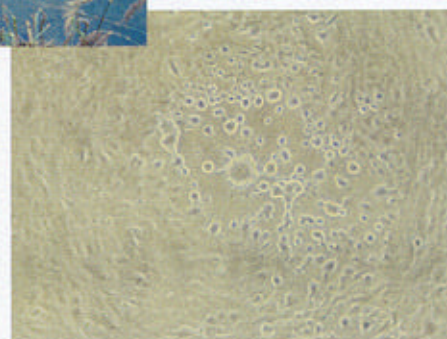
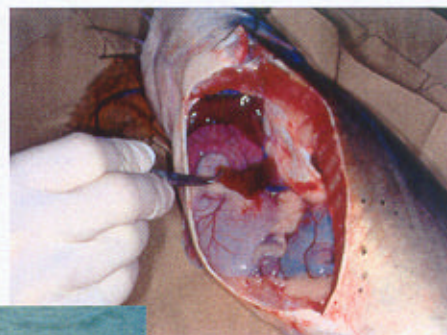
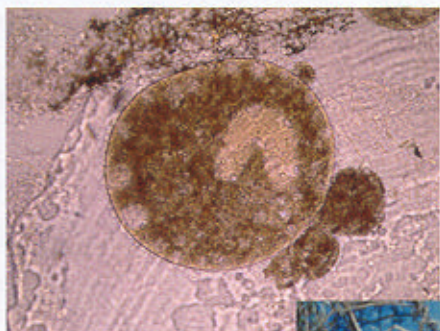


2002 ANNUAL CASE SUMMARY REPORT

AQUATIC DIAGNOSTIC LABORATORY



Mississippi State University
College of Veterinary Medicine

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SUMMARY

In 2002, the Aquatic Diagnostic Laboratory at Stoneville received a total of 1306 case submissions, 1057 diagnostic and 249 research. The number of producer submissions declined from 1602 in 2001 to 1057 in 2002, or a total of 34%. A major factor contributing to the lower case numbers was the relatively mild fall disease season believed to be associated with rapid decreases in pond temperatures following a succession of tropical storms and cold fronts in September and October. This rapid cooling appeared to result in a precipitous drop in the number of enteric septicemia cases received in September and an atypically low number of proliferative gill disease cases in October and November. Despite this fall cooling trend, average monthly water temperatures were remarkably similar to 2001. While the mild fall disease season provided welcome relief to producers, it is concerning that large numbers of susceptible year two fish with no previous exposure to ESC or PGD may be at risk as temperatures begin to moderate in the spring and heavy mortalities may occur at this time.

As in the past, each individual case represents a composite of fish from a single submission collected from one pond. It should be mentioned that the numbers represented in this report are derived solely from submissions received by the laboratory and do not necessarily reflect actual disease incidence in the field. Routine diagnostic procedures include evaluation of gill clips, fin and skin scrapes, gross external and internal lesions, touch impressions of tissues, bacterial and viral cultures of various tissues, as well as histopathology.

As in previous years, the bacterial diseases enteric septicemia of catfish (ESC) and columnaris disease continue to dominate the numbers of producer submitted cases. Examined as a single disease entity, ESC accounted for 13.6% of cases, but in combination with other disease agents was diagnosed in 39.8% of cases (36.4% in 2001). While columnaris has a lower tendency to occur alone, accounting for 9.9% of cases, in combination with other pathogens, columnaris was present in 44.5% of all cases (37.2% in 2001), making it the most frequently diagnosed cause of disease seen by the laboratory. ESC and columnaris were diagnosed together in 19.0% of case submissions. These numbers have remained relatively consistent over the past six years, where on average ESC was diagnosed in 37.6% and columnaris in 44.0% of all diagnostic cases.

