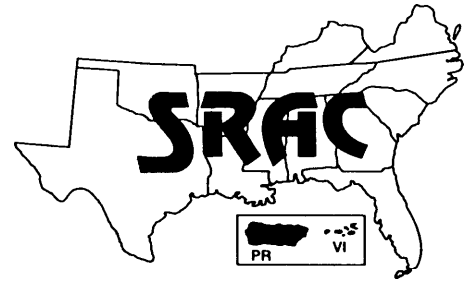


Southern Regional Aquaculture Center



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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.

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

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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 container with 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
Chicot 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 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
MHCRC-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
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