

Eel Fisheries in the Maritimes **(*Anguilla rostrata*)**

General description

American eels are catadromous (spawn at sea, then grow and approach maturity in fresh water) and widely distributed throughout Maritime streams and estuaries. Eels of various life stages occupy a wide variety of habitats, from ocean to estuaries, rivers, and lakes. Their extensive geographic range, ability to occupy a wide variety of habitats, and a panmictic (intermixing of eels from all geographic areas) spawning population contributes to their adaptive plasticity. Such adaptability is required by the unpredictable manner in which elvers are distributed throughout their range. Eel abundance is believed to be generally proportional to river system size and productivity.

Little work has been done to assess the status of American eel stocks in Maritime waters since the review by Jessop (1982), at which time a similar lack of knowledge of eel stock status was noted. There has recently been concern that eel abundance has declined in the Gulf of St. Lawrence since the mid-1980s but no evidence of similar decline has been observed in the Scotia-Fundy area or along the U.S. Atlantic coast. Recent biological data are unavailable for eel stocks of specific rivers; the only available information is the number of licenses (commercial and recreational) and reported landings (commercial fishery) by Fishery Statistical District.

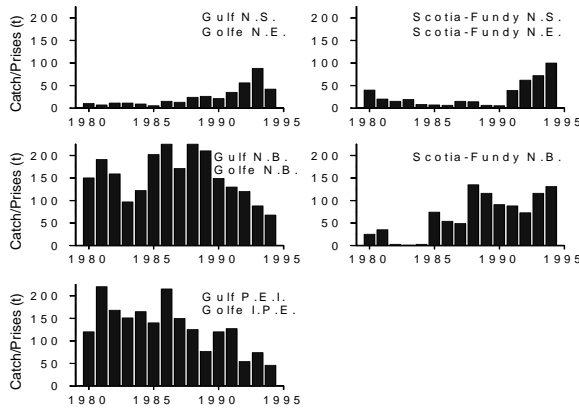
A fishery for American eel elvers has developed since 1989 in the Scotia-Fundy portion of the Maritimes Region. The absence of a link between stock and recruitment in panmictic species such as the American and European eel and the large, widespread, and long-established fisheries for European elvers are evidence that a properly managed, moderate-scale fishery for elvers can exist in Maritime rivers without significant negative effects on regional fisheries for larger eels. Elvers experience high rates of natural mortality; those caught in a fishery are part of the overall mortality, not necessarily a significant addition to it. Only when all sources of mortality, including that of fisheries for larger eels, become excessive is there a threat to stock abundance. The elver exploitation rate permissible with minor or no detectable effect on adult eel abundance in a river system is unknown. Whether elvers or larger eels are exploited is biologically immaterial as long as catch rates for each life stage, and over the geographic range of the population, remain within limits that will not produce spawning stock overfishing, i.e., overharvesting of eels throughout their distribution. The abundance of elvers entering any river is generally unknown; it is presumed to be proportional to river size and may vary annually and regionally due to stock and environmental factors.

This section reviews the eel fisheries in the Maritime Provinces with emphasis on those fisheries in the Scotia-Fundy area of the Maritimes Region. The review covers both adult eel and elver fisheries.

Management

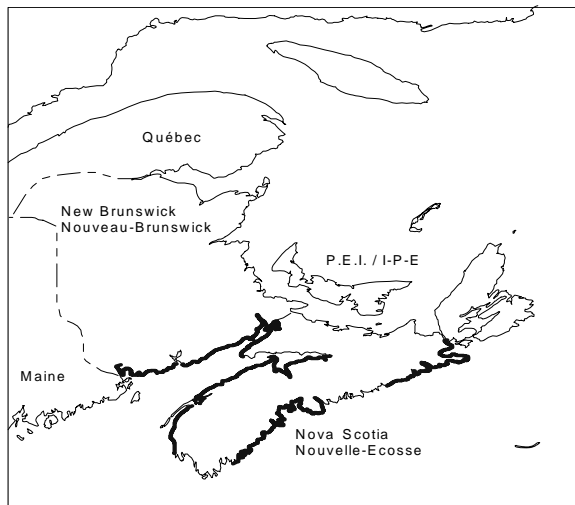
Small-scale commercial fisheries for large American eels occur throughout the Maritime Provinces, with major fisheries restricted to specific areas such as the Saint John River, the south and southwestern shores of mainland Nova Scotia, and the southeastern portion of Cape Breton Island and throughout most parts of the southern Gulf of St. Lawrence. Reported annual catches in the Scotia-Fundy area increased irregularly during the mid-1980s from about 60 t in 1986 to 231 t (worth \$821,000) in 1994. In contrast, fisheries in the southern Gulf of St. Lawrence appear to be in decline. Landings for the southern Gulf fisheries in 1994 equalled 156 tonnes (worth \$672,000).

