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regulatory costs over an increased production volume. Therefore, regulations resulting in lost and foregone sales have a dual impact of increasing regulatory costs, while simultaneously reducing the ability of producers to spread the increased costs by restricting sales volume.

Given that Arkansas producers were the only ones with a state-supervised fish inspection program, we also took a closer look at the breakdown of certified fish health testing costs. Of the farms who participated in Arkansas, 88% were also participants in the fish health certification

program. The average annual cost of fish health testing for producers in Arkansas was \$14,500 per farm, with an average cost per test of \$4,400. The largest cost component of the certified fish health testing activities (bottom pie graph, previous page) was the seining and preparation for testing (27%), followed by the cost of transporting samples (22%). These were followed by the program fee (17%) and the actual testing fees (12%).

Regulatory costs were also assessed by farm size. Small farms (under 50 acres) had a relatively higher regulatory cost. By farm size, 60% of Arkansas producers were large farms (over 500 acres),

32% were medium (between 50 and 500 acres), and 8% were small farms (less than 50 acres). This was very different from other states, where there were only medium and small farms. Due to the fact that many of the regulatory costs captured by the survey were fixed costs, small farms spent on average more per acre on regulatory compliance; while large farms were better able to spread regulatory costs across a larger acreage and production volume.

We would like to thank the Arkansas producers and all the Extension and research personnel who helped make this project possible.

## **New Study Underway to Estimate the Impact of Lesser Scaup on Arkansas' Baitfish Industry**

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The baitfish industry is an important economic enterprise for many aquaculture producers in Arkansas. The industry generates approximately \$30 million annually in farm-gate sales of these small fish that include fathead minnows, goldfish and golden shiners. Diving ducks known as scaup, or "Bluebills," spend late fall through early spring in Arkansas and Mississippi on deep water wetlands, rivers, and aquaculture ponds. The notion that scaup are consuming an abundance of baitfish in Arkansas ponds has concerned commercial growers for several years.

During the fall-winters of 2016-2018, the University of Arkansas at Pine Bluff is teaming with bird researchers from Mississippi State University and the USDA's National Wildlife Research Center (at Mississippi State) to study impacts of scaup on baitfish in Arkansas. Scaup traditionally feed on small prey such as insect larvae, tiny crustaceans or hard-shelled insects like freshwater shrimp, and submerged aquatic plants, such as pondweeds. Fish, historically, were not an important part of scaup diets. Recent observations by Arkansas baitfish producers suggest that scaup are foraging significantly on Arkansas baitfish and cutting into producer profits. Because of this concern by growers, USDA Wildlife Services and UAPB Extension personnel collected foraging scaup from baitfish ponds in winters 2014-2015 and found that scaup were in fact eating baitfish. Our new study is designed to investigate this in more detail and will focus on: 1) assessing the abundance and distribution of scaup using baitfish farms, 2) quantifying the amount of prey (baitfish) available in ponds and the amount of fish and other prey consumed by the scaup, and 3) estimating the total economic impact of scaup foraging on baitfish on Arkansas' baitfish farms. All of these factors weigh heavily on the minds of Arkansas producers so this research is designed to answer these questions and identify potential solutions for the industry.

Researchers will sample baitfish ponds every two weeks from November through March, winters 2016-2018. Each day afield, we will count scaup and other waterbirds from vehicles or blinds on a pre-selected set of ponds that will be chosen from 15-20 farms participating in the study. We will count scaup and other birds, such as cormorants, great blue herons and white egrets, using the ponds and potentially consuming baitfish. Similar efforts to study scaup foraging on baitfish were conducted in 2004-2005, so our newer study results will be compared with the prior results.

In addition to surveys, we will collect scaup by directly shooting actively feeding individuals after they have been observed feeding for approximately 10 minutes. Once birds are collected in the field, various procedures will be used to preserve food consumed by the birds, as well as various data collected from the birds themselves, such as their sex, weight, etc. Ultimately, our goal is to estimate the species and abundance of fish consumed by scaup.

Once all of our data is collected, we can estimate numbers of scaup present over the two winters, amount and types of fish and other organisms eaten by the birds, and finally an economic analysis of the cost to growers related to fish consumed by scaup. The economic analysis will be led by Dr. Carole Engle. Dr. Engle has valuable previous experience working with aquaculture producers in estimating costs of their farming operations and the economic losses due to depredating birds.

We are eager for this collaboration between researchers and aquaculture producers, and are especially thankful for funding and other support from USDA's Southern Regional Aquaculture Center. As the aquaculture industry changes and migrating and wintering birds discover "profitable" food sources, research such as this is necessary to continue to understand relationships between wild waterbirds and their food and other habitat needs, particularly when it involves potential depredation of an important economic enterprise such as baitfish. These results will enhance our knowledge of this human-wildlife conflict and we will strive to provide conservation solutions for growers.

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