



UNITED STATES
DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
State, Federal & Constituent Programs Office

COMPLETION REPORT

Grantee: MINNESOTA DEPARTMENT OF NATURAL RESOURCES

Project No: 3-IJ-105

Grant No: NA56FI0413

Project Title: LAKE SUPERIOR COMMERCIAL FISHERIES STUDIES

Period Covered: 07/01/95 - 06/30/98

Prepared by: STEVEN A. GEVING

Approved by: _____

Date: MARCH 16, 1999

Statutory Funding Authority: Anadromous Fish Conservation Act
(P.L. 89-304)

Chesapeake Bay Studies

Endangered Species Act

X Interjurisdictional Fisheries Act
(Title III of P.L. 99-659)

Magnuson Act

Oyster Disease Research

Saltonstall-Kennedy

Unallied Industry Projects

Unallied Science Projects

ACFCMA

Unallied Management Projects

**Field Report Summary
3IJ-105 Segments 1-3**

**Minnesota Department of Natural Resources
Division of Fish and Wildlife
Section of Fisheries**

**LAKE SUPERIOR COMMERCIAL FISH ASSESSMENT STUDIES
STATUS OF THE LAKE SUPERIOR FISH STOCKS**

March 15, 1999

Prepared by :

Steven A. Geving

Job 1. Determine individuals who are authorized to commercially fish water of Lake Superior under the jurisdiction of the State of Minnesota.

The commercial industry and Department of Natural Resources have been successful in implementing regulation changes that have simplified and clarified many restrictions regarding industry operations. These simplifications were enacted after establishing a maximum allowable number of participants. Existing regulations continue to require 30 days of participation.

A small amount of growth may occur in the industry where: herring abundance is highest; new participants have developed a relationship with existing operators; and/or new participants have access to the lake.

Job 2. Determine annual production and relative abundance indices of commercial fish stocks.

Trends in abundance by species have been monitored annually in the commercial fisheries as long as reporting has been required by commercial operators. Abundance of lake herring, deepwater chubs and lake trout steadily declined throughout the first half of this century. Commercial harvest of lake trout was discontinued in the 1960's and restrictive harvest regulations for lake herring and deepwater chubs were implemented in the 1970's. Abundance of lake herring and deepwater chubs has increased since enactment of these regulations, but has not returned to historic levels. Commercial harvest of lake herring, deepwater chubs and rainbow smelt continues to be allowed by law. Trend analysis of lake herring, deepwater chub, and rainbow smelt abundance have been updated for the 1998 fishing season and are presented in the Commercial Fishing Summary for the Minnesota Waters of Lake Superior, 1998.

Lake herring abundance has stabilized. Harvest of deepwater chubs seems to remain stable based on the effort of a single commercial operator. However, CPUE of deepwater chubs is quite variable due to the small amount of effort being conducted. Harvest of rainbow smelt has reached a recent low and is expected to remain low for the foreseeable future.

Job 3. Determine the degree of interaction between commercial, sport and licensed charter fishing in Minnesota waters of Lake Superior.

Interaction between commercial and sport interests has predominantly been presented as a comparison of lake trout harvest. The charter industry has traditionally comprised one fourth to one fifth of the total angling effort and in excess of 40% of the total sport harvest of lake trout. Incidental commercial catch of lake trout has been less

than five percent of the total sport harvest. Commercial operators are not allowed to possess other species of game fish, but must report the occurrence of any incidental species caught.

Commercial fishing regulations are designed have minimal impact on game species. As long as commercial operators continue to comply with the regulations, conflict between competing fisheries should remain low. Some commercial operators also exercise personal restraint above the required regulations to further reduce opportunity for conflict.

Job 4. Maintain a historical record of Minnesota's commercial fishing activities on Lake Superior.

Recent records of commercial activity have been stored in electronic databases and maintained annually. Improvements in computer technology continue to enable database management to become more specific and reporting categories have evolved which will allow examination of fisheries and biological trends in greater detail. Monthly commercial reporting forms will focus on queries previously unable to be analyzed. Monthly reports currently archived will be combined to examine specific historic trends.

Job 5. Develop biological data on commercial stocks.

Lake herring, deepwater chubs and rainbow smelt are sampled in the commercial catch to examine biological parameters. Sampling during major commercial activity provides an opportunity to describe the parameters of the adult stocks. Sampling conducted by MN-DNR personnel using gear not allowed in the commercial fishery has provided additional information on size structure or age groups not sampled in the commercial catch. Lake herring recruitment has not been observed since 1990. Deepwater chubs seem to follow similar recruitment trends. Although age 1 smelt are abundant, they are not recruiting to the fishery. Predation by game fish is suspected to be the main cause of juvenile mortality.

Continued commitment to monitoring the commercial species has provided an opportunity to improve upon standardizing protocols and sampling gear. Increased sampling and analysis will provide additional information on recruitment and population structure of fish species that support the commercial fishery and provide forage for predator species.

Highlights of the 1998 Commercial Fishing Season

1. The following report summarizes monthly fishing reports submitted by the Lake Superior commercial operators from January through December of 1998.
2. Twenty-seven operators were licensed in 1998, twelve in MN-1, six in MN-2, and nine in MN-3. There were five apprentices licensed in 1998, four in MN-3 and one in MN-1 (Table 1).
3. The amount of chub net issued in 1998 continued to decline to 10,000 feet of net, following a trend set in 1992 when the Department began reviewing this issue. The amount of herring net licensed in 1998 dropped to 45,900 feet, also reflecting legitimate need (Table 1).
4. Dockside gross harvest value is determined as the value of the fish in round weight before processing or handling adds value. Gross dockside market value totaled \$188,702 in 1998 (Table 2).
5. Eighty percent (338,519 lbs) of all herring harvested in 1998 were caught in MN-3. Fifty-one percent (215,590 lbs) were caught during the month of October when spawning herring are most vulnerable, and market opportunity is high due to demand for herring roe (Table 6).