Proliferative gill disease (PGD) was the third most commonly diagnosed disease representing 16.3% of cases versus 19.2% in 2001. Again, the decreased number of cases is believed to be the result of rapid cooling this fall. Saprolegnia, the cause of winter fungus, was present in 10.1% of cases, almost identical to the 10.4% seen in 2001. The number of channel catfish virus (CCV) disease cases declined from 7.3% in 2001 to 5.8% in 2002, but remained above the 6 year

average of 3.9%. Numbers of channel catfish anemia (CCA) cases were minimally increased from 5.0 to 5.3%, but remain above the 6 year average of 3.9%. Similarly, the number of *Ichthyophthirius multifiliis* (Ich) cases increased slightly from 1.8 to 2.2%, and remain above the 6 year average of 1.4%.

Notably, the number of trematode cases, now identified as *Bolbophorus damnificus*, continued to decrease from a high of 5.6% in 2000, to 4.4% in 2001, and 2.0% in 2002. While the number of cases seen by the lab does not always reflect incidence in the field, decreased losses attributed to *Bolbophorus* trematodes are believed to be the result of greater awareness among producers, leading to increased surveillance and control of the ram's horn snail intermediate host of the parasite. Cases of visceral toxicosis (VTC) declined slightly from 2.5 to 2.0% in 2002. Although a blue-green algal toxin is suspected, the cause of this enigmatic disease remains unknown.

The number of water quality samples received by the laboratory increased from 1037 in 2001 to 1191 in 2002. As in 2001, however, the total number of farms submitting declined. In other words, fewer farms submitted a greater number of individual samples. Raising pond chloride levels above 100 ppm is the most frequent recommendation made regarding water quality. Only two cases of brown blood disease were seen during 2002.

Four hundred twenty-three *Edwardsiella ictaluri* (ESC) and 472 *Flexibacter columnare* (columnaris) bacterial isolates were tested for antibiotic resistance. Of these, there were no isolates tested showing resistance to the antibiotics Terramycin® and Romet®.

Diagnosis of the major diseases/conditions were based on the following criteria:

Enteric septicemia of catfish (ESC) - isolation of *Edwardsiella ictaluri* on blood agar from cultures of the brain and posterior kidney.

Columnaris - isolation of *Flavobacterium columnare* on dilute Mueller Hinton agar and/or microscopic identification of the typical slender filamentous bacteria on fin/skin scrapes, or gill clips of fish with the characteristic necrotic lesions. Our client reports differentiate between the two methods with the latter used for the designation of external Columnaris when the bacteria cannot be isolated on agar. For the purposes of this report, all cases of Columnaris (external or internal) have been grouped together.

Proliferative Gill Disease (PGD - Hamburger gill) - diagnosis is based on microscopic detection of cartilage defects on gill wet mounts or in histopathology sections.

Channel catfish virus (CCV) disease - this is based on observance of cytopathic effects (CPE) in channel catfish ovary cell cultures that have been inoculated with suspensions from the spleen, posterior and anterior kidney.

Saprolegnia (winter fungus) - this is based on microscopic identification of typical fungal hyphae on skin/fin scrapes or gill wet mounts.

Channel catfish anemia - this is diagnosed when the packed cell volume (PCV) in stocker or food fish is less than 10% of the total blood sample volume.

Branchiomyces - this is based on microscopic identification of the characteristic fungal hyphae on gill wet mounts.

Visceral toxicosis of catfish (VTC) - tentative diagnoses are based on the presence of typical gross lesions in a composite sample of affected fish, including ascites, intussusceptions, congested spleens, intestines with pale serosal surfaces and prominent blood vessels, and a reticular pattern to the liver. Confirmation is based on biological testing, i.e. injecting test fish with serum from affected fish and having them succumb to this disease with similar gross lesions.

Trematodes - diagnosis based on the presence of the digenetic trematode tentatively identified as *Bolbophorus damnificus*. This is based on the morphological characteristics of the metacercariae that are obtained from the affected fish. This does not include the yellow grub (*Clinostomum*).

