the shell-cracker

FLORIDA CHAPTER OF THE AMERICAN FISHERIES SOCIETY

http://www.sdafs.org/flafs

July, 2006

President's Message:

"Stop and Smell the Roses"

It seems that when we are undergraduates, we are always busy taking notes in lectures, conducting lab exercises, writing papers and lab reports, and studying for and taking tests. As graduate students, we still do all of the above, but we also have to help give the lectures, prepare and teach the labs, assist in writing and grading the tests, and help grade the numerous papers and lab reports. In addition, we have to get through our field and lab work and write our theses and dissertations. We also have to help faculty, staff, and other graduate students with their research and sometimes work with and help educate the public.

When we get out of school, things really don't change, in fact our schedules often get even busier. This is true whether you are an agency biologist, private consultant, or university faculty member. Data sets and reports get bigger and more complex. We have to give presentations to our peers and to the public. We write journal articles. We have to keep current in our field, reading books and journal articles, attending society meetings, continuing education workshops, and even an occasional college lecture. AND, we have to attend those uncountable meetings.

As a university professor, I also still have to make and grade exams, prepare and conduct labs and lectures, and grade papers and lab reports. I often think, "Boy was it ever great being a student! What a life I had!"

So, where am I going with this? It seems that as we progress though our professional careers that life never slow down, in fact, it seems to get even busier and more complex.

Looking back through my 35+ professional years, I can think of one time that I truly regret. I had gone on the first deer hunt of my life in South Texas with friends and had a great trip. When I got back to town, I spent the next month trying to get caught up with all of my "work". I kept planning to call my Dad, an avid hunter, to tell him about my adventure, but it seemed that I always had work to do, so I never called him. It was a Friday evening when I got the call. My Dad was in the hospital! The next morning, I got another call. My Dad was dead!

To this day, I still regret not calling to tell him about my trip. I can never go back and spend the few minutes it would have taken to call him. The work is still there. In fact, there seems to be more than ever!

Now, I'm the Dad. I anxiously wait for the phone calls from my two college-age daughters to make sure that they made it safely home, to hear about their classes, to hear about what they had done during the past week, to even hear about there grumpy old professors!

Getting in Touch

So, if you have not gotten my message by now, my message is simple: The work will always be there, your family and friends may not. PLEASE take a few moments and contact someone that you care about: whether it's your parents, your spouse, your children, or simply a friend.

Chuck Cichra, President FL AFS

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Upcoming Events

Jul 10-14—**Fish Population Structure: Implications to Conservation,** Aberdeen, UK.

Jul 11-12—**Workshop on Gonadal Histology of Fishes,** New Orleans, LA.

Jul 12-17—**American Society of Ichthyologists and Herpetologist Annual Conference,** New Orleans, LA.

July 31-Aug 15—**Identification and Ecology of Larval Marine Fishes Course,** Biddeford, Maine.

Aug 1-2—**Twelfth Aquaculture Drug Approval Coordination Workshop,** La Crosse, WI.

Aug 6-11—**Eighth International Conference on Mercury as a Global Pollutant,** Madison, WI.

Aug 8-9—**Electrofishing Course,** Vancouver, WA.

Sep 10-14—**American Fisheries Society 136th Annual Meeting**, Lake Placid, NY.

Sep 10-14—**30th Annual Larval Fish Conference,** Lake Placid, New York.

Check out our Parent Society's calendar at http://www.fisheries.org/Calendar.shtml for other events not listed here!

Feature Article

Largemouth Bass Virus (LMBV) and Its Effects on Largemouth Bass Resources

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Largemouth bass virus, family *Iridoviridae*, is the only virus to have been associated with a lethal disease of largemouth bass *Micropterus salmoides* (Grizzle and Brunner 2003). Largemouth Bass Virus (LMBV) was first isolated from Lake Weir, Florida in 1991 (Grizzle et. al. 2002), and was first associated with mortality of largemouth bass *Micropterus salmoides* in the wild during a fish kill in Santee Cooper Reservoir, South Carolina in 1995 when at least 1,000 bass died (Plumb et al. 1996). Since 1995, LMBV has been implicated as a source of mortality in more than 25 fish kills throughout the southeastern and midwestern United States (Goldberg, 2002; Grizzle and Brunner 2003). Deaths of trophy-sized largemouth bass during many fish kills heightened concern about this possible pathogen among both anglers and fishery scientists (Goldberg 2002). Fortunately, evidence suggests that fish populations develop immunity following exposure to the virus. There have been no well-documented recurrences of LMBV disease in a body of water in the years following a LMBV fish kill (B.A.S.S. 2004; Grizzle and Brunner 2003). Fish kills associated with LMBV have declined over time, and to our knowledge, none have been observed over the past two years.