ACKNOWLEDGEMENTS

I would like to thank all the commercial operators who submitted timely reports for this study. Without their cooperation and attention to thoroughness the information in this report would not have been available. I would also like to thank Laura Schnobrich for handling the data and for typing this report.

Table 1. License summary of Minnesota Lake Superior Commercial fishery by statistical district, 1998.

Item	MN-1	MN-2	MN-3	Total
Number of licensed fishermen	12	6	9	27
Number of apprentices licensed	1	0	4	5
Herring net licensed (feet) ¹	15,900	8,600	21,400	45,900
Chub net licensed (feet) ²	5,000	3,000	2,000	10,000
Pound nets licensed (number)	7	2	0	9
<u>Special Permits (number)</u>				
Commercial trawl				
January - October	2	0	0	2
December - February	2	0	0	2
Experimental Small Mesh Herring				
Permits Issued	1	1	1	3
Maximum Net Permitted (feet) ¹	100	100	100	300
Lake trout assessment permits				
May	0	3	2	5
September	0	3	2	5

¹ 2.25-2.75 in stretch measurement gill nets weighted to fish in a floating or suspended position off the bottom, limited by statute to 100,000 feet.

² 2.25-2.75 in stretch measurement gill nets weighted to fish on the bottom, limited by statute to 120,000 feet

Table 2. Total catch by species in pounds (all gear combined), and dockside gross harvest value in the Minnesota waters of Lake Superior, 1998.

Species	MN-1	MN-2	MN-3	Total	Average Price/pound	Approx. value
Herring	42,662	43,322	338,519	424,503	0.38	161,311
Chubs	10,393	0	0	10,393	0.60	6,236
Smelt	5,325	0	0	5,325	0.40	2,130
Lake Trout						
Herring net ¹	433	407	1,126	1,966	1.50	2,949
Chub net ¹	391			391	1.50	587
Trout net ²	0	4,962	5,110	10,072	1.50	15,108
Whitefish	0	11	51	62	1.50	93
Suckers	2,701	0	0	2,701	0.10	270
Burbot	184	0	0	184	0.10	18
Total						\$ 188,702

¹ Incidental catch.

² Taken during assessment netting operations under special permit.

Table 3. Estimated total fishing effort by gear type and statistical district in the Minnesota waters of Lake Superior, 1998.

District	Feet of Gill Net Lifted				Pound Net Lifts	Trawl	
	2.25 - 2.75 in		4.50 - 5.5 in ¹			Hours	Tows
	Herring Net	Chub Net	Trout May	Trout September			
<u>MN-1</u>	121,140	95,520	0	0	80	10.3	12
<u>MN-2</u>	340,425	0	40,450	66,700	0	0	0
<u>MN-3</u>	673,490	0	38,550	26,750	0	0	0
<u>Shorewide Totals</u>	1,135,055	95,520	79,000	93,450	80	10.3	12

¹ Assessment under permit.

Table 4. Catch in pounds by species, gear type and statistical district in the Minnesota waters of Lake Superior, 1998.

Area and Species	2.25 - 2.75 in	Gill Net		Pound Net	Trawl
		4.5 - 5.5 in ¹			
		May	Sept		
<u>MN-1</u>					
Lake Herring	42,662				
Lake Trout	433 ²				
Lake Whitefish	391 ³				
Chubs	10,370				23
Smelt				4,971	354
Suckers				2,598	103
Burbot				78	106
<u>MN-2</u>					
Lake Herring	43,322				
Lake Trout	407 ²	732	4,230		
Lake Whitefish			11		
<u>MN-3</u>					
Lake Herring	338,519				
Lake Trout	1,126 ²	2,412	2,698		
Lake Whitefish		25	26		
<u>Shorewide Totals</u>					
Lake Herring	424,503				
Lake Trout	391 ¹ 1,966 ²	3,144	6,928		
Lake Whitefish		25	37		
Chubs	10,370				23
Smelt				4,971	354
Suckers				2,598	103
Burbot				78	106

¹ Assessment netting under permit.

² Incidental catch of dead lake trout in herring nets.

³ Incidental catch of lake trout in chub nets.

Table 5. Catch per unit effort, CPUE, by gear type and statistical district in Minnesota waters of Lake Superior, 1998.

Area and Species	Pounds per 1,000 ft gill net lifted	Pounds per 1,000 ft gill net lifted	Pounds per pound net lifted	Pounds per Trawl Hour
	2.25-2.75 in	4.50-5.5 inch ¹		
		May	Sept.	
<u>MN-1</u>				
Lake Herring	352.2			
Lake Trout	3.6 ² 4.1 ³			
Lake Whitefish				
Chubs	108.6			2.2
Smelt			62.1	34.4
Suckers			32.5	10.0
Burbot			1.0	10.3
<u>MN-2</u>				
Lake Herring	127.3			
Lake Trout	1.2 ²	18.1	63.4	
Lake Whitefish			0.2	
<u>MN-3</u>				
Lake Herring	502.6			
Lake Trout	1.7 ²	62.6	100.9	
Lake Whitefish		0.6	1.0	
<u>Shorewide Average</u>				
Lake Herring	374.0			
Lake Trout	1.72 ²			

¹ Assessment netting under special permit.

² Incidental catch of dead lake trout in herring nets.

³ Incidental catch of lake trout in chub nets.

Table 6. Total catch in pounds by species, month and statistical district; all gear combined in the Minnesota waters of Lake Superior, 1998.

