

VI. KEEPING FISH HEALTHY



Growing Fish Field Creates Big Splash

By Douglas P. Anderson

Fishing is a national recreation, fish are a nutritious and staple food, and raising fish as pets and for display is a delightful hobby for millions of Americans. Clean streams and lakes are sources of healthy foods and places to escape and relax from our busy social and work-a-day world.

We use more fish for sport and food than nature can provide; therefore, growing fish on farms, called aquaculture, is developing into a multibillion-dollar business. Raising fish interests entrepreneurs and established farmers who search for new ways for making profits and seek to diversify by expanding into little-

used marginal river lowlands or other clean water sources.

The National Aquaculture Development Plan prepared by a Joint Subcommittee on Aquaculture and edited by the U.S. Departments of the Interior, Agriculture, and Commerce, reports that catfish farming is the largest aquaculture industry with over \$120 million invested at the beginning of the 1980's. Raising baitfish is second in value with over \$100 million, and trout farming third at \$48 million. The value of tropical fish farms is probably underestimated at \$20 million. A rapidly growing industry is Pacific salmon culture, often done in sheltered marine bays. It is valued at over \$4 million.

Pollution Effects

Keeping fish healthy and their waters clean are major concerns of all Americans. Pollution from cities, indus-

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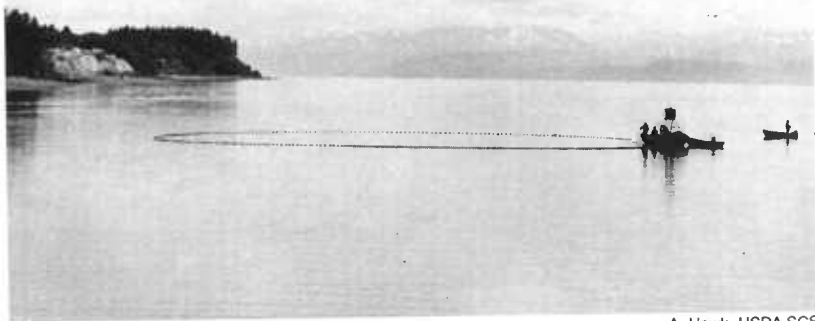
James L. Bilyou, USDA-SCS



The fact that we use more fish for sport and food than nature can provide is the main reason aquaculture is developing into a multibillion dollar business. Catfish farming is the largest aquaculture industry with over \$120 million invested at the beginning of 1980.

tries and agriculture affects our Nation's waters. Reports of fish kills due to spills of chemicals into the water are not uncommon.

From long term environmental research studies we now realize that the slower, insidious effects of lingering, low concentrations of chemicals such as pesticides, fertilizers, and industrial exhausts may result in the gradual deterioration of fish health. Acid rain can kill small plants and animals on the lower part of



A. Hawk, USDA-SCS

"Fish"—this word brings smiles to the faces of millions of Americans with memories of an enjoyable day of fishing on the water . . . the sport and anticipation of a possible freezer full of fish for some, a livelihood and business for others . . . and hours of enjoyment with a pet for the rest.

the food chain, indirectly affecting fish populations. The effect of some pollutants may suppress defense mechanisms, causing the fish gradually to be more susceptible to infectious diseases.

Infectious diseases of fish are similar to those of other wild and domestic animals. Fish may harbor, or be exposed to, parasites and pathogenic disease-causing agents during much of their life.

Most healthy animals are able to resist or at least accommodate their microscopic enemies. But when fish are domesticated and raised under intensive conditions, the magnification of environmental conditions can make them more susceptible to disease.

Humans can easily upset the delicate balances of the ecological web. Once interrupted, the interactions of aquatic animals, disease agents and their environments are difficult to repair; sick fish rarely get well. There's a cynical saying by fish culturists, "A sick fish is a dead fish," and it's often true. To prevent and cure diseases, veterinarians and pathologists are developing better management techniques,

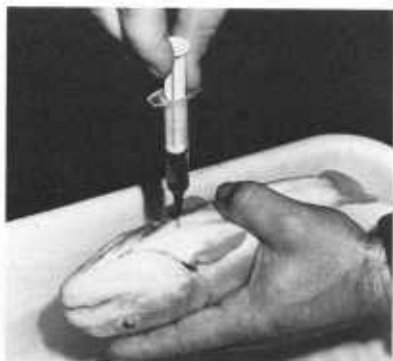
stricter import and transportation regulations, new chemicals for disinfection, stronger drugs, potent vaccines and genetic breeding methods to build up and maintain healthy fish stocks.