The disease associated with LMBV occurs during warmer temperatures in the summer and only larger bass >300 mm TL have typically been observed during fish kills. Buoyancy or equilibrium problems have been associated with LMBV disease (B.A.S.S. 2001). Swim bladder lesions (thick, yellow or brown exudates) were first described in LMBV-diseased bass collected from Santee-Cooper Reservoir (Plumb et. al. 1999), and later in bass collected from Sardis Reservoir, Mississippi (Hanson et. al. 2001). However, this finding has been inconsistent. Diseased fish sometimes had slightly reddened, over-inflated swim bladders or appeared normal. Healthy fish have also been observed with similar swim bladder lesions. Thus, the lack of distinctive, easily recognized lesions makes the disease difficult to diagnose. As a result, there has been some controversy among scientists, and criticism that evidence linking LMBV to some, but not all, fish kills has been anecdotal. While LMBV has been isolated from a number of other species of warm-water fishes, the disease response has only been observed in largemouth bass.

Experimental exposure to LMBV has also been variable. All fish injected with a modest dose of the virus were still alive after 26d (Plumb et. al. 1996). The virus has been lethal in other laboratory experiments when largemouth bass were exposed to higher levels of LMBV (Plumb and Zilberg 1999; Grant et. al. 2003; Porak et. al. 2004). Temperature effects were observed by Grant et. al. (2003), who demonstrated that experimentally infected juvenile largemouth bass experienced greater mortality and had higher viral loads at 30° C than at 25° C. Concern among experts evaluating the impacts of LMBV were elevated when *in vivo* experiments indicated that virulence varied over five-fold between three genetically different isolated strains of LMBV (Goldberg et. al. 2003).

LMBV has been found only in the eastern United States. Distribution of LMBV has been tracked by several state fisheries agencies, U.S. Fish and Wildlife Service's National Wild Fish Health Survey (http://wildfishsurvey.fws.gov) and the Southeastern Cooperative Fish Disease Project (Auburn University; Plumb et. al. 1999; Woodland et. al. 2002). The origin of LMBV and the amount of time that it has been in the United States is unknown (Goldberg 2002). There is evidence that suggests that LMBV was recently introduced to the United States; such as, bass-only fish kills similar to those caused by LMBV were not observed prior to the 1990s. Also, cell culture isolation techniques used to detect LMBV have been routinely used for diagnosis of fish diseases for several decades. Therefore, the occurrence of LMBV would likely have been observed prior to the 1990s. Conversely, the wide distribution of LMBV in populations throughout the Eastern United States, and the occurrence of different strains of LMBV (Goldberg et. al. 2003), suggests that it has been in the United States for a considerable amount of time. We do know that LMBV has been in Florida for at least 15 years (Grizzle et. al. 2002).

Scientists from the University of Florida, College of Veterinary Medicine (UF - CVM), U.S. Fish and Wildlife Service (USFWS), Auburn University (AU), and Florida Fish and Wildlife Conservation Commission (FWC) have collaborated to assess the significance of LMBV to Florida's black bass fisheries. Florida largemouth bass (*Micropterus salmoides floridanus*) disease and fish kills have not been linked to LMBV in Florida. However, buoyancy problems and swim bladder lesions, symptoms associated with the virus, and an iridovirus-antibody response were observed in Florida largemouth bass following a bass-only fish kill in Lake Harris, Florida in the early 1990s (FWC, unpublished data; Haworth 1995). An iridovirus, which was later identified as LMBV

(Grizzle et. al. 2002), was also isolated from largemouth bass that had been collected from Lakes Weir and Holly during a disease episode on Lake Weir during this same period of the 1990s (Francis-Floyd, personal communication). This was the first known case of an iridovirus being observed in wild largemouth bass. The virus was not considered pathogenic in these lakes, in part, because Haworth (1995) found no relationship between the presence of viral antibodies and either body condition (KTL) or anemia in a small number of fish that were tested from Lakes Weir, Holly, Newnans and Harris in Florida. Haworth (1995) also reported that blood smears from antibody-positive fish did not have viral inclusion bodies, which might have been expected in an acute viral disease.

Tissue (posterior kidney and spleen) and/or blood serum samples, collected from black bass (largemouth bass and Suwannee bass, *Micropterus notius*) in 45 water bodies since 1999, indicated that the virus, not the disease, is widely distributed throughout Florida (Gaskin 2003; Porak 2003; Porak 2004; Porak 2005). Seventy-two percent of the sample populations had individuals that tested positive for LMBV and/or viral antibodies, geographically ranging from Seminole Reservoir at the Florida-Georgia border to Nine Mile Pond in Everglades National Park. The frequency of LMBV-positive fish in samples tested using cell culture isolation techniques averaged 8% and ranged from 0 to 40% (Figure 1). Prevalence of individuals positive for viral antibodies, indicated by seropositive fish in samples using agar gel immunodiffusion (AGID) assays, averaged 28% and ranged from 0 to 55% (Figure 2). It's to be expected that some of the populations which tested negative for LMBV may be "false negatives" simply due to small sample sizes (e.g., N = 10) of individuals tested during early surveys and the relatively low prevalence of LMBV-positive individuals in most populations.

