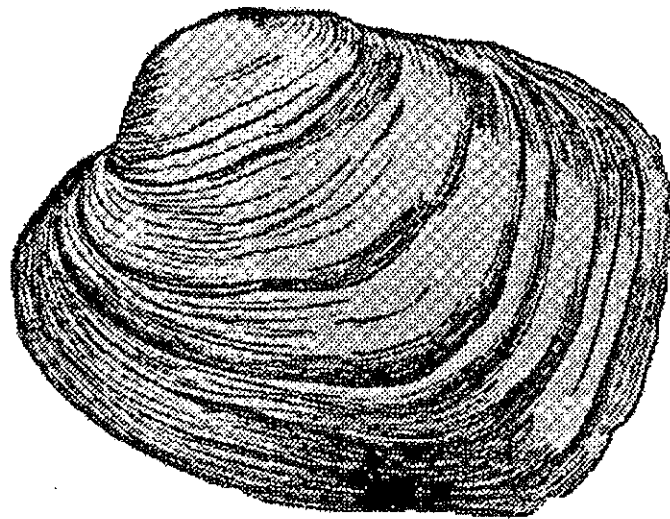


# COMMERCIAL HARVEST OF FRESHWATER MUSSELS IN WISCONSIN:

APRIL 1 TO SEPTEMBER 30, 1991



KURT I. WELKE

*Wisconsin Department of Natural Resources  
Bureau of Fisheries Management  
Prairie du Chien, WI 53821*

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*Objectives* - To summarize the monthly harvest data of freshwater mussels from the Wisconsin - Iowa and Wisconsin - Minnesota boundary waters of the Mississippi River. To provide documentation of relevant statistics of the commercial musseling industry.

### INTRODUCTION

Commercial mussel harvest has been, and continues to be, of biological and economic significance to the freshwater mussel resource, and those who derive income from it in the Mississippi river bordering Wisconsin. Several authors have compiled comprehensive historical overviews of the mussel industry and its effect on mussel populations (Carlander 1954, Coker 1919, Davidson 1924, Knott 1980, Thiel 1981, Waters 1980). These references are largely qualitative due to the lack of detailed and comparable harvest data. The Wisconsin Department of Natural Resources initiated mandatory harvester and buyer reporting in 1986. These reports have been the basis for tracking the activities of the mussel industry. The volume and location of harvest, species content and disposition (live or dead) in the harvest, value of the fishery, number of licensees, and effect of regulatory actions have been documented. The information has proven valuable in examining trends within the mussel industry, in shaping management and regulatory actions, planning survey needs, and in helping corroborate results of population investigations.

### METHODS

Wisconsin resident mussel shellers and buyers, as well as Iowa shellers harvesting under reciprocity agreements in Wisconsin waters, submit monthly report forms to the Department. This information is keyed into a Lotus computer program that summarizes harvest and sales by selected fields.

These fields include the take of each species by size and disposition for each month and pool. The program compiles weight, average price, and total value information for each sheller and buyer transaction to provide annual statistics. Reporting compliance is performed by program comparison of sheller to buyer records. Reporting failure or discrepancies are identified and written to separate files by using program macro features. Buyer records from Iowa are paired with Wisconsin sheller reports to verify weights and pool information when shells are sold out of state.

### RESULTS

*Harvest.* - The 1991 harvest of commercial mussels reported to the Wisconsin Department of Natural Resources from commercial shellers and buyers was 722,219 lbs (361 tons). This represents harvest in the WI/IA and WI/MN waters of the Mississippi river. Harvest of mussels from inland waters was prohibited in 1991.

The total harvest from the river was an additional 15% to 17% greater than reported by either sheller or buyer sources (Table 1).

**Table 1.** Information origins for commercially harvested mussels, 1991.

Reported harvest from sheller reports	596,205 lbs.
Under reported or not reported from shellers	19,046 lbs.
Using buyer reports (no sheller reports filed)	106,968 lbs.
From Wisconsin shellers	15,809 lbs.
From Iowa shellers	89,025 lbs.
From unknown origins	2,134 lbs.
Actual total harvest in 1991	722,219 lbs.
Reported by buyers as purchased from sellers	598,104 lbs.
Using sheller reports, with buyers cross-check; these lbs. taken but not sold, or sold out-of-state	124,115 lbs.
Actual total harvest in 1991	722,219 lbs.

Table 2. HARVEST - AS REPORTED BY THE SHELLERS ON MONTHLY REPORTS - 1991

Pool 4A - Lake Pepin / Pool 99 - Unknown

	APRIL				MAY				JUNE					
	LW	DW	LY	DT	LO	DO	TOTALS	LW	DW	LY	DT	LO	DO	TOTALS
4	0	0	11,700	1,350	53	7	13,110	0	0	0	0	0	0	0
4A	0	0	0	0	0	0	0	0	0	29,371	3,238	0	0	32,610
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	194	0	0	0	0	0	194
9	2,378	1,848	5,310	379	46	0	9,862	4,127	5,441	6,857	1,181	2,756	24	20,386
10	5,380	12,555	5,162	1,443	111	0	24,651	4,868	8,032	3,864	378	147	1	17,386
11	244	274	174	98	0	0	791	3,750	3,436	388	156	10	0	7,740
12	70	358	0	0	0	0	428	1,108	1,005	0	0	0	0	2,112
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals:	6,073	15,035	22,348	3,271	210	7	48,842	13,851	18,107	40,580	4,952	2,813	25	80,428
	Washboards 23,108			Threeridge 25,617			Other 217	Washboards 31,958			Threeridge 45,533			Other 2,938
	APRIL				MAY				JUNE					
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	3,291	0	0	0	3,291
9	8,927	12,037	8,832	2,367	860	7	33,050	9,277	12,037	8,832	2,367	860	7	33,050
10	2,155	8,460	1,122	1,012	12	0	12,761	2,155	8,460	1,122	1,012	12	0	12,761
11	6,435	11,907	2,041	778	134	97	21,390	6,435	11,907	2,041	778	134	97	21,390
12	4,049	5,865	176	58	0	0	10,146	4,049	5,865	176	58	0	0	10,146
99	194	803	161	612	28	0	1,798**	194	803	161	612	28	0	1,798**
Totals:	21,760	40,793	41,407	6,772	1,034	104	111,870	21,760	40,793	41,407	6,772	1,034	104	111,870
	Washboards 62,553			Threeridge 48,179			Other 1,138	Washboards 62,553			Threeridge 48,179			Other 1,138

\*\* We stopped tracking pool numbers on the shellers' reports in Jun (We will resume this element for '92.) However, this info is still reflected in the Pool Tables (see Table 4).