Three basic gear types are used in the large eel fishery: fyke nets, weirs, and baited pots, although spears are used in some areas. The gear used depends upon the habitat fished and whether yellow (juvenile) or silver (maturing) eels are sought. Weirs primarily fish silver eels in rivers, pots are used in the relatively still waters of lakes and estuaries to catch yellow eels, while fyke nets, which are prohibited in inland waters, catch yellow or silver eels in estuarine areas. Spears are used during winter to catch yellow eels. Most (over 98%) of the fishery occurs between May and October, with peak catches occurring in June and July. Before mid-August, the catch is primarily yellow eels; later catches include increasing numbers of silver eels. Gear use may be seasonally, geographically, and regionally restricted according to the provisions of the Maritime Provinces Fisheries Regulations.



Seven experimental licenses for the elver fishery have been issued in the Scotia-Fundy area of the Region. Four of these are for fishing areas totally within Nova Scotia, two within New Brunswick, and one with areas in both provinces. Elver fishing occurs in rivers totalling about 23% of the freshwater drainage area in the Scotia-Fundy portions of mainland Nova Scotia and New Brunswick. Each license has an overall catch quota of 1,000 kg, with smaller quotas applied to specific rivers. An additional permit was issued in 1995 to fish for elvers in the Miramichi River estuary but no catches were made; a test fishery under this permit is expected to be conducted in 1996.

Elver Fishing Areas



The elver fisheries primarily use dip-nets, but elver fyke nets, surface push-nets, and traps have been used also. The fisheries operate between late April and late June, with the timing of peak catches and duration of the fishery depending upon the geographic area. Restrictive provisions include limitation of the geographic area and rivers fished (no

fishing is permitted in rivers where adult eel fisheries exist), type and number of units of fishing gear used, bycatch limits, weekly closed periods, and catch quota. Catch (kg), by fishing location and gear, are obtained from the commercial fishery by logbook submitted at the end of each season. Beginning in 1996, effort data will also be collected. Total landings increased from 26 kg in 1989 to 3,238 kg in 1995.

| Year | New Brunswick | Nova Scotia | Total |
|------|---------------|-------------|-------|
| 1989 | 0 | 26 | 26 |
| 1990 | 132 | 42 | 174 |
| 1991 | 65 | 0 | 65 |
| 1992 | 227 | 0 | 227 |
| 1993 | 534 | 179 | 713 |
| 1994 | 650 | 924 | 1,574 |
| 1995 | 549 | 2,689 | 3,238 |

No management target or catch quotas exist for fisheries for large American eels in the Maritimes Region because rational targets or quotas for the stock of eels in any river or geographic area would be difficult to set due to their unique life history and our limited knowledge of critical life history parameters. Arbitrary, but evidently achievable, quotas of 1,000 kg per license have been set for the elver fishery, with a maximum of 300 kg to come from any one river.

Except for the elver fisheries, a minimum size limit of 20 cm was imposed in Nova Scotia and New Brunswick in 1973 as a measure to preserve seed stock for aquaculture and to require the harvest of larger eels. A 46 cm minimum size limit exists in Prince Edward Island and a 36 cm minimum size in other parts of the southern Gulf of St. Lawrence area. The difference in minimum size presumably reflects local conditions. The present size limits for large eels are based primarily on economic rather than biological considerations.

A freeze on issuing new licenses to commercially fish large American eels in Scotia-Fundy area of the Region was implemented in 1993. The continued, controlled growth of the elver fishery, the high unit value of the catch, the developing understanding of the role of elver fishing as a component of the total eel fishery, and concern for the status of the eel stock in a North American context, have heightened interest in a comprehensive management plan for this species, both locally and coast-wide.

Public consultations

Several Eel Advisory Committees exist through the Maritime Region but meetings are sporadic. Several consultations are scheduled for later in 1996. In May 1995, a meeting was held in Bridgewater, N.S., to discuss the status of, and rationale for, the elver fishery. In December a meeting took place with a core group of elver fishers to discuss aspects of the fishery and licensing policy.

