

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-81-R-2

Study No.: 488

Title: Status of the Lake St. Clair fish community and sport fishery

Period Covered: October 1, 2000 to September 30, 2001

Study Objective: The objectives of this study are (1) to measure the abundance of yellow perch and other forage species in Lake St. Clair, (2) to monitor yellow perch diet and growth, and compare with yellow perch populations of Saginaw Bay and Lake Erie, (3) to monitor the abundance and distribution of newly introduced exotic fish species in Lake St. Clair, (4) to document the abundance and distribution in Lake St. Clair of species of special concern, and (5) to monitor trends in sport fish catch rates for the Lake St. Clair fishery.

Summary: Fish populations were sampled with 10 m and 4.8 m headrope bottom trawls during 2000 and 2001. Data entry and analysis for all 2000 trawls are complete. Yellow perch, spottail shiner, mimic shiner, and trout-perch dominated the trawl catches. Round goby trawl catch rates declined slightly. Special concern species sampled with trawls included eastern sand darter and lake sturgeon. Sport fishing catch and effort information was collected with a voluntary angler diary program in 2000 and 2001. Data entry and analysis for all 2000 sport diaries are complete. Catch rates for yellow perch and smallmouth bass increased substantially, while catch rates for walleye and muskie remained within the range of catch rates observed for these species since 1992. Sport diaries were distributed to cooperators in April 2001 for the 2001 fishing season. Yellow perch foraged extensively on invertebrates such as midges (chironomids), mayflies (emphemeroptera), and caddisflies (tricoptera) during June. Snails (gastropods), fish, and zooplankton (primarily ostracods) became more common in the yellow perch diet in September. Yellow perch recruitment in Lake St. Clair is highly variable between years. The 1992, 1995, and 1999 year classes appeared weak, while the 1991, 1993, 1994, and 1998 year classes were comparatively strong.

Job 1. Title: Sample yellow perch and forage with index trawls.

Findings: During 2000 fish were collected at the Anchor Bay index site with a 10 m headrope bottom trawl with 13 tows in June and 19 tows in September. In June spottail shiner, yellow perch, and trout-perch were most abundant. During September spottail shiner, yellow perch, and rock bass were most abundant. Comparison of spring and fall densities for Anchor Bay since 1993 revealed some interesting seasonal patterns (Table 1). Rainbow smelt were abundant in June but decreased to low abundance in September, probably a result of the warmer water conditions found in Lake St. Clair during July and August. Similarly, yellow perch density was consistently higher during June than during the fall sampling period. We suspect that yellow perch catch rates were low in September due to yellow perch distribution in macrophyte beds, which were abundant by September. Unfortunately, we were unable to effectively trawl in heavily vegetated areas of the lake. Conversely, mimic shiners were rather rare in the June trawls, but were one of the most abundant species in the fall trawl catch. Similarly, alewife and smallmouth bass abundances were

generally higher in the fall sampling. This increase may be related to recruitment of age 0 fish to the trawl gear by September.

While few trends in catch rates across the time period 1993-2000 were evident, several species appear to have lower catch rates in recent years. Alewife, bluntnose minnow, logperch, trout-perch, mimic shiner, johnny darter, and rainbow smelt have all exhibited lower catch rates since 1998. Conversely, rock bass catch rates in September 2000 were the highest for fall sampling during this time period. Samples of yellow perch collected in June and September 2000 were frozen for later analysis of age, growth, condition, and diet.

Sampling has continued on schedule in 2001.

Job 2. Title: Sample exotic and other fish species with trawls.

Findings: In addition to trawls included under Job 1, exotic species and special concern species were sampled from June through October 2000 with a total of 203 trawl tows made lakewide. Lake St. Clair was divided into a 5 minute grid system. The 5 minute grids were grouped for the three main areas of the lake, the northwest portion or Anchor Bay, the southwest area, and the southeast area. Trawl locations were randomly selected from shoreline grids and offshore grids. Shoreline grids were sampled with the 4.8 m headrope trawls pulled by 18 foot work boats. Offshore grids were sampled with 10 m headrope trawls pulled by the RV Channel Cat.

