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COHO SALMON IN MICHIGAN TRIBUTARIES OF LAKE SUPERIOR, 1966-1974 ✓

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SUMMARY

Adult and/or juvenile coho salmon were found in 60 widely distributed Michigan tributaries of Lake Superior during 1966-1974.

The largest fall spawning runs of coho usually occurred in streams that had been stocked the preceding year. However, some streams in which stocking of hatchery-reared coho was discontinued have substantial self-perpetuating spawning runs. Also, some streams which were never stocked with coho have annual spawning runs which developed from spawning by straying adults. Most adult coho in Lake Superior grow to about 500-550 mm (22 inches) long and have an average weight of 1.5 kg (3 lbs.). Coho salmon spawning runs usually begin during late September or early October, and peak in late October or early November.

✓Contribution from Dingell-Johnson Project F-35-R Michigan.

COHO SALMON IN MICHIGAN TRIBUTARIES OF LAKE SUPERIOR, 1966-1974[1]

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INTRODUCTION

Coho salmon (Oncorhynchus kisutch) have been stocked annually since 1966 in a number of Michigan tributaries of Lake Superior. Many salmon reached maturity in Lake Superior and returned to the stocked streams or strayed to other streams to spawn (Rybicki 1973). These stocked coho have given rise to substantial populations of wild juvenile coho salmon (Stauffer, unpublished data). These wild coho have, in turn, produced spawning runs of wild adults in certain streams. This report summarizes the available information on adult and juvenile coho distribution and gives rough indices of abundance of adults. The probable origin (hatchery or wild) of adult coho is also mentioned. In addition, biological parameters of adult salmon such as length, weight and time of spawning are presented.

On the Pacific Coast of North America, coho salmon have a 3-year life cycle ending in death after spawning (Shapovalov and Taft 1954). They leave the Pacific Ocean, entering freshwater streams to spawn in the fall of the year. Eggs hatch the following spring after which the young coho live in the stream for about a year, then migrate to the ocean. Most coho spend about 18 months or two summers in the ocean before they mature and return to freshwater streams to spawn. Most coho salmon in Lake Superior have the same life history.

Juvenile coho salmon can be distinguished from other salmonids by anal fin characteristics (Carl, Clemens and Lindsey 1967). Coho have 13 or more anal fin rays which separate them from trout and Atlantic salmon (Salmo salar) which have 9-12 rays. The anal fin of young coho has elongated first rays which create a concave margin and the leading edge of the fin has a white stripe followed by a dark stripe; characteristics which are not present in other juvenile Pacific salmon. Characters used to differentiate between adult coho salmon and other adult Pacific salmon found in Lake Superior are described in several identification brochures distributed by the Michigan Department of Natural Resources.

As background, coho salmon yearlings were first stocked in the Lake Superior watershed in May 1966 at the Huron River in northeastern Baraga County. Since then, plants of coho have been made in an additional number of streams (Table 1). Survival of coho to adulthood has been substantial, but variable, as indicated by angler catch and number of adults returning to spawn. The 1967 catch and escapement of coho was estimated to be 31,000 fish or 16 percent of the 1966 plant at the Huron River (Miller and Scott 1968). The 1968 return of 10,500 coho was 2 percent of the 1967 Huron River Plant (Miller 1968). During 1969-1973,

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[1]Contribution from Dingell-Johnson Project F-35-R Michigan.

Table 1. Number (1,000's) of Yearling Coho Salmon Planted in Michigan Tributaries of Lake Superior, 1966-1973

County And River	Year							
	1966	1967	1968	1969	1970	1971	1972	1973
Gogebic								
Black	--	--	--	--	--	125	76	--
Presque Isle	--	--	32	50	50	25	--	--
Ontonagon								
Ontonagon	--	--	50	75	--	--	--	--
Baraga								
Sturgeon	--	--	--	75	100	--	--	--
Falls	--	--	60	50	82	80	--	--
Marquette								
Huron	192	467	--	--	--	--	--	--
Dead	--	--	--	--	75	122	76	100
Chocolay	--	--	25	--	--	--	--	--
Alger								
Anna	--	--	175	226	150	--	--	--
Sucker	--	--	40	50	50	50	--	--
TOTALS	192	467	382	526	507	402	152	100

the sport fishery catch of coho from Michigan waters of Lake Superior ranged from 60,000 to 33,000 fish with a mean catch of 47,600 fish (Jamsen 1972, 1973 and 1974; Jamsen and Ellefson 1970; Jamsen, Ryckman and Jamsen, 1970). Additional coho were taken by the sport fishery in Minnesota and Wisconsin waters according to Parsons (1973).