Month	Herring	Chubs	Smelt	Lake Trout	Whitefish	Suckers	Burbot
MN-1							
January	2,119	0	40	0	0	6	0
February	3,967	10	140	0	0	18	16
March	4,320	3	135	0	0	40	90
April	6,765	10	5,010	90	0	2,413	78
May	1,209	470	0	74	0	224	0
June	1,012	2,180	0	72	0	0	0
July	0	2,945	0	105	0	0	0
August	0	2,600	0	78	0	0	0
September	525	2,175	0	212	0	0	0
October	16,094	0	0	187	0	0	0
November	0	0	0	0	0	0	0
December	6,651	0	5	6	0	0	0
Totals	42,662	10,393	5,325	824	0	2,701	184
MN-2							
January	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0
March	109	0	0	0	0	0	0
April	2,462	0	0	29	0	0	0
May	3,481	0	0	748	0	0	0
June	4,517	0	0	47	0	0	0
July	6,409	0	0	83	0	0	0
August	6,885	0	0	137	0	0	0
September	5,055	0	0	4,275	11	0	0
October	12,455	0	0	47	0	0	0
November	0	0	0	0	0	0	0
December	1,949	0	0	3	0	0	0
Totals	43,322	0	0	5,369	11	0	0
MN-3							
January	0	0	0	0	0	0	0
February	399	0	0	0	0	0	0
March	8,769	0	0	31	0	0	0
April	15,964	0	0	129	0	0	0
May	10,935	0	0	2,539	25	0	0
June	13,428	0	0	275	0	0	0
July	21,992	0	0	231	0	0	0
August	27,490	0	0	95	0	0	0
September	44,031	0	0	2,716	26	0	0
October	187,041	0	0	207	0	0	0
November	0	0	0	0	0	0	0
December	8,470	0	0	13	0	0	0
Totals	338,519	0	0	6,236	51	0	0
Grand totals	424,503	10,393	5,325	12,429	62	2,701	184

Table 7. Trawl harvest by month in Minnesota waters of Lake Superior, 1998.

	Tows	Smelt (lbs)	Chubs (lbs)	Suckers (lbs)	Burbot (lbs)	Ruffe Number
January	2	40	0	6	0	0
February	2	140	10	18	16	0
March	3	135	3	40	90	0
April	5	39	10	39	0	80
Totals	12	354	23	103	106	80

Table 8. Trawl CPUE by month in Minnesota waters of Lake Superior, 1998.

	Trawl Hours	Smelt (lbs/hr)	Chubs (lbs/hr)	Suckers (lbs/hr)	Burbot (lbs/hr)	Ruffe (num/hr)
January	1.80	22	0	3	0	0
February	1.67	84	6	11	10	0
March	3.33	41	1	12	27	0
April	3.50	11	3	11	0	29
Totals	10.30					
Average		34	2	10	10	8