Mississippi State University - College of Veterinary Medicine
Fish Diagnostic Laboratory - Stoneville, MS - 2002

Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
Columnaris	0	0	3	33	9	12	20	20	7	11	0	0	115	8.81%
Columnaris, Enteric Septicemia (ESC)	0	0	0	4	26	15	44	49	24	39	0	0	201	15.39%
Columnaris, Channel Catfish Anemia (CCA)	0	0	0	2	0	0	2	0	6	2	0	0	12	0.92%
Columnaris, Ich	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
Columnaris and Trematode	0	0	0	0	0	0	4	0	0	0	0	0	4	0.31%
Columnaris, Channel Catfish Virus (CCV)	0	0	0	0	0	6	10	9	0	0	0	0	25	1.91%
ESC	0	0	1	3	12	19	35	32	8	31	3	0	144	11.03%
ESC, CCA	0	0	0	0	3	1	0	0	3	3	0	0	10	0.77%
ESC, Columnaris, Ich	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
ESC, CCV	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
ESC, Columnaris, CCV	0	0	0	0	0	0	3	2	0	0	0	0	5	0.38%
ESC, Columnaris, CCA	0	0	0	0	0	1	0	0	0	1	0	0	2	0.15%
CCA	0	0	0	1	1	2	1	0	6	2	1	0	14	1.07%
CCV	0	0	0	0	0	11	13	1	0	0	0	0	25	1.91%
Edwardsiella tarda	0	0	0	0	0	0	0	0	1	0	0	0	1	0.08%
Ich	0	5	3	3	1	0	0	0	0	0	0	0	12	0.92%
Algal Toxin	0	0	0	0	0	0	0	0	1	0	0	0	1	0.08%
Brown Blood, Saprolegnia, PGD	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
Brown Blood	0	0	0	0	0	0	0	0	0	0	1	0	1	0.08%
Visceral Toxicosis of Catfish (VTC)	0	0	5	8	0	0	0	0	0	1	0	1	15	1.15%
VTC, CCA	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
VTC, Saprolegnia	0	0	0	2	0	0	0	0	0	0	0	0	2	0.15%
VTC, PGD	0	0	0	2	0	0	0	0	0	0	0	0	2	0.15%
VTC, Trematode	0	0	0	0	0	0	0	0	0	0	0	1	1	0.08%

Fish Diagnostic Laboratory - Stoneville, MS- 2002

Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
Saprolegnia	11	10	6	6	0	0	0	0	0	0	0	2	35	2.68%
Saprolegnia, Proliferative Gill Disease (PGD)	4	1	1	0	0	0	0	0	0	0	0	0	6	0.46%
Saprolegnia, CCA	1	2	0	0	0	0	0	0	0	2	0	0	5	0.38%
Saprolegnia, CCA, Parasitism	1	0	0	0	0	0	0	0	0	0	0	0	1	0.08%
Saprolegnia, ESC	1	0	0	0	1	0	0	0	0	0	0	0	2	0.15%
Saprolegnia, Columnaris, PGD	0	0	2	6	0	0	0	0	0	0	0	0	8	0.61%
Saprolegnia, PGD, CCA	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
Saprolegnia, Columnaris	0	2	3	21	1	0	0	0	0	1	2	0	30	2.30%
Saprolegnia, Columnaris, Ich	0	0	3	2	0	0	0	0	0	0	0	0	5	0.38%
Saprolegnia, ESC, Columnaris	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
Saprolegnia, Columnaris, ESC, PGD	0	0	0	2	0	0	0	0	0	0	0	0	2	0.15%
Saprolegnia, Columnaris, PGD, CCA	0	0	0	1	0	0	0	0	0	0	0	0	1	0.08%
Saprolegnia, Columnaris, Aeromonas	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
Saprolegnia, Ich	0	1	2	0	0	0	0	0	0	0	0	0	3	0.23%
PGD, Ich	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
PGD	3	5	6	31	20	3	0	0	1	2	1	0	72	5.51%
PGD, Columnaris	0	0	2	10	12	0	1	0	0	2	0	0	27	2.07%
PGD, ESC	0	0	1	0	17	2	0	0	0	3	0	0	23	1.76%
PGD, ESC, Columnaris	0	0	0	2	8	0	0	1	1	4	0	0	16	1.23%
PGD, CCA	0	1	0	3	1	0	0	0	0	0	0	0	5	0.38%
PGD, CCA, ESC	0	0	0	1	3	0	0	0	0	0	0	0	4	0.31%
PGD, CCV, Columnaris	0	0	0	0	0	0	0	1	0	0	0	0	1	0.08%
Parasitism	0	1	0	0	0	0	0	0	0	1	0	0	2	0.15%
Aeromonas hydrophila	0	0	0	1	1	0	0	2	0	0	0	0	4	0.31%
Aeromonas, Columnaris	0	0	0	0	0	0	0	0	0	1	0	0	1	0.08%
Aeromonas, Saprolegnia	0	0	0	0	0	0	0	0	0	0	2	0	2	0.15%

