

Diagnostic Services in Illinois and Indiana

LaDon Swann
Illinois-Indiana Sea Grant Program
Purdue University

Fish diseases are a common problem plaguing the aquaculture industry. Because of this problem, a basic understanding of the nature of fish diseases is important for aquaculturists who need to be better equipped to prevent and handle disease outbreaks. Without an understanding of what causes fish diseases, the aquaculturists will suffer economic losses.

What Is an Infectious Fish Disease?

Fish, like all animals, are subject to a variety of diseases. They can suffer from infectious diseases caused by pathogens, called organisms which are capable of causing disease only when the host's resistance is lowered. Fish diseases include parasitism, bacteria, or viruses. In addition, fish can suffer from environmental and nutritional diseases. A fish disease which may lead to death is a state of imbalance between the fish and its environment.

Fish seldom suffer from severe disease outbreaks under natural conditions. However, when fish are crowded and reared under unnatural conditions, the potential exists for a serious disease outbreak.

What Causes Fish Diseases?

Fish diseases are the result of interaction between a pathogen, a fish (host), and a stressful environment (Figure 1). Even if the pathogen is present a disease outbreak will not occur unless the environment becomes too stressful for the fish (Figure 2).

Intensively raised fish are stressed by fluctuating water temperatures, changes in water quality, overcrowding, handling, and transport. Fish can handle these stresses up to a point, but when they can no longer adjust, they may succumb to disease and eventually die.

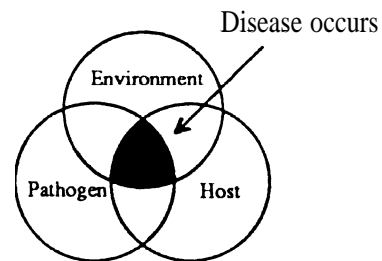


Figure 1. Interaction between a stressful environment, host, and pathogen which results in a disease outbreak.

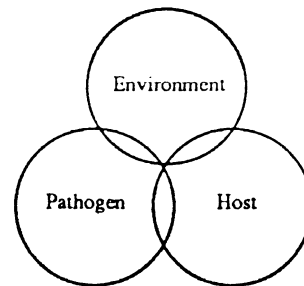


Figure 2. Interaction between a nonstressful environment, host, and pathogen which does not result in a disease outbreak.

How Can Disease Be Prevented?

Prevention of disease is a primary goal in aquaculture. Ideally, the fish facility should be free of pathogens, but this is not always the case. If the fish are bought, the buyer should obtain healthy fish from a reputable dealer. Trout and salmon must be purchased from a certified disease-free hatchery if stocked in waters that drain into Lake Michigan. The fish should be stocked in an environment having sufficient oxygen, low levels of ammonia, and minimal organic loading (overfeeding fish will result in an accumulation of food, causing poor water quality).

Fish must not be handled too often or too roughly because this will result in stress which may trigger diseases. Preventive methods can be incorporated to keep the amount of stress encountered by the fish to a minimum. For example, transportation and handling stress can be reduced by adding 1,000 to 10,000 parts per million (ppm) salt and enough calcium chloride to raise the total water hardness to 50 parts per million for soft waters. Additional calcium chloride is not needed in harder waters.

What Are Warning Signs of Diseases

In spite of the best preventive efforts, diseases occur. It is vital to detect the disease as soon as possible. The best way to detect a disease at its onset is by observing the fish when they are feeding. If any of the following are observed, a disease outbreak may be occurring and immediate treatment is necessary:

Behavioral Signs:

- failure to feed properly
- flashing (turning on their sides)
- rubbing on the bottom
- gathering mound the water inflow
- reduced vitality
- gasping at the surface

Physical Signs:

- blistered areas
- swollen bellies
- popped-out eyes
- bloody (hemorrhaged) areas on fins
- discoloration or erosion of body part
- excessive mucus
- growths on the body

Fish mortality rates should be carefully monitored and recorded daily. Records indicate the trend of the disease and provide clues as to the cause. Figure 3 (Meyer et al. 1983) illustrates the relationship between percent mortality and time (days), which may help trace the cause of the problem. Line (A) represents a die-off due to a severe environmental problem (e.g., low oxygen or a toxic chemical). Line (B) is die-offs due to a severe disease outbreak (e.g. bacteria); (C) is die-offs due to a persistent disease such as external parasites. A diagnostic laboratory can use this information to help distinguish between an infectious disease and other types of disease.

How Can an Infectious Disease Be Diagnosed?