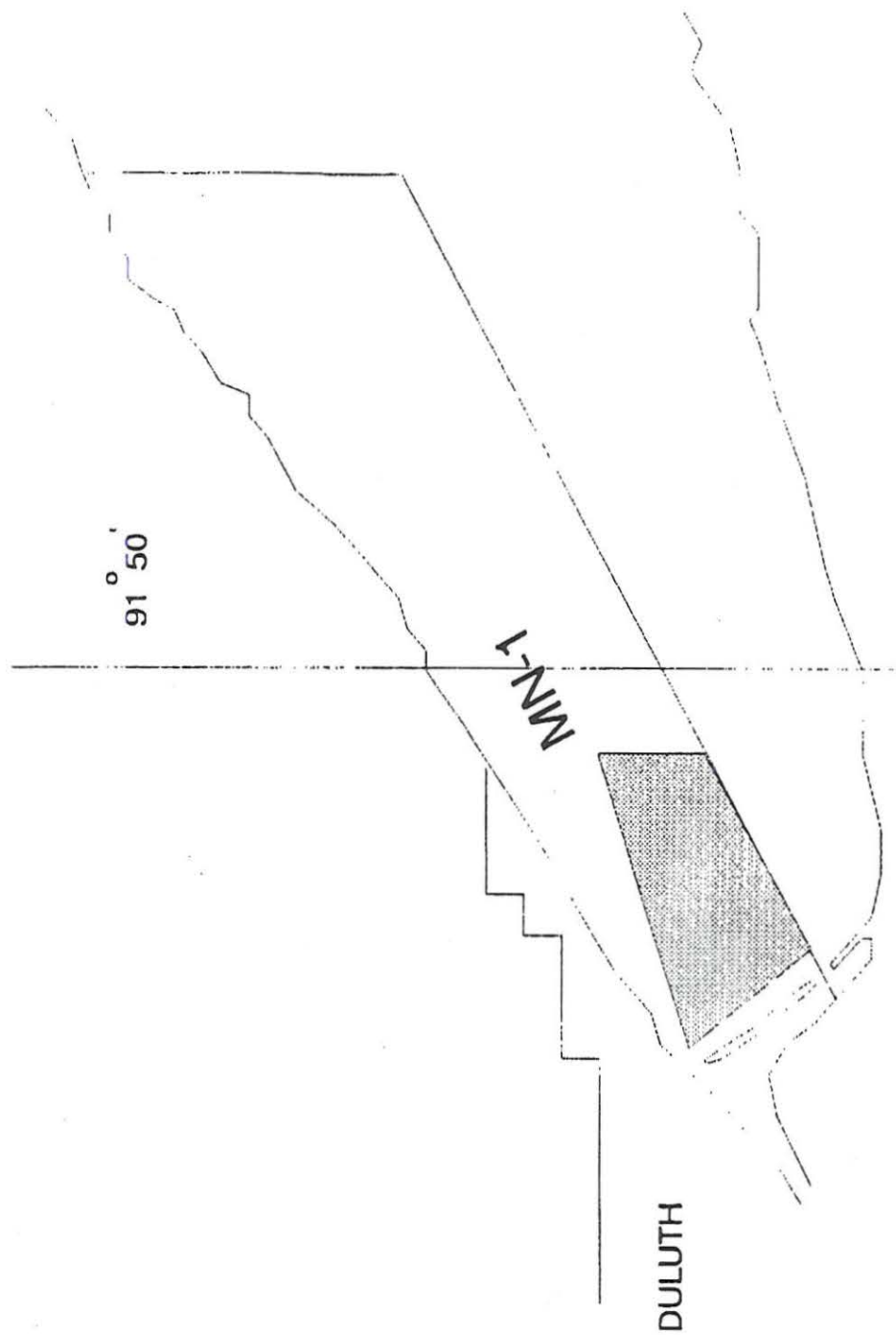


Figure 1. Geographic area suitable for commercial bottom trawling, Minnesota waters of Lake Superior.

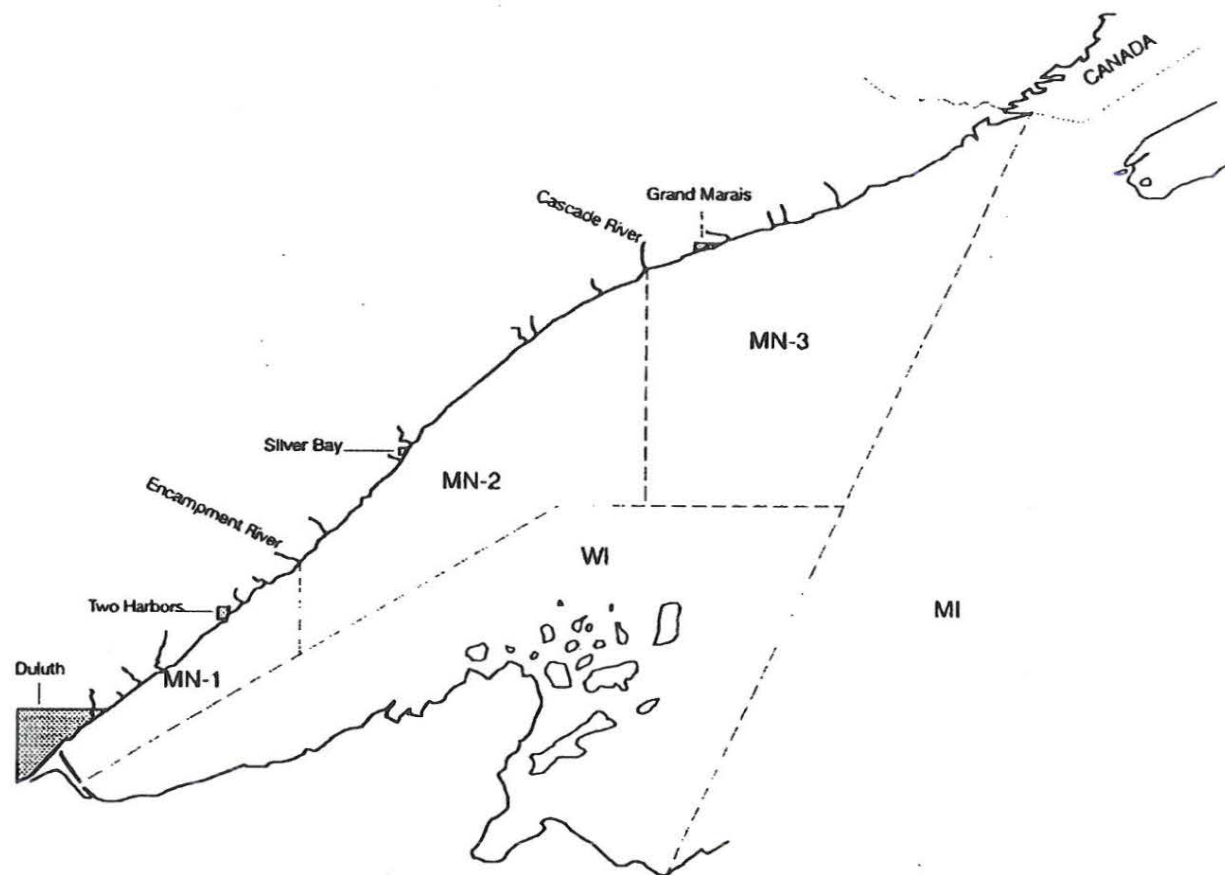


Figure 2. Statistical reporting districts in the Minnesota waters of Lake Superior.

