

American eel abundance indicators in Canada

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ABSTRACT

This report compiles data that are linked to abundance and abundance trends of American eels (*Anguilla rostrata*) in Canada. Eels were historically present in all coastal and accessible inland waters of eastern Canada up to the mid-Labrador coast. Eels are or have been fished commercially in much of the St. Lawrence River system and tidal waters of the southern Gulf of St. Lawrence. Elsewhere in eastern Canada eels are fished only in a minority of the habitat they occupy. Reported data series include landings, landed values, catch per unit effort from commercial and research fisheries, movement counts from an eel ladder, fish fences, fishway traps, and rotary screw traps, elver series from ramp and habitat traps, estimated densities from electrofishing, capture-mark-recapture and glass bottom boat surveys, and age frequency distributions. Data coverage is best in the St. Lawrence River system and poorest in Newfoundland. The St. Lawrence River and the southern Gulf of St. Lawrence have long-term yellow eel abundance indices, but only the St. Lawrence River has long-term silver eel indices. All areas have at least some age structure data.

RÉSUMÉ

Ce rapport compile des données qui sont liées à l'abondance et aux tendances en abondance de l'anguille d'Amérique (*Anguilla rostrata*) au Canada. L'anguille était historiquement présente dans toutes les eaux côtières et les eaux accessibles de l'intérieur de l'est du Canada jusqu'à la côte moyenne du Labrador. Les anguilles sont ou ont été pêchées dans une grande partie du fleuve Saint-Laurent et dans les eaux tidales du sud du Golfe du Saint-Laurent. Ailleurs dans l'est du Canada l'anguille est pêchée seulement dans une minorité de l'habitat qu'elle occupe. Les séries présentées incluent des débarquements, des valeurs des débarquements, des prises par unité d'effort des pêches commerciales et de la recherche, des décomptes de mouvement par une passe-échelle, par des clôtures à poisson, et par des trappes rotatives, des séries de civelles des trappes à rampe et à l'habitat, des densités estimées par la pêche électrique, la capture-marquage-recapture et des relevés d'un bateau muni d'un fond de vitrine, et des distributions des fréquences d'âge. La couverture des données est la plus forte dans le système du fleuve Saint-Laurent et la plus faible à Terre-Neuve. Le système du fleuve Saint-Laurent et le sud du Golfe du Saint-Laurent ont des indices d'abondance à long terme pour anguilles jaunes, mais seulement le fleuve Saint-Laurent a des indices à long terme pour les anguilles argentées. Toutes les régions ont au moins quelques données sur la structure d'âge.

INTRODUCTION

The American eel is the West Atlantic representative of the worldwide genus *Anguilla*, whose members spawn in ocean waters, migrate to coastal and inland continental waters to grow, and then return to ocean spawning sites to reproduce and die. Several *Anguilla* species have shown sharp population declines, spurring international conservation concerns (Dekker et al. 2003, Tatsukawa 2003).

Concerns have also been raised about American eel (*A. rostrata*) populations. The collapse of the formerly large eel population of Lake Ontario, and decreasing indicators elsewhere, have been taken as evidence of a species-wide decline (Haro et al. 2000, Richkus and Whalen 2000, Casselman 2003). Overfishing, obstacles to migration, turbine mortality in hydro dams, pollution, habitat degradation, and ocean changes have been proposed as reasons for the population changes, but no clear cause has been identified (Castonguay et al. 1994a,b; COSEWIC 2006).

This paper assembles time series which are linked to abundance or abundance trends of American eels in Canada. Eels are managed provincially in Ontario and Quebec and federally in the Atlantic Provinces. Data are derived primarily from the Ontario Ministry of Natural Resources (OMNR) and the Quebec Ministère des ressources naturelles et de la faune (MNRF), and from the Department of Fisheries and Oceans (DFO) in the Atlantic Provinces. In the Maritime Provinces, waters draining into the Gulf of St. Lawrence are under the jurisdiction of DFO Gulf Region, and waters draining into the Bay of Fundy and the Atlantic Ocean are under the jurisdiction of DFO Maritimes Region. In this paper the part of the Maritime Provinces which drain into the Bay of Fundy and the Atlantic Ocean is termed the Scotia-Fundy area.

This compilation is not exhaustive. At least two major groups of data are not treated; these are distribution and catch rates of American eels in Newfoundland as reported by Vladykov (1970), Fletcher and Anderson (1973), Brennan (1976), and Mullins (1980), and eel landings from the 19th century as compiled in Sessional Papers of the Parliament of Canada and of colonial legislatures.

CANADIAN RANGE

The historic Canadian range of the American eel encompasses all accessible fresh water, estuaries and coastal marine waters connected to the Atlantic Ocean, up to Hamilton Inlet - Lake Melville on the mid-Labrador coast (Scott and Crossman 1973, COSEWIC 2006) (Fig. 1). Continental shelves are used by juvenile eels arriving from the spawning grounds, and by silver eels returning to the spawning grounds. The presence of eels in electrofishing surveys in the English River, near Postville, Labrador (D. Reddin, DFO, pers. comm.) indicates that the species sometimes strays north of Hamilton Inlet-Lake Melville. Postville is about 100 km north of Hamilton Inlet. Niagara Falls is the natural limit of the American eel's distribution in the Great Lakes. Occurrences reported in the upper Great Lakes watersheds (Lakes Erie, Huron and Superior) are the result of recent dispersal through the Erie and Welland Canals (Scott and Crossman 1973).

American eels are or have been fished commercially in much of the St. Lawrence River system and tidal waters of the southern Gulf of St. Lawrence (Figs. 2-3). Elsewhere in eastern Canada eels are fished in only in a minority of the habitat they occupy. Eels were commercially exploited in the Ontario portions of Lake Ontario and the upper St. Lawrence River until these fisheries were closed in 2004 (Fig. 2). Commercial fishing zones in Quebec are located on the St. Lawrence River upstream and downstream of Montreal, and also in the St. Lawrence River estuary (Figs. 2-3). Most commercial fishing in the Atlantic Provinces occurs in the southern Gulf of St. Lawrence, New Brunswick's Saint John River, various locations on the Atlantic drainages of the Maritime Provinces, and various locations in Newfoundland (Fig. 3). There is no eel fishing in the north shore of the Gulf of St. Lawrence, nearly all of the Gaspé Peninsula, most of the fresh waters draining into the southern Gulf of St. Lawrence, and most of the coastal waters of Newfoundland.

ONTARIO

Eels in Ontario are part of the Upper St. Lawrence River - Lake Ontario population, whose location is the most distant of any major rearing area from the American eel's spawning grounds. The principal historic areas used by eels in Ontario are the main stem of the St. Lawrence River, the eastern part of Lake Ontario, and the Ottawa River (Figs. 2 and 4, Verreault et al. 2004). Accessible tributaries to these water bodies were also occupied.

Eels were present in eastern Ontario waters in prehistoric time (from archaeological digs) and in early historic time (from contemporary reports) (Casselman 2003). Data from these sources suggest that eels were abundant and were a significant food source for native peoples (Junker-Andersen 1988, Casselman 2003).

Population status, fisheries, and management of eels in Ontario waters have been described by Hurley (1972, 1973), Kolenosky and Hendry (1978, 1982), Casselman et al. (1997a,b), Stewart et al. (1997), Casselman (2003), Marcogliese and Casselman (in press), and Mathers and Stewart (in press).

Table 1 and Fig. 5 present reported landings of American eels in Ontario. Landings have been influenced by market and contaminant considerations, as indicated in Table 1. The commercial fishery for eel in Ontario was closed in 2004. Table 2 and Fig. 6 present catch, effort, and catch per unit effort (CPUE) of setline (also known as hookline), hoopnet, and trapnet fisheries for American eels in eastern Lake Ontario, the Bay of Quinte, and the upper St. Lawrence River (Kolenosky and Hendry 1982). Table 3 and Fig. 7 present mean eels per haul from a trawl survey conducted in the Bay of Quinte, an arm of Lake Ontario, since 1972, and mean catch rates of an electrofishing survey conducted in eastern Lake Ontario since 1984. Note that the Quinte trawl results are in the form of arithmetic means, in contrast to the geometric means presented by Casselman et al. (1997b).

Eels moving up the St. Lawrence River towards Lake Ontario pass the Moses-Saunders hydroelectric dam between Cornwall, Ontario, and Massena, New York. This dam was constructed in 1954-1958. Eels

accumulated below this dam in such large numbers that they interfered with maintenance work when turbines were closed for cleaning (Whitfield and Kolenosky 1978). This prompted dam operators to construct an eel ladder on the Canadian side of the dam, which came into service in August 1974. This ladder was replaced with a new structure in 1980 (Marcogliese and Casselman in press). A ladder on the U.S. side of the dam came into service in summer 2006. The ladder on the Canadian side releases eels directly into the headpond. The ladder on the U.S. side leads into a pipe which releases eels 300 m upstream from the dam. This is intended to reduce the proportion of eels that ascend the ladder and then fall back through the dam. The Canadian data series has traditionally been referred to as the Moses-Saunders index. In this paper it is called the Saunders index, to distinguish it from the new U.S. series, which is called the Moses index.

Table 4 and Fig. 7 show mean daily counts of eels ascending the Saunders ladder during the 31 day summer peak migration period (Casselman et al. 1997a, Casselman 2003, Marcogliese and Casselman in press). Historically, the great majority of eels ascending the ladder did so in summer, but in recent years a substantial portion of the annual run has occurred in fall (Table 4, Fig. 7).

Table 5 presents age frequency distributions of eels sampled in Ontario waters, and also at the Moses Ladder on the U.S. side of the Moses-Saunders dam. Eels ascending the Saunders ladder had a mean age of 9.23 years in 1974 and 6.02 years in 1975 (Table 5). The higher mean age in 1974 vs. 1975 probably reflects the accumulation of eels which had been impeded from ascending above the dam before the opening of the ladder in 1974. Fig. 8. plots length frequency distributions of eels ascending the Saunders ladder in 1975-2006.

QUEBEC

Eels use Quebec as rearing habitat, and also use the St. Lawrence River as a migratory corridor to reach upstream rearing habitat, notably Lake Ontario and Lake Champlain. Eel status in Quebec has been reviewed by Axelsen (1997), Tremblay (1997) and Caron et al. (2006, 2007).

No time series of glass eels or elvers is available for Quebec waters. Dutil et al. (1989) documented glass eel and elver influx into the estuary of the Petite Rivière de la Trinité between mid June and the end of July. Glass eels or elvers have also been documented in June/July at Neuville, 25 km upstream from the Quebec City (Vladykov 1955), the Grande-Rivière-Blanche at St.-Ulric near Matane (Vladykov and Liew 1982), the Rivière Trinité and the nearby Petite Rivière Godbout (Vladykov 1966), and the Matamek River (Dolan 1975).

Eel fisheries are prosecuted in Quebec at the yellow and silver stages. Reported landings are presented in Table 6 and Fig. 9. There is a small eel fishery in the Magdalen Islands. There are two eel fishing permits for the south shore of the Gaspé Peninsula, but it is not known if these permits are active.

Migrating eels have been counted or estimated in the Petite Rivière de la Trinité, the Rivière Sud-Ouest, the Rivière Richelieu, the Rivière Saint-Jean, the

Beauharnois Dam on the St. Lawrence, and the St. Lawrence estuary (Table 7, Fig. 10) (data from Caron et al. 2006, 2007). High counts in the first two years of operation of the Chambly fish ladder on the Richelieu may have been due to the accumulation of eels below the dam prior to ladder construction. Salmonid populations are monitored by electrofishing in many Quebec rivers. Eel capture data from these surveys are reported in Tables 8-11 and Fig. 11. Because of low eel captures, it is generally not possible to estimate densities by the depletion method. Data are therefore presented as summed counts over three sweeps per 100 m².

Number of eels caught in eel traps in the St. Lawrence in the Quebec City area (Fig. 12) are presented in Table 12 and Fig. 13 (data from de Lafontaine et al. in press). The experimental trap at Saint-Nicolas (also known as the Parc Aquarium experimental trap) primarily captures yellow eels in summer and silver eels during fall. Table 13 and Fig. 14 present effort and CPUE from two eel fishers at Rivière-Ouelle in the St. Lawrence estuary. Table 14 and Fig. 15 present effort and CPUE from commercial fisheries in the estuary, including those of Kamouraska County, where approximately 80% of eel fishing in the estuary is located (data from Axelsen 1997 and Verreault et al. 2003).

Lemire et al. (1978) and Pilote (1989) conducted extensive eel surveys on the north shore of the Gulf of St. Lawrence in 1978-1985 (Fig. 16). Catch, CPUE, length, and weight from this work are presented in Table 15. Lemire et al. (1978) provided detailed maps of study sites visited in 1978, but Pilote (1989) did not provide maps or coordinates for locations studied in 1979-1985. Some coordinates in Table 15 were derived by searching for place names given by Pilote (1989) in the National Atlas of Canada (www.atlas.nrcan.gc.ca). It is possible that some of these coordinates are for different localities than those visited by Pilote (1989).

Age frequency distributions of eels sampled in Quebec are presented in Table 16.

SOUTHERN GULF OF ST. LAWRENCE

American eels occupy fresh, brackish, and sheltered salt waters of Prince Edward Island and the Gulf drainages of New Brunswick and Nova Scotia. Smith and Saunders (1955), Eales (1966), Taylor (1979), Hutchison and Taylor (1980), Hutchison (1982), Locke et al. (1995), Chaput et al. (1997), and Paulin (1997) presented data on the distribution, status, and fisheries for American eels in this region. Cairns et al. (2007) presented a detailed compilation of southern Gulf abundance indicators. Landings of commercial fisheries in the southern Gulf region, which primarily target yellow eels in estuaries and bays, are presented in Table 17 and Fig. 17. Table 18 and Fig. 18 present catch rates of legal and sublegal eels from data recorded by volunteer logbook fishers on Prince Edward Island. Table 19 presents eel catch rates from commercial and research fishing in the southern Gulf. Tables 20-22 and Figs. 19-21 present eel densities derived from electrofishing surveys in the southern Gulf. For the Miramichi River, New Brunswick, the database for 1952-1969 was reconstructed using original paper records. Some

densities calculated from the new database differ from those reported by Cairns et al. (2007).

Table 23 presents eel densities derived from electrofishing, capture-mark-recapture, and glass bottom boat (GBB) surveys. GBB surveys were conducted at night from a 3.95 m boat equipped with a bottom window and underwater lights. Area surveyed was calculated as the product of transect width and length. Eel densities were estimated as eels counted within transect divided by survey area. Table 24 and Fig. 22 present counts of eels under 9.0 cm long at ramp and habitat traps at two sites on the central north shore of Prince Edward Island. Otolith aging indicates that 9.0 cm is the approximate cut-off between young-of-the-year and older eels in this area (Cairns unpubl.). Habitat trap catch rates are presented as catch per haul, rather than catch per gear-day, because habitat traps do not retain eels that enter them (Silberschneider et al. 2001). Table 25 and Fig. 23 present mean eel counts at interceptory fishing gears in the southern Gulf. Table 26 presents age-frequencies of eels in the southern Gulf.

SCOTIA-FUNDY

American eel distribution, fisheries, and status in the Scotia-Fundy area have been described by Smith and Saunders (1955), Eales (1966), Jessop (1975, 1982, 1996), Taylor (1979), Hutchison and Taylor (1980), Hutchison (1982), and Stevens (1997). American eels are fished as elvers and as yellow and silver eels in Scotia-Fundy (Fig. 24). This is the only region of Canada where an elver fishery operates (Jessop 1995). Landings, derived from a logbook system, are presented in Table 27-28 and Fig. 25. Table 29 and Fig. 26 present elver run sizes measured at the mouths of East River-Sheet Harbour and East River-Chester, Nova Scotia (Jessop 2000a,b; 2003). Electrofishing surveys are conducted in Scotia-Fundy rivers to assess salmonid populations (Gibson et al. 2003, Amiro et al. 2006, Jones et al. 2006). Because eel catches in these surveys are generally insufficient to allow population estimates by the depletion method, results are presented as the sum of eels counted per 100 m² (Tables 30 and 31, Fig. 27). Some electrofishing sessions in which eels were not recorded may have been deleted from files in the Nova Scotia part of Scotia-Fundy. This would have the effect of upwardly biasing mean counts per 100 m². Table 32 presents age frequencies of American eels in the Scotia-Fundy area.

NEWFOUNDLAND AND LABRADOR

Landings reported for the American eel fishery in Newfoundland and Labrador (Fig. 28) are presented in Table 33 and Fig. 29. Landings in this province are derived from a purchase slip system. Reported landings differ substantially from those reported in a logbook system (G. Vienott, DFO, St. John's, pers. comm.). Table 34 presents catch rates of American eels in research fyke nets set by Dietrich (2001) in Western Brook, near the outlet of Western Brook Pond, in Gros Morne National Park, Newfoundland. Table 35 presents age frequency distributions of American eels sampled in Newfoundland.

Detailed data on distribution and research catch rates of American eels in Newfoundland are presented

by Vladykov (1970), Fletcher and Anderson (1973), Brennan (1976), and Mullins (1980). Bruce (1982) and Knight (1997) describe aspects of American eel status and fisheries in Newfoundland and Labrador.

CANADA AND INTERNATIONAL

Table 36 and Fig. 30 present reported American eel landings for Canada and the United States. Table 37 and Fig. 31 present values of eel landings in Canada, and Table 38 and Fig. 32 present mean price per kg of eel landings. Fig. 33 presents a schematic summary of Canadian data sets presented in this report, by eel stage and region. Eels from the St. Lawrence River system are well covered with indices for the yellow and silver stages, but lack indices for glass eels/elvers. The St. Lawrence River and the southern Gulf have long-term yellow eel abundance indices, but only the St. Lawrence River has long-term silver eel indices. Newfoundland is the most data-poor area of the American eel's Canadian range, and has no data sets that indicate abundance trends or absolute abundance at any life stage. All areas have at least some age structure data. Data coverage in eastern Quebec, the southern Gulf of St. Lawrence, and Scotia-Fundy is intermediate between that of the St. Lawrence River system and Newfoundland.

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Table 2. Catch, effort, and catch per unit effort in setline (hookline), hoopnet, and trapnet fisheries for American eels in Ontario, 1959-1983. Eastern Lake Ontario data are from Statistical Districts (SDs) 3 and 6 (Fig. 4). Bay of Quinte data are from SD 4. Upper St. Lawrence River data are from SD 5.

Year	Setline fishery						Hoopnet fishery						Trapnet fishery					
	Eastern L. Ontario			Bay of Quinte			Eastern L. Ontario			Bay of Quinte			Upper St. Lawrence R.			Bay of Quinte		
	Catch (kg)	Effort (100s of hook- line hrs)	Catch (kg)	Effort (100s of hook- line hrs)	Catch (kg)	Effort (100s of hook- line hrs)	Catch (kg)	Effort (number of net lifts)	Catch (kg)	Effort (number of net lifts)	Catch (kg)	Effort (number of net lifts)	Catch (kg)	Effort (number of net lifts)	Catch (kg)	Effort (number of net lifts)	Catch (kg)	Effort (number of net lifts)
1959	10,205	538	18.97	14,078	2,071	6.80	8,493	1,549	5.48	6,544	5,054	1.29	2,243	1,307	1.72			
1960	14,030	826	16.99	13,464	1,550	8.69	5,647	1,800	3.14	4,293	4,691	0.92	4,843	2,110	2.30			
1961	19,174	968	19.81	19,194	1,934	9.92	3,835	1,298	2.95	5,196	4,816	1.08	5,368	1,563	3.43			
1962	20,249	1,263	16.03	15,218	1,600	9.51	2,610	1,242	2.10	4,624	4,632	1.00	4,837	1,868	2.59			
1963	26,192	1,992	13.15	23,206	2,696	8.61	3,285	1,240	2.65	6,138	6,606	0.93	6,219	2,989	2.08			
1964	44,513	2,886	15.42	35,131	3,903	9.00	6,188	2,022	3.06	7,266	5,847	1.24	5,338	2,032	2.63	141	4	35.25
1965	32,340	1,958	16.52	18,564	2,701	6.87	6,547	1,931	3.39	8,783	6,066	1.45	3,013	1,911	1.58	976	62	15.74
1966	17,145	1,370	12.51	10,178	2,422	4.20	8,824	2,195	4.02	7,473	5,836	1.28	2,620	1,780	1.47	3,119	50	20.79
1967	17,836	1,297	13.75	9,053	1,889	4.79	7,334	3,856	1.90	8,437	5,286	1.60	3,876	1,988	1.95	4,727	320	14.77
1968	17,014	1,469	11.58	17,984	2,598	6.92	15,020	4,423	3.40	10,840	6,907	1.57	6,800	2,898	2.35	8,261	754	10.96
1969	18,501	1,230	15.04	26,346	4,117	6.40	9,993	3,004	3.33	7,147	6,037	1.18	4,810	2,287	2.10	8,381	747	11.22
1970	9,389	622	15.09	24,379	3,478	7.01	8,098	2,763	2.93	6,405	5,389	1.19	6,850	2,016	3.40	8,118	555	14.63
1971	16,281	1,003	16.23	20,380	3,242	6.29	11,383	2,110	5.39	6,103	3,979	1.53	5,586	1,410	3.96	12,639	567	22.29
1972	57,623	2,489	23.15	22,271	2,938	7.58	4,868	1,870	2.60	6,403	4,624	1.38	4,198	1,979	2.12	16,159	630	25.65
1973	28,641	2,057	13.92	21,359	2,523	8.47	5,518	3,660	1.51	8,288	5,528	1.50	5,621	3,329	1.69	8,185	540	15.16
1974	40,036	2,418	16.56	21,100	2,404	8.78	7,029	3,628	1.94	8,930	4,606	1.94	3,677	2,160	1.70	15,955	391	40.81
1975	73,952	4,537	16.30	27,370	3,251	8.42	14,990	4,436	3.38	9,194	5,025	1.83	7,392	3,119	2.37	18,129	488	37.15
1976	77,551	5,230	14.83	24,349	1,992	12.22	7,379	3,511	2.10	8,434	4,809	1.75	4,084	2,680	1.52	21,138	1,250	16.91
1977	94,812	5,500	17.24	20,333	2,000	10.17	11,200	4,510	2.48	10,628	5,712	1.86	5,169	2,345	2.20	18,165	1,040	17.47
1978	128,798	7,568	17.02	29,611	3,095	9.57	7,999	7,349	1.09	10,808	9,310	1.16	4,079	1,480	2.76			
1979	108,107	8,685	12.45	37,449	3,301	11.34	7,760	7,187	1.08	13,540	10,856	1.25	8,334	2,287	3.64			
1980	79,884	9,836	8.12	29,576	4,054	7.30	7,402	5,144	1.44	14,063	12,059	1.17	5,963	1,954	3.05			
1981	42,811	5,061	8.46	17,436	2,976	5.86	3,776	4,782	0.79	16,373	14,872	1.10	5,224	3,013	1.73			
1982	2,166	468	4.63	6,378	1,144	5.58	2,192	4,949	0.44	6,105	13,639	0.45	3,675	3,095	1.19			
1983	22,934	2,425	9.46	11,346	1,748	6.49	4,986	10,967	0.45	6,081	14,805	0.41	4,688	5,194	0.90			

Table 3. American eel trawl and electrofishing indices for Lake Ontario.

Year	Bay of Quinte, mean eels per trawl	Eastern L. Ontario basin, eels electrofished per hour
1972	5.231	
1973	4.250	
1974	2.000	
1975	5.250	
1976	3.083	
1977	1.917	
1978	0.667	
1979	2.667	
1980	0.500	
1981	1.000	
1982	2.500	
1983	0.333	
1984	0.500	85.60
1985	0.833	63.10
1986	1.833	82.90
1987	2.111	89.00
1988	0.556	68.80
1989	1.088 ^a	93.00
1990	0.417	64.10
1991	1.125	38.50
1992	1.125	44.40
1993	0.705	22.70
1994	2.042	30.00
1995	0.125	10.50
1996	0.583	14.90
1997	0.135	7.30
1998	0.160	12.90
1999	0.042	21.60
2000	0.083	9.37
2001	0.021	6.82
2002	0.042	3.36
2003	0.000	0.65
2004	0.000	0.52
2005	0.000	1.23
2006	0.000	0.49

^aSurvey data are unavailable for 1989. The number given is the mean of the values for the 4 preceding and the 4 succeeding years.

Table 4. The Saunders ladder index of eel recruitment to the upper St. Lawrence River. Data for 1974-1995 from Casselman et al. 1997a. Data for 1997-2006 from Lake Ontario Management Unit, OMNR.

Year	Number of days ladder operating	Estimated total annual passage	31 day peak summer period						Mean eels per day during the 31 day peak fall period	
			Start	End	Number of days	Eels per day				
						Mean	95% CI	CV		
1974 ^a	33	130,000	12 Aug	21 Aug	7	7,934	2,400	32.7	42.7	
1975 ^a	88	936,128	14 Jul	13 Aug	30	14,403				
1976	98	659,478	20 Jul	19 Aug	31	10,363	514	13.5	48.7	
1977 ^b		966,800				20,013				
1978 ^b		794,600				16,448				
1979	91	869,135	1 Aug	31 Aug	31	18,977	657	9.4	67.7	
1980 ^c	70	253,758	21 Jul	20 Aug	20	9,046	3,196	75.5	71.3	
1981	105	748,724	15 Jul	14 Aug	31	13,796	1,459	28.8	57.1	
1982	100	1,013,570	18 Jul	17 Aug	31	27,489	1,992	19.8	84.1	
1983	94	1,313,570	16 Jul	15 Aug	31	26,426	1,088	11.2	62.4	
1984	75	647,480	20 Jul	19 Aug	31	15,051	1,458	26.4	72.1	
1985	110	935,320	24 Jul	23 Aug	31	18,510	453	6.7	61.2	
1986	95	230,570	29 Jul	28 Aug	31	5,380	551	28.0	72.3	
1987 ^d	125	465,364	3 Jul	2 Aug	28	9,277	818	22.7	55.8	
1988	78	213,187	10 Jul	9 Aug	31	5,442	765	38.3	79.1	
1989	87	258,622	10 Jul	9 Aug	31	5,795	905	42.6	69.5	
1990	85	121,907	9 Jul	8 Aug	31	3,096	367	32.3	78.7	
1991	84	40,241	14 Jul	13 Aug	30	1,226	344	75.1	91.4	
1992	101	11,534	18 Jul	17 Aug	31	277	69	67.3	74.3	
1993	60	8,289	31 Jul	30 Aug	31	232	36	42.2	86.8	
1994	86	163,518	8 Jul	7 Aug	31	4,998	1,389	75.8	94.8	
1995 ^e	92	35,076	17 Jul	16 Aug	31	671	185	75.2	59.3	
1996 ^f					31	405				
1997		6,117			31	144	67			49
1998	34	3,432	2 Jul	1 Aug	31	57				36
1999	149	1,860	19 Jun	19 Jul	31	27				19
2000	140	2,919	18 Jul	17 Aug	31	54				12
2001	159	944	19 Jun	19 Jul	31	21				7
2002	143	2,663	7 Jul	6 Aug	31	55				17
2003	143	2,835	7 Jul	6 Aug	31	40				20
2004	143	11,385	11 Jul	10 Aug	31	54				274
2005	146	14,891	30 Jun	1 Aug	31	228				160
2006	134	17,144	11 Jul	12 Aug	31	224				

^aMean daily passage, based on a 31-day peak period estimated from the mean dates demarcating the 95% confidence limits for the mean summer peak period over the period 1974-1995.

^bCounts are not available for these years. Mean daily passage is estimated using the regression equation:

$$Y_{(\text{mean for the peak period})} = 0.0207X_{(\text{estimated total annual passage})}$$

^cConstruction of a new eel ladder resulted in reduced total counts.

^dInstallation of an electronic eel counter between 27 July and 2 August.

^eCounts are not available. The value given for 1996 is the mean of the values for 1995 and 1997.

