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AQUACULTURE SITUATION AND OUTLOOK REPORT 2010: WEST VIRGINIA

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Industry Trends and Outlook

West Virginia is characterized by streams and mountainous terrain. Water is readily available for aquaculture, but many sources are small. Natural springs occur most commonly in the eastern portion of the state, whereas groundwater from coal mines is most abundant in the southern portion of the state. Traditional pond aquaculture is most common in the western half of the state. Nearly all lakes or ponds are man-made.

Successful aquaculture enterprises in West Virginia have and will continue to develop in response to the natural resource base, climate, infrastructure, human capital, and economic opportunity.

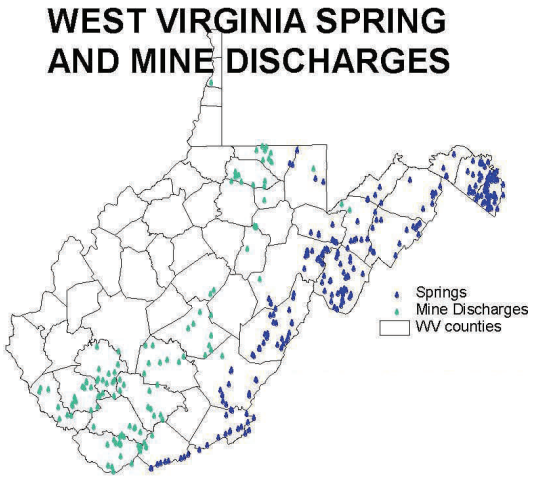

Photo credit: WV Sea Grant Extension

Though flowing water systems for trout are the most successful type of enterprise, there is potential to leverage small water resources by taking advantage of improvements in technology of recirculating systems. Suitable climate is another constraint, especially with another proven production system – earthen ponds. In pond systems, warmwater fish like catfish and bass have a short growing season, and production of coldwater fish like trout are not well suited to production during the summer months. Regardless, many types of fish can be grown in proximity to markets in the region.

Trout is the fish most commonly grown by West Virginia producers. The estimated value of trout produced in West Virginia for 2009 exceeded $2 million. The two largest commercial farms are Mountaineer Trout Farm near Sophia and Trout Lodge and Angler's Resort near Lindside. Trout Lodge and Angler's Resort processes and markets fresh and smoked trout products. Approximately 30 operations in West Virginia produce and sell live fish to recreational and food fish markets.

The West Virginia Division of Natural Resources is the largest single producer of fish in the state. It operates two warmwater and seven coldwater hatcheries. The warmwater hatcheries produce Muskellunge, Walleye, Channel Catfish, Hybrid Striped Bass, Paddlefish, Black Bass, Sauger, Blue Catfish, and Shovelnose Sturgeon fingerlings. The coldwater hatcheries produced about 700,000 pounds of brook, brown, rainbow, and golden rainbow trout in 2008-09.

Three resident businesses offer a variety of fish, plants, and other products for warmwater ponds and distribute throughout the state. They compete with businesses in Arkansas which send trucks to local farm supply stores. These vendors sell catfish, bass, sunfish, baitfish, koi, carp, and other species.

Often, fee-fishing businesses do not grow the fish they need, rather fish are purchased from a distributor who obtains them from a variety of sources and delivers them as needed. Trout are the fish of choice during the cool months and catfish are desirable during the warm months. Catfish are purchased from growers south of West Virginia where the growing season is longer. In recent years, West Virginia has changed from a net importer to a net exporter of live trout.

Emerging Issues and Critical Needs

Critical needs for each farmer will vary since each business and the individuals who operate them face different problems and opportunities. If the aquaculture industry is expected to grow, those who have invested resources and time in aquaculture must obtain a reasonable return on their investment. In general, the trained aquaculture workforce in West Virginia is small. As such, human capital may limit development of an aquaculture industry, and the consumer traditions which can drive the industry.

Until recently, aquaculture was not fully embraced as agriculture by regulatory agencies, and other agencies supporting agriculture development. This is reflected in the fact that the present infrastructure does not actively encourage development of the aquaculture industry. However, there is an effort to recognize the state Department of Agriculture as the lead agency for aquaculture and to create an Aquaculture Advisory Board to bring representatives from state agencies and industry together constructively address issues facing aquaculture development.