The number of individual fish in fish population samples collected in Florida that were seropositive for antibodies almost always exceeded the number of largemouth bass that tested positive for LMBV. Results of laboratory studies strongly suggest that many largemouth bass become immune upon exposure to the virus, and detectable blood serum antibody levels persist for long periods of time after tissue LMBV levels have fallen below detectable limits (UF; unpublished data). Also, minimum detection thresholds are unknown for both LMBV cell culture isolation techniques and the AGID assays, which may affect these results. A distinction should always be made between fish that are infected with LMBV and fish that are diseased as a result of the virus. Almost all of the populations sampled in Florida and included in our data set were not experiencing disease problems or fish kills.

Hatchery production fish have been evaluated for LMBV each of the past four years by the USFWS. All fingerling bass produced by FWC fish hatcheries have tested negative for the virus. A Freshwater Fish Health Committee was established and organized by Rick Stout and Greg Vermeer (FWC), and a protocol has been established for testing hatchery fish for LMBV in future years.

In the past three years, three fish kills were evaluated as potential LMBV fish kills. A bass die off in a private pond near Tampa, Florida was diagnosed as a fish kill caused by depressed oxygen levels. A second disease event in Lake Butler, Orange County, during 2003 was associated with an *Aeromonus spp.* epidemic. In 2004, a die-off of quality- and trophy-sized largemouth bass in Lake Hollingsworth, Polk County, followed a lake-wide alum treatment by the county, and the results of the investigations were inconsistent with LMBV disease. To our knowledge, only a few other bass die-offs were reported during this period, but, as in the case of many fish kills, moribund fish were not available for analysis.

The good news for Florida's bass resources is that die-offs that could be representative of LMBV disease events have been only infrequently reported in Florida during the past 10 years.

Studies of LMBV at the Eustis Fisheries Research Laboratory

A series of LMBV exposure or challenge studies were done collaboratively between UF-CVM and FWC. These projects were completed at the Eustis Fisheries Research Laboratory, and determined that largemouth bass inoculated with LMBV produced antibodies, appeared to develop immunity, and cleared the virus over time (Gaskin 2003; Porak 2004; Porak 2005). In the first phase of the study, test fish were inoculated intramuscularly in the mid-dorsal area with 2×10^6 infectious units of LMBV in saline solution. All 48 experimentally infected largemouth bass in heated (29° C) tanks and 92% of 48 bass held at ambient temperature (25° C) developed antibodies within 21 days after being inoculated with LMBV (Figures 3 and 4). None of 48 sham-inoculated control fish developed an antibody response during the experiment. Seropositive sentinel fish indicated that lateral transmission of the virus occurred at both temperatures within the first 21 days of the experiment, but sentinel fish showed

a much greater antibody response at 29° C compared to 25° C. The antibody response observed in the heated tanks for both test fish and sentinel fish was more persistent than that observed at ambient temperatures.

External lesions, substantially more severe at elevated temperatures, were observed at the site of inoculation in some virus-infected fish, but not in sham-inoculated control bass. While some virus-infected fish died during the experiment, many fish, even with the most severe lesions, healed over time. Lesions that occurred at the inoculation site in the laboratory study would likely not be found in the wild because the intramuscular injection of LMBV bypassed the natural defense mechanisms of the fish. Sentinel fish that were infected either by transmission through the water or by physical contact with virus-infected fish support this conclusion because none of the seroconverted (hence, infected) sentinel fish developed lesions.

Although the virus exposure experiment was designed to monitor antibody responses rather than measure mortality rates, 22 virus-infected fish died in heated tanks, four virus-infected fish died in unheated tanks, and one control fish died during the experiment. Ten of the fish from the heated treatment group died within 21 days after the first handling and bleeding procedure. These ten mortalities were attributed to the cumulative effects of stress from handling, bleeding, and anesthetization while being in a weakened condition due to the viral infection.

In summary, experimentally infected largemouth bass showed a more dramatic disease response, a more persistent antibody response, greater transmission of infection to sentinel fish, and higher mortalities at 29° C compared to 25°C. Greater replication rates of the LMBV virus and increased mortalities of juvenile largemouth bass in lab experiments have been reported at elevated temperatures (i.e., 30° C) by other researchers (Goldberg 2002). Our experimental results were also consistent with observations in wild fish populations, as all LMBV-associated fish kills throughout the United States have been reported during summer and early fall when water temperatures are high.

