

National Assessment Sheds Light on Educational Needs for Aquaculture in the United States

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with introduced species and fisheries as key words reveal dozens of articles and books written on biological and social aspects of species introductions. Examples of communication skills important for fisheries professionals can be found in Bonar (2007), Jacobson (2009), and Bonar and Fraidenburg (2010). Finally, the history of nonnative species in fisheries is long and varied and can be found in many publications, including excellent North American overviews by Allard (1978) and Moffitt et al. (2010). Strong knowledge of potential effects of introduced species management, based on their history and biology, and success in interacting with the public, including evaluating their viewpoint, will serve a new (or experienced) biologist well.

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FISH CULTURE SECTION

National Assessment Sheds Light on Educational Needs for Aquaculture in the United States

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INTRODUCTION

Education and training are fundamental to growing and maintaining a skilled workforce. Diverse, accessible educational opportunities are critical to the success and stability of the aquaculture industry. Ideally, aquaculture education and training blend many different sciences and technical fields germane to extensive or intensive rearing of aquatic organisms in inland, coastal, or offshore environments. Prior to the 1970s, there were few postsecondary institutions in the United States with aquaculture-specific programs (Figure 1). In response to growing enthusiasm for a “blue revolution” and the job opportunities aquaculture was expected to provide, numerous universities invested in new aquaculture-related programs, and student

interest and enrollment grew through the 1990s. Graduates of these programs helped to build the U.S. aquaculture industry but are now nearing retirement. The average U.S. aquaculture extension educator, for example, is now in his or her 60s and 70s and transitioning out of professional life (Jensen et al. 2005). Although job opportunities outside of the United States have increased in recent years, new generations of aquaculture professionals are needed to replace retiring domestic aquaculture “baby boomers.” Unfortunately, opportunities for education and training appear to be contracting, and even some historically strong aquaculture programs have been allowed to senesce.

An aging workforce, coupled with fewer educational opportunities for younger generations, is clear cause for concern

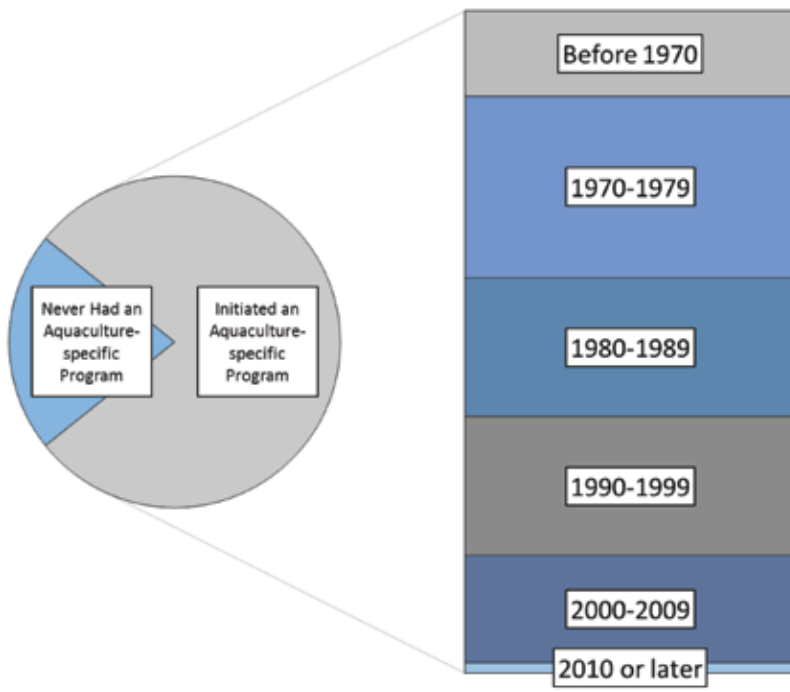


Figure 1. Relative number of the responding institutions (n = 79) that had or had not initiated aquaculture-specific undergraduate or graduate education/training programs and the decade of their initiation.



Figure 2. Number of students completing aquaculture-related degree/certification programs in 2000 (completed), 2010 (enrolled), and 2015 (projected). Each person icon represents 100 individuals, and both U.S. and international students are represented. Although international students only represent 3%–6% of undergraduate students, they represent 18%–25% of M.S. students and 35%–47% of Ph.D. students.

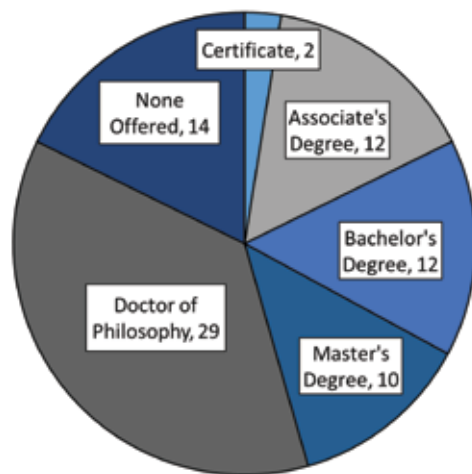


Figure 3. Relative number of responding institutions (n = 79) with aquaculture-specific education/training programs according to the highest certification/degree offered.

in any industry, including aquaculture. There is concern about the size and readiness of the aquaculture workforce poised to take over the aquaculture industry in the future, as well as the desire among students to pursue aquaculture as a career. To address these issues, the U.S. Department of Agriculture National Institute of Food and Agriculture in collaboration with the United States Aquaculture Society (a chapter of the World Aquaculture Society), the Fish Culture Section of the American Fisheries Society, and the National Shellfisheries Association conducted a national survey. The survey attempted to document aquaculture-related instruction, teaching, and training at postsecondary institutions in the United States. We solicited input from postsecondary institutions across the United States that offer any level of teaching/instruction, including elective courses, subject-matter specialization, diplomas, certificates, or degrees related to aquaculture (88 of 115 institutions responded with information about their programs). Here, we summarize key findings from the project.

