AN 11-YEAR SUMMARY OF FISH DISEASE CASES AT THE SOUTHEASTERN COOPERATIVE FISH DISEASE LABORATORY[1]

by

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ABSTRACT

An 11-year summary of fish disease case work at the Southeastern Cooperative Fish Disease Laboratory is presented. A total of 1,573 cases were examined. Approximately 61 percent of these cases occurred in April through September with June having the greatest number. Viral cases, primarily channel catfish virus, were diagnosed from June through September. Bacterial organisms were diagnosed in 27 percent of the cases and were most prevalent from April through September. *Aeromonas hydrophila* or *Flexibacter columnaris* were involved in 82.2 percent of the bacterial cases. Parasitic cases were most prevalent in the spring and fall. Parasites were diagnosed in 25.2 percent of the cases. Of these, protozoa were involved in 59 percent with the dominant forms being *Ichthyophthirius* and *Trichodina*.

INTRODUCTION

Seasonal fluctuations of fish diseases have been recognized for many years, especially in the temperate regions of the world (Snieszko, 1958; Schaperclaus, 1954). Meyer (1970) elaborated on the monthly distribution of parasitic and bacterial diseases of cultured catfish and minnows. Rogers (1969) presented data that included the seasonality of diseases for cultured and wild fish populations. These fluctuations are usually associated with changes in water temperatures as in spring when the fishs' resistance is low, or in warm weather when environmental stresses increase the susceptibility of fish to disease.

The Southeastern Cooperative Fish Disease Laboratory (SCFDL) at Auburn University has been in existence for over 11 years and during that time the number of cooperating Southern States has ranged from 6 to the present 10. These states have contributed the bulk of the funds for the project through Sport Fish Restoration Funds. Other sources of financial support have been private industry, Hatch (Regional Research S-83) 340 funds, and National Oceanic and Atmospheric Administration funds administered through state conservation agencies. Researchers at the SCFDL have published numerous papers relevant to all phases of fish diseases and have examined over 1,500 groups of fish for viral, bacterial or parasitic disease organisms. Rogers (1969) summarized the first 5 years of the project during which time approximately 300 cases were recorded at the laboratory. The objective here is to summarize the 11-year diagnostic case records of the SCFDL and to point out some trends that have emerged through the disease diagnostic services.

SEASONAL FLUCTUATIONS OF CASES

A total of 1,573 disease cases were recorded from July 1, 1964 through June 30, 1975, Table 1. The case load (groups of fish examined) during the first 5 years the project was in existence averaged 60 cases per year, however, many routine examinations were not included in that figure. During the past 6 years the average case load has been 207 cases per year, Table 1. This upward trend is attributed to an increase in intensive fish culture, and a greater awareness and use of the diagnostic services. Channel catfish, large mouth bass and bluegills composed 83 percent of the species examined; however, a total of 75 different species were involved in these cases. The lowest incidence of diseases occurred from November to March, with an average low of 5.6 cases being recorded in December, Figure 1. The case load during the winter months (1969-75) was 2 to 3 times higher than that reported by Rogers (1969), and much higher than that reported by Meyer (1970). This latter difference may be due to milder winters and warmer temperatures in the Gulf Coast States than occurs in Arkansas. Beginning in April, the number of cases increased until they reached a peak in June when an average of 20 cases per month were recorded for the 11-year period. Approximately 61 percent of all recorded cases occurred from April to September.

[1] Supported by: Sport Fish Restoration Funds, National Oceanic and Atmospheric Administration PL-88-309 and Hatch (Regional Research S-83) 340 funds.

Table 1. Summary of case work at the Southeastern Fish Disease Laboratory, Auburn, Alabama.