Table 5. Mean ages and age frequency distributions of American eels in Ontario and in St. Lawrence River waters of New York State. Eels are considered to be age 0 in their year of arrival in continental waters.

System	Lake Ontario	Lake Ontario, St. Lawrence R. R.	St. Lawrence Upper Iroquois	St. Lawrence R. Saunders	St. Lawrence R. Dam	St. Lawrence R. River								
Site	Eastern Lake	Eastern Lake,	Upper St. Law. R.	St. Law. R.	Dam	River	Ascending	Ascending	Ascending	Dam	River	River	Ascending	Ascending
Habitat Stage	Lake Yellow	Lake Yellow	Lake Silver	Silver	River	River	juveniles	juveniles	juveniles	River	River	River	juveniles	juveniles
Year	1958-1966	mid 1990s	1960s	2002	1974	1975	1981	1986	1993	2000	2003	2004	2004	
Gear Exploited	Various	Electrofishing	Yes	Fixed trawl	Ladder trap	Ladder trap	Ladder trap	Ladder trap	Ladder trap	Ladder trap	Ladder trap	Ladder trap	Ladder trap	
Source	Yes	Casselman 2003,	Yes	Tremblay 2004, unpubl.	Liew 1976	Liew 1976	Liew 1976	Liew 1976	Greer 2008	Casselman 2003,	Greer 2008	Casselman et al. 1997	Greer 2008	
Length (cm)		83.8	100.1	6.6		33.2							49.3	
Mean				30			533						65	
SD														
N														
Age (years)														
Mean	11.5	17.8	19.7	21.0	9.2	6.0	9.0	7.8	11.9	8.8	10.1	8.4		
SD	2.7			4.0	2.0	1.7								
N	195			30	322	533								
0	1	2	3	4	5	6	7	8	9	10	11	12	13	
1	2	3	3	4	5	4	7	10	12	10	11	12	13	2
2	2	3	3	4	5	4	7	8	10	8	9	10	11	3
3	2	3	3	4	5	4	7	9	11	9	10	11	12	1
4	2	3	3	4	5	4	7	10	12	10	11	12	13	4
5	2	3	3	4	5	4	7	10	12	10	11	12	13	3
6	2	3	3	4	5	4	7	10	12	10	11	12	13	2
7	2	3	3	4	5	4	7	10	12	10	11	12	13	1
8	2	3	3	4	5	4	7	10	12	10	11	12	13	0
9	2	3	3	4	5	4	7	10	12	10	11	12	13	0
10	2	3	3	4	5	4	7	10	12	10	11	12	13	0
11	2	3	3	4	5	4	7	10	12	10	11	12	13	0
12	2	3	3	4	5	4	7	10	12	10	11	12	13	0
13	2	3	3	4	5	4	7	10	12	10	11	12	13	0
14	2	3	3	4	5	4	7	10	12	10	11	12	13	0
15	2	3	3	4	5	4	7	10	12	10	11	12	13	0
16	2	3	3	4	5	4	7	10	12	10	11	12	13	0
17	2	3	3	4	5	4	7	10	12	10	11	12	13	0
18	2	3	3	4	5	4	7	10	12	10	11	12	13	0
19	2	3	3	4	5	4	7	10	12	10	11	12	13	0
20	2	3	3	4	5	4	7	10	12	10	11	12	13	0
21	2	3	3	4	5	4	7	10	12	10	11	12	13	0
22	2	3	3	4	5	4	7	10	12	10	11	12	13	0
23	2	3	3	4	5	4	7	10	12	10	11	12	13	0
24	2	3	3	4	5	4	7	10	12	10	11	12	13	0
25	2	3	3	4	5	4	7	10	12	10	11	12	13	0
26	2	3	3	4	5	4	7	10	12	10	11	12	13	0
27	2	3	3	4	5	4	7	10	12	10	11	12	13	0
28	2	3	3	4	5	4	7	10	12	10	11	12	13	0
29	2	3	3	4	5	4	7	10	12	10	11	12	13	0
30	2	3	3	4	5	4	7	10	12	10	11	12	13	0
31	2	3	3	4	5	4	7	10	12	10	11	12	13	0
32	2	3	3	4	5	4	7	10	12	10	11	12	13	0

Table 5 (continued)

System	St.	St.	St.	St.	Ottawa
Site	Lawrence R. Saunders Dam	Lawrence R. Moses Dam	Lawrence R. Saunders Dam	Moses- River	R. Chats Falls
Habitat	River	Ascending juveniles	Ascending juveniles	Upstream migrants	River
Year	2006	2006	2006	2006	1963-1964
Gear	Ladder trap	Ladder trap	Ladder trap	Ladder trap	Trap
Exploited	K. Oliveira unpubl.	K. Oliveira unpubl.	K. Oliveira unpubl.	K. Oliveira unpubl.	No
Source					Hurley 1972
Length (cm)					
Mean	34.8	38.9	35.4		
SD	5.1	5.0	5.2		
N	38	6	44		
Age (years)					
Mean	6.6	6.7	6.6	4.5	
SD	1.6	2.0	1.6	2.2	
N	38	6	44	17	
0					
1				3	
2				5	
3				2	
4		1	1	1	
5		8	3	11	1
6		14	1	14	2
7		5	6	6	2
8		4	4	4	1
9		5	2	7	1
10				1	
11					
12					
13					
14					
15					
16					
17					
18					
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22					
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24					
25					
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27					
28					
29					
30					
31					
32					

Table 6 (continued)

Year	Lake	St.	Ottawa	Richelieu	Lake Saint-Pierre			St. Lawrence estuary						Quebec totals				
	Saint-Francis	Lawrence	River	R.	Yellow	Silver	Total	Riverine estuary			Middle estuary	Maritime estuary	Total	Total	Yellow	Silver	Total	
	Yellow	Montreal		Silver				Yellow	Silver	Total	Silver	Silver						
1980	0.9				66.3	24.0	52.2	76.2	0.4	25.5	25.9	314.6	111.5	451.7	452.1	25.2	570.2	595.4
1981	2.1				72.9	28.4	61.7	90.1	0.5	33.0	33.5	320.6	80.9	434.5	434.9	30.9	569.1	600.1
1982	1.6				48.9	22.5	49.0	71.6	0.4	27.1	27.5	153.3	78.4	258.8	259.2	24.6	356.6	381.2
1983	0.9				33.0	23.4	50.8	74.2	0.3	22.5	22.8	174.9	46.0	243.3	243.7	24.6	327.2	351.7
1984	2.4				21.9	28.2	61.3	89.5	0.2	16.1	16.4	253.2	28.4	297.7	297.9	30.8	380.9	411.7
1985					47.5							249.0	93.0	342.0	342.0	0.0	389.5	389.5
1986	4.6	0.0	0.1		48.1	22.0	47.8	69.8	0.8	55.6	56.4	239.0	22.4	317.0	317.8	27.4	412.9	440.3
1987	4.2	0.0	0.1		36.7	15.7	34.1	49.8	0.8	53.1	53.9	243.3	31.2	327.6	328.4	20.7	398.5	419.1
1988	5.2	0.0	0.2		33.3	13.9	30.2	44.1	0.8	59.1	59.9	255.5	26.2	340.8	341.6	19.9	404.2	424.1
1989	9.2	0.0	0.3		25.9	17.8	38.7	56.6	0.8	56.9	57.8	253.0	27.7	337.6	338.4	27.8	402.3	430.1
1990	15.7	0.0	0.2		19.0	16.8	36.6	53.4	1.3	88.8	90.0	276.2	19.4	384.3	385.6	33.8	439.9	473.7
1991	12.7	1.3	0.1		21.9	15.8	34.3	50.1	0.7	49.5	50.2	235.3	23.0	307.9	308.6	30.5	364.1	394.6
1992	6.8	3.2	0.1		19.7	13.7	29.7	43.4	1.0	68.6	69.6	158.5	21.2	248.2	249.2	24.7	297.6	322.3
1993	2.2	1.5	0.6		14.1	16.5	35.8	52.2	0.8	55.3	56.1	181.6	22.2	259.1	259.9	21.0	309.0	330.0
1994	5.2	0.0	0.2		8.4	14.6	31.7	46.3	0.9	60.2	61.1	144.7	16.5	221.4	222.3	20.7	261.5	282.3
1995	10.0	0.0	0.0		12.6	11.7	25.5	37.2	1.1	74.7	75.7	120.1	22.6	217.4	218.4	22.8	255.4	278.2
1996	14.1	0.0	0.1		2.1	14.4	31.3	45.8	0.8	55.7	56.5	93.9	13.3	162.9	163.7	29.3	196.3	225.6
1997	15.6	0.3	0.7		4.7	10.2	22.2	32.4	0.7	47.9	48.6	88.5	11.4	147.8	148.5	26.7	174.7	201.4
1998	10.6	0.2	0.3		0.0	10.9	23.7	34.5	0.8	54.0	54.7	110.6	16.6	181.1	181.9	22.5	204.8	227.3
1999	10.0	0.7	0.3		0.0	8.2	17.7	25.9	0.7	46.4	47.0	77.7	16.0	140.1	140.8	19.6	157.9	177.4
2000	23.3	0.4	0.4		0.0	12.4	27.0	39.4	0.8	53.1	53.8	61.3	13.4	127.8	128.6	36.9	154.8	191.7
2001	25.2	1.1	0.2		0.0	8.1	17.7	25.8	0.7	50.6	51.4	59.8	11.1	121.5	122.3	35.2	139.2	174.4
2002	23.6	1.1	0.0		0.0	9.6	21.0	30.6	0.6	43.0	43.6	62.5	6.5	111.9	112.6	34.9	132.9	167.8
2003	23.6	1.0	0.0		0.0	6.2	13.4	19.6	0.5	33.2	33.7	46.8	12.8	92.9	93.4	31.2	106.3	137.6
2004	29.0	0.5	0.1		0.0	7.8	16.9	24.7	0.5	35.1	35.6	47.3	3.8	86.2	86.7	37.8	103.2	140.9
2005	16.0	0.3	0.0		0.0	4.0	8.6	12.6	0.5	34.7	35.2	51.2	3.5	89.4	89.9	20.8	98.0	118.8
2006	5.6	0.0	0.0		0.0	3.6	7.7	11.3	0.6	41.0	41.6	44.8	1.9	87.7	88.2	9.7	95.4	105.1

Table 7. Abundance indicators for migrating small eels, yellow eels, and silver eels in Quebec. Data from Bernard and Desrochers (2006) (Chambly and Beauharnois) and from Caron et al. (2007) (all other series).

Year	Small eels				Yellow eels				Silver eels			
	Petite Trinité	CMR ^a	Sud-Ouest	Richelieu	Beauharnois ^c	West	East	St. Lawrence, upstream from Quebec City ^b	Fish fence count	Sud Ouest, full fish count with fence	Petite CMR ^a Estimate	Saint-Jean
Visual counts of eels creeping up rocks	estimate	count of eels ascending a rock face	Visual count of eels at falls	Chamby Ladder count	Chamby trap at falls			upstream from Quebec City CMR estimate			Partial estimate	Partial estimate
Mean size (cm)	>15	>12	22.8	24.6	32.5-38.6	34.4-47.2	34.0-44.9	84.8	102.8			
Age	1-2	1-2	2-10	2-10	4-12	4-12						
1982	4,027											
1983	3,643											
1984	732											
1985	581											
1993	1,178											
1994	488											
1995	3,440											
1996	3,550											
1997												
1998												
1999	13,912	407										
2000	19,829	285										
2001	17,534	435										
2002												
2003												
2004												
2005												
2006												

^aCapture-mark-recapture

^bIn 1997, most counted eels were released downstream from the dam to test the efficiency of the eel passage facility.

^cAscending eels were counted in traps at the west site in 1994-1995 and 1998-2001, and at the east site in 1994 and 2002-2003. Permanent eel ladders with counting facilities were installed at the west site in 2002 and at the east site in 2004. Eels were counted at the east ladder on only 10 days in 2005. The estimated total extrapolated from the 10 days of counts is 2,932.

^dA substantial proportion of these eels were released below the dam for tagging studies.

Table 8. Numbers of eels caught in electrofishing sweeps and mean number of eels captured per 100 m² in the Saint-Jean River, 1975-2000.

Year	Eels counted in Sweep			No. sites	Site areas (m ²)	Eels captured 100 m ⁻²
	1	2	3			
1975					~100	0.20
1976						
1977		1		20	50-150	0.05
1978			3	19	50-180	0.16
1979						
1980						
1981						
1982						
1983						
1984						
1985						
1986						
1987						
1988	1	0	0	12	105	0.08
1989	3	2	3	13	100	0.62
1990	2	0	0	12	100	0.17
1991	0	0	0	12	100	0.00
1992	2	1	0	12	100	0.25
1993						
1994						
1995						
1996						
1997						
1998						
1999						
2000		2	13	100		0.15

^aTotal catch; breakdown by sweep number not available

Table 9. Numbers of eels caught in electrofishing sweeps and mean number of eels captured per 100 m² in the Trinité River, 1984-1992.

Year	Closed stations			Open stations			All stations												
	Sweep	No.	Site areas (m ²)	Eels captured	1	2	3	No. sites	Site areas (m ²)	Eels captured	100 m ⁻²	Sweep	1	2	3	sites	Site areas (m ²)	Eels captured	100 m ⁻²
1984	0	0	14	100	0.07	0	2	0	53	100	0.04	0	2	1	67	100	0.04	0.04	
1985	3	0	0	19	100	0.16	3	10	11	49	100	0.49	6	10	11	68	100	0.40	0.40
1986	0	0	0	11	100	0.00	4	5	10	46	100	0.41	4	5	10	57	100	0.33	0.33
1987	1	0	1	16	100	0.13	3	7	0	53	100	0.19	4	7	1	69	100	0.17	0.17
1988	1	0	0	11	100	0.09	3	6	3	53	100	0.23	4	6	3	64	100	0.20	0.20
1989	2	0	0	11	100	0.18	9	8	4	53	100	0.40	11	8	4	64	100	0.36	0.36
1990	0	0	0	11	100	0.00	6	3	4	52	100	0.25	6	3	4	63	100	0.21	0.21
1991	1	0	0	10	100	0.10	4	6	4	52	100	0.27	5	6	4	62	100	0.24	0.24
1992	0	0	0	4	100	0.00	2	4	0	28	100	0.21	2	4	0	32	100	0.19	0.19

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Table 10. Numbers of eels caught in electrofishing sweeps and mean number of eels captured per 100 m² in the Bec-Scie River and its tributary Ruisseau Castor, Anticosti Island, 1985-1996.

Year	Bec-Scie			Ruisseau Castor			All sites										
	Eels counted in Sweep	No. sites	Site areas (m ²)	Eels captured	1	2	3	No. sites	Site areas (m ²)	Eels captured	1	2	3	No. sites	Site areas (m ²)	Eels captured	100 m ⁻²
1985	17	0	6	96-110	2.73						17	0	0	6	96-110	2.73	
1986	25	0	5	91-108	4.02						25	0	0	5	91-108	4.02	
1987	25	0	200	98-108	22.20			75	7	96-375	10.70			275	16	96-375	17.20
1988	143	9	98-108	15.90			25	7	96-150	3.60			168	16	96-150	10.50	
1989	88	6	10	96-104	9.40	24	-	7	96-104	3.42	112	6	-	156	16	96-104	6.94
1990	137	9	96-105	15.20			19	7	96-105	2.70			87	16	96-105	9.80	
1991	77	9	96-104	9.40			10	7	99-108	1.40							5.40
1992	241	9	98-110	26.80			13	7	98-108	1.90			254	16	98-110	15.90	
1993	95	9	10.60				15	7		2.10			110	16			6.90
1994	223	9	24.80				8	7		1.10			231	16			14.40

^aData files do not break down eel counts by sweep number.

Table 11. Indices of eel abundance from electrofishing surveys in Quebec, 1971-2004.

Year	Bonaventure		Caspéedia		Petite Cascapédia		Dartmouth		York		Grande Rivière		Grande Rivière Est		Rivière Ouest		Petit Pabos		Grand Pabos Nord		Grand Pabos Ouest		Saint-Anne		Cap-Chat	
	N	Index ^a	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index
1971																										
1972																										
1973																										
1974																										
1975																										
1976																										
1977	n.d. ^b																									
1978																										
1979																										
1980																										
1981																										
1982																										
1983																										
1984																										
1985																										
1986																										
1987																										
1988																										
1989																										
1990	25	0.00	17	0.06	32	10	12	5	4	6	4	0.30	5	9	8	0.00	14	0.00	13	0.15	10	0.31	10	0	10	0
1991	25	0.00	17	0.12	32	10	0.80	6	4	0.20	8															
1992	25	0.04	17	0.06	32																					
1993	25	0.00	16	0.06	33																					
1994																										
1995																										
1996																										
1997																										
1998																										
1999	38	0.00	64																							
2000	25	0.00	17	32	11	0.40	12	0.40																		
2001	25	0.00	17	33	11	0.09	14																			
2002																										
2003																										
2004																										

^aIn most cases index means the number of fish caught in 3 sweeps, per 100 m² of surveyed area. However there may have been some variation in how the index was calculated.

^bn.d. means no data.

Table 11 (continued)

Year		Madeleine	Sud-Ouest	Ouelle	Rimouski	Mitis	Matane	Petite Matane	Port-Daniel Nord	Port-Daniel du milieu	Port-Daniel	Petite rivière Port-Daniel	Causapscal	Humqui	Fatapédia
N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index	N	Index
1971	n.d	n.d	0	n.d	0	n.d	0	n.d	0	n.d	0	n.d	-	n.d	-
1972	n.d	n.d	0	n.d	0	n.d	0	n.d	2.3	n.d	0	n.d	8.6	n.d	8.6
1973	n.d	n.d	0	n.d	0	n.d	0	n.d	0.3	n.d	0	n.d	2.1	n.d	2.1
1974	n.d	n.d	0.2	n.d	0.2	n.d	0.2	n.d	0.4	n.d	0.2	n.d	0	n.d	0.3
1975	n.d	n.d	0.4	n.d	0.4	n.d	0.1	n.d	0	n.d	0	n.d	0	n.d	0.3
1976	n.d	n.d	0.4	n.d	0.4	n.d	0.1	n.d	0	n.d	0	n.d	0.1	n.d	0
1977	n.d	n.d	0.7	n.d	0.3	n.d	0.1	n.d	0.4	n.d	0.1	n.d	1	n.d	0
1978	n.d	n.d	0.3	n.d	0	n.d	0	n.d	0	n.d	1.1	n.d	0.1	n.d	0

Table 12. Number of eels caught in research (Saint-Nicolas) and commercial (other) eel traps in the Quebec City area. Counts are for 1 September to early November unless otherwise indicated. Data from de Lafontaine et al. in press.

Survey year	Carrière	Anse Douville	Anse Gingras	Saint-Nicolas			Pont	North shore	Anse Verte	Saint-Romuald ^a	Landry	Saint-David	Lévis
		15 May-31 Aug	1 Sep-31 Oct	15 May-31 Oct									
1944										846	568		
1945										908	721		
1946										638	835		
1947													
1948													
1949													
1950													
1951													
1952													
1953													
1954													
1955													
1956													
1957													
1958													
1959													
1960													
1961													
1962													
1963													
1964							1,031						
1965			690				1,208						
1966			401				662	224					6,761
1967			984				822						
1968			851	193			751		48				
1969			959				728						
1970		NotOp					NotOp	NotOp	NotOp				
1971	NotOp ^b	Op ^c	NotOp	414			NotOp	NotOp	NotOp				
1972	NotOp	Op	NotOp	297			NotOp	NotOp	NotOp				
1973	NotOp	Op	NotOp	225			NotOp	NotOp	NotOp	1,138			
1974	NotOp	Op	NotOp	209			NotOp	NotOp	NotOp	1,916			
1975	NotOp	Op	NotOp	115	232	347	NotOp	NotOp	NotOp	3,020			
1976	NotOp	Op	NotOp	246	194	440	NotOp	NotOp	NotOp	1,964			
1977	NotOp	1,711	NotOp	133	328	461	NotOp	NotOp	NotOp	2,379			
1978	NotOp	Op	NotOp	134	449	583	NotOp	NotOp	NotOp	4,232			
1979	NotOp	2,338	NotOp	128	273	401	NotOp	NotOp	NotOp	4,314			
1980	NotOp	1,226	NotOp	90	187	277	NotOp	NotOp	NotOp	2,294			
1981	NotOp	816	NotOp	143	176	319	NotOp	NotOp	NotOp	1,471			
1982	NotOp	1,082	NotOp	100	199	299	NotOp	NotOp	NotOp	2,864			
1983	NotOp	1,661	NotOp	115	234	349	NotOp	NotOp	NotOp	2,675			
1984	NotOp	Op	NotOp	147	166	313	NotOp	NotOp	NotOp	2,944			
1985	293	743	NotOp	129	200	329	NotOp	NotOp	NotOp	2,686			
1986	369	720	NotOp	136	176	312	NotOp	NotOp	NotOp	2,356			
1987	394	911	NotOp	83	166	249	NotOp	NotOp	NotOp	2,474			
1988	NotOp	1,196	NotOp	69	207	276	NotOp	NotOp	NotOp	2,109	1,040		
1989	NotOp	482	NotOp	104	83	187	NotOp	NotOp	NotOp	796	423		
1990	NotOp	819	NotOp	87	160	247	NotOp	NotOp	NotOp	1,359	787		
1991	NotOp	600	NotOp	48	169	217	NotOp	NotOp	NotOp	891	945		
1992	NotOp	708	NotOp	89	177	266	NotOp	NotOp	NotOp	1,566	1,369		
1993	NotOp	986	NotOp	78	188	266	NotOp	NotOp	NotOp	1,276	702		
1994	NotOp	971	NotOp	103	200	303	NotOp	NotOp	NotOp	1,683	1,291		
1995	NotOp	814	NotOp	45	208	253	NotOp	NotOp	NotOp	1,860	1,196		
1996	NotOp	341	NotOp	103	127	230	NotOp	NotOp	NotOp	1,622	894		
1997	NotOp	528	NotOp	74	138	212	NotOp	NotOp	NotOp	1,571	1,221		
1998	NotOp	536	NotOp	93	205	298	NotOp	NotOp	NotOp	1,962	1,175		
1999	NotOp	Op	NotOp	69	381	450	NotOp	NotOp	NotOp	2,146	1,822		
2000	NotOp	Op	NotOp	112	190	302	NotOp	NotOp	NotOp	1,872	998		
2001	NotOp	Op	NotOp	67	350	417	NotOp	NotOp	NotOp				
2002	NotOp	491	NotOp	90	239	329	NotOp	NotOp	NotOp	1,524	639		
2003	NotOp	282	NotOp	78	257	335	NotOp	NotOp	NotOp	1,168	651		
2004	NotOp	364	NotOp	78	200	278	NotOp	NotOp	NotOp	878	200		
2005	NotOp	410	NotOp	27	223	250	NotOp	NotOp	NotOp	975	399		
2006	NotOp		NotOp				NotOp	NotOp	NotOp				

^aThe Saint-Romuald trap was set up differently in 1944-1946 than in 1973-2005; hence data for the two periods are not compatible.

^bTrap not operating

^cTrap operating but catch records are not available

Table 13. Catch and catch per unit effort of two eel fishers at Rivière-Ouelle on the St. Lawrence estuary. Each fisher fished from 1 to 3 traps.

Year	Fisher 1			Fisher 2			Mean CPUE	Mean CPUE, constant effort	Mean CPUE, decreasing effort
	Catch (kg)	Effort (m of net)	CPUE (kg eels/ m of net)	Catch (kg)	Effort (m of net)	CPUE (kg eels/ m of net)			
1985	4,841	601	8.06	1,547	230	6.73	7.39	7.39	
1986	10,560	601	17.57	2,171	230	9.44	13.51	13.51	
1987	7,139	601	11.88	1,873	230	8.14	10.01	10.01	
1988	7,467	601	12.42	2,240	230	9.74	11.08	11.08	
1989	6,852	601	11.40	1,543	230	6.71	9.05	9.05	
1990	8,691	601	14.46	2,095	230	9.11	11.78	11.78	
1991	6,860	601	11.41	1,781	230	7.74	9.58	9.58	
1992	4,156	601	6.92	877	230	3.81	5.36	5.36	
1993	5,892	601	9.80	1,474	230	6.41	8.11	8.11	
1994	5,347	601	8.90	1,584	230	6.89	7.89	7.89	
1995	4,405	601	7.33	948	230	4.12	5.73	5.73	
1996	3,325	601	5.53	794	230	3.45	4.49	4.49	
1997	2,886	601	4.80	918	230	3.99	4.40	4.40	
1998	3,854	601	6.41	1,374	171	8.04	7.22		7.22
1999	1,887	510	3.70	993	171	5.81	4.75		4.75
2000	2,750	367	7.49	705	171	4.12	5.81		5.81
2001	2,728	454	6.01	445	171	2.60	4.31		4.31
2002	2,935	402	7.30	502	122	4.11	5.71		5.71
2003	1,859	448	4.15	292	168	1.74	2.94		2.94
2004	4,029	402	10.02	666	122	5.46	7.74		7.74

Table 14. Catch and catch per unit effort in the commercial eel fishery in the St. Lawrence estuary. Data for 1979-1995 are from Axelsen 1997. Data for 1996-2001 are from Verreault et al. 2003. Data for 1996-2001 are from index fishers, hence catch and effort for that period do not reflect total catch and total effort of all fishers.

