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CONCURRENT SESSION #6 (BIRDS/EDUCATION)

LESSER SCAUP DEPREDATION AND ECONOMIC IMPACT AT BAITFISH FACILITIES IN ARKANSAS

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Abstract: During the winters of 1994-95 and 1995-96, unusually large numbers of diving ducks were observed on baitfish facilities in Arkansas. Historically, lesser scaup (*Aythya affinis*) inhabited baitfish ponds with little reported impact on minnow production, and thus little attention was paid to the birds. Unfortunately, minnow crops in the spring of 1995 fell short of expectations and immediate attention became focused on the role lesser scaup may have had on that minnow shortage. Subsequently, lesser scaup were collected from baitfish facilities in an effort to determine their effect on commercial fish farms. Two hundred and twenty-three lesser scaup were analyzed and esophageal/gizzard contents were examined. Seventy-two percent ($n = 161$) contained at least one food item, with 28% ($n = 45$) containing minnows that were commonly raised by baitfish farmers. Other food items consisted of snails, freshwater shrimp, insects, insect larvae, and vegetation. For ducks containing minnows, mean number of golden shiners and goldfish consumed per duck was 2.90 and 8.72 with mean total length being 6.22 cm and 3.95 cm, respectively. Mean loss estimates for golden shiners was \$0.04 per bird per feeding, while goldfish was \$0.12 per bird per feeding.

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Key Words: *Aythya affinis*, baitfish, depredation, economic loss, lesser scaup

The aquaculture industry in Arkansas has increased dramatically since the 1960s. Currently, the Arkansas baitfish industry encompasses 29,500 acres with an annual farm gate value of \$43.7 million (Collins 1995). Golden shiners (*Notemigonus crysoleucas*) and goldfish (*Carassius auratus*) constitute 92% of baitfish raised in Arkansas, with fathead minnow (*Pimephales promelas*), grass carp (*Ctenopharyngodon idella*), and various game-fish species also produced. Most baitfish production is located in Lonoke, Prairie, Greene, and Monroe counties.

During the winters of 1994-95 and 1995-96, unusually large numbers of diving ducks were observed on baitfish facilities in

Arkansas. Baitfish ponds offer the safety of open water and a variety of food sources such as seeds, vegetation, snails, small fish, and insects. Flocks of 200-1,000 diving ducks are commonly found around baitfish facilities. Most frequently observed are lesser scaup (*Aythya affinis*); however, redhead (*A. americana*), canvasback (*A. valisineria*), and ring-necked ducks (*A. collaris*) also use these ponds.

Historically, lesser scaup inhabited baitfish ponds with little reported impact on minnow production, and thus little attention was given to the birds. Unfortunately, minnow crops in the spring of 1995 fell short of expectations and immediate attention became focused on the role lesser scaup may have had on that minnow shortage. Baitfish producers estimated losses to diving ducks as high as \$500,000 during that year. These estimates are somewhat arbitrary since until now little has been known about the feeding habits of lesser scaup at baitfish facilities. Following these reports, lesser scaup were collected from baitfish facilities in an effort to determine their effect on commercial baitfish farms.

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COLLECTION AREA AND METHODS

Lesser scaup were collected in March 1995 and from December 1995 to March 1996. Most scaup were collected with shotguns, although a few were taken with .22 caliber rifles. All birds were collected from baitfish production ponds under the authority of a U.S. Fish and Wildlife Service (USFWS) authorized scientific collecting permit.

Lesser scaup esophagus and gizzard contents were removed and food items identified (Pennak 1953, Prescott 1980, Robison and Buchanan 1988). Fish prey were counted by species and total length of each was measured to the nearest 0.1 centimeter. Number and length of each minnow species for each bird were recorded and tabulated. Mean total length and mean number consumed was computed for each minnow species. Mean number of golden shiners and goldfish consumed was converted to mean live weight

using baitfish length-weight regression tables (Flickinger 1971, Dormand 1991). Mean live weight of goldfish and golden shiners was multiplied by the average number consumed to produce a goldfish and golden shiner consumption rate for lesser scaup. Loss estimates were calculated by multiplying the goldfish and golden shiner consumption rate (in lbs.) by the current wholesale market value for goldfish and golden shiners (goldfish = \$3.75 per pound, golden shiners = \$2.75 per pound; December 1995) and the number of lesser scaup present at the baitfish facility.

Documentation is not available concerning the frequency at which diving ducks feed at baitfish facilities; however, Thornburg (1973) and Day et al. (1993) reported a minimum of 3 periods of moderate daily feeding activity on Keokuk Pool, Mississippi. This conforms with field observations of daily feeding activity made during this study. Daily loss rate calculations were based on 3 feedings per day. Annual loss rates were estimated by multiplying daily loss rates times the number of days that depredating diving ducks inhabited a baitfish facility.

