

# Submitting a Sample for Fish Kill Investigation

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Fish kills occur both in natural populations and under aquaculture conditions. When fish kills or disease outbreaks occur on a fish farm or private pond or lake, it is usually an emergency situation. To optimize the response to a fish kill, producers should be prepared in advance.

#### How can I best be prepared for a fish kill or disease problem?

To minimize fish losses, the following preparations should be made:

- Have a water quality test kit and know how to use it;
- Know the telephone number and address of the fish disease diagnostic laboratory in your area;
- Call the laboratory and inquire as to how they prefer samples be shipped and what days and times samples can be delivered;
- Know how to collect appropriate samples;
- Have the type of container(s) needed to ship samples; and
- Determine the best method of transportation (personal delivery, bus, air freight, overnight express) and schedule that will ensure prompt delivery.

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# How can I determine if I have a water quality problem?

Poor water quality can cause massive fish kills and is often a major factor contributing to fish disease and parasite infections. Water quality does not remain constant. In ponds, it can change dramatically over a few hours. Even water from deep wells and springs can change over time. Commercial fish farmers should not rely on diagnostic laboratory results to identify water quality problems. It is extremely important and cost effective to have a water quality test kit, know how to use it, and be able to interpret the results. Water quality should be monitored routinely to identify problems before fish kills occur. In addition, any time fish appear stressed or fish mortalities are observed, water quality should be evaluated immediately for temperature, dissolved oxygen, total ammonia, pH, and nitrite. Other tests may be appropriate depending on results of the initial screen.

# How can I find the fish disease diagnostic laboratory in my area?

Contact the fish disease specialists in your state (listed in the Appendix).

# What type of sample should be submitted for evaluation?

In most instances live, sick fish and a water sample are required to have a high probability of determining the cause of a fish kill. An excellent sample would include several (three to six) live fish that exhibit obvious physical signs of disease such as:

- open sores;
- yellowish or light-colored, slightly eroded areas on the body, fins, gills, or in the mouth;
- swollen, fused, or clubbed gills; or
- eroded or bloody fins.

An excellent sample would also include fish exhibiting abnormal or unusual behavior such as lying listlessly in shallow water or at the water surface or swimming erratically or in circles. Recently dead fish that have gills, eyes, color and mucus that still appear as those of live fish are a fair sample, if live sick fish are unavailable. Dead fish that have floated to the surface of a pond are useless for diagnostic purposes. It is difficult to tell if the bacteria found in the dead fish were responsible for its disease condition.

A water sample without fish is usually of little value in determining the cause of a fish kill. Sometimes, however, toxic fish waste products such as ammonia and nitrite are responsible for the death of the fish. Toxic chemicals entering ponds from outside sources may be the cause of fish mortalities. Therefore, a water sample should be submitted to the diagnostic laboratory along with the fish sample.

Special sampling and handling procedures may need to be taken

if a toxic substance is suspected in a fish kill. In many states, very specific instructions must be followed if any legal action is to be taken. Request approved procedures from the diagnostic laboratory in your state (listed in the Appendix) before collecting samples.

# What is the best method to collect sick fish?

The best method for collecting sick fish is to walk the pond bank with a dip net or cast net and selectively remove fish which are at the surface, at the water's edge, or otherwise appear abnormal. It may take extra effort to find and catch sick fish in this manner, but the quality of the resulting information will be well worth it. A random sample of fish taken from a seine has a poor probability of identifying the cause of the fish loss, because many of the fish in the pond may be healthy. The worst way to collect sick fish is by hook and line. Sick fish usually do not eat; the healthiest fish in the pond will still be actively feeding. Therefore, the use of a rod and reel to collect fish will result in a sample of little or no diagnostic value.

# How many fish and how much water should be included in the sample?

Ideally, a minimum of three to six sick fish should be submitted for examination. If only one fish is submitted it is possible that an inaccurate or incomplete diagnosis will result; one fish is usually not completely representative of a population. Most fish disease outbreaks involve more than one problem, Therefore, a representative sample is essential for good management decisions.