Year	Kamouraska County			District 10			District 11			District 18			District 15			Upper Estuary total			St. Lawrence estuary			
	Catch (kg)	Effort (m of net)	CPUE (kg eels/ m of net)	Catch CPUE (kg)			Catch CPUE (kg)			Catch CPUE (kg)			Catch CPUE (kg)			Sector 1			Sector 2			
				Catch CPUE (kg eels/ m of net)			Catch CPUE (kg eels/ m of net)			Catch CPUE (kg eels/ m of net)			Catch CPUE (kg eels/ m of net)			(upstream) (middle) (downstream)			Sector 3			
1979	243,368	29,502	8.25																			
1980	297,350	29,489	10.08																			
1981	313,160	31,266	10.02																			
1982	148,870	8,204	18.15																			
1983	219,491	18,073	12.14																			
1984	229,600	29,987	7.66																			
1985	216,388	29,155	7.42																			
1986	247,885	36,511	6.79	27,630	6.42	235,188	7.05	79,644	4.07	4,393	1.31	346,855	5.65									
1987	208,197	37,087	5.61	29,723	6.87	192,031	5.79	85,364	4.11	3,749	1.12	310,867	5.00									
1988	203,007	36,759	5.52	42,987	8.75	211,559	6.57	70,017	3.39	5,443	1.24	330,006	5.31									
1989	213,325	37,969	5.62	22,956	4.39	213,113	6.06	67,258	3.05	2,165	0.61	305,492	4.52									
1990	258,131	36,589	7.05	25,720	4.48	235,766	7.51	65,517	2.89	3,455	0.66	330,458	5.09									
1991	220,210	37,730	5.84	25,839	4.42	199,141	6.15	58,573	2.66	3,122	0.78	286,675	4.47									
1992	141,676	37,511	3.78	35,428	6.11	131,679	3.98	47,590	2.21	1,944	0.45	216,641	3.34									
1993	168,572	38,664	4.36	27,160	4.71	148,397	4.80	54,591	2.14	857	0.22	231,005	3.62									
1994	118,567	33,246	3.57	30,515		111,998		34,846		2,053		179,412										
1995	97,094	30,932	3.14	41,219		109,980		30,523		995		182,717										
1996	105,629	26,674	3.96																			
1997	90,811	26,553	3.42																			
1998	116,170	24,717	4.70																			
1999	90,847	20,694	4.39																			
2000	61,337	17,038	3.60																			
2001	58,363	16,394	3.56																			

Table 15 (continued)

Year	Site Location	Hab. ^a	Coordinates ^b	Region ^c	Gear	Eels caught	Effort (h)	CPUE (eels/100 h)	CPUE (kg/d)	CPUE (kg/100 h)	Length (cm)			Mean	SD	N	
											Mean	SD	N				
1985	19 Marina de Sept-Îles		50°11'59"N, 66°22'59"W	MNS	Pot	24	784	3.065	0.736	1.03	0.247	52.8	12.5	24	373.8	240.8	24
1985	20 Rivière du Vieux Fort	h		MNS	Pot	12	707	1.697	0.407	0.57	0.137	44.7	11.2	12	210.0	143.0	12
1985	21 Rivière au Foin	h	50°15'45"N, 66°24'26"W	MNS	Pot	142	3.094	4.590	1.102	1.54	0.370	47.5	13.1	142	280.6	238.0	142
1985	22 Rivière Rapide	h		MNS	Pot, fyke	1,334	2,500	53.381	12.811	17.88	4.291	52.4	11.2	1,273	309.8	217.8	1,274
1985	23 Rivière Rapide	h		MNS	Pot	58	1,107	5.239	1.257	1.76	0.422	44.0	9.9	58	186.7	144.8	58
1985	24 Rivière Hall		50°12'38"N, 66°32'29"W	MNS	Pot	233	1,625	14.338	3.441	4.80	1.152	55.0	6.2	228	320.4	105.7	228
1985	25 Rivière Ste.-Marguerite		50°08'34"N, 66°35'45"W	MNS	Pot	27	5,835	0.463	0.111	0.16	0.038	54.2	13.2	27	330.0	267.7	27
1985	26 Rivière Ste.-Marguerite		50°08'34"N, 66°35'45"W	MNS	Pot	5	196	2.551	0.612	0.85	0.204	49.6	12.2	5	276.0	176.7	5
1985	27 Rivière Birochu		50°06'25"N, 66°41'56"W	MNS	Pot	4	2,088	0.192	0.046	0.06	0.014	54.0	10.4	3	310.0	141.8	3
1985	28 Rivière Dominique		50°01'35"N, 66°52'02"W	MNS	Pot, fyke	74	1,771	4.181	1.003	1.40	0.336	72.3	11.6	73	784.9	400.9	73
1985	29 Rivière aux Rochers		50°01'10"N, 66°52'04"W	MNS	Pot	4	3,180	0.126	0.030	0.04	0.010	46.5	3.5	4	187.5	45.0	4
1985	30 Rivière aux Rochers		50°01'10"N, 66°52'04"W	MNS	Pot	0	671	0.000	0.000	0.00	0.000						
1985	31 Rivière Vachon		49°57'22"N, 66°38'17"W	MNS	Pot	8	1,248	0.641	0.154	0.21	0.050	89.6	7.5	8	1,233.7	281.2	8
1985	32 Rivière des îles de Mai		49°55'39"N, 66°38'51"W	MNS	Pot	1	864	0.116	0.028	0.04	0.010						
1985	33 Rivière Rivérin		49°47'08"N, 67°09'20"W	MNS	Pot, fyke	68	1,269	5.363	1.287	1.80	0.432	64.8	11.5	68	578.5	300.9	68
1985	34 Rivière Penticôte		49°46'48"N, 67°09'49"W	MNS	Pot	26	960	2.708	0.650	0.91	0.218	46.9	12.2	26	245.8	190.3	26
1985	Sum/mean			MNS	Pot	544	22,359	2,433	0.584	0.92	0.221						

^aHabitat: F-fresh water, BR-bay with rocky bottom, MS-river mouth with sandy bottom.^bCoordinates for 1978 are from Google Earth, based on detailed site maps in Lemire et al. 1978. Coordinates for other years were obtained by looking up the site names given by Pilote 1989 in the online National Atlas of Canada (www.atlas.nrcan.gc.ca). These coordinates do not necessarily correspond with exact sampling locations. A blank cell means that the site could not be identified in the National Atlas.^cUNS - Upper North Shore, MNS - Middle North Shore, LNS - Lower North Shore.^dEffort, CPUE, and length data are for Sites 1 and 2 combined.^eThe National Atlas lists Baie Salt Water at 51°05'22"N, 58°36'26"W and Étang Salt Water at 50°58'13"N, 59°02'48"W.^fThe National Atlas lists Baie Louis-Lessard at 51°05'21"N, 58°47'45"W.^gCPUE is given for fishing between 3 and 14 August. CPUE for other fishing periods (18-24 June, 22 September-2 October) was ≤ 2.2 eels/100 h.^hUnable to reliably locate this site.

Table 16. Age frequency distributions of American eels in Quebec. Eels are considered to be age 0 in their year of arrival in continental waters.

System/ region Site	St. Lawrence R. Beauharnois Dam	St. Law. estuary Various	St. Law. estuary Kamour- aska	St. Law. estuary R. Verte	St. Law. estuary Trois- Pistoles	St. Law. estuary R. Sud- Ouest	St. Law. estuary Vente, Trois-Pistoles, Sud-Ouest	St. Law. estuary R.	Gulf N. Shore Petite r. de la Trinité			
Coordinates									River Yellow	River Yellow	River Yellow	River Silver
Habitat Stage	River Ascending juveniles	River Ascending juveniles	Estuary Silver	Estuary Silver	2001	2006	2006	2006	River Yellow	River Yellow	River Yellow	River Silver
Year Gear	Ladder trap	Ladder trap	Trap Yes	Fixed trap Yes	E-fishing All	E-fishing No	E-fishing All	E-fishing All	2001	2000	1999-2001	2001
Exploited Size sampled	No	No	All	All	K. Larouche et al. 1974	Tremblay 2004, unpubl.	K. Oliveira unpubl.	K. Oliveira unpubl.	Counting fence No	No	No	No
Source	Stratified ^a Verreault and Tardif 2006	K. Oliveira unpubl.							All	All	All	All
Length (cm)	35.1	34.2	79.2	83.7	21.1	36.9	29.9	30.3	104.3			
Mean	7.1	6.2	6.9	6.9	15.2	16.9	5.8	12.4	6.7			
SD	984	20	3.841	30	5	8	15	28	30			
N												
Age (years)												
Mean	6.3	6.1	16.8	20.1	4.0	6.6	5.9	5.8	22.6	10.8	6.8	19.2
SD	2.2	1.8	2.9	3.8	2.0	4.3	1.6	2.8	4.7	6.6	4.3	4.0
N	82 ^a	20	2,931	30	5	8	15	28	30	45	133	74
0												
1												
2		0.2										
3		1.5										
4												
5												
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Table 16 (continued)

System/ region Site	Gulf N. Shore Matamek R., Bill Lake	Gulf N. Shore Ruisseau Sylvie	Gaspé Pen. Saint-Jean	Gaspé Pen. Saint-Jean	Gaspé Pen. Saint-Jean
Coordinates					
Habitat Stage	Lake	Estuary	River	Lake	Estuary
Year	1970	1973	Yellow, mig. downstream	Yellow	Yellow
Gear	Fyke	Rotenone	2004	2004	2004
Exploited	No	No	No	No	No
Size sampled	All	All	All	All	All
Source	O'Connor & Power 1973	Dolan 1975	Caron & Thibault unpubl.	Caron & Thibault unpubl.	Caron & Thibault unpubl.
Length(cm)					
Mean					
SD					
N					
Age(years)					
Mean	10.6	2.2	8.7	11.2	7.4
SD	2.3	2.7	3.8	4.3	2.2
N	19	69	78	36	48
0	23				
1	16				
2	5				
3	12	1	7	7	7
4					
5	2	6	6	5	5
6	2	10	10	5	5
7	1	5	6	6	3
8	2	13	13	17	
9	3	6	4	2	
10	3	13	2	4	
11	1	8	4	5	
12	2	3	3		
13	2	1	1		
14		1	1	2	
15	1			2	
16	1	1	1	3	
17			1	1	
18				3	
19					
20					
21					
22	23				
23					
24				2	
25					
26					
27					
28					
29					
30					
31					
32					

a82 otoliths aged from a length-stratified sample were used to create an age-length key, which was applied to lengths of 984 randomly sampled eels. Data are presented as percent age distribution

bestimated for the random sample.
refers to age 11 and older

Table 17. Reported landings (tonnes) of American eels in the southern Gulf of St. Lawrence, by province. Data for 2006 are preliminary.

Year	New Brunswick	Nova Scotia	Prince Edward Island	Total	Year	New Brunswick	Nova Scotia	Prince Edward Island	Total
1917	51.0	12.6	0.0	63.6	1962	81.9	26.4	13.1	121.4
1918	61.8	13.1	0.0	74.9	1963	53.7	23.6	15.9	93.2
1919	75.1	6.3	0.0	81.4	1964	56.4	18.8	34.2	109.4
1920	24.2	10.7	0.0	34.9	1965	62.6	16.3	48.6	127.5
1921	40.7	14.8	0.0	55.5	1966	99.2	15.0	32.8	147.0
1922	14.0	7.5	0.0	21.5	1967	108.0	52.3	61.8	222.1
1923	10.2	0.7	0.0	10.9	1968	150.6	28.3	130.7	309.6
1924	10.0	7.5	0.0	17.5	1969	214.2	38.1	194.5	446.8
1925	18.4	4.3	0.0	22.7	1970	294.7	45.4	239.9	580.0
1926	5.4	5.7	0.0	11.1	1971	319.4	52.1	351.4	722.9
1927	1.4	3.5	0.0	4.9	1972	272.8	50.3	272.8	595.9
1928	16.3	6.6	0.0	22.9	1973	220.4	28.0	157.2	405.6
1929	5.2	4.5	0.0	9.7	1974	156.2	28.3	101.2	285.7
1930	11.8	15.2	0.0	27.0	1975	120.8	28.6	103.5	252.9
1931	18.8	11.9	0.0	30.7	1976	118.7	18.0	94.1	230.8
1932	9.1	13.8	0.0	22.9	1977	110.1	5.9	97.6	213.6
1933	11.0	16.7	0.0	27.7	1978	81.6	12.3	113.6	207.5
1934	11.3	5.8	0.0	17.1	1979	102.4	12.6	111.0	226.0
1935	7.6	5.2	0.0	12.8	1980	150.4	9.5	120.1	280.0
1936	4.4	4.1	0.0	8.5	1981	191.2	7.5	220.0	418.7
1937	5.7	4.2	0.0	9.9	1982	159.2	11.3	167.6	338.1
1938	9.4	9.7	0.0	19.1	1983	97.4	9.6	150.5	257.5
1939	11.0	8.7	0.0	19.7	1984	122.4	8.9	164.6	295.9
1940	4.8	10.6	0.0	15.4	1985	202.4	5.1	139.4	346.9
1941	3.6	3.4	0.0	7.0	1986	230.2	15.6	226.0	471.8
1942	12.5	4.8	0.0	17.3	1987	171.6	13.2	149.9	334.7
1943	14.1	5.0	0.0	19.1	1988	233.5	24.7	124.7	382.9
1944	13.9	6.9	0.0	20.8	1989	209.0	30.2	69.5	308.7
1945	14.5	10.7	0.0	25.2	1990	149.3	20.8	123.8	293.9
1946	29.1	16.7	0.0	45.8	1991	130.2	34.8	126.6	291.6
1947	31.8	13.6	0.9	46.3	1992	119.6	56.0	54.0	229.6
1948	29.0	8.7	10.0	47.7	1993	88.3	89.2	74.0	251.5
1949	29.4	37.6	3.6	70.6	1994	68.1	42.3	45.8	156.2
1950	22.2	23.6	2.3	48.1	1995	60.2	16.3	34.6	111.0
1951	15.5	20.9	3.6	40.0	1996	48.7	11.4	36.0	96.1
1952	15.8	11.9	5.0	32.7	1997	36.4	17.2	31.3	84.9
1953	13.1	7.7	6.3	27.1	1998	49.2	15.0	23.6	87.8
1954	33.1	6.4	3.7	43.2	1999	47.2	9.0	35.3	91.5
1955	48.6	10.5	9.1	68.2	2000	76.4	6.9	63.5	146.7
1956	10.5	14.6	4.6	29.7	2001	92.2	3.4	41.2	136.8
1957	8.6	10.1	12.3	31.0	2002	129.0	4.2	86.4	219.6
1958	14.5	14.1	18.7	47.3	2003	139.6	9.1	71.3	219.9
1959	23.6	11.4	26.4	61.4	2004	123.1	4.4	69.0	196.5
1960	30.9	23.6	31.9	86.4	2005	102.2	7.0	81.5	190.7
1961	57.4	27.8	17.7	102.9	2006	95.0	9.9	68.7	173.7

Table 18. Catch rates of legal and sublegal eels in fyke nets on Prince Edward Island, as reported by logbook fishers. Adjusted catch rates are adjusted to a minimum size of 53.0 cm.

Year	Number of log- keepers	Number of fishing sites	Number of net- days	Minimum legal size (cm)	Legal eels				Sublegal eels				
					Catch (kg)	Adjust- ment factor ^a	kg caught/net-day	Un- adjusted	Ad- justed	Catch (no. of eels)	Adjust- ment factor ^b	Un- adjusted	Ad- justed
1996	7	18	9,996	46.0	3,768	0.774	0.377	0.292	0.292	7,230	1.440	0.723	1.042
1997	7	15	10,513	46.0	3,589	0.774	0.341	0.264	0.264	15,174	1.440	1.443	2.078
1998	5	12	6,985	50.8	3,542	0.923	0.517	0.477	0.477	17,567	1.086	2.515	2.731
1999	4	11	9,019	50.8	8,327	0.923	0.923	0.852	0.852	36,450	1.086	4.041	4.389
2000	3	10	6,192	50.8	5,646	0.923	0.912	0.842	0.842	12,240	1.086	1.977	2.147
2001	6	14	8,497	50.8	5,436	0.923	0.640	0.590	0.590	9,731	1.086	1.145	1.244
2002	6	16	9,852	50.8	7,554	0.923	0.767	0.708	0.708	13,152	1.086	1.434	1.557
2003	7	17	9,792	50.8	8,526	0.923	0.871	0.804	0.804	15,918	1.086	1.626	1.765
2004	5	12	7,832	50.8	9,026	0.923	1.153	1.064	1.064	15,977	1.086	2.059	2.236
2005	4	11	7,941	53.0	7,507	1.000	0.945	0.945	0.945	15,844	1.000	1.995	1.995
2006	3	9	5,728	53.0	4,714	1.000	0.823	0.823	0.823	7,399	1.000	1.292	1.292
2007	9	20	13,693	53.0	18,721	1.000	1.367	1.367	1.367	42,891	1.000	3.132	3.132

^aBased on measurements and weights of 1,249 commercially caught eels on PEI, 1997-2002. Summed weight of eels between 50.9 cm and 52.9 cm was 7.7% of the summed weight of eels that were >= 50.8 cm. Summed weight of eels between 46.0 cm and 52.9 cm was 22.6% of the summed weight of eels that were >= 46.0 cm.

^bBased on measurements of 2,748 commercially caught eels on PEI, 1997-2002. Number of eels between 50.9 cm and 52.9 cm was 8.6% of the number of eels that were under 50.8 cm. Number of eels between 46.0 cm and 52.9 cm was 44.0% of the number of eels that were under 46.0 cm.

Table 19. Mean catch rates of eels in research and commercial fishing in the southern Gulf of St. Lawrence.

Region	Fishery ^a	Years	Gear	Number of gear-days	Catch rate		
					Number/ gear-day	Wt (kg)/ gear-day	
<u>Bays, estuaries, and tidal lagoons</u>							
Gulf NB	Res	1999-2002	Fyke	218	0.191		
Gulf NS	Res	2001	Fyke	208	0.466	0.177	
Gulf NS ^b	Com	1997-2005	Fyke	10,933		1.342	
PEI	Res	1999-2005	Fyke	3,463	1.270	0.352	
PEI ^c	Com	1996-2006	Fyke	92,347		0.696	
PEI ^d	Com	1996-2006	Fyke	92,327	2.043		
<u>Salt marsh pools</u>							
PEI	Res	2001	Pots	259	0.000	0.000	
<u>Salt marsh creeks</u>							
PEI	Res	2001	Pots	889	0.019		
<u>Lakes</u>							
Gulf NS	Res	1979-1981	Pots	163	0.166		
<u>Barachois ponds with an outlet to the sea</u>							
PEI	Res	1999-2003	Fyke	3,448	1.297	0.477	
<u>Landlocked barachois ponds</u>							
Gulf NB	Res	2002	Fyke	45	0.000	0.000	
PEI	Res	1999-2000	Fyke	105	0.446	0.145	
<u>Freshwater impoundments</u>							
PEI	Res	1999-2005	Fyke	1,304	0.324	0.171	

^aRes - research fishery, Com - commercial fishery.

^bLegal-size catches only. Catch rates not adjusted for changes in minimum size.

^cCatch rates of legal eels, adjusted to a minimum size of 53 cm (see Table 18).

^dCatch rates of sublegal eels, adjusted to a minimum size of 53 cm (see Table 18).

Table 21. Mean densities (eels/100 m²) of American eels estimated from electrofishing surveys in Gulf Nova Scotia rivers.

Year	Phillip Wallace	Waugh	John	Middle (Pictou)	East (Pictou)	Suther-lands	French	Barneys	West (Antigonish)	South (Antigonish)	Pomquet	Afton	Tracadie	Mabou	Margaree	Cheticamp
	Density N ^a	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N	Density N
1957															4.061	9
1958															1.877	7
1959															3.090	8
1960															5.257	8
1961															4.559	8
1962															3.870	1
1963															4.929	13
1964															2.964	18
1965															2.306	14
1966															3.266	23
1967															2.323	22
1968															1.545	21
1969															1.170	10
1970																
1971																
1972																
1973																
1974															1.943	30
1975															1.725	25
1976															1.462	16
1977															1.308	20
1978	0.354	6						0.372	4	0.916	4				1.792	8
1979	1.538	4					0.113	2	0.282	4	3.888	3	0.351	5	1.170	17
1980																
1981																
1982																
1983																
1984																
1985																
1986	1.067	1													0.559	13
1987															0.967	4
1988																
1989																
1990																
1991																
1992	0.000	5	0.000	4	0.000	6	0.000	5	0.000	3	0.000	3	0.000	1	1.162	5
1993	0.000	3	0.000	5	1.931	6	0.000	4	0.000	5	0.000	2	0.000	2	0.000	3
1994	0.000	0	0.000	6	0.000	5	0.000	4	0.000	2	0.000	3	0.000	2	0.000	3
1995	0.000	0	0.000	6	0.000	5	0.000	5	0.000	2	0.000	3	0.000	2	0.146	5
1996	0.000	1	0.000	3	2.897	4	0.000	4	0.000	5	0.000	2	0.000	2	0.115	6
1997	0.000	3	0.000	4	2.996	5	0.000	2	0.000	2	0.906	5	0.000	2	0.000	5
1998	0.000	3	0.000	7	4.327	3	0.000	3	0.000	1	0.000	5	0.000	2	0.224	5
1999	0.000	2	0.000	3	0.000	4	0.000	6	0.000	2	0.000	3	0.000	2	0.947	2
2000	0.000	2	0.000	3	0.000	2	0.000	4	0.000	3	0.000	4	0.000	2	0.148	4
2001	0.000	2	0.000	3	0.000	2	0.000	6	0.000	2	0.000	3	0.000	4	0.124	5
2002	0.000	2	0.000	3	0.000	2	0.000	3	0.000	4	0.000	3	0.000	4	0.876	40
2003															0.300	15
2004															0.000	13
2005															0.000	13
2006															0.000	9
2007																

^aNumber of electrofishing sessions.

Table 22. Mean densities (eels/100 m²) of American eels estimated from electrofishing surveys in Prince Edward Island.

Year	Trout (Coleman)		Ellerslie		Morell		Vernon		Seal (Vernon)		Enmore		Little Pierre Jacques	
	Density	N ^a	Density	N	Density	N	Density	N	Density	N	Density	N	Density	N
1975					12.731	5								
1976														
1977														
1978														
1979														
1980														
1981														
1982														
1983														
1984					8.183	4								
1985					5.804	6								
1986														
1987														
1988														
1989														
1990														
1991														
1992														
1993	0.000	1	0.000	4			0.000	4	0.000	4	0.000	4	0.000	4
1994			0.000	12	1.260	12	0.000	12	0.000	12	0.000	16	0.000	12
1995			0.000	12	0.524	30	0.000	8	0.000	8	0.000	12	0.000	12
1996					0.409	14								
1997					0.437	14								
1998					3.083	6								
1999														
2000														
2001							1.761	6						
2002							1.181	4						

^aNumber of electrofishing sessions.

Table 23. Mean densities of eels in the southern Gulf of St. Lawrence.

Region	Location	Years	Method ^a	No. of surveys	Eels/ha	kg/ha
<u>River</u>						
Gulf NB	Restigouche River	2000-2007	E-fish		117.3	7.7
Gulf NB	Miramichi River	2000-2007	E-fish		87.3	5.7
Gulf NS	Margaree River	2000-2007	E-fish		33.4	2.2
	Mean				79.3	5.2
<u>Barachois ponds with an outlet to the sea</u>						
PEI	Clarkes Pond	2000, 2001	CMR	2	21.3	8.2
PEI	Lake of Shining Waters	2000	CMR	1	20.1	6.7
PEI	Rollings Pond	2000, 2001	CMR	2	191.8	67.8
PEI	Long Pond, Dalvay	2000, 2003	CMR	2	121.5	33.3
PEI	Campbells Pond, Dalvay	2000, 2001	CMR	2	22.9	6.4
PEI	Schooner Pond	2000	CMR	1	28.1	7.8
PEI	Mean				67.6	21.7
<u>Freshwater lakes and impoundments</u>						
NS	Lake Ainslie	2007	GBB	4	18.2	
PEI	Murphys Pond, Trout River, Millvale	2006, 2007	GBB	2	0.0	
PEI	Bells (Campbells) Pond, Hunter R.	2007	GBB	1	207.1	
PEI	Cass Pond	2006	GBB	2	83.0	
PEI	North Pinette Pond	2000	CMR	1	84.4	52.5
	Mean				93.6	
<u>Estuaries and bays</u>						
NB	St. Nicholas River, Richibucto	2007	GBB	1	38.5	
NB	Kouchibouguac River	2007	GBB	1	27.8	
NS	Margaree River Estuary	2007	GBB	1	41.4	
PEI	Mill River Estuary	2007	GBB	1	104.9	
PEI	Trout River Estuary, Roxbury	2007	GBB	1	40.0	
PEI	Grand River Estuary	2007	GBB	1	27.0	
PEI	New London Bay	2007	GBB	1	20.9	
PEI	Hope River Estuary	2007	GBB	1	151.4	
PEI	Hunter River, Rusticoville	2007	GBB	1	103.4	
PEI	Wheatley River, Cymbria	2007	GBB	1	70.3	
PEI	Covehead Bay	2007	GBB	1	43.2	
PEI	Morell River Estuary	2006, 2007	GBB	2	300.1	
PEI	Basin Head	2005, 2006	GBB	6	71.9	
PEI	Flat River Estuary	2002	CMR	1	28.3	10.5
PEI	South Pinette Estuary	2000	CMR	1	655.8	192.2
PEI	North Pinette Estuary	2000	CMR	1	171.2	49.9
PEI	Mean				137.6	

^aE-fish - electrofishing; CMR - capture-mark-recapture estimate; GBB - glass bottom boat survey

Table 24. Catch rates of eels <9.0 cm long at two ramp traps at the base of the dam at McCallums Pond, PEI, and at one habitat trap at the base of the dam at Cass Pond, PEI.

Year	MacCallums ramp traps												Cass habitat trap											
	June			July			August			July & August			June			July			August			July & August		
	Eels <9.0 cm	Gear-days	Eels/gear-day	Eels <9.0 cm	Gear-days	Eels/gear-day	Eels <9.0 cm	Gear-days	Eels/gear-day	Eels <9.0 cm	Gear-days	Eels/gear-day	Eels <9.0 cm	Gear-days	Eels/gear-day	Eels <9.0 cm	Gear-days	Eels/gear-day	Eels <9.0 cm	Gear-days	Eels/gear-day	Eels <9.0 cm	Gear-days	Eels/gear-day
2005	8	18	0.44	76	51	1.49	84	69	1.22	23	5	4.60	13	9	1.44	36	14	2.57	0	38	0.00	1	62	0.02
2006	6	51	0.12	12	58	0.21	27	62	0.44	39	120	0.33	7	14	0.50	5	14	0.36	1	11	0.09	6	25	0.24
2007	0	38	0.00	1	62	0.02	25	64	0.39	26	126	0.21	7	9	0.78	18	13	1.38	4	13	0.31	22	26	0.85

Table 25. Mean of weekly eel counts in fish gears which intercept upstream and downstream movement in the southern Gulf of St. Lawrence, by year.

System	Mean number of eels per week																				Margaree	Morell
	Tabusintac	Tabusintac	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi	Miramichi			
Site	Millbank	NW Eel Ground Index	Cassilis Estuary	Cassilis Estuary	Red Bank NW	Red Bank Little SW	Little SW at Catamaran	Catamaran Brk.	Catamaran Brk.	SW Eel Ground Enclosure	SW Eel Ground FF	Millerton	Millerton	Bartholemew	Fordview	Leads						
	ET	ET	ET	ET	ET	ET	RST	FF Up	FF Dn	ET	ET	ET	ET	ET	ET	ET	ET	ET	ET			
1976			2.70																	0.00		
1977			1.45																	0.34		
1978			0.93																			
1979			1.84																			
1980			0.76																			
1981			1.16																			
1982			1.28																	0.00		
1983			1.03																	0.03		
1984			1.34																	0.04		
1985			0.00																	1.13	0.00	
1986			0.71																	1.90	0.05	
1987			1.05																		0.00	
1988			0.44																		0.04	
1989			0.82																		0.09	
1990			0.91																		0.13	
1991			0.21																		0.00	
1992	1.00	0.31	1.81																		0.20	
1993	5.25	0.93	0.72																		0.11	
1994	0.00	0.26	0.77			1.52	0.09														0.00	
1995			0.74			1.28	0.52														0.04	
1996	0.00	0.00	6.40			6.46	6.89														0.41	
1997			2.47			0.78	0.73															
1998	4.03	1.05	0.71	3.48	7.97	0.00	0.93															
1999	12.06	2.53	1.26	0.99	3.84	0.16	0.26														0.00	
2000			1.81	2.19	3.40	0.26	0.51	3.89														
2001				1.25	4.28	0.18	1.34	16.95														
2002	7.55	1.65		1.11	2.77	2.93	0.38	1.11	17.04	0.11	0.68	5.16	5.80	1.35	2.95				3.66			
2003					1.91	1.36	2.58	0.53	0.76	1.17	0.00	0.34	1.53	2.82	1.36	5.60			10.92			
2004						2.08	1.94		0.18	1.08	0.00	0.40	0.67	1.04	1.79	7.68			34.35			
2005							3.02	1.81		0.98	0.48	0.12	1.00	1.68	3.15	3.50			41.86			
2006							2.52	10.50		1.81	0.15	1.02	1.14	0.27	2.80	7.24			42.62			

^aET - estuary trap; ETS - estuary trap, with pen fitted with fine mesh to retain Atlantic salmon smolts; FF - fish fence; FWT - fishway trap; RST - rotary screw trap.

Table 26. Age frequency distributions of American eels in the southern Gulf of St. Lawrence. Eels are considered to be age 0 in their year of arrival in continental waters. Data from Cairns et al. 2007, DFO files, H. Lamson (unpubl.) and V. Tremblay (unpubl.).