LW - Live Washboard  
LT - Live Threeridge  
LO - Live Other  
DW - Dead Washboard  
DT - Dead Threeridge  
DO - Dead Other

	JULY				AUG & SEP				YEAR TO DATE					
	LW	DW	LY	DT	LO	DO	TOTALS	LW	DW	LY	DT	LO	DO	TOTALS
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4A	0	0	7,915	0	0	0	7,915	0	0	52,434	4,992	0	0	57,426
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	3,830	3,980	6,168	469	358	0	14,805	314	0	0	600	461	0	1,375
10	1,220	1,958	588	188	188	0	3,952	519	418	70	50	0	0	1,057
11	2,506	4,960	8,833	1,600	277	0	18,176	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	29,228	58,604	64,847	3,075	1,258	561	155,373
99	19,653	44,024	13,774	1,689	1,128	46	80,314	0	0	0	0	0	0	0
Totals:	27,208	54,922	37,278	3,758	1,949	46	125,182	30,061	57,022	117,151	8,717	1,719	561	215,231
	Washboards 82,131			Threeridge 41,056			Other 1,993	Washboards 87,083			Threeridge 125,868			Other 2,280
	JULY				AUG & SEP				YEAR TO DATE					
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4A	0	0	11,700	1,350	53	7	13,110	0	0	11,700	1,350	53	7	13,110
5	0	0	0	0	0	0	0	0	0	115,504	10,160	0	0	127,385
5A	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	19,577	23,306	27,167	5,016	4,481	31	79,578	19,577	23,306	27,167	5,016	4,481	31	79,578
10	14,140	31,423	10,806	2,881	458	1	59,807	14,140	31,423	10,806	2,881	458	1	59,807
11	12,935	20,577	11,436	2,631	421	87	48,097	12,935	20,577	11,436	2,631	421	87	48,097
12	5,227	7,228	178	58	0	0	12,686	5,227	7,228	178	58	0	0	12,686
99	49,075	101,431	78,582	5,376	2,414	607	237,485	49,075	101,431	78,582	5,376	2,414	607	237,485
Totals:	100,954	185,879	258,762	27,470	7,925	743	581,633 ##	100,954	185,879	258,762	27,470	7,925	743	581,633 ##
	Washboards 286,832			Threeridge 286,233			Other 8,568	Washboards 286,832			Threeridge 286,233			Other 8,568

## Final editing increased this figure by 14,572 lbs (to 596,205 lbs) Due to the nature of this editing, the increase is NOT reflected in the YTD Table.

Because shells can be held, sold out of state, or sold in Wisconsin from Iowa licensees, these harvest and sales activities lack a complimentary cross-check. Depending on the origin of the information, an additional 106,968 to 124,115 lbs. are attributable to either shellers or buyers. The sources of these additional shells are found in Table 1.

The harvest by shellers obligated to report by license condition and having complimentary buyers reports totalled 596,205 lbs. or 298 tons (Table 2, Figure 1). Similarly, Wisconsin licensed buyers reported purchasing 598,104 lbs. or 299 tons.

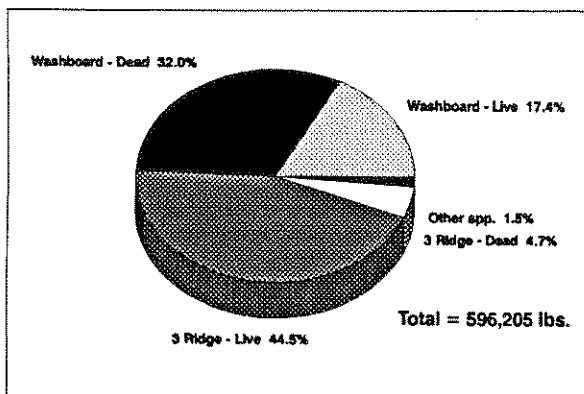


Figure 1. Composition of commercial mussel harvest from Wisconsin waters of the Mississippi River, 1991. (Data obtained from seller reports).

The harvest was equally divided between washboard (49%) and threeridge (49%) with fractional amounts of pimpleback and mapleleaf taken (2%). The monthly harvest distribution is given in Figure 2, with 78% of the harvest occurring from June through September.

The washboard harvest was 286,832 lbs., of which 100,954 lbs. (35%) were live shells, and 185,879 lbs., (65%) were dead shells. The majority of live shell was taken in the months of July and August (Figure 3).

For shells that had their origins reported, pools 10, 9, and 11 contributed 16%, 15%, and 12% respectively (Figure 4). Over half (53%) of washboards had untracked or unknown origins (appear as Pool 99) for the period July through August. The percent harvest by pool during April through June was applied to these months to estimate annual contribution by pool. Pools 10, 9,

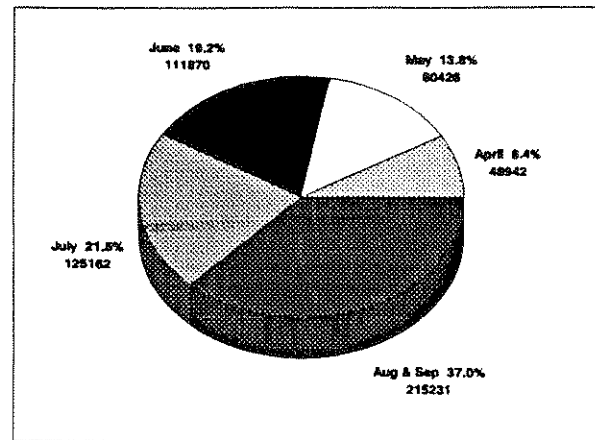


Figure 2. Monthly commercial harvest of mussels, 1991.

11, and 12 contributed 36%, 30%, 23%, and 11% of the undocumented washboard harvest. Table 3 presents the calculated contributions by pool for the total washboard harvest and the live dead components. Live and dead washboards were collected at similar rates and volumes (Figure 5).