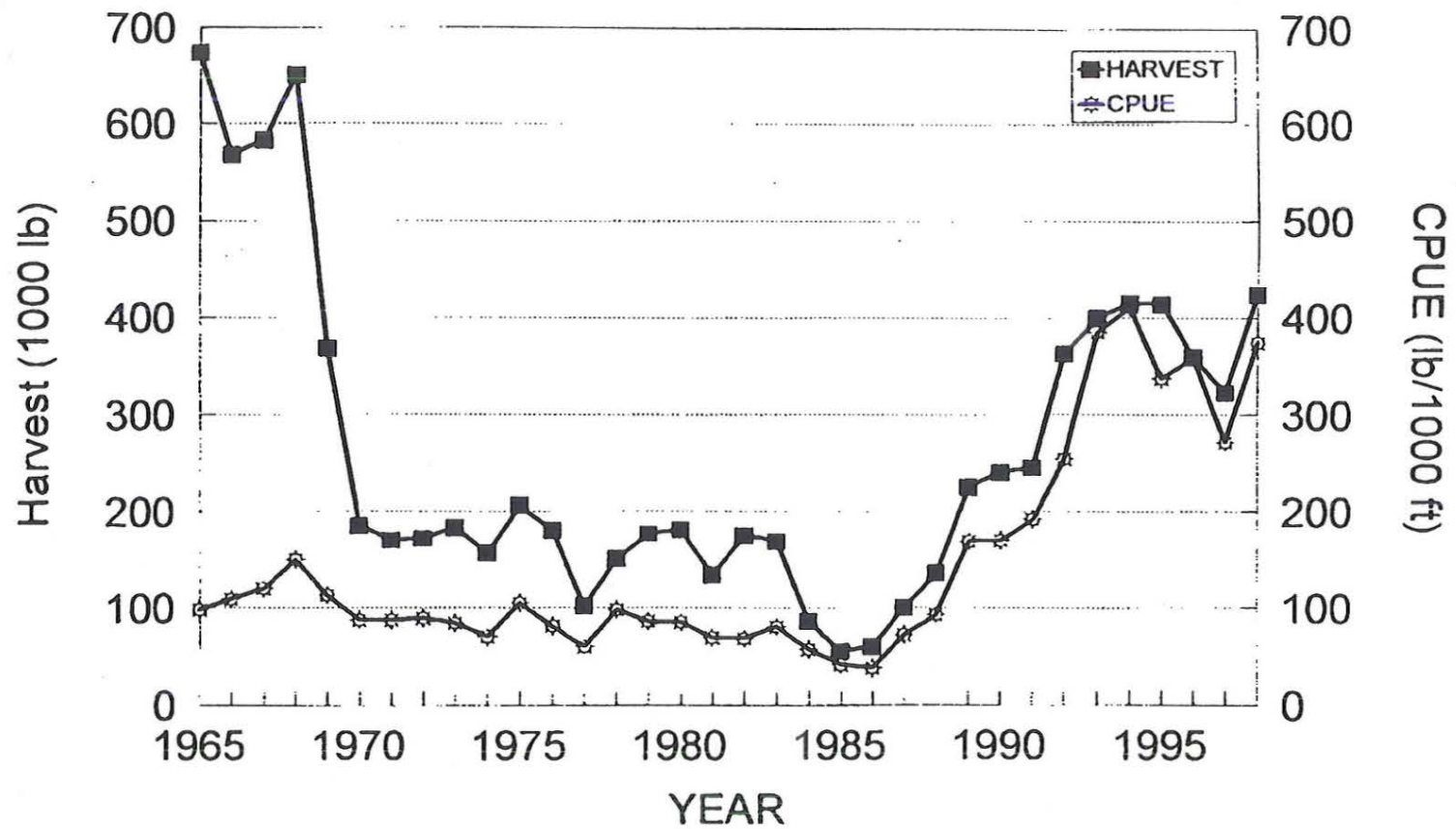


Figure 3. Harvest and CPUE, of lake herring taken in commercial gill net fishery from Minnesota waters of Lake Superior, 1965-1997. November harvest restricted 1973 through 1998.

