



Lesser Scaup Predation on Arkansas Baitfish and Sportfish Farms

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Summary

Baitfish and sportfish losses over the winter can be catastrophic on farms in Arkansas. In recent years, farmers have reported losing more than 50 percent of their crop during the winter months. Water acreage losses of small baitfish and sportfish on farms in Arkansas have been recorded as high as 7,225 acres (winter of 2012/2013).

In 2014, 16,072 acres of baitfish (minnows) were in production in the state of Arkansas. The combined losses (5,785 acres) in fathead minnows and golden shiners alone equated to 36 percent of the baitfish production (in terms of water acres) in the state over the winter of 2012/2013. Fathead minnows, golden shiners and bream are the fish species most affected by unusual fish losses during the winter. Losses reported for other species (goldfish, largemouth bass, grass carp and hybrid striped bass) had very few affected acres compared to baitfish.

Farmers have several different theories that might explain these losses, including abnormally high fall season water temperatures, large fluctuations in pond water temperature, abnormally long winter and increased predation by ducks (particularly diving ducks such as lesser scaup, *Aythya affinis*). Lesser scaup have been regular visitors to baitfish ponds but were not thought to significantly impact farms by feeding on small fish. Preliminary studies have demonstrated that lesser scaup consume baitfish and sportfish in

numbers larger than previously believed. Economic estimation of fish losses is currently unknown. A study is currently underway to determine the costs of preventing or decreasing bird depredation on baitfish and sportfish farms in Arkansas.

Species Description and Life History

Lesser scaup, *Aythya affinis*, is one of the most abundant and widespread migrating diving duck populations in North America. It is medium-sized (16 to 18 inches head to tail) and distinguished by a head that is taller than it is wide, with a peak toward the rear of the crown, and the back of the head is flat (Figure 1). Like many birds, lesser scaups are sexually dimorphic; male birds are quite distinguishable from the female when mature and during the breeding season. Females are dark brown with a darker brown head and, during winter, have a white patch next to a dark gray bill with a black tip. The female has eyes that range from orange to amber in color. Mature males are black and white, with a purplish/green iridescence to the head. Although the flanks and belly are white, their backs have a finely barred black and white pattern, and the rump is black. Males have a light gray-blue bill with a black tip and brilliant yellow eyes. Nonbreeding males have a mottled brown and grey body with a blackish head and yellow eyes. Both males and females have a light band near the trailing edge of the wings that only extends halfway down the wing.



Figure 1. From left to right; adult male lesser scaup in breeding plumage, female, and a male lesser scaup in non-breeding plumage. From Cornell Lab of Ornithology and the Macaulay Library. https://www.allaboutbirds.org/guide/Lesser_Scaup/id

Lesser scaup can be found throughout Canada and the United States (including Hawaii), to Panama, the West Indies and the northern shore of Venezuela (Figure 2). These ducks are often found on inland waters in flocks. They are slow to migrate, often not leaving until the water freezes over. They feed on snails, clams, aquatic insects, small fish, seeds and pondweeds. They eat by diving and swimming underwater or by sticking their tails out of the water when feeding in shallow water. Lesser scaup have also been reported to feed at night.

Not only is lesser scaup the most abundant of the North American ducks, it also has the largest breeding range. The breeding range extends from the prairie pothole regions of the northwestern United States to the Bering Sea, with the largest breeding populations found in the boreal forests of Canada.

Pair formation begins toward the end of winter, with breeding taking place in late May to July. During the breeding season, fresh, and to a limited extent brackish, wetland areas with emergent vegetation are used as nesting sites. Lesser scaup construct nests close to the water. The nest is simple, consisting of a slight depression in the ground with some dry grass used to line the nest. The female lays one egg per day and begins to incubate the eggs two days before she lays the final egg. About halfway through incubation, the males aggregate away from the females to molt into nonbreeding plumage.

The female incubates between 8 to 14 eggs for 21 to 27 days.