			Cause				
Year	*Viral*	*Bacterial*	*Parasite*	*Bacteria and Parasite*	*Miscellaneous*[1]	*Unknown*	*Total*
1964-65	——	——	——	——	——	——	81
1965-66	0	17	26	0	7	8	58
1966-67	0	12	13	0	7	14	46
1967-68	0	30	7	0	7	13	57
1968-69	4	17	15	5	10	13	64
1969-70	3	49	60	0	40	26	178
1970-71	5	53	37	2	76	28	201
1971-72	6	56	58	13	71	26	230
1972-73	3	66	74	6	65	31	245
1973-74	4	52	54	6	61	31	208
1974-75	4	50	46	4	64	37	205
Total	29	402	390	36	408	227	1573
%[3]	1.9	27.0	26.2	2.4	27.3	15.2	

[1] Includes cases where fish were adversely affected or killed by nutritional deficiencies, pesticides, gas buble, or mechanical injury; or were examined prior to stocking.

[2] Includes those unsuitable for examination, and deaths of unknown causes.

[3] Percentages do not include 1964-65 cases.

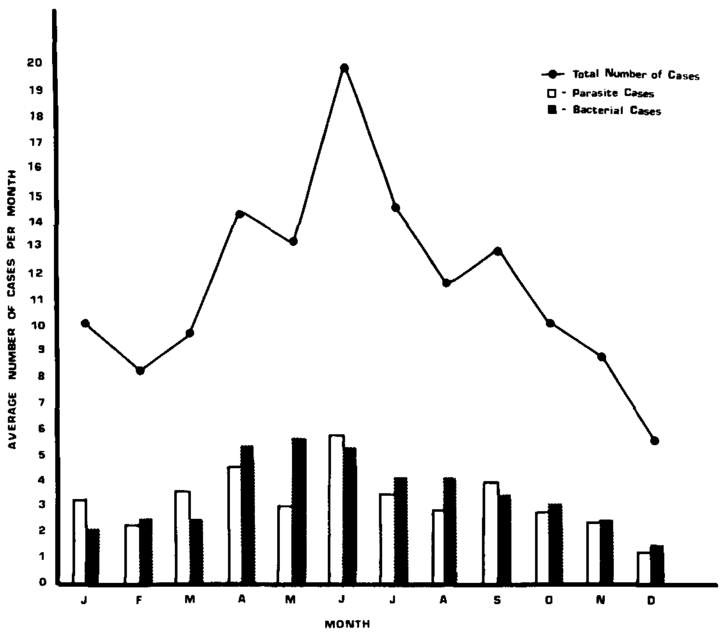

Figure 1. Monthly average of all cases, and those caused by bacteria and parasites, examined at the Southeastern Fish Disease Laboratory, Auburn University, Auburn, Alabama between July 1964 and June 1975.

The rise in incidence in fish diseases in spring can be contributed to the fact that water temperatures are warming, fish begin to feed more vigorously, bacterial organisms are becoming more abundant, and the fishs' resistance is low (Snieszko, 1958). Also at this time of year the young of many species of fish are abundant and these young fish appear to be much more susceptible to diseases than older fish which may have either natural or acquired immunity to many pathogenic organisms. Another contributing factor is the stress placed on adult fish by spawning activities. During the winter months protective antibody has been lost and it requires time at warmer temperatures to build immunity. Therefore, the fish do not have the capacity to produce protective antibody which aids them in combating pathogenic organisms. April, May, and June are also months when water temperature is more favorable for protozoan parasite growth. Throughout the summer and fall, case load remained relatively high averaging between 10 and 15 cases for July through October.

VIRAL DISEASES

The only viral diseases diagnosed at the SCFDL were lymphocystis and channel catfish virus, and accounted for 1.9 percent of all cases recorded, Table 1. Lymphocystis may occur at any time of the year on spinny rayed fish, but has been diagnosed infrequently, probably since it does not cause direct mortality of infected fish. Channel catfish virus was first reported in 1968 (Fijan, 1968) and since that time the disease has been identified and confirmed at 29 different installations, Table 2. This disease is very temperature dependent (above 25°C), and is an infection primarily of young fish. It was frequently found in close association with "columnaris" infections.

Table 2. Monthly occurrence of channel catfish virus from July 1968 through June 1975.

Month	*No. of Cases*
June	8
July	7
August	7
September	7
Total	29

BACTERIAL DISEASES

Bacterial diseases accounted for 27.0 percent of the total case load, Table 1, with 64 percent of all bacterial cases occurring between April and August. April, May, and June were peak periods for bacterial diseases with an average of 5.5 to 5.1 cases recorded per month for the 11-year period. July, August and September averaged 3.9 to 3.4 cases per month. The low period for bacterial infections in Southern United States, Figure 1, was from October to March at which time the average cases recorded was less than 2 to 3 per month.