Table 26 (continued)

Table 26 (continued)

Province	PEI	PEI	PEI	PEI	PEI	PEI	PEI	PEI	PEI	PEI	PEI	PEI
System	McCallums Pond	Cass Pond	Marshalls Pond	Boughton	Whitlocks	PEI	McCallums Pond	Cass Pond	Long Pond Outlet ^e	Long Pond Outlets ^f	Campbells Pond	Long/Campbells outlet ^g
Site												
Habitat	Impoundment	Impoundment	Impoundment	Impoundment	Impoundment	Foot of dam	Foot of dam	Barachois outlet	Barachois outlet	Barachois outlet	Barachois outlet	Barachois outlet
Main stage	Yellow	Yellow	Yellow	Yellow	Yellow	Elver	Elver	Silver	Silver	Silver	Silver	Silver
Year	2003	2003	2003	1999	99-03	2006	2006	2002	2002	2002	2002	2002
Gear ^f	Fyke No	Fyke No	Fyke No	Fyke No	Fyke No	Ramp No	HT No	Fyke No	Fyke No	Fyke No	Fyke No	Fyke No
Exploited												
<u>Length (cm)</u>												
Mean	68.3	53.4	60.4	73.2	62.3	9.5	11.2	36.3	68.7	73.5	71.4	
SD	12.9	12.0	16.4	9.7	15.2	1.9	7.5	3.3	4.9	4.5	5.2	
N	12	20	30	15	77	87	19	5	36	46	82	
	0					72	10					
	1						12	8				
	2						3	1				
	3			1								
	4		3				3					
	5		4	7			11		4			
	6	1	7	3			11		1			
	7	1	2	4			7					
	8		3	1			4				1	1
	9											
	10										1	1
	11	1			2	3					2	2
	12	1		2		3					3	3
	13	1				1				2	3	5
	14	2	1	4		7					1	1
	15				2	2					4	5
	16	2			3	5					1	5
	17	2		2	2	6			5	6	11	
	18	1		2	2	5			6	6	12	
	19								4	5	9	
	20			2		2			8	4	12	
	21			1		1			6	4	10	
	22				2	2			1	1	2	
	23			1		1						
	24											
	25				1	1				1	1	
	26				1	1			1		1	
	27											
	28											
	29								1		1	
	30											

^aResults of histological examination of gonad tissue: 45 eels were female, 7 showed no sexual differentiation, and 3 had very small gonads that could not be successfully extracted.

^bSampled from commercial harvest in an area with a minimum legal size of 53 cm

^cResults of histological examination of gonad tissue: 5 eels were female, 1 showed no sexual differentiation, and 2 had very small gonads that could not be successfully extracted.

^dResults of histological examination of gonad tissue: 45 eels were female and 3 showed no sexual differentiation.

^eEels <45 cm long.

^fEels ≥45 cm long.

^gRST - Rotary screw trap; MS - mud spear, used in winter; HT - habitat trap.

Table 28. Reported landings (t) of yellow, silver, and elver American eels in Scotia-Fundy. Yellow and silver landings data for 1950-1993 are from Jessop 1996. Elver landings data for 1989-1995 are from Jessop 1998. Other data are from DFO files. Data for 2006 are preliminary.

Year	Yellow and silver eels						Elvers New Brunswick and Nova Scotia	All eels			
	Nova Scotia			New	Total	New		Nova Scotia	New	Total	
	Cape Breton	Eastern mainland	Southwest Nova Scotia	Fundy Nova Scotia	Brunswick	Brunswick		Brunswick	Brunswick		
	Nova Scotia										
1950		7.2	13.6	20.8	18.5	39.3		20.8	18.5	39.3	
1951		8.1	17.2	25.3	2.8	28.1		25.3	2.8	28.1	
1952		10.0	25.3	35.3	8.6	43.9		35.3	8.6	43.9	
1953	1.8	10.5	27.2	1.0	40.5	21.0	61.5	40.5	21.0	61.5	
1954	1.8	12.3	36.7	0.5	51.3	9.5	60.8	51.3	9.5	60.8	
1955	5.9	15.9	45.0	0.5	67.3	39.6	106.9	67.3	39.6	106.9	
1956	1.8	14.6	31.8		48.2	2.4	50.6	48.2	2.4	50.6	
1957	2.3	2.7	16.4	0.5	21.9	5.0	26.9	21.9	5.0	26.9	
1958	4.1	9.0	25.8		38.9	7.1	46.0	38.9	7.1	46.0	
1959	1.9	6.8	11.4		20.1		20.1	20.1	0.0	20.1	
1960	4.5	4.2	12.3	0.5	21.5	0.8	22.3	21.5	0.8	22.3	
1961	1.4	8.1	15.5		25.0	8.6	33.6	25.0	8.6	33.6	
1962	2.3	5.4	16.8		24.5	8.7	33.2	24.5	8.7	33.2	
1963	2.3	9.1	29.1		40.5	13.1	53.6	40.5	13.1	53.6	
1964	1.9	5.9	20.0	15.0	42.8	9.7	52.5	42.8	9.7	52.5	
1965	3.6	1.4	17.8	4.1	26.9	5.3	32.2	26.9	5.3	32.2	
1966	0.5	4.1	22.2	1.4	28.2	19.7	47.9	28.2	19.7	47.9	
1967	2.1	0.4	11.2	0.1	13.8	4.1	17.9	13.8	4.1	17.9	
1968	7.0	2.2	12.7	0.2	22.1	12.3	34.4	22.1	12.3	34.4	
1969	7.2	2.5	13.9		23.6	60.4	84.0	23.6	60.4	84.0	
1970	2.1	2.6	24.3		29.0	54.3	83.3	29.0	54.3	83.3	
1971	2.6	10.9	35.6		49.1	67.1	116.2	49.1	67.1	116.2	
1972	1.1	2.1	21.8		25.0	35.4	60.4	25.0	35.4	60.4	
1973	1.3	2.9	15.7		19.9	27.1	47.0	19.9	27.1	47.0	
1974	3.2	1.3	9.1		13.6	20.9	34.5	13.6	20.9	34.5	
1975	0.9	1.0	10.5		12.4	51.9	64.3	12.4	51.9	64.3	
1976	1.0	1.0	7.0		9.0	78.0	87.0	9.0	78.0	87.0	
1977	2.0		5.0	2.0	9.0	100.0	109.0	9.0	100.0	109.0	
1978		1.0	51.0		52.0	44.0	96.0	52.0	44.0	96.0	
1979	6.0		15.0		21.0	76.2	97.2	21.0	76.2	97.2	
1980		10.5	20.0		30.5	24.0	54.5	30.5	24.0	54.5	
1981	1.0	1.0	18.0		20.0	35.0	55.0	20.0	35.0	55.0	
1982		2.0	15.0		17.0	3.0	20.0	17.0	3.0	20.0	
1983	2.0		16.0	1.0	19.0		19.0	19.0	0.0	19.0	
1984	5.0		3.0		8.0	3.0	11.0	8.0	3.0	11.0	
1985	2.0		5.0		7.0	73.0	80.0	7.0	73.0	80.0	
1986	2.0		4.0		6.0	55.0	61.0	6.0	55.0	61.0	
1987		13.0	1.0		14.0	49.0	63.0	14.0	49.0	63.0	
1988		13.0	1.0		14.0	135.0	149.0	14.0	135.0	149.0	
1989		1.0	5.0		6.0	116.0	122.0	0.026	6.0	116.0	122.0
1990	0.5		4.5	0.5	5.5	90.1	95.6	0.174	5.5	90.2	95.8
1991	0.5	11.5	23.0	3.5	38.5	88.2	126.7	0.065	38.5	88.3	126.8
1992	19.0	10.0	22.0	2.0	53.0	69.4	122.4	0.227	53.0	69.6	122.6
1993	40.0	7.5	21.5	3.0	72.0	116.9	188.9	0.713	72.2	117.4	189.6
1994	7.0	8.5	27.8	2.2	45.5	86.5	132.0	1.574	46.4	87.2	133.6
1995	15.2	2.8	37.7	7.5	63.1	100.7	163.8	3.238	65.7	101.3	167.0
1996	13.9	6.9	22.4	7.1	50.3	63.0	113.3	2.864	52.7	63.5	116.2
1997	6.5	10.1	27.6	6.0	50.2	69.2	119.4	4.130	53.5	70.1	123.6
1998	17.5	9.6	40.0	6.4	73.5	87.7	161.2	2.049	75.0	88.2	163.3
1999	17.8	6.7	36.4	8.7	69.6	79.6	149.2	0.478	70.1	79.6	149.7
2000	12.6	11.1	48.4	18.0	90.0	69.0	159.0	0.676	90.7	69.0	159.7
2001	11.4	16.8	31.1	9.1	68.4	64.3	132.7	1.842	70.2	64.4	134.6
2002	13.3	4.4	24.6	10.0	52.3	63.3	115.6	2.403	54.6	63.3	118.0
2003	9.4	7.6	13.7	4.3	35.0	59.0	94.0	1.850	36.9	59.0	95.9
2004	12.6	11.3	29.4	4.9	58.1	55.8	113.9	1.511	59.6	55.8	115.5
2005	11.6	8.7	22.7	3.2	46.1	45.8	92.0	3.158	49.3	45.9	95.1
2006	10.5	5.0	35.8	13.5	64.7	40.9	105.6	2.463	67.2	40.9	108.0

Table 29. Estimated size of elver runs at East River-Sheet Harbour and East River-Chester, Nova Scotia.

Year	East R.-Sheet Harbour		East R.-Chester	
	Estimate	95%CI	Estimate	95%CI
1990	218,300			
1991	376,000			
1992	219,200			
1993	134,100			
1994	309,900	10,900		
1995	101,500	1,600		
1996	336,500	10,100	1,138,100	24,200
1997	467,400	7,000	1,419,000	52,100
1998	109,200	2,000	432,400	8,200
1999	134,600	600	441,700	9,800
2000			791,204	
2001			608,377	
2002			1,715,009	

Table 30. Arithmetic annual mean (±standard error) of American eels per 100 m² in the first sweep of electrofishing surveys in barriered and open sites in New Brunswick rivers that flow into the Bay of Fundy.

Year	Hammond			Kennebecasis			Keswick			Nashwaak - barrier			Nashwaak - open			Big Salmon			
	Eels/100 m ²		Survey	Eels/100 m ²		Survey	Eels/100 m ²		Survey	Eels/100 m ²		Survey	Eels/100 m ²		Survey	Eels/100 m ²			
	Mean	SE	N	type ^a	Mean	SE	N	type	Mean	SE	N	type	Mean	SE	N	type	Mean	SE	N
1979	1.89		1	B	1.44		1	B	2.68		5	B							
1980																			
1981	3.26	0.81	5	B	0.72	0.54	5	B	2.71	0.54	7	B							
1982	2.08	0.79	5	B	1.00	0.35	5	B	1.58	0.39	8	B							
1983	3.71	1.53	5	B	2.91	0.93	5	B	3.04	0.49	8	B							
1984	3.91	0.98	5	B	1.31	0.54	5	B	2.74	1.02	8	B							
1985	5.04	0.67	5	B	4.32	1.13	5	B	3.63	0.38	8	B							
1986	4.02	0.94	5	B	4.30	2.46	5	B	2.26	0.63	8	B							
1987																			
1988	4.78	1.44	5	B	1.13	0.17	4	B	4.70		1	B							
1989	1.72	0.58	5	B	2.54	1.00	5	B	3.36	1.79	8	B							
1990	2.98	1.49	5	B	2.83	0.92	4	B	3.61	0.42	8	B							
1991	3.76	1.37	5	B	2.54	0.81	5	B	3.14	0.66	5	B							
1992																			
1993																			
1994	0.00	0.00	3	O	0.00		1	O	0.00	0.00	5	O							
1995																			
1996	0.80	0.29	4	O	1.20		1	O	0.88	0.38	4	O	1.40	0.22	9	O	0.34	0.27	5
1997	0.95	0.31	4	O	0.17	0.17	3	O	0.48	0.15	4	O	1.03	0.23	9	O	4.38	1.60	4
1998	0.53	0.20	4	O	0.07	0.03	3	O	0.85	0.30	4	O	1.23	0.25	8	O			
1999	0.75	0.21	4	O	0.13	0.13	3	O	0.17	0.12	3	O	0.93	0.00	3	B	1.38	0.33	9
2000	0.00	0.00	2	O	1.50	0.27	4	O	2.60	1.10	3	B	1.53	0.27	10	O	2.98	1.06	4
2001	0.68	0.23	4	O	1.73	0.65	4	O	1.38	0.35	9	O	0.80	0.57	3	B			
2002	0.25	0.06	4	O	1.00	0.35	3	O	0.65	0.00	2	B	0.66	0.25	7	O	1.62	0.67	5
2003	0.57	0.09	3	O									2.13	0.35	3	O	1.88	0.92	5
2004													1.57	0.27	6	O	1.02	0.35	5
2005																	1.94	0.58	5

^aB - barrier, O - open

Table 31. Arithmetic annual mean (\pm standard error) of American eels per 100 m^2 in the first sweep of electrofishing surveys in barriered and open sites in Nova Scotia rivers that flow into the Bay of Fundy and the Atlantic Ocean.

Year	Stewiacke				St. Marys - barrier				St. Marys - open				Lahave			
	Eels/ 100 m^2		Survey		Eels/ 100 m^2		Survey		Eels/ 100 m^2		Survey		Eels/ 100 m^2		Survey	
	Mean	SE	N	type ^a	Mean	SE	N	type	Mean	SE	N	type	Mean	SE	N	type
1967													1.683	1.065		B
1968	21.57	6.285	6	B												
1969	21.13	5.564	6	B												
1970																
1971	17.18	5.194	6	B												
1972													1.606	0.623	5	B
1973													0.853	0.37	4	B
1974	9.899	2.847	6	B									1.684	0.261	5	B
1975													2.41	1.175	5	B
1976													0.415	0.24	3	B
1977													0.724	0.278	5	B
1978					7.607	2.185	8	B					0.803	0.284	5	B
1979					5.70	0.94	9	B								
1980					6.87	1.22	9	B					2.18	0.77	3	B
1981					6.61	1.56	8	B					2.03	1.08	3	B
1982					2.98	0.63	8	B					0.22	0.16	4	B
1983					7.79	1.04	8	B								
1984	6.59	1.00	11	O	11.55	8.87	7	B								
1985	6.76	1.20	15	O					6.89	1.12	8	O				
1986	6.34	1.51	20	O	4.89	1.23	7	B	6.48	0.57	9	O				
1987	9.78	2.28	22	O	8.00	1.32	9	B								
1988	15.74	2.49	20	O	7.65	1.58	7	B								
1989	10.50	2.37	17	O												
1990	8.68	1.84	24	O												
1991	5.87	0.74	30	O												
1992	5.62	0.94	28	O												
1993	6.02	0.84	30	O												
1994	4.90	0.76	30	O												
1995	5.81	0.96	26	O					6.61	1.20	10	O	0.81	0.17	4	O
1996									3.51	0.70	8	O				
1997	9.54	1.51	27	O					5.04	0.75	10	O	1.60	0.58	4	O
1998	6.98	1.08	28	O					8.45	1.37	10	O				
1999	7.08	1.84	21	O					5.42	1.19	10	O				
2000	2.34	0.56	20	O					1.66	0.23	10	O	3.64	0.36	2	O
2001	0.90	0.11	9	O					1.68	0.48	6	O	1.90	0.60	2	O
2002	1.71	0.45	16	O					1.40	0.32	8	O	1.86	0.37	3	O
2003	1.90	0.31	26	O					1.83	0.60	6	O	0.57	0.11	4	O
2004									0.47	0.12	6	O	0.46	0.25	3	O

^aB - barrier, O - open

Table 32. Age frequency distributions of American eels in the Scotia-Fundy area. Eels are considered to be age 0 in their year of arrival in continental waters.

Table 32 (continued)

Table 34. Catch rates of American eels in fyke nets in Western Brook, Newfoundland. Data from Dietrich 2001.

Year	May				June				July				All months			
	Eels caught	Gear-days	Gear location ^a	Eels/gear-day	Eels caught	Gear-days	Gear location ^a	Eels/gear-day	Eels caught	Gear-days	Gear location ^a	Eels/gear-day	Eels caught	Gear-days	Gear location ^a	Eels/gear-day
1998	79	10	60	7.90	116	30	60	3.87	30	29	60	1.03	225	69	60	3.26
1999					239	75	60	3.19	21	93	60	0.23	260	168	60	1.55
2000					653	78	330	8.37	201	145	330	1.39	854	223	330	3.83
Mean				7.90				5.14				0.88				2.88

^aDistance (m) downstream from Western Brook Pond

Table 35. Age frequency distributions of American eels in Newfoundland. Eels are considered to be age 0 in their year of arrival in continental waters.

Site	Salmon R.	Burnt Berry Brk.	Indian Pond	Dog Bay	Topsail Barachois	Topsail Pond	Holyrood Bay
Habitat	Stream	Stream	Brackish pond	River mouth	Brackish pond	Fresh pond	River mouth
Main stage	Yellow	Yellow	Yellow	Silver	Yellow	Silver	Silver
Year	1968	1967	1967	1981	1967	1967	1981
Gear	Smolt trap	E-fishing	Pots	Fyke	Pots	Fyke	Fyke
Exploited			Yes		No		Some
Source	Gray and Andrews 1971	Gray and Andrews 1971	Gray and Andrews 1971	Bouillon and Haedrich 1985	Gray and Andrews 1971	Gray and Andrews 1971	Bouillon and Haedrich 1985
<u>Age (years)</u>							
Mean	6.7	5.7	8.7	13.0	8.0	12.3	12.9
SD	1.5	2.0	1.6	1.6	1.5	1.6	1.6
N	38	66	75	94	135	92	90
0							
1							
2		2					
3		6					
4	3	13			2		
5	7	13	2		5		
6	6	15	6		19		
7	9	3	10		20		
8	11	6	13		27		
9	1	5	15	1	45	5	2
10	1	2	20	3	12	5	3
11		1	7	11	4	13	11
12			2	21	1	34	21
13				27		20	22
14				16		6	20
15				12		6	5
16						1	3
17				2		1	3
18				1		1	
19							
20							
21							
22							

Table 37. Landed values American eels in Canada, from DFO Statistics Branch (http://www.dfo-mpo.gc.ca/communic/statistics/commercial/index_e.htm). Conversion to 2004 dollars is from the Canadian Consumer Price Index (<http://www40.statcan.ca/l01/cst01/econ46.htm>).

Year	Landed value (1,000s of dollars)							Landed value (1,000s of dollars), in 2004 dollars						
	Ont	Que	NB	NS	PEI	Nfld	Canada	Ont	Que	NB	NS	PEI	Nfld	Canada
	& Lab							& Lab						
1980	455	1,940	219	51	145	19	2,829	1,082	4,613	521	121	345	45	6,727
1981	260	1,829	358	50	364	43	2,904	550	3,869	757	106	770	91	6,143
1982	39	749	281	47	281	47	1,444	74	1,429	536	90	536	90	2,755
1983	111	770	164	46	226	36	1,353	200	1,388	296	83	408	65	2,440
1984	226	1,090	197	32	272	20	1,837	391	1,884	340	55	470	35	3,175
1985	236	1,385	613	24	255	18	2,531	392	2,301	1,018	40	424	30	4,205
1986	283	1,996	738	49	558	52	3,676	451	3,185	1,178	78	891	83	5,865
1987	247	2,277	781	91	467	105	3,969	378	3,482	1,194	139	714	161	6,067
1988	236	2,114	1,332	129	351	219	4,381	347	3,106	1,957	190	516	322	6,438
1989	362	1,683	1,423	94	212	308	4,083	507	2,357	1,992	132	297	431	5,716
1990	225	2,545	1,018	26	390	560	4,765	300	3,399	1,360	34	521	748	6,363
1991	430	2,590	918	74	426	564	5,002	544	3,277	1,161	93	539	714	6,328
1992	526	2,057	808	118	184	390	4,083	655	2,563	1,007	147	229	486	5,088
1993	193	1,822	1,062	657	246	485	4,465	236	2,231	1,299	804	301	593	5,465
1994	241	1,809	1,117	548	220	469	4,404	294	2,210	1,364	669	269	573	5,380
1995	281	1,943	1,296	1,440	203	431	5,594	336	2,323	1,550	1,722	243	515	6,689
1996	289	2,113	914	1,545	224	579	5,664	340	2,486	1,075	1,818	264	681	6,664
1997	206	1,568	1,567	2,130	241	446	6,158	239	1,816	1,815	2,467	279	516	7,131
1998	62	1,673	606	718	115	417	3,591	71	1,919	695	824	132	478	4,120
1999	65	1,469	530	254	179	332	2,829	73	1,656	598	286	202	374	3,190
2000	138	1,706	689	468	328	341	3,670	151	1,873	756	514	360	374	4,029
2001	172	1,386	851	763	230	139	3,541	184	1,484	911	817	246	149	3,790
2002	85	1,297	700	620	297	265	3,264	89	1,358	733	649	311	277	3,418
2003	85	1,037	821	474	269	269	2,955	87	1,057	836	483	274	274	3,011
2004	1	^a	855	889	306	232	2,283	1	^a	855	889	306	232	2,283

^aData not available

Table 38. Mean price per kg paid to fisheries for American eels in Canada, calculated from DFO Statistics Branch (http://www.dfo-mpo.gc.ca/communic/statistics/commercial/index_e.htm). Conversion to 2004 dollars is from the Canadian Consumer Price Index (<http://www40.statcan.ca/l01/cst01/econ46.htm>).

Year	Mean price per kg								Mean price per kg, in 2004 dollars							
	Ont	Que	NB	NS	PEI	Nfld	Canada & Lab	Canada, no elvers ^a	Ont	Que	NB	NS	PEI	Nfld	Canada & Lab	Canada, no elvers ^a
1980	2.69	3.22	1.24	0.98	1.20	0.23	2.35	2.35	6.40	7.65	2.96	2.33	2.85	0.55	5.59	5.59
1981	2.34	3.03	1.58	1.85	1.65	1.05	2.36	2.36	4.96	6.42	3.34	3.92	3.48	2.22	4.99	4.99
1982	1.22	2.22	1.76	1.88	1.67	1.27	1.90	1.90	2.33	4.24	3.35	3.59	3.19	2.42	3.63	3.63
1983	1.59	2.18	1.67	1.53	1.51	1.29	1.86	1.86	2.86	3.93	3.02	2.76	2.72	2.32	3.35	3.35
1984	1.98	2.51	1.54	1.88	1.65	1.43	2.11	2.11	3.43	4.34	2.66	3.25	2.85	2.47	3.64	3.64
1985	2.25	3.10	1.79	2.18	1.82	1.64	2.39	2.39	3.73	5.15	2.97	3.62	3.03	2.72	3.98	3.98
1986	2.40	4.02	2.21	2.42	2.47	1.96	3.01	3.01	3.83	6.41	3.52	3.86	3.94	3.12	4.80	4.80
1987	2.38	4.14	2.98	3.25	3.11	3.44	3.53	3.53	3.63	6.32	4.56	4.96	4.76	5.25	5.39	5.39
1988	2.34	4.39	3.11	3.34	2.82	3.61	3.55	3.55	3.43	6.44	4.57	4.91	4.14	5.30	5.21	5.21
1989	2.94	3.31	3.26	2.91	2.76	3.69	3.24	3.24	4.12	4.63	4.56	4.07	3.86	5.16	4.53	4.53
1990	2.59	4.28	3.24	1.00	3.15	3.82	3.69	3.91	3.45	5.72	4.33	1.34	4.21	5.11	4.93	5.22
1991	3.31	4.61	3.18	1.00	3.37	4.21	3.80	4.21	4.18	5.84	4.02	1.26	4.26	5.32	4.81	5.33
1992	4.17	4.60	3.49	1.00	3.38	4.34	3.83	4.40	5.20	5.73	4.35	1.25	4.21	5.40	4.77	5.48
1993	2.19	4.04	3.52	4.12	3.34	4.18	3.75	3.77	2.68	4.94	4.30	5.05	4.09	5.11	4.59	4.61
1994	3.39	4.54	3.51	3.87	4.81	4.23	4.06	4.37	4.15	5.54	4.29	4.72	5.87	5.17	4.95	5.34
1995	4.39	5.41	7.41	10.70	5.87	4.96	6.55	5.25	5.25	6.47	8.87	12.80	7.02	5.94	7.84	6.28
1996	5.07	6.00	6.05	18.51	6.27	6.13	7.32	5.94	5.97	7.05	7.12	21.78	7.38	7.22	8.61	6.99
1997	4.68	5.45	6.55	26.34	5.49	6.22	8.03	5.50	5.42	6.32	7.58	30.50	6.36	7.20	9.29	6.37
1998	2.82	4.85	4.38	8.00	4.89	5.72	5.19	4.89	3.23	5.57	5.03	9.18	5.61	6.56	5.96	5.61
1999	3.00	4.88	3.28	2.99	5.12	6.09	4.29	4.96	3.38	5.50	3.70	3.37	5.78	6.86	4.84	5.59
2000	4.67	5.87	3.21	4.80	4.15	5.45	4.74	5.44	5.13	6.44	3.53	5.27	4.55	5.99	5.21	5.97
2001	5.93	5.14	4.00	10.30	3.75	3.79	5.18	4.86	6.35	5.50	4.29	11.03	4.01	4.05	5.55	5.20
2002	5.31	6.25	3.91	10.54	3.44	4.05	5.32	5.18	5.56	6.55	4.10	11.04	3.60	4.24	5.58	5.42
2003	5.67	6.87	4.14	10.27	3.79	4.17	5.41	5.50	5.77	7.00	4.22	10.47	3.86	4.24	5.52	5.61
2004	b	b	4.62	14.11	4.43	4.76	6.24	4.58	b	b	4.62	14.11	4.43	4.76	6.24	4.58

^aExcludes data from Nova Scotia and New Brunswick in 1989-2004, when the elver fishery operated.

^bNo fishery or data not available

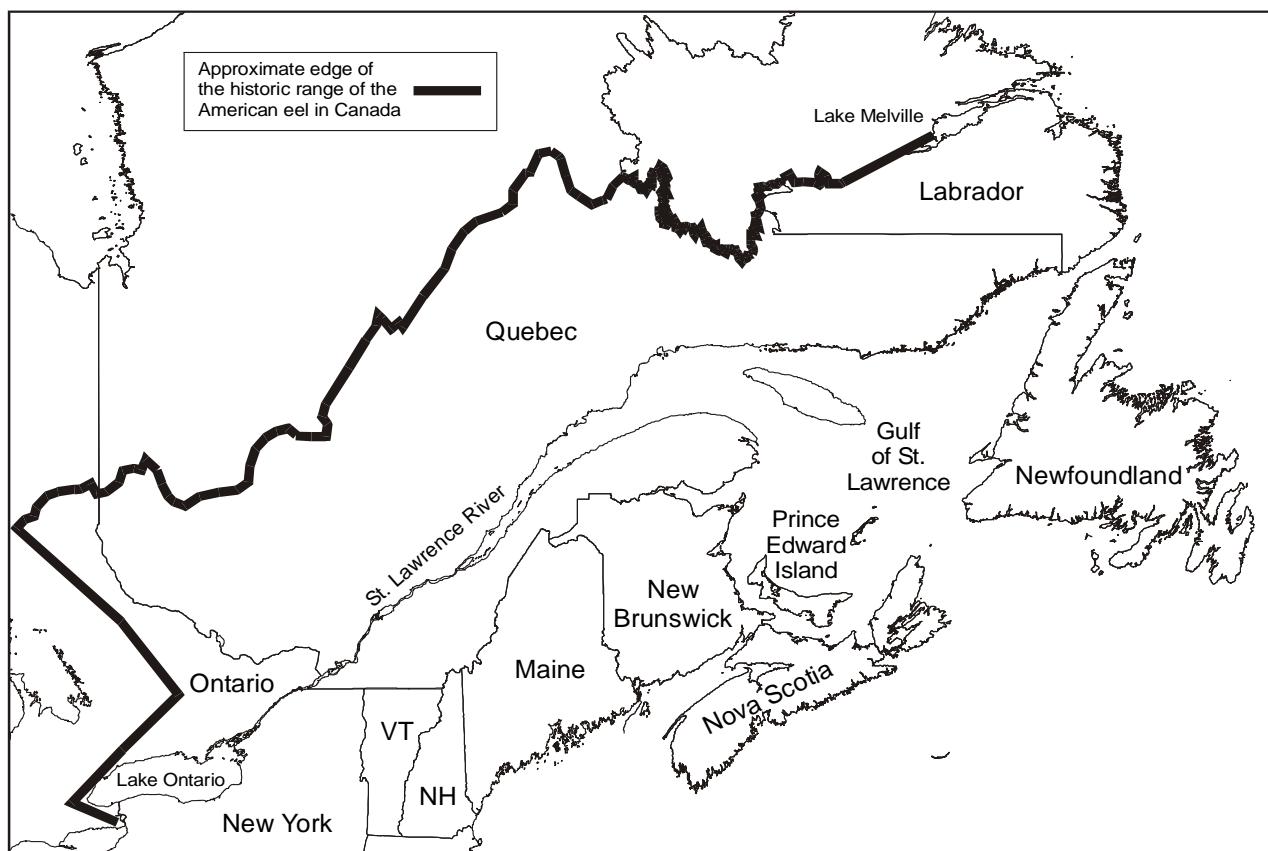


Fig. 1. Approximate edge of the historic range of the American eel in Canada, based on COSEWIC 2006.

