

**The Bait Industry in Illinois,  
Michigan, Minnesota,  
Ohio, South Dakota, and Wisconsin**

by

Thomas G. Meronek<sup>1</sup>

Wisconsin Cooperative Fishery Research Unit,  
University of Wisconsin , Stevens Point, WI

Fred A. Copes,

Biology Department, University of Wisconsin,  
Stevens Point, WI; and

Daniel W. Coble,

Wisconsin Cooperative Fishery Research Unit,  
University of Wisconsin , Stevens Point, WI

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<sup>1</sup>Present address: Georgia Department of Natural Resources, Wildlife Resources  
Division, Fisheries Section, 22814 Hwy. 144, Richmond Hill, GA



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# INTRODUCTION

This bulletin provides information from a comprehensive survey of the status of the bait industry in the North Central states of Illinois, Michigan, Minnesota, Ohio, South Dakota, and Wisconsin. We supply information on species marketed, state by state estimated quantities of baitfish and non-fish baits sold, and supply shortages. Information in this bulletin should be useful to operating bait dealers and prospective bait wholesaler and retail dealers.

Baitfish and non-fish bait sales are economically important. Cultured baitfish were ranked third in sales in the United States aquaculture industry (Mittlemark et al. 1993) and third in the North Central Region (NCR) behind Salmonidae and Ictaluridae (Hushak 1993). Arkansas has led the nation in aquaculture of baitfish (Hudson 1974). Baitfish cultured in the southern states were reported to have a value of US\$ 56 million in 1987 (Mittlemark et al. 1993). Litvak and Mandrak (1993) considered the bait industry to be worth at least US\$ 1 billion annually in the United States and Canada. In the six states included in this report the value of baitfish and non-fish bait were estimated to be US\$ 254 million in 1992 (Meronek et al., 1997).

Several methods have been employed to obtain accurate information from bait dealers. Warnick (1973) summarized data from a mandatory reporting system in South Dakota, where relicensing depended on annual reporting, and concluded that his bait volume and value estimates were underestimates. However, Peterson and Hennagir (1980) reported good results using a similar method in Minnesota. Van Eeckhout (1976) interviewed dealers but was unable to obtain reliable data in North Dakota. Nielson (1982) in Ohio and West Virginia and Noel and Hubert (1988) in Wyoming used the mail survey methods of Dillman (1978) and considered their estimates of volume and value reliable.

We used a mail survey in 1993 to determine the status of the 1992 live

bait industry in the six North Central states. The survey, designed and implemented using Dillman's (1978) system, allowed for strict confidentiality of the results. We took the information reported to us from a sample of retail dealers surveyed and expanded the reported volumes based on the estimated number of active retail dealers in each state. For example, if a state had 100 active retail dealers, and we surveyed 10 of those dealers, we divided 100 into 10 to calculate a multiplier. That multiplier, in this case 10, was then multiplied by the quantities of bait sold that were reported to us in the survey to estimate the total retail sales of bait in each state. The estimated quantities of bait reported here were not adjusted for bias associated with under-reporting or over-reporting; however adjusted values have been reported by Meronek et al. (1997). The terms 'quantity' and 'amount' herein refer to unadjusted estimated totals of baitfish and non-fish bait sold.

Common units of measure in the bait industry in the north central United States are U.S. gallons for baitfish and dozens for non-fish bait. A gallon of minnows would be determined by putting a gallon of water in a bucket calibrated in gallons, then holding the fish in a net in the air to allow excess water to drain before adding the fish to the bucket to bring the level of the contents to the next gallon mark. The number of baitfish in a gallon varies by species and size; estimated number per gallon for various species is provided (Table 1).

## SPECIES IMPORTANT IN EACH STATE

Ranked according to quantity sold, the largest amount of baitfish was sold in Minnesota, followed in order by Michigan, Wisconsin, Ohio, Illinois, and South Dakota. Generally the fathead minnow was the most important baitfish species. White suckers were also an

important species, but tended to be less important in the more southerly states of Ohio and Illinois. Lake shiners were most important in the Great Lakes states of Ohio, Michigan, Illinois, and Wisconsin; they were less important than river shiners in South Dakota and chubs in Minnesota. Golden shiners ranked

among the top three baitfish sold in four of the six states surveyed. Overall, baitfish species such as chubs, mud minnows, and those sold as mixed species were less important.