Aeromonas hydrophila and *Flexibacter (Chondrococcus) columnaris* were the two most serious bacterial disease organisms infecting pond fish in Southern United States, Table 3. These were involved in 82.8 percent of the bacterial cases diagnosed. Both organisms may occur at any time of the year but were more abundant in spring, early summer, and early fall, Figure 2. However, the greatest number of *A. hydrophila* and *F. Flexibacter* cases per month occurred in September and October respectively. Both organisms appeared to be closely associated with poor water quality or environmental stresses that predispose the fish to bacterial infection. Meyer (1970) reported a correlation between oxygen depletions and subsequent bacterial infections. Other bacterial organisms associated with fish mortalities were *Pseudomonas fluorescens, Acinetobacter* (Schachte 1973), *Vibrio anquillarum, Micrococcus, Streptococcus* (Plumb, et al. 1974), *Achromobacter,* and bacterial kidney and bacterial gill diseases of trout. These have not been diagnosed frequently enough to observe seasonal occurrences.

PARASITIC DISEASES

Parasitic organisms alone accounted for 26.2 percent of the case load, however, a combination of bacterial and parasitic infestations accounted for 2.4 percent of the cases recorded. These cases

Table 3. Bacterial and parasitic organisms diagnosed as causing diseases of fish at the Southeastern Fish Disease Laboratory from July 1969 through June 1975.

Bacterial			*Parasitic*		
	Cases			*Cases*	
Organism	*Number*	*Percent*	*Organism*	*Number*	*Percent*
Aeromonas hydrophilia	158	57.9	FUNGI[2]	8	2.7
Felxibacter columnaris	68	24.9	PROTOZOA		
Pseudomonas fluorescence	15	5.5	*Costia*	24	8.5
Multiple bacteria	18	6.6	*Ichthyophthirius*	47	16.6
Other[1]	14	5.1	*Chilodonella*	7	2.5
			Epistylis	12	4.3
			Trichodina	38	13.4
			Sporozoans	6	2.1
			Other protozoa[3]	33	11.7
			Monogenetic trematodes	25	8.8
			Digenetic trematodes	9	3.2
			Cestodes	4	1.4
			Nematodes	7	2.5
			Copepods	22	7.8
			Multiple parasites	41	14.5
Total	273			283	

[1] Other bacteria identified were *Vibrio anguilarum, Acinetobacter, Micrococcus, Streptococcus, Achromobacter*, bacterial kidney disease and bacterial gill disease of trout.

[2] Fungi included primarily *Saprolegnia* and one *Branchiomyces sanguinis* case.

[3] Other protozoan disease organisms included *Glossatella, Scyphidia, Trichophrya, Ophryoglena, Tetrahymina, Amoeba, Glenodinium*, and *Dermocystidium*.

included external and internal parasites and occurred throughout the year, but troublesome parasites were not as abundant from November to February as they were at other times of the year, Figure 1. In March and April there was an increase in parasitic infestations but for unknown reasons they decreased in May before reaching a peak in June. Presumably these 4 months have optimum water temperature for parasite reproduction and 47 percent of all parasitic cases were recorded during this time. Parasite infestations decreased in July and August due to higher water temperatures but a slight increase in parasitic cases was noted in September before a winter decline.

Protozoa were involved in 59 percent of the parasite cases, Table 3. *Trichodina* was the most frequently found parasite, but it was considered the etiological agent in only 13.4 percent of the parasitic cases, Table 3. *Trichodina* was found throughout the year and occurred most often from April to July and September to November, Figure 3. *Ichthyophthirius multifilis* was the second most frequently observed parasite, and possibly the most serious, but was the etiological agent in 16.6 percent of the parasitic cases, Table 3. This parasite was most frequently encountered from March to May, but was seen throughout the year, Figure 3. *Costia* was the third most serious parasite and was not often seen from April through June and October through January, Figure 3. Other protozoa which caused fish disease problems in Southern United States were *Chilodonella, Epistylis, Glossatella, Scyphidia, Tetrahymena, Amoeba, Glenodinium, Trichophrya, Ophryoglena, Dermocystidium*, and sporozoans.

