

Dealing with Largemouth Bass Virus: Benefits of Multi-sector Collaboration

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Abstract: Largemouth bass virus (LMBV), a recently identified pathogen, affected largemouth bass (*Micropterus salmoides*) in the southeastern United States beginning in the 1990s. Concern about the impacts of this little-known pathogen on largemouth bass populations, effects on fisheries management, and the need to provide anglers and the media with consistent and accurate information prompted a private organization (Bass Anglers Sportsman Society) to invite managers and researchers from state and federal agencies and universities to a series of five annual public workshops beginning in 2000. These workshops provided a mechanism to share information, identify and prioritize action items, and develop consensus information and outreach materials that could be provided to bass anglers and the media. Regionalizing the LMBV issue and collaboration among researchers, managers, and a fishing organization may also have allayed angler and media concerns. The process embodied in these workshops is offered as a successful example of multi-agency, multi-sector collaboration to facilitate information acquisition and guide action to address a regional fisheries management issue.

Keywords: fisheries management, information and education, largemouth bass virus, fish diseases, outreach, recreational fishing

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Largemouth bass virus (LMBV) was first isolated from largemouth bass (*Micropterus salmoides*) in Lake Weir, Florida, in 1991 (Grizzle et al. 2002). The first major fish kill attributed to LMBV was in Santee Cooper lakes (Lakes Marion and Moultrie), South Carolina, in 1995 (Plumb et al. 1996). Fish kills attributed to LMBV in Alabama, Georgia, Louisiana, Mississippi, and Texas (Bister et al. 2006) later during the 1990s elicited the concern of anglers and fisheries managers.

This paper presents a case history of how fishery managers and researchers, facilitated by a private organization (Bass Anglers Sportsman Society [BASS]), dealt with a rapidly spreading and relatively unknown pathogen that had the potential to significantly affect a popular sportfish species and its fishery. The biological aspects of LMBV are summarized by Goldberg (2002) and Grizzle and Brunner (2003), and we make no attempt to review or synthesize any of the LMBV research. Also, we do not attempt to provide a comprehensive report of the presentations and discussions at the annual LMBV workshops discussed below. Rather, we present brief overviews of the decisions and products that resulted from these meetings.

The Issue

Neither the public nor fisheries managers were generally aware of LMBV until several largemouth bass kills occurred across the

southeastern United States in 1998 and 1999. Because of the popularity and economic impact of largemouth bass fishing, LMBV attracted considerable media attention, which resulted in concern among fisheries managers, anglers, and the sportfishing industry. With little known about this new disease, the publicity of the kills posed unanswerable questions to fisheries managers.

BASS is a private company that conducts black bass (*Micropterus* spp.) tournaments, publishes books and magazines for bass-fishing members, produces televised bass-fishing programs, and is an active private-sector advocate for healthy fisheries and aquatic resources. Its interest in LMBV was stirred by concern for fishery resources, by the potential impact of LMBV on bass fishing and the sportfishing industry, and by concern that misinformation could lead to angler panic and fishery agency overreaction, such as regulations that would unnecessarily constrain bass fishing or bass tournaments. It was apparent by the late 1990s that LMBV was at least a southeastern United States regional issue and potentially a national issue. Available information needed to be shared and strategies for how the fisheries profession should address LMBV needed to be discussed.

The Process

Bruce Shupp, BASS conservation director at the inception of this process, recognized the need to establish a forum where

fisheries managers, fish disease experts, and fisheries researchers could assemble available information and chart a course for action. He organized a professionally facilitated LMBV workshop convened in conjunction with the Southern Division of the American Fisheries Society 2000 annual meeting. The workshop was widely announced and open to all. Several fish pathologists who had experience with LMBV were invited to attend and provide state-of-the-science updates. Fishery management agencies were asked to present the status of LMBV in their respective jurisdictions. Approximately 70 participants representing southeastern states, federal agencies, universities, and other stakeholders attended the first meeting in Savannah, Georgia. This diverse representation of stakeholders continued in the succeeding workshops in Jacksonville, Florida; Little Rock, Arkansas; Wilmington, North Carolina; and Oklahoma City, Oklahoma, between 2000 and 2004, drawing over 300 participants from 22 states. Professional facilitators contracted by BASS kept the workshops on schedule, focused the discussions, and prepared transcripts of the presentations and discussions. The meetings focused on sharing existing information about LMBV and charting the distribution of LMBV-infected bass populations and fish kills attributed to LMBV.

It was apparent at the first meeting that standardized procedures were needed to effectively monitor LMBV infections. A major limiting factor to monitoring LMBV and diagnosing fish kills was lack of a real-time, non-lethal diagnostic methodology. The workgroup considered this the highest research priority. It was also apparent that expanded sampling efforts throughout the southeastern United States and consistent reporting of fish kills and LMBV infections would help track the spread of the disease and aid in identifying factors that might be triggering fish kills.