Ranked according to quantity sold, the largest amount of non-fish bait was in Ohio, followed in order by Michigan, Minnesota, Illinois, Wisconsin, and South Dakota. Night crawlers and grubs were ranked in the top three non-fish baits sold in all six states surveyed, as were leeches (except in Michigan where they ranked sixth). Although, crayfish were important species where locally available, regulations pertaining to their sale are usually complicated, and many dealers did not sell them. More difference occurred in ranking among states for non-fish than for fish. For the three northern states of Michigan, Wisconsin, and Minnesota, whichever non-fish bait ranked 1st, 2nd, 3rd, 5th, or 6th in estimated amount sold in any one state did not have the same rank in either of the other states. For the two more southerly states of Ohio and Illinois, night crawlers ranked 1st in estimated sales in both states, but non-fish baits were not the same in all subsequent rankings in Ohio and Illinois.

For non-fish baits the amounts reported here may be an underestimate of the actual amount sold. A comparison of our estimate with an estimate from a second method (Meronek et al. 1997) indicated our estimate of non-fish bait sold may be about 40% too low. The disparity is probably due to sales of non-fish bait by wholesale dealers to non-licensed dealers that were not included in the survey. A license was not required by most states to sell some kinds of non-fish bait. Businesses selling those kinds of non-fish baits were not included in the survey because they could not be identified from lists of licensed dealers. However, the rankings of non-fish bait should be accurate even though the volumes may be low.

## Illinois

The quantity of fathead minnows sold was about two times that of the second

**Table 1. Units for various species of baitfish and non-fish baits.**

Bait	Size (inches)	Number /Gallon	Number /Pound	Misc. Units
<b>Fish</b>				8.0 pound/gal.
Fathead Minnow ( <i>Pimephales promelas</i> )	small (1.5)	5920	740	
	medium (2.0)	2400	300	
	large (2.5)	1200	150	
White Sucker ( <i>Catostomus commersoni</i> )	small (3.0)	944	118	
	medium (4.5)	248	31	
	large (5.5)	128	16	
	ex-large (7.0)	64	8	
Golden Shiner ( <i>Notemigonus crysoleucas</i> )	medium (3.0)	944	118	
	large (4.0)	376	47	
	jumbo (6.0)	90	12	
Lake Shiner ( <i>Notropis atherinoides</i> , <i>N. hudsonius</i> , <i>N. stramineus</i> )	small (2.5)	1720	215	
	medium (3.0)	944	118	
	large (3.5)	90	71	
Mud Minnow ( <i>Umbra limi</i> )	(3.5)	416	52	
Chub ( <i>Nocomis biguttatus</i> , <i>Semotilus atromaculatus</i> )	medium (2.5)	456	57	
	large (3.5)	136	17	
Rosy Red ( <i>Pimephales promelas</i> )	(2.5)	1200	150	
Dace ( <i>Margariscus margarita</i> , <i>Phoxinus eos</i> , <i>P. neogaeus</i> )	(2.5)	1200	150	
River Shiner ( <i>Notropis blennioides</i> )	(3.5)	598	75	
Mixed species	(3.0)	672	84	
<b>Non-Fish</b>				
Leech ( <i>Nepheopsis obscura</i> )		104	156	13 dozen/pound
Salamander ( <i>Ambystoma tigrinum</i> )		78	-	
Crayfish ( <i>Orconectes</i> spp.)		120	16	7.5 pound/gallon

**Table 2. Volume (gallons) of baitfish sold in Illinois, Michigan, Minnesota, Ohio, South Dakota, and Wisconsin in 1992. Dashes indicate not reported.**

State	Fathead Minnow	White Sucker	Golden Shiner	Lake Shiner	Chub	Mud Minnow	River Shiner	Rosy Red	Dace	Mixed Species
Illinois	24,973	140	11,619	2,450	596	–	1,225	85	–	–
Michigan	24,123	21,533	1,913	67,938	4,756	286	6,092	347	350	–
Minnesota	87,889	40,451	10,015	8,614	16,496	1,372	1,774	392	903	431
Ohio	67,136	674	4,812	18,022	1,182	–	–	120	–	–
South Dakota	20,568	2,232	492	–	–	–	260	–	–	–
Wisconsin	70,809	11,237	9,445	3,606	1,912	103	332	–	136	346

ranked golden shiner (Table 2). Lake shiners ranked third in quantity sold with sales of about one-fifth that of golden shiners.