Unique Aspects

Raising fish presents unique differences from culture of other animals. Each farm, pond and tank is an isolated environment with its own particular advantages and problems. Variations in temperature, oxygen supply and water quality must be recognized by the supervisor and special care taken. Prediction of disease outbreaks and patterns is difficult; indeed, a disease occurring in one local pond for some unexplained reason may not spread to another. Other times, an epidemic is uncontrollable.

Management for individual fish farms, hatcheries or aquariums has to be specifically designed. In addition, species of fish we cultivate are so different from one another that treatment of diseases of trout held in cold water, for instance, may not resemble those treatments used in eel culture or warm water household aquariums.

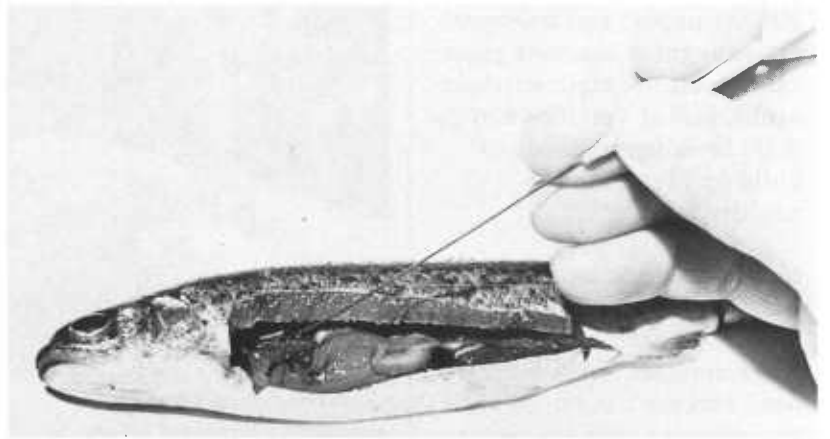
Recognizing diseases and their causes in individual fish



P. Kangas

Growth of aquaculture has resulted in increased efforts by veterinarians and pathologists to develop better management techniques and more effective fish vaccines and medications. Here a blood sample is taken from an anesthetized albino rainbow trout. The blood will be tested for antibody which indicates that the vaccination worked.

and large populations is important to prevent spreading to other ponds by early treatment. There are various ways of recognizing and identifying diseases: the simplest level is the observation that includes noting mortality patterns. If there is a sudden increase in deaths, the farmer might begin to look for unusual behavioral signs. The fish may be "off feed," and showing irregular growth patterns—for instance, big and little fish occurring in a pond of fish that are all the same age. There may be individual darkened



P. Kangas

A sterile needle is used to take a kidney tissue sample from a diseased fish. The sample will be smeared on agar media to observe for bacterial growth for diagnosing a bacterial disease.

fish swimming at the end of the pond, gills may appear pale, or lesions and ulcers may occur on the fish.

Diagnosis, Control

The next stages of disease recognition may have to be done by highly trained professionals, who are veterinarians or fish pathologists certified to do this work. If a viral disease is suspect, tissue samples of fish are taken and processed in a diagnostic laboratory. Identification of bacterial diseases often requires taking a kidney sample and streaking the piece on an agar plate to check for growth of the pathogen.

Disease control requires continual vigilance. Many

chemicals and drugs have been used in the past with various success; today only a few of the drugs are approved for use in food fish. Whenever treatments are used on fish, careful management of effluents is necessary. Major advances have recently been made in controlling disease by immunization. Fish can be given baths of vaccine to build up immunity against diseases.

Fighting changes in the aquatic environment and keeping diseases from reducing production is a continual process for the fish farmer and aquarist. The following chapters discuss some of the special problems you may face in raising fish and keeping them healthy.