In a second experiment, we administered an intramuscular injection (2×10^6 infectious units) of LMBV to five test fish that had been previously inoculated with the same strain of virus during the first experiment as well as two previous sentinel fish that had cohabited with infected fish during the first experiment, and five unexposed, naive fish. After two weeks, we added two more previously unexposed fish to the tank to serve as sentinels. All fish were held in a single 800-L tank at an elevated temperature of 29°C. All inoculated fish in this second experiment were seropositive (i.e., antibody-positive) within one week following intramuscular injections with LMBV. Also within the first week, the five previously unexposed largemouth bass developed small lesions at the injection site, which enlarged modestly over the next few weeks. Two of these five fish that had been inoculated for the first time died within the first month. None of the previously exposed test fish developed lesions, suggesting that the fish exposed for a second time were immune to intramuscular challenge with the homologous virus from the first study (Gaskin 2003). One of the two sentinel fish marginally seroconverted approximately two months after being introduced to the tank, suggesting possible long-term shedding of virus by some of the recovered fish.

A third experiment was designed to investigate whether the original test fish were latently-infected with LMBV 2½ years after they had been first injected with the virus. We also planned the experiment to determine if exposure to high temperatures would reactivate the virus in latently-infected bass, and cause it to be shed and transmitted to co-habited, naïve (virus-free) bass. A group of "seronegative" previously infected fish gave variable serologic results (some stayed negative, others became positive again), "seropositive" fish remained seropositive (with two isolated exceptions) and "naïve" sentinel fish remained seronegative throughout the experiment. At the end of this third experiment, some original test fish, sentinels, and controls were sacrificed and evaluated for LMBV utilizing cell culture techniques. All fish (N = 58) tested negative for LMBV. These results indicated that previously exposed test fish did not appear to be latently infected with LMBV, and therefore, the virus was not shed and transmitted to cohabited, naïve fish. These results also suggest that virus was eliminated from all previously exposed largemouth bass.

ACKNOWLEDGEMENTS

The research conducted in Florida could not have been completed without Dr. Jack Gaskin, a virologist at the College of Veterinary Medicine, University of Florida. Norm Heil and his staff at the National Wild Fish Health Survey, U.S. Fish & Wildlife Service, ran cell culture analyses for LMBV in most of the wild fish surveys. John Grizzle and his staff at the Southeastern Cooperative Fish Disease Project, Auburn University, collaborated on field and laboratory studies. Dr. Ruth Francis-Floyd, College of Veterinary Medicine, University of Florida helped projects get started and provided guidance throughout this research. Greg Vermeer (FWC), Ann Forstchen (FWC-FWRI) and Theresa Cody (FWC-FWRI) assisted with fish health assessments and consultation during our lab experiments. The staff at the Eustis Fisheries Research Laboratory, particularly Gina Delpizzo, Holly Alred and Bill Johnson, helped with the laboratory work. Diane Heaton-Jones assisted Dr. Gaskin with the assays conducted at the University of Florida.

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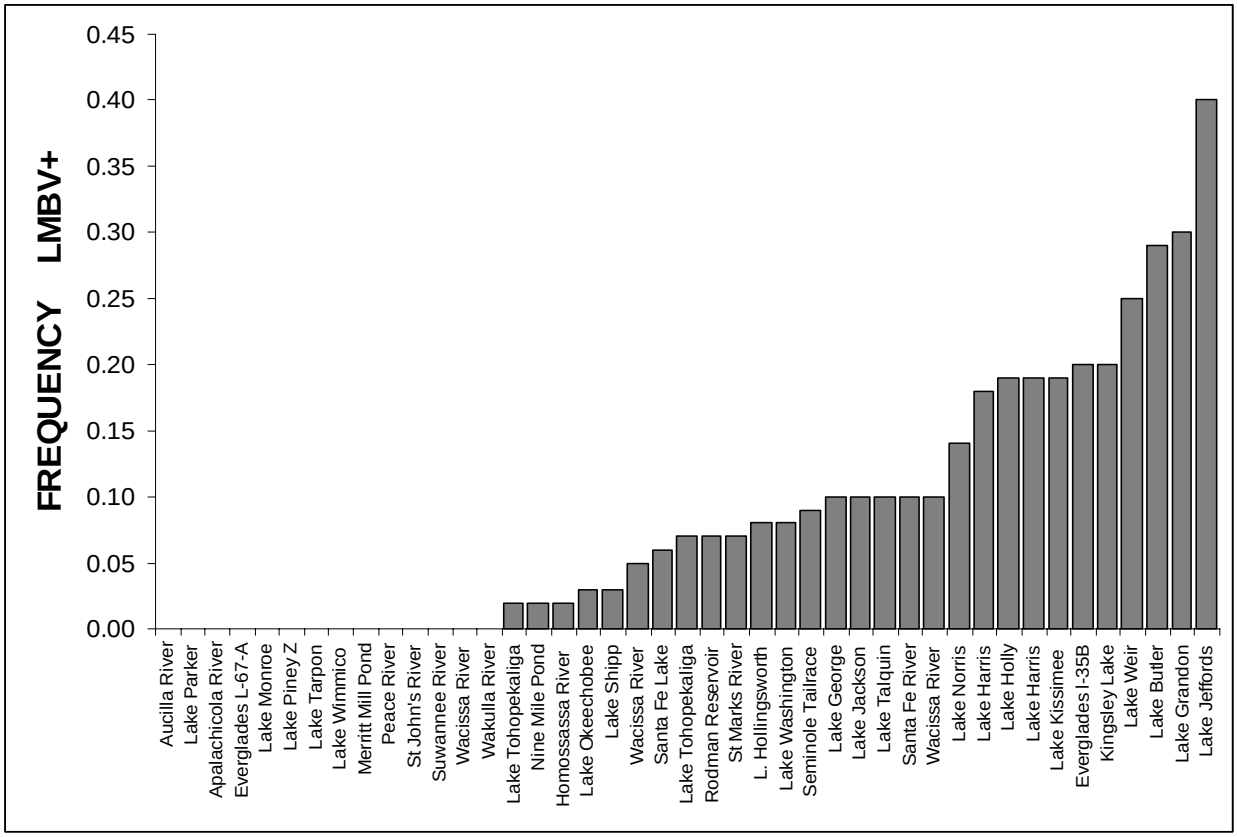