White suckers were sold in the lowest quantity of any state surveyed. Generally, white suckers are less available in southern Illinois.

For non-fish baits, night crawlers were first in quantity sold, and grubs were second (Table 3). The third-ranked crickets were the highest of any state surveyed. Leeches ranked fourth in amount sold.

### Michigan

The quantity of lake shiners sold was nearly three times that of fathead minnows, which ranked second in amount sold. The quantity of golden shiners sold was low, perhaps because of a preference for lake shiners by Michigan anglers.

For non-fish bait, grubs were sold in the largest quantity, followed by night crawlers and mayflies. The other non-fish baits were sold in much smaller quantities.

### Minnesota

The fathead minnow was sold in the largest quantity, twice the amount of second-ranked white suckers. Chubs ranked third followed by golden shiners. Golden shiners are difficult to obtain in

Minnesota because no baitfish can be imported legally. Our rankings differ slightly from Peterson and Hennagir (1980) who reported fathead minnows, white suckers, shiners, chubs, and dace, in decreasing order by amount, were the principal baitfish sold.

For non-fish baits, leeches made up the largest quantity sold. Grubs were second followed by night crawlers. Peterson and Hennagir (1980) indicated that leeches, night crawlers, earthworms, and grubs, in decreasing order by amount, were the most important non-fish bait sold. Our survey indicated in 1992 that grubs were more important than both night crawlers or worms.

### Ohio

The quantity of fathead minnows sold was about four times that of second-ranked lake shiners. The golden shiner ranked third. The ranking by quantity is the same as that of Nielsen (1982). However, fathead minnows may have been more important in 1992; the ratio of amount of fathead minnows to shiners sold was 3 to 1, compared with 1.7 to 1 in 1982.

For non-fish baits, the quantity of night crawlers sold was about 11 times that of second-ranked grubs. Leeches and worms tied for third in amount sold.

**Table 3. Quantity (million dozens) of non-fish bait sold in Illinois, Michigan, Minnesota, Ohio, South Dakota, and Wisconsin in 1992. Dashes indicate not reported.**

State	Night Crawler	Grub	Leech	Cricket	Mayfly	Worm	Frog	Crayfish	Salamander	Hellgrammite
Illinois	2.05	1.20	0.33	0.49	0.00008	0.30	–	0.016	0.021	–
Michigan	1.90	2.30	0.11	0.21	1.40	0.20	–	0.0072	–	0.0012
Minnesota	0.93	1.70	2.90	–	–	0.11	–	–	–	–
Ohio	15.70	1.30	0.49	0.096	0.032	0.49	–	0.017	–	–
South Dakota	0.29	0.02	0.03	–	–	0.006	–	–	–	–
Wisconsin	0.72	0.93	0.38	–	0.021	0.29	–	0.0025	–	0.0093

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## South Dakota

Fathead minnows were sold at about eight times the amount of second-ranked white suckers. Golden shiners and river shiners were the only other baitfish reported sold in South Dakota. Our rankings are the same as those of Gourneau and Hanten (1987) who reported minnows, presumably fathead minnows, were first and white suckers, which were referred to as chubs in South Dakota, ranked second. It appears that the amount of baitfish sold has increased since their survey; Gourneau and Hanten (1987) reported 15,162 gallons of minnows and 1,596 gallons of white suckers sold in South Dakota, whereas our data indicated 20,568 gallons of fathead minnows and 2,232 gallons of white suckers were sold in 1992.

Night crawlers were first in quantity of non-fish baits sold at about 10 times that of second-ranked leeches. Grubs, third and worms, fourth, were the only other non-fish bait reported sold.

Carlson and Berry (1990) reported that salamanders from the wetlands of eastern South Dakota had a wholesale value of about \$233/ha. South Dakota retail dealers failed to report sales of salamanders; however, it appears that they were used as bait because wholesale dealers in our survey reported selling 534 dozen salamanders.