Straying of adult coho salmon to non-stocked streams has been extensive (Peck 1970; Michigan Department of Natural Resources Region I Salmonid Reports 1966-1972 and 1974). Peck cites confirmed reports of adult coho present in 33 Michigan tributaries of Lake Superior during fall 1967.

Evidence of successful natural reproduction of coho salmon was found during summer 1968 in 16 of Michigan's tributaries to Lake Superior (Peck 1970). Continued reproduction in five Lake Superior tributaries was confirmed by annual population estimates of juvenile salmonids during 1968-1974 (Stauffer, unpublished data).

METHODS

Coho salmon populations in seven streams were examined in some detail. Adult salmon were counted by visual inspection or by collection with electro-fishing gear, gill nets and trap nets. Population estimates of young-of-the-year coho were made annually during 1968-1974 on five of the streams.[2] The occurrence of young coho gave positive proof of the presence of adult coho the previous fall. Since, on the more intensively studied streams, there seemed to be a relationship between numbers of young coho and adult coho counted the previous fall, the number of young also provided supplementary information on abundance of spawners. Preliminary analysis of scales from adult coho allowed tentative conclusions as to the origin (hatchery or wild) of certain groups of adult salmon.[3]

The remaining streams were much less intensively studied. Occurrence and abundance data on the streams were obtained from various sources, as follows: unpublished records of the Fisheries Division, Michigan Department of Natural Resources; sea lamprey monitoring weir records and stream survey records of the Marquette Sea Lamprey Control Center, U.S. Fish and Wildlife Service; a survey questionnaire completed by District Fisheries Biologists of the Michigan Department of Natural Resources; and confirmed catches of coho by anglers.

The methods by which data were collected differed so much among streams that a brief description of methods for each stream is given in the results.

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[2] Stauffer (unpublished data). The population estimates will be the subject of a report to follow.

[3] Stauffer (unpublished data). Determination of origin of salmon by scale analysis will be described in detail in a later report.

RESULTS

The occurrence and abundance of coho salmon in Michigan tributaries to Lake Superior during 1966 to 1974 are shown at the end of the "results" in Figures 1-2 and Table 8. In the text below, the seven streams that were intensively studied are discussed separately (in order of west to east) and the remaining streams as a group.

Union River

The Union River has never been stocked with coho salmon and no direct observations of spawning adults have been made. However, during population estimates of juvenile salmonids in 1968-1974, we found age-0 coho each year in varying abundance, so some adults obviously were present. Adults in 1967-1969 were hatchery strays while adults in 1970-1973 were planted strays or wild coho.

Huron River and Chinks Creek

Data on coho spawning runs in the Huron River were obtained from boom shocker surveys, entrapment netting, and electrical weir collections in the lower 2.4 km of stream (Miller and Scott 1968 and Miller 1968). The magnitude of spawning runs in Chinks Creek, a small tributary of the Huron River, was determined from electrofishing surveys of adults during 1971-1973 and annual population estimates of young during 1968-1974.

Initially, in 1967 and 1968, adult coho spawning runs were large, due to the plantings in 1966 and 1967, but thereafter numbers of coho declined substantially (Table 2). The spawning run of 1967 (8,000) was much larger than that of 1968 (2,500) as estimated by Miller and Scott (1968) and Miller (1968). Their offspring, young coho of the 1968 and 1969 year classes, were very abundant in Chinks Creek.

In 1969, few adult coho were found in the Huron River. Any coho that were present were strays from plants made in several other streams in 1968, because the Huron was not stocked in 1968, and because the first year class (1968) of naturally produced coho had not yet reached maturity. Additional evidence of the near absence of adults in 1969 is provided by the virtual absence of y.o.y. coho in Chinks Creek in 1970.

A small to moderate number of adult coho entered the Huron River in 1970. This judgement was based on the catch of 46 coho in a trap net set in the lower river during 17 September-24 October and on the relatively abundant natural reproduction in Chinks Creek in 1971.