Figure 1. Frequency of largemouth bass and Suwannee bass samples collected from Florida water bodies that tested positive for Largemouth Bass Virus (LMBV) using cell culture techniques and validated with PCR from 1999 to 2005. The frequency of LMBV-positive fish in samples averaged 8% and ranged from 0 to 40%

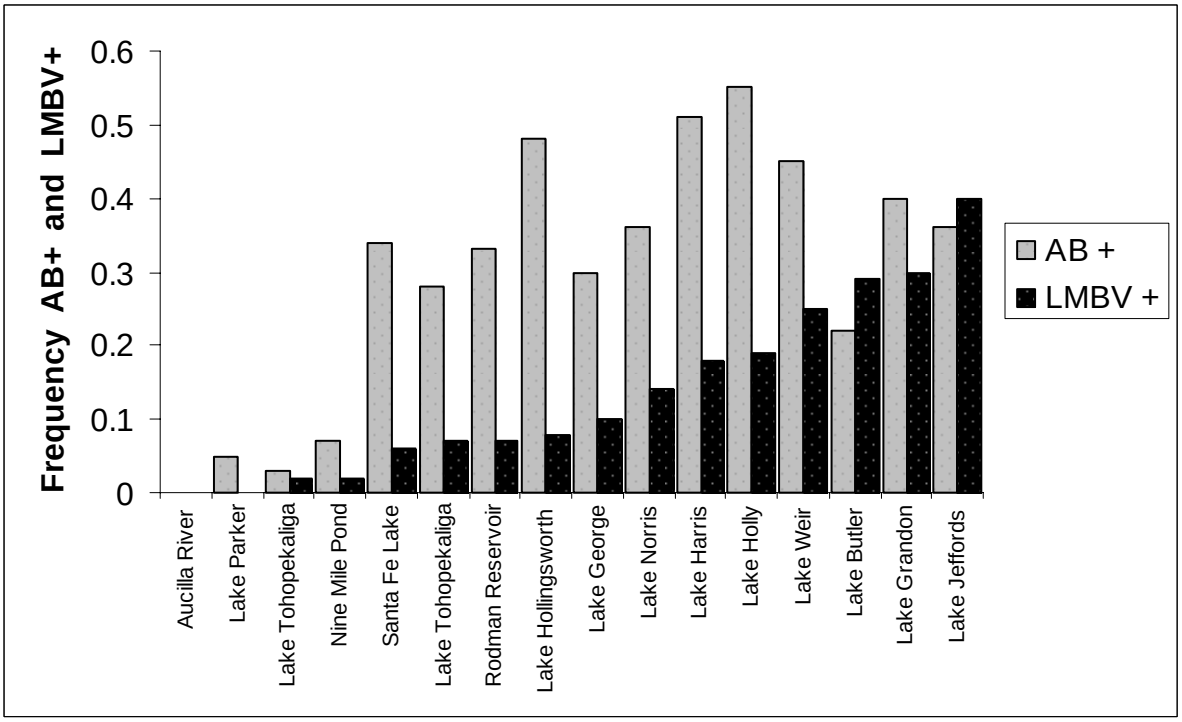


Figure 2. Frequency of largemouth bass samples that were LMBV positive (LMBV+) using cell culture and validated with PCR techniques, and frequency that were antibody or seropositive (AB+) in water bodies sampled from 2001 to 2005. Water bodies were included only if both laboratory analyses were performed on the samples.