Other recent initiatives that may facilitate growth in the food fish and recreational fish culture industry include:

- The state has begun to review its policies with respect to water usage. Since ground water, including water from coal mines, has value for production of salmonids, access to this resource could be significant to development of the industry.
- With improved supplies of fish and prudent management the development of a profitable processor-based trout enterprise may become available.
- The state no longer considers fish manure as industrial waste, but deems it comparable to other manures. This change makes it easier to land-apply fish manure.
- Increasing private water bodies managed to support recreational activities would allow West Virginia vendors to increase their market for stocking such warmwater ponds.
- In addition, it would allow private landowners to stock streams on their land with trout and charge a fee for visitors to fish. This has been profitable for several locations in nearby Virginia.
- The stocking of streams by private individuals for recreational opportunities is growing faster than the traditional fee-fishing which occurs in ponds. Individuals utilize the stocking of large trout (>1.5 lb) into a pay-to –fish format in streams which flow across their property. Issues of stream ownership and access have surfaced since the inception of this new pay fishing technique and need to be resolved.
- Resolution and explanation of stream ownership/access as well as permitting issuance for recreational stream fee-fishing venues could create an increased demand for farm grown trout. Fishing events developed can utilize both public and private water.
- The emergence of VHS in states bordering the Great Lakes and the resulting policy changes has emphasized the importance of accessible and affordable fish health certification. This may create incentive to utilize water sources in West Virginia.
- Variation in policies regarding certification and transport can be serious problems for those who buy and sell live fish. There has been an increased demand for a reliable supply of locally produced brook and brown trout eggs and fingerlings which are specific pathogen free.

Addressing Industry Needs

Researchers, Extension specialists, resource managers, industry associations and concerned stakeholders all play a role in addressing industry needs. The following sections outline the new initiatives and recent accomplishments in these areas.

Aquaculture Research

West Virginia University (WVU) is a leader for aquaculture research in the state. The following two projects are currently being conducted at WVU:

Rainbow Trout Genome Project- The focus of the rainbow trout genome project is to develop genetic/ genomic resources, e.g. microsatellite markers, linkage maps, Expressed Sequence Tags (ESTs), Bacterial Artificial Chromosomes (BAC) libraries and microarrays, and utilize them to identify genetic elements that control economically important production traits such as fillet quality, embryogenesis, growth rate, feed efficiency and disease resistance. The ultimate goal is to use this knowledge in selective breeding programs to develop more desirable strains of rainbow trout for efficient production. This project is in collaboration with the National Center for Cool and Cold Water Aquaculture (NCCCWA).

The Aquaculture Product and Marketing Development Project is a market-oriented multidisciplinary effort that is administered through the WVU Davis College of Agriculture, Forestry and Consumer Sciences. Individual objectives of the project focus on the following disciplines: Marketing, Agricultural Economics, Animal Science, Food Science, Engineering, Recreation and Parks, Horticulture, and Extension. The project seeks to focus on two economic development opportunities associated with aquaculture development in West Virginia - flowing water systems and niche markets.

National Center for Cool and Cold Water Aquaculture the mission of the NCCCWA http://www.ncccwa.ars.usda.gov is to support and enhance the nation's cool and cold water aquaculture production through research and technology transfer . The goals of the program are to improve production efficiency, aquatic animal health, and product quality through the development of economically and environmentally sustainable commercial systems and practices. Research emphases include applied genetics and breeding, integrated aquatic animal health, aquaculture engineering, nutrition, physiology, culture and management, and product quality. The focus species include, but are not limited to, rainbow trout, Artic char, and striped bass.

Flowing water system for commercial production of trout (Photo: Ken Semmens)

The Leetown Science Center http://www.lsc.usgs.gov is located adjacent to the National Center for Cool and Cold Water Aquaculture. Historically it has been an important resource for aquaculture, particularly in the area of fish health. Currently it is administered as part of US Geological Survey. Investigators conduct research needed to restore, maintain, enhance, and protect aquatic and terrestrial organisms and their supporting ecosystems.

White Sulphur Springs National Fish Hatchery is a specific pathogen-free trout hatchery that maintains two strains of rainbow trout as part of the National Broodstock Program http://www.fws.gov/northeast/wssnfh/index.html. Broodfish are grown, spawned and each year approximately 7.5 million eggs are shipped all over the United States. Shipments are made to tribal, state, and other national fish hatcheries. These production hatcheries rear the eggs and grow the fish to a stockable size.