We judged that the spawning run of coho in 1971 was of moderate size. Coho were abundant enough to be easily caught with a boom shocker in the lower river on 16 September (26) and 1 October (40). Also, we collected 9 adults in October and 33 adults in November from the 305-m index station on Chinks Creek. The total number of coho which returned to the Huron River in 1971 was estimated at 1,000 by Fisheries Management personnel. Their offspring (y.o.y. in 1972) were very abundant in Chinks Creek.

In 1972, the spawning run of coho salmon into the Huron appeared to be small. We estimate the run at less than 500 fish, based on the following observations. First, only eight coho were collected during two boom shocker surveys on the lower river in October. Second, only three adult coho were found on two electrofishing trips in the 305-m index station of Chinks Creek in October and November. Third, a creel census in September and October showed that only 89 ± 22 coho were caught by anglers. On the other hand, offspring of the 1972 run were very abundant in Chinks Creek in 1973 which would indicate a larger run than we estimated.

The Huron River and Chinks Creek apparently had a small to moderate coho spawning run in 1973. A visual check of .8 km of the West Branch of the Huron revealed only limited spawning activity. Electrofishing in the 305-m index station of Chinks Creek produced 20 adult coho on 6 November and 12 adult coho on 3 December. Age-0 coho were found in Chinks Creek in 1974.

Table 2. Numbers of adult coho salmon observed or collected in the Huron River and Chinks Creek, September-December 1966-1973.

Year	Lower Huron River 11 Sep-15 Nov	Chinks Creek (305-m population estimate area) Oct	Nov	Dec	Catch at USFWS electric weir
1966[a]	24[b]	-	-	-	12
1967	5,000[c]	-	-	-	2,691
1968	2,500[c]	-	-	-	-
1969	few	-	-	-	-
1970	48[d]	-	-	-	-
1971	33[e]	9	33	-	-
1972	4[e]	2	1	-	-
1973	-	-	20	12	-

[a] "Jack" coho salmon spawning run.
[b] Fyke and pound net catch.
[c] Estimated number seen when collecting with a boom shocker.
[d] Forty-six caught in a trap net plus 2 caught in two boom shocker collections.
[e] Average of two boom shocker collections.

Adult coho in the Huron River in 1967-1969 were all planted fish. In 1970-1973, the majority of adult coho were of wild origin as determined by examination of their scales. Also, the number of coho spawners generally seemed to be related to the abundance of wild age-0 coho of that year class in the stream.

In the Huron River, "jack" coho salmon averaged 367 mm long and annual mean lengths of full-term adults ranged from 513 mm to 542 mm (Table 3). There appeared to be no difference in mean total length of coho among years.

Table 3. Length (mm) of adult[a] coho salmon collected from the Huron River and Chinks Creek

Parameter	Huron River			Chinks Creek		
	1966[b]	1967	1968	1971	1972	1973
Number measured	29	1200	37	42	10	32
Mean total length	367	513	536	542	522	497
± 95% confidence limits	13	-	-	27	27	19
Range of total length	262-412	-	-	311-660	467-611	342-602

[a] May include a few "jack" coho salmon.
[b] All "jack" coho salmon.

Coho salmon usually began entering the Huron River in mid to late September according to electrical weir records in 1967 and boom shocker surveys of the lower river in 1968 and 1971. The spawning run apparently peaked in late October to early November.

Little Huron River

Coho salmon have not been stocked in the Little Huron River, but at least a few adult coho have entered the stream to spawn in each year during 1967-1972. This is shown by the observation of three adults in 1967; the collection of one in 1968 and two in 1971; and by the occurrence of age-0 coho each year during 1968-1973. No y.o.y coho were found in 1974, which indicates that few if any adults were present in 1973. The adult coho present in 1967-1969 had strayed from other planting sites, while adults in 1970-1972 could have been either hatchery-reared strays or wild fish from natural reproduction.

Little Garlic River

Electrofishing collections of adults in a 750-m index station and in a 305-m population-estimate area, miscellaneous electrofishing collections, fisheries management reports, and annual population estimates of juvenile salmonids from 1967-1974, collectively provided the data on coho spawning runs and on juveniles in the Little Garlic River. Coho salmon have never been stocked in the Little Garlic River, but substantial plants were made annually in 1970-1974 at the Dead River about 17 km away. The number of spawning coho in the Little Garlic River increased gradually during 1967-1973 (Table 4).