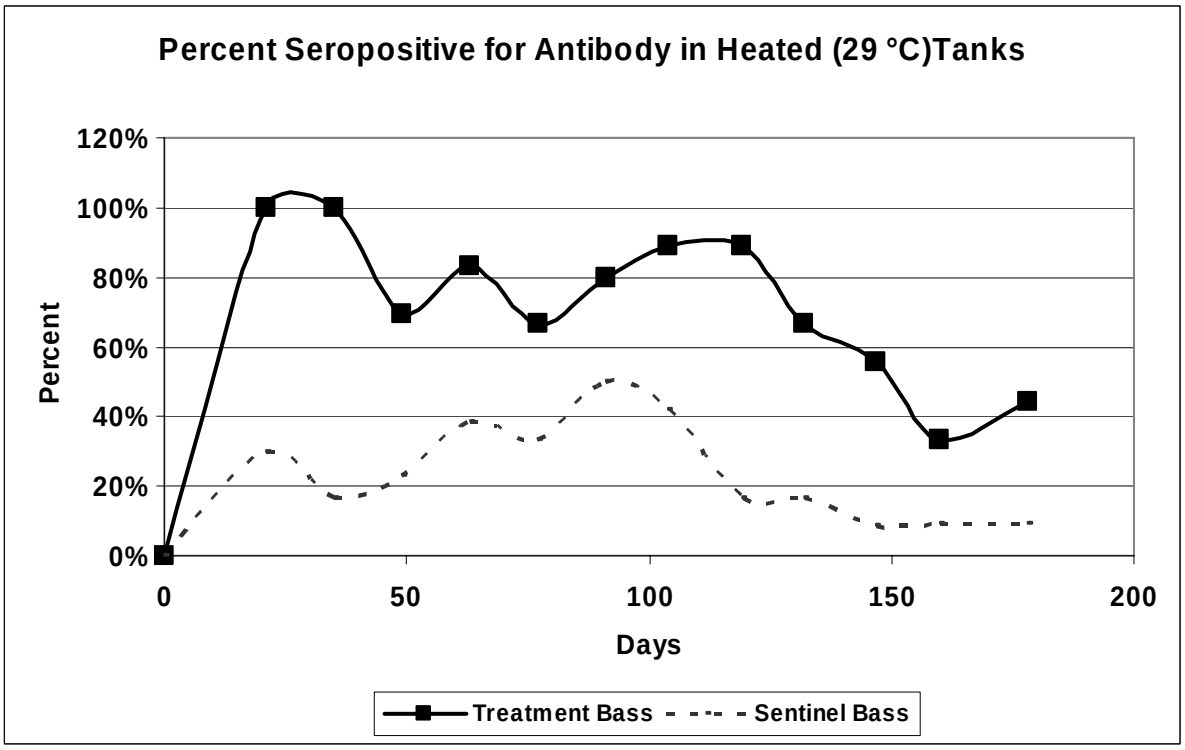


Figure 3. Percentage of LMBV-infected and sentinels largemouth bass that were seropositive for LMBV antibodies in 29° C tanks during a 178-day laboratory experiment.

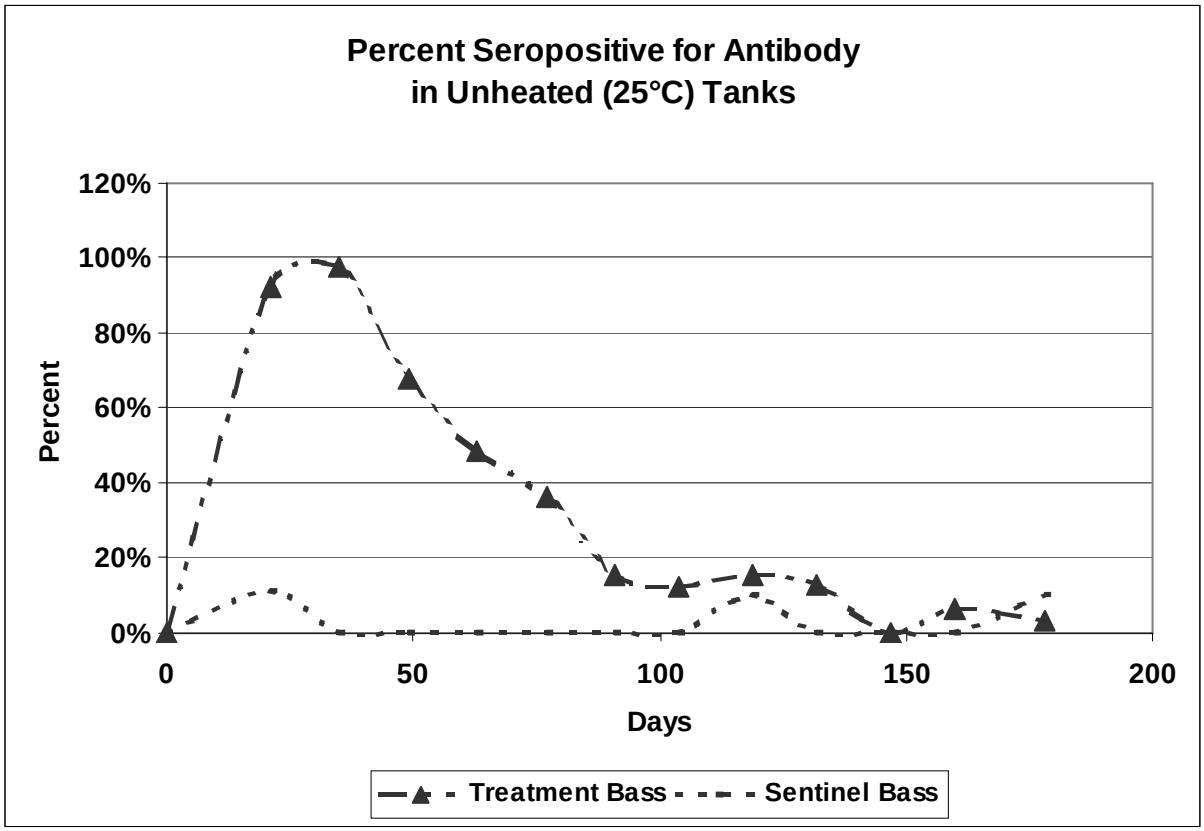
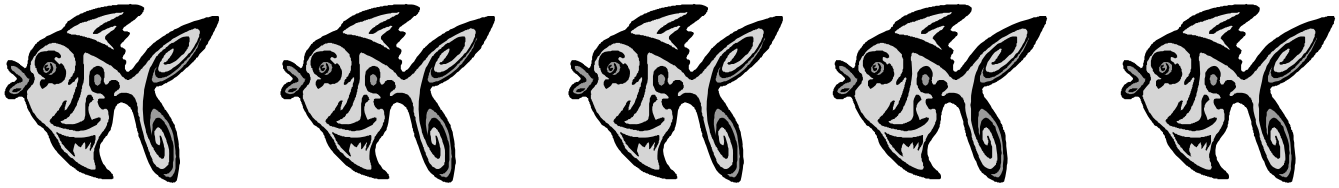