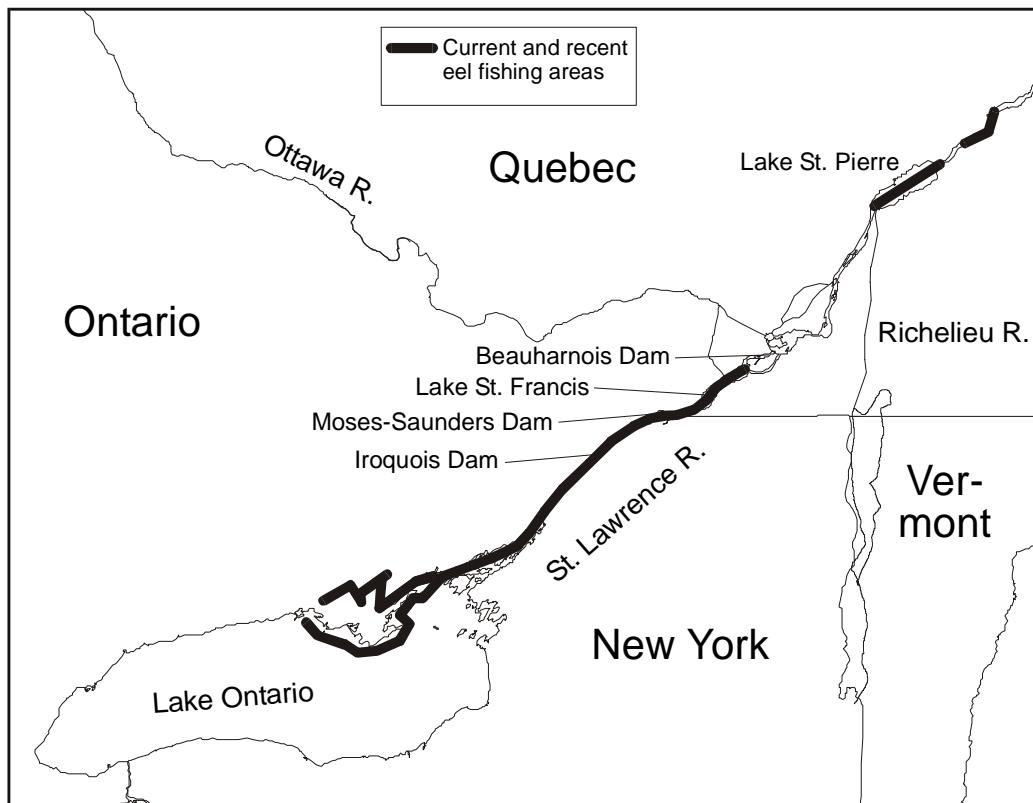


Fig. 2. Approximate areas of current and recent commercial eel fisheries in the St. Lawrence system upstream of the Quebec City area. Data from John Casselman, Queens University; Yves Mailhot, Pierre Dumont, Pierre Pettigrew and Guy Verreault, MNRF; pers. comm.

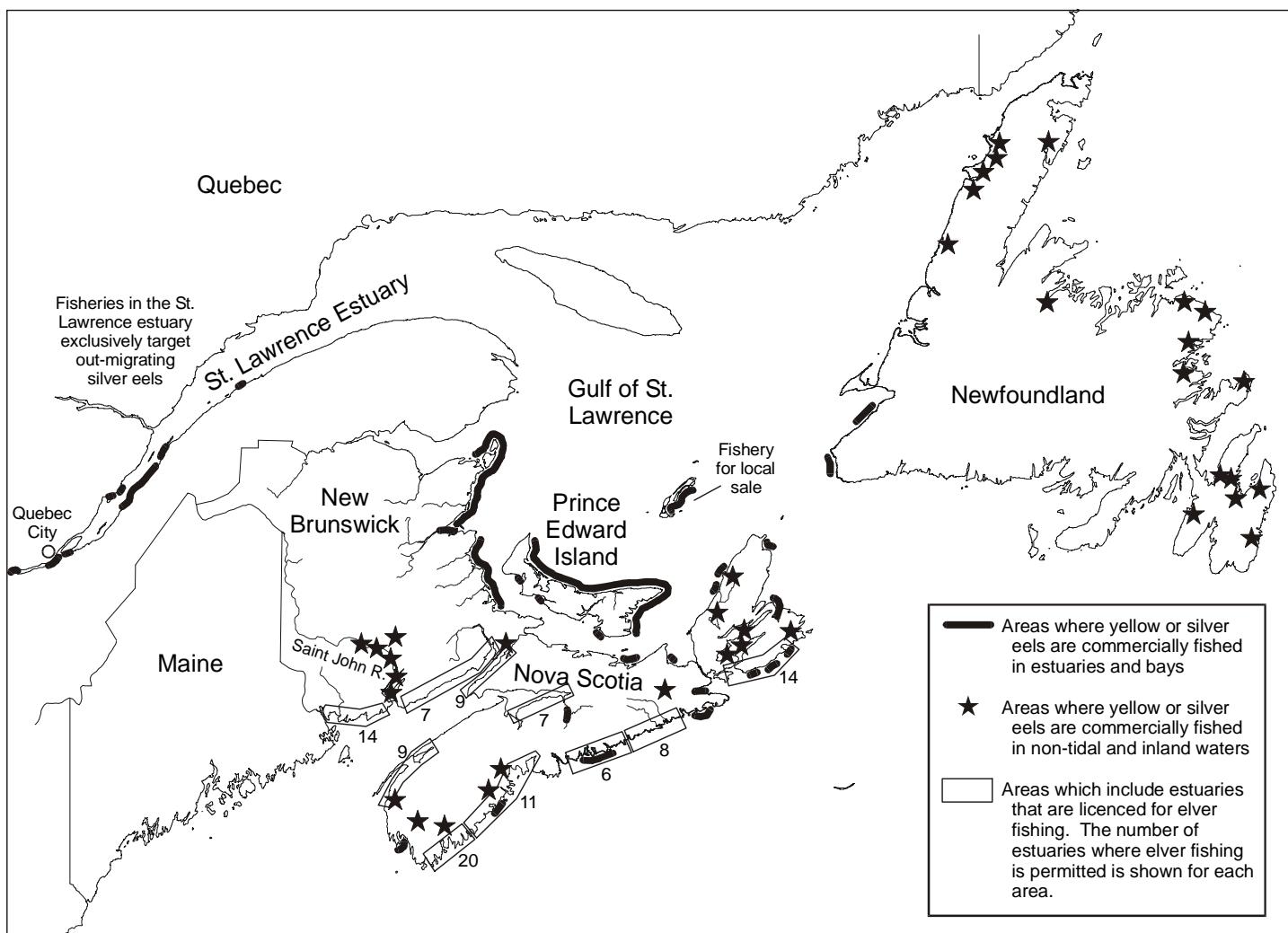


Fig. 3. Approximate areas of commercial eel fishing in Canada east of the Quebec City area. Data from Mitchel Feigenbaum and Paul Firminger, South Shore Trading Limited; François Caron, Stan Georges, and Rémi Tardif, MNRF; David Cairns, Brian Jessop, and Greg Stevens, DFO; pers. comm.

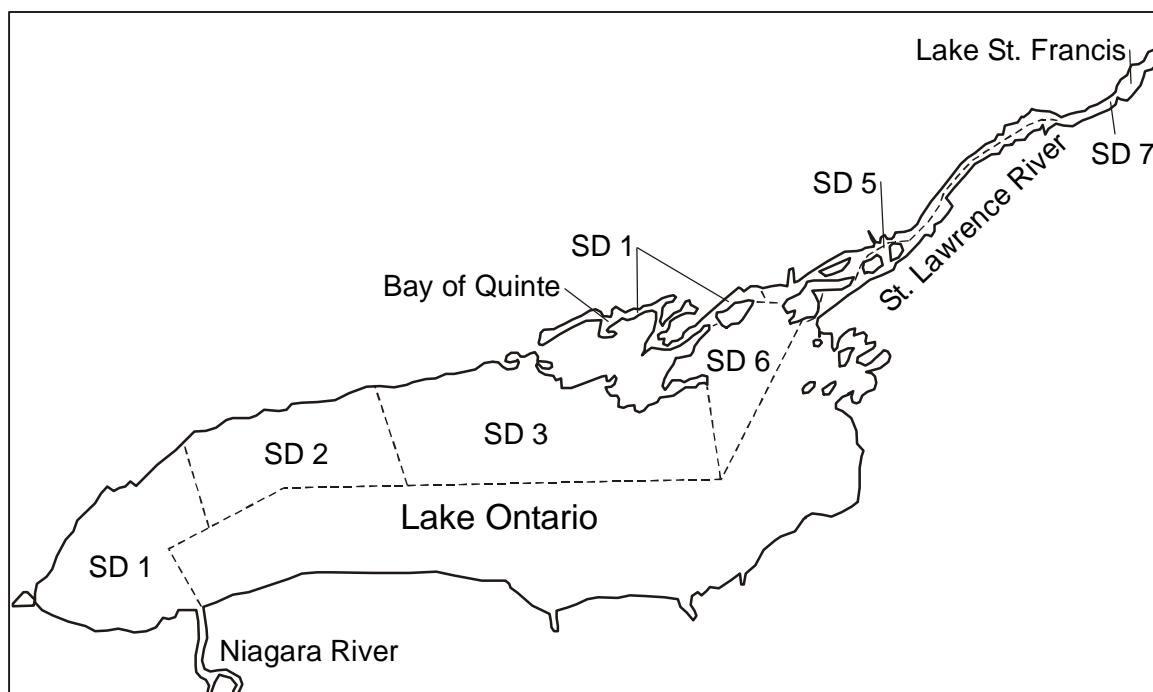


Fig. 4. Lake Ontario and the upper St. Lawrence River, showing Statistical Districts.

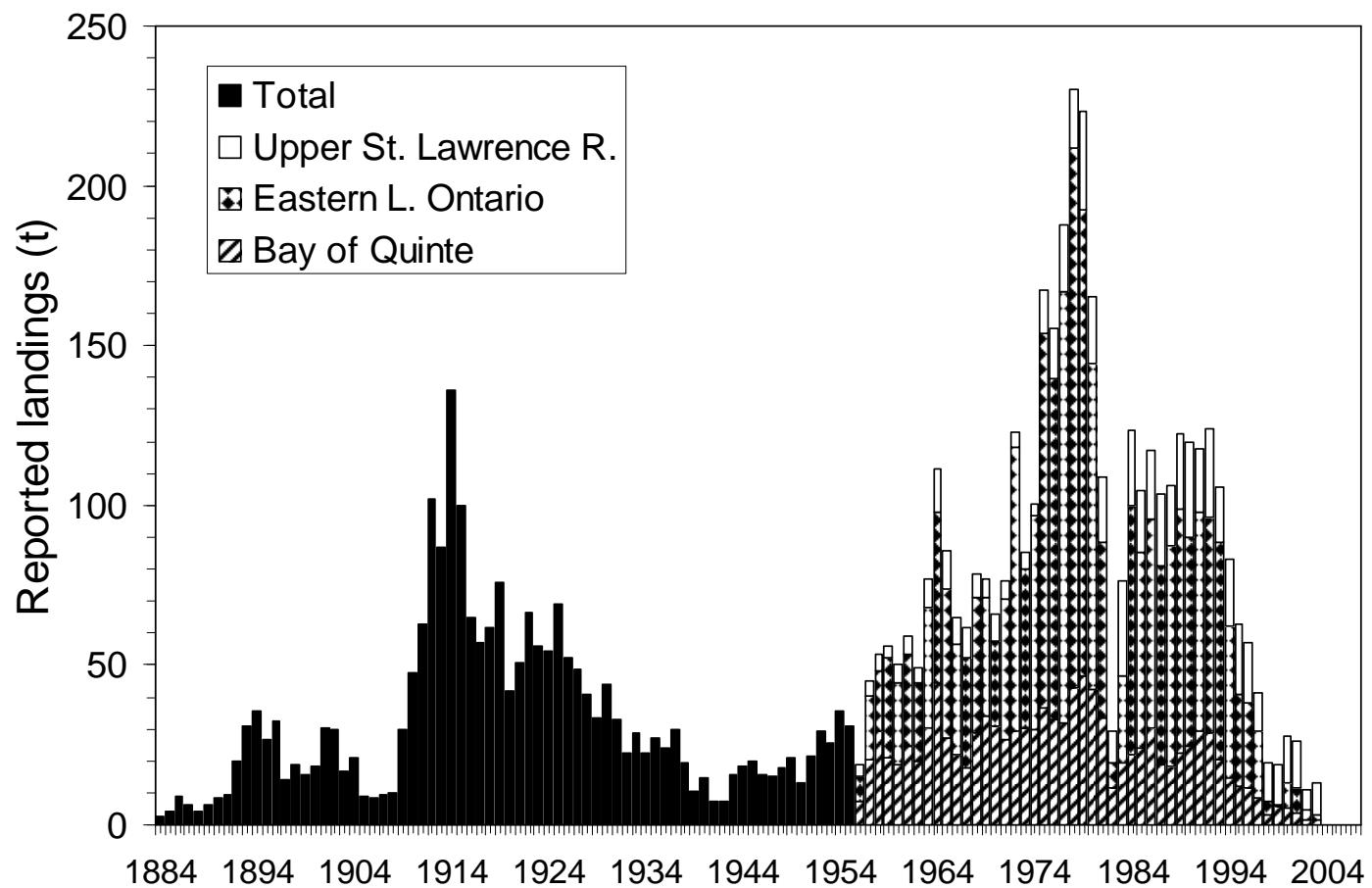


Fig. 5. Reported landings of American eels in Ontario. Geographic breakdown of landings is unavailable for 1884-1955.

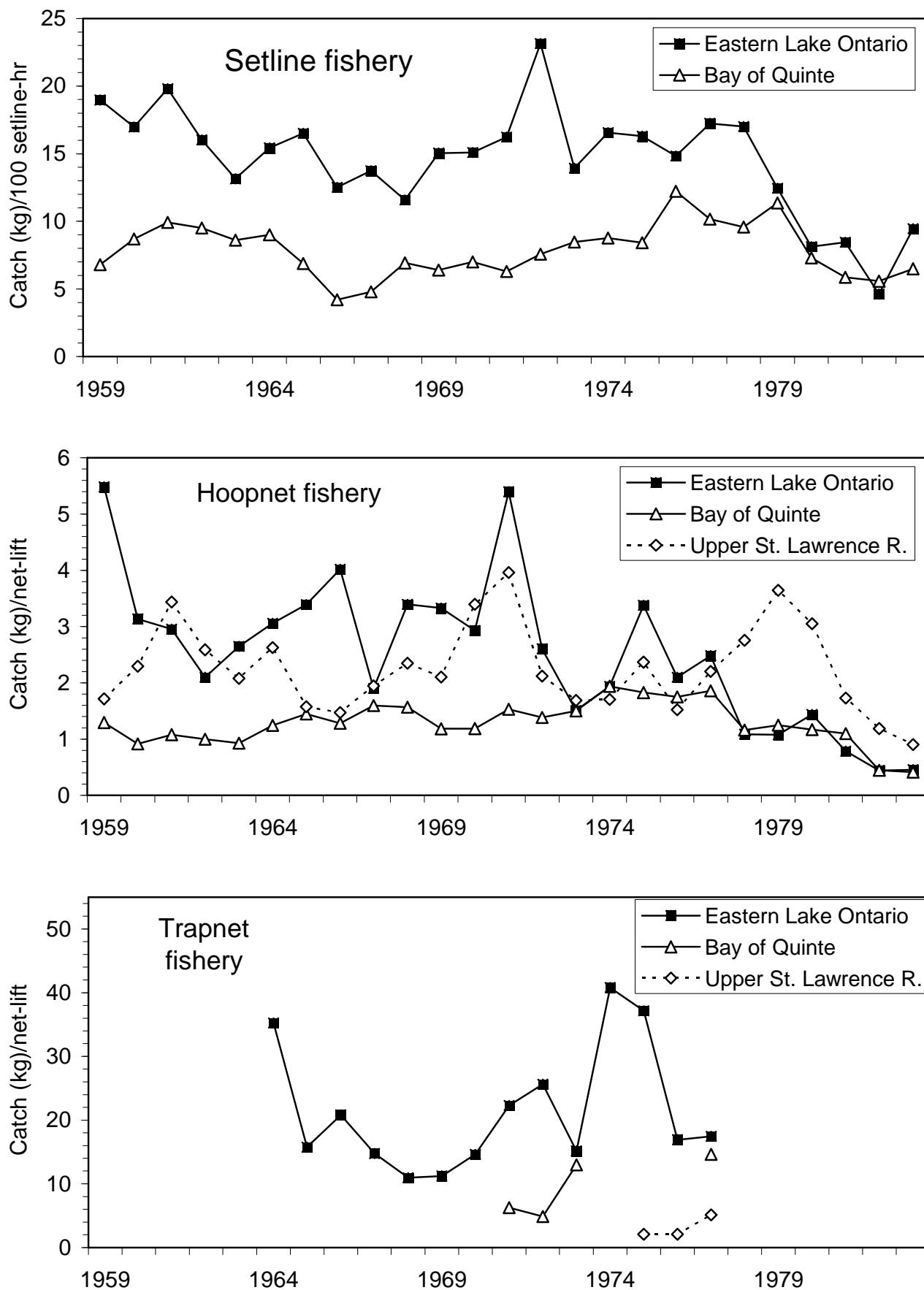


Fig. 6. Commercial CPUE for American eels in Ontario, 1959-1983.

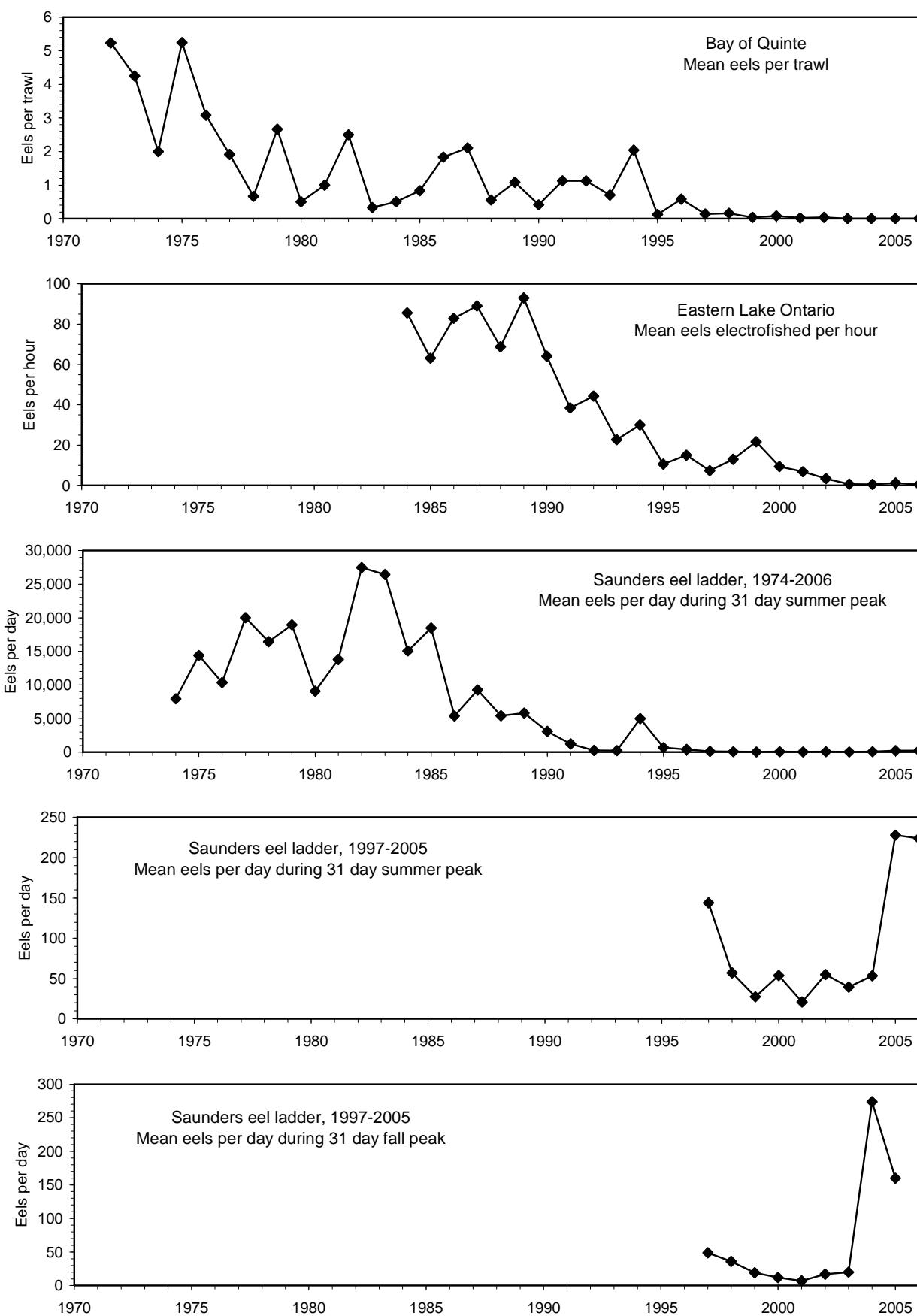


Fig. 7. American eel indices derived from Bay of Quinte trawling, Lake Ontario electrofishing, and the Saunders eel ladder on the Moses-Saunders dam.

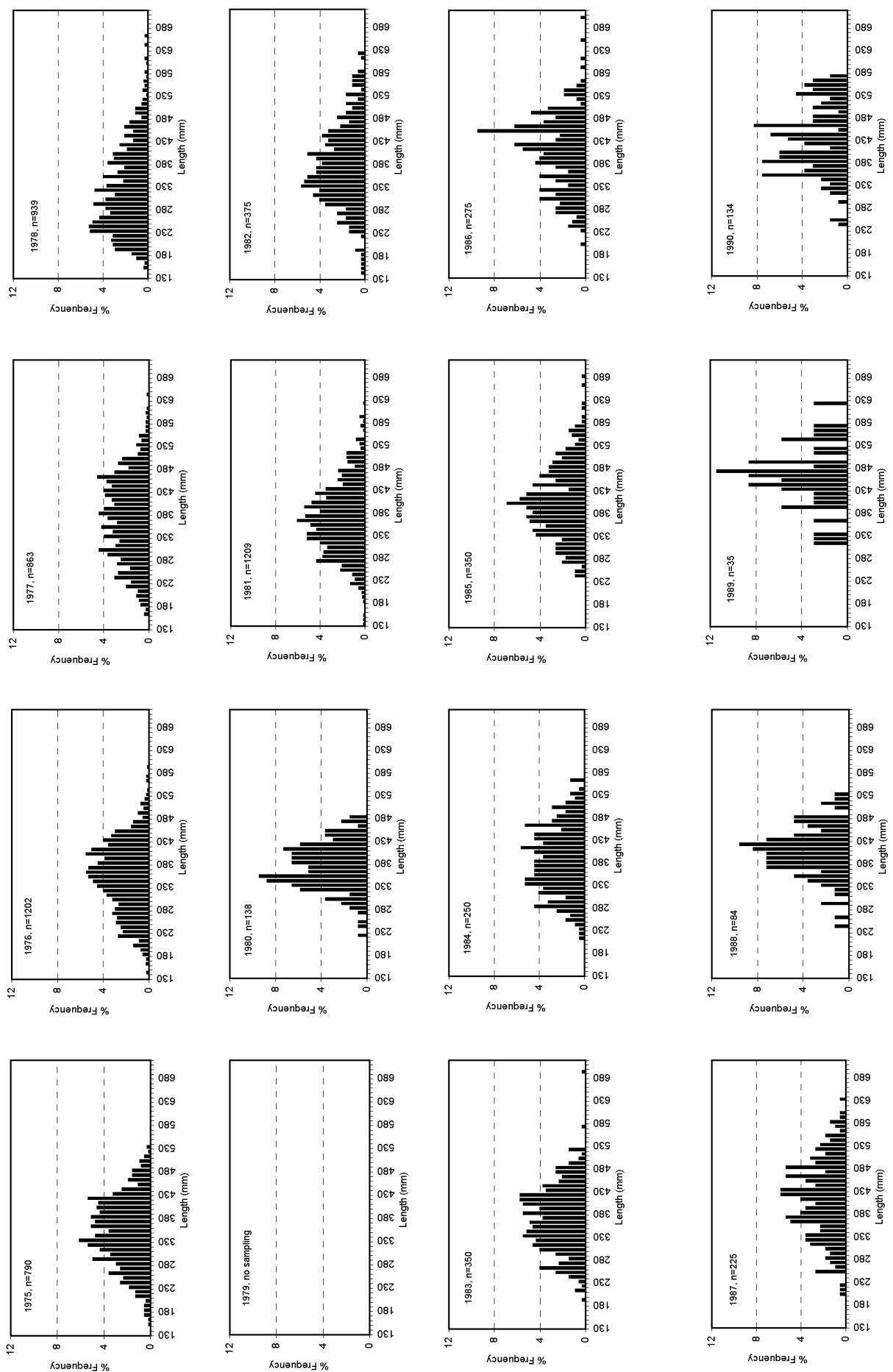


Fig. 8. Percent length frequency distributions of American eels ascending the Saunders ladder, 1975-2006.