Although only three stray adult coho, from the Huron River plants, were seen in the autumn of 1967 and no observations were made in 1968, more than a few adults probably were present because substantial populations of age-0 coho were found in 1968 and 1969. In 1969, apparently very few adult coho strays were present, since only one was found in the population estimate section in November and only a few age-0 fish were found in 1970.

Coho spawning runs appeared to be more substantial in 1970-1972. Only 1 adult coho was captured from the 305-m population estimate section in November 1969, whereas 10 were caught in November 1970 and 6 in November 1972. No collections were made in the 750-m index section in 1969 and 1970, but in 1971 and 1972, 37 and 25 adult coho were captured. Offspring of coho in the 1970-1972 spawning runs were numerous which may also indicate that these spawning runs were substantial.

In 1973, the Little Garlic River apparently received the largest spawning run ever of coho salmon. Some 64 adults were taken in two collections at the 750-m index section compared to 37 in 1971 and 25 in 1972. Also, in November 1973, 45 additional coho were counted at the index section. Inexplicably, few young were produced by the abundant 1973 spawners.

Table 4. Numbers of adult coho salmon observed or collected in the Little Garlic River, September-November 1967-1973

Year	305-m population estimate area			750-m index section		Miscellaneous collections[a]
	Sep	Oct	Nov	Oct	Nov	
1967	-	-	-	-	-	3
1968	-	-	-	-	-	-
1969	0	-	1	-	-	-
1970	0	2	10	-	-	6
1971	0	-		18	19	9
1972	-	-	3[b]	-	12[b]	-
1973	-	3	8	33	31	45

[a] Number of adult salmon observed or collected at other locations in the Little Garlic River.

[b] Average of two collections

Preliminary scale analysis suggested that most of the mature coho in the Little Garlic River were of wild origin in 1970, 1971 and 1973, but that the majority of adults found in 1972 were of hatchery origin. This assessment is reinforced when the abundance of wild juvenile coho of the 1968, 1969 and 1971 year classes and their near absence in 1970 is considered.

Coho salmon in the Little Garlic River ranged in average total length from 492 mm in 1973 to 533 mm in 1972 (Table 5). There was no significant difference in mean length among years during 1970-1973.

Table 5. Length (mm) of adult[a] coho salmon collected from the Little Garlic River, 1970-1973.

Parameter	Year			
	1970	1971	1972	1973
Number measured	18	46	33	75
Mean total length	532	498	533	492
± 95% confidence limits	12	22	19	14
Range of total length	503-577	322-610	411-611	322-669

[a] May include a few "jack" salmon.

The coho spawning run usually began in early October and probably peaked by early November. We base this conclusion on the absence of spawners in late September of 1970 and 1971, yet, finding them in substantial numbers by mid-October in most years.

Dead River

Data on adult coho returns to the Dead River were obtained from creel surveys conducted by Fisheries Management personnel and from gill net sets in the river.

Yearling coho have been stocked annually in or near the Dead River during 1970-1973 (Table 1). In 1967-1970, there were few, if any, adult salmon in the Dead River. The first spawning run of coho to the Dead River occurred in 1971 and amounted to some 1,200 fish (Miller 1972). In 1972, the total spawning run of coho was estimated at 4,000 fish (Miller 1972). The 1973 and 1974 spawning runs seemed to be small to moderate, although the Dead River was stocked with yearling coho in 1972 and 1973. Four overnight gill net sets (300 feet of 4-inch mesh) in the river during September and October of 1973 produced only 21 adult coho. In 1974, only two coho were collected in the river with six overnight gill net sets (90 feet of 2-1/2 inch mesh) between 15 September-1 December 1974 (Richard Berg, Northern Michigan University Graduate student, personal communication).

The habitat in the Dead River is unsuitable for any significant amount of natural reproduction. This suggests that most coho which return to the Dead River to spawn are from plants made there.

Chocolay River (Cherry Creek)

Coho salmon spawning runs in Cherry Creek, a tributary of the Chocolay River, were assessed by collecting with a shocker at a 27-m long index station just below the Marquette State Fish Hatchery outfall. Coho were blocked from further upstream migration so they were concentrated in the index station. Collections were made when visual observations indicated that coho were abundant in the index station. Catches at the index station were: 78 (1967), 28 (1968), 146 (1969), 51 (1970), 14 (1971), 0 (1972), 6 (1973) and 0 (1974).