Fish Diagnostic Laboratory - Stoneville, MS-2002

Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
Branchiomyces, Columnaris	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
Branchiomyces, Columnaris, ESC	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
Branchiomyces, CCV	0	0	0	0	0	2	1	0	0	0	0	0	3	0.23%
Branchiomyces, Columnaris, CCV	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
Branchiomyces	0	0	0	0	0	1	1	0	0	0	0	0	2	0.15%
Trematode & Columnaris	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
Trematode & ESC	0	0	0	0	0	0	1	0	0	0	0	0	1	0.08%
Trematode, ESC, Columnaris	0	0	0	0	0	1	2	2	0	1	0	0	6	0.46%
Trematode	0	0	0	0	0	5	3	0	0	2	0	0	10	0.77%
Trematode, PGD, ESC, Columnaris, Parasite	0	0	0	0	0	0	0	0	0	0	1	0	1	0.08%
Trematode, Saprolegnia, PGD	0	0	1	0	0	0	0	0	0	0	0	0	1	0.08%
Research	8	4	14	25	20	27	13	90	33	8	7	0	249	19.07%
Histology Only	0	0	0	0	0	1	0	0	0	0	0	0	1	0.08%
Health Check	0	0	0	0	0	0	1	0	0	0	0	0	1	0.08%
Disease Check	19	12	23	16	20	23	21	9	7	11	7	3	171	13.09%
CASES SUBMITTED BY FARMERS	40	40	65	165	136	110	163	128	65	120	18	7	1057	80.93%
CASES SUBMITTED FOR RESEARCH	8	4	14	25	20	27	13	90	33	8	7	0	249	19.07%
CATFISH CASES	46	44	77	189	155	136	173	218	92	126	23	7	1286	98.5%
OTHER SPECIES	2	0	2	1	1	1	3	0	6	2	2	0	20	1.5%
TOTALS	48	44	79	190	156	137	176	218	98	128	25	7	1306	
Water														
Farms	19	12	16	63	51	30	22	14	22	19	7	9	284	
Quality														
Ponds	77	36	43	320	293	146	91	35	53	46	25	26	1191	

MSU-CVM-Fish Diagnostic Laboratory - Stoneville

TOTAL CASES OF EACH MAJOR DISEASE ^(*)

