roche, Inc.), Oslo, Norway; for control in salmonids of furunculosis caused by *Aeromonas salmonicida*; Type A medicated article; 42-day withdrawal time; for control in catfish of enteric septicemia caused by *Edwardsiella ictaluri*; Type A medicated article; 3-day withdrawal time.

There are also two Indexed drugs allowed for use on ornamental fish. These drugs are unapproved drugs that can be legally marketed. They are as follows:
Salmon gonadotropin Releasing Hormone analog and Domperidone (Ovaprim®) - supplied by Western Chemical, Inc., Ferndale, WA for use as a spawning aid in ornamental fish
Metomidate (Aquacalm™) - supplied by Western Chemical, Inc., Ferndale, WA for the sedation and anesthesia of ornamental finfish.

In addition to the approved drugs, CVM also has a list of unapproved animal drugs used in aquaculture that are considered to be of low regulatory priority. CVM's enforcement position on the use of these substances should **not** be considered an approval, **or** an affirmation of their safety and effectiveness. CVM reserves the right to take a different position on the use of any or all of these substances at some time in the future. CVM is unlikely to object to the use of these substances if the following conditions are met: 1) The substances are used for these indications; 2) The substances are used at the prescribed levels; 3) The substances are used according to good management practices; 4) The product is of an appropriate grade for use in food animals, and 5) There is not likely to be an adverse effect on the environment. The low regulatory compounds are:
Acetic Acid - 1000 to 2000 ppm dip for 1 to 10 minutes as a parasiticide for fish.
Calcium Chloride - Used to increase water calcium concentration to ensure proper egg hardening. Dosages used would be those necessary to raise calcium concentration to 10-20 ppm CaC03. Used up to 150 ppm indefinitely to increase the hardness of water for holding and transporting fish in order to enable fish to maintain osmotic balance.
Calcium Oxide - Used as an external protozoacide for fingerlings to adult fish at a concentration of 2000 mg/L for 5 seconds.
Carbon Dioxide Gas - For anesthetic purposes in cold, cool and warm water fish.
Fullers Earth - Used to reduce the adhesiveness of fish eggs to improve hatchability.
Garlic (whole) - Used for control of helminth and sea lice infestations of marine salmonids at all life stages.
Ice - Used to reduce metabolic rate of fish during transport.
Magnesium sulfate - Used to treat external monogenic trematode infestations and external crustacean infestations in fish at all life stages. Used in all freshwater species. Fish are immersed in a 30,000 mg $MgS0_4$/L and 7000 mg NaCl/L solutions for 5 to 10 minutes.
Onion (whole) - Used to treat external crustacean parasites, and to deter sea lice from infesting external surface of salmonids at all life stages.
Papain - Use of a 0.2% solution in removing the gelatinous matrix of fish egg masses in order to improve hatchability and decrease the incidence of disease.
Potassium Chloride - Used as an aid in osmoregulation; relieves stress and prevents shock. Dosages used would be those necessary to increase chloride ion concentration to 10-2000 mg/L.
Povidone Iodine - 100 ppm solution for 10 minutes as an egg surface disinfectant during and after water hardening.
Sodium Bicarbonate - 142-642 ppm for 5 minutes as a means of introducing carbon dioxide into the water to anesthetize fish.
Sodium Chloride - 0.5% to 1.0% solution for an indefinite period as an osmoregulatory aid for the relief of stress and prevention of shock; and 3% solution for 10 to 30 minutes as a parasiticide.
Sodium Sulfite - 15% solution for 5 to 8 minutes to treat eggs in order to improve their hatchability.
Thiamine hydrochlorid - Used to prevent or treat thiamine deficiency in salmonids. Eggs are immersed in an aqueous solution of up to 100 ppm for up to four hours during water hardening. Sac fry are immersed in an aqueous solution of up to 1,000 ppm for up to one hour.
Urea and Tannic Acid - Used to denature the adhesive component of fish eggs at concentrations of 15g urea and 20g NaCl/5 liters of water for approximately 6 minutes, followed by a separate solution of 0.75g tannic acid/5 liters of water for an additional 6 minutes. These amounts will treat approximately 400,000 eggs.

There are also products found not to be low regulatory priority but regulatory action has been deferred pending further study. The two important ones for aquaculture include copper sulfate and potassium permanganate.