RESULTS AND DISCUSSION

Some instructional programs contracted in response to slower growth in the domestic aquaculture industry and fewer job opportunities. In this context, the relatively stable enrollment from 2010 to 2015 may be considered “good news” (Figure 2); however, recruitment problems exist. Fewer international students enrolled in B.S. programs, but international enrollment in Ph.D. programs matched that of U.S. students. A considerable number of institutions still offer some level of instruction in aquaculture (Figure 3), though many are smaller institutions; the creation of new aquaculture programs virtually stopped after 2010 (Figure 1). Declining student interest in aquaculture could significantly affect future institutional capacity through a self-reinforcing feedback loop. Projected patterns of faculty retirement and contraction of aquaculture instructional programs will likely lead to further reductions in student interest and enrollment. A growing number of online course offerings may help to break this feedback loop (Figure 4); however, concerns regarding the ability of U.S. postsecondary institutions to prepare sufficient numbers of adequately trained aquaculture professionals appear warranted. Respondents suggested that employment prospects remain strong, particularly for those with advanced training in aquaculture (Figure 5), but whether an adequate number of students will be able to access the necessary education/training and

seize these opportunities is unclear. Our findings reveal considerable interest in initiatives to “teach the teachers” innovative curriculum development techniques and teaching methods to help address this challenge and achieve improved learning outcomes.

CONCLUSIONS

Driven by market forces and public interest, aquaculture will continue to grow and innovate, but the trajectory of the domestic industry will depend upon the presence of a competent workforce to develop, regulate, and sustain what is now the world’s most important source of seafood. The United States cannot afford to lose its critical human capital and instructional capacity that has matured since pioneering efforts in the 1960s–1970s. This first-ever assessment offers insights into the diversity and scope of aquaculture instruction at postsecondary institutions in the United States. The data and information can help to identify present needs and serve as a benchmark to monitor trends in future years. Over the past 10–15 years, there have been fewer job announcements specific to aquaculture, especially in the academic and government sectors. Interest among U.S. students to pursue aquaculture training appears stable; however, numerous institutions report challenges in recruiting U.S. students for advanced degree programs. Some institutions remain committed to aquaculture and are actively revamping existing programs and facilities, increasing capacity, and adding courses; others have seen their traditionally strong instructional programs waver or disappear. The ability to create and transfer knowledge is critical, if we are to capitalize on the diversity of animal science, including aquaculture, and improve national and global food security (NRC 2015). We encourage those in positions of influence to consider the future of U.S. aquaculture and the importance of maintaining needed instructional capacity at postsecondary institutions.

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Figure 4. Number of institutions reporting online courses in subjects related to aquaculture in 2010. Each computer icon represents an institution.

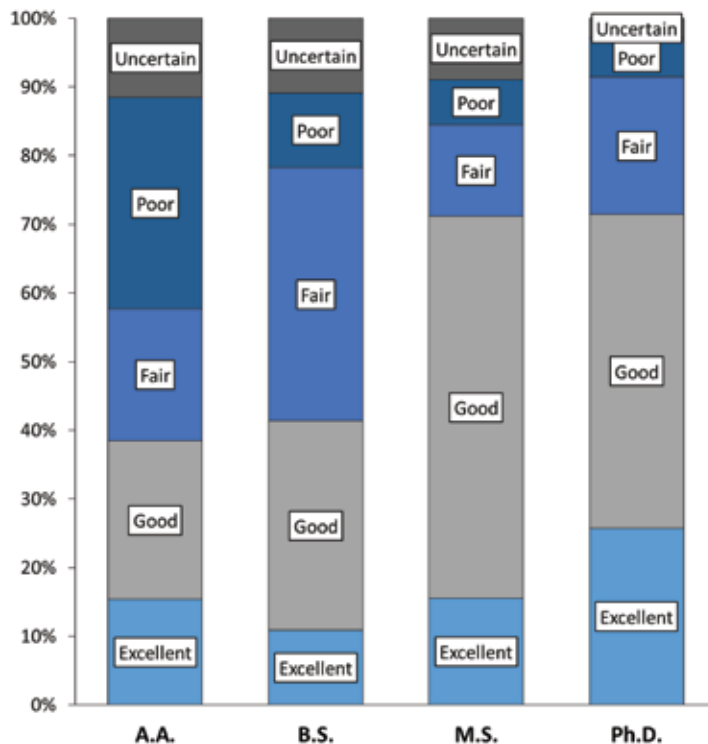


Figure 5. Prospects for job placement for students completing aquaculture-related degree programs in 2010.