The Threeridge harvest was 286,233 lbs. The majority (44%) of the harvest occurred in August and September (Figure 6). Pool 4A (Lake Pepin) accounted for 44% of the 1991 take (Figure 7). This late, localized harvest is due to the additional month of opportunity allowed in WI/MN waters, and the relatively high quality shell found here. Shellers shift their focus to Lake Pepin when WI/IA boundary waters close August 31, and buyers fill their remaining orders with Lake Pepin stock. Live and dead shell comparisons by pool are presented in Figure 8. The importance of the upriver pools are born out as pools 10 - 12 contribute only 8% of live threeridge and 20% of dead threeridge weight towards the total harvest poundage.

Buyer data summations by species, size, and disposition by pool and month are provided in Table 4. Values are generally comparable to those reported by shellers. The discrepancies in washboard weights largely represent shells purchased from Iowa licensees. Threeridge harvest exceeded sales as markets became over supplied as the season progressed.

*Price.* - The total reported value of mussel shells bought by Wisconsin licensed buyers was \$513,556 (Table 5). Washboard receipts totaled \$430,595 or 84% of the reported value. Threeridge sales were

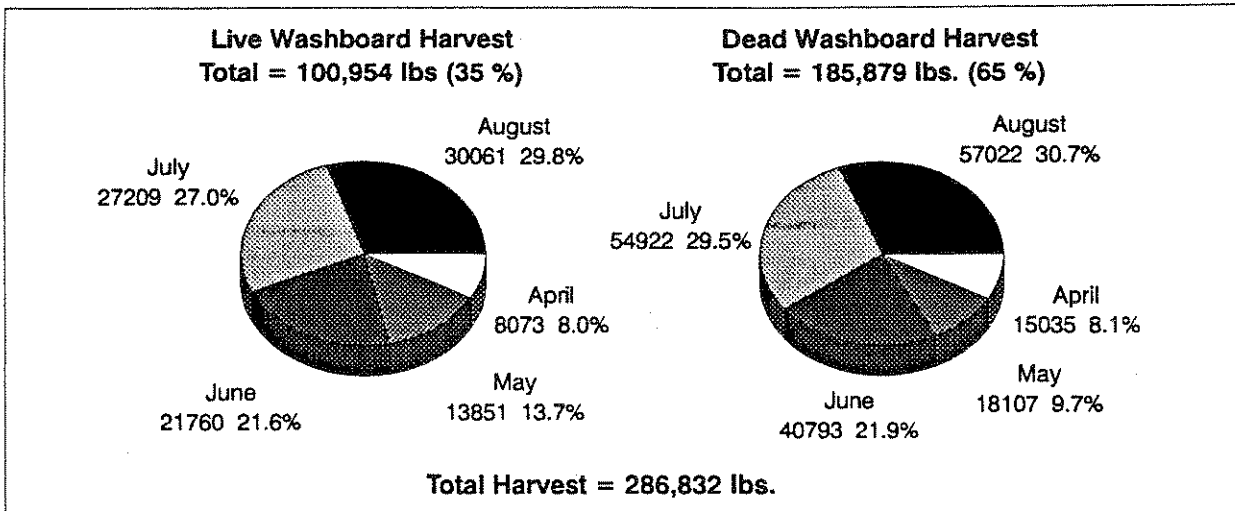


Figure 3. Monthly live and dead shell components of commercially harvested washboard mussels, 1991. (Data were obtained from seller reports).

valued at \$78,284. Average prices per pound were calculated by dividing weights of any given sized species and disposition by total dollars reported paid. Mean washboard prices ranged from \$.82/lb for dead, 3.5" (height) washboard to \$1.76/lb for live washboards, 3.5" in height and larger. Threeridge prices averaged \$.29/lb for both live and dead shell. The range of prices solicited from buyer inquires were from \$.50 for dead 3.5" washboard in May 1991 to \$ 3.75/lb for 4" washboard "cut-outs" (sheller processed shell with viscera removed) in September 1991.

Threeridge prices ranged from \$.20/lb to \$.30/lb. Threeridge shells 3" and larger which were cut-out demanded the highest price.

DISCUSSION

*Harvest.* - The 1991 live washboard harvest was 28% greater than the 1990 live harvest. However, from the highest recorded live harvest of 526,674 lbs. in 1987, the 1991 harvest represents a 76% decline for the 5 year period (Figure 9).