If an infectious disease outbreak is suspected because of a warning sign(s), then samples of fish should be sent to a disease specialist for analysis. Contact a disease specialist

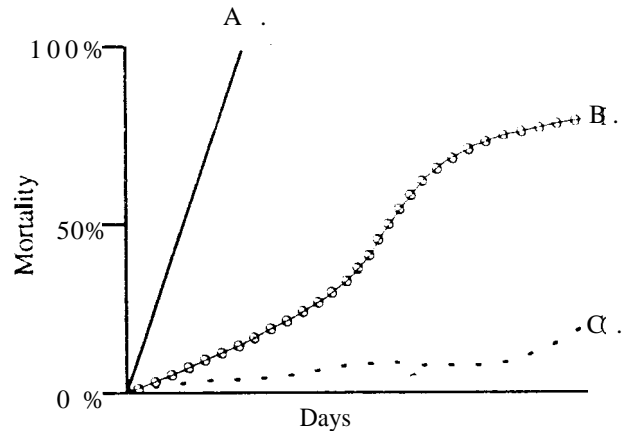


Figure 3. Graphic illustration of fish mortality patterns. Line A represents a die-off resulting from a severe environmental problem such as oxygen depletions. Line B is a die-off due to severe disease outbreaks such as bacterial infections. Line C is a die-off due to a persistent disease such as severe external parasitic infections.

or laboratory for specific instruction on how many fish to send and how to ship them.

The following are the kinds of fish to sample (in order of preference from excellent to fair) that can best be used by a disease specialist to determine the cause of a disease:

- * Fish, delivered live, exhibiting behavioral symptoms such as lethargy, listlessness, or erratic swimming. The probability of finding the cause is high.
- * Fish, delivered, live, exhibiting overt physical symptoms such as open sores, eroded areas on the body surface or gills, bloody fins, and swollen or clubbed gills. The probability of finding the cause is high.
- * Dead fish that still have red gills and somewhat normal amounts of color and mucus. This is a fair sample; the probability of identifying the cause of death depends on how long the fish have been dead.

The following list consists of the kinds of fish samples that cannot be used by a disease specialist to determine the cause of the disease.

- * Several fish taken at random from a seine sample. This is a poor sample; the probability of identifying the cause of death is low since a majority of the fish may be healthy. The fish that are sample must have the symptoms.
- * Dead fish that have lost body color and mucus layer and have white, mushy gills or fish that have been frozen. These are unusable samples.

Who Can Be Contacted for Advice and Diagnostic Services?

In most cases, fish culturists need the assistance of a trained pathologist to diagnose and treat a disease.

The first contact for Illinois and Indiana producers is your local veterinarian. He or she will be able to help you directly or guide you to a fish disease diagnostic facility. The following is a list of diagnostic facilities in Illinois and Indiana.

Rod Homer, Fish Pathologist
Jake Wolf Fish Hatchery
Route 4, Box 54
Manito, IL 61546
309-968-7531

Fish Diagnostic Services
Southern Illinois University
Fisheries Research Laboratory
Carbondale, IL 62901
618453-6025

Animal Disease Diagnostic Laboratory
University of Illinois
1224 VMBSB
2001 South Lincoln Ave.
Urbana, IL 61801
217-333-1620

Animal Disease Diagnostic Laboratory
1175 ADDL
Purdue University
West Lafayette, IN 47907-1175
317-494-7440

A second contact is the United States Fish and Wildlife Service Fish Disease Control Center. They provide advice and diagnostic services. The center for Illinois and Indiana and nearby states is:

United States Fish and Wildlife Service
Fish Disease Control Center
2630 Fanta Reed Road
LaCrosse, Wisconsin 54603
(608)-783-6451

Fish Health Certification

Producers interested in importing or exporting species of fish not on either the Illinois or Indiana approved species list need to be aware of possible fish

health certifications required before fish can be imported and or cultured. Information for each respective state concerning any regulations can be obtained from:

Aquaculture Coordinator Illinois Dept. of Conservation Route 4, Box 54 Manito, IL 61546 309-968-7531	Fisheries Staff Specialist Indiana Dpt. of Natural Resources 607 State Office Building Indianapolis, IN 46204 317-232-4080
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Before shipping salmonid eggs, fry, fingerlings outside of Illinois or Indiana, contact the state fish and wildlife agency for the respective state. Many states have stringent health standards regarding exported and imported fish.

Selected Further Readings

Procedures for the Detection and Identification of Certain Fish Pathogens 1979. David McDaniel, American Fisheries Society.

The Third Report to the Fish Farmers. Harry K. Dupree and Jay V. Huner. 1984. United States Dept. of the Interior Fish and Wildlife Service. 270 pp.

A Guide to Integrated Fish Health Management in [the Great Lakes Basin]. 1983. Fred P. Meyer, James W. Warren, and Timothy G. Carey, Great Lakes Fishery Commission.

Fish Hatchery, Management 1982. Piper et. al. United States Department of the Interior Fish and Wildlife Service. 517 pp.

References

- Meyer, F. P., J. W. Warren. and T. G. Carey (cd). 1983. A guide to Integrated Fish Health Management in the Great Lakes Basin. Great Lakes Fishery Commission, Ann Arbor, Michigan. Spec. Pub. 83-2:272p.
- Meyer, F. P. and Lee A. Barclay (cd). 1990. Field Manual for the Investigation of Fish Kills. U. S. Fish and Wildlife Services. 121 pp.

This publication is adapted from Superior Advisory Note No. 23, "Information about the diagnosis of fish diseases in the upper Midwest," Anne R. Kapuscinski and Mark L. Gross. University of Minnesota.

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