In ponds larger than one surface acre, a minimum of two one-pint water samples should be collected from opposite ends of the pond for analysis. Dissolved oxygen should be checked by the producer at the pond bank; this parameter cannot be accurately measured at the laboratory. Do not combine fish and water in the same container.

# What containers are best for shipping samples to a diagnostic laboratory?

Ideally, sick fish should be transported live. If the diagnostic lab is within an hour's drive, sick fish can be transported in a container of water. Sick fish can also be shipped live in a plastic bag with water and oxygen for several hours. The bag is sealed and is placed in an insulated shipping ith ice to keep water temperature cool. For longer shipping times, sick fish or fish that have just died should be wrapped in a moist paper towel, placed in a plastic bag (without water), and transported on crushed ice in a cooler or styrofoam lined shipping box. A sample handled in this manner should be of diagnostic value for up to 48 hours. Sick or recently dead fish can be frozen and used for bacterial cultures but are of little value for parasites identification on skin, fins, and gills.

Water samples can be collected in any clean glass or plastic jugs or jars. The water sample, of at least a pint in volume, should be transported on ice with the fish sample. As previously mentioned, special instructions must be followed in cases where a toxic substance may be involved.

# What information should be provided with the samples?

The following information should be included with each sample submitted to a fish disease laboratory.

- 1. Name, address, and phone number of the owner of the fish.
- 2. Name or designation of pond or tank from which fish were removed. (Note: Fish collected from different ponds or tanks should be labeled and shipped in separate containers and accompanied by a water sample from each unit.)
- 3. Dimensions of pond or tank, including depth.
- 4. Species, number, and average size of fish stocked.

- 5. Date when fish were last stocked (include number, species, and size stocked).
- 6. Amount fed per day. (Are fish still eating? If not, when did they stop eating?)
- 7. Date when mortalities were first noticed.
- 8. Number of fish that have died per day since mortalities were first noticed.
- 9. The most recent treatment used, including treatment date and amount of chemical used.
- 10. Condition of the plankton bloom, determined by the maximum depth that a pie plate attached to a yardstick can be seen.
- 11. Any water quality data collected by the owner.

#### What steps can be taken to control losses while awaiting results?

Individual laboratories vary in the time period required to process the sample and communicate the results to the producers. In most cases, water quality data and results of the necropsy and parasitology examination should be available within 24 hours of receipt of the fish. Depending on circumstances and the degree of fish loss, a preliminary assessment may be made at that time.

Microbiology (bacterial isolation and sensitivity), virology (identification of virus), and histopathology (microscopic examination of specially prepared tissues) take more time. Bacterial isolation and sensitivity are usually complete within 48 to 96 hours, but virology and histopathology may take one to two weeks for completion.

The best approach is to improve water quality while waiting for diagnostic results. Increased aeration and a fresh water flush can help alleviate many problems.

## Conclusions

Fish kills occur both in natural populations and under aquaculture conditions. In aquaculture facilities, good management and nutrition practices, however, can help prevent fish kills. When fish kills do occur on a fish farm or private pond or lake, it is usually an emergency situation. To optimize the response to a fish kill, producers must be prepared to check water quality parameters, obtain a proper fish and water sample, and transport it as quickly as possible to a diagnostic laboratory. While waiting for diagnostic results, the best approach is to improve water quality.

## Appendix

#### Alabama

Fish Health Laboratory Swingle Hall Auburn University, AL 36849-5419 (205) 844-9220 Alabama Fish Farming Center P.O. Box 487 Greensboro, AL 36744 (800) 423-5496 / (205) 624-4016

#### Arkansas

Fish Disease Laboratory Arkansas Cooperative Extension Service Chichot County Extension Office Highway 85 and 62 Lake Village, AR 71653 (501) 265-5883 Fish Disease Laboratory Arkansas Cooperative Extension Service Lonoke Agricultural Center P.O. Drawer D Lonoke, AR 72086 (501) 676-3124 Fish Farming Experimental Laboratory U.S. Fish and Wildlife Service P.O. Box 860 Stuttgart, AR 72160-0860 (501) 673-4483