RESULTS AND DISCUSSION

Two hundred and twenty-three lesser scaup were collected and esophageal/gizzard contents were examined. Seventy-two percent ($n = 161$) contained at least 1 food item, with 28% ($n = 45$) containing minnows that were commonly raised by baitfish farmers (Figure 1). Of the lesser scaup samples containing minnows, 44% ($n = 20$) contained golden shiners and 44% ($n = 20$) contained goldfish. Other food items consisted of snails, freshwater shrimp, insects, insect larvae, and vegetation (Table 1). Mean number of golden shiners and goldfish consumed per duck was 2.90 and 8.72 with mean total length being 6.22 cm and 3.95 cm, respectively (Table 2).

1. Composition of lesser scaup esophagus and gizzard samples ($n = 161$) collected at baitfish facilities in Arkansas, 1995-96.

Crustaceans

Decapoda

Palaemonidae (Freshwater Shrimp)

Minnnows

Notemigonus crysoleucas (Golden Shiner)

Carassius auratus (Goldfish)

Pimephales promelas (Fathead Minnow)

Ctenopharyngodon idella (Grass Carp)

Gastropods

Helisoma spp.

Physa spp.

Insects

Diptera

Tendipedidae (Midges)

Odonata

Zygoptera (Damsel Flies)

Trichoptera (Caddis Flies)

Vegetation

Chara spp. (Muskgrass)

Myriophyllum spp. (Water Milfoil)

Potamogeton spp. (Pond Weed)

Unidentified Seeds

2. Monetary loss estimates and consumption of golden shiners and goldfish by lesser scaup ($n = 40$) collected at baitfish facilities in Arkansas, 1995-96.

	Golden Shiners	Goldfish
Mean No. Consumed	2.90	8.72
Max. No. Consumed	11.00	9.00
Mean Total Length	6.22cm	3.95cm
Max. Total Length	8.00cm	6.00cm
Mean Cost/Feeding	\$0.04	\$0.12
Max. Cost/Feeding	\$0.15	\$0.52

Mean loss estimates for golden shiners was \$0.04 per bird per feeding, while goldfish was \$0.12 per bird per feeding (Table 2). Total losses are dependent on the number and duration of ducks inhabiting a baitfish facility. A population of 100 ducks per facility for a 120 day period would result in estimated losses of \$1,440 for golden shiners and \$4,320 for goldfish (Table 3). Although maximum loss estimates are not as representative of

losses incurred by baitfish producers, it does provide a value for the potential losses caused by diving ducks should continental diving duck numbers continue to increase. Currently, during the fall and spring migration, as many as 2,000 diving ducks may inhabit a baitfish facility. Based on our estimates, a baitfish producer could lose \$10,000 in a 14-day period of average minnow consumption.

3. Estimated monetary losses of golden shiners and goldfish to lesser scaup at baitfish facilities in Arkansas.*

			Estimated	Dollars	Lost
Baitfish	# Birds	30 Days	60 Days	90 Days	120 Days
Golden Shiners	100	360	720	1,080	1,440
	300	1,080	2,160	3,240	4,320
	500	1,800	3,600	5,400	7,200
	1,000	3,600	7,200	10,800	14,400
Goldfish	100	1,080	2,160	3,240	4,320
	300	3,240	6,480	9,720	12,960
	500	5,400	10,800	16,200	21,600
	1,000	10,800	21,600	32,400	43,200

* Based on 3 feedings per day and average consumption rate.

Ninety-eight percent ($n = 71$) of the lesser scaup collected in March of 1996 contained at least 1 food item. This high percentage could possibly be attributed to the ducks necessity to accumulate a large deposition of fat before spring migration to breeding grounds (Belrose 1976). Increased need for food items during the spring is terrible timing for baitfish producers. Spring represents an increase in demand for baitfish and ponds are often drawn down so minnows can be harvested. During the 3 to 4 days necessary to draw a pond down to seining levels, minnows are concentrated in smaller areas providing diving ducks and other fish-eating birds an excellent opportunity to consume large amounts of food while expending a minimal amount of energy.