Cherry Creek was stocked with coho only in 1968 (Table 1). The catch at the index station indicated that the 1967 and 1968 runs were small to moderate. These adults were strays from the Huron River plants. The number of coho spawners collected in 1969 (146) indicated that this was the largest spawning run, which probably resulted from the 1968 plant. Collections and observations of adult coho in 1970-1974 indicate that the size of spawning runs have decreased. Scale examination of adult coho from Cherry Creek in 1970-1971 and 1973 suggest that they were mostly of hatchery origin.

Spawning runs of coho to Cherry Creek usually began in late September and peaked by mid to late October.

Anna River

Data on coho spawning runs and occurrence of young in the Anna River were obtained from annual electrofishing collections of adults in a 400-m index section during 1971-1974, from nonsystematic miscellaneous electrofishing collections of adults, from Fisheries Management records and from annual population estimates (1967-1974) of juvenile salmonids.

In 1967 and 1968, only a few adult coho salmon entered the Anna River, as judged by the few found in 1967 (Table 6) and the small number of progeny collected in 1968 and 1969. All adults were strays from the 1966 and 1967 plants in the Huron River. Yearling coho were stocked annually in the Anna in 1968-1970. This resulted in large spawning runs in 1969-1971 as shown by the many adults collected then and by the numerous progeny found in 1970-1972. We estimate that the minimum number of spawners in the runs was 500-1,000 fish per year.

Substantial spawning runs have continued annually through 1974 although hatchery-reared coho were not stocked in the Anna River after 1970. In fact, spawning runs seemed to be of the same magnitude as in 1970 and 1971 when large spawning runs resulted solely from plantings of coho smolts in 1969 and 1970. This conclusion is based on the catch of electrofishing surveys in 1972-1974 at a 400-m index section that totaled 76 (1972), 68 (1973) and 55 (1974) adult coho as compared to a catch of 85 at the same index section in 1971.

We believe that most coho in the 1972-1974 spawning runs were of wild origin. First, preliminary scale analysis indicated that most adult coho which returned to spawn in 1972 and 1973 were wild. Second, straying of coho to the Anna River from distant planting sites apparently is insignificant, judging from the few strays encountered in 1967 and 1968. Third, large numbers of young of the 1970-1972 year classes were produced in the Anna River.

The average total length of coho in the Anna River ranged from 518 mm in 1969 and 1970 to 556 mm in 1972 (Table 7). Examination of 95% confidence limits for the mean lengths of coho in 1970-1974 revealed that in 1970 the sampled fish were slightly smaller. The slight difference in average length could be due to sampling error, because the 1970 collection was made at an earlier date than the rest.

Table 6. Numbers of adult coho salmon observed or collected in the Anna River, September-November 1967-1974

Year	305-m population estimate area 26 Sep-5 Oct	400-m index section Sep	Oct	Nov	Miscellaneous collections[a]
1967	-	-	-	-	6
1968	0	-	-	-	-
1969	19	-	-	-	-
1970	30	-	-	Many	231
1971	21	16	34[b]	-	-
1972	0	-	11[b]	54	-
1973	5	-	25[b]	18	65
1974	21	-	37	18	30

[a] Number of adult salmon observed or collected at other locations in the Anna River

[b] Average of two collections

Table 7. Length (mm) of adult[a] coho salmon collected from the Anna River, 1969-1974