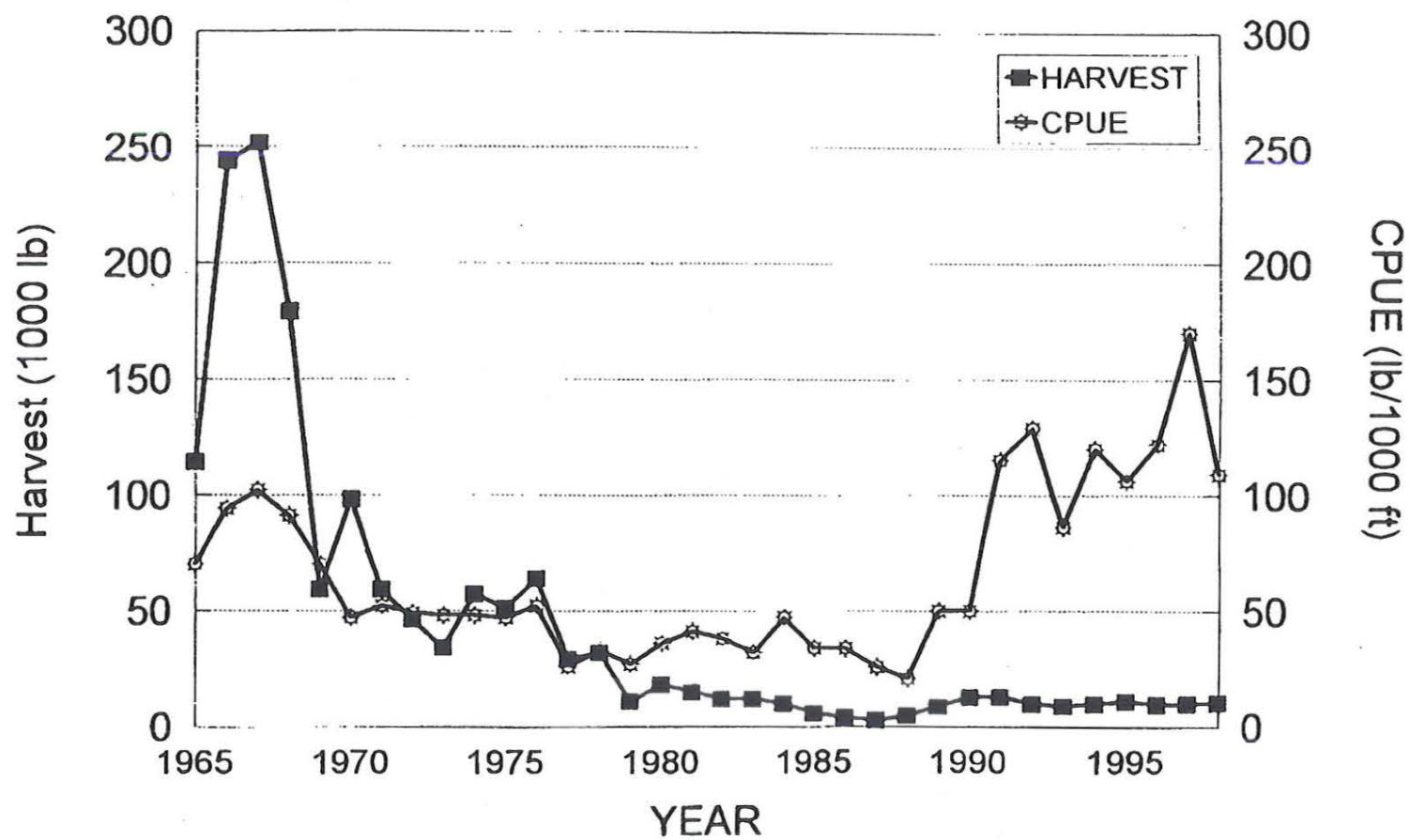


Figure 4. Harvest and CPUE, catch per unit effort, of deepwater chubs from the Minnesota waters of Lake Superior, 1965-1998.

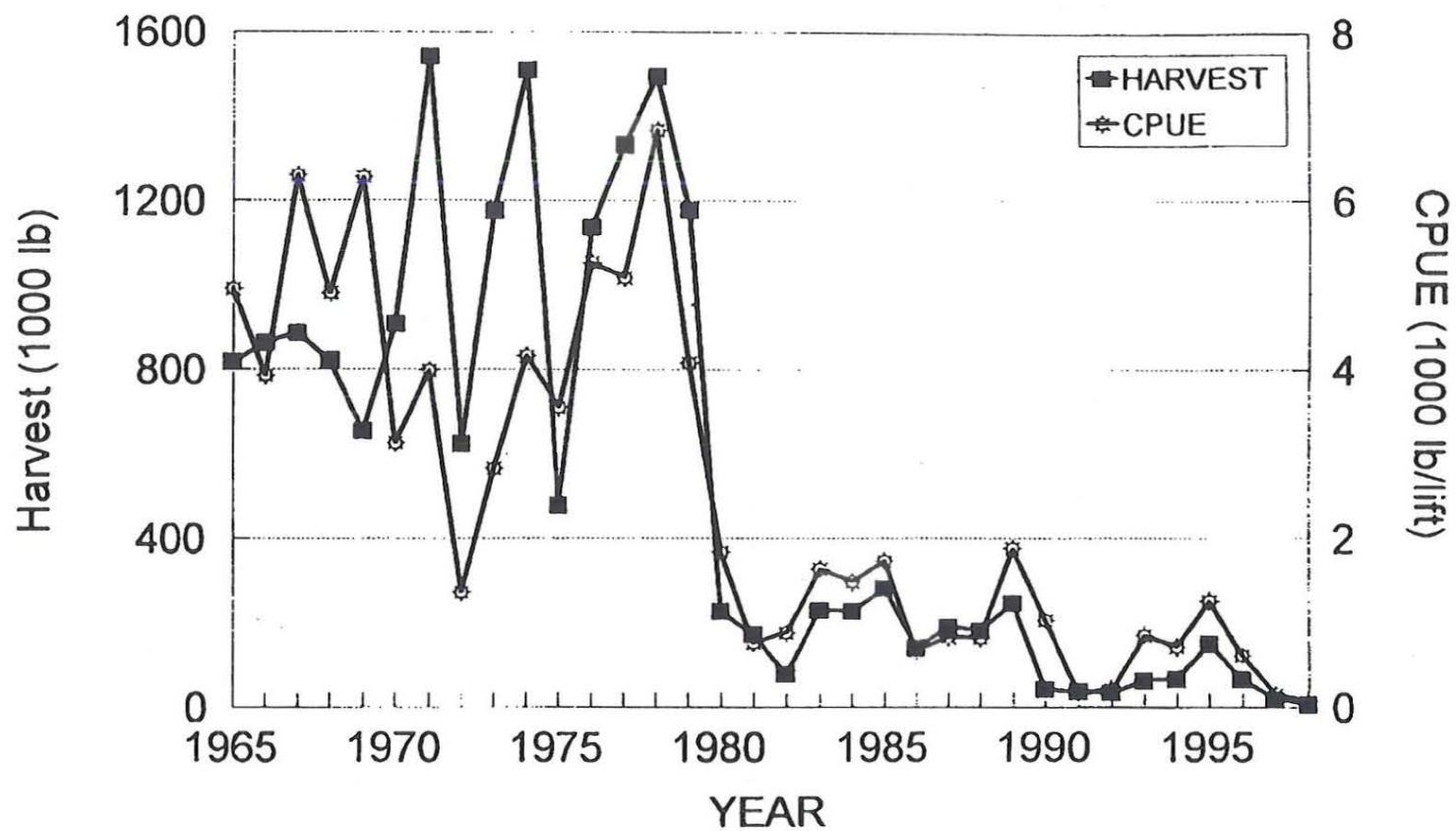


Figure 5. Harvest and CPUE, catch per unit effort, of rainbow smelt caught in commercial pound nets from the Minnesota waters of Lake Superior, 1965-1998.