Figure 4. Percentages of LMBV-infected and sentinel largemouth bass that were seropositive for LMBV antibodies in 25° C tanks during a 178-day laboratory experiment.

General Announcements

4th North American Reservoir Symposium
Balancing Fisheries Management and Water Uses for Impounded River Systems
June 6-9, 2007
Atlanta, Georgia

Water allocation is one of the leading issues facing fisheries today, and fisheries managers are increasingly required to interact with other professionals including hydrologists, economists, and industry representatives in water conflicts. This symposium will address the challenges of managing reservoir fisheries and habitat in the context of competing water uses. Speakers will address topics such as water allocation, hydroelectric demands, and establishing minimum flows in reservoir tailwaters and streams. The symposium will include not only fisheries managers but experts related to water allocation issues from economic, legal, and watershed-management perspectives. The symposium will include a series of mini-symposia that address issues of critical need for reservoir habitat management, human dimensions aspects, implications of catch-and-release fishing, stock enhancement, and data analysis and interpretation. Collectively, the symposium and book that follows will provide a valuable resource for reservoir fisheries managers, anglers, and professionals in fields related to water allocation. In addition to invited and contributed papers, a free two-hour workshop entitled "Reservoir Habitat Initiative" will be conducted by the Association of Fish and Wildlife Agencies, and a fantastic dinner social will be held at the new Georgia Aquarium in downtown Atlanta. So, mark your calendar and join us in Atlanta! Additional information will be available soon via the SDAFS website.
Contact: Vic DiCenzo at Vic.Dicenzo@dgif.virginia.gov.



Power Tie Award

Each year, a special award (The Power Tie Award) is presented to the most professionally outspoken individual or individual that gives the most thought-provoking talk at our Chapter's annual meeting. The recipient is selected by the individual (Will Patterson – University of West Florida) that received the award at the prior year's meeting. This year's recipient is Noel Burkhead, US Geological Survey, Florida Integrated Science Center, Gainesville, Florida. Noel's talk was entitled "The Borg Assimilation Hypothesis: Fact or Prevarication?" The abstract for this presentation and the others presented at our meeting can be found at http://www.sdafs.org/flafs/PDF/2006-Abstracts.pdf

Student Section

Student Research Highlight

Evaluating the use of ciliates as suitable first foods for larval red snapper (*Lutjanus campechanus*)

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Red snapper are one of the most economically important finfishes in the Gulf of Mexico. However, their recreational and commercial popularity has lead to major decline in populations. Stock enhancement efforts have begun with the intent to aid in the recovery of this over fished species. Since the first successful laboratory rearing of red snapper in the late 1970's efforts to culture larval snapper have been challenging with significant mortality occurring shortly after first feeding. Additional mortality has also been witnessed around day 19-post hatch when larvae metamorphose into juveniles. The culture bottleneck occurring around first feeding (approximately 3 day old larvae) is speculated to be caused by lack of nutritious as well as appropriately sized prey items. This study examined the naked ciliate, *Strombidinopsis* sp., as well as a natural assemblage of ciliates, as suitable first food for larvae.