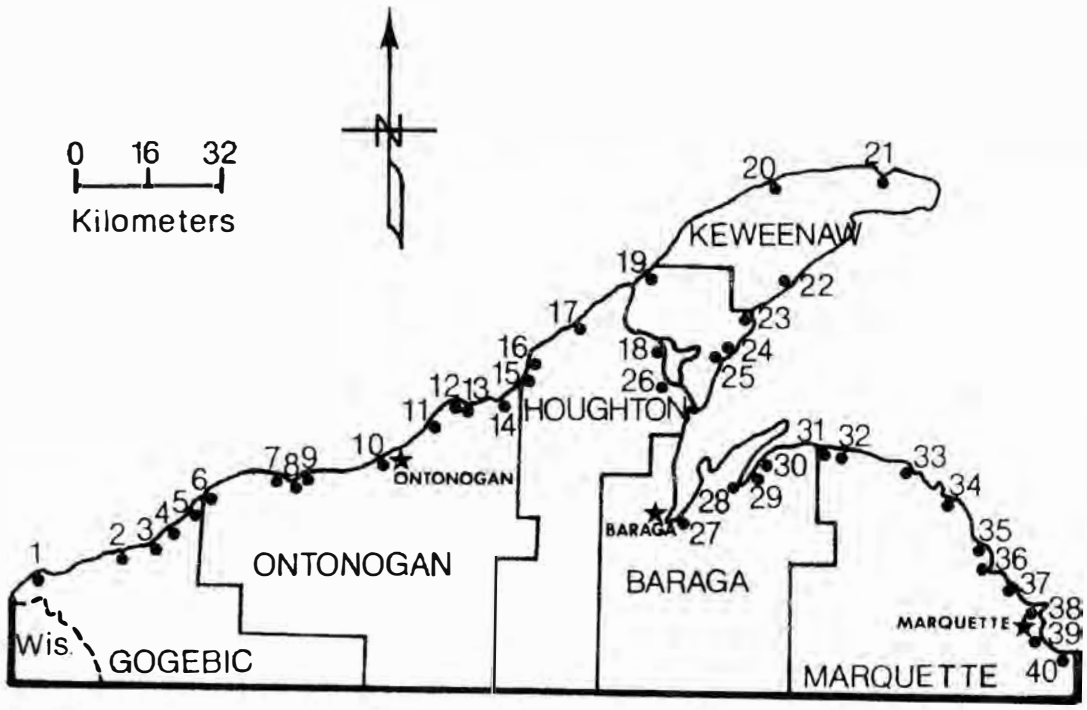
Parameter	Year 1969	1970	1971	1972	1973	1974
Number measured	154	49	69	75	50	73
Mean total length	518	518	552	556	550	539
± 95% confidence limits	-	12	12	13	17	8
Range of total length	-	442-610	362-675	328-667	334-646	462-617

[a] May include a few "jack" coho salmon.

Generally, the spawning run of adult coho to the Anna River began about the middle of September and peaked in mid to late October. The exceptions were 1972 and 1973 when the spawning run apparently began in early October and peaked in early November.

Other Streams

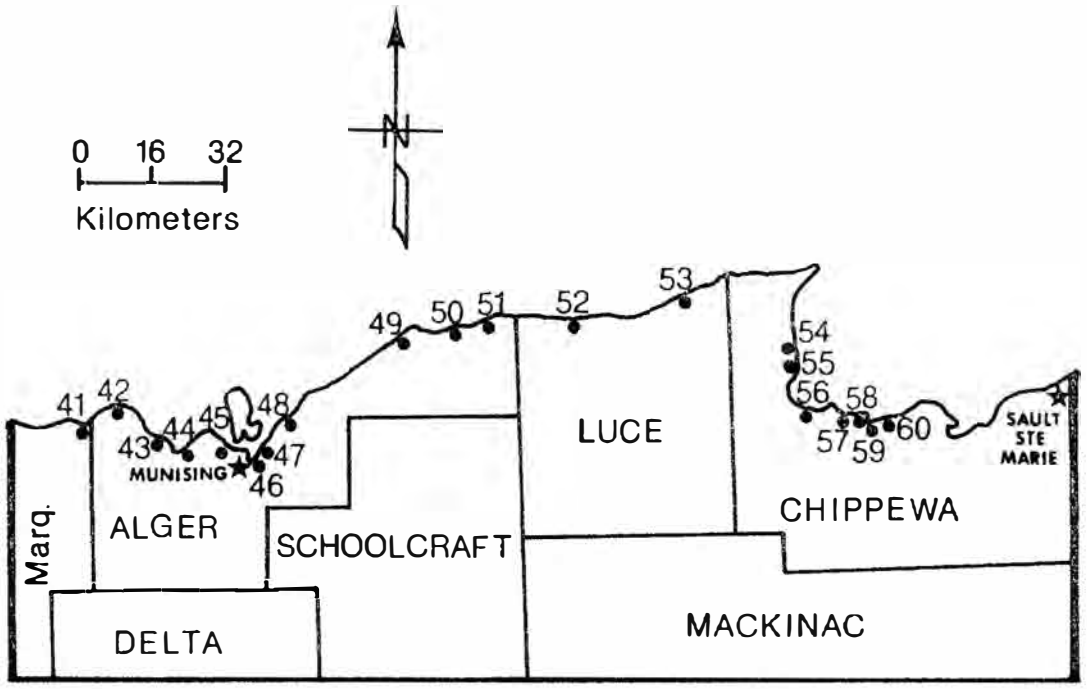
Adult coho salmon or their offspring have been found in 53 additional streams in one or more years from 1966-1974 (Table 8). Coho are distributed in streams along the Michigan shore of Lake Superior, from Ohman Creek in western Gogebic County to Pendills Creek in central Chippewa County (Figures 1 and 2).