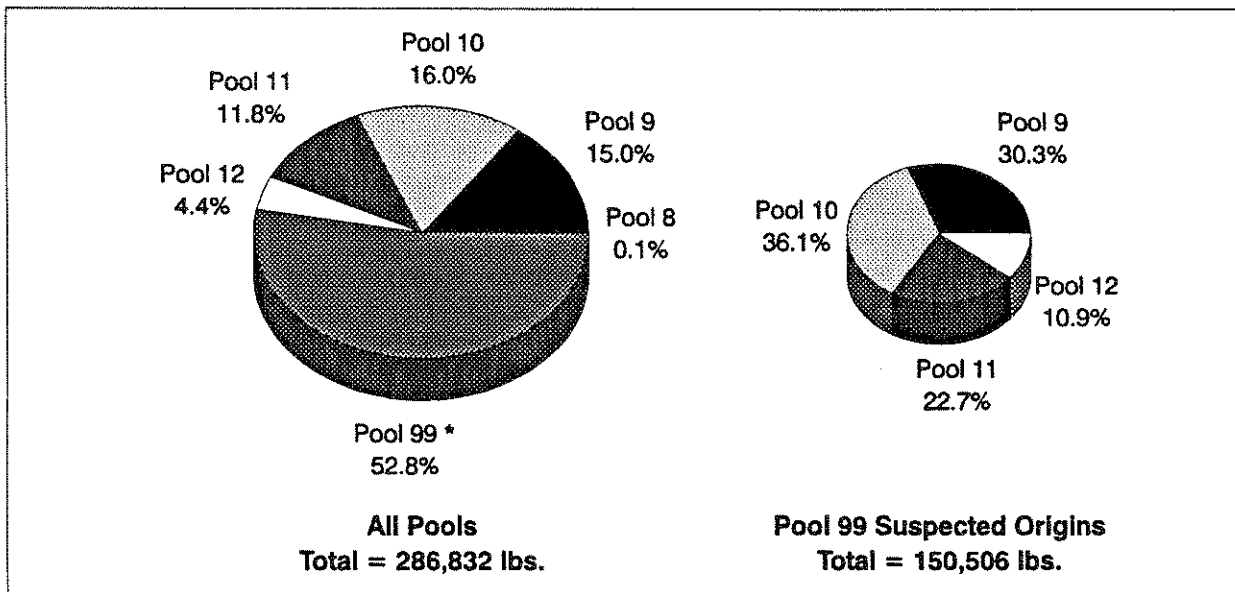


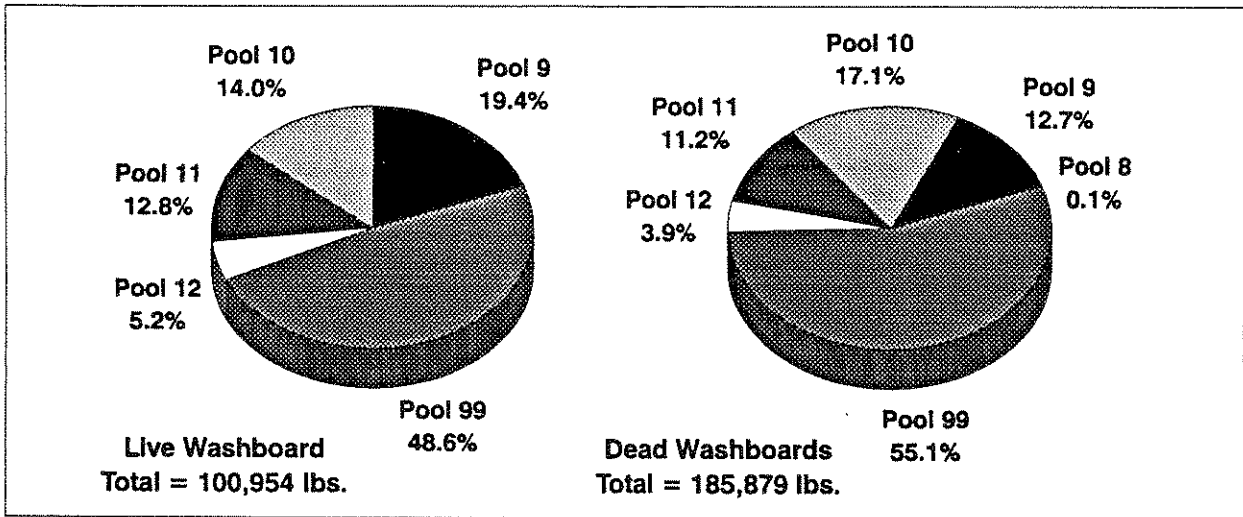
Figure 4. Pool distribution of live and dead shell components of commercially harvested washboard mussels, 1991.

**Table 3.** Calculated contribution (%) of washboard mussel harvest by pool, 1991.

	Pool 9	Pool 10	Pool 11	Pool 12
Total harvest	32	35	24	9
Live shells	34	31	25	10
Dead shells	29	37	24	10

For the years 1988 and 1989, the washboard harvest was evenly split, with approximately 50% of the harvest contributed by live and dead shell components. With the institution of the 4" size limit, live shell volumes have declined to an average of 32% of the total washboard harvest.

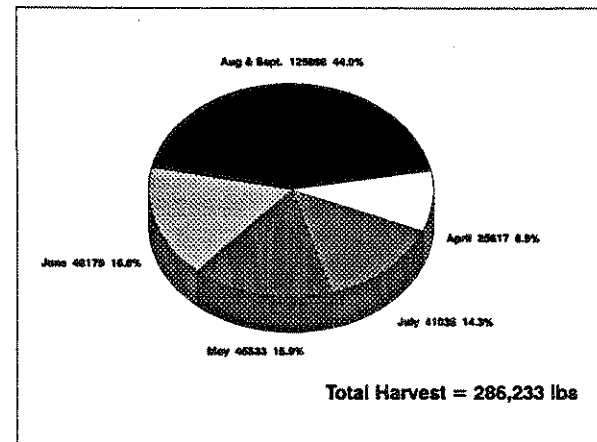
Also of note is the shifting of harvest location and intensity. Pool 10 traditionally accounted for approximately 65% of the live washboard harvest,



**Figure 5.** Pool distribution of live and dead washboards mussels commercially harvested in 1991. (Data obtained from sheller reports).

The combined effect of the 4" height size limit initiated in 1990 and declining densities of legal sized stock (Welke, 1992) are evident when compared to the period of record presented in Figure 9. Despite stable numbers of shellers (Figure 11) and the offering of the highest recorded price per pound in 1991 (Figure 12), the resource was unable to supply the historical or contemporary demand.

Dead shell harvest decreased for the fourth consecutive year, attaining its lowest level since 1987. This suggests that the availability of market quality dead shell is similarly limited. Lower volumes of dead shell, which occurred from natural mortality, corroborate the presumed decline in legal sized shells as well. Apparently less marketable dead shell was available because the supply had been pared down in previous years and the naturally occurring contribution continues to decrease simply due to the paucity of legal sized shell eligible to die. Live to dead ratios in the harvest continue to decrease as legal-sized shells become more scarce.



**Figure 6.** Monthly commercial harvest of threeridge mussels, 1991.

(Welke, 1990, and Welke and Miller, 1991). Pools 9 and 11 contributed an additional 15% each for 1989 and 1990. In 1991, pools 9 and 11 accounted for approximately 34% and 25% of the total live harvest respectively. The effect of long term, intensive harvest in pool 10 has necessitated the exploration

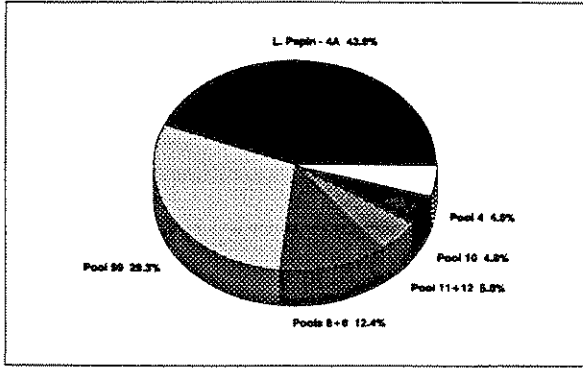


Figure 7. Pool distribution of commercially harvested threeridge mussels, 1991.

among producers will influence future harvest. It seems likely that as long as threeridge remain a cost effective "second choice" to supply the cultured pearl industry, that a harvest approaching the average experienced over the last 6 years will occur.