Environmental considerations

A general concern exists about the adequacy of fish passage for eels at man-made obstructions such as dams and road culverts. The decline in juvenile eel recruitment to the Gulf of St. Lawrence, believed due to some aspect of marine environmental conditions, does not seem to have affected recruitment to more southern rivers but the situation throughout the Region should be monitored.

Status of stocks

The status of American eel stocks in the rivers and estuaries in the Maritimes Region can be assessed only by the trends in reported catches, which indicate a general increase in catch over the past 10 years in the Scotia-Fundy area and a decrease in catch over the same period in the southern Gulf of St. Lawrence. An assumption that catches from a given river or region reflect resident stock status seems reasonable but is biased by the effects of market demand on fishing effort and changes in fishing effort over time that would be revealed by catch/effort data, which are unfortunately unavailable. Declines in catch in a given river or area may reflect adverse market conditions, overfishing, or environmental problems on a local or regional scale; the more widespread a true decline, the more serious the implications. The available data indicate that stocks of large American eels in the Scotia-Fundy area may be heavily exploited in some rivers; many smaller streams are unfished because it is uneconomic to do so. Some of these streams are now being fished for elvers. Insufficient data exists with which to estimate stock parameters for the run of elvers to any river in which an elver fishery occurs.

The run of elvers to an individual river has been monitored at one location in Nova Scotia, i.e., East River, Sheet Harbour, since 1989. Annual run size averaged 227,000 elvers between 1990 and 1994 with up to three-fold annual variability (range 101,000 - 376,000 elvers).

| Year | Estimate |
|------|---------------------|
| 1989 | 10,710 ^a |
| 1990 | 220,100 |
| 1991 | 376,000 |
| 1992 | 219,200 |
| 1993 | 134,100 |
| 1994 | 309,900 |
| 1995 | 101,500 |

^aIncomplete estimate.

The stock status of the North American eel cannot be determined on the basis of eel abundance in an individual river or group of rivers in a small geographic area but only on the basis of abundance throughout its geographic range. The contribution of mature eels to the spawning population in the Sargasso Sea by an individual river is not likely to have any bearing on recruitment of elvers to that river, which is believed to be largely influenced by marine environmental factors such as large and small scale current patterns. It is the size of the entire spawning population for this species that is important to conservation of this resource.

Prospects

No predictions of future stock status can be provided for American eels in the Maritimes Region due to inadequacies of data on the appropriate scale (i.e., the east coast of North America) and the nature of eel life history. The 1993 freeze in issuance of new licenses to fish large American eels may help to stabilize existing conditions in the Scotia-Fundy area.

Harvests of elvers will likely increase as fishers become more expert and while markets remain good, up to the limits imposed by the catch quotas and restrictions on licenses issued. Market prices fluctuate greatly between years and it is unlikely that the high market prices of recent years will continue. Preliminary indications are that 1996 market prices will be lower than in 1995.

Management considerations

The existing freeze should be maintained on the issuance of new licenses to fish large eels and the potential for a sudden influx of fishing effort should be reduced by eliminating licenses that are not actively fished. The biological basis for a common minimum size limit for retention of large eels by the fisheries within the Maritime Region should be evaluated.

The policy of restricting elver fisheries to rivers in which no significant large eel fishery occurs should

be continued. Caution should be exercised with respect to any expansion of this fishery considering that we do not know the impact of this fishery on the overall stock.

A coordinated strategy and management plan for eel conservation throughout Eastern Canada and the United States should be developed in the very near future in view of declining trends in adult eel catches at the northern end of the range (i.e., Québec and southern Gulf of St-Lawrence).

Research recommendations

- Continue the annual index of elver abundance at East River, Sheet Harbour to obtain long-term data on the annual variability in elver run size.
- Attempt to estimate the exploitation rate for elvers by the fishery in a small river to determine potential impacts on adult stock abundance.
- Evaluate the post-fishery escapement of silver eels from a river.
- Determine eel length-weight-age-sex relations in a variety of different rivers and habitats.

Reference

Jessop, B.M. 1982. A review of the status and management of commercial fisheries for American eels (*Anguilla rostrata*) in the Maritime Provinces. p 28-31. In K.H. Loffus, ed. Proc. N. Amer. eel conf., Ont. Min. Nat. Res., Ont. Fish. Tech. Rep. Ser.4.

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