The fungus, *Saprolegnia* was often a secondary invader of injured or diseased fish and it was a primary factor in seven cases. *Branchiomyces sanquinis* was found in the gills of small mouth bass and trout. The latter is thought to be a new host record for this parasite in North America. Fungi accounted for only 2.7 percent of the parasite cases.

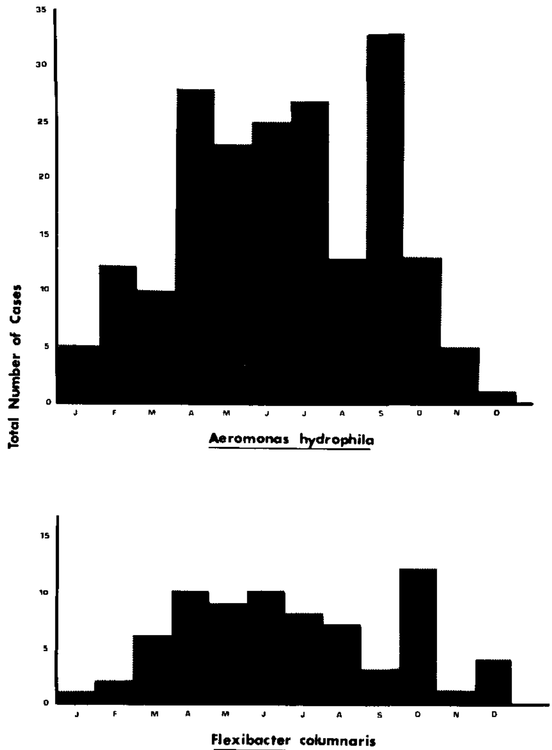

Figure 2. Total number of cases per month caused by *Aeromonas hydrophila* and *Flexibacter columnaris* from 1964 through 1975 at the Southeastern Fish Disease Laboratory.

Other parasites found to cause problems, but not necessarily fish kills, were monogenetic trematodes *(Gyrodactylus, Cleidodiscus,* and *Dactylogyrus),* digenetic trematodes *(Clinostomum marginatum,* and *Posthodiplostomum minimum),* cestodes *(Corallobothrium* and *Proteocephalus),* nematodes *(Philometra* and *Geozia),* and copopods *(Lernaea* and *Ergasilus),* and the fish louse, *Argulus.* Multiple parasitic species were found in 14.5 percent of the parasitic cases.

MISCELLANEOUS AND UNKNOWN CASES

The fish kills of unknown etiology, and specimens received in a condition unsuitable for examination, constituted 15.2 percent of the total case load, Table 1. The miscellaneous category (27.3 percent of total cases) included conditions caused by pesticides, mechanical injury, poor water quality, and routine examinations of groups of fish.

SUMMARY AND CONCLUSIONS

The case load at the Southeastern Cooperative Fish Disease Laboratory has increased from an average of 60 cases per year in 1964-69 to over 200 cases per year in 1969-75. This increase is attributed to more intensive fish culture in Southern United States and to a greater awareness of diagnostic services available. Bacterial and parasitic organisms contributed to approximately 53 percent of the total case load and viral diseases contributed approximately 2 percent. There has been a greater proportional increase in "miscellaneous" cases due to an increase in pesticide kills, greater fish population densities in culture ponds, and in some instances, poorer water quality.