*Price and Value.* - The value of the Wisconsin mussel industry decreased for the first time since the current period of record, 1987 - 1991, Figure 13. This is due to the above average value of the 1990 harvest which was inflated by a large threeridge component. The value of the industry appears to

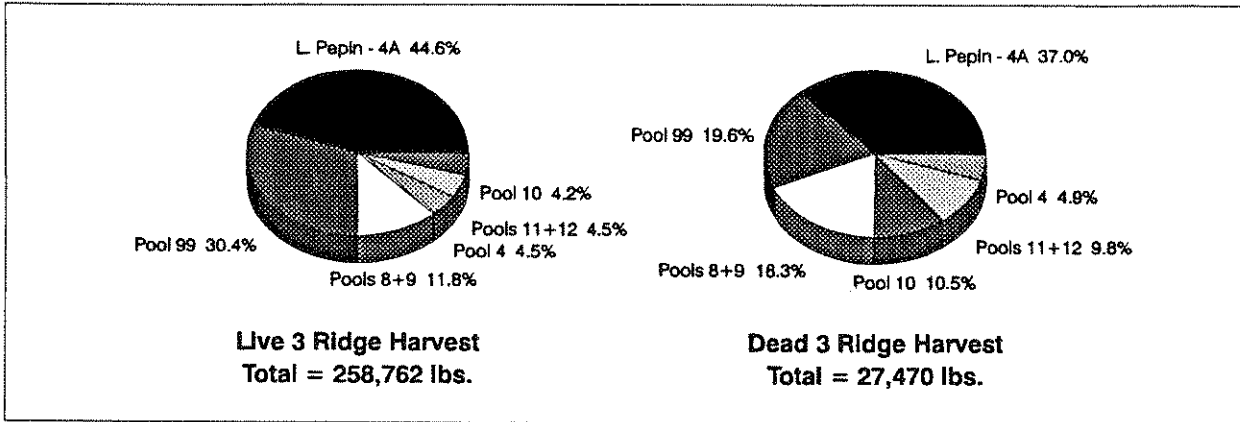


Figure 8. Pool distribution of live and dead threeridge mussels harvested from the Mississippi River, 1991.

and exploitation of washboard populations in other, more remote locations.

The harvest of threeridge has moderated from the record levels observed in 1989 and 1990 (Figure 10). The six year average take is 413,061 lbs., but the actual yearly harvests have fluctuated widely above and below this figure. The insecurity that existed in the market due to the dwindling washboard supply has fueled an expanding threeridge harvest since 1988. However, it is difficult to accurately speculate on the future demand for threeridge. It appears that future short term demand may have already been met by the enormous 1990 harvest.

If the Japanese and Pacific pearl producers can and will substitute the smaller threeridge nuclei in lieu of the nuclei from washboards, then one may anticipate a harvest on the order of what has been taken the last three years. Several variables such as consumer demand, alternate sources of raw material, economic stability, and competition

have reached an equilibrium of approximately one half million dollars annually.

RECOMMENDATIONS

While the combination of market factors and size limits have contributed to a moderation of the harvest, there are certain problems that warrant consideration and action.

The shifting of washboard harvest pressure away from pool 10 to other pools necessitates the gathering of baseline density information in these locations. The intensified harvest of threeridge stocks from Lake Pepin merit quantitative survey work. This information would allow quantification of the effects of harvest and provide comparable data to that which exists for pool 10. These data have been the underpinnings of management actions.

Table 4. MUSSEL TOTALS BY POOL AND MONTH, 1991.  
Source: Buyers' Reports

Pool	3.5*		4*		3.5*		4*		Unknown		3-Ridge		3-Ridge		Total Washboards	Total 3-Ridge	Total Other	Total All	Pool of Total
	Dead Washboard	Live Washboard	Dead Washboard	Live Washboard	Dead Washboard	Live Washboard	Dead Washboard	Live Washboard	Dead	Live	Dead	Live	Dead	Live					
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
4A	11	3	0	431	1,727	176,384	0	6	0	0	0	0	0	0	536	178,111	6	178,653	4A
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
5A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5A
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
7	0	0	0	10	2,198	2,251	0	0	0	0	0	0	0	0	10	4,449	0	4,459	7
8	49	117	194	118	0	1,544	19	21	0	0	19	1,544	40	40	476	1,544	40	2,060	8
9	5,303	33,602	4,786	27,352	2,477	32,640	39	931	4,816	970	39	32,640	857	857	76,172	35,117	970	112,259	9
10	25,614	30,911	2,419	17,818	2,502	13,590	191	868	2,501	191	191	13,590	857	857	80,030	16,092	857	96,978	10
11	25,794	32,590	1,983	24,445	2,124	13,151	379	1,138	2,226	24	24	13,151	243	243	87,418	15,275	243	104,210	11
12	10,939	6,358	371	6,122	105	1,832	24	219	442	105	24	1,832	243	243	31,101	1,937	243	33,281	12
99	23,874	12,251	0	9,498	1,313	13,057	287	821	0	0	0	13,057	1,108	1,108	50,726	14,370	1,108	66,204	99**
<b>Totals:</b>	<b>91,584</b>	<b>115,830</b>	<b>9,763</b>	<b>86,541</b>	<b>12,446</b>	<b>254,419</b>	<b>939</b>	<b>3,802</b>	<b>9,985</b>	<b>12,446</b>	<b>254,419</b>	<b>4,741</b>	<b>4,741</b>	<b>328,469</b>	<b>266,895</b>	<b>4,741</b>	<b>598,104</b>	<b>100%</b>	

\*\* See Table 2.