Over 51,000 fish comprising 41 species were collected (Table 2) from a total of 203 trawl tows. Spottail shiner (37.4%), mimic shiner (25.3%), yellow perch (15.3%), trout-perch (4.1%), and rock bass (3.1%) were the most abundant species combining for over 85% of the total catch. Round gobies were collected from all three areas of the lake, and in both nearshore and offshore grids. A total of 1,159 round gobies were collected lakewide, representing 2.2% of the total catch. In contrast, only 27 tubenose gobies were collected. Special concern species, including eastern sand darter (1), and lake sturgeon (150), were also collected.

An analysis of the mean annual catch rates during 1996-2000 for all species revealed few trends. However, two species have apparently experienced a dramatic decline during this time period - Johnny darter and logperch (Table 3). Both species have experienced decreased mean catch rates and have reduced spatial distributions in the lake. Researchers have hypothesized that round goby competition could precipitate declines in native benthic fish populations such as darters and sculpins. The declines documented in this study may be a result of such a competitive interaction.

Sampling has continued on schedule in 2001.

Job 3. Title: Collect catch and effort data for the sport fishery with angler diaries.

Findings: A voluntary angler diary program was used to collect catch and effort data for recreational fishing on Lake St. Clair. The program was initiated by the Ontario Ministry of Natural Resources (OMNR) in 1985 to monitor trends in the muskellunge catch rate for Lake St. Clair. Five years later the program was expanded to include other species. The Michigan Department of Natural Resources (MDNR) became involved in the program in 1993. Since that time, the program has been a cooperative effort between the OMNR and MDNR. In 2000 the MDNR distributed 71 angler diaries to Michigan resident sport anglers interested in participating in the diary program. A total of 49 diaries were returned by cooperating anglers during fall and early winter.

The Lake St. Clair Angler Diary Program provides annual estimates of catch rates for the major sport fish species in the lake. Ontario and Michigan angler diary data were pooled to produce the 2000 estimates (Table 4). The walleye catch rate in 2000 remained within the range of catch rates observed since the program expanded in 1992. The catch rates for yellow perch and smallmouth bass increased substantially for the second consecutive year. The 2000 muskellunge catch rate for Lake St. Clair increased slightly and was within the range observed since 1992. However, effort was the lowest observed for the period. Increased angler participation is needed if this program is to continue to provide reasonable estimates of catch rates for sport fish in Lake St. Clair.

New angler diaries were distributed in April 2001 and will be recalled in November 2001.

Job 4. Title: Identify and quantify perch stomach contents.

Findings: Lab processing of stomach contents from yellow perch collected in June and September of 1998 and 1999 has been completed. Ephemeroptera, chironomid larvae, and tricoptera larvae were all found in high percentages of the non-empty June stomach samples (Table 5). In the September samples, gastropods, fish, and zooplankton also became important components of the diet. Yellow perch in Lake St. Clair have begun to forage on round gobies. Stomachs of yellow perch collected in September 1996, 1997, 1998, and 1999 have contained some round gobies.

Lab processing of stomach contents from yellow perch collected in June and September 2000 is underway.

Job 5. Title: Analyze data and estimate growth rates for yellow perch.

Findings: Processing of yellow perch scale samples and diet samples collected in 2000 is underway. Although the data set covers only a six year time span, it appears that growth rates, based on mean length at age, have declined and are now below state average (Table 6). The causative factor in this decline is not clear.

Evaluation of catch rates by age indicated the presence of strong and weak year classes in the population (Table 7). The 1992, 1995, and 1999 year classes appeared weak, while the 1991, 1993, 1994, and 1998 year classes were comparatively strong. Variable recruitment is characteristic of yellow perch populations throughout the Great Lakes. The apparent decline in growth for recent years could be related to higher yellow perch densities due to the strength of the 1993, 1994, and 1998 year classes.

Job 6. Title: Prepare annual performance reports.