## Wisconsin

The fathead minnow was sold in the largest quantity, six times the amount of the second-ranked white sucker. Golden shiners ranked a close third. Threinen (1982) reported, in order of decreasing importance, fathead minnows, golden shiners, creek chubs, white suckers, emerald shiners, and other species (dace, shiners) as important baitfish in Wisconsin. It appears that white suckers and lake shiners (which include the emerald shiner) are now important baitfish in Wisconsin.

Grubs made up the largest quantity of non-fish bait sold. Threinen (1982) reported that non-fish baits sold in Wisconsin, in decreasing order of impor-

tance, were crayfish, hellgrammites, mayflies, leeches, night crawlers, worms, grubs, and frogs. These rankings are markedly different; his top three non-fish baits were of low relative importance in our survey.

## BAITFISH SUPPLY SHORTAGES

The supply of bait shifts seasonally and annually, but the demand for popular baits remains relatively steady. A shift in bait supply usually produces a shift in wholesale price, e.g., large supplies translate into low wholesale prices, but not necessarily changes in retail prices. Frost and Trial (1993) found relatively stable retail prices even when wholesale supplies and prices changed in a 7-year study in Maine.

### Fathead minnow

The peak mean shortages of the fathead minnow, averaged for the six states, were in March and summer. However, Illinois, Michigan, Minnesota, and South Dakota bait dealers reported an additional shortage during April; South Dakota was the only state where a large shortage occurred November–March.

Typically, fathead minnows were harvested from shallow ponds and lakes in Michigan, Minnesota, South Dakota, and Wisconsin throughout summer. Shortage of fathead minnows in March and April occurs near the start of spring fishing in the six states, when rivers may be free of ice, but lakes in the northern states may still have ice cover, hampering harvest of minnows. Some wholesaler dealers seined their holding ponds underneath the ice or purchased fathead minnows from southern states. Summer shortages coincide with high summer angling activity and demand in the NCR. The November to March shortage in South Dakota suggests that those dealers rely heavily on bait they harvest from the wild.



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## Lake shiners

The mean shortage of lake shiners occurred from June through September, peaking in July and August. Michigan and Ohio bait dealers reported the greatest shortages in July and August and substantial shortages in other months. In Michigan lake shiners were the baitfish most desired by anglers; many retailers did not sell the fathead minnow, which was popular in other NCR states. Ohio anglers had a similar preference for lake shiners although Ohio River anglers used a large volume of fathead minnows. Minnesota dealers reported a year-round shortage of lake shiners, probably a reflection of the restriction on importation of baitfish into Minnesota.

## White sucker

White suckers were mainly in short supply in the six states from May to August. Minnesota bait dealers reported the greatest shortage of white suckers probably because of their popularity and the prohibition of imported baitfish.

## Golden shiner

The peak mean shortage of golden shiners was in August. Minnesota bait dealers reported the largest shortage probably because of a restriction on importing baitfish. Shortage at any time in Minnesota, Michigan, and Wisconsin is probably a result of the popularity of this baitfish. Shortages of golden shiners in summer can also be attributable to transportation difficulties. Many wholesale dealers stop hauling golden shiners from Arkansas after March because stress from high temperature combined with handling reduces their survival rate.

## Chubs

The peak mean shortage of chubs appeared to occur in March. South Dakota bait dealers reported the largest part of this shortage. However, South Dakota bait dealers may have been expressing a need for white suckers, which are commonly called chubs in South Dakota. Michigan and Minnesota reported a shortage throughout the year,

and Wisconsin reported a shortage from October to April.

The chub in short supply in Minnesota probably was the hornyhead chub, which was a popular baitfish commonly sold as the 'redtail chub'. In Michigan and Wisconsin the creek chub probably constituted the largest part of the shortage. These species are not available from bait aquaculturists; the supply depends on harvest from the wild.

## River shiners

The peak mean shortage of river shiners was in April. South Dakota bait dealers were responsible for a large part of the reported shortage. River shiners were in short supply throughout the year in Michigan and Minnesota. River shiners are supplied exclusively through harvest from the wild.

## Dace

The peak mean shortage of dace was from June to August with bait dealers in Michigan and Minnesota responsible for the reported shortage. The finescale dace and the pearl dace probably constituted a large part of the reported shortage. These species were sold together as the rainbow chub. The northern redbelly dace probably was not part of the shortage because it was usually harvested incidentally with the fathead minnow and sold as a fathead minnow.