A paramount concern of fishery administrators and BASS was effective communication of factual information. To minimize misinformation and to avoid public overreaction, agency participants agreed that information about fish kills should be shared among all states in the region and all factual information should be released to the media as soon as possible. To this end, the workgroup agreed to develop a fact sheet for anglers and the media. The fact sheet would be a consensus document of the workshop participants. Meeting participants served as real-time peer reviewers and only information that was considered valid was included in the fact sheet. A press release based on the fact sheet was also prepared by BASS immediately after the meeting, distributed to all workshop participants for approval, and then released through the BASS media information network. In addition to the fact sheet and press release, workshop participants agreed that the facilitator's transcripts of the meeting would be posted on the BASS web site.

The fact sheets developed at workshops summarized the current

distribution and knowledge of LMBV, emphasized that LMBV did not pose a human health hazard, and explained that fish kills due to LMBV were minor compared to fish kills attributed to other known diseases. The fact sheets also informed anglers about how to recognize diseased fish, how to report suspected LMBV disease, and what they could do to help minimize the spread of LMBV (e.g., cleaning boats, trailers, and equipment thoroughly between fishing trips, not moving fish from one water body to another, holding tournaments during cooler weather, etc). Fisheries agencies were encouraged to share state-specific fact sheets with other fisheries agencies in the region to keep information consistent.

The workgroup identified and prioritized research needs. Researchers prepared LMBV-related proposals to address these needs. BASS committed to informing the principals involved with funding decisions about the potential significance of LMBV to fisheries resources and the importance of the proposed research. The lead investigators of each project were encouraged to coordinate their proposed objectives to avoid redundancy and inefficiency.

By 2001, LMBV had spread throughout all southeastern states, had been detected in several northern states, and had caused one fish kill in a lake on the Indiana-Michigan border. Although state agency reports at the 2002 meeting indicated LMBV was continuing to spread, the frequency of fish kills had diminished and the prevalence of LMBV (percentage of the sample that tested positive for LMBV) in infected populations was, in general, declining. The paradigm shifted from "a significant threat to largemouth bass populations" at the first workshop in 2000 to a consensus among the 2002 workshop participants that LMBV "is one more ecological factor affecting largemouth bass populations."

Public concern about LMBV gradually dwindled. By 2004, the number of reported largemouth bass fish kills was low, there was no evidence of further geographic expansion of LMBV, and the prevalence of LMBV generally was declining in those populations that had been monitored over time. The general sense among workshop participants was that LMBV was "just one of several fish health issues affecting largemouth bass," and that further studies of LMBV could be handled by fish pathologists. At the end of the fifth meeting, the LMBV workgroup decided that formalized annual meetings were no longer necessary. Smaller meetings of researchers, held on an "as needed" basis, would be a more efficient and cost-effective way to share and exchange information. The process was complete.

Significant Outputs of the Workshops

Although the spread of LMBV infections and fish kills were well underway by the first workshop, the meetings facilitated track-

ing the spread of the disease. Further, reporting numbers of fish kills, new locations of infected populations, and changes in LMBV prevalence allowed better assessment of trends than could have been achieved without collaboration of fisheries scientists from many agencies. The broad jurisdictional and spatial representation of workshop participants also made it apparent that LMBV infections do not always escalate to disease and, based on uninfected populations interspersed among lakes with infected populations, that not all largemouth populations become infected with LMBV.

Procedures for containing LMBV were determined. Effective means of sterilizing equipment were developed and tested. LMBV at hatcheries was a particularly difficult issue because of the limitations of detection methods (testing required sacrificing large numbers of fish, diagnosis took 2–3 weeks, and negative results were inconclusive). The workgroup recommended that broodstock and progeny should both be tested for LMBV and infected fish should not be stocked into populations that tested negative for LMBV. Some states, including a large hatchery system in Texas (Southard et al. 2009), implemented these recommendations to prevent the spread of LMBV to public water and other hatcheries.

The workgroup reached consensus that regulatory changes to restrict bass fishing or tournaments were not needed. Despite numerous angler complaints about declining largemouth bass catch and that some affected reservoirs had decreased numbers of large largemouth bass (Maceina and Grizzle 2006), no state agency had sufficient evidence to support significant declines in the total size of largemouth bass populations. Further, no state fisheries agency was able to support benefits gained by restricting fishing or tournaments. This consensus was not binding, but probably helped prevent hasty decisions and provided a defense against those groups demanding constraints on bass fishing and tournaments.

Funding was obtained from the Sport Fish Restoration program administered by the U.S. Fish and Wildlife Service for four research projects that addressed priority research needs identified at the workshops. To date, these projects have developed improved methods for detecting LMBV (Grizzle et al. 2003; McClenahan et al. 2005a, 2005b; Beck et al. 2006) and determined that LMBV transmission occurs rapidly among fish in confinement including conditions encountered in boat livewells and during tournaments (Schramm and Davis 2006, Schramm et al. 2006, Rees, 2007).