Wild zooplankton samples were collected from the Gulf of Mexico at Pensacola Beach, Florida. Samples were enriched with *Isochrysis galbani* to stimulate ciliate production. Ciliates were identified to lowest taxonomic order and isolated into clonal cultures. Larvae were collected from Auburn Universities Claude Peteet Mariculture center in Gulf Shores, Alabama at approximately 24 hours post hatch. Larvae were stocked into 10L tanks (unfed control, fed treatment A, or B) and held at a constant 26.5ºC (+/- 0.05ºC) for the duration of the experiment which was approximately 5 days when larvae were approximately 6 – 7 days old. Water quality (oxygen, temperature, and ammonia) and ciliate prey concentrations were monitored multiple times daily. Upon experiment termination, larvae were removed from the tanks via siphon filter and preserved in 95% Ethanol for enumeration.

Over our experimental time period, only one experiment yielded a statistically significant outcome between the unfed control and one fed treatment. Overall, the 10L experiments were not as successful as hoped due to the occurrence of hypoxic and tropical cyclonic events that led to the catastrophic mortality of both ciliates and larvae. Additional data analyzed from experiments where these events were not witnessed suggest that ammonia was the most significant factor influencing larval mortality. Much evidence still exists to suggest that naked ciliates could be a viable first food for larval snappers and we feel that further investigation is warranted.

Interested in contributing something to the Shell-Cracker? Email Jackie Debicella at *jmdebicella@mactec.com* with any articles or information that you would like to be included in the next issue. The deadline for the next issue is Sept 30th, 2006, so start fishing...

Student Announcements

The subunit website is updated!! Take some time and check it out at http://www.sdafs.org/flafs/Students/index.html .

The annual student business meeting minutes can be viewed at http://www.sdafs.org/flafs/Students/minutes2006.html .

Also, photos from the annual meeting can be viewed at http://www.sdafs.org/flafs/Students/photosgallery2006.html .

Attention all artists!! We are would like you to design a t-shirt logo for your subunit. Having t-shirts would not only be a great fundraiser, it would also be nice to have something to represent the organization at meetings and service events. The deadline to submit designs will be August 1, 2006. Please submit designs to Nicole (nmm7@students.uwf.edu), Jennie (jss18@students.uwf.edu), or Matt (catalm@ufl.edu).

ANNOUNCEMENT FOR NOMINATIONS – C. W. WATSON AWARD

Nominations are being sought for the 2006 Clarence W. Watson Award. This annual award will be presented at the Southeastern Association of Fish and Wildlife Agencies Meeting in Norfolk, Virginia, on November 5-8, 2006. The Clarence W. Watson Award is the most prestigious award given in the Southeast and is presented to the career individual who, in the opinion of the Award Committee, has made the greatest contribution to wildlife or fish conservation during the previous year or years. Consideration includes research, administration, law enforcement, I&E, wildlife management, fish management, teachers, and students. Preference is given to nominees in the Southeast. The award is a mounted bronze plaque presented jointly by the Southern Division of the American Fisheries Society, the Southeastern Section of The Wildlife Society, and the Southeastern Association of Fish and Wildlife Agencies. All Southeastern fish and wildlife conservationists and other interested persons are encouraged to nominate worthy candidates. Nominations should be submitted in the format shown below and should include complete information on the candidate's background, i.e., education, training, noteworthy accomplishments, and particularly, the achievement(s) for which the nomination is being made. The nomination should include, but not be limited to, a description of the accomplishment(s), application in the state and region concerned, time involved, and the amount of aid received from associates. As much information as possible should be furnished to aid the committee in making the selection. A previously unselected nominee may be resubmitted each year. Last year's recipient was Kenneth M. "Ken" Babcock of Ducks Unlimited, Inc.

Letters of endorsement are not necessary and are discouraged. Selection will be based on specific accomplishment(s) and other information included in the letter of nomination.

Nominations should be sent to: John E. Frampton, Director, SC Department of Natural Resources, P.O. Box 167, Columbia, SC 29202, phone 803-734-4007, fax 803-734-9809, or email: framptonj@dnr.sc.gov, as soon as possible, but **not later than September 1, 2006.**

NOMINATION FORMAT

Background information

Name, Birthdate, Education, Employment History

Accomplishment(s)* and Application of Accomplishment(s) Upon Which The Award Should Be Made

(1) Problem or opportunity with which nominee was involved.
Action nominee took to solve problem or capitalize on opportunity.
Results (accomplishments) of nominee's actions.

B. " " "

C. " " "

D. " " "

*The C.W. Watson Award may be given for accomplishing a single item or a series of different non-related items. But, the award is given to a nominee who has contributed the most to any of the appropriate areas of fish and wildlife conservation. Emphasis is on contribution, not tenure. Those making nominations are requested to insure that they explain clearly what was accomplished and how it contributed.

Florida Chapter AFS
601 W. Woodward Ave.
Eustis, FL 32726

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