

Introduction to Fish Health Management¹

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What Is Fish Health Management?

Fish health management is a term used in aquaculture to describe management practices that are designed to prevent fish disease. Once fish get sick, it can be difficult to salvage them.

Successful fish health management begins with prevention of disease rather than treatment. Prevention of fish disease is accomplished through good water quality management, nutrition, and sanitation. Without this foundation it is *impossible* to prevent outbreaks of opportunistic diseases. Fish are constantly bathed in potential pathogens (disease-causing organisms), including bacteria, fungi, and parasites. Even use of sterilization technologies (e.g., ultraviolet sterilizers, ozonation) does not eliminate all potential pathogens from the environment. Suboptimal water quality, poor nutrition, or immune system suppression caused by stressful conditions allow these potential pathogens to cause disease. Medications used to treat these diseases can buy some time for the fish to overcome opportunistic infections, but medications cannot substitute the need for proper animal husbandry.

Daily observation of fish appearance, behavior, and feeding activity allows early detection of problems when they do occur, so that a diagnosis can be made before the majority of the population becomes sick. If treatment is indicated, it will be most successful if it is implemented early in the course of the disease while the fish are still in good shape.

The Significance of Fish Disease to Aquaculture

Fish disease is a substantial source of monetary loss to aquaculturists. Production costs are increased by fish disease outbreaks because of the investment lost in dead fish, cost of treatment, and decreased growth during convalescence. In nature, we are less aware of fish disease problems because sick animals are quickly removed from the population by predators. In addition, fish are much less crowded in natural systems than in captivity. Parasites and bacteria may be of minimal significance under natural conditions but can cause substantial problems when animals are crowded and stressed under culture conditions.

Disease is rarely a simple association between a pathogen and a host fish. Other factors are usually needed for active disease to develop in a population. These circumstances are generally grouped under the general term "stress" (Figure 1). Stress is discussed in greater detail in the UF/IFAS Extension Circular 919, *Stress—Its Role in Fish Disease*. Management practices directed at limiting stress are likely to be most effective in preventing disease outbreaks.

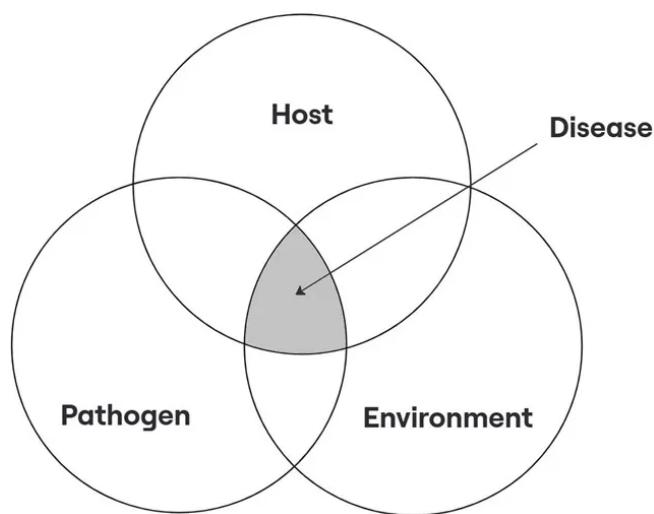


Figure 1. Disease rarely results from simple contact between the fish and a potential pathogen. Environmental problems, such as poor water quality and other stressors, often contribute to the outbreak of disease.

Credit: UF/IFAS

Determining If Your Fish Are Sick

The most obvious sign of sick fish is the presence of dead or dying animals. However, the careful observer can usually tell that fish are sick before they start dying because sick fish often stop feeding and may appear lethargic. Healthy fish should eat aggressively if fed at regularly scheduled times. Pond fish should not be visible except at feeding time. Fish that are observed hanging listlessly in shallow water, gasping at the surface, or rubbing against objects indicate something may be wrong. These behavioral abnormalities indicate that the fish are not feeling well or that something is irritating them.

In addition to behavioral changes, there are physical signs that should alert producers to potential disease problems

in their fish. These include the presence of sores (ulcers or hemorrhages), ragged fins, or abnormal body conformation (i.e., a distended abdomen or "dropsy" and exophthalmia or "popeye"). When these abnormalities are observed, the fish should be examined for parasitic, bacterial, fungal, or viral infections.