Legend: Key to rivers

1. Ohman Creek
2. Maple Creek
3. Black River
4. Presque Isle River
5. Little Carp River
6. Carp River
7. Union River
8. Little Iron River
9. Iron River
10. Ontonagon River
11. Firesteel River
12. West Sleeping River
13. East Sleeping River
14. Misery River
15. Little Elm River
16. Elm River
17. Salmon Trout River
18. Pilgrim River
19. McGunns Creek
20. Eagle River
21. Fanny Hooe Creek
22. Tobacco River
23. Deer Lake Creek
24. Rice Lake Creek
25. Mud Lake Creek
26. Sturgeon River
27. Falls River
28. Silver River
29. Slate River
30. Ravine River
31. Huron River
32. Little Huron River
33. Salmon Trout River
34. Iron River
35. Garlic River
36. Little Garlic River
37. Harlow Creek
38. Dead River
39. Carp River
40. Chocolay River

Figure 1. Michigan tributaries of western Lake Superior in which coho salmon were observed, 1966-1974.



Legend: Key to rivers

41. Sand River
42. Laughing Whitefish River
43. Rock River
44. AuTrain River
45. Bay Furnace Creek
46. Anna River
47. Tannery Creek
48. Miners River
49. Hurricane River
50. Sable Creek
51. Sucker River
52. Blind Sucker River
53. Two Hearted River
54. Black Creek
55. Tahquamenon River
56. Roxbury Creek
57. Halfaday Creek
58. Unnamed Creek
59. Unnamed Creek
60. Pendills Creek

Figure 2. Michigan tributaries of eastern Lake Superior in which coho salmon were observed, 1966-1974.

Table 8. Occurrence and abundance[a] of coho salmon adults and juveniles in Michigan streams tributary to Lake Superior, 1966-1974

County and tributary	Year								
	66	67	68	69	70	71	72	73	74
Gogebic									
Ohman Creek	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Maple Creek	.	F	R	.	.	.	.	.	.
Black River Basin	.	F	R	.	.	.	C	C	C
Presque Isle River	.	F	R	F	C	C	C	C	C
Little Carp River	.	F	R	.	.	.	.	.	.
Ontonagon									
Carp River	.	F	R	.	.	.	.	F	F
Union River	.	P	Pa	Pc	Pf	Pc	Pc	Pa	c
Little Iron River	.	F	.	.	.	.	.	.	.
Iron River Basin	.	F	.	.	.	.	.	.	.
Ontonagon River Basin	.	.	.	F	F	.	.	.	.
Firesteel River	.	F	P	Pf	c	.	.	.	.
West Sleeping River	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
East Sleeping River	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Misery River	.	.	P	Pf	c	.	.	.	F
Houghton									
Little Elm River	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Elm River	.	F	R	.	.	.	.	F	F
Salmon Trout River	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Pilgrim River	.	.	.	.	.	F	.	.	.
McGunns Creek	.	F	.	.	.	.	.	.	.
Keweenaw									
Eagle River	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Fanny Hooe Creek	.	F	.	.	.	.	.	.	.
Tobacco River	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Houghton									
Deer Lake Creek	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Rice Lake Creek	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Mud Lake Creek	P	P	Pp	Pp	Pp	Pp	Pp	Pp	Pp
Baraga									
Sturgeon River	.	.	P	Pf	Fc	F	F	F	.
Falls River	.	F	f	C	C	A	A	.	.
Silver River	.	C	Ff	Cc	Pf	Pf	Rf	P	Rf
Slate River	.	F	R	R	R	R	R	R	R
Ravine River	.	F	R	R	R	R	R	R	R

Table 8. Occurrence and abundance[a] of coho salmon adults and juveniles in Michigan streams tributary to Lake Superior, 1966-1974 (continued)