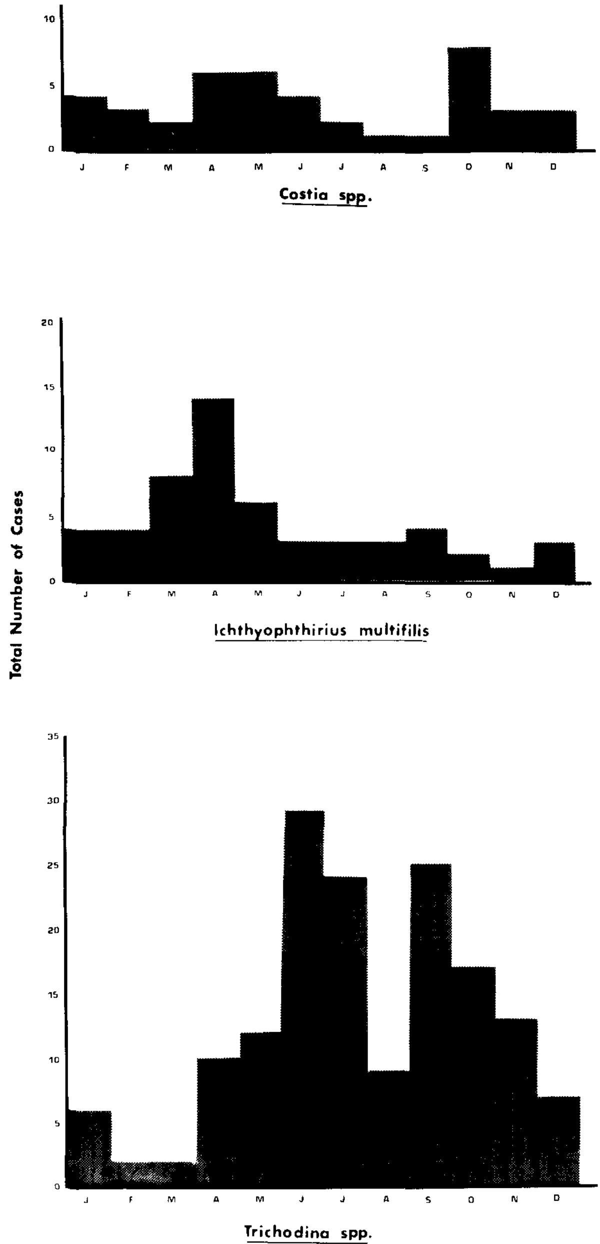

Figure 3. Total numbers of cases per month caused by *Trichodina*, *Ichthyophthirius multifilis*, and *Costia* from 1964 through 1975 at the Southeastern Fish Disease Laboratory.

Bacterial diseases are more prevalent in the spring and early summer and decrease in fall-winter. Parasitic cases are more frequent in spring and fall with approximately 61 percent of the cases occurring from April to September. During periods when disease potential is highest it would be advantageous to the fish farmer or pond owner to practice good pond management. To reduce the frequency and severity of disease outbreaks prophylactic treatments should be used when handling fish, good water quality should be maintained, and the fish should be observed closely for signs of stress.

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SURVEY OF SUCCESS AND OWNER MANAGEMENT OF NORTH ALABAMA PONDS ONE ACRE AND LESS IN SIZE

by

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ABSTRACT

To determine the extent of pond owner management and the condition of balance of the fish population during the first 2 years of fishing in small ponds, 40 ponds were randomly selected for study from 150 ponds 1.0 acre or less in size stocked in the 1971-72 stocking season. Only five ponds contained balanced fish populations both study years. Primary factors affecting fish population balance were fertilization, livestock utilization, competitive species, severe water level reduction or complete loss of water, and fish kills. Proper pond management was not practiced by most pond owners in the study.

INTRODUCTION

In 1951, the Fisheries Section of the Game and Fish Division, Alabama Department of Conservation and Natural Resources, was organized and furnished technical advice on construction and management of ponds including fish population analysis where requested (Alabama Department of Conservation, 1952). Fisheries biologists began visiting ponds prior to the stocking of hatchery fish in 1955 (Kelly, 1961). Kelly's study demonstrated that these prestock visits to the ponds and discussions of pond management with the owners increased the chances of the fish populations attaining a balanced condition as described by Swingle (1950). Swingle (1949) stated that unfertilized ponds less than 0.5 acre and fertilized ponds less than 0.25 acre are too small to insure good results with the bass-bluegill combination. Hooper (1970) reaffirmed Swingle's findings in a study of 33 ponds in Alabama with a surface area of 0.25 acre or less. In recent years, observations by fisheries biologists indicate that ponds 1.0 acre or less in size, constructed for purposes other than fishing, such as stock