What to Do If Your Fish Are Sick

If you suspect that fish are getting sick, the first thing to do is check the water quality. If you do not have a water quality test kit, contact your local UF/IFAS Extension office; some counties have been issued these kits, and your Extension agent may be able to help you. If your county is not equipped with a water quality test kit, call your nearest aquaculture Extension specialist (see the list at the end of this publication). Anyone contemplating commercial production of fish should invest in a water quality test kit and learn how to use it. An entry level kit for freshwater aquaculture can be purchased for a few hundred dollars and can save thousands of dollars' worth of fish with its first use. Less expensive test kits are available for hobbyist use, but these tend to be more basic and less accurate. In addition to a general water quality test kit, a dissolved oxygen meter should be considered essential equipment for commercial operations.

Low oxygen is a frequent cause of fish mortality in ponds, especially in the summer when the water is warmer. High levels of ammonia are also commonly associated with disease outbreaks when fish are crowded in vats or tanks. Separate Extension fact sheets are available that explain oxygen cycles, ammonia cycles, and management of these water quality problems (search the "Ask IFAS" website: <https://edis.ifas.ufl.edu/> and the "SRAC: Publications" website: <https://srac.tamu.edu/>). In general, a minimum water quality screen during a fish disease outbreak should check dissolved oxygen, ammonia, nitrite, and pH levels. Other parameters of significance include total alkalinity, total hardness, nitrate (especially in saltwater systems), carbon dioxide, and chlorine (if using city water).

Ideally, daily records should be available for immediate reference when a fish disease outbreak occurs. These should include the dates fish were stocked, size of fish at stocking, source of fish, feeding rate, growth rate, daily mortality numbers, and water quality data. This information is needed by the aquaculture specialist working with you to solve your fish disease problem. Good records, a description of behavioral and physical signs exhibited by sick fish, and results of water quality tests provide a complete case history for the diagnostician working on your case.

Professional assistance is available to Florida residents through UF/IFAS Extension, the UF College of Veterinary Medicine, the Department of Agriculture and Consumer Services, Division of Animal Industry and Division of

Aquaculture, as well as several private laboratories and veterinary practices. A list of public resources is included at the end of this publication.

If you decide to submit fish to a diagnostic laboratory, you should first contact them to get specific instructions on how to select and transport or ship fish to them. For example, if the fish cannot be transported alive or may not survive shipment, they may ask you to collect live, sick fish, place them in a freezer bag (without water), and ship them on ice to the nearest facility. Small fish can be shipped alive by placing them in plastic bags that are partially filled (30%) with water. Oxygen gas can be injected into the bag prior to sealing it. An insulated container is recommended for shipping live, bagged fish to minimize temperature fluctuations during transit. In addition to fish samples, a water sample collected in a clean jar should also be submitted. Detailed information on submitting samples is available in UF/IFAS Fact Sheet FA-55, *Submission of Fish for Diagnostic Evaluation*.

Types of Fish Diseases

There are two broad categories of disease that affect fish: infectious and non-infectious diseases. Infectious diseases are caused by pathogenic organisms present in the environment or carried by other fish. They are contagious diseases, and some type of treatment may be necessary to control the disease outbreak. In contrast, non-infectious diseases are caused by environmental problems, nutritional deficiencies, or genetic anomalies; they are not contagious and usually cannot be cured by medications.

Infectious Diseases

Infectious diseases are broadly categorized as parasitic, bacterial, viral, or fungal diseases.

Parasitic diseases of fish are most frequently caused by organisms called protozoa, which live in the aquatic environment, although other types of parasites, including flatworms called monogeneans, can also be problematic. There are a variety of protozoans that infest the gills and skin of fish, causing irritation, weight loss, and eventually death. Most protozoan infections are relatively easy to control using standard fishery chemicals such as copper sulfate, formalin, or potassium permanganate. Information on specific diseases and proper use of fishery chemicals is available from your fish health specialist.

Bacterial diseases are often internal infections and may require treatment with medicated feeds containing antibiotics that are approved for use in fish by the Food and Drug Administration. Medicated feeds are closely regulated, and a veterinarian will have to issue a Veterinary Feed Directive for any antibiotic use in fish that are cultured for food. Fish health specialists are available in Florida to assist you with this process.