The most important list is the list of illegal drugs. Any drug that is not on the following lists: 1) approved drugs for aquatic species; 2) low regulatory priority unapproved drugs; 3) regulatory discretion; or 4) currently being tested under an Investigational New Animal Drug Application is considered illegal for use in food fish. However, in the United States, use of malachite green, chloramphenicol, nitrofurans, fluoroquinolones or gentian violet (also called crystal violet) as drugs in all aquacultured animals is illegal. The reasons these drugs are illegal is because research has shown that malachite green, chloramphenicol, gentian violet and nitrofurans are cancer-causing agents. Fluoroquinolones represent a critically important class of synthetic antibiotics used to treat serious infectious in humans. There is evidence that widespread application of fluoroquinolones in food animals could promote the evolution of drug-resistant pathogens that could be transmitted to humans via the food chain, and that resistant pathogens could be present at slaughter. Consequently, the ability to treat human diseases with these antimicrobial drugs could be compromised. Since CVM classifies malachite green, chloramphenicol, nitrofurans, fluoroquinolones and gentian violet as high enforcement priority, it is best not to have any of these drugs on your farm.

The New National Aquatic Animal Health Plan: What Does it Mean for Fish Farmers?

Andy Goodwin, Professor and Fish Pathologist

At the Federal level, the responsibility for protecting the health of farmed and wild fish is split between the USDA Animal and Plant Health Inspection Service (APHIS), the Department of the Interior U.S. Fish and Wildlife Service, (FWS) and the Commerce Department's National Oceanic and Atmospheric Administration (NOAA). When a disease problem arises, all of these agencies must work together to respond. In the past, these collaborations have been fairly difficult because the agencies have different goals and responsibilities.

The USDA-APHIS focuses on aquaculture and import/export, the FWS on wild fish and NOAA on ocean aquaculture and coastal fisheries. In times of crisis, there were no emergency plans and no prior agreement describing what each agency would do. This situation has led to delayed emergency responses, problems with international trading partners and serious financial impacts for farmers.

In 2001, the aquaculture industry worked through the Joint Subcommittee on Aquaculture (JSA) and asked the three federal agencies to work together on a National Aquatic Animal Health Plan (NAAHP) that would detail how the agencies would coordinate their efforts. As part of the process, the agencies held many stakeholder meetings with representatives of the aquaculture industries, aquatic animal health professionals and with state agriculture and wildlife agencies. The final product was published in the Federal Register. It can be seen at www.aphis.usda.gov/animal_health/animal_dis_spec/aquaculture/, or a copy can be requested from UAPB Aquaculture/Fisheries Extension specialists.

The good news for the aquaculture industry is that the plan is well thought out, comprehensive and sensitive to the needs of fish and shellfish farmers. This is the direct result of the three agencies' diligent effort to seek stakeholder input and to place the responsibility for drafting the plan into the hands of agency representatives that were knowledgeable about the practices and importance of commercial aquaculture.

The NAAHP is not a regulation. It is essentially a "road map" to establish the roles of the agencies and to describe how they will work together to meet the goals of the NAAHP. It does not contain a list of directives for farmers. However, some of the goals of the program, especially those related to international trade, do have the potential to directly affect farmers.

Our international trading partners do have certain expectations of the U.S. animal health system and rely on it to insure the health of live and processed aquatic animals exported from the United States. A critical part of that system is that we must have a reliable way to detect and report diseases existing on our farms and in our products. For this to work, we must have a national network of fish disease laboratories that all use the similar testing methods, and we must have a fish disease reporting system. Such a laboratory network is one of the key recommendations for the NAAHP, and preliminary plans for organizing a lab network are already underway. A system for disease reporting is much more challenging and will certainly involve some controversy.

For reporting to be useful, the system has to be detailed enough that you can answer a question like "where does whirling disease exist in the United States?" or "what is the distribution of SVCV in the United States?" On the other hand, producers and dealers may not want a data base with farm level data because their data could be used against them in the market place and could also lead to a loss of market access. The trick will be to find the middle ground where the system is useful, beneficial to farmers and regulators, but that will not reveal what farmers regard as proprietary information.

In summary, the NAAHP should reduce the impact and uncertainly when there are emergencies like VHS and SVC. The NAAHP will hopefully serve as a model that might lead to greater consistency among state regulations. The Plan will put the United States in a stronger position for international exports. The overall impact of the NAAHP should be beneficial to industry, but we will need to keep a close watch on how it is implemented to make sure that industry concerns are addressed.

Inexpensive Decoy Helps Eliminate Cormorants

George Selden, Extension Aquaculture Specialist

In 1998, the U.S. Fish and Wildlife Service passed a depredation order allowing the killing of double-crested cormorants around private fish farms to reduce removal of fish by these birds. The Service finalized the regulation in 2003 authorizing the taking of birds, egg and their nests. The order states that this can be done only within the boundaries of the aquaculture facility and only during daylight hours. Birds may be taken only by shooting and if a shotgun is used then non-toxic shot is required.

