2021

Summary of Aquaculture in the United States

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Introduction

U.S. policy makers are increasingly looking at aquaculture to address growing domestic demand for seafood. Aquaculture, which is the breeding, rearing and harvesting of fish, shellfish, and aquatic plants (NOAA 2019), offers the potential for sustainable, local seafood production. Aquaculture production in the United States has fallen from 10% of global production in 1950 to less than 0.5% in 2017 (Shamshak et al. 2019). As a result, U.S. seafood consumption now relies heavily on imports of mainly aquaculture products (Shamshak et al. 2019). This reliance is concerning to policy makers, and even motivated a Presidential Executive Order in 2020 aimed at supporting domestic aquaculture production (Executive Order 13921).

Aquaculture comes in two types: marine and freshwater. U.S. marine aquaculture has a production value of about $400 million, compared to about $700 million from freshwater. Traditional marine aquaculture uses net pens in coastal waters, and freshwater aquaculture uses ponds and flowthrough raceway systems, although both marine and freshwater species can and increasingly are grown in artificial tanks (NOAA 2019). Each production system brings sustainability challenges. Of biggest concern: diseases that spread from farmed to wild populations; concentrated waste discharges that damage ecosystems; and, with net pen systems, aquatic animals that become entangled in the nets.

In the remainder of this fact sheet, we briefly review additional aspects and concerns about the U.S. aquaculture industry. We examine the geographic distribution of production, the effect of regulations, and potential compatibility with other aquatic industries. This review uses statistics from the U.S. Census of Aquaculture conducted in 2005, 2013 and 2018, including a statistical analysis of the census data; we have placed the results of the analysis in a separate appendix, available upon request.

Aquaculture by region

Most freshwater aquaculture production in the United States occurs in coastal states, with a particularly high volume in the South. Figure 1 shows the distribution of aquaculture production separated by region corresponding to the Regional Aquaculture Centers (RACs) administered by the Department of Agriculture's National Institute of Food and Agriculture (each RAC supports cooperative research, development and demonstration projects that address industry needs for the states in their region). More than half of the industry's production value is based in the southern region, with most of the remainder in the western region.

Reliance on pond systems for production and favorable climate conditions likely explain the southern region's outsized contribution. There is a strong association between production value, temperature and precipitation, as states with warmer and wetter climates have more favorable outside production conditions. Additionally, the low-lying floodplains of the Mississippi are near ideal for production (Muir 1985). Ponds in the north are more costly to construct and require greater depths if fish are to safely overwinter.

Nevertheless, Washington and California are important states for production. Figure 2 compares the top six states in terms of production value.

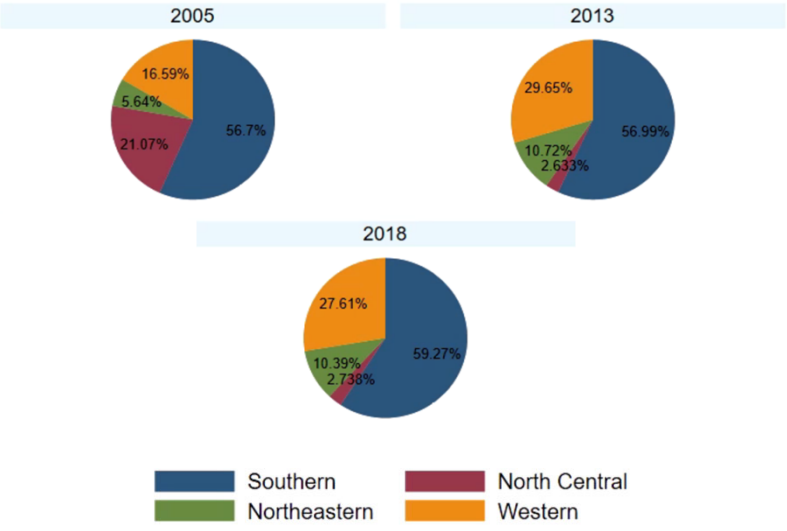

Fig. 1 – Contribution to total US aquaculture production by region.

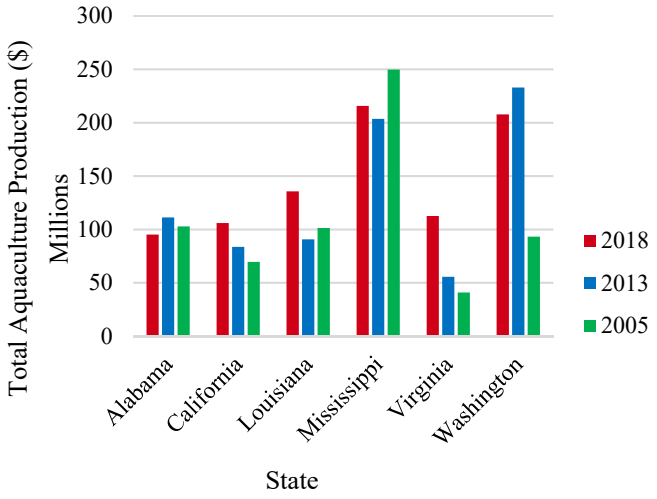

Fig. 2 – Total aquaculture production of top 6 highest producing states.

Role of regulatory agencies

Regulation of the U.S. aquaculture industry is an important topic for several reasons. First, regulations are necessary to ensure that the industry is operating sustainably. Second, stagnation of the U.S. aquaculture industry has been partly attributed to regulations (Engle and Stone 2013). Third, public opinion in some states suggests a need for clearly defined limits on fish farms (MEC 2016).

Agencies responsible for monitoring aquaculture operations and enforcing regulations have the potential to influence the amount of production in a state. This influence can be positive or negative. Although it is difficult to measure regulatory burden, we checked whether states that involve their department of agriculture in licensing aquaculture operations was associated with relatively lower or higher production levels, compared to states that relied wholly on their department of natural resources for licensing. Some stakeholders may perceive departments of agriculture, which focus on supporting farmers and food producers, as "friendlier" to aquaculture producers than departments of natural resources, which are generally responsible for protecting and conserving the natural resources in a state. Average annual production is indeed higher in states that involve their department of agriculture, but the difference is not statistically significant after controlling for other important differences between states.

Interaction with recreational and wild caught fishing operations

Spillovers between industries can leave people better or worse off. Poorly managed aquaculture can hurt people and the environment by damaging wild and recreational fisheries. Sustainable aquaculture, on the other hand, can benefit wild harvest and recreational fisheries by reducing harvest pressure and provide a source of stock for lakes and streams, and even bait products (Tisdell 2003). Policies and programs should impede negative spillovers and augment positive spillovers. Evidence indicates that recreational fishing and aquaculture complement more than clash. States with more recreational fishing tend to have more aquaculture: We find that, across census years, the correlation coefficient between state aquaculture production and recreational fishing license sales is 0.201; this association is highly significant after controlling for other important factors. There is less evidence of a relationship—positive or negative—between aquaculture and wild caught fishing in terms of sales, with a correlation coefficient of 0.010.

For more information

Contact your local state extension or Sea Grant office, or look for affiliated research and outreach programs like the Great Lakes Aquaculture Collaborative.

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