Fish infected with a bacterial disease may show a variety of signs, including hemorrhagic spots or ulcers along the body wall and around the eyes and mouth. If the infection is internal, they may also have an enlarged, fluid-filled abdomen and protruding eyes. Some bacterial diseases can be initiated by rough handling, making the fish more susceptible to skin damage and opportunistic bacteria entering the wounds from the water. This typically leads to erosions and ulcerations in the skin. *Columellaris* is a common example of an external bacterial infection that may be initiated by rough handling.

Viral diseases are impossible to distinguish from bacterial diseases without special laboratory tests. They are difficult to diagnose and there are no specific medications available to cure viral infections of fish. Consultation with an aquaculture or fish health specialist is recommended if you suspect a bacterial or viral disease is killing your fish.

Fungal and fungus-like diseases are the fourth type of infectious disease and include a group known as water molds. Fungal spores are common in the aquatic environment, but do not usually cause disease in healthy fish. When fish are infected with an external parasite, bacterial infection, or injured by handling, the fungus or water mold can colonize damaged tissue on the exterior of the fish. These areas appear to have a cottony growth or may appear as brown matted areas when the fish are removed from the water. Formalin or potassium permanganate can be effective against most fungal infections, if not too severe. Since fungi are usually a secondary problem, it is important to diagnose the original problem and correct it as well.

Non-Infectious Diseases

Non-infectious diseases can be broadly categorized as environmental, nutritional, or genetic.

Environmental diseases are the most important in commercial aquaculture. Environmental diseases include low dissolved oxygen, high ammonia, and high nitrite, as well as natural or man-made toxins in the aquatic environment. Proper techniques for water quality management enable producers to prevent most environmental diseases. There are separate UF/IFAS publications that address water quality management in greater detail. As stocking densities and feeding rates increase, water quality management becomes more complex.

Nutritional diseases can be very difficult to diagnose. A classic example of a nutritional disease of catfish is "broken back disease," caused by vitamin C deficiency. The lack of dietary vitamin C contributes to improper bone development, resulting in deformation of the spinal column. Nutritional diseases can also result from improper storage of feeds leading to breakdown of nutrients or pathogen contamination. There have been many advances

in fish nutrition in recent years and commercial growers are encouraged to work with their fish health professional for assistance in nutritional management of their stocks.

Genetic abnormalities include conformational oddities such as lack of a tail or presence of an extra tail. Most of these are of minimal significance; however, it is important to bring in unrelated fish for use as broodstock every few years to minimize inbreeding. Most fish culturists will cull young fish that have obvious abnormalities rather than grow them out.

Summary

There are many diseases of fish that can be troublesome to commercial producers as well as the recreational pond owner. Many disease outbreaks of captive fish stocks are associated with stressful conditions such as poor water quality, excessive crowding, or inadequate nutrition.

There are two broad categories of disease that relate directly to selection of appropriate treatments:

1. Infectious diseases are contagious diseases caused by parasites, bacteria, viruses, or fungi. These often require some type of medication to help the fish recover.
2. Non-infectious diseases are broadly categorized as environmental, nutritional, or genetic. These problems are often corrected by changing management practices.

Fish disease outbreaks are often complex, involving both infectious and non-infectious processes. Appropriate therapy often involves medication and changes in husbandry practices. Assistance from UF/IFAS aquaculture Extension specialists is available to help you manage disease outbreaks and develop management programs to prevent them. A list of public laboratories available to assist with diagnosis of fish disease is provided for your convenience at the end of this publication. There are many private veterinarians willing to see fish or aquaculture species in their practice. Your aquaculture veterinary Extension specialist may be able to refer you to a veterinarian in your area.

State Specialists

UF/IFAS Extension Aquaculture Specialists

UF College of Veterinary Medicine Aquatic Animal Health Program
2015 SW 16 Ave
Gainesville, FL 32608
(352) 294-4198
Vm-aquaticAHP@ad.ufl.edu

UF/IFAS School of Forest, Fisheries, and Geomatics Sciences Tropical Aquaculture Laboratory
(commercial aquaculture clients only)
1408 24th Street SE
Ruskin, FL 33570
(813) 671-5230

Florida Department of Agriculture and Consumer Services, Division of Animal Industry
Bronson Animal Disease Diagnostic Laboratory
2700 N John Young Pkwy
Kissimmee, FL 34741
(321) 697-1400

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