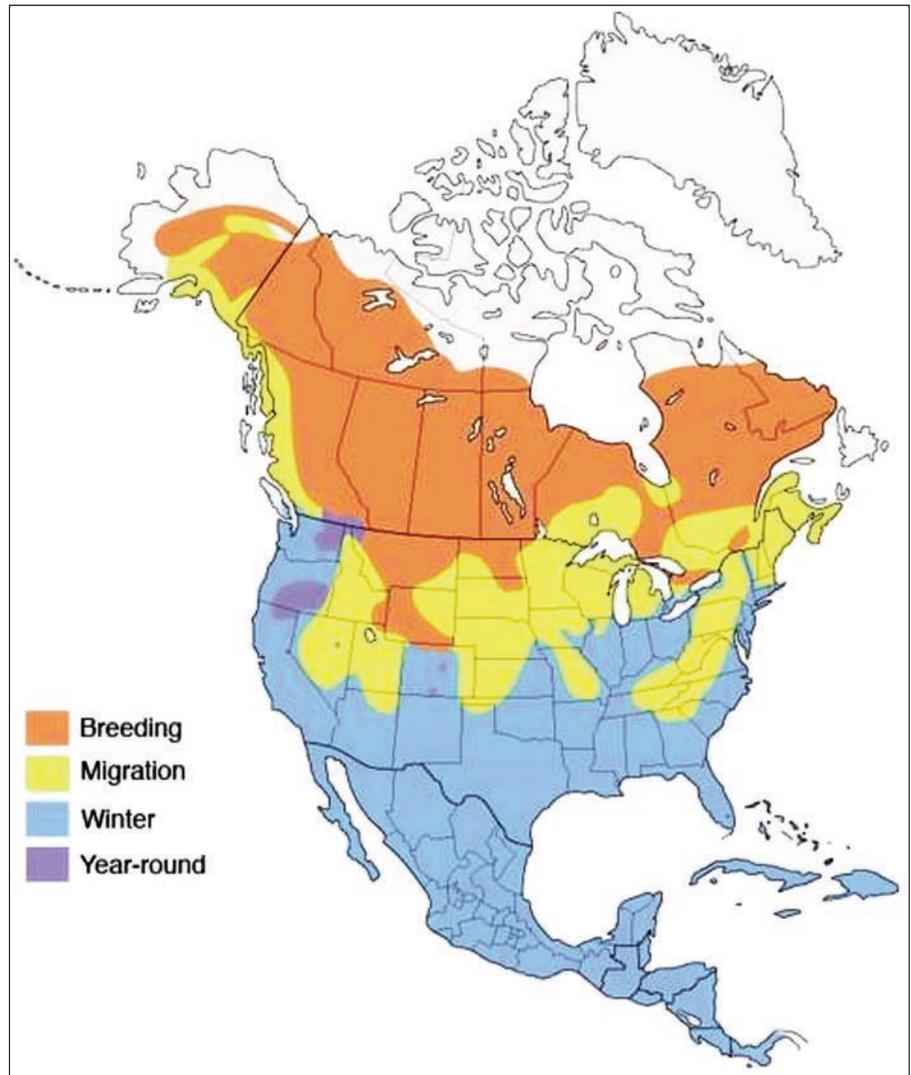


Figure 2. Distribution of the lesser scaup including nonbreeding winter habitat, year-round habitats, migration areas and breeding areas. From Cornell Lab of Ornithology and the Macaulay Library. <https://neotropical.birds.cornell.edu/Species-Account/nb/species/lessca/overview>

Shortly after hatching, the female leads the hatchlings to the water where the chicks feed themselves. Lesser scaup young will start to fly 47 to 52 days after hatching. Male and female lesser scaup can breed in the first year after hatching or their second summer of life.

The Baitfish and Sportfish Industry in Arkansas

The birthplace of warm water aquaculture in the United States is Arkansas. The first commercial fish farms were built in Arkansas in the 1940s to raise goldfish.

The Arkansas aquaculture industry has expanded to the production of more than 20 species of fish and crustaceans. These species supply food-fish markets, recreational fishing markets and waters, retail pet markets, gardening supply markets and markets for aquatic weed and snail control.

Arkansas ranks second in aquaculture-producing states. It leads in production of baitfish (live fish bought by anglers as bait for fishing), largemouth bass for stocker fish, hybrid striped bass fry and triploid grass carp. It is third nationally in catfish production. The world's largest baitfish farm, largemouth bass farm, goldfish farm and hybrid striped bass hatchery are all in Arkansas.

The baitfish industry in Arkansas mainly produces fathead minnows, *Pimephales promelas*; golden shiners, *Notemigonus crysoleucas*; and goldfish, *Carassius auratus*. According to the Census of Agriculture, by 2005 more than six billion baitfish were sold annually from Arkansas. Sales of live bait are the major air freight commodity from the state, and baitfish production is the leading aquaculture industry in Lonoke County.

Sportfish hatcheries in Arkansas raise largemouth bass, several bluegill varieties, bluegill hybrids, redear sunfish, crappie and catfish for sale to pond and lake owners for recreational fishing. While most sales are to wholesalers and distributors, hatcheries also sell to private pond owners. Arkansas has hundreds of thousands of private ponds, used for a variety of purposes, such as watering livestock, fire control, attracting wildlife and recreational fishing.

Use of Baitfish/Sportfish Ponds by Lesser Scaup

Most baitfish and sportfish farms in Arkansas are located along the Mississippi Flyway. Consequently, large numbers of migratory waterfowl are present on baitfish and sportfish farms during

the winter months every year. Over the last half decade, Arkansas commercial baitfish and sportfish producers have reported substantial increases in the numbers of lesser scaup on their production ponds. Diving ducks, particularly lesser scaup, have been observed by farmers feeding in large numbers on ponds stocked with fathead minnows, golden shiners and smaller sportfish such as bluegill, redear sunfish and crappie (Roy et al. 2013). January, February and March are typically the months in which lesser scaup are most abundant on aquaculture ponds in Arkansas.