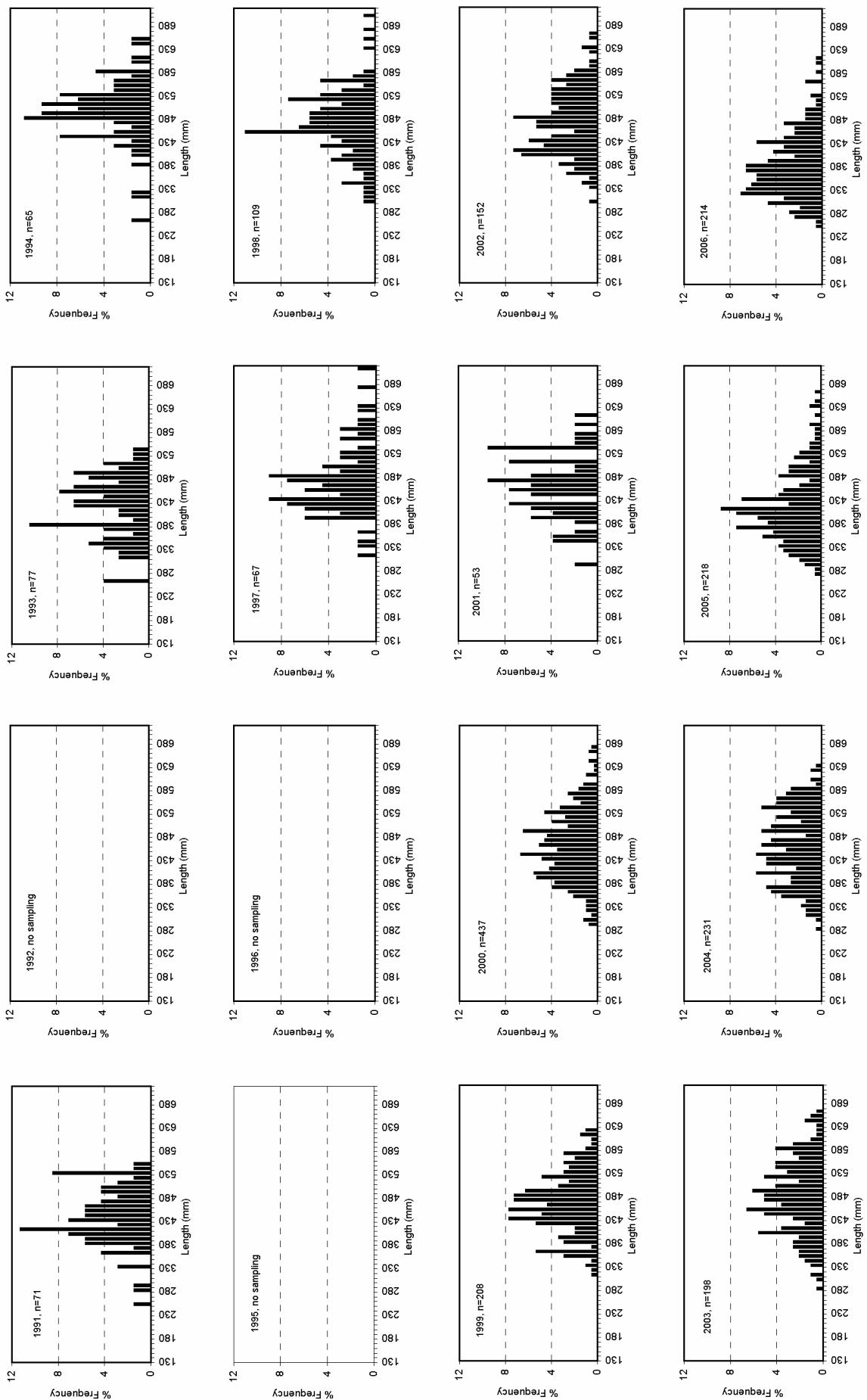


Fig. 8 (continued)

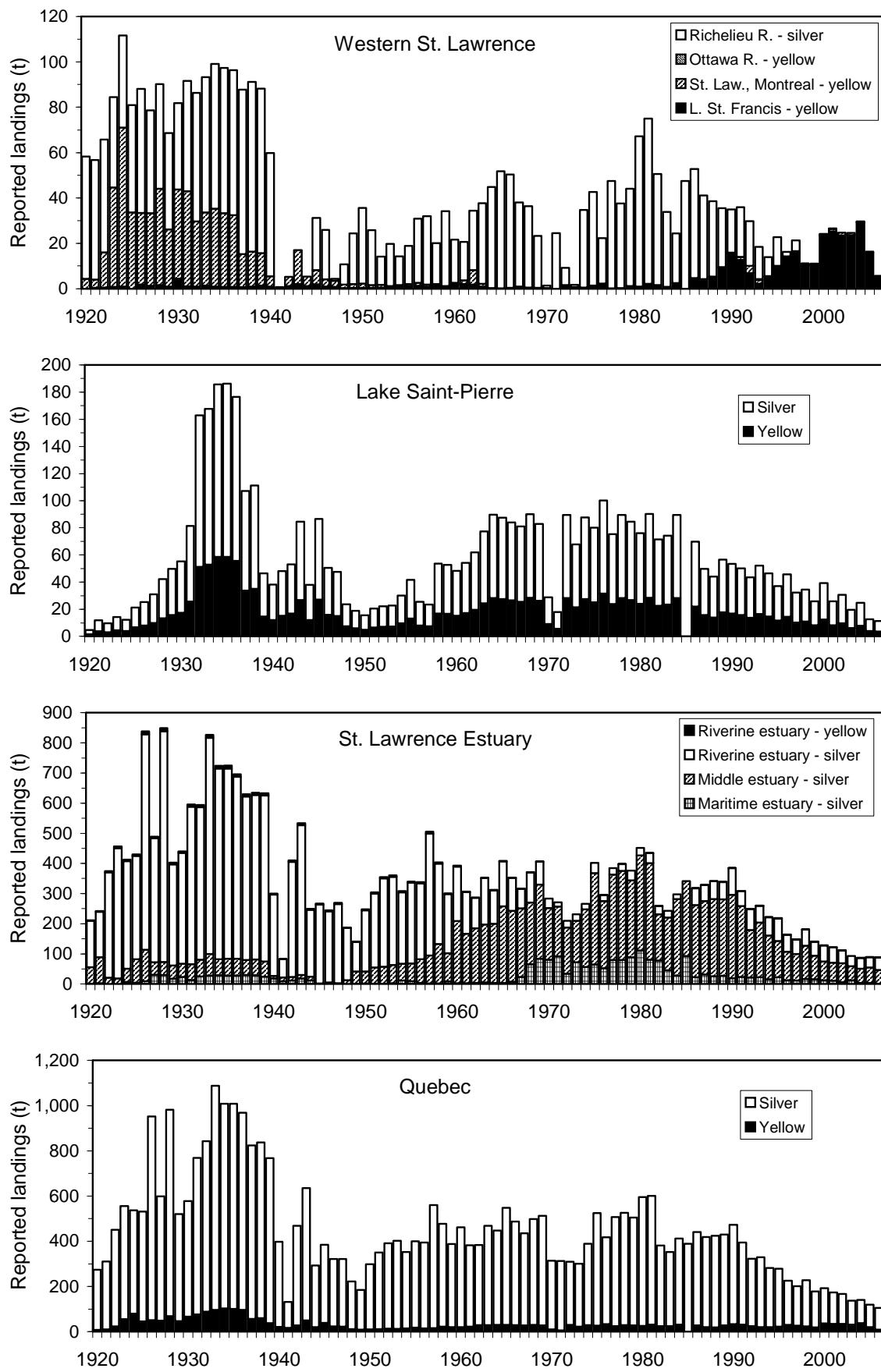


Fig. 9. Reported commercial landings (t) of American eels in Quebec, by year, stage, and region. Data for 2006 are preliminary.

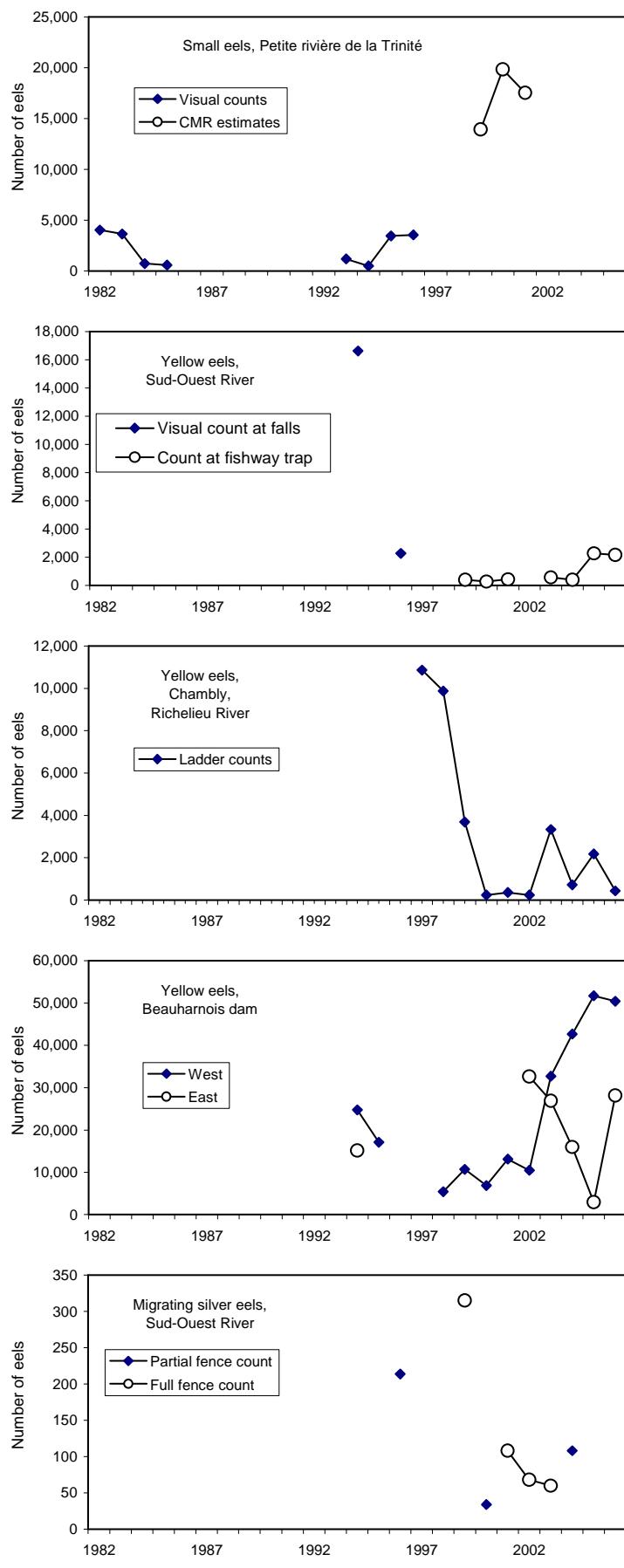


Fig. 10. Abundance indicators for small eels, yellow eels, and silver eels in Quebec. Data from Bernard and Desrochers 2006 (Chamby and Beauharnois) and from Caron et al. 2007 (all other series).

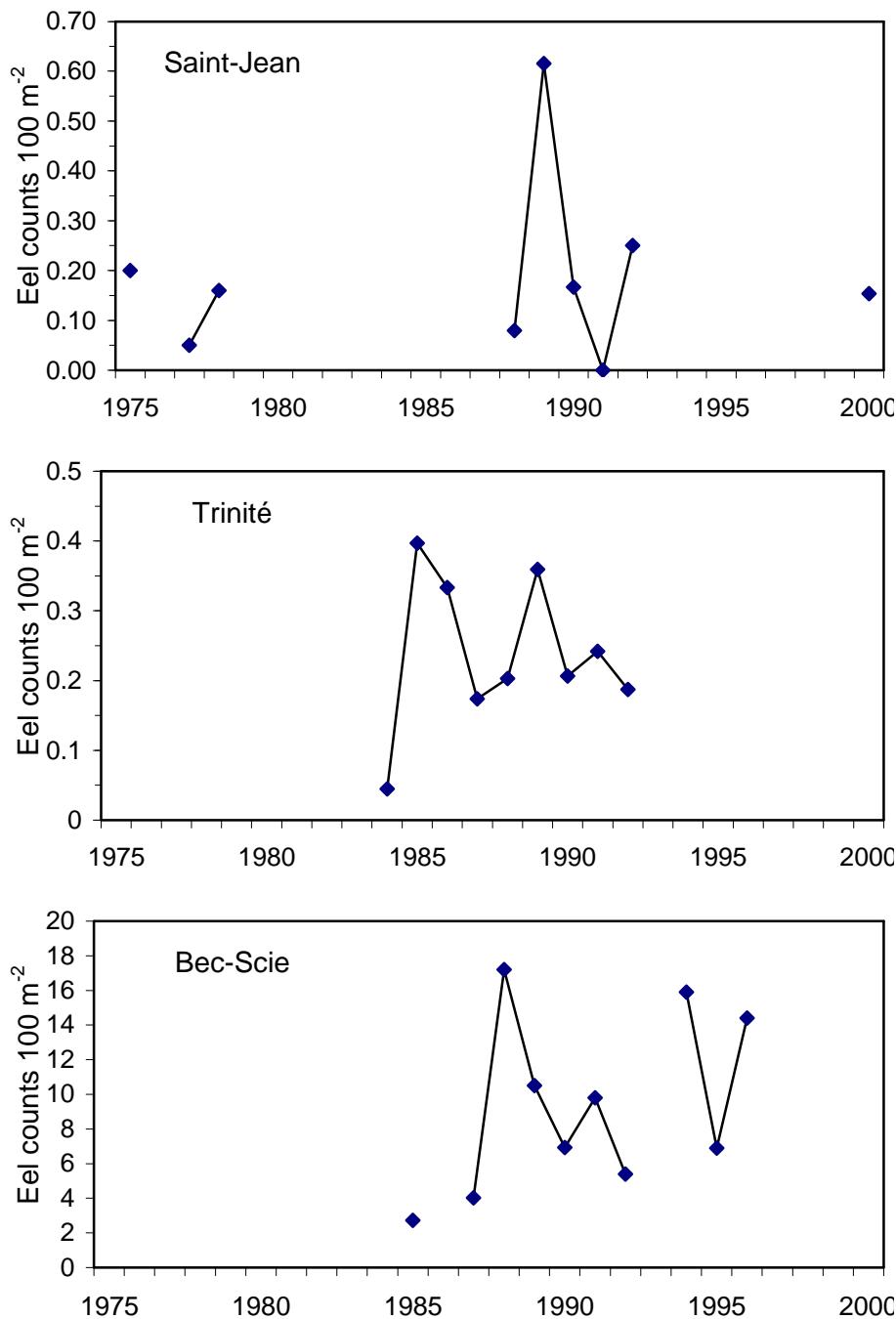


Fig. 11. Numbers of eels caught in 3 electrofishing sweeps per 100 m² in the Saint-Jean River, the Trinité River, and the Bec-scie River (including Ruisseau Castor).

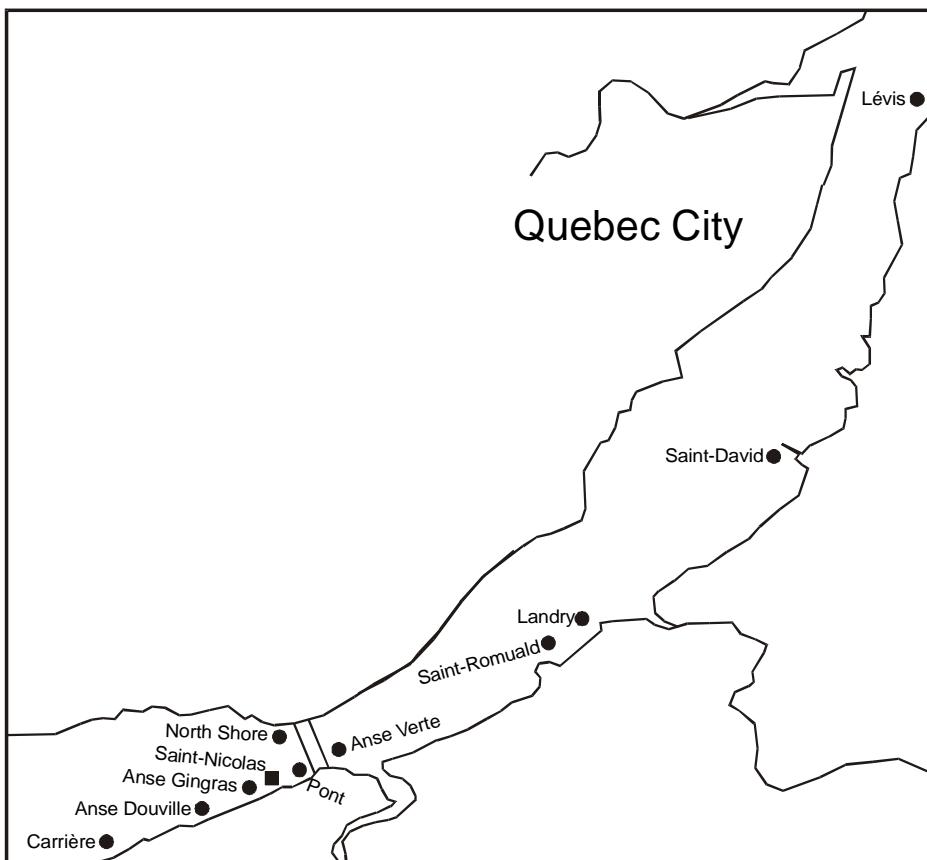


Fig.12. The St. Lawrence River in the vicinity of Quebec City, showing locations of commercial (circles) and research (square) eel trap-nets.

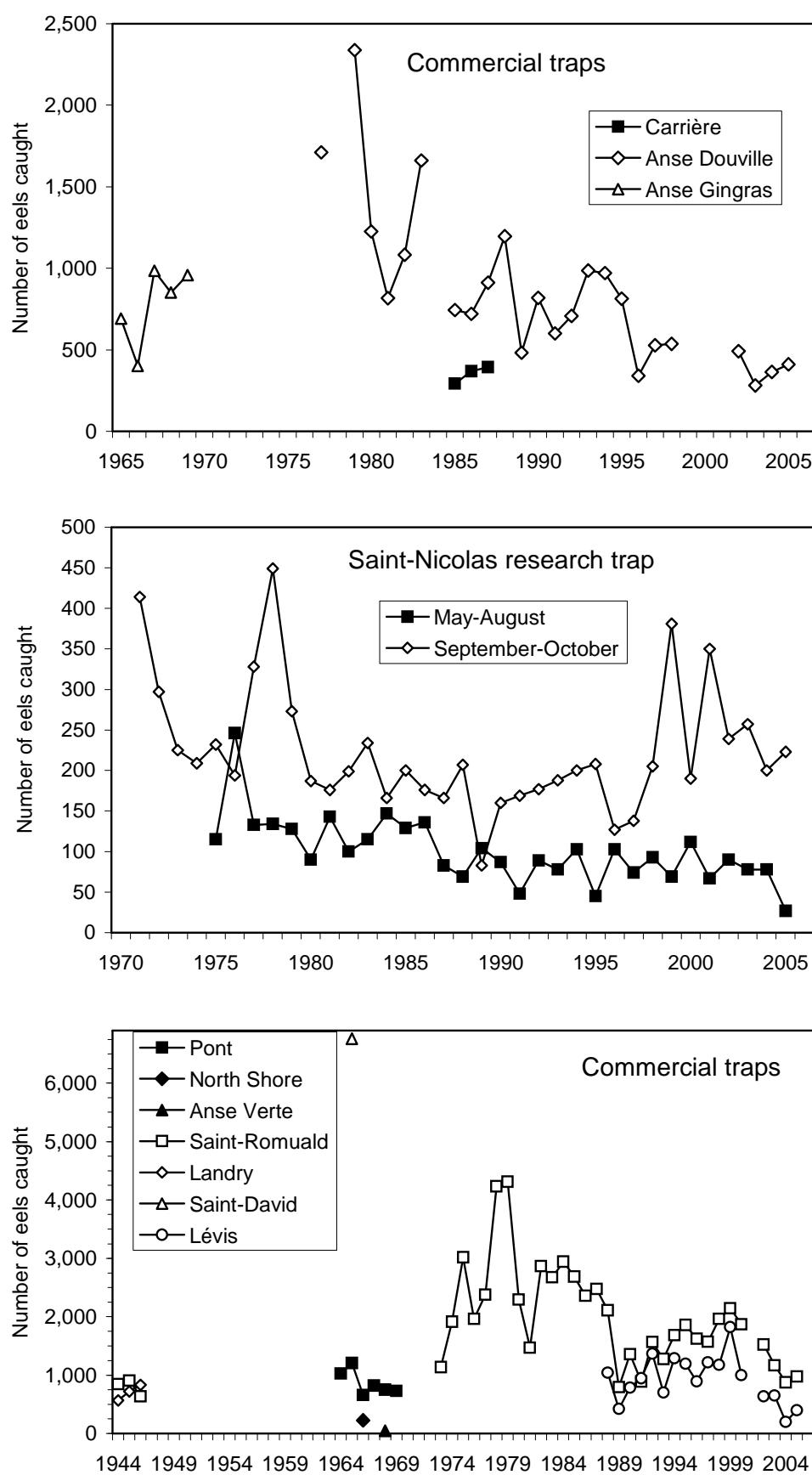


Fig. 13. Number of eels caught in commercial and research estuary trap-nets in the Quebec City area. Catches are for September to early November unless otherwise indicated. Data are from de Lafontaine et al. in press. The Saint-Romuald trap was set up differently in 1944-1946 than in 1973-2005; hence data for the two periods are not compatible.

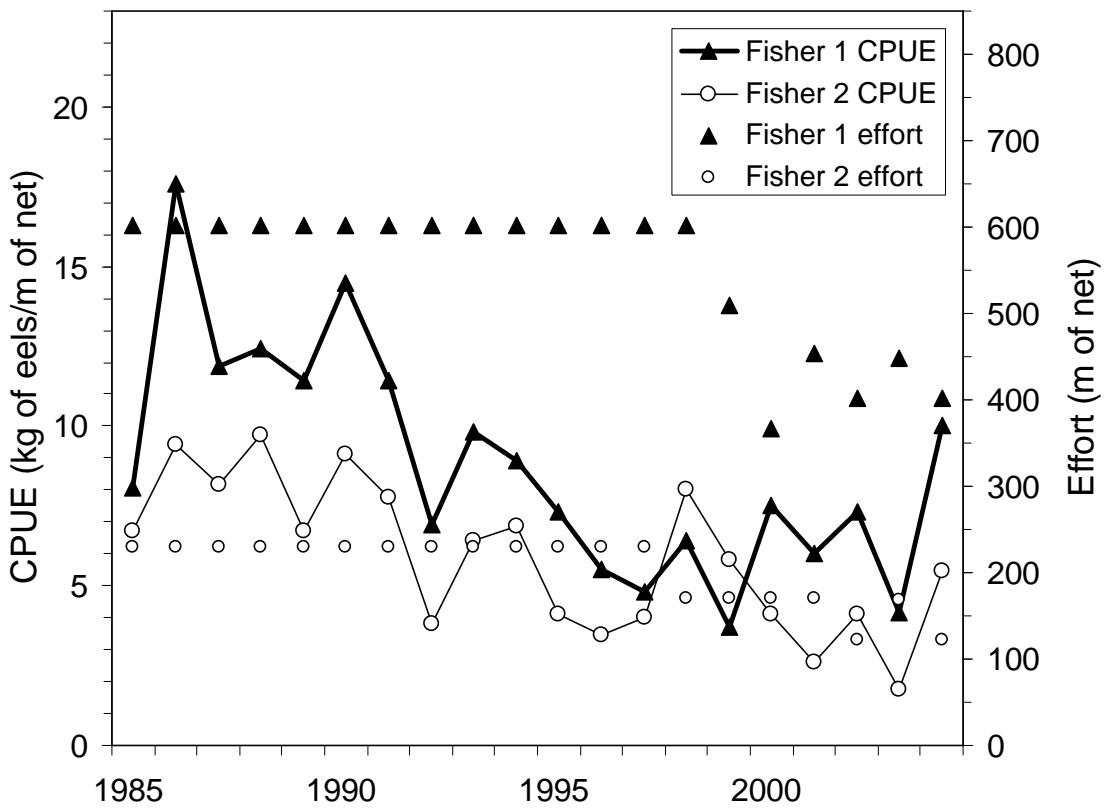


Fig. 14. Catch and catch per unit effort of two eel fishers at Rivière-Ouelle in the St. Lawrence estuary.

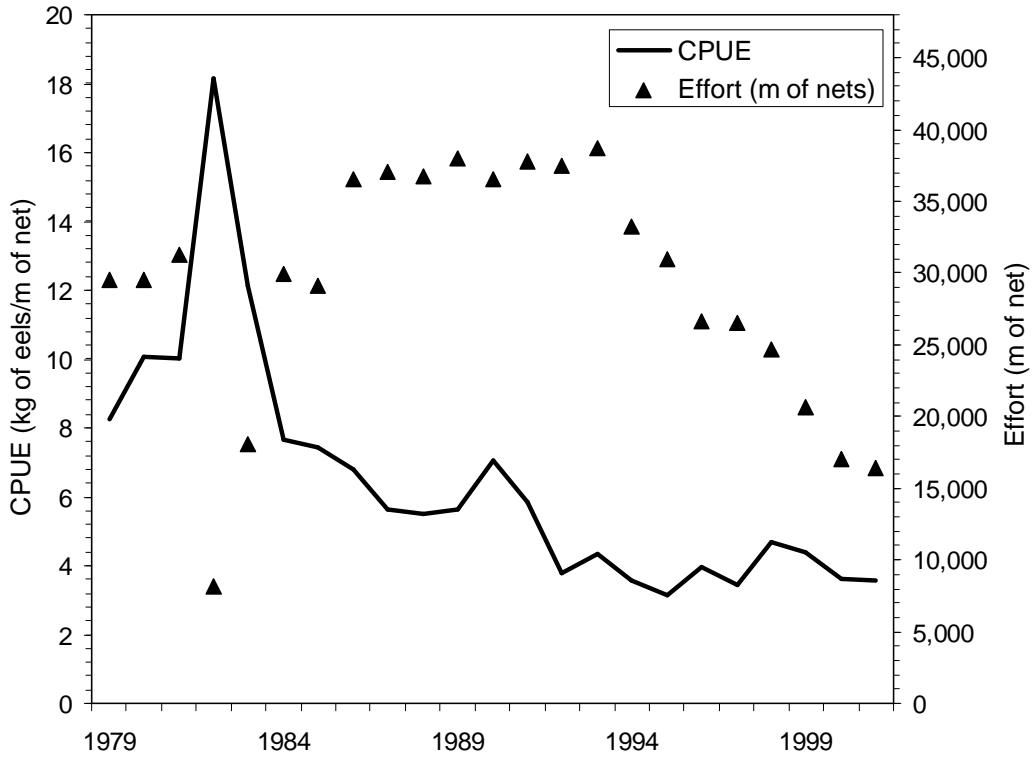


Fig. 15. Catch and catch per unit effort of eel fishers in Kamouraska County, Quebec. Data from Axelsen 1997 for 1979-1995 and from Verreault et al. 2003 for 1996-2001. Data from 1996-2001 are from index fishers, hence effort during that period does not reflect total effort of all fishers.

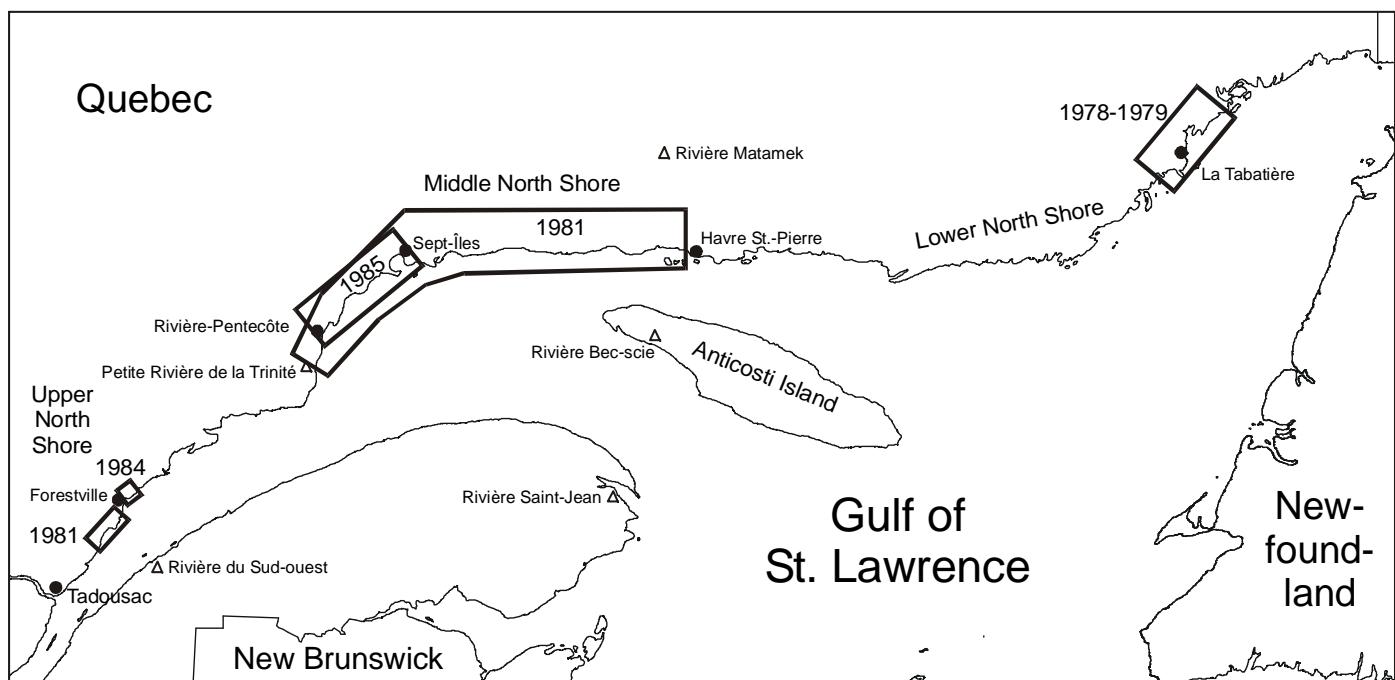


Fig. 16. Eastern Quebec, showing eel study sites. Boxes indicate study areas of Lemire et al. (1978) and Pilote (1989). Triangles indicate other study sites.