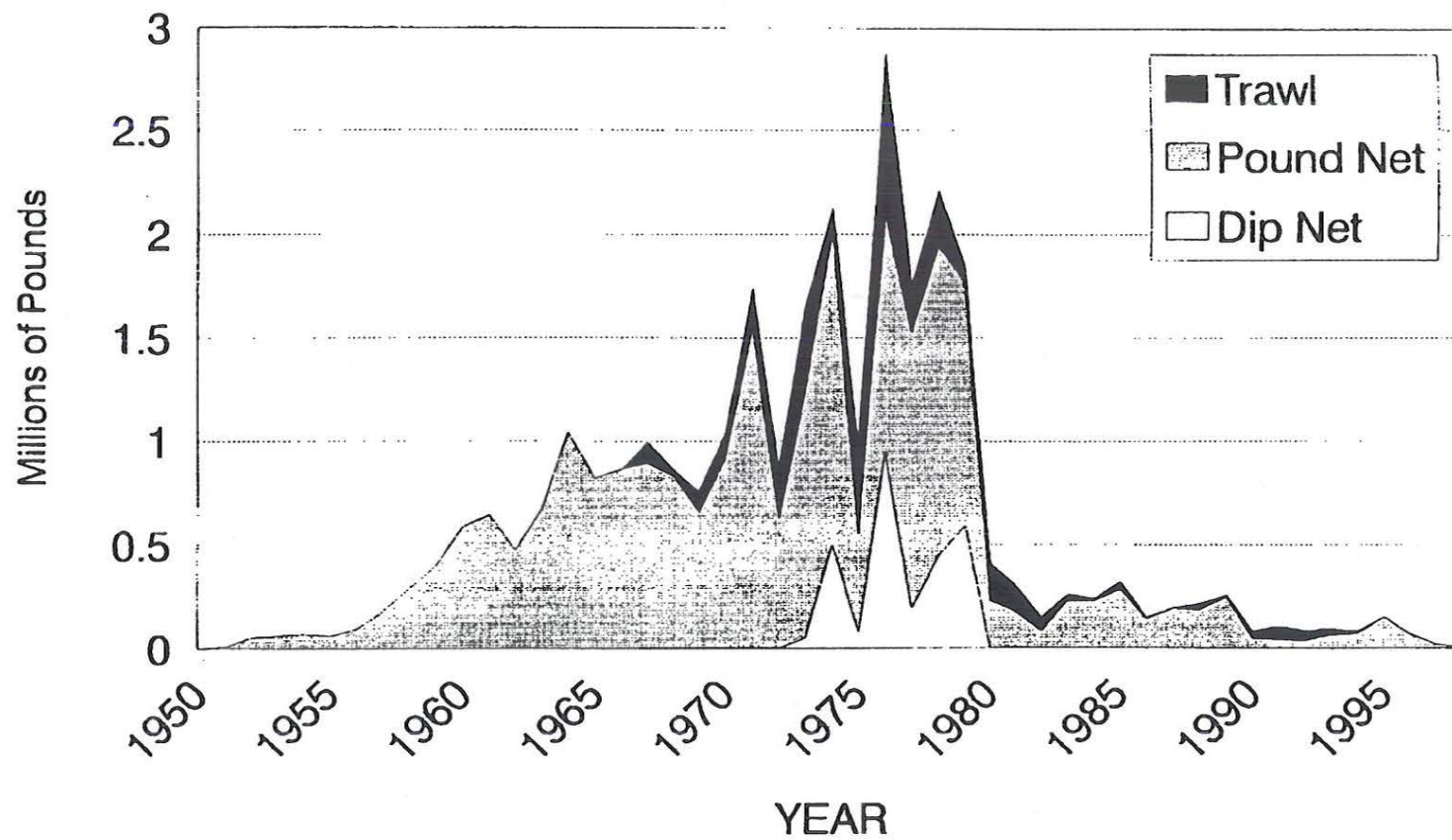


Figure 6. Commercial harvest of rainbow smelt from various gear types in Minnesota waters of Lake Superior, 1951-1998.