Impacts

During the migration seasons, several thousand lesser scaup can be present on an aquaculture facility at any one time. Lesser scaup are commonly found on baitfish ponds, but since their diet was believed to only consist of 3.5 percent fish, they were not considered major predators, and it was thought they did not significantly impact farms. Due to a minnow shortage in 1995, the USDA/APHIS Animal Damage Control Unit (now Wildlife Services) conducted a study examining the role of lesser scaup using minnows as a food source on commercial farms. This study showed that 25 percent of the ducks examined had minnows, and of those samples, 44 percent contained golden shiners and 44 percent contained goldfish. The average number of golden shiners eaten by lesser scaup was three and the average number of goldfish was nine (Phillips and Hoy 1997). A similar study was conducted during November to April in 1999 and 2000. This study found fish or fish parts in 25.5 percent of the lesser scaup sampled. Fish consumption was higher in females than males and higher in juvenile birds versus adults. Fish were the second highest food consumed by lesser scaup, with chironomids being the highest.

Farmers reported unusual losses of not only baitfish but also small sportfish in the spring of 2013. UAPB Extension personnel

conducted in-person surveys to determine the number of fish losses. Many of the baitfish and sportfish producers reported reductions in production ranging from 50 to 90 percent of the crop in their ponds (Roy et al. 2013). Fathead minnows, golden shiners and bream were the fish species most affected (Table 1). At the time of the survey, there were 16,072 water acres in Arkansas used to raise baitfish (fathead minnows and golden shiners). A total of 5,785 water acres were lost, which is equal to 36 percent of the baitfish production.

Table 1. Water acres of fish production by species that experienced unusual fish losses during the winter of 2012/2013.

Fish Species	Number of Water Acres
Fathead minnows	3,242
Golden shiners	2,543
Bream*	1,168
Goldfish	135
Largemouth bass	66
Grass carp	50
Hybrid striped bass	20
Total	7,224

*Includes redear sunfish, coppernose bluegill, hybrid bluegill and native bluegill.

A follow-up study by UAPB Extension and USDA/APHIS Wildlife Services personnel was conducted in 2014 to estimate the number of baitfish consumed by lesser scaup (Roy et al. 2014). The study revealed that fish and fish parts (bones, scales and otoliths) were identified in 41 percent of the lesser scaup examined (Figure 3). Fish were second only to snails,



Figure 3. Lesser scaup collected on an Arkansas baitfish farm in the act of consuming fathead minnows. On the right, the tail of a fathead minnow is sticking out of the duck's mouth. On the left, the head of a fathead minnow can be observed.

which occurred in 42.7 percent of the lesser scaup examined. A similar study conducted on sportfish ponds in 2015 revealed that 82 percent of the lesser scaup examined had fish as part of their diet (Figure 4 and 5). These studies show that lesser scaup consume considerably more baitfish than originally thought.



Figure 4. Twenty-six centrarchids removed from the esophagus and crop of a lesser scaup on an Arkansas sportfish farm in central Arkansas.



Figure 5. The esophagus, crop and gizzard of a lesser scaup collected on an Arkansas baitfish farm. The fish inside the esophagus and crop are golden shiners.

Additionally, fish that are not caught and consumed by lesser scaup can be injured by them. These fish typically have scars that appear on their sides or have missing scales. The mechanical damage caused by avoiding predation to lesser scaup can lead to bacterial or fungal infections in the fish, some of which can result in substantial losses.

Management Strategies

There are many methods to control birds on aquaculture ponds. In addition to chasing birds with vehicles and shooting pyrotechnics, noise cannons and firearms, many fish farmers in Arkansas will lease a portion of their ponds to duck hunters during hunting season to temporarily reduce lesser scaup numbers. Because of data generated from the studies described above, U.S. Fish and Wildlife has allowed sportfish and baitfish farmers to add 25 lesser scaup to their existing depredation permits. For further information on adding lesser scaup to a depredation permit, please contact USDA APHIS Wildlife Services.

Cost of Predation by Lesser Scaup

The 1995 study on baitfish consumption by lesser scaup estimated the maximum value of fish loss was \$14,400 for golden shiners and \$43,200 for goldfish per farm, based on farm gate values of fish at that time. The maximum calculated losses in the 1999-2000 study based on a 500-acre farm with 6,975 scaup-

days/acre ranged between \$23,990 and \$29,900 based on the low and high farm gate value for baitfish during those years. However, the losses on sportfish ponds are unknown. At the time of printing, the exact economic loss due to predation of small baitfish by lesser scaup is likely underestimated. Previous studies only examined the cost associated with fish losses. These economic losses should also factor in indirect costs, such as the costs for personnel to chase the birds and any scare tactics that are used requiring equipment or supply purchases, as well as the cost of trucks, fuel and levee maintenance. Current research is underway to determine direct and indirect costs of scaup predation to baitfish and sportfish farmers.

Additional Information

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Printed by University of Arkansas Cooperative Extension Service Printing Services.

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