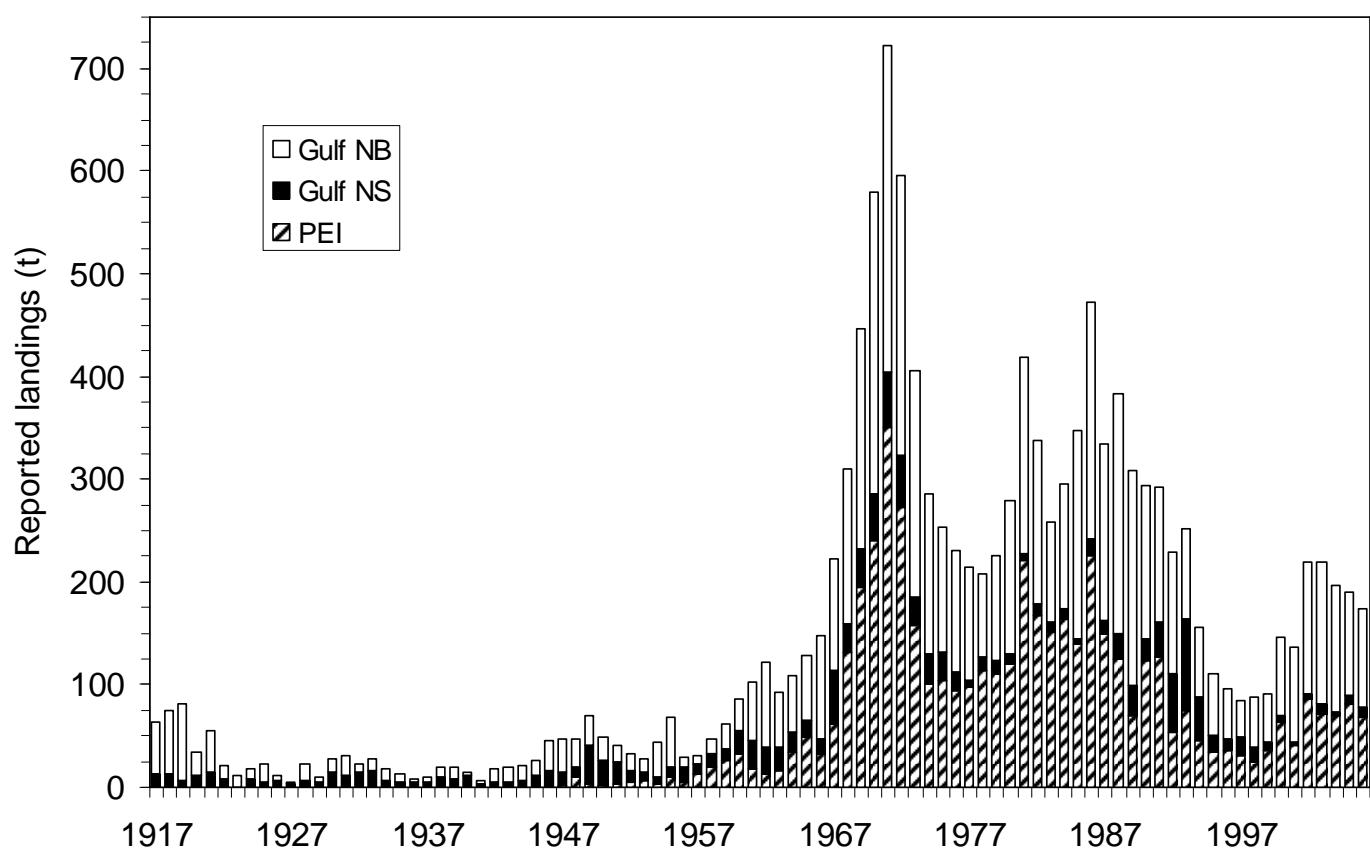


Fig. 17. Reported landings of American eels in the southern Gulf of St. Lawrence, 1917-2006, by province. Data for 2006 are preliminary.

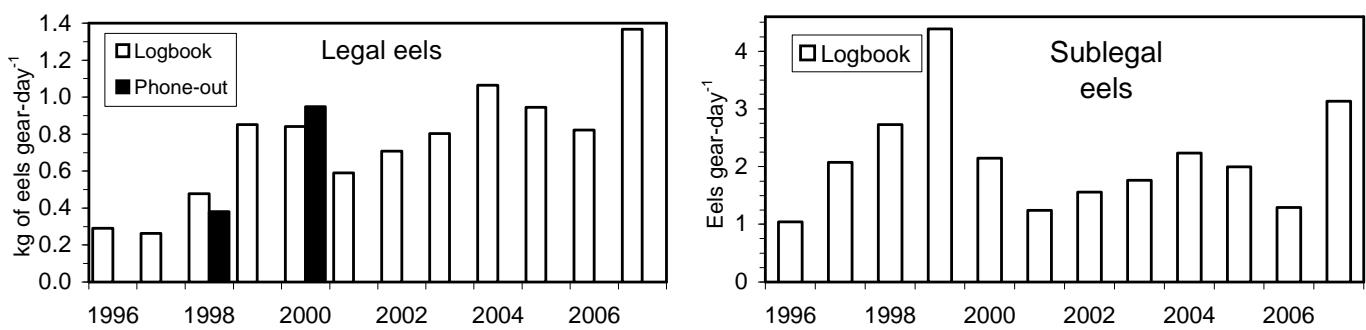


Fig. 18. Catch rates of legal and sublegal eels in fyke nets from logbook surveys (1996-2007) and from phone-out surveys (1998 and 2000) on Prince Edward Island. Catch rates are standardized to a minimum size of 53.0 cm.

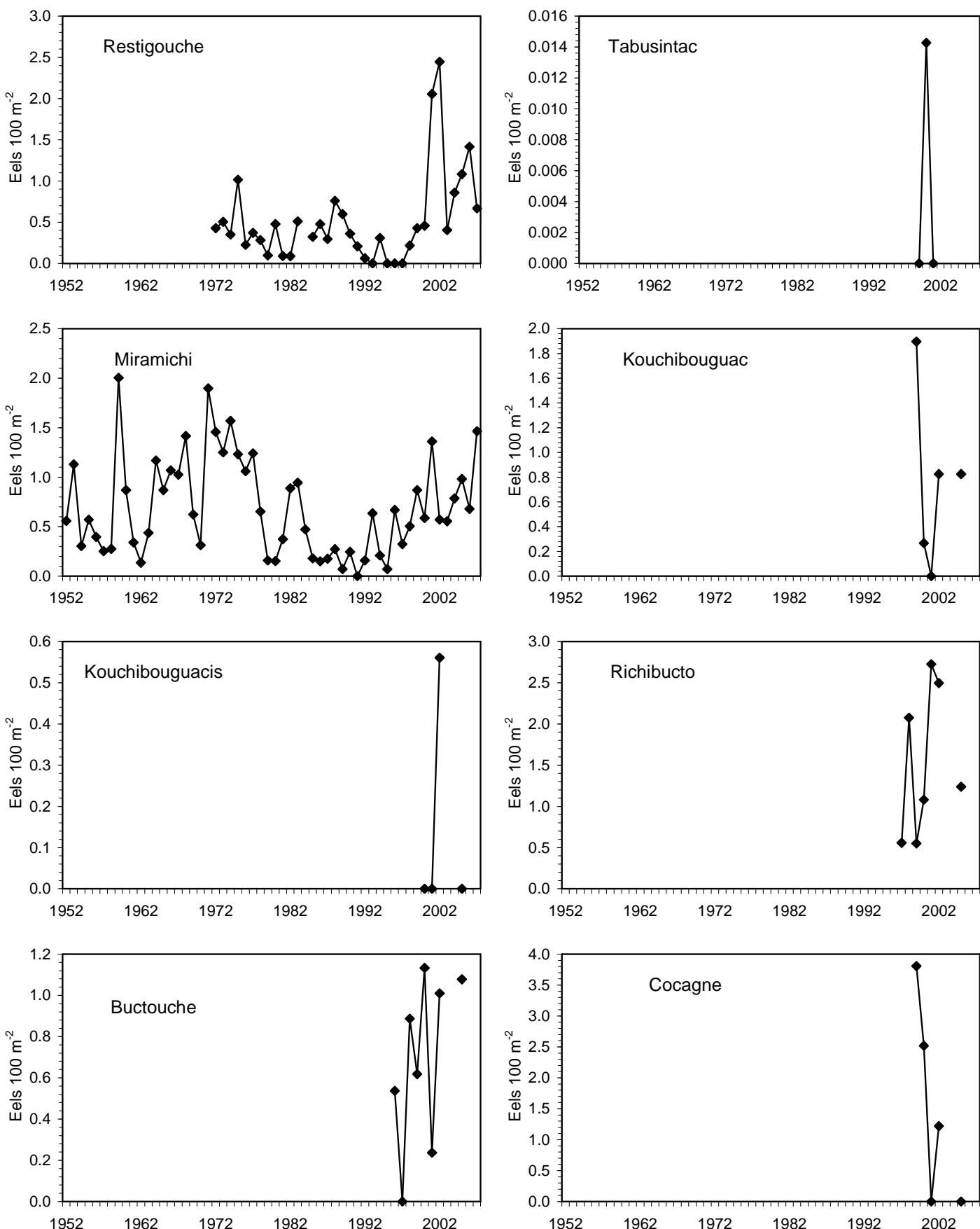


Fig. 19. Mean densities of American eels estimated from electrofishing surveys in Gulf New Brunswick rivers.

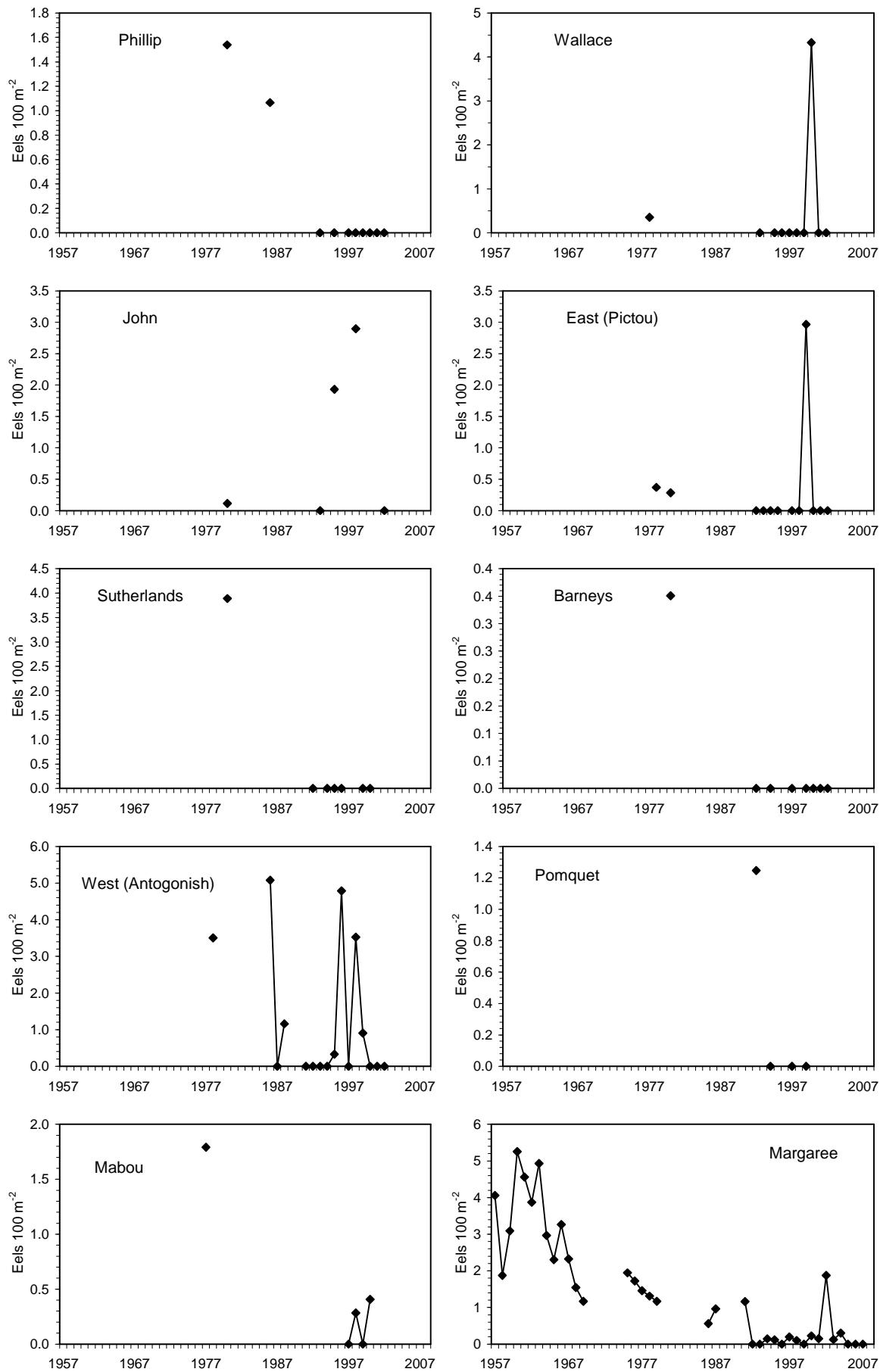


Fig. 20. Mean densities of American eels estimated from electrofishing surveys in Gulf Nova Scotia rivers.

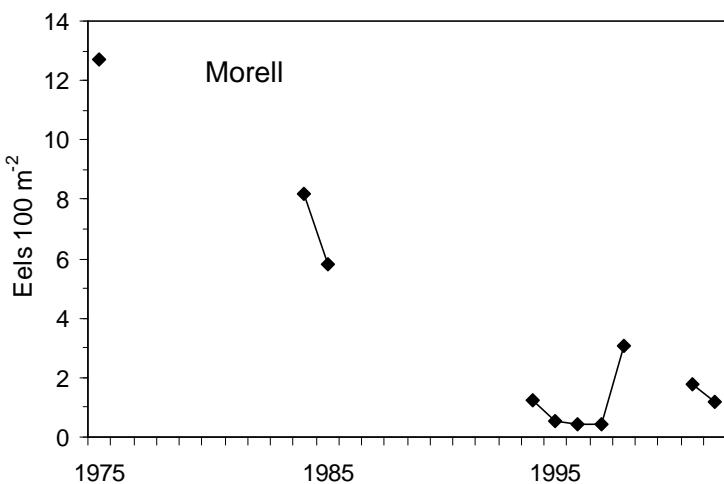


Fig. 21. Mean densities of American eels in the Morell River, PEI, estimated from electrofishing surveys.

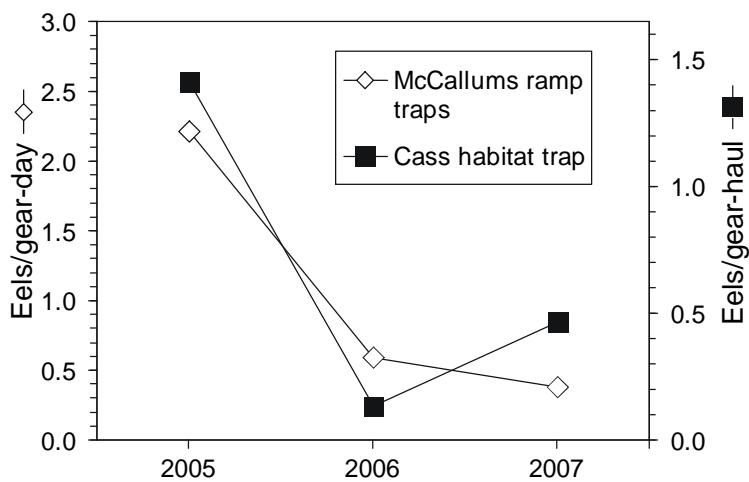


Fig. 22. Catch rates of eels <9.0 cm long at McCallums Pond and Cass Pond, PEI, in July-August 2005-2007.

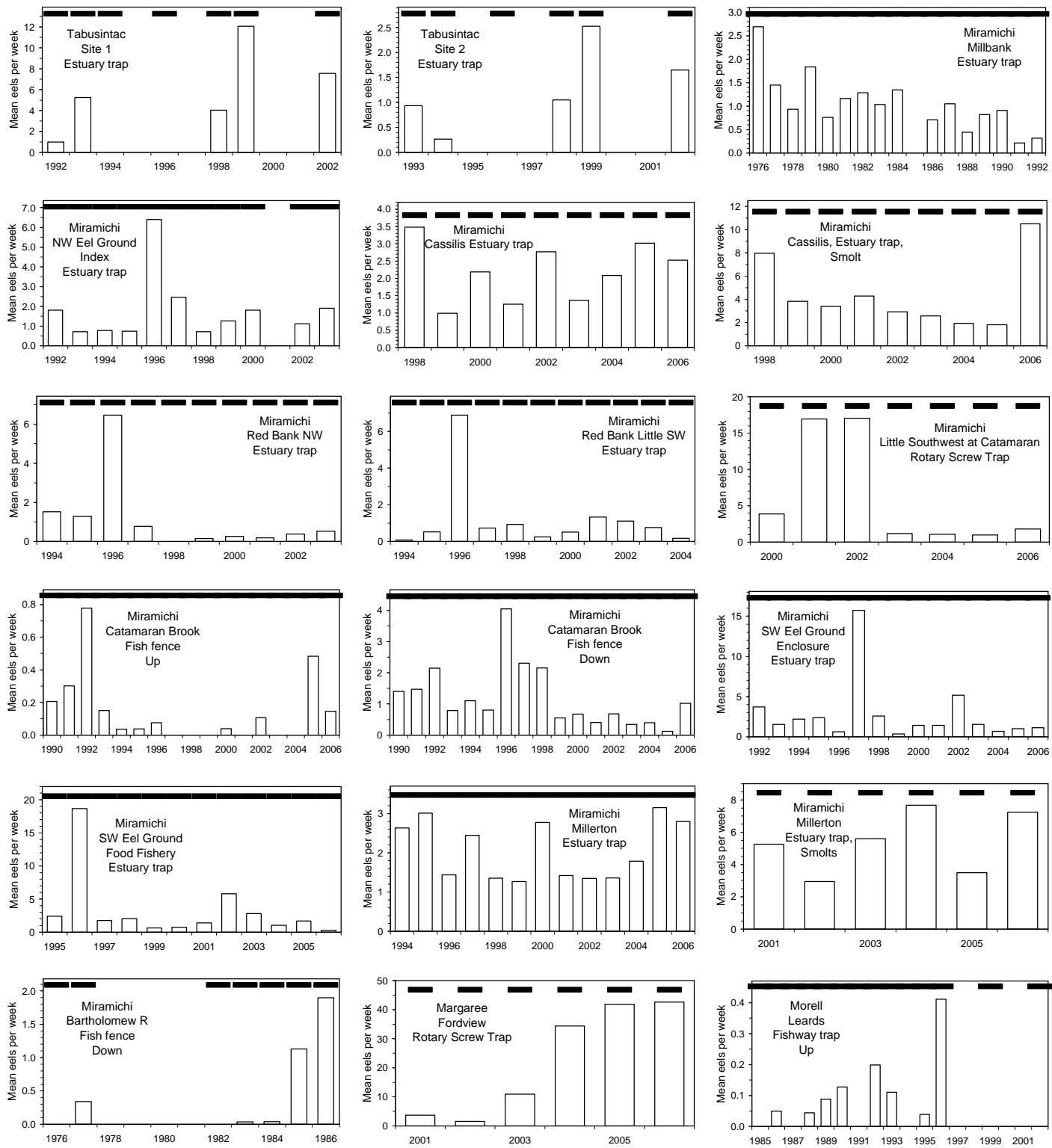


Fig. 23. Mean of weekly eel counts in fishing gears which intercept upstream and downstream movement in the southern Gulf of St. Lawrence, by year. Horizontal bars indicate the years for which data are available.

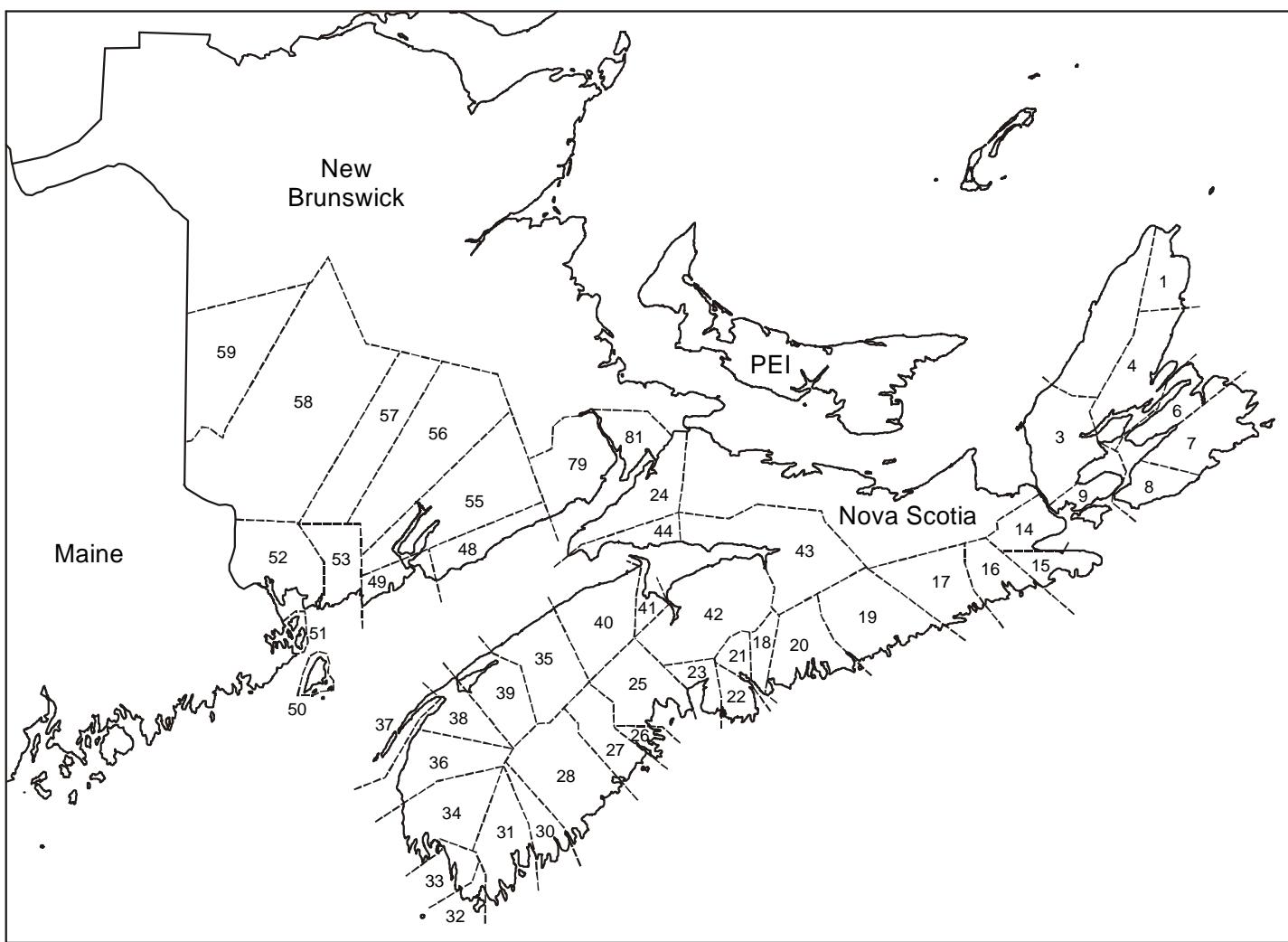


Fig. 24. Statistical Districts in the Scotia-Fundy area of New Brunswick and Nova Scotia.

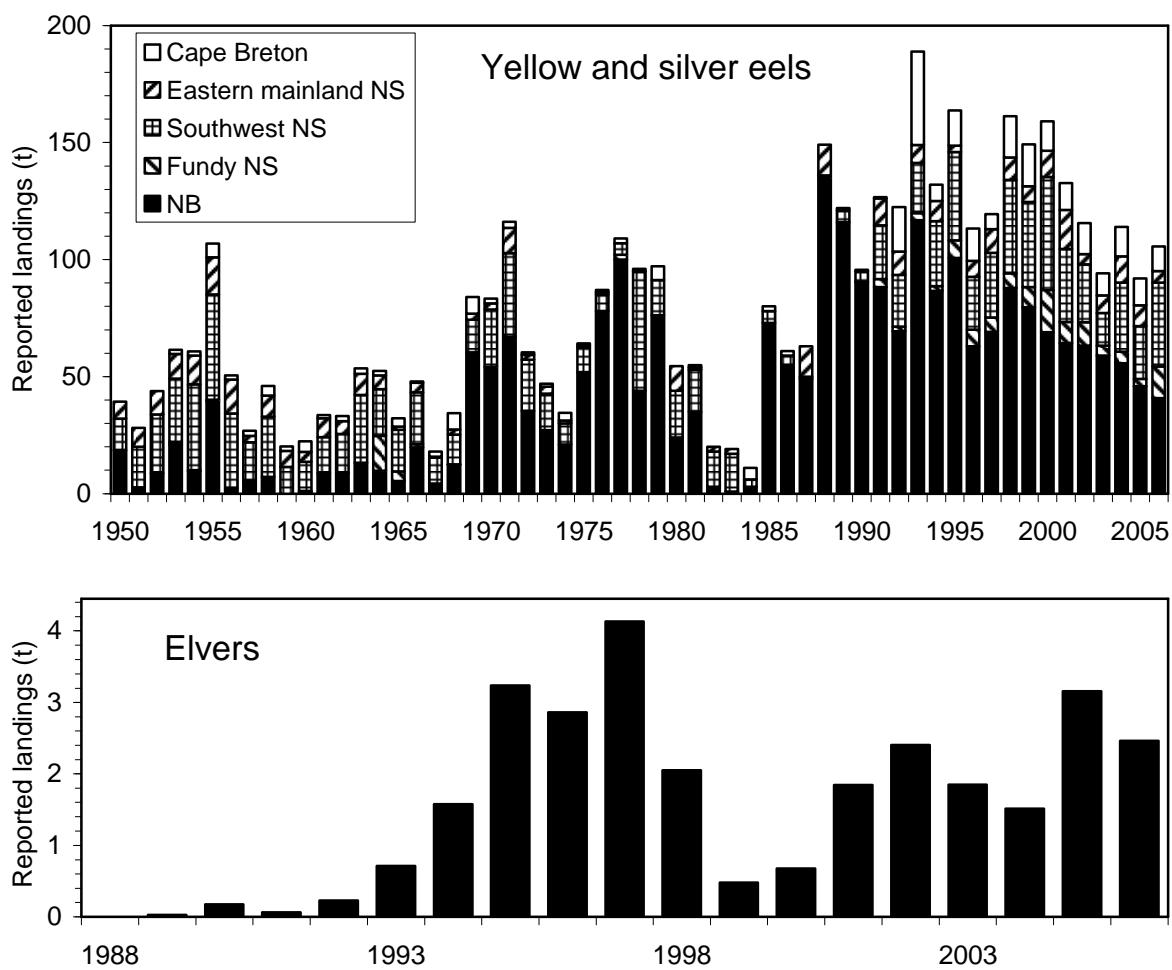


Fig. 25. Reported landings (t) of yellow and silver (upper panel) and elver (lower panel) American eels in the Scotia-Fundy area of New Brunswick and Nova Scotia.