2002 Case Summary

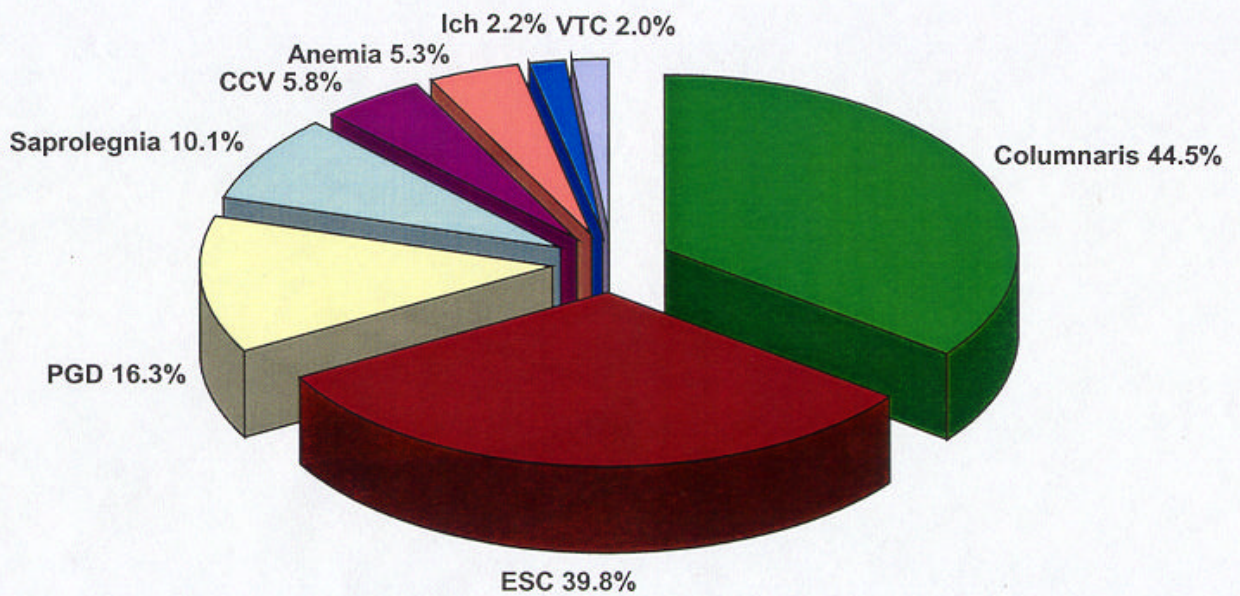
Disease	Total # Disease Cases	% Total Disease Cases
Columnaris	470	44.56
ESC	421	39.83
PGD	172	16.28
Saprolegnia	107	10.12
CCV	61	5.77
Anemia	56	5.29
Brown Blood	2	0.019
Ich	23	2.17
VTC	21	1.98
Disease Check ^{(*)2}	171	16.18
Health Check ^{(*)3}	1	0.09

^{(*)1} A case may be represented by more than one disease.

^{(*)2} Cases from ponds with mortality and no pathogens identified.

^{(*)3} Cases from healthy ponds for monitoring/pre-purchase exams.