Investigators are also developing a freshwater mussel propagation program aimed at restoring imperiled species in the mid-Atlantic and southeastern states. Ongoing research with Virginia Tech seeks to improve aquaculture technology for the restoration of threatened and endangered freshwater mussel species in West Virginia and southern Appalachia.

The Freshwater Institute http://www.freshwaterinstitute.org is a nationally recognized program of the non-profit Conservation Fund http://www.conservationfund.org, a 501(c)(3) organization based in Arlington, Virginia. Recognizing the value of clean water resources, the Freshwater Institute works with government, industry, nonprofits and individuals to shape sustainable, environmentally responsible solutions to water resource management. From its campus in Shepherdstown, West Virginia, the

Institute's staff combines applied research, engineering, and economic development skills to show the critical role freshwater resources play in the achievement of economic and environmental goals. Freshwater Institute projects provide demonstration of practices or development of technology that meet concern for environmental protection and the recognized need for fair return on investment.

The Natural Capital Investment Fund (NCIF) was established by The Conservation Fund in 2000 to provide financing to natural resource-based businesses that will advance sustainable economic development http://www.ncifund.org. NCIF focuses its activities on the following sectors: sustainable/value-added agriculture; sustainable forestry & value-added forest products; renewable energy & energy efficiency; heritage & eco-tourism; green building; and recycling. NCIF provides subordinated debt and equity financing to new and expanding businesses in these sectors, especially those that are unable to obtain sufficient financing from conventional sources. As an affiliate of the Freshwater Institute, NCIF is interested in working with and has supported aquaculture business in West Virginia.

Aquaculture Extension

West Virginia University is the primary aquaculture extension program in the state. Many different methods are used to reach a diverse group of stakeholders. The year begins with a statewide meeting known as the Aquaculture Forum which draws over 100 individuals to discuss aquaculture and its development as a viable industry for West Virginia. Throughout the year, fish are grown at two locations with flowing water systems. These facilities are utilized for research and demonstration and are made available to classes, visitors, and for workshops. A web site http://aquaculture.ext.wvu.edu/ is maintained for extension and for communicating research results. A quarterly newsletter is distributed http://aquaculture.ext.wvu.edu/newsletters and articles are submitted to popular publications. Responses to requests for literature and information are made via email, and telephone. When these methods are not sufficient, site visits are scheduled to meet directly with stakeholders.

Aquaculture extension also facilitates access services such as water quality testing, testing for contaminants, disease diagnosis, etc. and develops tools to promote development of the aquaculture industry in West Virginia.

Aquaculture Education

Students statewide are presently receiving exposure to career development opportunities in aquaculture through the West Virginia Secondary Agricultural Education Program. In many cases, aquaculture instruction is infused in the advanced agri-science curriculum. Students are afforded some excellent opportunities for "hands-on" instruction through agricultural education aquaculture labs. These labs have been made possible by local partnerships, private foundation monies and special appropriations by the West Virginia Legislature.

West Virginia University - The Davis College of Agriculture, Natural Resources and Design http://www.davis.wvu.edu/ offers undergraduate and graduate degrees in many disciplines which relate to Aquaculture including Animal Science, Resource Economics, Horticulture, Fisheries Biology, etc. A course in Aquaculture Management is offered annually through the Division of Resource Economics.

West Virginia State University http://www.wvstateu.edu at Institute, West Virginia offers undergraduate and graduate courses in aquaculture that include Principles of Aquaculture, Aquatic Animal Nutrition, and Biology of Fishes. A Masters Degree in Biotechnology and aquaculture is offered within the curriculum track called organismal/environmental biotechnology. There is also an Masters Degree in Biotechnology suitable for students who do not need a research-based degree.

Aquaculture Resources

The West Virginia Department of Agriculture http://www.wvagriculture.org offers services provided by individuals in various offices.

The West Virginia Aquaculture Association (WVAA) http://wvaquaculture.com/ is the only statewide producer organization.

The Northeastern Regional Aquaculture Center (NRAC) http://www.nrac.umd.edu is one of five Regional Aquaculture Centers established by the U. S. Congress which supports research and outreach efforts to promote the development of the aquaculture industry.

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