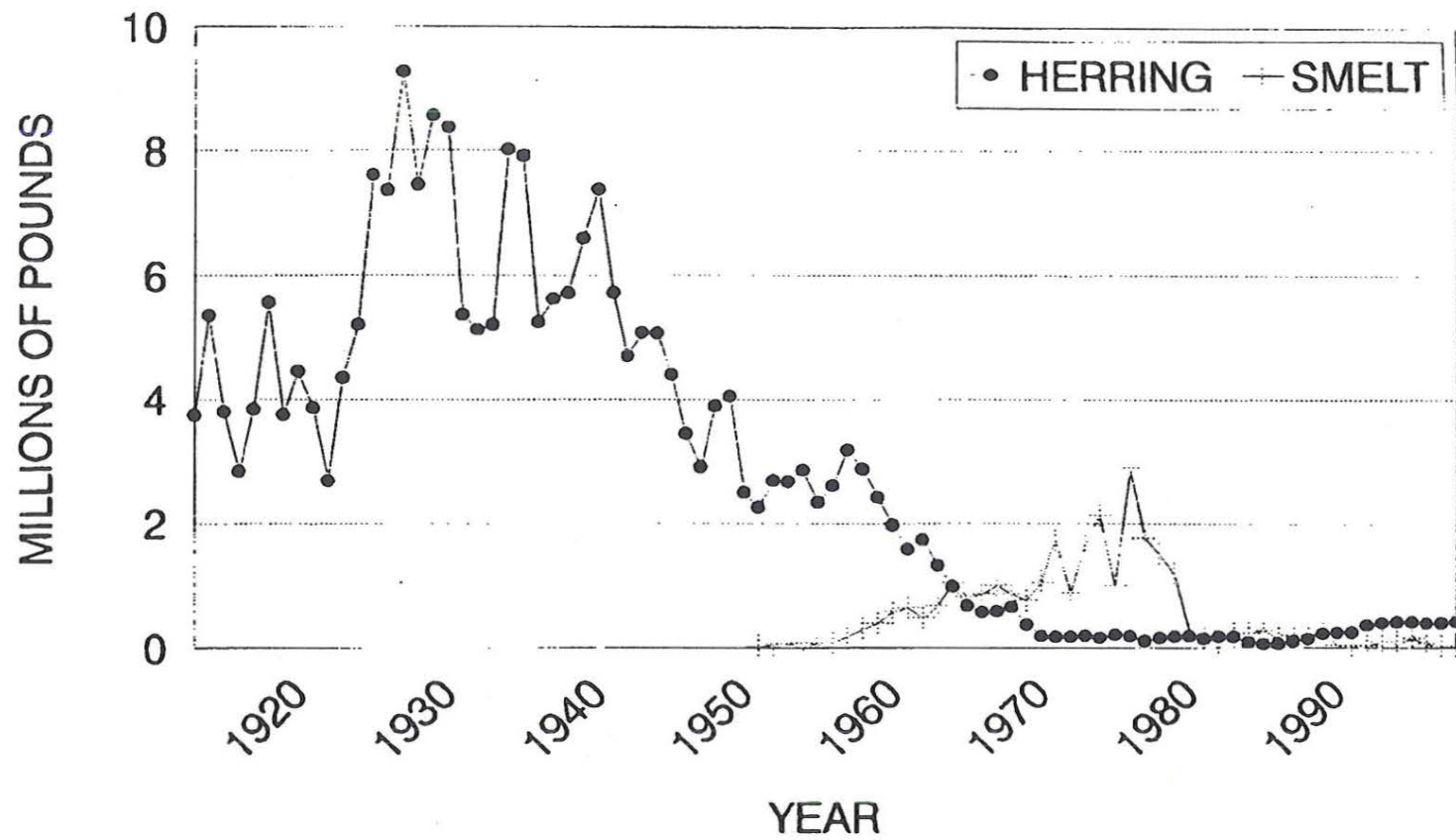


Figure 7. Commercial harvest comparing lake herring and rainbow smelt from the Minnesota waters of Lake Superior, 1913-1998.

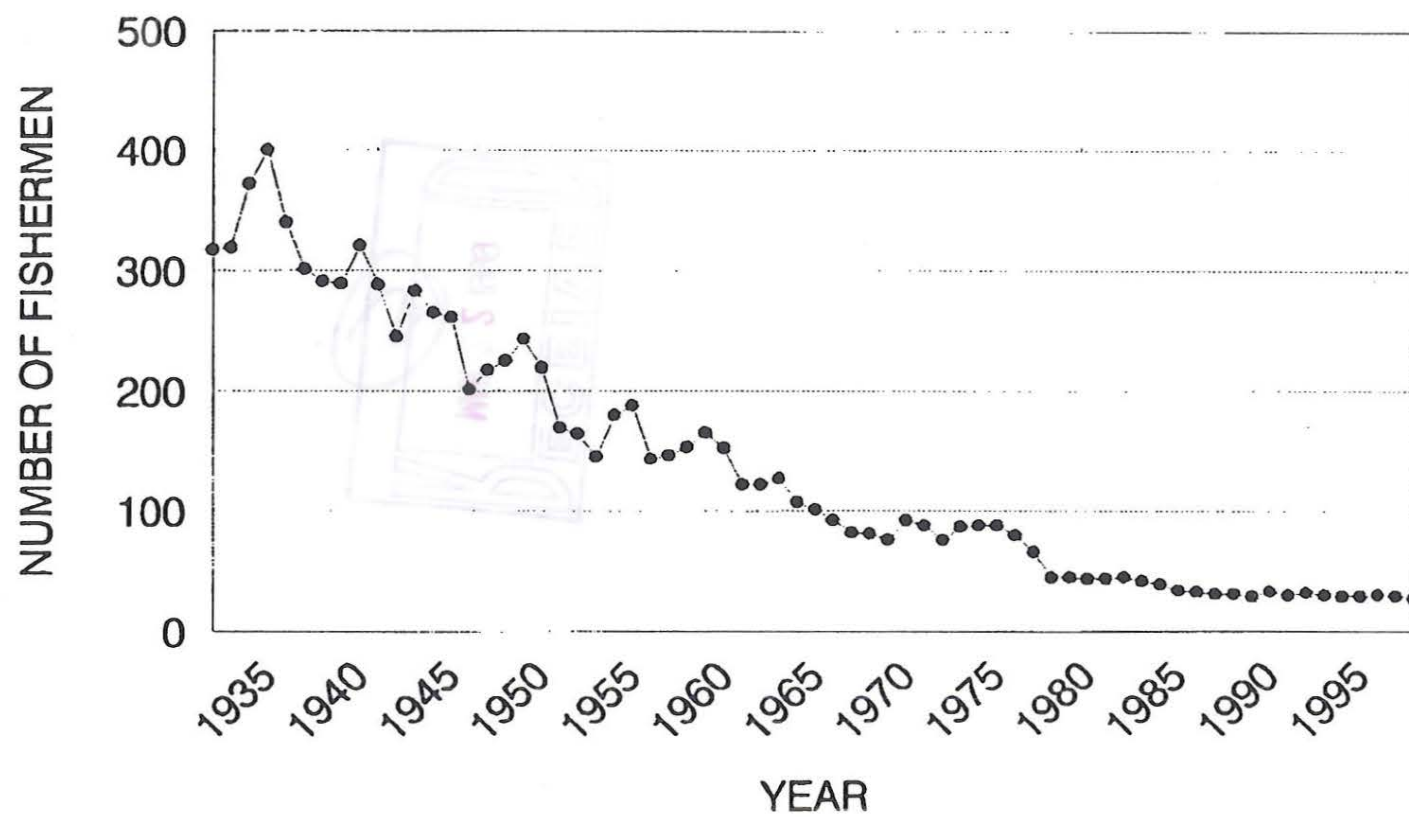


Figure 8. Number of commercial fishermen operating in the Minnesota waters of Lake Superior, 1932-1998.