Findings: In addition to this study performance report, findings of work conducted under this study were summarized in an annual fisheries status report prepared for the Lake Erie Committee of the Great Lakes Fisheries Commission.

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Date: September 30, 2001

Table 1.—Mean density (number per hectare) for all fish species caught during spring (June) and fall (September or October) with 10 m headrope index trawls in Anchor Bay, Lake St. Clair.

Species	Spring										Fall									
	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000						
Alewife	3.4	4.3	29.2	10.6	2.5	1.9	3.9	24.9	30.8	28.3	30.7	11.5	1.6	2.8						
Banded killifish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.8						
Black crappie	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.0						
Blackchin shiner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Blackside darter	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0						
Bluegill	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.7	0.0	0.0	0.0	7.5	0.0						
Bluntnose minnow	62.5	18.8	0.7	0.0	0.2	0.0	11.1	1276.9	30.1	0.0	33.5	0.2	9.4	14.8						
Brook silversides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	1.1	0.0	0.1	0.0	2.5	0.0						
Brook stickleback	62.9	2.3	0.0	0.0	0.0	0.0	0.0	1.6	0.2	1.1	0.0	0.0	0.0	0.0						
Brown bullhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0						
Channel darter	1.1	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0						
Common carp	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.5	0.2	0.9	0.0	0.1	0.0						
Eastern sand darter	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Emerald shiner	0.0	0.2	0.7	0.2	0.0	0.0	5.1	0.0	4.3	3.8	1.1	7.5	0.0	0.0						
Freshwater drum	1.6	0.2	6.6	12.5	5.0	2.3	0.7	0.9	4.5	1.1	0.6	0.2	1.4	1.0						
Gizzard shad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	0.0	0.9	0.0	0.0						
Golden redhorse	0.0	0.0	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0						
Iowa darter	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Johnny darter	61.4	17.9	21.7	2.8	7.0	0.0	0.2	0.0	4.3	17.7	4.0	0.0	0.0	0.10						
Lake sturgeon	0.0	0.0	2.3	0.4	0.0	0.1	0.2	0.0	0.0	1.8	0.0	1.4	0.0	0.1						
Largemouth bass	0.0	0.0	0.0	0.0	0.0	0.0	0.1	55.0	18.6	0.0	0.0	0.0	3.0	1.8						
Logperch	9.7	75.6	8.8	75.6	83.3	7.6	0.2	14.3	27.8	32.4	40.0	20.6	1.3	5.2						
Mimic shiner	1.4	1.4	17.2	26.3	1.6	0.0	13.5	1711.4	1594.6	267.6	1094.9	0.2	29.8	14.8						
Muskellunge	0.2	0.0	0.0	0.2	0.0	0.1	0.0	3.2	0.7	0.2	0.2	0.0	0.0	0.1						

Table 1.-Continued.