WEIGHT	3.5*		4*		3.5*		4*		Unknown		3-Ridge		3-Ridge		Total Washboards	Total 3-Ridge	Total Other	Total All Claims
	Dead Washboard	Live Washboard	Dead Washboard	Live Washboard	Dead Washboard	Live Washboard	Dead Washboard	Live Washboard	Dead	Live	Dead	Live	Dead	Live				
Apr	2,127	3,018	1,285	1,229	1,332	6,344	0	137	2,499	2,499	0	6,344	0	137	10,216	7,876	137	18,029
May	7,451	7,104	8,478	7,051	662	10,408	7	224	7,467	7,467	7	10,408	7	224	39,699	11,070	231	50,998
Jun	18,673	23,302	0	2,826	2,689	49,422	142	193	0	0	142	49,422	476	1,958	66,576	52,111	335	119,022
Jul	28,815	36,397	0	3,797	2,902	44,067	476	1,858	0	0	476	44,067	314	1,290	86,230	46,969	2,434	145,633
Aug/Sep	36,518	46,008	0	4,167	4,861	144,208	314	1,290	0	0	4,861	144,208	1,804	1,804	113,759	149,069	1,804	264,432
<b>Totals:</b>	<b>91,584</b>	<b>115,830</b>	<b>9,763</b>	<b>86,541</b>	<b>12,446</b>	<b>254,419</b>	<b>939</b>	<b>3,802</b>	<b>9,985</b>	<b>12,446</b>	<b>254,419</b>	<b>4,741</b>	<b>4,741</b>	<b>328,469</b>	<b>266,895</b>	<b>4,741</b>	<b>598,104</b>	





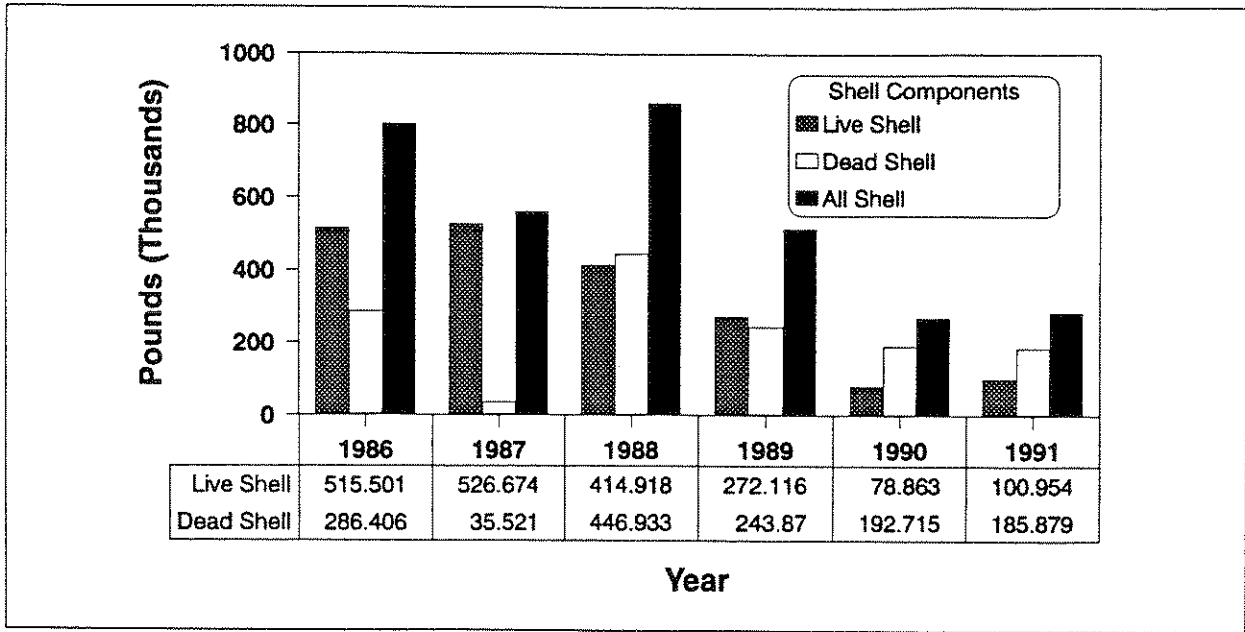


Figure 9. Harvest comparison of live and dead shell Washboard mussels from the Mississippi River, 1986-1991. (Data obtained from sheller reports).

The Wisconsin mussel program still suffers from license revenues insufficient to cover harvest statistic compilation. Given the value of the resource, it would seem prudent to "plow back" some of the income from an increased license fee to enable self-sufficiency. Additional license fees could also fund some of the needed survey work which is not

currently possible within project planning and funding. This may also include inland work when necessary. A license increase would also bring Wisconsin into fee balance with Iowa, thereby reducing the problems associated with attracting shellers because of the existing fee difference between states. This may also help alleviate the