#### Florida

IFAS Extension Veterinarian for Aquaculture Aquaculture Animal Medical Lab 7922 NW 71st Street Gainesville, FL 32606-0300 (904) 392-9617 Aquaculture Extension Specialist Hillsborough County Extension Office 5339 State Road 579 Seffner, FL 33584 (813) 621-5605 Northwest Florida Aquaculture Farm P.O. Box 434 Blountstown, FL 32424 (904) 674-8353

## Georgia

Athens Diagnostic Laboratory College of Veterinary Medicine The University of Georgia Athens, GA 30602 (404) 542-5568 Animal Science Department Coastal Plain Experiment Station The University of Georgia P.O. Box 748 Tifton, GA 31793-0748 (912) 386-3364 Extension Aquaculture and Fisheries

Department The University of Georgia Athens, GA 30602 (404) 542-1924

Warm Springs Fish Health Center U.S. Department of Interior Fish and Wildlife Service Route 1, Box 105 A Warm Springs, GA 31830 (404) 655-3620

#### Kentucky

State Specialist for Aquaculture Cooperative Extension Program Kentucky State University Frankfort, KY 40601 (502) 227-6581

### Louisiana

Louisiana Wildlife & Fisheries Commission District 11 P.O. Box 4004 Monroe, LA 71203 (318) 343-4044

Aquatic Animal Diagnostic Laboratory School of Veterinary Medicine Louisiana State University Baton Rouge, LA 70803 (504) 346-3312

#### Mississippi

Delta Research and Extension Center Fish Disease Diagnostic Laboratory Box 197 Stoneville, MS 38776 (601) 686-9311 Mississippi Cooperative Extension Service Fish Disease Diagnostic Laboratory Box 631 Belzoni, MS 39038 (601) 247-2917 Fish Diagnostic Laboratory College of Veterinary Medicine Drawer V Mississippi State MS 20762

Mississippi State, MS 39762 (601) 325-3432

#### **North Carolina**

North Carolina Cooperative Extension Service North Carolina State University Department of CASS CVM-NCSU 4700 Hillsborough Street Raleigh, NC 27606 (919) 829-4200 North Carolina Cooperative Extension Service North Carolina State University Department of Zoology MHCREC-NCSU 2016 Fanning Bridge Road Fletcher, NC 28732 (704) 684-3562 Rollins Animal Disease Diagnostic Laboratory P.O. Box 12223 Blue Ridge at Reedy Creek Rd. Raleigh, NC 27605 (919) 733-3986 Animal Disease Diagnostic Laboratory P.O. Box 38, Paradise Road Edenton, NC 27932 (919) 482-3146 Rose Hill Animal Disease Diagnostic Laboratory P.O. Box 37 Rendering Plant Road Rose Hill, NC 28458 (919) 289-2635 Northwestern Animal Disease Diagnostic Laboratory P.O. Box 70 Eldin, NC 28621 (919) 526-2499 Western Animal Disease Diagnostic Laboratory Airport Road Arden, NC 28704 (704) 684-8188 Oklahoma Southeast District Fish Disease Diagnostic Laboratories Oklahoma Cooperative Extension

Oklahoma Cooperative Extensio Service P.O. Box 1378 Ada, OK 74820 (405) 332-4100 Fish Culture Project Langston University P.O. Box 730 Langston, OK 73050 (405) 466-3836

#### **Puerto Rico**

Department of Marine Sciences University of Puerto Rico P.O. Box 5000 Mayaguez, Puerto Rico 00709-5000 (809) 899-2048

### South Carolina

Cooperative Extension Services Department of Aquaculture, Fisheries & Wildlife G 08 Lehotsky Hall Clemson University Clemson, SC 29634-0362 (803) 656-2810

#### Tennessee

Department of Biology University of Tennessee Martin, TN 38238 (901) 587-7170

## Texas

Fish Disease Laboratory Wildlife and Fisheries Sciences Department Texas A&M University College Station, TX 77843-2258 (409) 845-7473

### Virginia

Aquatic Animal Medicine Laboratory Virginia-Maryland Regional College of Veterinary Medicine Virginia Tech Blacksburg, VA 24061 (703) 231-5131 Extension Aquaculture Specialist Virginia State University P.O. Box 540

Petersburg, VA 23803 (804) 524-5903

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