Species	Spring										Fall										
	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
Northern pike	0.7	0.0	0.0	0.4	0.2	0.0	0.1	0.5	1.4	0.0	0.4	0.0	0.1	0.5	1.4	0.0	0.4	0.0	0.1	0.1	0.3
North. shorthead redhorse	3.4	0.9	7.7	6.7	0.7	6.9	2.5	0.0	1.1	0.2	0.4	0.2	0.4	0.0	1.1	0.2	0.4	0.2	0.4	0.4	0.7
Pumpkinseed	0.0	0.0	0.0	0.6	0.0	0.0	0.0	2.3	77.0	0.2	4.0	0.0	1.6	0.0	77.0	0.2	4.0	0.0	1.6	1.6	0.4
Quillback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.9	0.1	1.1	0.0	0.0	0.9	0.9	0.1	1.1	0.0	0.0	0.7
Rainbow smelt	1417.5	986.2	593.0	656.1	4.3	4.0	3.8	0.2	3.6	0.9	16.5	0.2	0.0	0.2	3.6	0.9	16.5	0.2	0.0	0.0	1.0
Rock bass	26.5	36.9	43.0	17.5	5.4	1.0	12.8	66.6	94.6	18.3	81.5	0.9	89.0	92.8	94.6	18.3	81.5	0.9	89.0	89.0	92.8
Round goby	0.0	0.2	4.8	14.3	28.1	6.0	10.8	0.5	20.2	65.7	9.7	22.2	9.6	10.0	20.2	65.7	9.7	22.2	9.6	9.6	10.0
Silver lamprey	0.0	0.0	0.0	0.2	0.0	0.9	0.3	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.5	0.0	0.0	0.2	0.2	0.0
Silver redhorse	0.0	0.0	0.7	2.3	0.2	0.4	0.9	0.0	0.2	4.5	0.9	0.7	0.0	0.4	0.2	4.5	0.9	0.7	0.0	0.0	0.4
Slimy sculpin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Smallmouth bass	0.2	0.2	0.2	3.2	0.5	0.0	0.8	3.6	2.9	13.6	10.6	24.5	10.7	6.1	3.6	2.9	13.6	10.6	24.5	10.7	6.1
Spottail shiner	22.9	24.7	178.2	122.6	8.2	68.9	935.4	7.2	72.5	17.0	487.2	45.3	200.0	50.5	7.2	72.5	17.0	487.2	45.3	200.0	50.5
Threespine stickleback	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trout-perch	11.1	52.1	231.2	345.9	98.5	154.0	34.3	19.2	153.1	775.7	92.3	25.8	2.9	0.2	19.2	153.1	775.7	92.3	25.8	2.9	0.2
Tube-nose goby	0.2	0.7	0.2	0.0	0.0	0.0	0.0	0.7	1.4	0.0	0.0	0.0	0.0	0.1	0.7	1.4	0.0	0.0	0.0	0.0	0.1
Unid. Redhorse	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0
Walleye	1.6	1.6	4.5	10.4	0.9	1.7	1.2	0.7	4.3	7.2	1.3	2.7	0.9	0.8	0.7	4.3	7.2	1.3	2.7	0.9	0.8
White bass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0
White perch	0.0	0.0	1.4	0.7	0.0	0.4	13.3	0.0	4.1	16.1	11.7	7.5	0.1	0.1	0.0	4.1	16.1	11.7	7.5	0.1	0.1
White sucker	1.1	0.0	5.4	3.7	3.6	0.0	2.5	1.6	0.2	0.5	2.3	0.0	0.3	1.0	1.6	0.2	0.5	2.3	0.0	0.3	1.0
Yellow perch	265.1	785.4	1184.1	560.3	249.7	866.9	157.8	38.5	76.5	34.2	26.8	68.8	21.7	40.9	38.5	76.5	34.2	26.8	68.8	21.7	40.9

Table 2.—Catch summary for 204 trawl tows on Lake St. Clair in 2000.

Species	Total catch	Percent of total
Spottail shiner	19,420	37.4
Mimic shiner	13,145	25.3
Yellow perch	7,945	15.3
Trout-perch	2,174	4.1
Rockbass	1,654	3.1
White perch	1,466	2.8
Round goby	1,159	2.2
Alewife	935	1.8
Emerald shiner	933	1.8
Rainbow smelt	921	1.8
Bluntnose minnow	673	1.2
Smallmouth bass	374	<.1
Pumpkinseed	198	<.1
Lake sturgeon	150	<.1
Logperch	130	<.1
Johnny darter	124	<.1
Largemouth bass	62	<.1
Walleye	62	<.1
Banded killifish	56	<.1
Northern redhorse	54	<.1
Bluegill	53	<.1
White sucker	52	<.1
Gizzard shad	39	<.1
Quillback carpsucker	35	<.1
Silver redhorse	34	<.1
Freshwater drum	32	<.1
Common carp	27	<.1
Tube-nose goby	27	<.1
Brook silversides	14	<.1
Silver lamprey	10	<.1
Great lakes muskellunge	6	<.1
Northern pike	6	<.1
Longnose gar	4	<.1
White bass	4	<.1
Brindled madtom	3	<.1
Black crappie	3	<.1
Golden redhorse	2	<.1
Unid. Shiner YOY	2	<.1
Channel catfish stickleback	1	<.1
Eastern sand darter	1	<.1
Rainbow darter	1	<.1

Table 3.—Mean annual catch rates for three benthic fish species from all Lake St. Clair 10 m headrope trawls, 1996-2000 (standard error in parentheses).