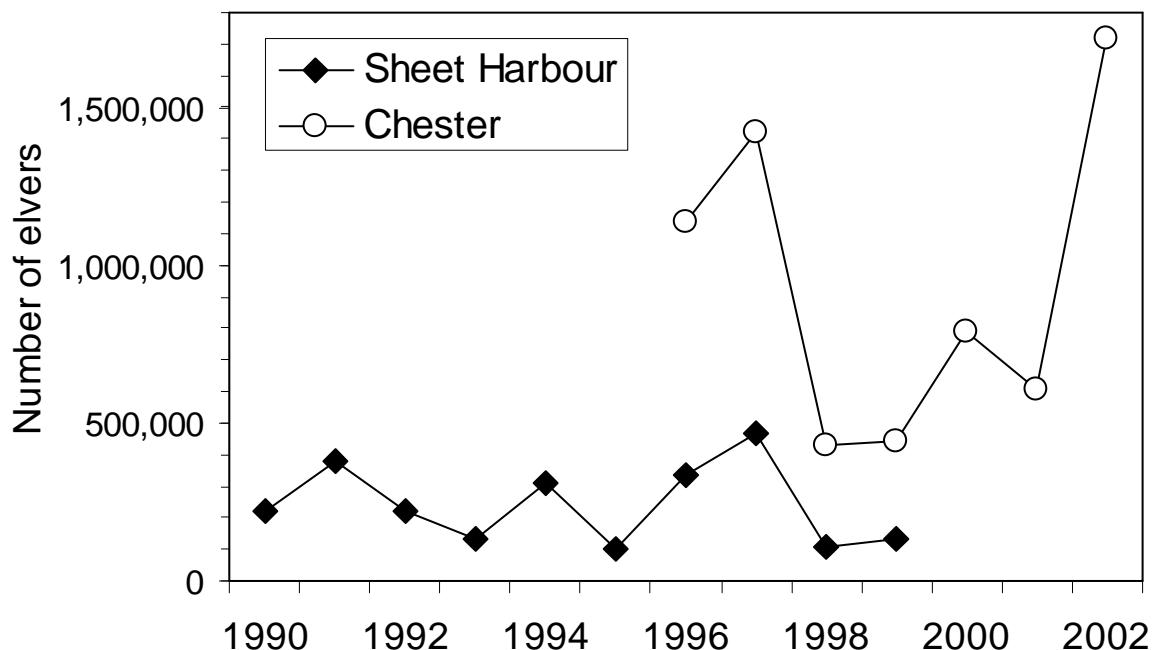


Fig. 26. Size of elver runs at East River-Sheet Harbour and East River-Chester Nova Scotia.

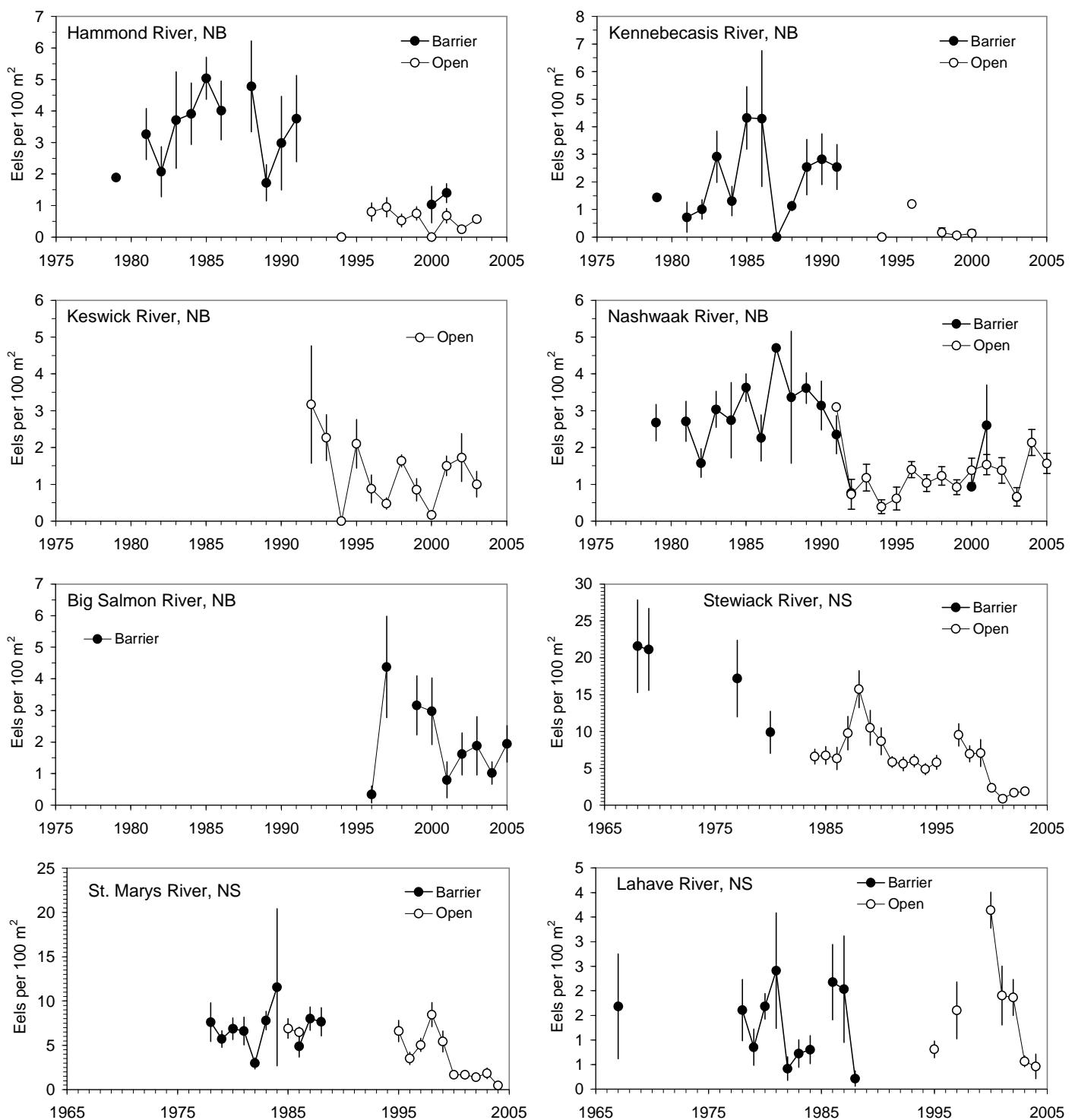


Fig. 27. Arithmetic annual mean (\pm standard error) of American eels per 100 m² in the first sweep of electrofishing surveys in barriered and open sites in New Brunswick and Nova Scotia rivers that flow into the Bay of Fundy and the Atlantic Ocean.

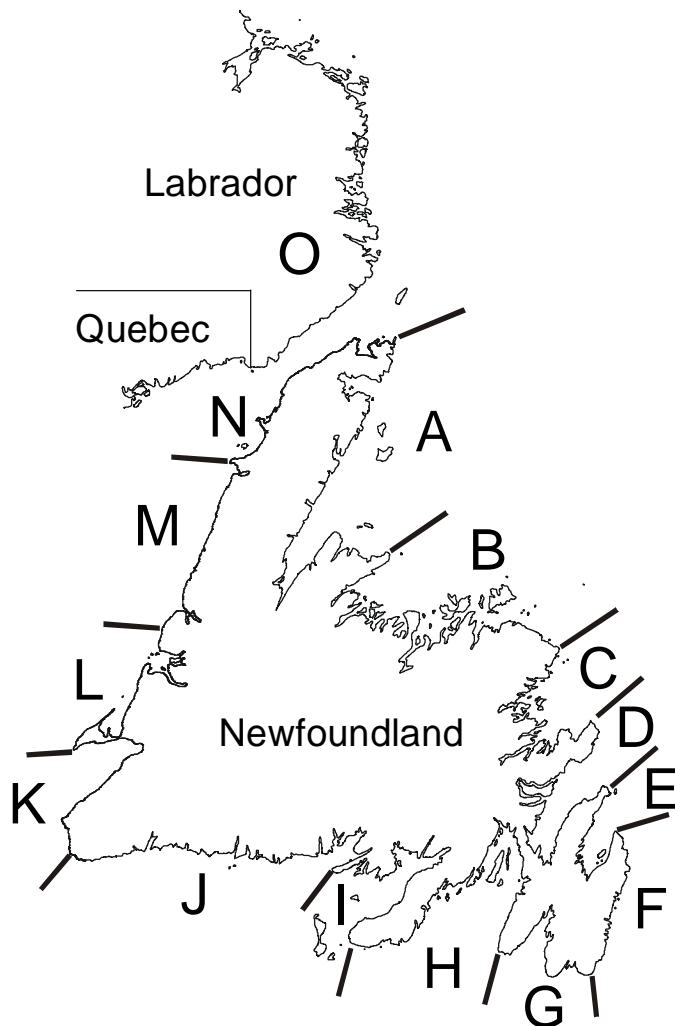


Fig. 28. Districts used to record eel landings in Newfoundland and Labrador.

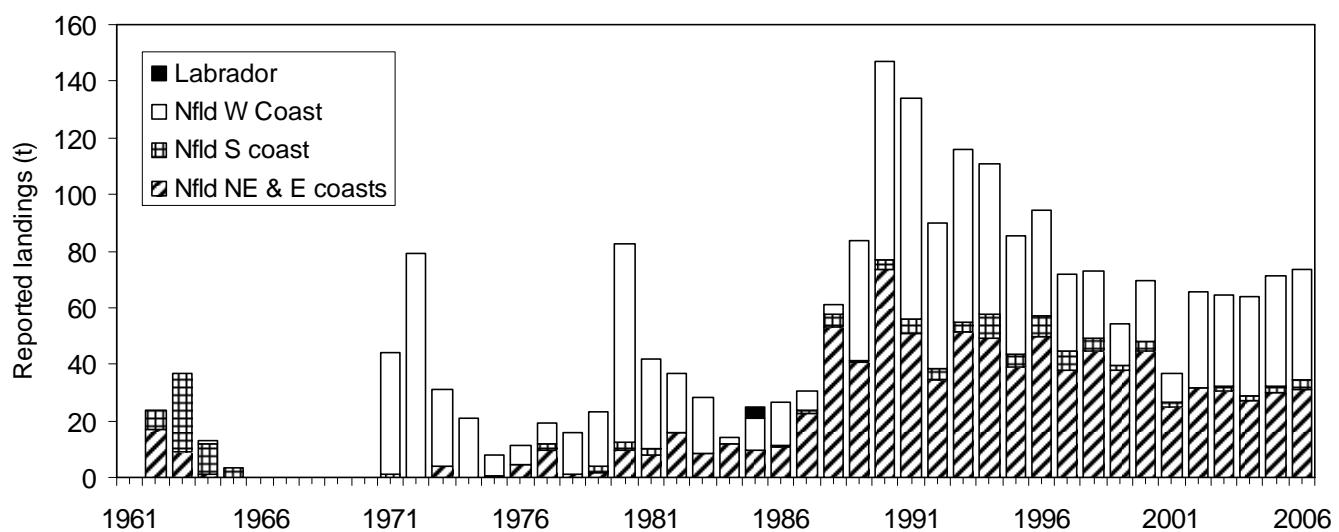


Fig. 29. Reported landings of American eels in Newfoundland and Labrador.

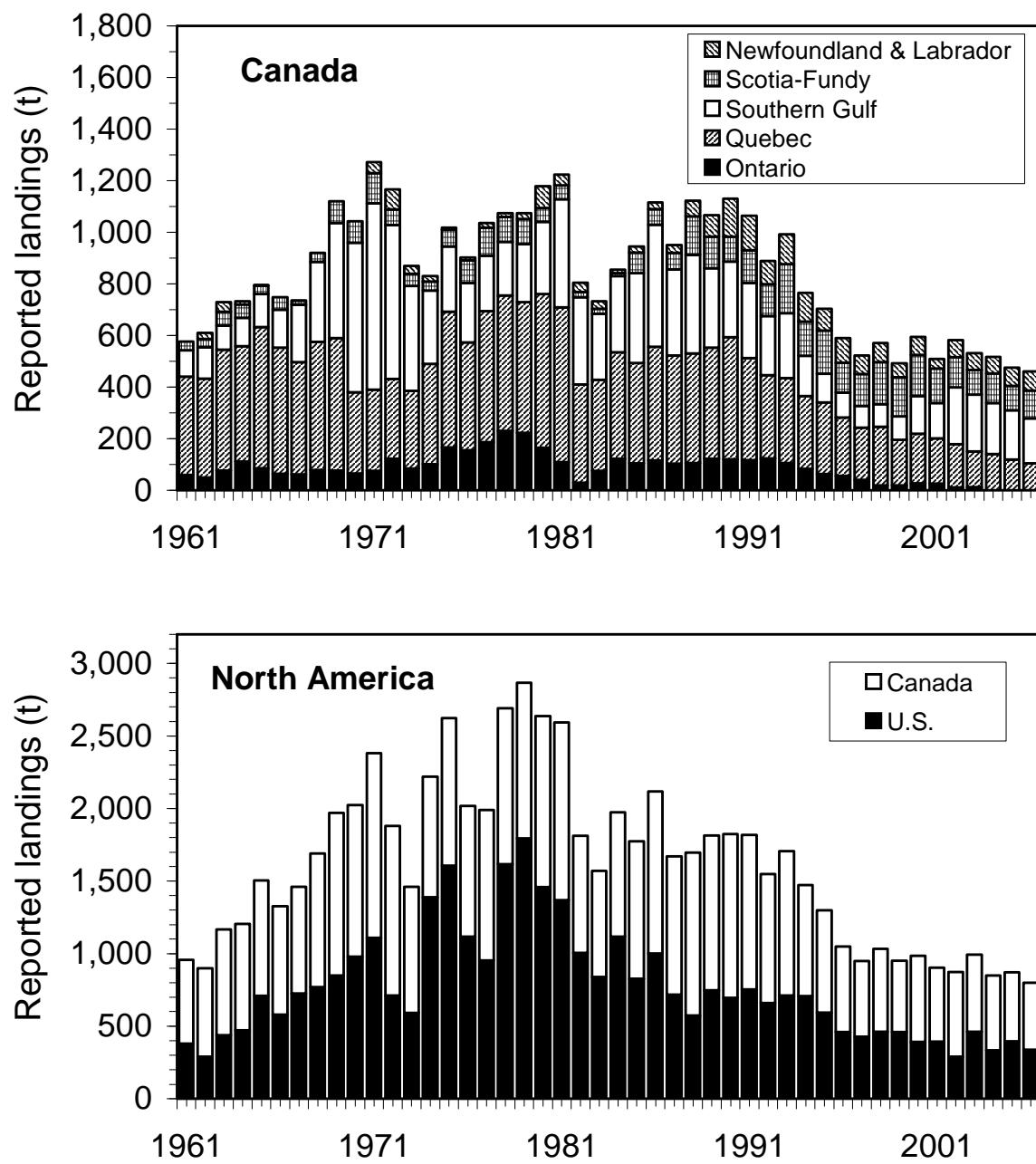


Fig. 30. Reported American eel landings in Canada (upper panel) and North America (lower panel).

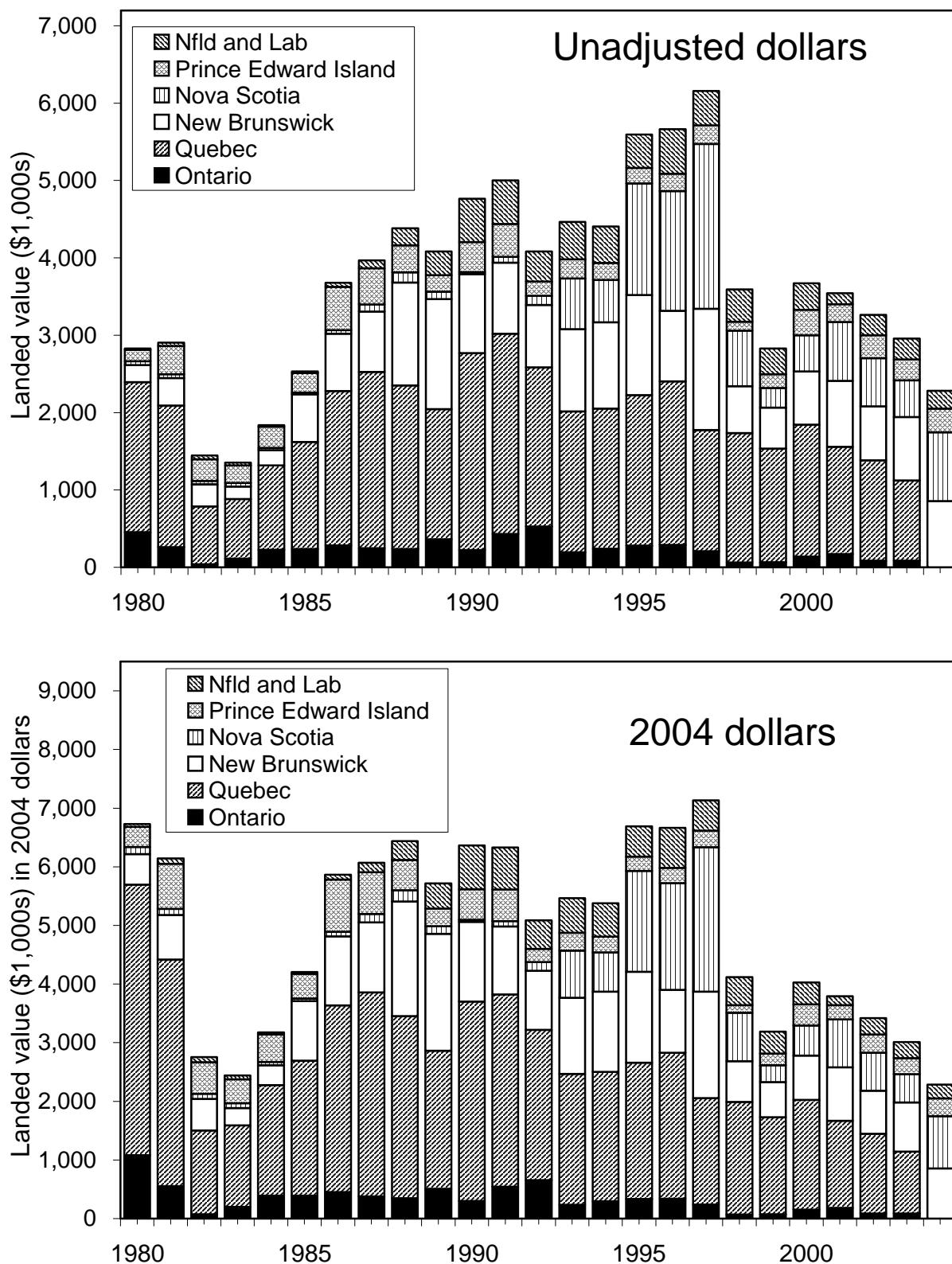


Fig. 31. Reported landed values of American eels in Canada, in unadjusted dollars (upper panel) and inflation-adjusted 2004 dollars (lower panel). Quebec data for 2004 are unavailable.

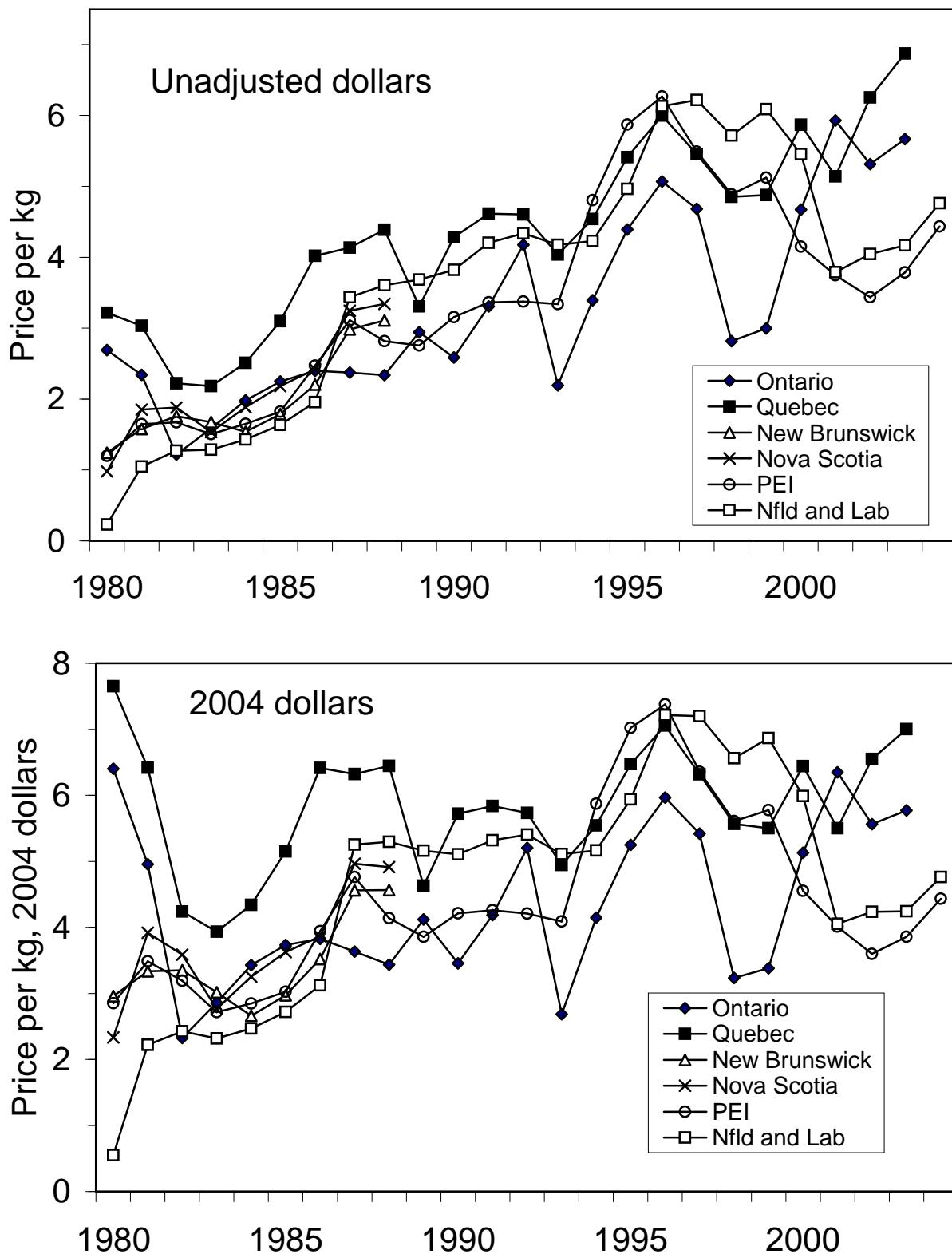


Fig. 32. Mean price per kg paid to fishers for American eels in Canada, in unadjusted dollars (upper panel) and in inflation-adjusted 2004 dollars (lower panel). Excludes data from Nova Scotia and New Brunswick in 1989-2004, when the elver fishery operated.

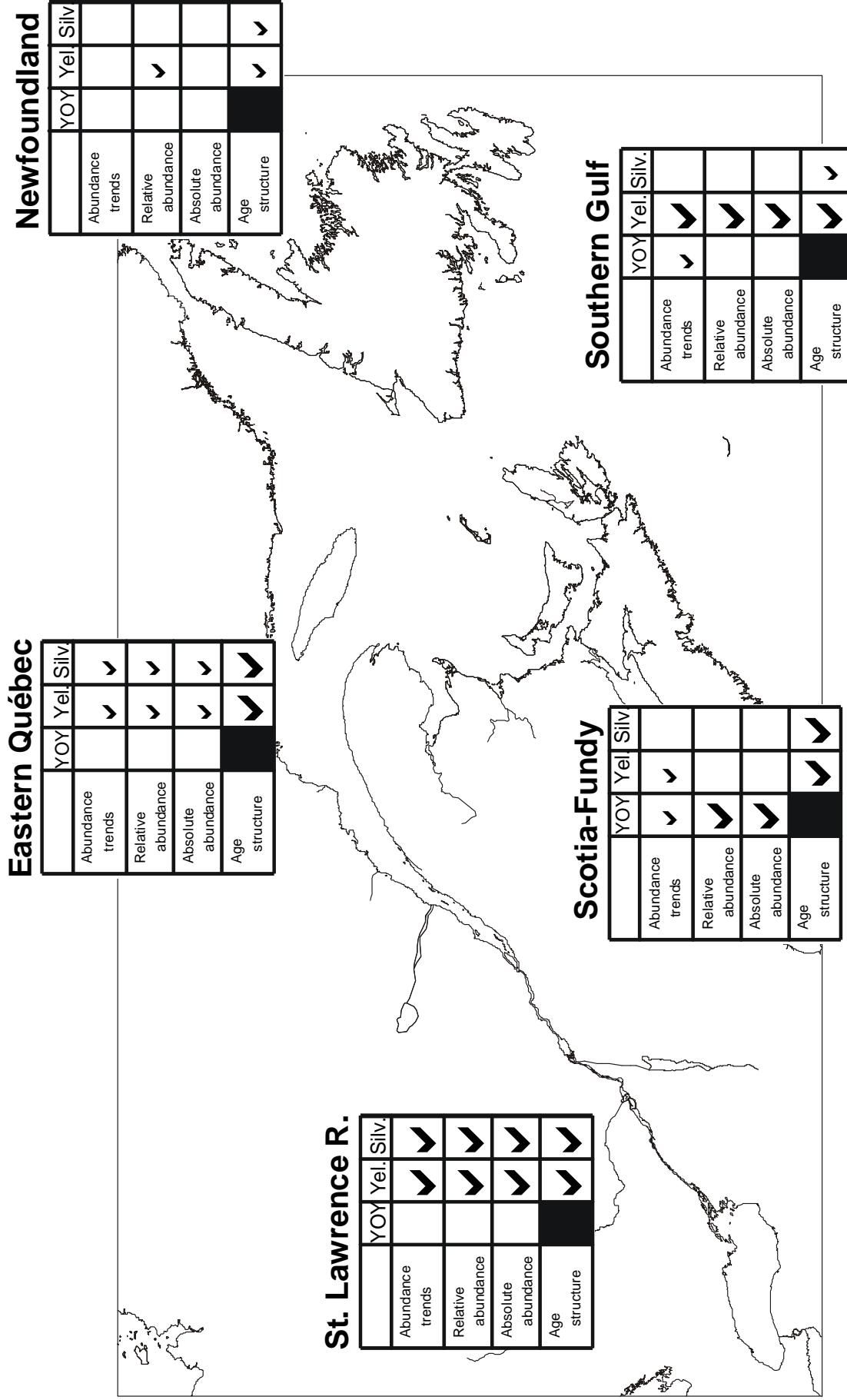


Fig. 33. Schematic summary of data availability for YOY (young of the year), yellow, and silver American eels in Canada. Large checks indicate long-term and ongoing data series. Small checks indicate data sets which are short-term or which are not ongoing.