What many may not know is that decoys, taped calls or other devices may be used to lure the birds within gun range. Just like duck hunting, luring the birds to a pond where a farmer is prepared can lead to more efficient cormorant control and less wasted time and effort. With a 2-liter bottle, some black paint, string and weight, and a little aluminum foil, a useful decoy can be very simple to construct.

After spraying the bottle black, screw the strip of foil in the bottle cap. The flash of the foil simulates a fish in the mouth of a cormorant. Next, attach the string and weight, and then place the bottle with foil in the pond of your choosing. Since cormorants ride rather low in the water it may be necessary to add water to the bottle to get the bottle to sit in the water correctly. At this point the producer can prepare a blind and commence with eliminating or scaring the birds from the facility.

Thanks to Mike Freeze of Keo Fish Farm for decoy construction details.

Upcoming Events

Species Introductions and Re-introductions Symposium
April 8-9, Mississippi State University, Starkville, MS
For more information visit:
http://www.cfr.msstate.edu/wildlife/symposium/

Alltech's 26th Annual International Animal Health and Nutrition Symposium
May 16-19, Lexington, Kentucky
This year the symposium is adding an aquaculture segment entitled "Exploring opportunities in an industry with a bright future: Aquatic proteins to feed a growing population."
For more information visit:
www.alltech.com/symposium

XVIIth International Commission of Agricultural Engineering (CIGR) World Congress
June 13-17, Quebec City, Canada
This meeting will include a technical sessions on the theme of "Aquaculture." The sessions are aimed at bringing together engineers and scientists to discuss the latest achievements and research opportunities and will focus on onshore aquaculture and precision aqua farming.
For more information visit:
www.cigr.org/

The Sixth International Symposium Aquatic Animal Health
September 5-9, Tampa, Florida
Global Strategies for a Changing Environment
Additional info at:
http://aquaticpath.epi.ufl.edu/isaah6/

Energy Use in Fisheries: Improving Efficiency and Technological Innovations from a Global Perspective
November 14-17, Seattle, WA
This meeting will provide a forum for commercial and recreational fishermen, processors, engineers, boat and engine developers, aquaculturists, fisheries managers, administrators, scientists and others from around the world to meet and address both the direct and indirect effects of energy costs related to fisheries.
For additional information visit:
www.energyfish.nmfs.noaa.gov

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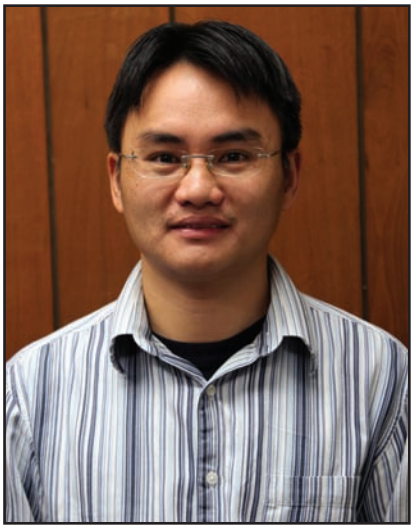
New Faculty Member at UAPB



Dr. Yushun Chen

Dr. Yushun Chen joined the aquaculture/fisheries faculty at the University of Arkansas at Pine Bluff in January. His post-doctoral training was in watershed development, water quality and ecosystem health at the Dauphin Island Sea Lab, Grand Bay National Estuarine Research Reserve and NOAA National Coastal Data Development Center. He received his Ph.D. in environmental engineering and science from West Virginia University and his B.S. and M.S. degrees in fisheries, aquaculture and aquatic ecology at a university in China.

Dr. Chen has field experience (lentic and lotic, freshwater and marine, watershed-aquatic ecosystems) in fish ponds, urban and rural lakes and lake-river wetlands in the Central Yangtze River Basin, to streams and watersheds in the Mid-Atlantic Highlands, to watershed-coastal ecosystems in the Gulf of Mexico, and now in the Lower Mississippi River Basin. He also has extensive laboratory training in physical (e.g., water quality), chemical (e.g., water quality), and biological analyses (e.g., fishes, aquatic plants, macroinvertebrates, and fecal coliform), and quantitative modeling training (e.g., statistical, hydrological, and GIS).

At UAPB, Dr. Chen will teach courses in water quality management, aquatic chemistry and analysis and limnology. His research will primarily focus on water quality management in fish ponds and environmental impacts and restorations from aquaculture and other anthropogenic stressors. Please feel free to contact with him at ychen@uaex.edu or 870-575-8136.

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Arkansas Aquafarming is published quarterly. Web address: www.uaex.edu/aqfi/newsletters
The purpose is to advance aquaculture production in Arkansas by providing reliable, practical, timely information.