County and tributary	Year								
	66	67	68	69	70	71	72	73	74
Marquette									
Huron River	F	A	Ca	Fa	Fc	Cc	Ca	Ca	Ca
Little Huron River	.	F	Pc	Pc	Pf	Fc	Pa	a	R
Salmon Trout River	.	R	R	.	.	.	.	P	Af
Iron River	.	P	f	P	f	P	f	R	R
Garlic River	.	P	Rf	.	.	.	.	.	.
Little Garlic River	.	F	Pa	Fa	Ff	Aa	Aa	Aa	c
Harlow Creek	.	R	R	.	.	.	F	.	.
Dead River	.	R	R	.	.	C	A	C	C
Carp River	.	R	F	.	.	.	.	.	.
Chocolay River	.	C	Cf	Cf	Cc	P	f	C	Cc
Alger									
Sand River	.	R	.	.	.	.	F	.	.
Laughing Whitefish River	.	F	F	f	.	.	P	f	.
Rock River	.	F	Ff	Pc	c	.	.	F	C
AuTrain River	.	R	.	.	.	.	.	P	c
Bay Furnace Creek	.	F	Pf	Pc	c	.	.	.	.
Anna River	.	F	Fc	Af	Ac	Aa	Aa	Aa	Aa
Tannery Creek	.	R	.	.	.	.	.	.	.
Miners River	.	.	P	f	.	.	.	.	.
Hurricane River	.	.	.	.	.	.	.	.	F
Sable Creek	.	.	.	.	.	F	.	.	.
Sucker River	.	P	Pc	Fa	Ac	Cc	Cf	Cc	F
Luce									
Blind Sucker River	.	.	.	F	.	.	R	.	A
Two Hearted River	.	P	Pf	Pf	Cf	Cf	Cf	Cc	Cf
Chippewa									
Black Creek	.	.	.	.	F	.	.	.	.
Tahquamenon River Basin	.	.	.	.	.	.	.	.	F
Roxbury Creek	.	.	.	R	.	.	P	Ff	.
Halfaday Creek	.	.	.	.	F	c	P	c	F
Unnamed Creek	.	P	f	.	.	.	.	.	.
Unnamed Creek	.	P	f	.	.	.	.	.	.
Pendills Creek	.	P	c	.	C	Cc	Cc	Ca	Ca

[a] The letter symbols represent rough estimates of abundance. Upper case letters indicate adult coho and lower case letters indicate juvenile coho as follows: Rr = reported, not confirmed by Department of Natural Resources fisheries personnel; Pp = present and confirmed, abundance not noted; Ff = few; Cc = common; Aa = abundant.

DISCUSSION

Either adult or juvenile coho salmon, or both, have been found in 60 widely distributed Michigan tributaries of Lake Superior in one or more years from 1966 to 1974. This number of streams with coho is minimal because most other streams tributary to Lake Superior were not examined.

Ten streams have been stocked with yearling coho salmon during 1966-1973. The largest spawning runs usually occurred in streams that were stocked the preceding year. However, some streams in which stocking of coho was discontinued have substantial self-perpetuating spawning runs. The Anna River, Huron River and Cherry Creek (Chocolay River) have continued to receive adult coho which produce new generations of young coho. Some streams which were never stocked with coho yearlings have small to moderate annual spawning runs which developed from straying adults and their offspring. The Union River, Silver River, Little Huron River, Little Garlic River, Two Hearted River and Pendills Creek are good examples.

Coho spawning runs, whether from stocked yearlings, straying adults or natural reproduction, have usually not remained stable in size from year to year. The spawning run of wild coho to the Little Garlic River has tended to slowly increase in magnitude, at least to 1973. The size of the spawning run in the Huron River has fluctuated yearly from small to moderate during 1969-1973. Numbers of coho spawners have generally decreased in the Dead River and Cherry Creek. But, the Chocolay River, into which Cherry Creek flows, apparently continues to receive a significant number of adult coho. Only in the Anna River has the number of spawning coho apparently stabilized at a relatively high level.

Generally, adult coho in Lake Superior attain a length of about 500-550 mm and weight about 1.5 kg. There have been rare reports of coho that weighed 3 kg. Precocious male coho ("jacks") which mature in their second year of life, rather than the usual third year, make up a small percentage ($\leq$5%) of the spawning runs. "Jacks" seldom exceed 400 mm total length and 0.7 kg in weight.

Coho salmon usually begin to enter spawning streams during late September to early October, however, some small deviations from that time period may occur due to environmental conditions. The peak of the spawning runs usually occur in late October to early November. Most coho have completed spawning by late November although some stragglers were found spawning in December, with a few even overwintering in some streams.

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