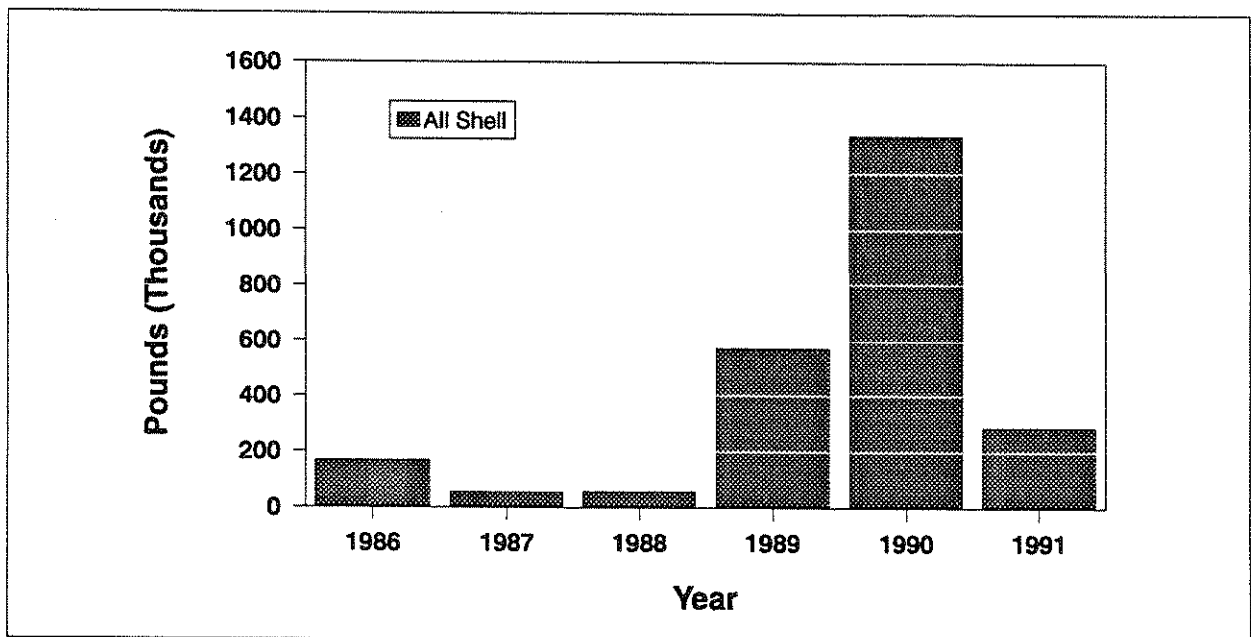


Figure 10. Harvest comparison of Threeridge mussels taken from the Mississippi River, 1986-1991. (Data obtained from sheller reports).

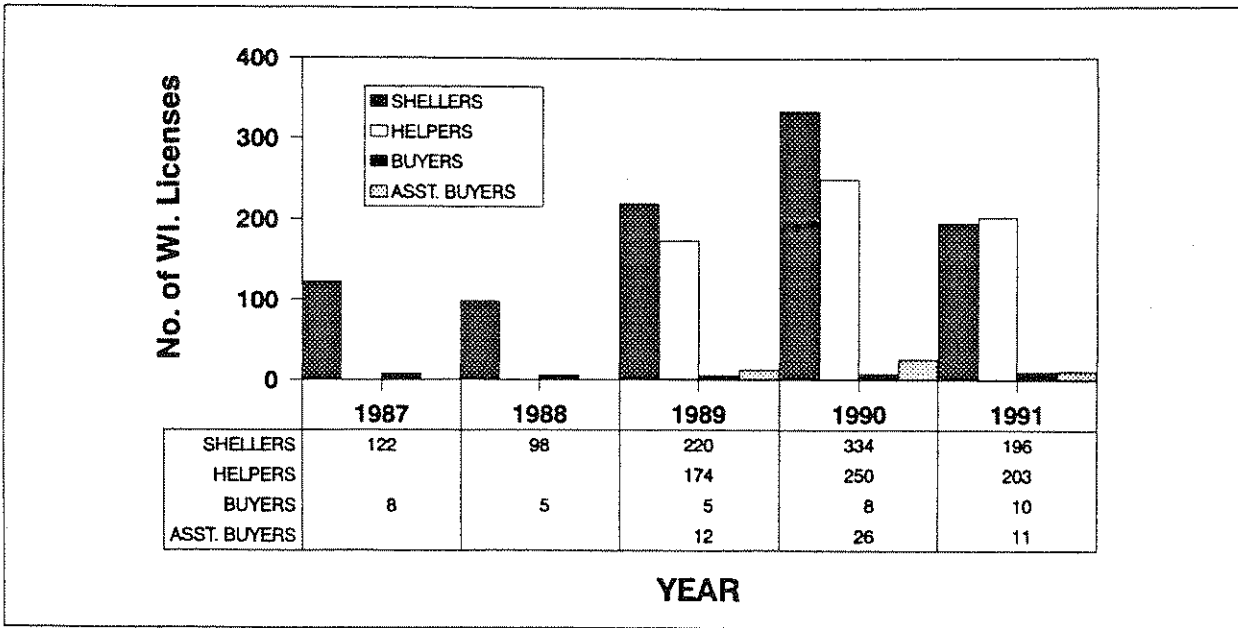


Figure 11. Number of mussel licenses sold to Wisconsin commercial anglers, 1987-1991.

ongoing problems associated with sheller residency. No impetus would exist to defraud the Department over claimed residency if fees were equalized.

The Department should continue its proactive role within the UMRCC ad hoc mussel committee. The adoption of a UMR - wide uniform reporting and regulation package, sponsorship of identification

seminars for law enforcement officers and biologists, and information transfer through the mussel symposium have all been positive endeavors. Future UMRCC activities will address the application of the computerized mussel harvest programs to yield basin wide comparable harvest statistics and quantifying the effect of zebra mussels on native mussels.