Year	Mean annual catch rate		
	Johnny darter	Logperch	Round goby
1996	3.67 (0.83)	20.21 (6.44)	20.95 (2.54)
1997	2.45 (0.79)	14.04 (1.93)	14.60 (2.97)
1998	0.60 (0.25)	8.42 (2.89)	17.31 (4.99)
1999	0.28 (0.11)	1.58 (0.33)	24.07 (5.37)
2000	0.94 (0.32)	2.01 (0.52)	9.61 (2.10)

Table 4.—Angler effort, catch, and catch rates for the Lake St. Clair sport fishing diary program.

Year	Effort (rod-hours)	Number caught	Number kept	Catch per rod-hour
Walleye				
1992	5,558	1,331	1,223	0.24
1993	8,159	2,901	2,616	0.36
1994	7,808	1,983	1,878	0.25
1995	6,296	1,458	1,220	0.23
1996	6,102	1,906	1,685	0.31
1997	4,681	1,479	1,311	0.32
1998	5,599	2,481	1,947	0.44
1999	5,850	2,610	2,239	0.44
2000	4,672	1,753	1,646	0.37
Yellow perch				
1992	3,148	6,017	4,297	1.91
1993	5,212	12,076	8,715	2.32
1994	5,548	12,331	8,508	2.22
1995	4,509	10,139	5,969	2.25
1996	3,462	10,654	5,846	3.08
1997	2,701	9,661	5,773	3.58
1998	3,520	7,134	5,048	2.03
1999	2,087	6,142	3,654	2.94
2000	2,892	10,436	5,660	3.61
Smallmouth bass				
1992	2,326	1,512	608	0.65
1993	3,284	1,376	584	0.42
1994	2,484	995	352	0.40
1995	2,069	1,008	269	0.49
1996	1,537	545	190	0.35
1997	1,375	687	148	0.50
1998	1,248	495	94	0.40
1999	1,841	1,112	204	0.60
2000	1,126	1,484	126	1.22
Muskellunge				
1992	9,799	742	16	0.076
1993	13,859	1,096	19	0.080
1994	19,069	1,628	22	0.090
1995	19,587	1,434	13	0.073
1996	15,629	1,458	12	0.093
1997	15,199	1,573	11	0.103
1998	11,336	1,075	8	0.094
1999	9,370	645	5	0.069
2000	8,874	749	16	0.084

Table 5.—Frequency of occurrence of food items (expressed as percent of non-empty stomachs containing each taxa) in yellow perch diets in Lake St. Clair.

Taxa	1996		1997		1998		1999	
	June	Sept.	June	Sept.	June	Sept.	June	Sept.
Amphipod	47.0	5.3	42.7	3.2	8.1	1.9	1.3	22.5
Chironomid larvae	84.1	33.6	83.9	7.8	64.6	12.1	50.5	39.7
Chironomid pupae	38.5	3.3	8.9	0.9	28.2	2.5	16.1	8.0
Dressiana polymorpha	1.9	0.7	1.1	0.0	0.5	1.9	0.3	4.6
Decapod	1.9	7.2	0.3	11.0	1.0	7.7	0.0	1.3
Ephemeroptera	79.9	49.3	65.9	41.3	85.7	93.8	98.4	56.3
Gastropod	6.6	8.6	33.9	21.6	4.3	1.2	2.3	25.2
Hydracarina	1.1	0.7	9.7	0.5	0.0	0.3	0.3	0.7
Isopod	29.1	2.0	7.8	0.0	1.0	0.0	0.0	0.0
Pelecepod	0.3	0.0	0.5	0.5	0.5	0.9	0.0	2.0
Tricoptera	13.5	23.0	37.9	16.5	36.8	6.5	18.7	24.5
All fish species	0.8	20.4	3.2	17.0	0.5	15.2	2.0	11.9
All zooplankton	0.3	19.1	1.3	11.5	14.4	14.9	2.3	21.9
Non-empty stomachs	364	152	372	218	209	323	305	151

Table 6.—Mean length at age (mm) for yellow perch from Lake St. Clair trawls in June. Sample size in parentheses.