Important questions about LMBV remain unanswered, but these annual workshops and the research they stimulated served to refine many of these questions. Non-lethal sampling methods to detect LMBV are not available and remain a significant need, but polymerase chain reaction procedures for confirming LMBV were improved through collaborative efforts and communication by participating laboratories. Environmental factors (other than

high temperatures) that predispose fish to LMBV remain uncertain, but these workshops led to investigations in Texas, through a statewide LMBV survey, which ruled-out several factors that were a concern to anglers (Southard et al. 2009). Workshop participants benefited from a large database (Wild Fish Health Survey maintained by the U.S. Fish and Wildlife Service) that describes the distribution of LMBV in the United States (USFWS 2008). Although some data are incomplete, this collaborative effort provided a means to amass considerable information in a short period of time and across a broad geographic area which, in turn, allowed detecting patterns that might not have emerged without a regional perspective.

The workshop process identified a core team of biologists and researchers continuing to work on and communicate about LMBV issues. This group met in San Antonio, Texas, in 2006 and reported that LMBV prevalence was declining in some areas and the abundance and angler catch rates of large largemouth bass were recovering. Most participating states thought they were now adequately prepared to deal with LMBV issues, and most of their work had evolved into long-term research projects, general monitoring of fish populations, and management of LMBV at state fish hatcheries. The long-term impacts and persistence of the virus and disease recurrence will be determined in the future; however, this team is in a position to quickly reassemble, share information, and respond to LMBV-related problems, should they occur.

Lessons Learned

The collaborative approach to managing LMBV that resulted from these workshops was successful in many ways. Agencies concerned with LMBV were identified and invited to participate, their capabilities were shared (and enhanced for several agencies), and they worked together to address a common issue. Sharing information facilitated determination of priority research questions and reduced wasted effort. The interest and participation in workshops helped focus government, industry, and public attention on this regional and expanding issue and, therefore, helped secure funding.

Possibly the greatest benefit was the capability to quickly assemble all available information, provide instantaneous peer review, and develop and disseminate consistent, scientifically valid outreach tools (e.g., fact sheets, news releases). Based on declining public concern and fewer sensationalized media releases, these tools apparently were effective. The reality that LMBV was not just a local problem and was being addressed by a regional team also probably helped modulate public concerns. Because of this, the LMBV issue then became a universal bass management issue rather than a single state's problem. Also, the sportfishing community

may have been reassured knowing that scientists and management agencies were working in concert with a non-government angling organization to jointly make decisions and solve problems on issues that may affect them.

The meetings provided a timely and focused forum for managers, agency biologists, and researchers to interact. The meetings also created an opportunity for the researchers to learn what information was needed by managers and managers a chance to help focus research to achieve those answers. The diverse mixture of managers, biologists, and researchers also provided real-time feedback on data interpretation and prioritization of issues and problems.

The leadership, organization, and infrastructure provided by a private organization cannot be overlooked and, in our opinion, were pivotal to the success of this management effort. BASS envisioned the need, planned the meetings, secured the facilities, and contracted the services of professional meeting facilitators (Group Solutions – www.group-solutions.com) who had extensive experience working on national fisheries issues. It was fortuitous that BASS, in addition to representing anglers, was also part of the communication industry. They brought an experienced outdoor writer (Robert Montgomery) to synthesize the meeting into accurate angler- and media-friendly fact sheets and press releases. BASS also provided a web site for posting fact sheets, meeting summaries, and other information so that this information was accessible to workshop participants, anglers, and the media. As such, BASS became the nexus of an instant communication network for the many individuals and entities concerned with LMBV.

There were some shortfalls in this LMBV management process. Reports of LMBV infections presented at the workshops were incomplete and inaccurate, and subsequent attempts to compile more accurate information by directly contacting fisheries management agencies resulted in additional inconsistencies. Undoubtedly more could have been learned with an aggressive, region-wide sampling design, more precise estimates of LMBV prevalence from each population, and improved fish population metrics and angler catch estimates. As is always the case, fishery agencies' ability to respond to exigencies was limited by human and fiscal resources; however, the information shared at these workshops maximized the return on each individual agency's investment of time and resources.

We suggest that the management process blueprint from these workshops may be useful for addressing other fisheries issues of regional or broader scope. Although the future importance of LMBV in the management of largemouth bass is unknown, similar problems are likely to arise in other regions and other countries. The outbreak of viral hemorrhagic septicemia in the Great

Lakes (Elsayed et al. 2006, USDA 2006) and golden alga (*Prymnesium parvum*) in the southern United States (Sager et al. 2008) are current examples.

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