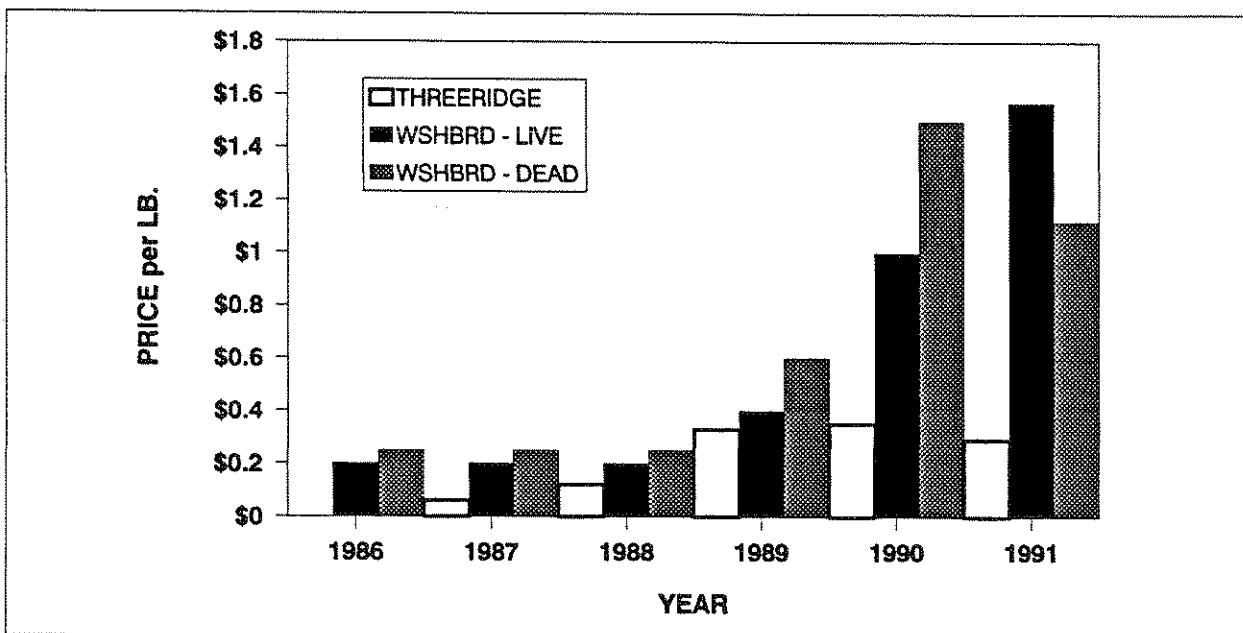


Figure 12. Average price per pound of mussel shells harvested from the Mississippi River, 1986-1991.

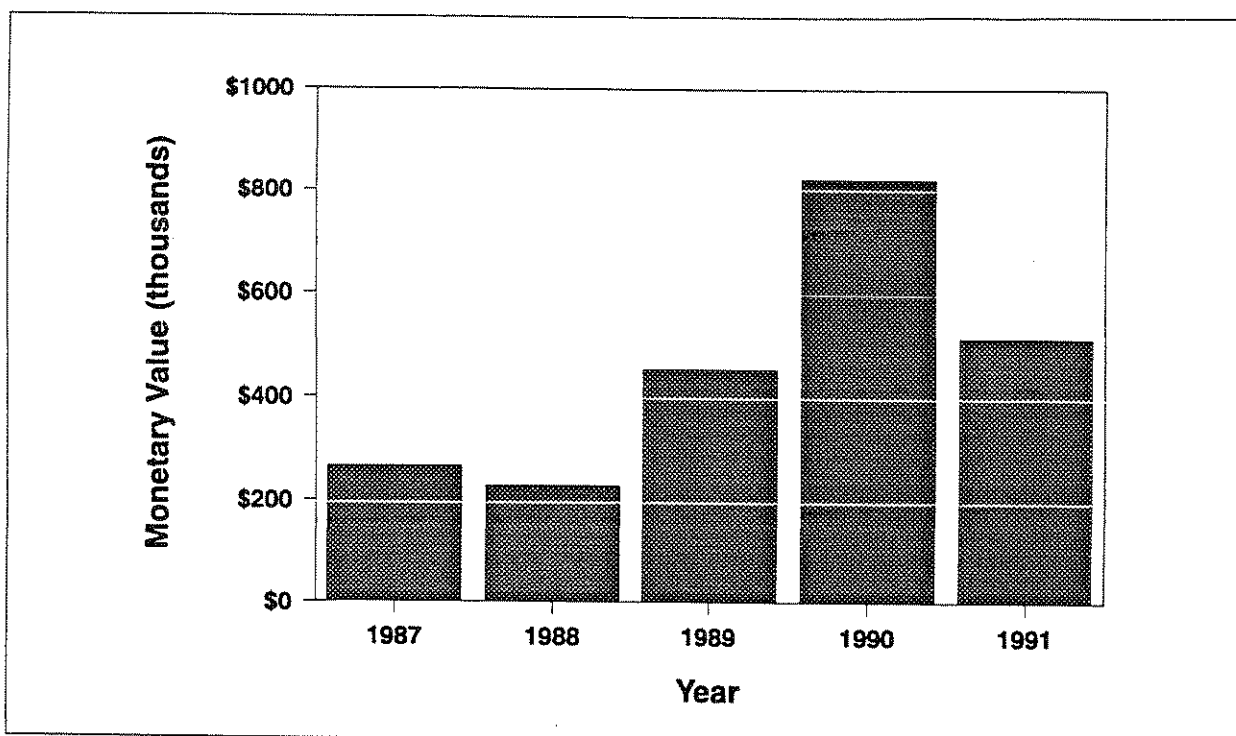


Figure 13. Monetary value of the Wisconsin mussel industry, 1987-1991.

#### REFERENCES

- Carlander, H. B. 1954. History of fish and fishing in the Upper Mississippi River. Upper Mississippi River Conservation Committee. 96 pp.
- Coker, R.E. 1919. Fresh-water mussels and the mussel industries of the United States. Bulletin of the Bureau of fisheries 36:13-89.
- Davidson, B.M. 1924. Seventh annual report of the Department of Agriculture. State of Illinois. 22-24
- Knott, W.J. 1980. The pearl button industry and its impacts on Mississippi River mussel fauna. pages 11-16 in J.L. Rasmussen, ed. Proceedings of the UMRCC symposium on Upper Mississippi River bivalve mollusks. May, 1979. Upper Mississippi River Conservation Committee, Rock Island Illinois. 270 pp.
- Thiel, P.A. 1981. A survey of unionid mussels in the Upper Mississippi River (Pools 3-11). Wisconsin Department of Natural resources Technical Bulletin No. 124. 24 pp.
- Waters, S.J. 1980. The evolution of mussel harvest regulations on the Upper Mississippi River. Pages 191-201 in J.L. Rasmussen, ed. Proceedings of the UMRCC symposium on Upper Mississippi River bivalve mollusks. May, 1979. Upper Mississippi River Conservation Committee, Rock Island, Illinois. 270 pp.
- Welke, K.L. 1990. Commercial Harvest of Freshwater Mussels in Wisconsin in 1989. Mississippi River Work Unit Fisheries Summary Reports - 1990. Wis. Dept. of Natural Resources: LaCrosse, WI.
- Welke, K.L. and G.L. Miller. 1991. Commercial Harvest of Freshwater Mussels in Wisconsin in 1990. Mississippi River Work Unit Fisheries Summary Reports - 1991. Wis. Dept. of Natural Resources: LaCrosse, WI. Unpublished
- Welke, K.L. 1992. A 10 Year Re-Evaluation of Mussel Densities and Populations in Pool 10, Upper Mississippi River. Mississippi River Work Unit Fisheries Summary Reports. Wis. Dept. of Natural Resources: LaCrosse, WI. In preparation.