Age	Year						State Average
	1995	1996	1997	1998	1999	2000	
Males							
1	100 (44)	94 (33)	87 (33)	102 (4)	102 (59)	109 (6)	
2	148 (55)	126 (106)	126 (32)	132 (104)	140 (48)	129 (110)	
3	186 (9)	167 (122)	147 (172)	162 (39)	158 (64)	158 (17)	
4	208 (52)	198 (9)	181 (74)	171 (111)	179 (45)	171 (60)	
5	228 (8)	212 (56)	206 (11)	187 (43)	186 (70)	189 (57)	
6	225 (12)	226 (15)	213 (24)	209 (12)	193 (43)	200 (47)	
7	243 (3)	237 (5)	225 (3)	238 (4)	218 (4)	209 (4)	
Females							
1	100 (46)	97 (20)	90 (23)	101 (5)	106 (94)	108 (2)	
2	147 (53)	130 (119)	136 (20)	141 (70)	139 (38)	138 (147)	
3	180 (3)	177 (119)	160 (136)	167 (11)	170 (43)	171 (18)	
4	220 (14)	190 (20)	195 (56)	186 (54)	181 (29)	194 (35)	
5	228 (5)	236 (26)	211 (8)	196 (47)	209 (42)	206 (46)	
6	—	246 (16)	245 (4)	226 (17)	223 (45)	229 (24)	
7	282 (2)	237 (2)	—	253 (2)	247 (4)	234 (14)	
Sexes combined							
1	100 (90)	94 (62)	88 (61)	102 (9)	103 (163)	109 (8)	102
2	148 (108)	128 (227)	130 (52)	135 (174)	139 (86)	134 (257)	145
3	184 (12)	171 (241)	152 (308)	163 (50)	163 (107)	164 (35)	173
4	211 (66)	192 (29)	187 (130)	176 (165)	180 (74)	180 (95)	198
5	228 (13)	219 (82)	208 (19)	192 (90)	195 (112)	197 (103)	221
6	225 (12)	236 (31)	218 (28)	219 (29)	208 (88)	210 (71)	239
7	258 (5)	239 (7)	229 (4)	243 (6)	233 (8)	228 (18)	267

Table 7.—Catch rate by age for yellow perch in June index trawl tows on Lake St. Clair.

Year Class	1993	1994	1995	1996	1997	1998	1999	2000
1984	0.06	0.08	0.27	—	—	—	—	—
1985	0.00	0.23	0.00	—	—	—	—	—
1986	0.18	0.08	0.00	—	—	—	—	—
1987	0.00	0.62	0.27	0.13	—	—	—	—
1988	0.90	1.63	0.94	0.27	0.33	—	—	—
1989	2.80	3.68	2.15	1.24	0.33	—	—	—
1990	6.12	4.12	13.41	5.18	1.28	0.30	—	—
1991	51.3	47.01	32.09	18.69	12.90	1.78	0.60	—
1992	1.00	3.39	5.81	11.49	9.56	10.38	1.14	0.07
1993	—	56.28	125.80	171.41	113.67	43.00	54.27	1.50
1994	—	—	166.16	293.17	348.22	88.08	20.61	8.26
1995	—	—	—	21.42	40.66	26.39	32.21	12.31
1996	—	—	—	—	33.26	77.10	70.29	11.26
1997	—	—	—	—	—	2.66	37.63	5.48
1998	—	—	—	—	—	—	650.15	114.11
1999	—	—	—	—	—	—	—	4.80