Individual Disease Diagnoses as a Percentage of Total Case Submissions for 2002

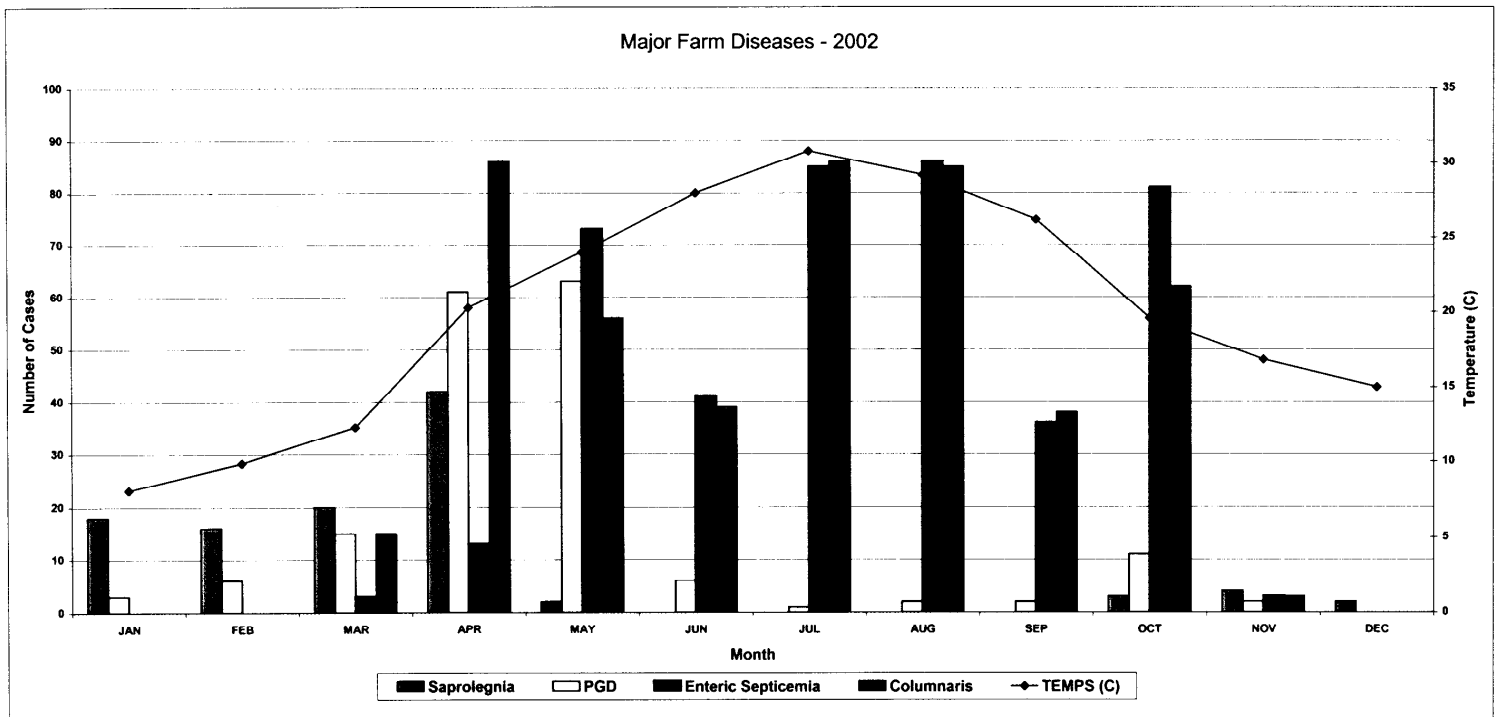


No Disease Agents Identified: 16.2%

*Based on 1057 Producer Submissions

Seasonal Changes in the Incidence of Major Farm Diseases - 2002

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
Saprolegnia	18	16	20	42	2	0	0	0	0	3	4	2	107
PGD	3	6	15	61	63	6	1	2	2	11	2	0	172
Enteric Septicemia	0	0	3	13	73	41	85	86	36	81	3	0	421
Columnaris	0	0	15	86	56	39	86	85	38	62	3	0	470
TEMPS (C)	8.1	9.9	12.3	20.3	24	28	30.8	29.2	26.2	19.6	16.8	15	



Antibiotic Resistance - 2002

Organism	# Tested	Romet Only	Percent	Terramycin Only	Percent	Both	Percent
<i>Flexibacter columnare</i>	472	0	0.0%	0	0.0%	0	0.0%
<i>Edwardsiella ictaluri</i>	423	0	0.0%	0	0.0%	0	0.0%
<i>Edwardsiella tarda</i>	1	0	0.0%	0	0.0%	1	100.0%
<i>Aeromonas hydrophilia</i>	2	0	0.0%	1	50.0%	1	50.0%

Trends in Disease Diagnoses as a Percent of Total Case Submissions Over Time

Average	Disease	2002	2001	2000	1999	1998	1997
44.0%	Columnaris	44.5	37.2	42.6	45.5	44.8	49.1
37.6%	ESC	39.8	36.4	33.5	41.2	41.2	33.6
23.5%	PGD	16.3	20.1	29.8	30	16.3	28.6
9.1%	Saprolegnia	10.1	10.4	10.5	8.7	8.6	6.4
3.9%	CCV	5.8	7.3	2.3	1.8	3.1	3
3.8%	Anemia	5.3	5	4.9	2.8	3.0	1.7
1.4%	Ich	2.2	1.8	2.7	0.7	0.5	0.8
3.8%	Bolbophorus	2	4.4	5.6	1.5		
2.3%	VTC	2	2.5				
15.1%	No Pathogens Found	16.2	19.2	15	15.2	11.4	13.6
1555.5%	Number of Cases	1057	1602	2189	2007	1647	831