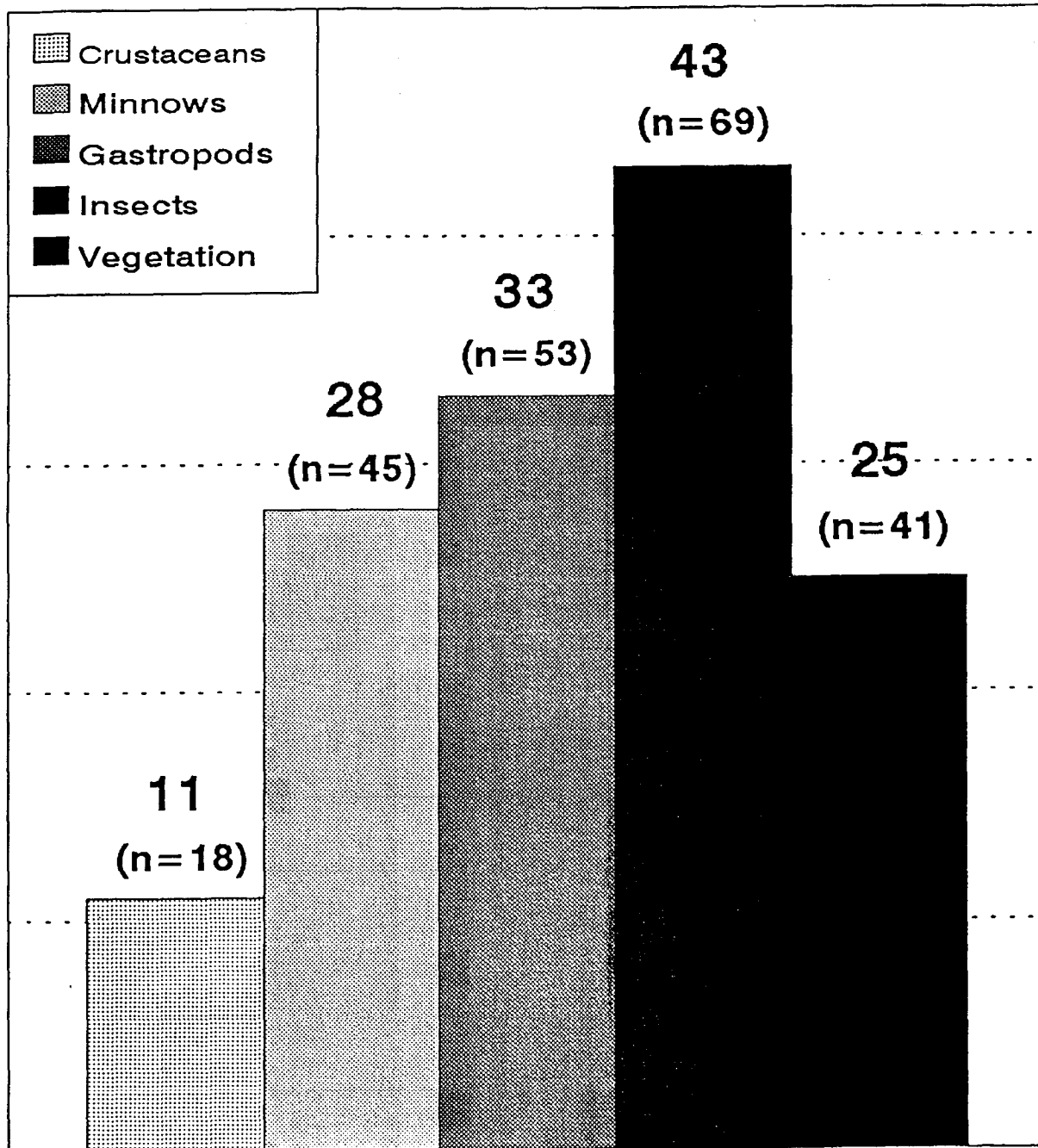
Various control methods have been tried to disperse diving ducks from baitfish facilities. The use of just one scaring method has limited efficacy in dispersing diving ducks as they readily acclimate to noise. However, with the use of controlled hunting during the waterfowl season, ducks that have acclimated to frightening devices can be removed and thereby increase the effectiveness of pyrotechnics, propane cannons, and other frightening devices. It appears, based on our observations, that harassment efficacy decreases after the waterfowl season because of the removal of hunting pressure and subsequent decoying effect of ducks that have acclimated to non-lethal frightening devices. Currently, the USFWS will not place migratory game birds on depredation permits issued to Arkansas fish farmers. Persistent birds need to be removed when possible to increase effectiveness of non-lethal control strategies at baitfish facilities, especially after the close of the duck hunting season.

Historically, little attention has been paid to depredation by diving ducks at baitfish facilities in Arkansas. Our results indicate that diving duck depredation can be significant if measures are not taken to disperse them from baitfish facilities.

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Figure 1. Frequency (%) of food items found in lesser scaup (n = 161) collected at baitfish facilities in Arkansas, 1995-96.*



*Total percentage is greater than 100 because some ducks contained more than one food item.