## Rosy red

The rosy red (a cultured red phase of the fathead minnow) is available from aquaculturists. Rosy reds were reported in short supply at various times of the year in Illinois, Michigan, and Minnesota. Minnesota bait dealers used the largest volume of rosy reds.

## Mud minnow

The peak mean shortage for the mud minnow was from July to September. Illinois and Wisconsin bait dealers were responsible for most of the reported shortage. Minnesota bait dealers reported a shortage throughout the year. The mud minnow was exclusively harvested from the wild

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and was not commonly sold by retailers in the six states.

### **Mixed baitfish**

No peak shortage was evident for mixed baitfish. The largest shortage was reported by Michigan bait dealers from October to April. Minnesota bait dealers reported a uniform shortage throughout the year; Ohio dealers reported a shortage in August. Because a variety of baitfish are sold as mixed bait, it is difficult to determine the cause of the shortage. Presumably, a shortage will occur in a year when the overall baitfish supply is low.

### **Night crawlers**

Peak mean shortages of night crawlers were in January, February, and August. South Dakota bait dealers did not report shortage in August but were responsible for most of the January-February reported shortage. It appeared that a large quantity of night crawlers was imported to the NCR from Canada; bait dealers indicated the importance of the Canadian night crawler market to the United States.

### **Grubs**

Ohio bait dealers appeared to have the greatest shortage of grubs with the most need in January, February, and July. Illinois bait dealers reported a small shortage throughout the year.

### **Leeches**

Leeches were commonly in demand from August to April. All states but Michigan and Minnesota reported substantial shortages in late winter and spring. Substantial shortages varied for the months August-December in the six states. Shortage of leeches probably occurs in the colder months because they are not available for harvest from the wild when waters are frozen. Shortages in late summer occur because adult leeches spawn and die ending a 2-year life cycle, and 1-year old leeches that remain are not at a desirable size for harvest.

### **Worms**

The peak mean shortage for worms was in August. Michigan and Ohio bait dealers reported the largest part of this shortage. A reported shortage in winter in Wisconsin may be related to use of worms by anglers fishing through the ice.

### **Mayflies**

Shortage of mayflies was greatest in summer, with Michigan bait dealers reporting the largest part of the shortage. Minnesota and Wisconsin bait dealers reported some shortage throughout the year. Shortage of mayflies in Michigan and Wisconsin may be influenced by regulations that prohibit harvest of mayflies from trout streams.

### **Crickets**

Crickets were reported to be in short supply only in two states: in Illinois (November-March) and in Michigan (June-December). Crickets were sold by Michigan retailers, but wholesale dealers indicated in interviews that a large portion were sold to bait dealers in states other than the six included in this report. Michigan wholesale dealers reported a large portion of the shortage. We presume these wholesale dealers were selling crickets to dealers in Ohio and Indiana, where a retail market existed. In Illinois a large retail market existed, and crickets were sold to local retailers by wholesaler dealers.

### **Salamanders**

Ohio bait dealers reported shortage of salamanders from May to September, and those in Illinois reported a shortage in April. Few dealers reported selling salamanders.

### **Crayfish**

The peak mean shortage for crayfish was in April and May. Illinois bait dealers reported a substantial shortage from November to May, and South Dakota dealers, during summer. Shortage of crayfish in Illinois, South Dakota, and Ohio may be attributable to unrestrictive regulations on the use of crayfish as bait (Meronek et al. 1995). Live crayfish were

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legal as bait in these states, and dealers wanted to sell them. In Michigan and Wisconsin use of hard-shell live crayfish as bait was prohibited. Soft shell crayfish were allowed as bait in Michigan, but many dealers felt the work required to obtain them was not worth the profit.

### **Frogs**

Shortage of frogs was reported only in Minnesota and South Dakota, and mainly from April to August. Frogs were not sold in large volume in the six states, and Minnesota was the only state where we interviewed a dealer selling frogs.

### **Hellgrammites**

Shortage of hellgrammites was reported only in Michigan and Wisconsin, mainly from July to October but throughout the year in Wisconsin. Hellgrammites were not a common bait in any of the states. Only one bait dealer in Wisconsin sold a large volume of hellgrammites.

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